Final Environmental Assessment

Shaw and Wide Hollow Creeks Flood Control Project

Yakima County, WA

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FEMA

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Acronyms and Abbreviations

APE	Area of Potential Effects
asl	above sea level
BFE	base flood elevation
BMPs	Best Management Practices
ca.	circa
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
DAHP	Department of Archaeology and Historic Preservation
DNR	(Washington State) Department of Natural Resources
DPS	Distinct Population Segment
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
HEC-RAS	Hydrologic Engineering Centers River Analysis System
LOMR	Letter of Map Revision
MBTA	Migratory Bird Treaty Act
NMFS	National Marine Fisheries Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Parks Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWCB	(Washington State) Noxious Weed Control Board
OHWM	ordinary high water mark
PDM	Pre-disaster Mitigation
Qal	alluvium and floodplain deposits
SHPO	State Historic Preservation Office

URS	URS Group, Inc.
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
U.S.C.	U.S. Code
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WEST	WEST Consultants, Inc.
WNHP	Washington Natural Heritage Program
WRCC	Western Regional Climate Center
YBFWRB	Yakima Basin Fish and Wildlife Recovery Board

Glossary

100-Year Flood: Flood with a 1 percent chance of occurring in any given year.

500-Year Flood: Flood with a 0.2 percent chance of occurring in any given year.

Area of Potential Effects (APE): Geographic area or areas within which an undertaking may cause changes in the character or use of historic properties if such properties exist. The APE is influenced by the scale and nature of the undertaking.

Bank: Sloping ground that borders a stream and confines the water in the natural channel when the water level (flow) is normal.

Best Management Practice: Measure used in conducting projects in an environmentally responsible manner.

Cubic foot per second (cfs): Rate of water discharge representing a volume of 1 cubic foot passing a given point during 1 second.

Discharge: Volume of fluid passing a point per unit of time.

Extirpated: Condition of a species that no longer exists in the wild in a certain area but can be found elsewhere in the world. Also known as “local extinction.”

Flood: Any relatively high stream flow that overflows the natural or artificial banks of a stream.

Floodplain: Area adjacent to a river that is susceptible to inundation; often bears geophysical evidence of flood events.

Floodway: Channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Infiltration: Process in which water on the ground surface enters the soil.

Invertebrate: Animal species without a vertebral column (backbone).

Loam: Porous soil composed of sand, silt, and clay in approximately even proportions.

National Flood Insurance Program: Federal program under which flood-prone areas are identified and flood insurance is made available to homeowners, renters, and business owners if their community agrees to adopt and enforce floodplain management ordinances that meet or exceed FEMA requirements to reduce the risk of flooding.

Ordinary high water mark (OHWM): Point on a bank or shore up to which the presence and action of the water leaves a distinct mark by erosion, destruction of terrestrial vegetation, or other easily recognized characteristic.

Riparian area: Area with a combination of physical and biological characteristics that are driven by the presence a stream or river.

SECTION ONE INTRODUCTION

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation (PDM) grant program provides PDM funds to assist States, Territories, federally recognized Tribes, and communities with hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. These plans and projects reduce the risk from hazard events to the population and structures, while also reducing reliance on funding from actual disaster declarations. The PDM grant program is authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended (42 U.S.C. § 5133).

Yakima County, Washington, applied for fiscal year 2011 PDM grant funding for the Shaw and Wide Hollow Creeks Flood Control Project in central WA. The opportunity for this project arose from the Shaw Creek FEMA flood mapping that identified the extent of widespread flooding, and the need to control development while the project could still be accommodated on undeveloped land. The estimated total cost for the proposed project is between $2.7 and $2.8 million, of which the Yakima County Flood Control Zone District and the City of Yakima would contribute a total of 25 percent. The project vicinity is just west of the City of Yakima, WA, as shown in Appendix A, Figure 1. Shaw Creek, a tributary to the Wide Hollow Creek, causes flooding during the 10-year flood event to surrounding properties. The largest recent flood occurred in 1996 and caused $17.7 million in damage in Yakima County with several million dollars in damage in the project vicinity.

The National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §§ 4321–4327), requires federal agencies to integrate environmental values into their decision-making processes before funding or approving actions and projects by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. An Environmental Assessment (EA) is prepared to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

This EA was prepared in compliance with NEPA, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 CFR Parts 1500–1508), and FEMA's regulations implementing NEPA (44 CFR Part 10). The purpose of this EA is to analyze the potential environmental impacts of the Shaw and Wide Hollow Creeks Flood Control Project in order to determine whether to prepare an EIS or issue a FONSI.

Much of the information about the project in this EA comes from the PDM grant application package, information provided by the subapplicant (Yakima County), a Cultural Resources Inventory (URS 2014) and a Biological Assessment for the project (URS 2015).

SECTION TWO PURPOSE AND NEED

The purpose of the Shaw and Wide Hollow Creeks Flood Control Project is to reduce the risk of flood damage to residences and infrastructure in the Cottonwood Grove, Westbrook, and Clinton Way subdivisions by removing approximately 493 existing and future residential lots from the 100-year floodplain.

The project area of approximately 22 acres is in Yakima County located 1.5 miles west of the City of Yakima (Appendix A, Figure 2). The project would relocate and increase the capacity of Shaw Creek to up to the 500-year flood event and increase the existing capacity of Wide Hollow Creek to contain most of the 100-year flood event. Reaches of Shaw and Wide Hollow Creeks within the project area flow through the Cottonwood Grove, Westbrook, and Clinton Way subdivisions. Roughly 493 existing and future residential lots would be removed, but 23 homes/structures would remain in the floodplain.

The largest recent flood in the project area was a 52-year flood event that occurred on February 9, 1996. Damage amounted to several million dollars in the project area and more than $17.7 million in Yakima County. Historically, Shaw Creek flooded agricultural areas, businesses, and rural residences, including repeated damage to the Meadowbrook Mobile Estates mobile home park with more than 170 mobile homes. Recent rapid and dense urbanization in the previously agricultural area at the Cottonwood Grove subdivision has occurred over the last 10 years and was annexed by the City of Yakima to allow for residential development between 2004 and 2010 (City of Yakima 2015).

This project, identified as a potential solution to flooding and degraded habitat in this area, is rated a high-priority mitigation project in the *Yakima County Multi-Jurisdictional Hazard Mitigation Plan* (Yakima County 2010b). The project is also identified as one of the highest priority projects in the *Ahtanum-Wide Hollow Comprehensive Flood Hazard Mitigation Plan* (Yakima County et al. 2012).

SECTION THREE ALTERNATIVES

This section describes the No Action Alternative (Alternative 1), Proposed Action (Alternative 2A), Overflow Bypass Channel (Alternative 2B), and an alternative that was considered and dismissed.

3.1 ALTERNATIVE 1: NO ACTION ALTERNATIVE

Under the No Action Alternative, FEMA would not provide PDM funding for flood control activities in the project area. The County would not have the funding for the project and the option to construct the channel relocation would likely become unavailable due to development pressures. It is anticipated that the northern half of the channel relocation would be developed and annexed by the City of Yakima. This large open parcel east of Cottonwood Middle School was pending sale to a developer but the County stopped the acquisition to make it available for the channel relocation. The southern half of the channel relocation is on undeveloped land that was annexed by the City of Yakima in 2010, and may be developed without the project.

Under the No Action Alternative, the Wide Hollow Creek conveyance improvements, bridge replacements, culvert addition, and overflow channel would not be constructed. Shaw Creek would remain in its current condition and would continue to flow to Wide Hollow Creek.

3.2 ALTERNATIVE 2A: PROPOSED ACTION

The Proposed Action would construct a new channel for lower Shaw Creek which matches the natural topography and is close to its original alignment to mimic the slopes and grades of the original creek. The portion to be relocated parallels Tieton Drive (north of Shaw Creek) from approximately South 92nd Avenue to South 80th Avenue; and then continues south along the western side of South 80th Avenue. It would also reconnect the confluence with Wide Hollow Creek back to its historic location.

For the Wide Hollow Creek portion of the project, conveyance improvements would occur between South 72nd Avenue and South 88th Avenue. Additionally, to accommodate the increased flows, two bridges would be replaced (Wide Hollow Road Bridge and the South 80th Avenue Bridge), a bridge culvert would be constructed on South 88th Avenue, and an overflow channel would be built between South 91st Avenue and South 88th Avenue to eliminate road closures. The Proposed Action would add a total of approximately 4,500 square feet of impervious surface area in association with the replacement of the two bridges.

Construction is described in Section 3.2.1, the schedule is described in Section 3.2.2, maintenance is described in Section 3.2.3, and property acquisitions are described in Section 3.2.4. Appendix B contains the preliminary design of the channel relocation, the

bridge replacements at South 80th Avenue and Wide Hollow Road, the design and location of the Wide Hollow Creek overflow channel, and staging/access routes. The existing ordinary high water mark (OHWM) for Wide Hollow Creek is shown on these drawings. The area of ground disturbance and area to be replanted for each component of the project is shown in Table 3-1.

Table 3-1: Area of Ground Disturbance and Replanting

Component	Length (feet)	Width (feet)	Depth (feet)	Area of Ground Disturbance (Acres)	Area of Replanting (Acres)
Shaw Creek	8,600	10	4	0	0
Shaw Creek Channel Relocation	3,600	70 to 200	5	10.8	10.8
Wide Hollow Creek Improvements South 90th Avenue to South 80th Avenue	3,150	70	10	5	5
Wide Hollow Creek Improvements South 80th Avenue to South 72nd Avenue	2,900	70	10	4.6	4.6
Wide Hollow Creek Overflow Channel	900	20	3 to 4	1.0	0.4
South 80th Avenue Bridge Replacement	40	51	10	.04	.010
Wide Hollow Road Bridge Replacement	40	45	10	.04	.01
South 88th Avenue Bridge Culvert Addition	50	10	5	.01	0
Total	-	-	-	21.5	20.8

3.2.1 Construction

The construction-related components of the Proposed Action include channel relocation, conveyance improvements, bridge replacements, culvert addition, overflow channel construction, use of heavy equipment, site access, staging areas, and vegetation and material removal.

3.2.1.1 Shaw Creek Channel Relocation

Shaw Creek would be diverted south from its current course approximately 500 feet west of South 92nd Avenue in order to locate the creek in a more natural gradient and topographic setting. It would flow southeast for approximately 800 feet, and then head south between the Cottonwood Grove subdivision on the east and Cottonwood Middle School on the west (Appendix A, Figure 2). Once past the subdivision (approximately

2,000 feet in distance), it would gradually turn toward the southeast to its new confluence with Wide Hollow Creek. The channel relocation would be approximately 3,600 feet long from its diversion point to its confluence with Wide Hollow Creek. The channel relocation would have a summer flow of approximately 3 to 4 cubic feet per second (cfs) and winter flow of approximately 8 to 10 cfs.

A total of approximately 50,000 cubic yards of soil would be removed from the channel relocation. Approximately 4,000 cubic yards would be used to build a berm and maintenance road on the eastern side of the channel relocation. The berm and access road would be built approximately 2 to 3 feet above the elevation of the east channel relocation elevation. Crushed rock would be utilized on top of the soil for surfacing. The excess of approximately 46,000 cubic yards of soil would be hauled off-site and used as a cap at the Yakima County Terrace Heights Landfill. There are no plans to fill Shaw Creek.

At the upstream end of the channel relocation, Wetland A has been identified as a 0.64-acre Category II depressional wetland with shallow standing water, likely fed by agricultural runoff (see Appendix C). The channel relocation would originate from this location and Wetland A would remain and drain south through the channel relocation instead of draining east through Shaw Creek. A portion of the wetland may become cut off from a water source.

The majority of the channel relocation would be a trapezoidal grassy swale, 70 to 200 feet wide, and up to 5 feet deep with side slopes of 3H;1V. As recommended by the Washington State Department of Fish and Wildlife (WDFW), a 3H:1V slope or flatter is preferred throughout the length of the channel relocation to minimize risk of bank erosion or loss of capacity and to optimize infiltration of surface water.

At the lower end (200 to 300 feet upstream of the confluence with Wide Hollow Creek) the design changes in accordance with WDFW recommendations are as follows:

> … a bifurcated or groundwater channel at the lowermost terminal end of the proposed channel that would provide a riparian buffer and bifurcated channel, or a long narrow retention pond area, which is in connectivity with groundwater and surface flows of Wide Hollow Creek. This area would provide settling of sediment during upstream storm events as well as provide fish and wildlife habitat. These channels and or ponds could be designed and maintained to temporarily isolate surface water during maintenance activities.

The riparian width will be determined during final design and any permitting requirements. The Natural Resources Conservation Service (NRCS) developed a conceptual planting plan for the channel relocation (NRCS 2013). The plan recommended herbicide use for

weed control prior to planting native grass species to allow grass seedlings to establish without competition in the drier portions of the channel relocation. The drier portions of the channel relocation would be planted with a native dryland bunch grass mix which is adapted to local desert conditions (annual precipitation between 7 and 18 inches). The downstream 300 feet of the channel relocation where the channel intersects Wide Hollow Creek would establish a riparian area. It will be planted with native trees along the outside perimeter of the channel at approximately 5-foot by 5-foot spacing. Trees and shrubs would also be planted in an island created by the bifurcated portion of the southern end of the channel relocation.

The bottom and side slopes of the channel relocation would be planted with native grasses such as critana thickspike wheatgrass, magnar basin wildrye, sherman big bluegrass, secar bluebunch wheatgrass, and slender wheatgrass.

Public Safety

The Shaw Creek channel relocation would be fenced in the vicinity of the Cottonwood Middle School to provide a safety measure for school children. Additional fencing along the relocation channel may be installed as necessary. The fence would also serve to prevent debris dumping and protect the integrity of the channel. A small pedestrian bridge would be installed in the middle section of the channel relocation (Appendix A, Figure 2).

Construction Methods

Construction would begin near the middle of the channel relocation, and then work north and south so that construction would be complete when the northern end of Shaw Creek. Geotextile fabric or jute would be utilized in the channel relocation to prevent erosion and stabilize slopes and replanting areas. No dewatering would be required within the channel relocation. A short segment at the north end of the channel relocation would be constructed to allow Shaw Creek to divert and prevent early releases of water. Construction sediment would settle out as Shaw Creek leaves the confluence wet area and redistributes sediments within the channel relocation forming a low flow channel.

Laydown, Staging, and Parking Areas

The staging area would be near the middle of the channel relocation on undeveloped land on the east side of the channel relocation (Appendix A, Figure 2).

Shaw Creek Diversion Plan

After construction of the channel relocation during the winter, the Shaw Creek would be blocked and all flow would be diverted.

Dewatering Shaw Creek

Shaw Creek would likely be dry with no natural flow during winter construction. However, there could be a few small ponded areas remaining after channel relocation. Prior to construction, a survey to determine fish presence in the project area would be undertaken. If necessary, a fish and invertebrate capture-and-release mission would occur in Shaw Creek for up to several days after the flow is directed into the channel relocation. Flows from Shaw Creek would irrigate vegetation in the channel relocation and optimize infiltration of surface water. Shaw Creek could still receive some irrigation flows from pooling that does not divert to the channel relocation.

3.2.1.2 Wide Hollow Creek Conveyance Improvements

Conveyance improvements in Wide Hollow Creek would reduce the risk of flooding downstream of the Wide Hollow Creek overflow channel intersection with the channel relocation (Appendix A, Figure 2). Conveyance improvements would occur in the approximately 6,050-foot-long reach of Wide Hollow Creek from South 90th Avenue to South 72nd Avenue.

The improvements would require removing up to 50 percent of the clumps of crack willow (*Salix fragilis*), which has been determined to be detrimental to conveyance (Yakima County 2014). Work in Wide Hollow Creek would occur between October 1 and April 30 when flows are minimal (between 1 and 2 cfs).

According to WEST,[1] the Wide Hollow Creek channel improvements would have side slopes varying from 2H:1V or less, and the bottom width would vary from 10 to 65 feet. Maintaining the existing channel invert is recommended by WEST so that the channel slope would remain unchanged. However, for approximately 400 feet upstream of the confluence with the channel relocation, a slight deepening (less than or equal to 1-foot) of the invert would be required to maintain no rise during the 100-year flood event.

Construction Methods

Crack willow in Wide Hollow Creek between South 90th Avenue and South 72nd Avenue would be removed between January and February over two seasons. All crack willow would be removed from the northern side of Wide Hollow Creek. Every other crack willow would be removed from the southern side of Wide Hollow Creek so the remaining crack willow would continue to provide shade until new vegetation is established in approximately 5 to 8 years. The remaining crack willow on the southern side of Wide Hollow Creek would then be removed using additional funding. The herbicide imazapyr, which has been approved by the Environmental Protection Agency

[1] WEST Consultants, Inc., Draft Report on Hydraulic and Floodplain Impacts Assessments for Shaw and Wide Hollow Creek Flood Control Project, July 2014

(EPA) for use in water, would be applied to limbs and other vegetative material (Ecology 2014). The herbicide is low in toxicity to invertebrates and practically non-toxic to fish, birds, and mammals. Application would occur in March and April during the growing season. Treated trees would be left to die, and then pulled out and disposed of off-site at a parcel owned by Yakima County at South 80th Avenue and Wide Hollow Creek. The crack willow would be cut up and made either available as firewood or chipped.

Laydown, Staging, and Parking Areas

Staging and laydown areas would tentatively occur on Yakima County public service lands at South 80th Avenue and at West Valley Park. A staging area may also be rented from a local landowner. The construction contractor would have final determination of the staging locations but would be required to maintain a 200-foot distance from riparian zones.

Isolating the Work Area

Isolation of the work area, if needed, would be accomplished by placing straw bales as appropriate. Excavation of Wide Hollow Creek would occur from October 1 to April 30, when flow are expected to be 1 to 2 cfs or completely dry in places.

Restoration above the OHWM

Planting after the removal of crack willow would include ponderosa pine (*Pinus ponderosa*), cottonwood (*Aigeiros*), rose (*Rosa woodsii*), red-osier dogwood (*Cornus sericea*) and a variety of shrub species.

Yakima County is working on a demonstration project that is removing crack willow from a stretch of Wide Hollow Creek upstream of the Proposed Action near South 96th Avenue. Results from the demonstration project will provide additional information for the development of a planting plan for the Proposed Action. The demonstration project will eventually reach the upstream limit of the Proposed Action.

3.2.1.3 Bridge Replacements

Two bridges would be replaced to allow for Wide Hollow Creek widening for greater than 10-year flood events (Appendix A, Figure 2). The span of the Wide Hollow Road Bridge on Wide Hollow Road west of South 88th Avenue would be increased to approximately 45 feet. The span of the South 80th Avenue Bridge on South 80th Avenue south of Wide Hollow Road would be increased to approximately 51 feet. The existing approaches, width (i.e., capacity), and current alignment of the bridges would remain the same. Additionally, city of Yakima codes require the new bridges to be designed with a 5 foot sidewalk on one side.

Construction Methods

The bridges would be replaced between June and September when flows in the reach of Wide Hollow Creek near the bridges are between 8 and 14 cfs (Ecology 2013).

The existing bridges have concrete abutments and six girder/deck units. The existing bridge decks would be removed, abutments would be cut off, and the foundations would be left below final ground level. A catchment device would be installed below the bridge and a sawcut would be made between each girder/deck unit. Holes would also be drilled to install lift chains. The individual units could then be removed using a crane and the catchment would contain any debris. The abutments would be removed by cutting and/or chipping into smaller pieces. The abutments would be isolated from the water with a temporary barrier or local diversion of water.

The new bridge foundations would be steel pipes filled with concrete. A pile foundation is proposed to minimize work and impacts below the water table. Approximately 200 cubic yards of light heavy riprap fill would be placed along the banks to protect the new abutment foundations. A total of approximately 4,500 square feet of impervious surface would be added.

Construction would require clearing, grading, and excavating an approximately 500-foot (7,000 square feet) paved segment of road on either side of both bridges in order to install stormwater collection, conveyance, and treatment facilities. Stormwater would be routed to roadside ditches. The clearing and grading would be limited to mostly grass and weeds adjacent to the road. Approximately 300 cubic yards of light loose riprap fill would be placed along the banks to protect the new abutment foundations. Approximately 700 cubic yards of soil would be excavated in the removal of the existing Wide Hollow Creek bridge abutments and wing walls. Excess materials would be disposed of at the Yakima County Terrace Heights Landfill and used as a cap.

Areas below the OHWM would be isolated using sandbags. This would allow work to occur in the dry portion for removal of the existing bridges and replacement with longer span bridges, as well as widening of the channel beneath the bridge for increased conveyance. It would also minimize ground disturbance adjacent to the channel. The sandbag isolation would require dewatering approximately 8,000 square feet at each site. Construction would require the use of heavy equipment both above and below the OHWM of Wide Hollow Creek. Heavy equipment may include dump trucks; excavators; backhoes; dozers; graders; pavers; rollers; cranes; and impact pile drivers.

Pile driving would include approximately 24 piles per bridge for the footings. The piles would be installed within the footprint of the existing footings above the OHWM. The bridge designs have not been started, but the hydraulics completed by WEST indicated that the bridge spans would be designed for 45 feet from the existing 24-foot Wide Hollow Road Bridge and 51 feet from the existing 29-foot South 80th Avenue Bridge.

Laydown, Staging, and Parking Areas

Staging areas would be on the existing roads that would be closed for construction (Appendix B). Road closure during the summer is preferable so that agricultural harvest and school traffic are not impacted.

Dewatering and Isolating the Work Area

Construction would also require dewatering 8,000 square feet or more through pump intakes from both bridge sites. Prior to construction, a 36-inch corrugated metal bypass pipe would be placed at each bridge site using straw bales and sand bags on the ends to isolate and bypass the in-water work area. The bypass pipe at each bridge would be approximately 250 feet long. Dewatering would allow the removal of the existing bridges, replacement with longer span bridges, and widening of the channel beneath the bridge. Pump intakes would be screened according to National Marine Fisheries Service (NMFS) guidelines, and water would be bypassed downstream of the dewatered site. Dewatering would minimize ground disturbance adjacent to the channel. In-water work for the bridges would be completed in approximately 4 months, from June to September. Prior to construction, a survey to determine fish presence in the project area would be undertaken. If necessary, a fish or invertebrate capturing mission would be planned for the dewatering areas.

Restoration below the OHWM

Species to be planted below the OHWM include red-osier dogwood, coyote willow (*Salix exigua*), bulrush, and cottonwood. Planting would be on a 5-foot by 5-foot spacing utilizing shovel planting or auger planting. In some areas, weed control fabric may be used to reduce competition with pasture grasses.

Restoration above the OHWM

Ponderosa pine and quaking aspen (*Populus tremuloides*) would be planted above the OHWM.

3.2.1.4 South 88th Avenue Bridge Culvert Addition

Hydraulic modeling by WEST indicated that the private bridge over Wide Hollow Creek on South 88th Avenue would require added capacity for greater than 10-year flood events. An approximately 10-foot by 4-foot box culvert would be installed parallel to and above Wide Hollow Creek on the northern side of the private bridge at South 88th Avenue. Minor excavation would be completed to route the water to the culvert. A channel approximately 5 feet wide and 20 feet long would be constructed from the main stem of Wide Hollow Creek to the new box culvert. The bridge culvert would serve as an overflow facility for the highest flows in Wide Hollow Creek. No in-water work or

dewatering of Wide Hollow Creek would be needed since the culvert would be above the OHWM. The existing bridge and approaches would remain the same.

Construction Methods

A backhoe would prepare the site and place the culvert. The existing soil would be backfilled around the culvert. Work would be completely outside of Wide Hollow Creek.

Laydown, Staging, and Parking Areas

The staging area for the culvert installation would be at a parking area immediately northeast of the site. The staging area would be the size of the existing parking area which is about 30 feet by 30 feet on private property.

3.2.1.5 Wide Hollow Creek Overflow Channel

The overflow channel would alleviate the 100-year overflow that overtops the right bank of Wide Hollow Creek south of Wide Hollow Road and upstream of the bridge. The overflow channel would be constructed south of Wide Hollow Road between South 91st Avenue and South 88th Avenue. It would be designed to carry 10- to 100-year flood events that would not otherwise be conveyed in Wide Hollow Creek north of Wide Hollow Road. The overflow channel would be approximately 900 feet long, 20 feet wide, and up to 4 feet deep. It would concentrate overflow along the southern side of Wide Hollow Road to remove some of the areas south of Wide Hollow Road and Wide Hollow Road from the 100-year floodplain. Chinese elm (*Ulmus parvifolia*) near the overflow channel would be removed and native seed mix would be used for revegetation.

Construction Methods

Construction would include removal of vegetation, excavation, and removal of excess soil off-site to Yakima County Terrace Heights Landfill.

Laydown, Staging, and Parking Areas

The most likely location for the staging area would be the private parcel to the south of the overflow channel. The construction contractor would determine the final location.

3.2.1.6 Heavy Equipment

Construction of the channel relocation and Wide Hollow Creek overflow may include use of backhoes, dozers, excavators, scrapers, and graders.

3.2.2 Schedule

Construction of the Proposed Action and native replanting would take place over approximately 3 years. Construction for the channel relocation, conveyance improvements, and the bridge culvert addition would occur between October and

March, during low flow in Shaw and Wide Hollow Creeks. Construction of the bridges would occur between June and September.

Construction of the approximately 3,600-foot channel relocation is expected to take one fall season. Conveyance improvements in Wide Hollow Creek are expected to take two seasons. Construction of the channel relocation and conveyance improvements in Wide Hollow Creek would begin at approximately the same time.

Removal of crack willow from South 90th Avenue to South 72nd Avenue is anticipated to occur in January and February (i.e., the driest time) over two seasons. The work would be done 5 days a week and approximately 10 hours per day. Vegetation planting could occur in the spring or fall and would likely occur in both seasons because of the amount of area that would require revegetation and to check tree/plant mortality.

Replacement of the two bridges could start when design and permitting are completed. Construction of the bridges would last approximately 3 to 4 months during the summer. Construction would occur in the summer so that road closures would minimize detour impacts to school and agricultural harvest traffic.

After construction, weed control and native planting would occur in the fall and spring in Shaw and Wide Hollow Creeks. Irrigation and weed abatement would continue for at least 2 years to protect riparian plant establishment.

The following schedule in Table 3-2 assumes the Proposed Action receives needed approvals by fall 2015; funding by November 2015; and design, contracts, and bid documents by winter 2015/2016.

Table 3-2: Proposed Action Schedule

Time Frame	Proposed Action
Channel Relocation – Construction and Revegation	
November 2016 to February 2017	Construction of the channel relocation from Shaw Creek to the intersection of Wide Hollow Creek during one dry season.
March 2017 to June 2017	Planting of the channel relocation and application of jute or other erosion prevention material in the first year immediately after disturbance. Treatment of disturbed soil with hydro-seeding with native grass species would occur in spring 2017.
October 2017 to December 2017	Plantings of shrubs in areas needing additional plants. Survival surveys to determine mortality and reseedings or re-plantings for areas not adequately revegetated.
February 2017 to May 2019	Survival monitoring and plantings required.
Bridge Replacements	
June 2016 to September 2016	Construction of the bridges would last approximately 3 to 4 months during the summer.

Time Frame	Proposed Action
Increase Conveyance in Wide Hollow Creek from South 90th Avenue to South 72nd Avenue	
March 2016 to April 2016	Remove all crack willow on the north side of Wide Hollow Creek from approximately South 90th Avenue to South 72nd Avenue and treat with herbicide. Remove and treat 50 % of the crack willow on the south side of Wide Hollow Creek along same segment.
October 2016 to November 2016	Remove crack willow stems with heavy equipment throughout segment on both sides of the Wide Hollow Creek segment. Wood would be stockpiled at Yakima County on South 80th Avenue parcel or delivered to a local wood retailer (e.g., Morton Landscaping).
November 2016 to April 2017	Excavation within Wide Hollow Creek and disposal of soil to Yakima County Terrace Heights Landfill. Excavation would occur when Wide Hollow Creek is at 1 to 2 cfs.
April 2017 to June 2017	Planting of shrubs, trees, and application of geotextile fabric if needed for Wide Hollow Creek from South 90th Avenue to South 72nd Avenue.
October 2017 to December 2017	Stocking surveys and replanting as necessary.
2018 to 2019	Killing and removal of remaining crack willow from south side of Wide Hollow Creek if vegetation has been established on the north side. Re-plantings to occur on disturbed sites as necessary.

3.2.3 Maintenance

Annual maintenance would consist of debris removal from the channel relocation and Wide Hollow Creek. Mechanical methods and aquatic labeled herbicide may be utilized for weed control. Maintenance would occur prior to the fall flood season and would take approximately 4 weeks. Areas planted with native grass species will require bi-annual mowing to reduce fire hazards. Maintenance would be the responsibility of the Yakima County Flood Control Zone District. Irrigation and weed abatement would be done as needed for at least 2 years to maximize the probability of riparian plant establishment. Cost of annual maintenance per year for Yakima County is anticipated to be $20,000. Yakima County would monitor impacts from potential fires or public use and maintain as necessary.

3.2.4 Property Acquisitions

The Proposed Action would include the acquisition of a portion of 11 properties (Table 3-3).

Table 3-3: Proposed Acquisitions

Address	Parcel No.	Description	Action
802 S. 92nd Avenue	18133022010	Manufactured home on parcel	Partial Acquisition
804 S. 92nd Avenue	18133022408	Two residences on parcel	Partial Acquisition
806 S. 92nd Avenue	18133022009	Single family home on parcel	Partial Acquisition
1409 S. 91st Avenue	18133034004	Single family home on large parcel	Partial Acquisition

Address	Parcel No.	Description	Action
8802 Wide Hollow Road	18133034001	Single family home on parcel	Partial Acquisition
640 to 997 S. 92nd Avenue	18133023003	Large school parcel	Partial Acquisition
641 to 999 S. 92nd Avenue	18133024005	Large school parcel	Corridor Acquisition
9001 Wide Hollow Road	18133031002	Large parcel	Corridor Acquisition
9001 Wide Hollow Road	18133031001	Large parcel	Corridor Acquisition
9001 Wide Hollow Road	18133031003	Large parcel	Corridor Acquisition
807 S. 96th Avenue	18133022404	Single family home on parcel	Partial Acquisition

3.3 ALTERNATIVE 2B: OVERFLOW BYPASS CHANNEL

Alternative 2B would largely have the same project components described in Section 3.2.1. The channel relocation would be constructed to carry 100-year flows of 349 cfs to Wide Hollow Creek, while flows less than 5 cfs would continue in Shaw Creek.

Project components that would be the same as Alternative 2A include the Wide Hollow Creek Conveyance Improvements (Section 3.2.1.2), Bridge Replacements (Section 3.2.1.3), South 88th Avenue Bridge Culvert Addition (Section 3.2.1.4), and Wide Hollow Creek Overflow Channel (Section 3.2.1.5). The Schedule (Section 3.2.2), Maintenance (Section 3.2.3), and Property Acquisitions (Section 3.2.4) would also be the same under Alternative 2B.

Construction of the Shaw Creek Channel Relocation (Section 3.2.1.1) would change under Alternative 2B. Shaw Creek would not be blocked and flow would not be completely diverted. The channel relocation would still originate from Wetland A but the berm would be designed to drain both east and south to Shaw Creek and channel relocation. The fish and invertebrate capture-and-release mission, if required, would not occur in Shaw Creek during dewatering. Flows of less than 5 cfs may not be adequate to irrigate revegetation and establish plants in the channel relocation. Annual maintenance would be similar to Alternative 2A (see Section 3.2.3).

3.4 ALTERNATIVE CONSIDERED AND DISMISSED

One alternative that was considered at stakeholder meetings in 2008 was dismissed. The alternative was the acquisition or elevation of the 48 most at-risk residences in the Cottonwood Grove subdivision. The 48 residences are in the floodway or floodplain with the highest risk of flood damage relative to other residences in the project area. Acquisition of the residences would cost approximately $12 million. Elevation was also considered but discarded as the cost would be approximately the same as the acquisition, yet still leave those structures vulnerable to flooding and flood damage.

Both acquisition and elevation of the 48 residences would still leave approximately 468 existing and potential future parcels in the floodplain at risk of being damaged.

This alternative was dismissed because it would not meet the purpose of addressing all at-risk properties in the Cottonwood Grove, Westbrook, and Clinton Way subdivisions; and would be cost-prohibitive.

SECTION FOUR AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This section discusses the potential impacts of Alternative 1 (No Action Alternative), Alternative 2A (Proposed Action), and Alternative 2B (Overflow Bypass Channel) on five categories of environmental resources: physical, water, biological, cultural, and socioeconomic. The potential cumulative environmental impacts are discussed in Section 4.6.

The impact analysis follows the same approach for all resource categories. When possible, quantitative information is provided to establish potential impacts, and the potential impacts are evaluated qualitatively based on the criteria listed in Table 4-1.

Table 4-1: Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected, or changes would be either non-detectable or if detected, would have effects that would be slight and local. Impacts would be well below applicable regulatory standards.
Minor	Changes to the resource would be measurable, although the changes would be small and localized. Impacts would be within or below applicable regulatory standards. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have both localized and regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes would be readily measurable and would have substantial consequences on a local and regional level. Impacts may exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Impacts are predicted based on the degree of change or loss of the resource from the baseline conditions. Impacts may be direct or indirect. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action and occur later in time or are farther removed from the area but are still reasonably foreseeable (40 CFR Part 1508).

4.1 PHYSICAL RESOURCES

The physical resources present in the project area and discussed are geology and soils (Section 4.1.1) and climate change (Section 4.1.2). The consequences of the alternatives on these physical resources are discussed in Section 4.1.3.

4.1.1 Geology and Soils

The project area is located within the Wide Hollow watershed, which lies east of the Cascade Range between Mt. Adams, Mt. Rainier, and the Columbia River in the south-central region of Washington State. The northern boundary of the Wide Hollow watershed is formed by Cowiche Mountain and the southern boundary by Ahtanum Ridge (Yakima County et al. 2012). Elevations range from over 6,500 feet in the mountainous portion of the watershed to 1,000 feet in Union Gap.

The four types of topography in the Wide Hollow watershed are mountains in the west, foothills, and a dissected plateau with hollows (i.e., small valleys formed by geologic folding) in the middle section of the watershed where the project area is located; and a broad, flat expanse of floodplain and Missoula Flood Deposits in, and adjacent to the Yakima River, which includes most of the urban areas (Yakima County et al. 2012).

The Wide Hollow watershed lies within the Columbia basin physiogeographic province and is adjacent to the Cascades province. Two geologic formations dominate the topography in the watershed: the Columbia River Basalt Group and Consolidated and Unconsolidated Non-Marine Sedimentary Rocks (Yakima County et al. 2012). The project area is located in alluvium and floodplain deposits (Qal) which are unconsolidated sand and gravel in channels of modern streams and on associated low terraces (DNR 2013).

The project area sits on loess or alluvial silts and sands which overlay the Ellensburg Formation. The Ellensburg formation is composed layers of cemented sands and gravels. The seasonal water table lies on top of the Ellensburg formation and varies in depth from 2-6 feet below surface. Aquifers in the Ellensburg formation are normally confined to small bands of coarse materials. Agricultural and residential irrigation in the watershed is the primary contributor to the aquifers and is the primary influencer of the water table.

Major soil types include Esquatzel silt loam, Logy silt loam, Outlook silt loam, Umapine silt loam, Weirman fine sandy loam, and Yakima silt loam (NRCS 2015). Soils in the project area range from somewhat poorly drained to well drained with slow to high infiltration (Table 4-2). The drainage class and hydrologic group describe the natural

Table 4-2: Soils Characteristics in Project Area

Soil Type	Approximate Percent in Project Area	Drainage Class	Hydrologic Group	Farmland Classification
Esquatzel silt loam	10	Well Drained	B (Moderate Infiltration)	Prime farmland if irrigated
Logy silt loam	18	Well Drained	B (Moderate Infiltration)	Prime farmland if irrigated
Outlook silt loam	10	Somewhat Poorly Drained	C (Slow Infiltration)	Not prime farmland

Soil Type	Approximate Percent in Project Area	Drainage Class	Hydrologic Group	Farmland Classification
Umapine silt loam	24	Somewhat Poorly Drained	C (Slow Infiltration)	Not prime farmland
Weirman fine sandy loam	25	Somewhat excessively drained	A (High Infiltration)	Not prime farmland
Yakima silt loam	13	Well Drained	B (Moderate Infiltration)	Prime farmland if irrigated

drainage condition and runoff potential that contributes to erosion processes. Soils that are poorly drained and have slower infiltration are generally more susceptible to higher levels of erosion. Water and wind typically cause the most erosion in the project area. Logy silt loam and Yakima silt loam are generally the most limited for structural support (NRCS 2015).

The Wide Hollow Creek floodplain is characterized by shallow silts over small to medium-sized stream cobble starting within the upper 4 inches of soil. Wide Hollow Creek has some areas where muck has accumulated and the native cobble is completely embedded due to leaf litter and log jams. Shaw Creek does not contain stream cobble and has a predominantly muck substrate.

The Farmland Protection Policy Act of 1981 (FPPA), as amended (7 U.S.C. 4201 et seq.), requires that federal agencies minimize the extent to which their programs contribute to the unnecessary conversion of prime farmland, unique farmland, and land of statewide or local important to non-agricultural uses. Prime Farmlands may be forestland, pastureland, or cropland but cannot be urban built-up land. There are areas with prime farmland, if irrigated, within the project area (NRCS 2015).

4.1.2 Climate and Climate Change

The climate in Yakima County varies from desert conditions in the southern lowlands to moist alpine conditions in the mountain headwater region. The project area, like the surrounding Yakima Valley region, is shielded from winter cold-air masses moving southward from Canada by the Rocky Mountains to the east and north, and shielded from moist Pacific Ocean marine air moving eastward by the Cascade Mountain barrier to the east. These conditions produce relatively mild winters and warm and dry summers (Yakima County et al. 2012). Average annual precipitation is 7 inches of rainfall and 18 inches of snowfall. Temperatures range from highs in the 80s (degrees Fahrenheit) in the summer, to the 30s in winter; and lows in the 50s in the summer, to the 20s in the winter (WRCC 2008).

The CEQ has released guidance on how federal agencies should consider climate change in their decision-making process. The threshold at which NEPA documents should include quantitative analysis for an action is if it will release more than 25,000 metric tons of greenhouse gases per year (CEQ 2010).

The Pacific Northwest has encountered many climate changes during the past 100 years. The Climate Impacts Group identifies the following observed changes in the 20th century: average annual increase of 1.5 (degrees Fahrenheit), decadal variability in annual precipitation, snow water equivalent decline, and timing of peak runoff (Climate Impacts Group 2008).

Over the next century, Washington's climate may experience changes. Using models based on projections made by the Intergovernmental Panel on Climate Change, scientists project that average annual temperatures in the Pacific Northwest will be almost 2 (degrees Fahrenheit) higher by the 2020s, and almost 3 (degrees Fahrenheit) higher by the 2040s, compared with 1970 to 1999 averages. These increases could change weather patterns and result in less snowfall and more rainfall, milder winters and hotter summers, earlier snowmelt and higher streamflow in winter and early spring, and an increase in extreme weather events including heavy downpours. An increase in winter rainfall (as opposed to snowfall) as a result of climate change may lead to more winter flooding from January to March and a decrease in flooding from April to May (Ecology 2012a).

4.1.3 Consequences of Alternatives

4.1.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to improve Shaw or Wide Hollow Creeks. The County would not have the funding to construct the project components.

Geology and Soils

Soil resources in the project area, including prime farmlands, could be eroded throughout the floodplain due to continued sheet flow during flood events. There would be continued loss of conveyance capacity and reduction of productivity of poorly drained soils. Sediment loads and turbidity in Wide Hollow Creek may continue to increase downstream. Adverse soil impacts in the project area and downstream would range from minor to major, depending on the severity of floods and subsequent soil erosion and sedimentation. Impacts to the Ellensburg Formation aquifer and water table are influenced by regional conditions; no impacts from the project are anticipated.

Climate Change

Potential increases in winter flooding and heavy downpours from climate change would have minor to moderate adverse impacts on flooding and subsequent soil erosion and deposition in Shaw and Wide Hollow Creeks.

4.1.3.2 Alternative 2A: Proposed Action

Geology and Soils

There would be minor short-term impacts on soils in the project area due to ground disturbance associated with the channel relocation, bridge replacements, culvert addition, channel improvements, and the overflow channel (see Section 3.2.1). No impacts to the Ellensburg Formation aquifer are anticipated.

There are approximately 5 acres of prime farmland soils within the relocation channel and overflow channel that would be permanently removed from potential production. Because the project is federally funded, a CPA-106 farmland conversion impact rating form for corridor projects was completed and submitted to NRCS (no response received). Given the extent of prime farmland soils in the Yakima Basin, impacts to prime farmlands are anticipated to be minor.

A temporary erosion and sediment control plan would be developed prior to construction. Erosion-control best management practices (BMPs) would be implemented to reduce sediments discharging into Shaw and Wide Hollow Creeks. The staging areas would be limited to minimize disturbance impacts, and silt fences adjacent to the streams would be installed prior to any construction activities. Geotextile fabric or jute would be utilized in the channel relocation to prevent erosion and stabilize slopes and replanting areas.

After construction, flows would be minimal in Shaw Creek resulting in no or minimal soil erosion and deposition. Vegetation that cannot survive without seasonal irrigation flows would naturally be replaced with other plant communities over time but erosion would not likely change in Shaw Creek. Sediments flowing from Wetland A would redistribute within the relocation channel due to its shallow continuous grade prior to reaching Wide Hollow Creek. The anticipated reduction in flooding in the project area would likely result in less soil erosion and deposition into Shaw and Wide Hollow Creeks. Negligible to minor beneficial geology and soils effects are anticipated after project construction.

Climate Change

Given the nature and small scale of the project and its lack of greenhouse gas releases, it would not meet the CEQ threshold and no detailed greenhouse gas analysis was conducted. With anticipated Pacific Northwest climate changes in the future, the Wide Hollow watershed may encounter earlier seasonal flood events and an increase in heavy downpours. The Proposed Action would accommodate climate change effects from flood events that may increase in duration or scale from climate change. Any flow increases resulting from climate change effects would have the potential to transport soil and infiltrate in the channel relocation. The anticipated reduction in flooding in the project area would likely result in less soil erosion and deposition into Shaw and Wide

Hollow Creeks. The Proposed Action is anticipated to have negligible to minor beneficial localized effects on climate change.

4.1.3.3 Alternative 2B: Overflow Bypass Channel

Geology and Soils

Geology and soils effects would largely be the same under Alternative 2B as described for Alternative 2A (Section 4.1.3.2). After construction, flows of less than 5 cfs would continue in Shaw Creek resulting in minimal soil erosion and deposition. Reed canarygrass and yellow flag iris would continue to receive irrigation flows in Shaw Creek and contribute to sediment accumulation. Minor geology and soil impacts are anticipated under Alternative 2B from continued prevalence of non-native plant communities.

Most of the sediments flowing from Wetland A would redistribute within the relocation channel due to its shallow continuous grade prior to reaching Wide Hollow Creek. The anticipated reduction in flooding in the project area would likely result in less soil erosion and deposition into Shaw and Wide Hollow Creeks. Negligible to minor beneficial geology and soils effects are anticipated after project construction.

Climate Change

Climate change effects would be the same to Wide Hollow Creek under Alternative 2B as described for Alternative 2A (Section 4.1.3.2). Alternative 2B would accommodate climate change effects from flood events that may increase in duration or scale from climate change. No climate change effects are anticipated from continuing flows of less than 5 cfs in Shaw Creek during irrigation months. Alternative 2B is anticipated to have negligible to minor beneficial localized effects on climate change.

4.2 WATER RESOURCES

4.2.1 Surface Water

Two streams occur within the project area: Shaw Creek and Wide Hollow Creek. Shaw Creek is a tributary to Wide Hollow Creek. Both creeks were likely constructed as conveyance for irrigation water in the late 1800s to early 1900s.

Shaw Creek was rerouted and used as conveyance for irrigation. The channel makes a 90-degree turn as it meets South 80th Avenue and crosses under the road through a culvert that is perpendicular to the road before it joins Wide Hollow Creek (Appendix A, Figure 2). Shaw Creek was altered into a roadside ditch as it approaches Wide Hollow Creek, near West Valley Park. Shaw Creek is composed primarily of irrigation return flows and is often dry due to diversion withdrawals (Golder 2005).

Wide Hollow Creek begins in the hills west of Yakima and flows through the southwestern portion of the City of Yakima. Two tributaries, Cottonwood Creek to the south and Shaw Creek to the north, flow into Wide Hollow Creek. Wide Hollow Creek enters the Yakima River in the City of Union Gap. The drainage area of Wide Hollow Creek is approximately 78 square miles.

Generally, flood flow in Shaw Creek is constricted by a number of culverts and dense vegetation within the stream channel. The stream channel has been straightened and has a primarily muck substrate. During construction of parts of the Cottonwood Grove subdivision, Shaw Creek was modified along the northern part of the development to pass larger flows and to support wetland vegetation. Because of residential development there has been a shift to less maintenance of Shaw Creek by previously large agricultural land owners.

Using the Hydrologic Engineering Centers River Analysis System (HEC-RAS) model of the system developed for flood insurance studies, WEST estimated the 100-year flow in Shaw Creek east of South 96th Avenue at 354 cfs (Yakima County 2010a). During floods of greater than the 10-year event, water floods out of Shaw Creek just upstream of South 92nd Avenue, floods to the south through open parcels and the Cottonwood subdivision, and eventually into Wide Hollow Creek.

Wide Hollow Creek is used as a conveyance for irrigation water and receives a relatively large amount of irrigation spill during the irrigation season in the summer. This additional flow results in an inverted hydrologic cycle. This means that during times of year when the flow would naturally be low, such as in the summer, it is actually high. There is some flow in Wide Hollow Creek during the non-irrigation season due to a combination of groundwater springs, irrigation seepage, precipitation, and snowmelt in the spring (Yakima County et al. 2012). Maps and historical surveys indicate Wide Hollow Creek was dry prior to the development of irrigation infrastructure that releases excess water into the creek.

The 100-year flow in Wide Hollow Creek upstream of its confluence with Shaw Creek is estimated to be 642 cfs, while the flow downstream of the confluence is estimated to be 775 cfs. This difference in cfs is due to the difference in the timing of peak flows in these reaches (Yakima County 2010a). Sheet flooding also occurs in upper Wide Hollow Creek itself, above its confluence with Cottonwood Canyon Creek (Yakima County et al. 2012).

There are no other known surface water bodies or lakes in the project area.

4.2.2 Water Quality

Section 303(d) of the Clean Water Act of 1977, as amended (33 U.S.C. § 1313(d)(2)), establishes requirements for the identification and prioritization of water bodies that do

not meet water quality standards. The Washington State Department of Ecology (Ecology) was queried to determine whether any streams in the project area are considered impaired or waters of concern. Lower Shaw Creek, the portion to be relocated by this project, is considered a 303(d) impaired stream for bacteria, and Wide Hollow Creek is considered a 303(d) impaired stream for temperature and bacteria (Ecology 2012b). Both streams are rated Category 5 for their pollutants. Category 5 waters are defined as waters that have water quality standard violations that do not have an established total maximum daily load (TMDL) or pollution control plan (Category 1 to Category 4 waters range from meeting water quality standards to polluted waters that do not require a TMDL). The TMDL study for bacteria has recently been completed by Ecology and the temperature TMDL study is in progress.[2] Ecology is conducting water quality measurements and studies on Wide Hollow Creek that indicate adverse conditions for salmonid species due to incoming irrigation inflows.[3]

4.2.3 Wetlands

Executive Order (EO) 11990, Protection of Wetlands, requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided.

According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, there is a narrow band of freshwater forested/shrub wetland associated with Wide Hollow Creek, from South 88th Avenue east to West Valley Park and beyond. Near West Valley Park, there is also a freshwater emergent wetland located south of Wide Hollow Creek (USFWS 2013). During the wetland investigation no wetlands in these areas were identified (see Appendix C).

Wetland A was identified at the upstream end of the Shaw Creek channel relocation area. The wetland is a 0.64-acre Category II depressional wetland with shallow standing water, likely fed by agricultural runoff (see Appendix C). Much of Wetland A is inundated while Shaw Creek has flow during the irrigation season. A portion of Wetland A extends into grazed fields some of which are regularly mowed.

4.2.4 Floodplains

EO 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains; and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

[2] Laine Young, Washington State Department of Ecology, Phone Conversation to Joel Hancock, URS, August 18, 2014.

[3] Cliff Bennett, Yakima County, email communication with Mark Eberlein, FEMA, August 13, 2015.

Portions of the project area are in Zone AE, floodways, and Zone X (Flood Insurance Rate Map Panels 53077C1009E and 53077C1028E, effective July 17, 2012). Zone AE is an area within the base floodplain (100-year or 1 percent-annual-chance) where base flood elevations (BFEs) have been determined. Zone X is an area that is determined to be outside the 500-year or 0.2 percent-annual-chance floodplain. Along Shaw Creek, BFEs range from 1,230 feet above sea level (asl) at the western edge of the project area, to 1,186 feet asl at the eastern edge of the project area.

Along Wide Hollow Creek, BFEs range from 1,224 feet asl on the western edge of the project area to 1,174 feet asl at the eastern edge of the project area. Portions of these floodplains and floodways have been developed with residential structures.

Modification and expansion of the drainage network for agricultural development, and the inverted hydrograph that results from irrigation, lead to existing flooding problems.

Flooding in Wide Hollow watershed normally occurs in winter or spring. Spring floods occur when warm weather and rainstorms accelerate snow melt and runoff. Winter floods, which are often of larger magnitude and less predictable, occur when a combination of rainfall and warm winds on saturated or frozen ground produce large volumes of runoff from snowmelt and rain.

The project area is known to have been flooded in 1974, 1995, and 1996 (prior to construction of most residences) and in 2003 (Yakima County et al. 2012). The largest recent flood that affected the project area occurred on February 9, 1996, with damage amounting to several million dollars in the project area. The flooding resulted in more than $17.7 million of damage in Yakima County.

During floods of greater than the 10-year event, water floods out of Shaw Creek just upstream of South 92nd Avenue, floods to the south through open parcels and the Cottonwood subdivision, and eventually into Wide Hollow Creek. The Cottonwood Grove subdivision and proposed developable land in the area between the two creeks are potentially threatened by this flooding.

4.2.5 Consequences of Alternatives

4.2.5.1 Alternative 1: No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to improve Shaw or Wide Hollow Creeks. The County would not have the funding to construct the project components.

Surface Water

The Wide Hollow Creek conveyance improvements, bridge replacements, culvert addition, and overflow channel would not be constructed. Shaw Creek would remain in

its current condition and would continue to flow to Wide Hollow Creek. The existing 100-year flows in Shaw and Wide Hollow Creeks would remain and could increase over time due to development pressures and increased precipitation due to climate change. Flooding impacts would be minor to major depending on the magnitude of flood events and the extent and character of development.

Water Quality

Shaw Creek in the project area flows through residential areas with grazed pastures and mowed lawns. Water quality concerns associated with the road ditch portion of Shaw Creek include road surface contaminants, sediment discharge from ditch cleaning, periodic flood erosion, sediment from driveway culverts, and illegal dumping of fill debris and yard waste. Groundwater infiltration is also affected by unauthorized water diversions in Shaw Creek.[4] Effects to water quality also occur downstream in Wide Hollow Creek. Shaw and Wide Hollow Creeks would continue to be listed as Section 303(d) streams for certain pollutants. Minor adverse impacts to water quality in the streams would continue.

Wetlands

Wetland A would not be impacted from construction of the channel relocation. Inundation in the wetland would continue while Shaw Creek has flow during the irrigation season. No wetland impacts are anticipated.

Floodplains

Nearby populations, residential structures, and bridges would continue to be at risk from flooding in Shaw and Wide Hollow Creeks. Roughly 516 residences would be left in the floodplain and some could be damaged from floods. This includes flooding of Shaw Creek in residential basements on the north side of the Cottonwood Grove subdivision and to the south through residences and undeveloped parcels. Residences adjacent to Wide Hollow Creek and the West Valley Park area would also be at risk from flooding.

Residential development in Cottonwood Grove, Westbrook, and Clinton Way subdivisions and surrounding areas would also be at risk, even with development restrictions required to protect residences. Residences and other structures would continue to be permitted per National Flood Insurance Program standards and development would not be allowed in the floodway. Damage severity to structures would be minor to major depending on the magnitude of flood events. Other impacted floodplain values and functions are discussed in the other resource sections of this draft EA.

[4] Eric Bartrand, Area Habitat Biologist, Washington State Department of Fish and Wildlife, written communication to Cliff Bennett, Yakima County Public Services, June 24, 2014.

4.2.5.2 Alternative 2A: Proposed Action

Surface Water

The Proposed Action would be designed to carry 100-year flows of 354 cfs from the channel relocation to Wide Hollow Creek. No flows would continue into Shaw Creek and flooding down to Wide Hollow Creek would be eliminated. Because the channel relocation would divert flows into Wide Hollow Creek that normally overtop the banks of Shaw Creek, the 100-year flows in Wide Hollow Creek would increase by between 133 and 136 cfs in the project area (Yakima County 2014). The Wide Hollow Creek conveyance improvements, bridge replacements, culvert addition, and overflow channel would mitigate the flow increases and no surface water impacts are anticipated.

Surface flows may become subsurface in the relocated channel with penetration of the subsurface caliche layer. This will be a temporary, minor impact. Based upon the applicant's experience with similar projects in the Ahtanum Valley, any penetration of that caliche layer will reseal after the first few flood events.

Water Quality

Shaw Creek is currently listed as a 303d listed stream negatviely affect its channel and downstream to Wide Hollow Creek. The channel relocation is anticipated to improve water quality for Shaw Creek and consequently Wide Hollow Creek. There would be a minor beneficial effect to water quality due to the diversion and improved stream conditions in the channel relocation.

Sediment loads could temporarily increase in Wide Hollow Creek from crack willow removal. Low flows during winter would not have the volume and velocity to carry sediment very far downstream, and the resulting turbidity from construction activities would likely settle out within a short distance from the input source. The moderate flows in summer could result in turbidity from bridge replacement work without suitable measures to minimize erosion. The County would be responsible for following a temporary erosion and sediment control plan with BMPs including installing silt fencing, mulch or straw bales, and covering material stockpiles. Effects to water quality during construction are anticipated to be minor and temporary if avoidance and minimization measures are taken and BMPs are properly implemented.

Wetlands

The channel relocation would originate from the area surrounding Wetland A. The wetland would remain and drain south through the channel relocation instead of draining east through Shaw Creek. A berm would likely be located on the east side of the wetland along the south side of the Shaw Creek ditch and a portion of the wetland may become cut off from a water source. This potential adverse impact to Wetland A would be mitigated, as determined necessary, through the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permitting process. The lower reach of the channel relocation may be a suitable mitigation site location if mitigation is required. Impacts on Wetland A would be minor and permanent.

Floodplains

The Proposed Action would greatly reduce flood risks by relocating Shaw Creek so that its capacity would increase and be sufficient to convey the 500-year flood. The Proposed Action would remove approximately 493 existing and potential future parcels from the 100-year floodplain. It also reduces support of floodplain development due to the reduction in the extent of the floodplain through the project area. About 23 homes/structures would remain in the new floodplain. Development associated with removal of the floodplain is discussed in the Cumulative Impacts Section 4.6

According to the HEC-RAS hydraulic model WEST developed, the Proposed Action would reduce the existing 100-year floodplain by 1,104 acres (Yakima County 2014). There would be new floodplain along the relocation channel (Appendix A, Figure 3). Yakima County would seek a Letter of Map Revision (LOMR) from FEMA as soon as the project is completed. Other impacted floodplain values and functions are discussed in the other resource sections of this draft EA. Appendix D, EO 11988 – Floodplain Management Eight-Step Decision-Making Process, also provides a detailed discussion of floodplain effects. Beneficial effects to the floodplain are anticipated to be moderate to major.

4.2.5.3 Alternative 2B: Overflow Bypass Channel

Surface Water

Alternative 2B would be designed to carry 100-year flows of 349 cfs from the channel relocation to Wide Hollow Creek, while flows less than 5 cfs would continue in Shaw Creek. These flows would not irrigate revegetation and establish plants in the channel relocation. Maintenance for riparian plant establishment would be the same as Alternative 2A.

Due to the timing of the 100-year floods in Shaw and Wide Hollow Creeks, the 100-year flow in Wide Hollow Creek would be increased by 108 cfs (Yakima County 2010a). The project components would mitigate the flow increases as described in Alternative 2A and floodplain impacts are similar to Alternative 2A and the No Action Alternative.

Water Quality

Water quality impacts would be the same as described for Shaw Creek under the No Action Alternative in Section 4.2.5.1. Water quality impacts for the Shaw Creek relocation channel and for Wide Hollow Creek would be similar as described under Alternative 2A.

Wetlands

The channel relocation would originate from the area surrounding Wetland A. The wetland would remain and a berm would be designed to drain both east and south to Shaw Creek and the channel relocation, and a portion of the wetland may become cut off from a water source. This potential adverse impact to Wetland A would be mitigated, as determined necessary, through the USACE Clean Water Act Section 404 permitting process. The lower reach of the channel relocation may be a suitable mitigation site location. Impacts on Wetland A would be minor and permanent.

Floodplains

Alternative 2B would have the same effects to the Shaw and Wide Hollow Creek floodplains as those described for the Proposed Action in Section 4.2.5.2. Other impacted floodplain values and functions are discussed in the other resource sections of this draft EA.

4.3 BIOLOGICAL RESOURCES

The biological resources in the project area that are discussed are vegetation, wildlife and fish, Threatened and Endangered species, critical habitat, and special-status species.

4.3.1 Vegetation

The riparian areas of Shaw and Wide Hollow Creeks in the project area contain a mixture of native vegetation and invasive species. While some remnants of native cottonwood (*Populus balsamifera*) remain, the majority of the two channels are dominated by stands of non-native and/or hybridized willows with understory vegetation composed of reed canarygrass (*Phlaris aurundacia*) and yellow flag iris (*Iris pseudacorus*). The majority of Shaw Creek below the OHWM is primarily yellow flag iris due to the largely inverted hydrograph of the stream. The willows are mostly white willow (*Salix alba*) and crack willow, both of which have been described as existing in Washington State, with white willow described in numerous locations in the Yakima basin. Both are known to hybridize with pacific willow (*Salix lucida* ssp. *lasiandra*) (Yakima County et al. 2012).

In areas where channels have been maintained as irrigation or drainage ditches, such as portions of Shaw and Wide Hollow Creeks, willow trees achieve unusually large size (more than 60 feet tall) and produce large amounts of litter in the form of leaves and seeds and large quantities of small, medium, and large pieces of stems and trunks. The large amounts of litter tend to be cohesive and coat the bottom of the channel in layers of muck as they break down, and the woody debris greatly increases channel roughness and reduces channel conveyance over time.

Spread of these willow populations within a drainage area is primarily through sprouting of the large amount of small and large woody debris generated by these trees. Hybrid trees also remain fertile and can produce large amounts of airborne seeds that can travel up to 15 miles to colonize other habitats. The negative effects of reed canarygrass and yellow flag iris are similar in terms of changes in bank form and sediment accumulation, increased water use, and loss of native species (Yakima County et al. 2012). Both reed canarygrass and yellow flag iris are considered Class C noxious weeds by the Washington State Noxious Weed Control Board (NWCB) (NWCB 2014). Class C noxious weeds are either already widespread or are of special interest to the agricultural industry.

Wetland A is dominated by invasive non-native willows and Russian olive (*Elaeagnus angustifolia*) with scattered western crabapple (*Malus fusca*). The herbaceous stratum is dominated by cattails, yellowflag iris, reed canarygrass, sedges (*Carex* spp.), and bittersweet nightshade (*Solanum dulcamara*) with the area of shallow inundation dominated by duckweed (*Lemna* sp.). Upland areas are dominated by primarily noxious weeds typical of abandoned agricultural areas.

4.3.2 Wildlife and Fish

The USFWS Office of Migratory Bird Management maintains a list of migratory birds in 50 CFR § 10.13. The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §§ 703–711), provides federal protections for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions. The act includes a “no take” provision.

Common MBTA bird species in this region include black swift (*Cypseloides niger*), brewer’s sparrow (*Spizella breweri*), cassin’s finch (*Carpodacus cassinii*), loggerhead shrike (*Lanius ludovicianus*), olive-Sided flycatcher (*Contopus cooperi*), sage thrasher (*Oreoscoptes montanus*), and willow flycatcher (*Empidonax traillii*).

Appendix E provides a list of MBTA species common in Yakima County. Eastern Washington is part of the Pacific Flyway, and open water areas such as Naches and Yakima Rivers are considered a stopover location for avian species. Ducks, geese, herons, egrets, grebes, and other water-loving birds congregate in the open water areas of Yakima County. The nesting season for migratory birds is generally from March through August, depending on species and location.

Mammals that may commonly be seen in the vicinity of Yakima County include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), beaver (*Castor canadensis*), black-tailed jackrabbit (*Lepus californicus*), Townsend’s ground squirrel (*Urocitellus townsendii*), and numerous bat species.

According to WDFW (2015), several large mammals use areas north of the project area, including winter ranges and year-round concentrations of mule deer (*Odocoileus hemionus hemionus*) and elk (*Cervus elaphus*).

Fish species known to occur in Wide Hollow Creek include coho (*Oncorhynchus kisutch*), rainbow trout (*Oncorhynchus mykiss*) and steelhead (*Oncorhynchus mykiss*) (WDFW 2015). Ecology conducted electroshock fish surveys in Wide Hollow Creek in August and November 2013 and recorded the following species: redside shiner (*Richardsonius balteatus*); bridgelip sucker (*Catostomus columbianus*); largescale sucker (*Catostomus macrocheilus*); chiselmouth (*Acrocheilus alutaceus*); rainbow trout (*Oncorhynchus mykiss*); pikeminnow (*Ptychocheilus oregonensis*); speckled dace (*Rhinichthys osculus*); Chinook salmon (*Oncorhynchus tshawytscha*); three-spine stickleback (*Gasterosteus aculeatus*); bluegill (*Lepomis macrochirus*); longnose dace (*Rhinichthys cataractae*); and torrent sculpin (*Cottus rhotheus*).

In areas with non-native willows, a significant amount of leaf litter and woody debris in Wide Hollow Creek has resulted in a series of log jams with an associated muck substrate that are significant barriers to fish passage. There is also an Alaska Steep Pass fishway at the mouth of Wide Hollow Creek that provides fish passage for adult salmonids but not juveniles or small resident fish (Yakima County et al. 2012). Other fish barriers have been identified upstream in Wide Hollow Creek (Appendix C). These conditions limit the potential of Wide Hollow Creek to provide spawning and rearing habitat for salmonids.

There is no documented utilization of Shaw Creek by anadromous fish species (WDFW 2015).

4.3.3 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §§ 1531–1544), was established to conserve, protect, and restore Threatened and Endangered species and their habitats. Section 7 of the ESA (16 U.S.C. § 1536) requires federal agencies to ensure that their actions do not jeopardize the continued existence of listed species, and do not result in adverse modification to designated critical habitat.

The WDFW, USFWS, and the NMFS databases identify eight Threatened and one Endangered species with potential to occur in the Yakima County area (USFWS 2014). Bull trout (*Salvelinus confluentus*) and the Middle Columbia River steelhead DPS are the only species that have the potential to occur in the project area. The other species are eliminated from further discussion in this draft EA because they have no potential to occur in the project area.

4.3.3.1 Steelhead

Steelhead exhibit the most complex life history of any species of Pacific salmonid. Steelhead that are anadromous are referred to as steelhead, and steelhead that are freshwater are referred to as rainbow trout.

Steelhead presence has been documented in lower Wide Hollow Creek downstream of the project area (Yakima County et al. 2012), and spawning has been recorded but has not been detected in many years.[5] A recent radiotelemetry study of adult steelhead in the Yakima basin did not find any use of Wide Hollow Creek. At some time in the past it may have supported limited steelhead spawning; but irrigation conveyance, return flows, and surrounding urban development currently hinder spawning. Two passage barriers in Wide Hollow Creek impede upstream passage of juvenile and adult steelhead. The NMFS assumes that the nearest steelhead presence is below the Fines diversion, approximately 2 miles downstream of the project area (Appendix F).

Critical habitat for steelhead is present in Wide Hollow Creek at the upstream-most extent of the project area. The critical habitat is of poor quality due to a severely disturbed hydrograph and a variety of deleterious effects resulting from agriculture and urban development (Appendix F).

For more details about Middle Columbia River steelhead DPS see the *Shaw and Wide Hollow Creeks Flood Control Project Draft Biological Assessment* (URS 2015), available upon request.

4.3.3.2 Bull Trout

Bull trout have stringent requirements for cold water and clean gravel to rear and reproduce. Spawning usually occurs in mountain streams fed by snow-melt or springs fed by snow fields (Goetz et al. 2004). The habitat components required by bull trout are often summed up by the “Four C’s” – cold, clean, complex, and connected. Bull trout exhibit patchy distributions because even under pristine conditions, the required habitat components are not ubiquitous throughout river basins.

Bull trout are not likely to occur in Wide Hollow Creek for the following reasons: temperature conditions cannot support bull trout, the creek has a reverse (i.e., flipped) hydrologic cycle due to irrigation conveyance, and bull trout occur in very low numbers in the Yakima River mainstem. Bull trout have not been documented in the portion of the Yakima River near the confluence with Wide Hollow Creek (Yakima County et al. 2012).

[5] Dale Bambrick, Chief, NOAA Fisheries, Columbia Basin Branch, written communication to Jennifer Pretare, Biologist, URS Group, Inc., July 18, 2014.

For more details about bull trout see the *Shaw and Wide Hollow Creeks Flood Control Project Draft Biological Assessment* (URS 2015), available upon request.

4.3.4 Special-Status Species

Two species are listed in Yakima County as Candidate species under the ESA: greater sage-grouse (*Centrocercus urophasianus*) and whitebark pine (*Pinus albicaulis*). Candidate species are those that have been petitioned and are actively being considered for listing as Endangered or Threatened under the ESA. Candidate species are afforded no protection under the ESA.

Data from WDFW and Washington Natural Heritage Program (WNHP) were queried for known special-status species in and near the project area (WDFW 2015; WNHP 2014). These data show no special-status species in the project area and they will not be discussed further in this draft EA.

4.3.5 Consequences of Alternatives

4.3.5.1 Alternative 1: No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to improve Shaw or Wide Hollow Creeks. The County would not have the funding to construct the project components.

Vegetation

Non-native plant communities of primarily yellow flag iris and crack willow would continue to affect the Wide Hollow Creek channel shape and function over time. They would continue to impede flow and increase overbank flooding in Shaw and Wide Hollow Creeks. Losses of vegetation in the floodplain would continue from flooding and the prevalence of non-native species. Adverse impacts from non-native plants and flooding of vegetation would be minor.

Wildlife and Fish

The potential for losses of wildlife and fish habitats due to continued flooding in Shaw and Wide Hollow Creeks would remain. Non-native plant communities would continue to dominate habitat along the stream channels and affect channel shape and function over time. Impacts on terrestrial and aquatic habitats would be minor to moderate.

Threatened and Endangered Species

Water quality and channel conditions in Shaw and Wide Hollow Creeks are not anticipated to affect potential ESA-listed steelhead assumed to be located below the Fines diversion 2 miles downstream of the project area. No impacts to Bull Trout and negligible impacts to steelhead are anticipated.

4.3.5.2 Alternative 2A: Proposed Action

Vegetation

Under the Proposed Action, the disturbance area would be approximately 21.5 acres where vegetation would be cleared and grubbed (Table 3-1). Because 97 percent of the disturbance area would be replanted through restoration work on the channel relocation and Wide Hollow Creek, impacts to vegetation would be minor and temporary. The long-term vegetation would be enhanced by removing invasive species and replacing with native plants. Yakima County is currently working on a demonstration project to remove crack willow along Wide Hollow Creek, and results of that project would provide additional information for a planting plan.

Vegetation in Shaw Creek including non-native plant communities that cannot survive without seasonal irrigation flows would naturally change over time with plant species better suited to the hydrologic conditions. Vegetation impacts are anticipated to be negligible.

Wildlife and Fish

Various factors, including changes in food sources, shelter, population density, and dispersal would determine the severity of impacts on wildlife. Minor, localized, and scattered impacts on wildlife, including migratory birds, could occur through floodplain restoration and changes to vegetation under the Proposed Action. The channel relocation and the Wide Hollow Creek improvements are anticipated to provide enhanced long-term wildlife habitat from native planting restoration compared to the habitat in Shaw and Wide Hollow Creeks.

The summer bird breeding season is generally from March through August. While most construction would occur during winter months, replacement of the two bridges would last approximately 3 to 4 months during the summer. Short-term construction activities that produce noises such as heavy equipment and trucks would cause temporary disturbance and/or dispersal of wildlife away from the bridges. Vegetation habitat along the channel relocation and Wide Hollow Creek would be temporarily lost to wildlife, but would occur during the non-breeding season for birds. Minor and temporary impacts could occur to nesting birds and birds protected under the MBTA.

Shaw Creek would likely be dry with no natural flow during winter construction. However, there could be a few small ponded areas remaining after the channel relocation is completed. Prior to construction, a survey to determine fish presence in the project area would be undertaken. If necessary, a fish or invertebrate capturing mission would be planned for the dewatering areas after the flow is directed into the channel relocation. After construction and dewatering, wildlife may have fewer resources available from seasonal irrigation in Shaw Creek. Wildlife may utilize resources that

become available in the relocation channel. Wildlife and fish impacts are anticipated to be negligible.

The channel relocation would have a summer flow of approximately 3 to 4 cfs and winter flow of approximately 8 to 10 cfs. It would be designed to be fish passable, but no current planned crossings would require a culvert. The channel relocation would provide enhanced fish habitat in Shaw Creek, especially on the southern end where a bifurcated channel would be designed per WDFW recommendations. No wildlife and fish impacts are anticipated.

The Wide Hollow Creek conveyance improvements would require removing clumps of crack willow and temporarily decreasing riparian shading during replanting with native vegetation. Sediment loads affecting aquatic species could temporarily increase in Wide Hollow Creek from crack willow removal. Low flows during winter would not have the volume and velocity to carry sediment very far downstream, and the resulting turbidity from construction activities would likely settle out within a short distance from the input source. The moderate flows in summer could result in turbidity from bridge replacement work without suitable measures to minimize erosion. Avoidance and minimization measures during dewatering of the bridge sites would reduce the potential harm or injury to fish and BMPs would be implemented to reduce the risk of erosion. Effects to wildlife and fish species are anticipated to be minor and temporary with properly implemented avoidance and minimization measures and BMPs.

Threatened and Endangered Species

Middle Columbia River steelhead DPS is the only listed species that has the potential to occur in the project area. Presence of steelhead in the project area is improbable because two passage barriers in Wide Hollow Creek impede upstream passage of juvenile and adult steelhead. Negligible impacts to steelhead are anticipated.

4.3.5.3 Alternative 2B: Overflow Bypass Channel

Construction of Alternative 2B would result in largely the same biological resource impacts as discussed for Alternative 2A (Proposed Action). Under Alternative 2B, flows of less than 5 cfs would continue in Shaw Creek during irrigation months and impacts would be similar to the No Action Alternative.

Vegetation

Irrigation flows would continue to support vegetation in Shaw Creek but these flows would not irrigate native vegetation in the channel relocation and optimize infiltration of surface water. Non-native plant communities would continue to be prevalent in the Shaw Creek. Minor vegetation impacts are anticipated from Alternative 2B.

Wildlife and Fish

Water quality concerns in Shaw Creek that may affect wildlife and fish would continue to be a concern as described in Section 4.2.5.3. Dry periods in the channel result in small ponding areas some of which dry, leading to potential isolation and mortality of fish. Shaw Creek provides little or no opportunity for restoration or enhancement which would benefit wildlife and fish. Minor to moderate wildlife and fish impacts are anticipated from Alternative 2B.

Threatened and Endangered Species

Water quality and channel conditions in Shaw and Wide Hollow Creeks are not anticipated to affect potential ESA-listed steelhead assumed to be located below the Fines diversion 2 miles downstream of the project area. No impacts to Bull Trout and negligible impacts to steelhead are anticipated.

4.4 CULTURAL RESOURCES

Cultural resources consist of locations of human activity and occupation and use identified through field inventory, historic documentation, or oral evidence. The term encompasses historic properties as defined by the National Register of Historic Places (NRHP), including archaeological and architectural properties, as well as sites of traditional cultural or religious importance to Native American Tribes or other social or cultural groups.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. § 470f), requires that activities needing federal permits or using federal funds undergo a review process to consider historic properties that are listed in or may be eligible for listing in the NRHP. The State Historic Preservation Office (SHPO) is the federal agency's primary Section 106 partner. Because Section 106 is a process in which the Federal Government assesses the effects of its undertakings on historic properties, it is the primary regulatory framework used in the NEPA process to determine impacts on cultural resources.

The Area of Potential Effects (APE) for the Proposed Action is limited to the ground-disturbing construction activities (21.5 acres) and a 200-foot buffer from the edge of all construction areas. The total disturbed area is approximately 42 acres. The APE for archaeological and historic-era built resources is considered to be the same.

4.4.1 Ethnographic and Historical Context

Before the arrival of Euro-Americans, Yakima Valley was the ancestral homeland of a large and diverse group of Native Americans. These people are known to have lived along the Yakima River for at least 10,000 years and shaped much of the cultural

landscape during this period. The project area lies within the ethnographic territory of the Yakama (Ray 1936). The Yakama practiced a seasonal subsistence and settlement system that included wintering in semi-permanent villages along the Columbia River and its tributaries, including the Yakima River.

The first direct contact of Native Americans with whites is attributed to the Lewis and Clark Expedition of 1805 to 1806. Within 10 years of this expedition, fur traders such as Alexander Ross of the North West Company began exploring the area. Missionaries arrived during the late 1830s and 1840s (Lyman 1919; Ruby and Brown 1992), introducing farming and irrigation techniques along with Christianity, but settlement remained sparse until the Donation Land Claim Act of 1850 spurred a great migration of settlers to the region.

The arrival of the Northern Pacific Railroad to the Yakima Valley in 1885 led to a population increase and stimulated agricultural growth. Concurrent with the development of the railroad and agriculture was the development of complex irrigation systems throughout the valley. The initial stage of agricultural irrigation extended through the 1870s, as hundreds of small irrigation systems were dug by individual and cooperative landowners (Dondrill and Sadin 2009).

The growth of transportation and irrigation facilities resulted in an economy shift from ranching to agriculture. Food processing plants and cold storage warehouses were established, and fruits, potatoes, and hops were exported via rail. The Yakima Valley grew substantially during the early 20th century. By the 1920s, rail lines running north-south through Yakima, from Union Gap to Selah Gap, stimulated industrial growth. Although the Depression of the 1930s severely slowed growth in the Yakima Valley, World War II ameliorated the effects of the Depression by the late 1940s, and Yakima's economy diversified. Yakima and surrounding communities remain dependent on an agricultural economy; orchard lands are scattered intensively throughout the region.

The U.S. National Park Service's Native American Consultation Database (NPS 2013) lists the Confederated Tribes and Bands of the Yakama Nation and the Confederated Tribes of the Colville Reservation as having ancestral interest in Yakima County.

The project area is approximately 3 miles from the Yakama Nation Reservation. Ahtanum Creek is the northern boundary of the reservation.

4.4.2 Identification of Historic Properties

In 2012 and 2013, a Phase I cultural resources survey was conducted by archaeological staff from URS Group, Inc. (URS) to locate archaeological and architectural resources that may exist within the APE that are potentially eligible for the Washington State Heritage Register or NRHP. The investigation consisted of a thorough background research of the history of land use activities within the project area, followed by a

surface survey of the project area and the excavation of subsurface probes in areas of high probability and low visibility.

Cultural properties within the APE were identified, documented, and evaluated in accordance with state and federal statutes and regulations, including Section 106 and its applicable guidelines (36 CFR Part 800).

Subsurface probes were conducted to determine the location, nature, and boundaries of any potentially significant archaeological sites. All architectural and archaeological resources 50 years of age or older were evaluated for their potential State or NRHP eligibility by an Secretary of Interior-qualified staff, documented on State of Washington Department of Archaeology and Historic Preservation (DAHP) forms, and submitted to DAHP as part of the cultural resources inventory report (URS 2014).

The survey resulted in the identification and recordation of two historic archaeological sites within the Shaw Creek channel relocation. Eight historic-era built resources are located within the APE. Three of the homesteads are along Wide Hollow Road, and two are situated along South 92nd Avenue. Two historic-era bridges are located along Wide Hollow Road, and one historic-era bridge is located along South 80th Avenue.

Due to lack of character defining features, the eight historic-era built resources are recommended as not eligible for listing in the NRHP. The two historic archaeological sites (sites 45YA1552 and 45YA1553) are also recommended as not eligible for listing in the NRHP (URS 2014).

4.4.3 Consequences of Alternatives

4.4.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to improve Shaw or Wide Hollow Creeks. The County would not have the funding to construct the project components.

Historic archaeological sites and historic-era built sites found by URS during the cultural inventory would continue to be at risk from flooding, along with any unidentified or buried cultural properties that may be NRHP-eligible. Impacts to cultural resources could be minor depending on the flood event and proximity to the sites.

4.4.3.2 Alternative 2A: Proposed Action

Eight historic-era built resources are located within the APE. Three of the homesteads are located along Wide Hollow Road: the ca. 1910 Zeigler House, the ca. 1925 Martz House, and the ca. 1950 Rhodes House. The ca. 1930 Daniels House and the ca. 1950 Woodkey House are situated along South 92nd Avenue. Two historic-era bridges are located along Wide Hollow Road (Bridges #80 and #81) and one historic-era bridge (#449) is located along South 80th Avenue.

The above-listed properties with the exception of the ca. 1950 Rhodes House and the two bridges would be partially acquired for the Proposed Action (see Table 3-3 for more information). The ca. 1925 Martz House would also be demolished. Given the nature and location of project activities, no other aboveground historic properties except those listed above as being acquired would be affected by the Proposed Action.

The relocation of Shaw Creek would occur in an area that has been previously disturbed for agriculture. Two archaeological sites have been documented in the APE adjacent to the channel relocation: sites 45YA1552 and 45YA1553.

The historic-era archaeological site 45YA1552 is in poor condition and has been disturbed by erosion from frequent flooding episodes, plowing, and construction activities associated with earthen embankments. Most of the surface artifacts have been crushed or partially buried by heavy, mechanized equipment. The site appears to have no integrity and no spatial artifact patterning. Therefore, the site is recommended as not eligible for listing in the NRHP under Criterion D (36 CFR § 60.4(d)).

Site 45YA1553 is a subsurface historic-era site adjacent to the APE with archaeological resources that appear to represent mid-20th century agricultural activities. The site is in poor condition and disturbed by erosion from frequent flooding episodes, and most of the artifacts have been crushed or buried by heavy, mechanized equipment. The site appears to have no integrity and no spatial artifact patterning. Therefore, the site is recommended as not eligible for listing in the NRHP under Criterion D (36 CFR § 60.4(d)).

The Proposed Action would have no effect on archaeological or historic properties.

In the event of an unanticipated archaeological discovery during construction, Yakima County will be required to stop work immediately in the vicinity of the find until a qualified archaeologist meeting the Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61) for archaeology can make a determination as to the significance of the find and identify an appropriate course of action in consultation with FEMA, the SHPO, and Tribes. In the event that human remains are encountered, all work will stop, and law enforcement and the county coroner shall be immediately notified (Revised Code of Washington 27.44; 68.50; 68.60). Concurrently, DAHP, the Yakama Nation, and the Colville Reservation will be contacted in the event the remains are non-forensic.

Consultation with the SHPO resulted in concurrence with the no effect determination (Appendix F). Additionally, coordination was initiated with the Yakama Nation and Colville Reservation on June 5, 2014, to help determine the project effects to historic properties of religious and cultural importance to the Tribes; no responses were recieved.

4.4.3.3 Alternative 2B: Overflow Bypass Channel

Construction of a Shaw Creek overflow bypass channel would result in the same impacts as discussed for Alternative 2A (Proposed Action). There would be no additional anticipated impacts to cultural resources under Alternative 2B.

4.5 SOCIOECONOMIC RESOURCES

The socioeconomic resource that is discussed is environmental justice (Section 4.5.1). The consequences of the alternatives on this socioeconomic resource are discussed in Section 4.5.2.

4.5.1 Environmental Justice

EO 12898, Environmental Justice, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from federal programs, policies, and activities. Socioeconomic and demographic data for residents in the project vicinity were studied to determine whether the Proposed Action would have disproportionate impacts on minority and low-income persons.

Data from the 2010 Census for Yakima County were used to identify the minority[6] and low-income[7] compositions of the project area, which is located in Census Tract 28.02. The minority population in the project area was approximately 13.8 percent. The poverty rate of the population in the project area was approximately 12.4 percent (U.S. Census Bureau 2010). These levels are consistent with the County and State as a whole.

4.5.2 Consequences of Alternatives

4.5.2.1 Alternative 1: No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to improve Shaw or Wide Hollow Creeks. The County would not have the funding to construct the project components. The risk of flooding and property loss would continue. Minority and low-

[6] A minority person is “a person who is: (1) Black (a person having origins in any of the black racial groups of Africa); (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); (3) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or (4) American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).” (U.S. Census Bureau 2014).

[7] Low-income is identified as “one whose median household income is at or below the Department of Health and Human Services poverty guidelines.” (USHHS 2013) Income data based on Department of Health and Human Services guidelines are difficult to gather, so U.S. Census Bureau data are often used for environmental justice analyses.

income populations in the project area would not benefit along with the entire affected population from a reduction in flood risks. No socioeconomic impacts are anticipated.

4.5.2.2 Alternative 2A: Proposed Action

The project area was chosen as high priority for mitigation based solely on the need to enhance protection for infrastructure and property and remove properties from the floodway and floodplain, while stabilizing the stream corridor and improving the aquatic ecosystem. Demographics were not a factor in the decision. Furthermore, minority or low-income populations in the project area will benefit equally to the entire affected population from a reduction in flood risks. No to negligible socioeconomic impacts are anticipated since only a few properties not currently in County ownership would be directly affected, and the beneficial effects would be equitable across all populations and economic groups.

4.5.2.3 Alternative 2B: Overflow Bypass Channel

Similar to Alternative 2A, construction of a Shaw Creek overflow bypass channel would benefit all populations in the project area equally by reducing the risk of flooding.

4.6 CUMULATIVE IMPACTS

CEQ regulations for implementing NEPA require an assessment of cumulative effects during the decision-making process for federal projects. Cumulative effects are defined as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).

Cumulative effects were determined by combining the effects of these alternatives with other past, present, and reasonably foreseeable future actions.

In the vicinity of the project area, some undeveloped lands remain, including agricultural lands, fallow fields and grazing pastures. The City and County of Yakima split administration of the land in this area. Most land within the city limits is designated as low to high density residential in the land use plan/zoning ordinance, and most of the unincorporated County lands to the south of Wide Hollow Road are designated in the land use plan/zoning as single family residential. The reduction of the 100-year floodplain is likely to encourage additional development in the vicinity of the project area. The change in the 100-year floodplain is shown in Appendix A, Figure 3. A residential developer owns a large parcel in the vicinity of the project. The proposed project would remove floodplain in several large parcels that would allow them to be

developed. At the early start of the project, the large parcel east of Cottonwood Middle School was in the process of being purchased by a developer and the plat had been drawn that included a minimum of 100 lots. Although the Proposed Action could facilitate an increase in population and housing in the Cottonwood Grove, Westbrook, or Clinton Way subdivisions by reducing flood risks, any new development would likely be outside the floodplain and floodway. Anyone proposing new development in the floodplain would need to apply for a Yakima County Flood Hazard Permit and Critical Areas, Shoreline, and Floodplain Site Plan, and be in compliance with minimum requirements of the National Flood Insurance Program, thereby minimizing flood damage risks. The project is not expected to increase development in the 100-year floodplain.

Cumulative effects from development of residential properties near the project area would likely increase the amount of impervious surface draining to Shaw Creek and Wide Hollow Creek. New development would be required to comply with the City and County of Yakima construction, grading, site plan and other permits that regulate stormwater and runoff. Impacts would also be minimized by Wide Hollow Creek conveyance improvements and restoration work.

Yakima County Water Resources Division plans a channel improvement along a 1,400-foot segment upstream on Wide Hollow Creek. The multi-phase flood control project would remove invasive plant species and clear debris and sediment underneath the South 96th Avenue Bridge. Permitting and approvals are complete, and work was planned to start in October 2014.[8] The results of this project would provide Yakima County additional guidance on best practices for the Proposed Action. The channel improvement project would eventually extend downstream to the upstream limit of the Proposed Action.

The Proposed Action and other projects that are planned in the greater Shaw and Wide Hollow Creeks areas are not expected to have adverse cumulative impacts on geology, soils, or climate; surface water, water quality, wetlands, or floodplains; vegetation, wildlife, or fish (including ESA-listed species and critical habitat); historic, archaeological, or cultural resources; or socioeconomic resources or environmental justice.

The projects would be implemented in accordance with the *Yakima County Multi-Jurisdictional Hazard Mitigation Plan* (Yakima County 2010b) and the *Ahtanum-Wide Hollow Comprehensive Flood Hazard Management Plan* (Yakima County et al. 2012).

[8] Troy Ross-Havens, Engineer, Yakima County Water Resources Division, written communication, to Mark Eberlein, FEMA Region X, October 7, 2014.

SECTION FIVE AGENCY COORDINATION AND PUBLIC INVOLVEMENT

Several outreach activities associated with the proposed project have occurred. During the 5-year planning process for the *Ahtanum-Wide Hollow Comprehensive Flood Hazard Management Plan* (Yakima County et al. 2012), many public meetings were held to identify flooding problems and possible solutions.

Press releases and two project-specific public meetings were held in 2008 to solicit input from landowners adjacent to the project area. Adjacent landowners and homeowners of nearby residences received scoping notices in June 2014. The scoping comment period ended on July 8, 2014. The purpose of the scoping process was to inform agencies and stakeholders about the proposed project and to allow the public, organizations, agencies, and Tribes to provide comments regarding the scope of the proposed project, the alternatives, and any environmental and historic preservation issues of concern that should be considered in the draft EA. The scoping notice and scoping report are included in Appendix H.

During preparation of this draft EA, Ecology, NMFS, SHPO, WDFW, and USACE were contacted for information and comment. Consultation with NMFS and SHPO was completed and correspondence is included in Appendix F. The Confederated Tribes and Bands of the Yakama Nation and the Confederated Tribes of the Colville Reservation were contacted for comment (Appendix G).

A public notice was provided for the draft EA and a public meeting was held on September 16, 2015. The public, Tribes, and agencies had the opportunity to comment on the EA for 30 days after publication of the notice. The notice identified the action, location of the proposed site, participants, location of the draft EA, and who to write with comments. FEMA reviewed all written comments submitted during the comment period and incorporated any necessary changes into the final EA. A summary of comments and FEMA's response can be found in Appendix I.

SECTION SIX PERMITTING, PROJECT CONDITIONS AND MITIGATION MEASURES

Yakima County will comply with the following project conditions and mitigation measures as part of the grant award and permitting conditions:

- Permits:
  - Nationwide Permit 27, USACE
  - Low Erosivity Waiver Certification, EPA
  - Washington State Hydraulic Code Permit, WDFW
  - Grading and flood hazard permits, Yakima County
- The County will be responsible for following a temporary erosion and sediment control plan with BMPs to control erosion and sedimentation, reduce spills, and pollution and provide habitat protection.
- Existing tree and shrub species that currently exist along the streambank will be preserved to the maximum extent to help provide additional bank stability and maintain riparian habitat functions.
- All disturbed ground will be revegetated at the earliest practicable time after completion of construction. A planting plan will be developed.
- If fish are identified during surveys, measures to protect fish species during dewatering will take place. They will include minimization of handling, adherence to NMFS electrofishing guidelines, use of sanctuary nets, use of bubblers in holding containers, and the quick release of captured fish downstream of the site.
- In the event that unanticipated cultural resources are discovered during project activities, and in compliance with state and federal laws protecting cultural resources, including Section 106 of the NHPA, work in the immediate vicinity will cease, the area will be secured, and FEMA and the SHPO will be notified.
- Once the project is complete, in accordance with its compliance with the National Flood Insurance Program, Yakima County will complete the LOMR process in a timely manner.
- Any change to the approved scope of work will require re-evaluation for compliance with NEPA and other laws and EOs before implementation.

SECTION SEVEN CONCLUSION

This draft EA evaluated environmental and historic resources that could be affected by the Proposed Action. The results of the evaluation are that the Proposed Action would not have any significant adverse impacts on the following resources: geology, soils, or climate; surface water, water quality, wetlands, or floodplains; vegetation, wildlife, or fish (including ESA-listed species and critical habitat); historic, archaeological, or cultural; or socioeconomic or environmental justice.

Implementing the conditions associated with permits or approvals is expected to avoid or minimize short-term, minor adverse effects associated with the Proposed Action. Following public involvement, FEMA will determine whether to issue a FONSI for the Proposed Action.

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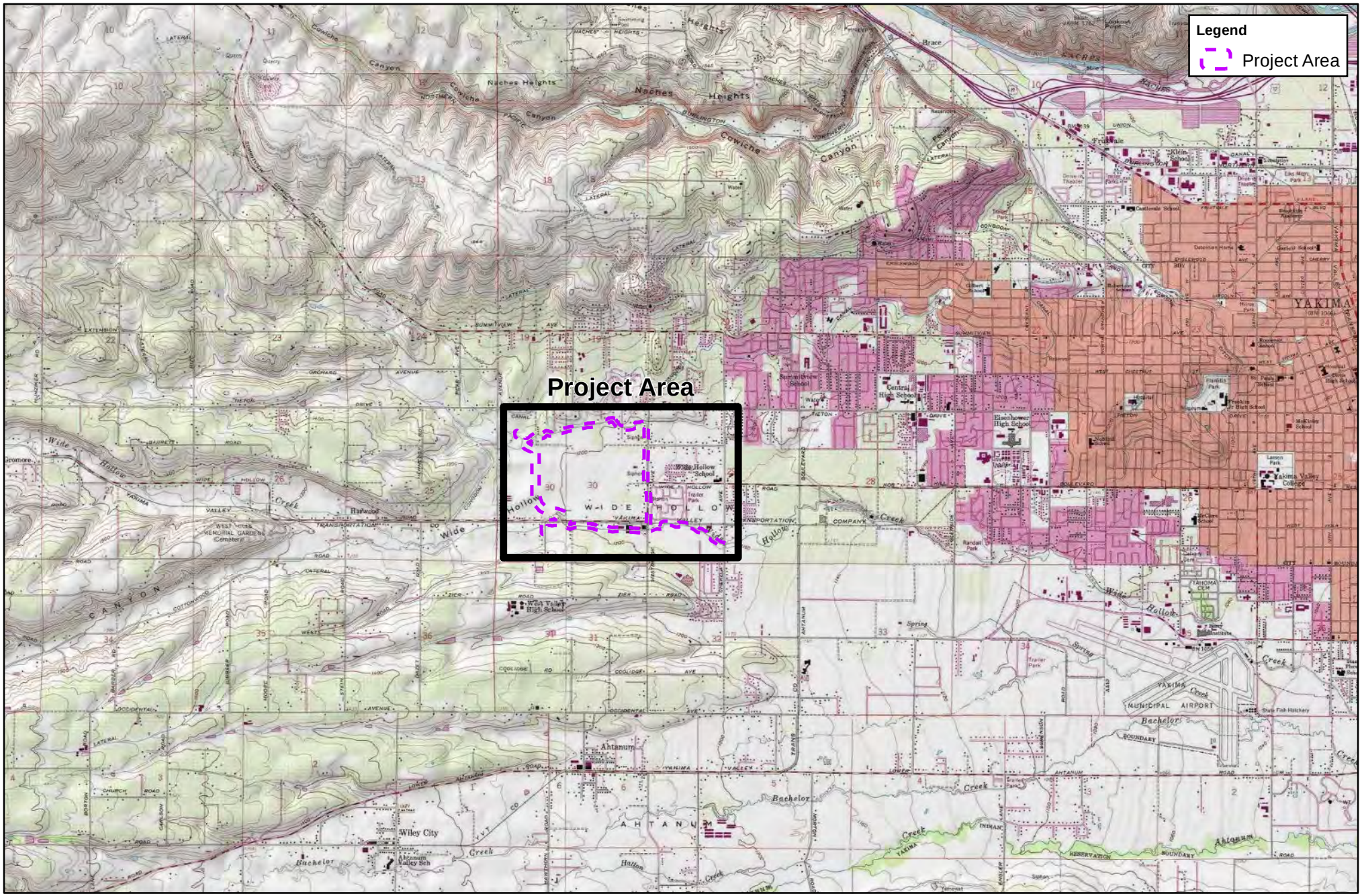
Appendix A
Figures



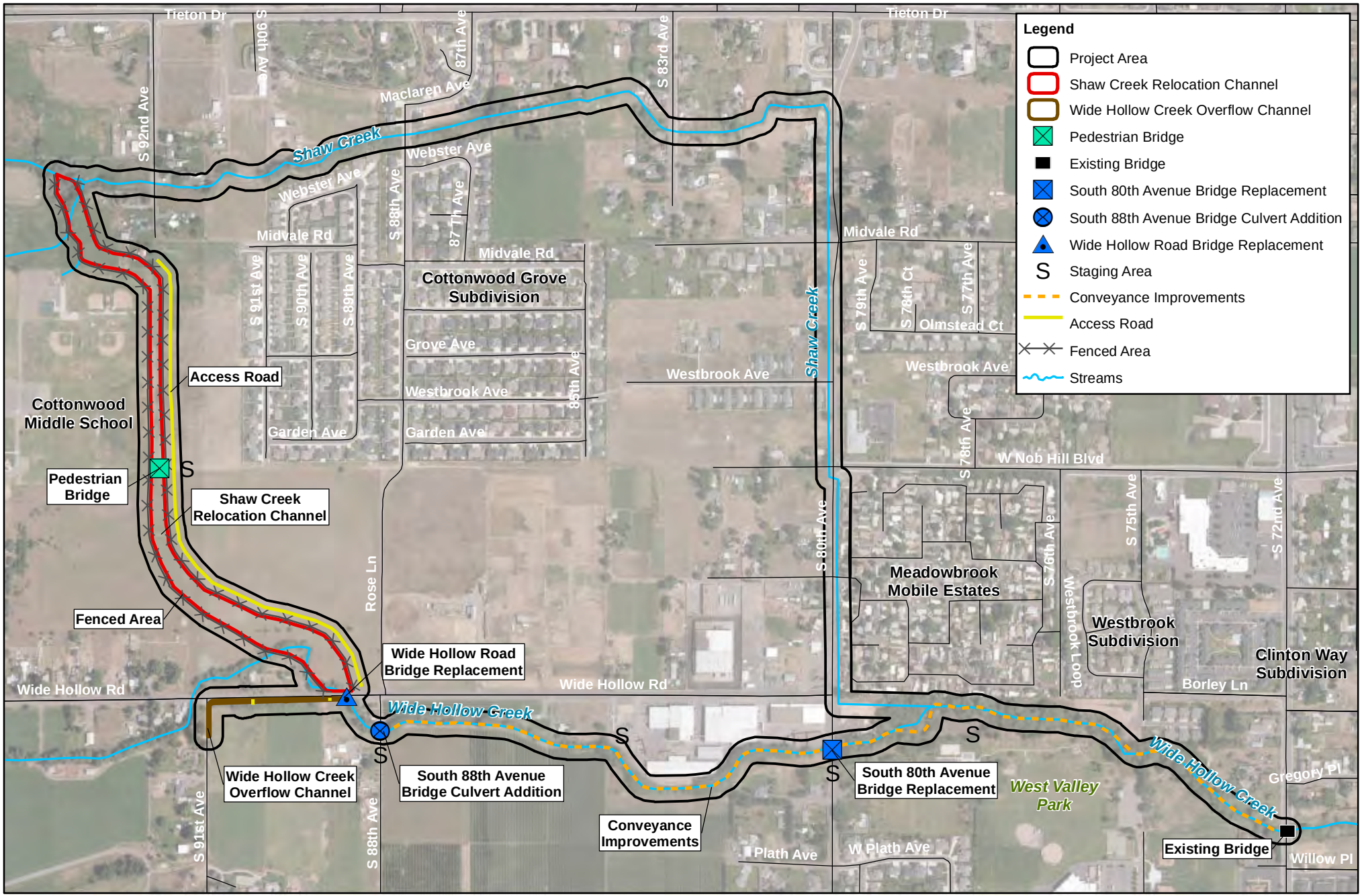
Background: ESRI USA Topo Maps.

Figure 1

Project Area and Vicinity

Shaw and Wide Hollow Creeks Flood Control Project

Yakima County, Washington



Background: ESRI Imagery.
Source: Yakima County.

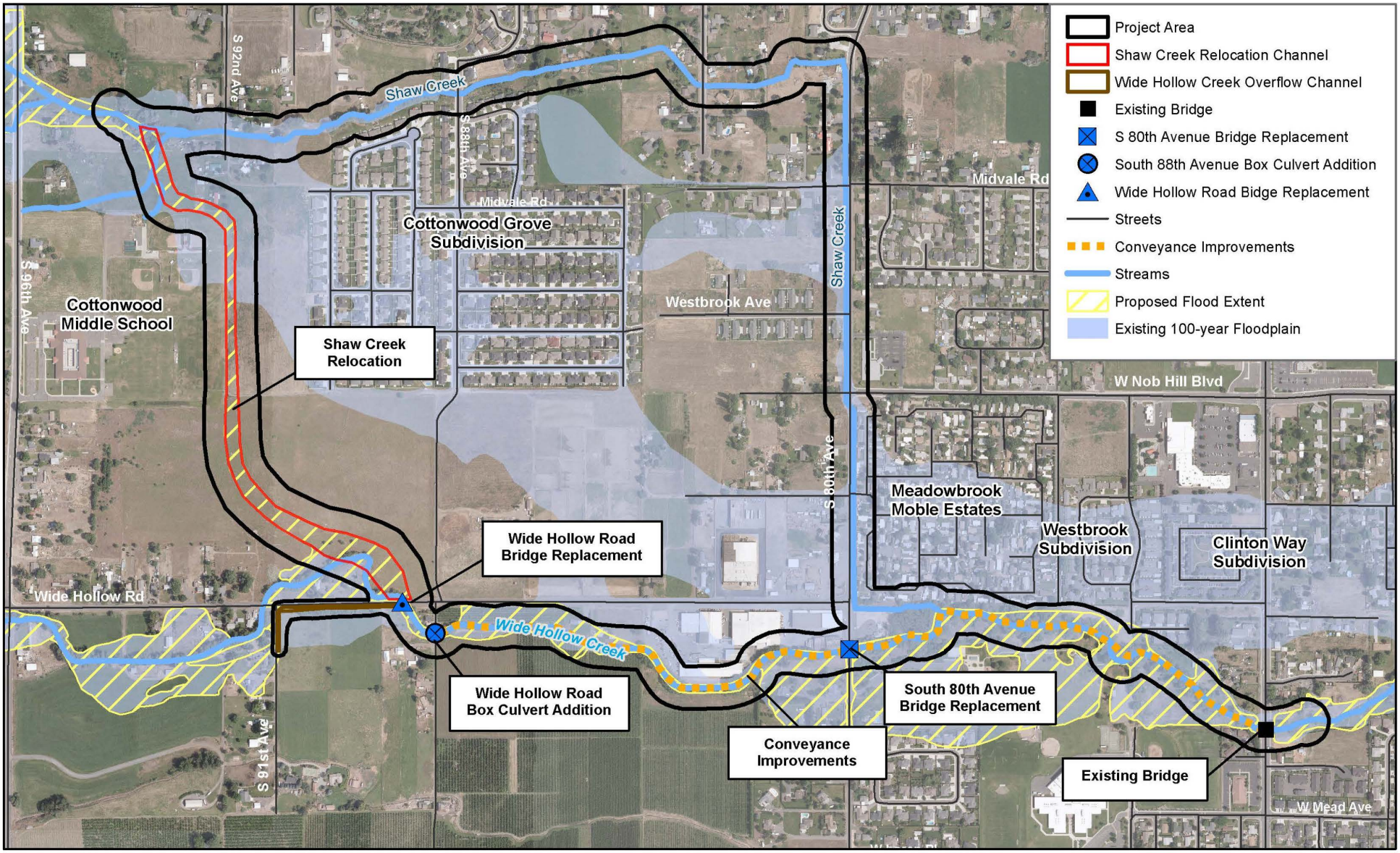
Feet
0 500 1,000

Figure 2

Project Area

Shaw and Wide Hollow Creeks Flood Control Project

Yakima County, Washington



Background: ESRI Imagery.
Source: Yakima County

NOT TO SCALE

0 250 500 1,000 Feet

Figure 3

Project Area and 100-year Floodplain

Shaw and Wide Hollow Creeks Flood Control Project

Yakima County, Washington

Appendix B
Preliminary Design

Shaw & Wide Hollow Creeks Flood Control Project

Wide Hollow Creek
City of Yakima
Bridge #80 Replacement

OHWM

Improved Structures

Staging Area

Parcels

Streams

Canal or Ditch

Stream

Roads

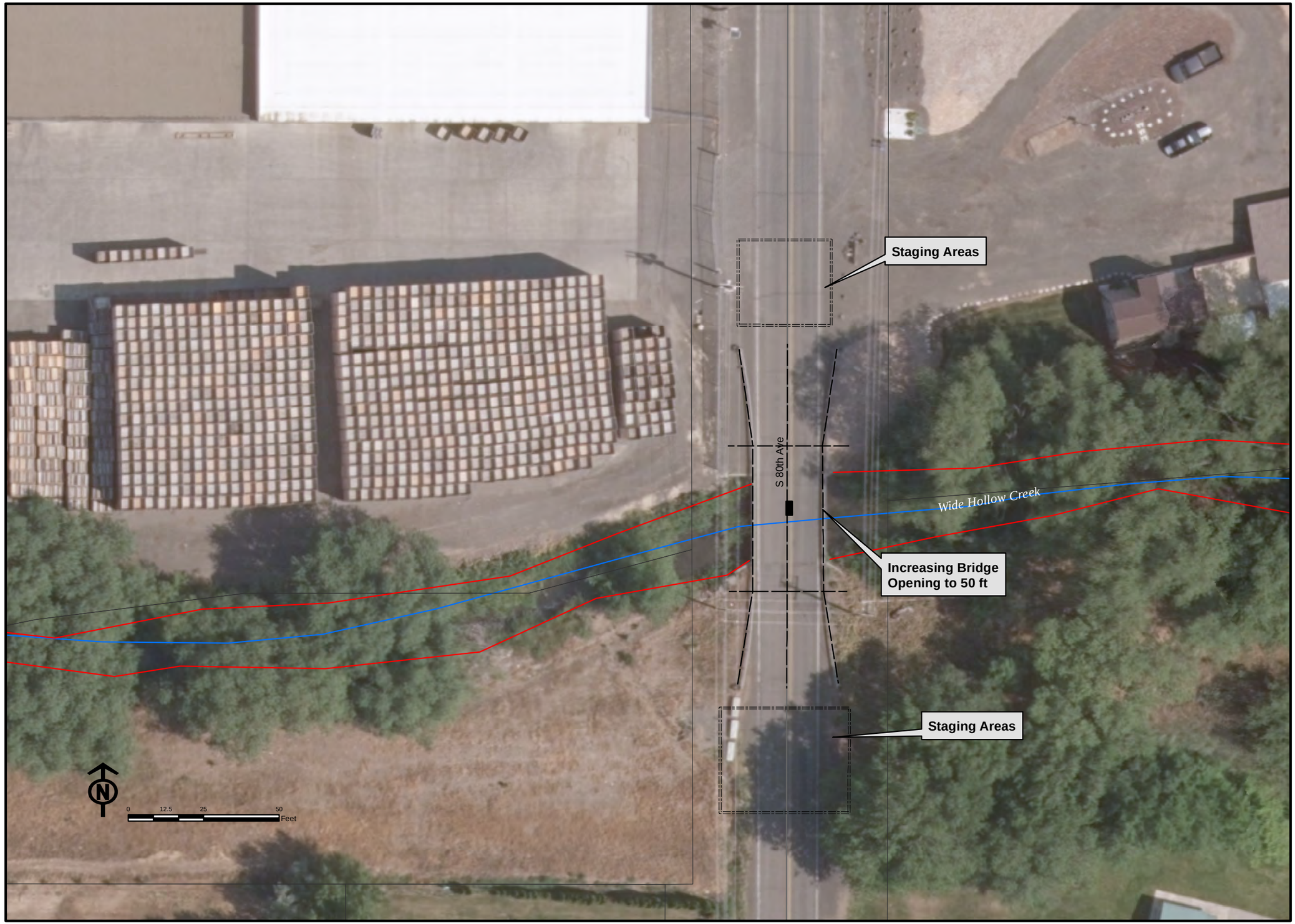
Shaw & Wide Hollow Creeks Flood Control Project

Wide Hollow Creek
City of Yakima
Bridge #449

- Bridge
- OHWM
- Improved Structures
- Staging Area
- Parcels

Streams

- Canal or Ditch
- Stream
- Roads



Shaw & Wide Hollow Creeks Flood Control Project

Wide Hollow Creek Overflow Channel

Structures

- Pedestrian Bridge
- Bridge
- Private Culvert
- Overflow Channel whc
- Removed Vegetation
- Access Road
- Staging Area
- Parcels
- Planted Vegetation

Streams

- Canal or Ditch
- Stream
- Roads

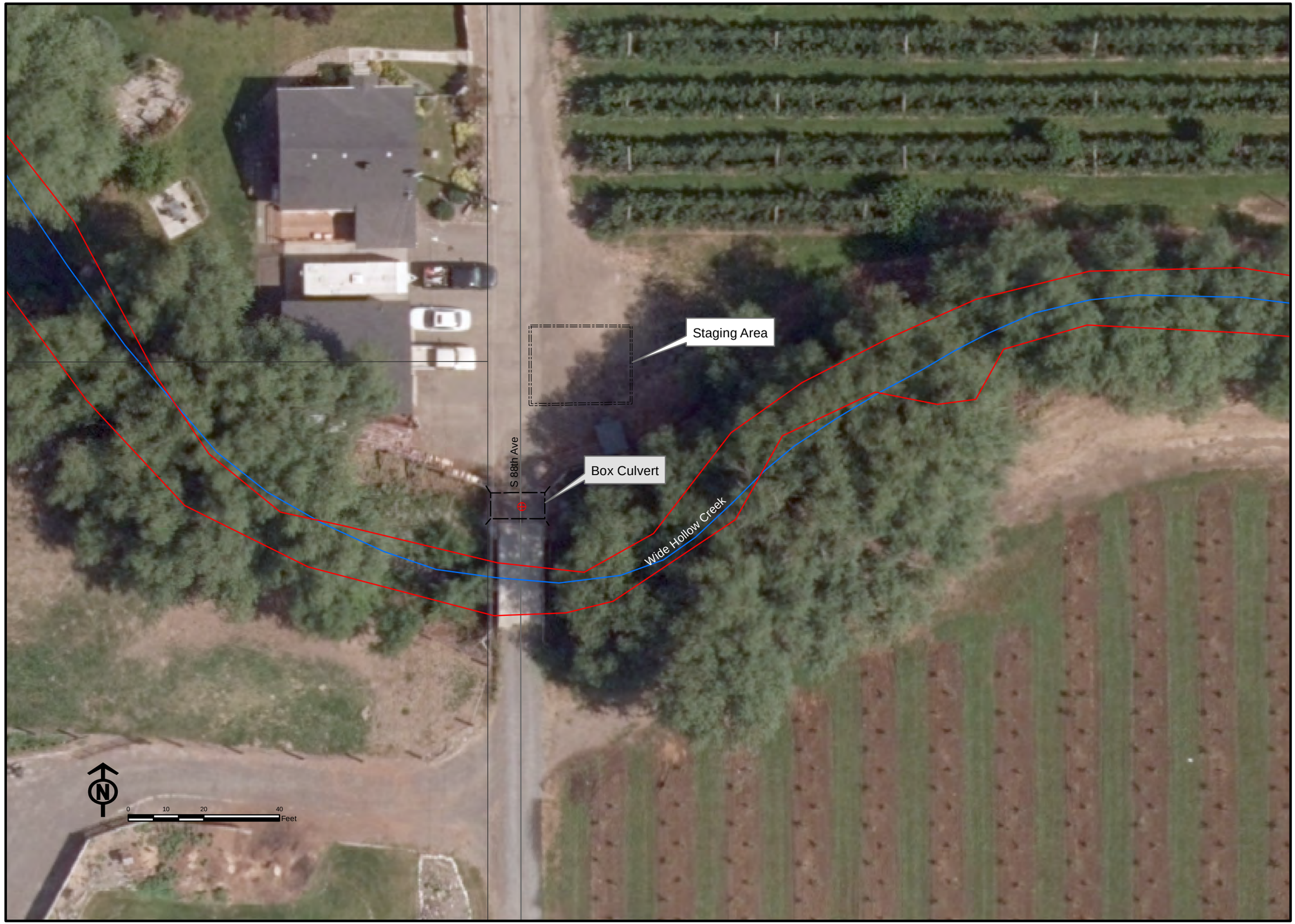
Shaw & Wide Hollow Creeks Flood Control Project

Wide Hollow Creek
Install Box Culvert
Private Residence

- Private Culvert
- OHWM
- Improved Structures
- Staging Area
- Parcels

Streams

- Canal or Ditch
- Stream
- Roads



Shaw & Wide Hollow Creeks Flood Control Project

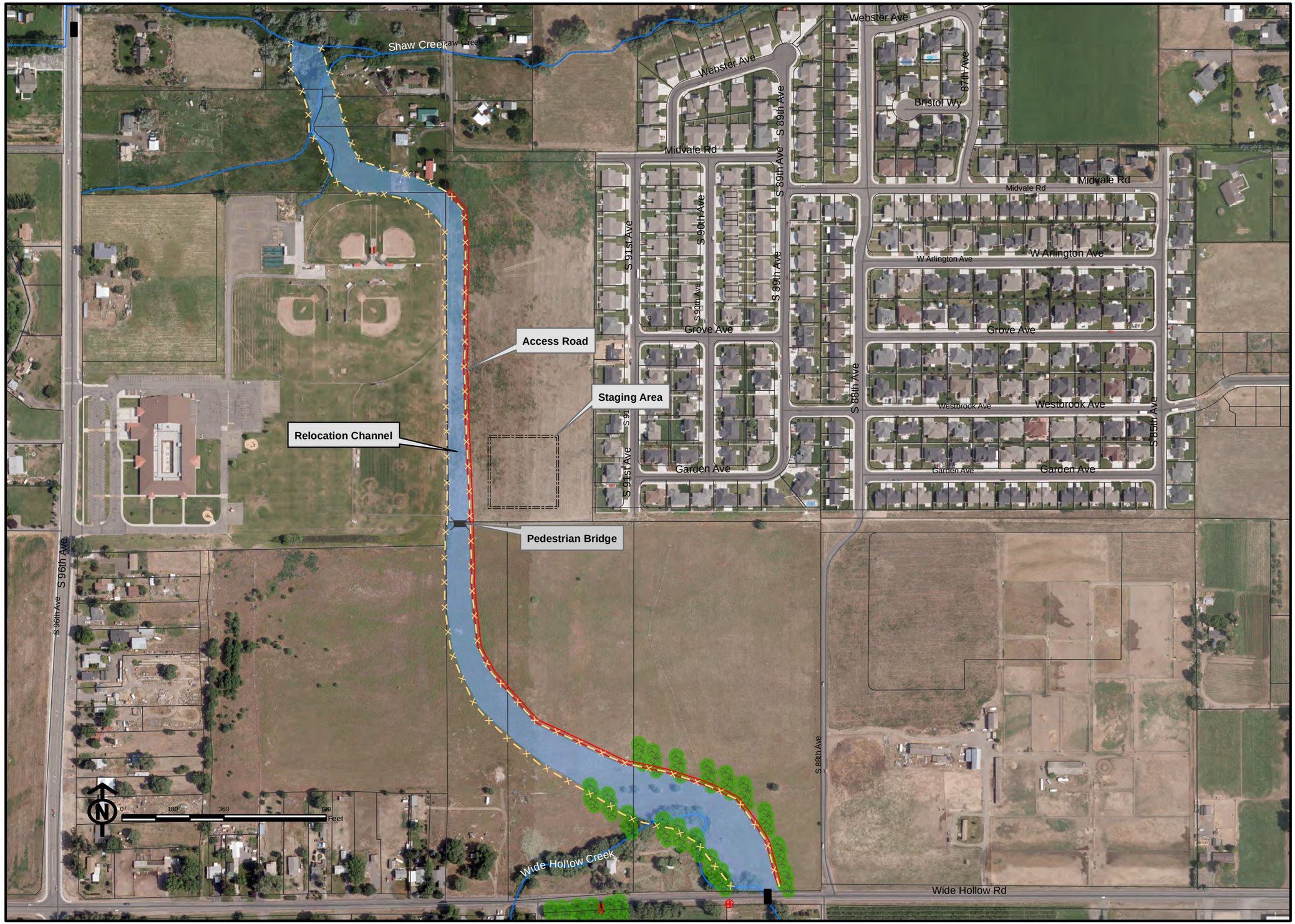
Shaw Creek Relocation Channel

Structures

- Pedestrian Bridge
- Bridge
- Private Culvert
- Fenced Area
- Access Road
- Staging Area
- Parcels
- Planted Vegetation
- Relocation Channel

Streams

- Canal or Ditch
- Stream
- Roads



Appendix C
Wetland Investigation and Delineation Report

Wetland Investigation and Delineation Report

Shaw Creek Flood Mitigation Project

Yakima County, WA

Prepared for:
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128 North 2nd Street
Yakima, WA 98901

Prepared by:
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10108 32nd Avenue W Suite D
Everett, WA 98204

January 2015

EXECUTIVE SUMMARY

Yakima County is proposing to perform several flood mitigation measures within the Wide Hollow and Shaw Creek watersheds in order to reduce flood risk within a rapidly urbanizing area on the west side of the City of Yakima, WA. This project will likely include relocating Shaw Creek and excavating a portion of Wide Hollow Creek in order to reduce flooding risk for many properties that were approved and constructed prior to Federal Emergency Management Agency (FEMA) flood mapping. This proposed project is located within the City of Yakima and unincorporated Yakima County, Washington (Township 13 North, Range 18 East, Sections 29 and 30). Widener and Associates was contracted to determine the location and extent of "Waters of the U.S.", including U.S. Army Corps of Engineers (USACE) jurisdictional wetlands, streams, and drainages within the subject project boundaries. This report summarizes the findings of field studies conducted in October and November of 2014.

The study area includes all areas within the limits of the proposed flood mitigation project, including the area of the proposed relocation channel of Shaw Creek, the reach of Shaw Creek that would be abandoned, and the reach of Wide Hollow Creek that would be excavated. One palustrine forested wetland (Wetland A) was delineated by Widener and Associates in October of 2014. This wetland is associated with Shaw Creek, an intermittently-flowing Type 4 stream (Yakima County Code 16C.06.06). The Ordinary High Water Mark (OHWM) of this stream was also delineated along with the OHWM of a flood channel for Shaw Creek and the OHWM of Wide Hollow Creek, an intermittently-flowing Type 2 stream (Yakima County Code 16C Appendix A).

Once impacts to the delineated wetland, Shaw Creek, Wide Hollow Creek, and/or the Shaw Creek flood channel have been identified and quantified, mitigation will be undertaken in accordance with USACE guidelines, as appropriate.

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1 Introduction

1.1 Authorizing agency and reason for the investigation

This Wetland Investigation and Delineation Report has been prepared on behalf of the Yakima County Public Services Department to delineate the location and extent of "Waters of the U.S.[1]", including wetlands, streams, and jurisdictional drainages, that may be impacted by the proposed Shaw Creek Flood Mitigation Project.

The primary objective of this delineation was to identify and delineate the waters/wetlands within the proposed project area consistent with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (Environmental Laboratory 2008). If required, a conceptual mitigation plan for the project will be provided at a later time.

1.2 Site Location/Project Area

The proposed project is located at the western boundary of the City of Yakima, partly within the boundary of the City of Yakima and partly within unincorporated Yakima County (Figure 1). The legal geographic location of the project area is Township 13 North, Range 18 East, Sections 29 and 30. The wetland and stream study area (approximately 52 acres) covers the footprint of all activities related to the proposed flood mitigation project, in order to capture any wetlands or "Waters of the U.S.[1]" that may be impacted by the project (Figure 2).

[1] "Waters of the U.S." are streams, wetlands, or any other body(s) of water as defined under 33 CFR Part 328

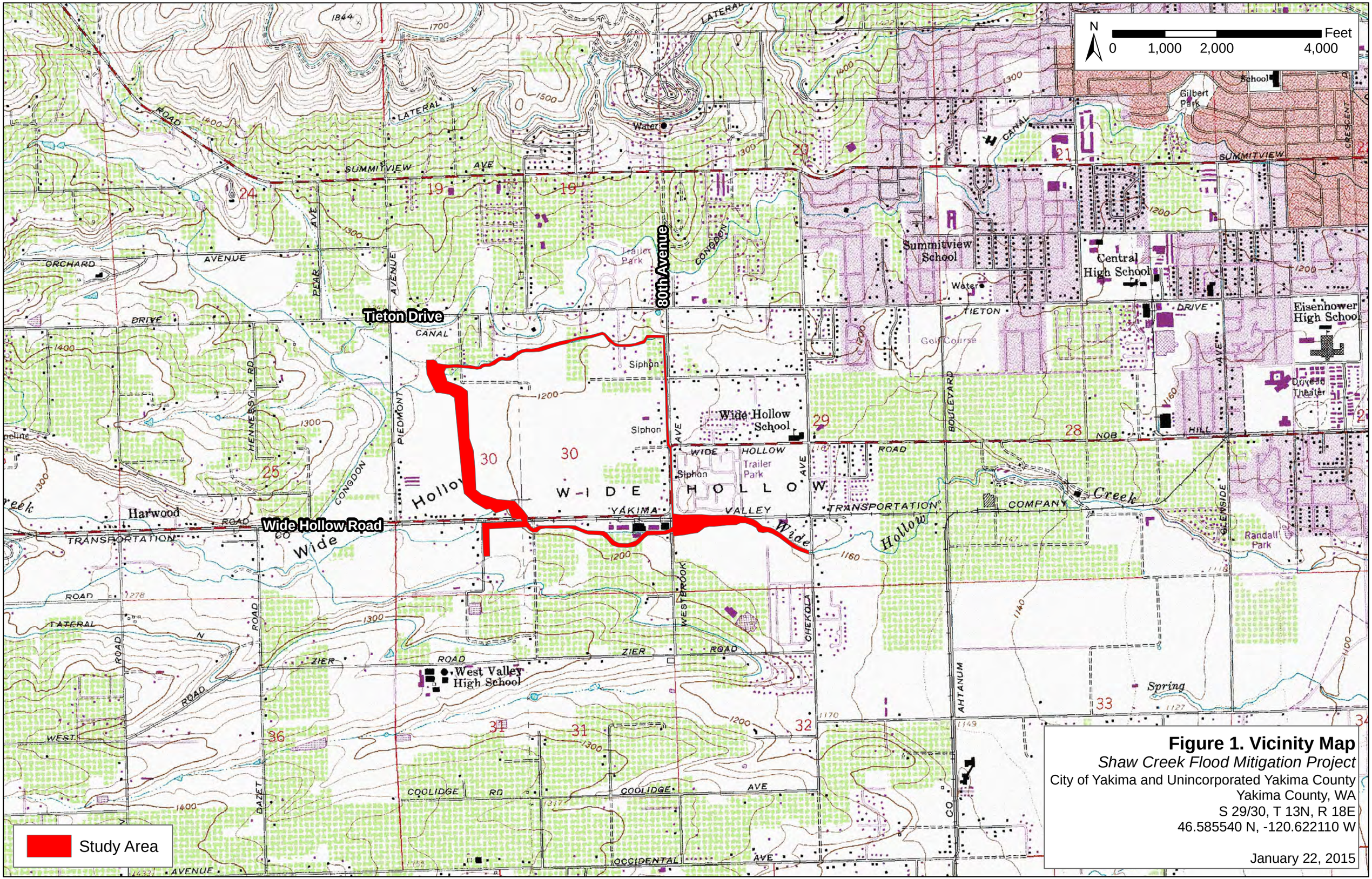


Figure 1. Vicinity Map

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 22, 2015

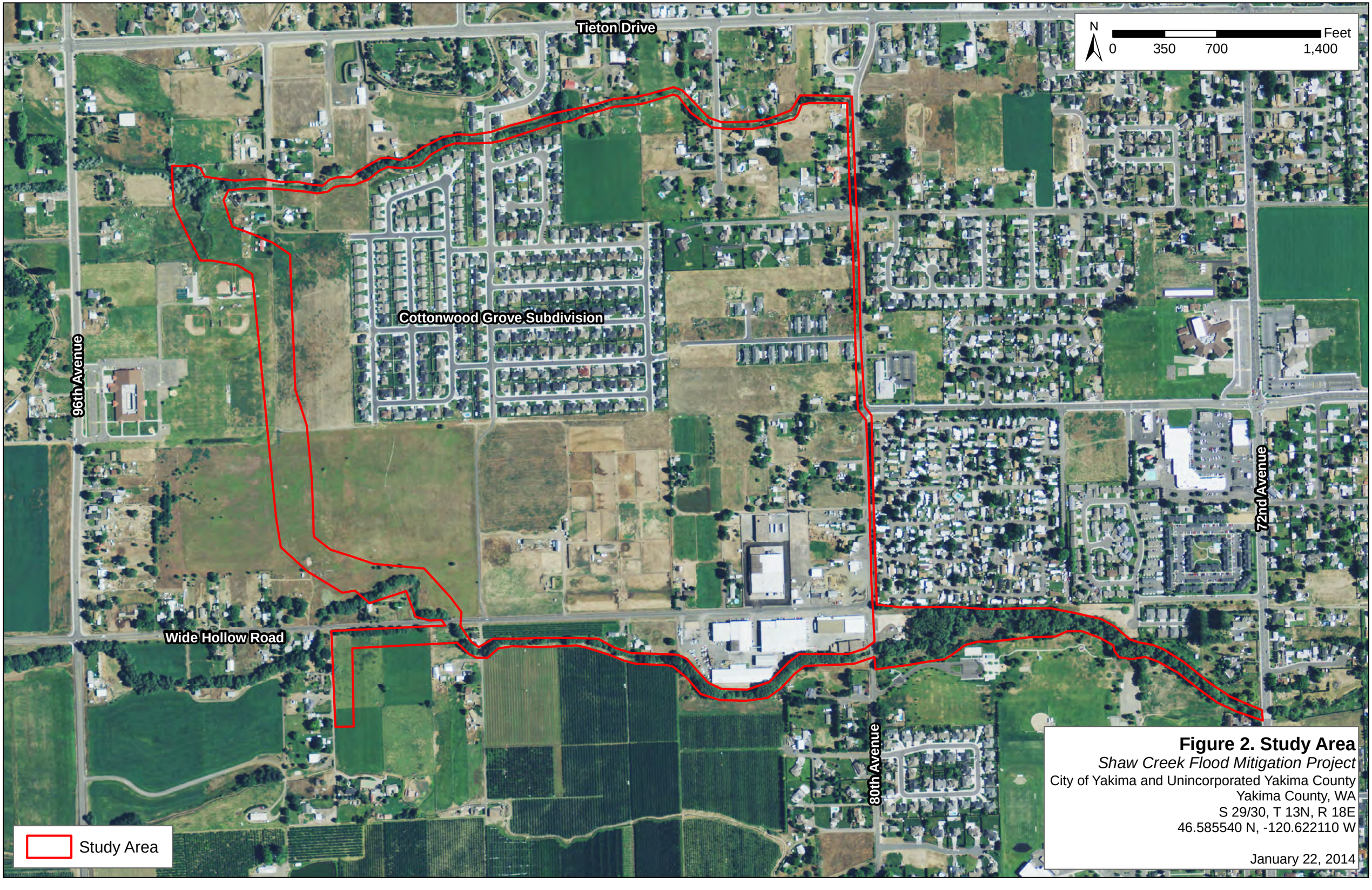


Figure 2. Study Area

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 22, 2014

1.3 Project Description

1.3.1 Existing Condition

The proposed project site is within a rapidly developing area on the west side of the City of Yakima. Several areas of residential and commercial development were approved and constructed prior to Federal Emergency Management Agency (FEMA) flood mapping. After FEMA studies were done within the project area, many of the buildings within the Wide Hollow and Shaw Creek watersheds were determined to be within the limits of the 100-year floodplain, and several properties have already experienced sub-grade flooding.

The project area consists of an approximately 1.3 mile reach of Wide Hollow Creek, an approximately 1.67 mile reach of Shaw Creek, a palustrine forested wetland associated with Shaw Creek, and several undeveloped or partially-developed upland parcels through which the proposed relocation channel for Shaw Creek would be constructed. The majority of the parcels that both creeks flow through consist of residential development, with the Cottonwood Grove residential subdivision taking up much of the area between Shaw Creek and Wide Hollow Creek. There are also smaller areas of agricultural and commercial operations along Wide Hollow Creek.

Shaw Creek flows east across the northern portion of the project area until it reaches 80th Avenue. At this point, it turns south and becomes a straightened roadside ditch. Shaw Creek has been historically altered in order to provide irrigation for surrounding agriculture. There is very little forested or shrub-scrub buffer along the portion of the creek that would be abandoned by the proposed project, and much of the existing channel is dominated by invasive yellowflag iris (*Iris pseudacorus*). The stream channel has also been straightened and has a primarily muck substrate. The creek is directly abutted by residential development and agriculture for a majority of the reach within the study area, with grazed fields and mowed lawns for most of the length. The few trees that do exist along the banks are mostly invasive crack willows (*Salix fragilis*) and white willows (*Salix alba*), as well as possibly hybrids between these two species and native Pacific willows (*Salix lucida*) (Yakima County 2012).

Wide Hollow Creek flows east across the southern portion of the project area. The portion within the study area is generally more natural than Shaw Creek, with some sinuosity and patches of medium-sized to large stream cobble that aren't completely embedded. There is also more tree cover along the banks of Wide Hollow Creek; however, the majority of the trees are also non-native invasive willows (*Salix spp.*). During the October and November site visits, there was very minimal flow, less than 5 cubic feet per second (cfs), in the western portion of Wide Hollow Creek, while the section east of 80th Avenue had no flow. There were a few scattered pools remaining east of 80th Avenue. Shaw Creek had no flow and there were no pools remaining throughout the entire study area reach. These observations were anticipated due to the inverted hydrographs of both creeks, as both creeks are heavily dependent on irrigation flow (Yakima County 2012).

The vacant parcels through which the proposed relocation channel of Shaw Creek would be constructed are characterized by noxious weeds typical of abandoned agricultural fields. No hydrophytic vegetation or indicators of wetland hydrology were observed throughout this upland area between Shaw and Wide Hollow Creeks. This area is within the limits of the 100-year floodplain of Shaw and Wide Hollow Creeks.

1.3.2 Proposed Condition

The proposed flood mitigation project would involve the creation of an approximately 3,500 linear-foot relocation channel for Shaw Creek. This new stream channel would be wider than the abandoned reach of Shaw Creek and would have a more natural cobble substrate and increased sinuosity. It would also be constructed through undeveloped land which would reduce the impact of surrounding residential and agricultural development. The banks and surrounding buffer would also be planted with native riparian plant species to help prevent establishment of invasive non-native willow species. An approximately 1.27 mile reach of Shaw Creek would be abandoned by construction of the proposed relocation channel.

In addition, an approximately 1.09 mile reach of Wide Hollow Creek from 72nd Avenue to 88th Avenue would be excavated in order to improve the channel capacity of the creek and to remove several log jams throughout this reach. All disturbed areas above the OHWM of Wide Hollow Creek would be revegetated with native riparian plant species and additional stream cobble would be imported to improve the stream substrate.

Several bridges are also being proposed for replacement to provide better flood conveyance, including the bridge at 80th Avenue and the bridge at Wide Hollow Road and approximately 89th Avenue. A box culvert is also proposed adjacent to the existing 88th Avenue bridge.

2 Methods

2.1 Wetland Delineation, Identification, and Classification

"Waters of the U.S.", including wetlands, were delineated consistent with the technical approaches outlined in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), and the *Regional Supplement to Corps of Engineers Wetland Delineation Manual: Arid West Region* (Environmental Laboratory 2008). In general, wetland delineation consisted of three main tasks: (1) assessing vegetation, soil, and hydrologic characteristics to identify areas meeting the wetland identification criteria, (2) evaluating streams and constructed drainage features to determine if they would be regulated by the USACE, and (3) marking wetland boundaries and OHW.

Hydrology data was collected from field observations and reference documents. Climate records for 29 years (1971 to 2000) for Yakima, WA were obtained from the U.S. Department of Agriculture through the National Resource Conservation Service's (NRCS) National Water and Climate Center website (USDA 2000). Upon site inspection, the presence of direct and indirect hydrologic indicators was used to infer wetland hydrology. Field indicators of wetland hydrology were determined in accordance with the USACE guidelines (Environmental Laboratory 2008).

Vegetation sampling locations were selected at sites representative of the area. Trees were identified within a 30-foot radius, shrubs were identified within a 15-foot radius, and herbaceous species were identified within a 5-foot radius of selected test pits. A determination of the presence of hydrophytic vegetation and wetland hydrology was then made at each sampling location in accordance with the USACE guidelines (Environmental Laboratory 2008).

The determination of the presence of hydric soils was consistent with the USACE Regional Supplement (Environmental Laboratory 2008). The Web Soil Survey provided information regarding the general characterization of the soils in the area, the parent material, as well as

series, taxonomy and subgroup information (NRCS 2014). Soils were examined to a depth of approximately 20 inches, or the depth at which it could be confirmed that positive indicators of hydric soil were either present or absent. The Munsell Soil Color Chart was used to aid in classification of soil colors (Munsell 2000).

Observations at each sampling location were recorded on Wetland Determination Data Forms and are available for review in Appendix A. The delineated wetland boundaries were marked in the field with sequentially numbered pin flags where indicators of wetland vegetation, hydric soil, and wetland hydrology were present on one side of the line and not observed on the other. Associated test pits were also flagged and numbered. Adjacent uplands were distinguished from the wetland by lack of hydrology, lack of hydric soils and/or the presence of upland plant species. Delineated boundaries and sampling locations were subsequently surveyed by Yakima County Public Services.

2.2 Pre-Field Review of Information

Project plans of the area were provided by Yakima County to orientate the delineator. Existing information concerning the project area was reviewed prior to fieldwork to identify vegetation patterns, topography, soils, streams, and other natural resources potentially located within the project boundaries. Documents reviewed included the USGS Topographic Quadrangle Map (National Geographic 2006), Web Soil Survey Information for the project area (USDA 2013), the National Wetlands Inventory Map (USFWS 2014a), and Yakima County GIS Mapping (Yakima County 2014).

3 Affected Environment

3.1 Project Area Setting

The project area occurs within portions of both the City of Yakima and unincorporated Yakima County. It is located within a low-lying, flood-prone area bounded by Shaw Creek to the north and west and Wide Hollow Creek to the south. The portion of Shaw Creek that would be abandoned by constructing the proposed relocation channel starts just west of 92nd Avenue and flows west until 80th Avenue, where it then flows south directly parallel with 80th Avenue. The portion of Wide Hollow Creek within the project area starts north of Wide Hollow Road at approximately 89th Avenue and flows west until 72nd Avenue. Both Creeks flow through residential areas with Wide Hollow Creek also flowing adjacent to a commercial area and an agricultural area (apple orchard). There is also grazing within the buffer of Shaw Creek. A majority of undeveloped land within the project area is former agricultural land characterized by upland weeds typical of abandoned fields. The eastern segment of Wide Hollow Creek also flows just north of West Valley Community Park.

Surrounding properties are primarily zoned One-Family Residential (R1), including the portion of undeveloped land proposed for channel relocation. The rest of the surrounding land is zoned Two-Family Residential (R2), Multi-Family Residential (R3), Suburban Residential (SR), Professional Business (B1), and Local Business (B2).

3.1.1 Water Features

The project area is located within the Wide Hollow and Shaw Creek watersheds within the Yakima River Basin. The terrain is relatively flat with elevations ranging from approximately 1178 to 1227 feet within the project area. The Yakima River Basin is one of the most intensely irrigated areas in the United States (USGS 2013), and many surface waters are heavily dependent on irrigation water, exhibiting inverted hydrographs.

The principal source of hydrology to the area appears to be groundwater due to a seasonal high water table and periodic surface flow from Shaw and Wide Hollow Creeks. Flooding in this area is generally infrequent due to the low average amount of annual precipitation; however, flooding events can be widespread when they occur due to the general lack of topography in the area. There has already been sub-grade flooding in the crawl spaces of several homes within the Cottonwood Grove subdivision.

Shaw Creek

Shaw Creek has been significantly altered from its historical course in order to provide irrigation to the surrounding area in the past. It is no longer utilized for irrigation within the project limits due to the conversion of former agricultural land to residential development and the conversion of the open water irrigation system in the area to a piped delivery system (Yakima County 2012). The creek channel has been straightened and narrowed, with some areas no more than 4 feet wide between the banks (Photo 1).

Photo 1. Shaw Creek with grazed buffer just west of Cottonwood Grove Subdivision

Flow in Shaw Creek is almost completely dependent on irrigation. Once the irrigation in the area is shutoff in the fall, the creek runs dry until it is turned back on in the spring. While Shaw Creek is shown as a Type 3 stream on Yakima County's GIS mapping application

(Yakima County 2014), Shaw Creek should be considered a Type 4 stream (Yakima County Code 16C.06.06) as it has intermittent, seasonal flow and can support fish life when water is present. While a USACE jurisdictional OHWM only exists for the northern portion of Shaw Creek within the project area, the roadside ditch along 80th Avenue that conveys floodwaters to Wide Hollow Creek is considered a significant nexus[2] to Wide Hollow Creek which is the tributary of a traditional navigable water, the Yakima River. As such, Shaw Creek is a "Water of the U.S." and is regulated by the USACE under the Clean Water Act.

Wide Hollow Creek

Wide Hollow Creek has also been significantly altered from its historical course in order to provide irrigation to the surrounding area. While it is no longer a major part of the local irrigation system, its flow is still primarily dependent on irrigation water. However, unlike Shaw Creek, there is still minimal flow in portions of Wide Hollow Creek between irrigation seasons due to the presence of groundwater springs and likely seepage from irrigation features within the watershed (Yakima County 2012). At the time of the October and November site visits, there was <5 cfs of flow in the stream reach west of 80th Avenue while the reach east of 80th Avenue had no flow and only a few remaining pools. Throughout the study area reach there were dead fish (primarily mountain whitefish - *Prosopium williamsoni*) that had become trapped in small pools once irrigation flows ceased (Photo 2). The stream reach within the study area is less straightened than Shaw Creek, with some areas of moderate sinuosity. There is also more natural stream cobble with some areas of medium to large-sized stream cobbles (Photo 3). Stream cobble is completely embedded in muck in other portions of the stream.

[2] A significant nexus exists if the tributary, together with its adjacent wetlands, has more than an insubstantial or speculative effect on the chemical, physical, and/or biological integrity of a downstream traditional navigable water as defined under RGL 07-01

Photo 2. Dead mountain whitefish in no-flow portion of Wide Hollow Creek

Photo 3. Forested section of Wide Hollow Creek with medium-sized stream cobble

One wetland was identified and delineated as part of this investigation that also meets the criteria for USACE jurisdiction as it is directly adjacent to the USACE jurisdictional portion of Shaw Creek. The OHWM of Shaw Creek becomes indistinguishable once the creek enters this wetland. This wetland occurs within a topographical depression that is characterized by a high water table, while the wetland also receives significant surface flow from Shaw Creek and an adjacent flood channel during irrigation flows and flooding events. This flood channel is also regulated by the USACE under the Clean Water Act as it

has a significant nexus with Shaw Creek which flows into Wide Hollow Creek, a tributary of the Yakima River.

No other jurisdictional water features were located within the study area. The ditch that conveys flood waters from Shaw Creek to Wide Hollow Creek, while a significant nexus, does not have a distinguishable OHWM as it receives extremely infrequent flows. There was no evidence of recent water in the ditch after it crosses from the west side of 80th Avenue to the east side of 80th Avenue. In addition, once the ditch turns away from 80th Avenue towards Wide Hollow Creek, the ditch is dominated by upland weeds (Photo 4).

Photo 4. Flood Channel of Shaw Creek with no observable OHW and upland weeds

The average annual precipitation in Yakima is approximately 8 inches (USDA 2000). According to the NRCS National Water and Climate Center, the growing season in Yakima, WA is approximately 175 days in length, from approximately April 21 to October 14 (using the 5 in 10 years criteria and 28°F) (USDA 2000). Refer to *Appendix B – Hydrologic Data* for the USDA WETS table for Yakima, WA. The area must be inundated or saturated for a minimum of 9 consecutive days in order to have wetland hydrology 5 percent of the growing season (22 days to have wetland hydrology 12.5 percent of the growing season). The area is characterized by a seasonal high water table from April to November due to intense irrigation within the Yakima River Basin (Lenfesty and Reedy 1985).

Site visits were undertaken on October 23rd through 25th, November 5th through November 7th, and November 11th, 2014. A total of 0.28 inches of rain was recorded during these days, with most (0.20 inches) falling on October 24th. During these site visits, the water table was found within the upper 12" of the soil in several wetland test pits. There were also large areas of soil saturated to the surface and one large area of shallow standing water within the delineated wetland area. Sediment deposits and water-stained leaves present throughout the wetland provided an indirect indicator of periodic inundation. *Refer to Appendix A - Data Forms.* Precipitation and weather for the month prior to the October 23rd site visit is available in *Appendix B – Hydrologic Data*.

3.1.2 Plant communities

The project is located within the Columbia Basin physiographic and geological province and within the Shrub-Steppe (with *Artemisia tridentata*) major vegetation area (Franklin and Dyrness 1973). Vegetation within Shaw Creek is dominated by yellowflag iris (*Iris pseudacorus* - OBL), cattail (*Typha latifolia* - OBL), and reed canarygrass (*Phalaris arundinacea* - FACW), with some areas completely dominated by yellowflag iris within the OHWM of the creek (Photo 5).

Photo 5. Shaw Creek west of 92nd Ave dominated by yellowflag iris

The few forested areas along the study area portion of Shaw Creek and a large portion of Wide Hollow Creek are dominated by invasive non-native crack willows (*Salix fragilis* - FAC) and white willows (*Salix alba* - FACW), as well as possibly hybrids between these two species and native Pacific willows (*Salix lucida* - FACW) (Yakima County 2012). Shrubs are generally lacking along Shaw Creek and shrubs along Wide Hollow Creek are mostly red-osier dogwood (*Cornus sericea* – FACW), shrubby willows (*Salix spp.*) or rose species (*Rosa spp.*).

The delineated wetland associated with Shaw Creek (Wetland A) is dominated by invasive non-native willows (*Salix spp.*) and Russian olive (*Elaeagnus angustifolia*) with scattered western crabapple (*Malus fusca* - FAC). The herbaceous stratum is dominated by cattails, yellowflag iris, reed canarygrass, sedges (*Carex spp.*), and bittersweet nightshade (*Solanum dulcamara* – FAC) with the area of shallow inundation dominated by duckweed (*Lemna sp.* – OBL).

Upland areas are dominated by primarily noxious weeds typical of abandoned agricultural areas including teasel (*Dipsacus fullonum* - FAC), Canada thistle (*Cirsium arvense* - FACU), common mullein (*Verbascum thapsus* - FACU), diffuse knapweed (*Centaurea diffusa* – UPL), kochia (*Bassia scoparia* – FAC), horseweed (*Conzya canadensis* – FACU), absinthe wormwood (*Artemesia absinthium* - NI), and Russian thistle (*Salsola kali* – FACU). There is some forested upland adjacent to Wide Hollow Creek, especially near West Valley Park, that is dominated by crack willows, black cottonwood (*Populus balsamnifera* – FAC), and Siberian elm (*Ulmus pumilla* – UPL). *Refer to Appendix C – Observed Plants.*

3.1.3 Soils mapped and found

The Yakima County soil survey identifies eight major soil types in or adjacent to the project study area. These include: Esquatzel silt loam, Logy silt loam, Umapine silt loam, Outlook silt loam, Yakima silt loam, Weirman fine sandy loam, Harwood loam, and Gorst loam (USDA 2013). The Wide Hollow Creek corridor within the study area is primarily mapped as Weirman fine sandy loam, especially west of 80th Avenue. The Shaw Creek corridor is

primarily mapped as Esquatzel silt loam and Outlook silt loam. The upland area proposed for construction of the Shaw Creek relocation channel is primarily mapped as Umapine silt loam, drained, Yakima silt loam, and Logy silt loam. Of these mapped soils, Logy silt loam, Umapine silt loam, Outlook silt loam, and Weirman fine sandy loam are listed on the national hydric soil list (USDA 2014). *Refer to Appendix D –Yakima County Soil Survey Data*.

Areas within the floodplain of Wide Hollow Creek are characterized by shallow silts over small to medium-sized stream cobble starting within the upper 4 inches of soil. There is a lack of stream cobble within the Shaw Creek corridor, likely due to the fact that Shaw Creek has been realigned to provide agricultural benefits in the past. Shaw Creek has a predominantly muck substrate. Wide Hollow Creek also has some areas where muck has accumulated and the native cobble is completely embedded, likely due to the large amount of leaf litter input from invasive willows and the numerous log jams throughout the creek. The soils within Wetland A are primarily muck with clayey silt towards the edges of the wetland. A gleyed matrix begins within the upper 12 inches of soil within the delineated boundary of this wetland. Adjacent uplands, where there was not a significant layer of stream cobble, were mostly 10YR 3/2 or 10YR 3/3 silt loam with no observable redox features.

3.1.3 Existing Wetland Mapping

The National Wetlands Inventory was referenced for information on potential wetlands in the project area. The only areas indicated on the National Wetlands Inventory within the proposed project area are areas mapped as possible forested and emergent wetland adjacent to Wide Hollow Creek, especially adjacent to West Valley Park (USFWS 2014a). *Refer to Appendix E - NWI Map.*

4 Results

4.1 Wetlands

The entire lengths of Shaw Creek and Wide Hollow Creek within the proposed project area were investigated for possible adjacent wetlands that would be regulated as "Waters of the U.S." under the Clean Water Act. In addition, the area proposed for construction of the Shaw Creek relocation channel was also investigated for possible wetlands that could be impacted by the proposed project. Only one wetland was identified and delineated within the boundaries of the area potentially impacted by the proposed flood mitigation project. This wetland, Wetland A, is associated with Shaw Creek in the vicinity of the northern end of the proposed relocation channel.

The areas indicated on the National Wetlands Inventory were determined to not qualify as wetlands. While there are areas with a prevalence of hydrophytic vegetation including black cottonwood (FAC), red-osier dogwood (FACW) and willows (FAC – FACW), no hydric soils or indicators of hydrology were located outside of the delineated OHWM of Wide Hollow Creek. Soils in the areas indicated on the National Wetlands Inventory were shallow silt loam over a layer of small to medium-sized stream cobble. There was no thin muck layer or observable redox features that would serve as hydric soil indicators in the thin soil layer above the cobble. In addition, there were no observable indicators of wetland hydrology and the herbaceous stratum was dominated by upland weeds typical of disturbed areas including lesser burdock (FACU), Canada thistle (FACU), and common mullein (FACU). There is also a large population of Siberian elm (UPL), especially on the south side of Wide Hollow Creek. While these areas are within the floodplain of Wide Hollow Creek, flooding doesn't occur with enough frequency to create wetland conditions.

Wetland A

Wetland A (Figure 3) is an approximately 27,974 sq. ft. (0.64 acre) palustrine forested wetland (Cowardin et al. 1979). It is rated as a Category II depressional wetland according to the *Washington State Wetland Rating System for Eastern Washington* (Hruby 2014).

Wetland A is associated with a portion of Shaw Creek with little to no discernable banks or OHWM. Seasonal flows from Shaw Creek spill into this low lying area. As a result, much of Wetland A is inundated while Shaw Creek has flow during the irrigation season. At the time of the October, 2014 site visits, there was shallow standing water in much of the wetland, with evidence of inundation extending further out from this inundated area. Evidence of inundation included the presence of duckweed (Lemna sp.), bare ground, sediment deposits, and water stained leaves.

A portion of Wetland A extends into a grazed field, a portion of which is also regularly mowed. This area has problematic vegetation, however the presence of common rush (*Juncus effusus* – FACW) and caric sedges (*Carex spp.*) along with some yellowflag iris (OBL) would indicate that this area would likely be dominated by hydrophytic vegetation without regular grazing or mowing. There are also personal accounts of standing water in this emergent portion of the wetland, with some areas of bare ground with surface cracks indicating relatively recent inundation.

Photo 6. Grazed and mowed portion of Wetland A with problematic vegetation

The forested portion of Wetland A is dominated by Russian olive (FAC), crack willow (FAC), white willow (FACW), as well as possibly hybrids between these non-native invasive willow species and native Pacific willow (FACW). There is a sparse shrub stratum

in the portion of the wetland that is not subject to prolonged inundation, characterized by scattered Pacific crabapple (FAC) and chokecherry (*Prunus virginiana* – FAC). The area of prolonged inundation is characterized by cattails (OBL), yellowflag iris (OBL), reed canarygrass (FACW) and duckweed (OBL) with patches of bare ground.

Photo 7. Cattails in the seasonally-inundated forested portion of Wetland A

Soils within Wetland A are primarily muck with clayey silt loam towards the outer edges of the wetland. A gleyed matrix starts within the upper 12 inches of soil within this wetland. Adjacent uplands, including a small upland berm between Wetland A and the delineated Shaw Creek flood channel are characterized by 10YR 3/2 or 10YR 3/3 soil with no observable redox features and no evidence of hydrology. Most of the surrounding upland soils are silt loam with some loamy clay within the upland berm.

All sampling locations within Wetland A satisfied either the dominance test or prevalence index for hydrophytic vegetation. Primary indicators of hydric soil were Hydrogen Sulfide (A4), Loamy Mucky Mineral (F1), and Redox Depressions (F8). Primary indicators of wetland hydrology within Wetland A included High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), and Hydrogen Sulfide Odor (C1).

As Wetland A is directly associated with Shaw Creek, which has a significant nexus to Wide Hollow Creek, a tributary of the Yakima River, Wetland A is regulated by the USACE as a "Water of the U.S." under the Clean Water Act. As such, any unavoidable impacts to this wetland by the proposed flood mitigation project will be mitigated for in accordance with USACE guidelines.

4.2 Other Identified "Waters of the U.S."

The OHWM of both Shaw and Wide Hollow Creeks were delineated within the limits of the proposed project. The OHWM of a flood channel off of Shaw Creek was also delineated. As Shaw Creek has a significant nexus to Wide Hollow Creek, and Wide Hollow Creek is a tributary of the Yakima River, both creeks and the Shaw Creek flood channel are regulated as "Waters of the U.S." by the USACE under the Clean Water Act.

Shaw Creek

Shaw Creek has a discernable OHWM for a majority of the reach that would be bypassed by the proposed flood mitigation project. The OHWM of Shaw Creek from Wetland A to 80th Avenue, then south to Nob Hill Boulevard, was delineated and subsequently surveyed by Yakima County Public Services (Figure 4). The delineated portion of Shaw Creek has a surface area of 51,046 square feet (1.17 acre). The reach of Shaw Creek that would be bypassed by the proposed flood mitigation project has no regulated buffer as it is an irrigation feature constructed in an upland area.

At Nob Hill Boulevard, there is a culvert under 80th Avenue that conveys flood flows from Shaw Creek to a ditch on the east side of 80th Avenue. This ditch has no evidence of recent flow and no discernable OHWM (Photo 8). As an extremely intermittent ditch with no discernable OHWM, the ditch south of Nob Hill Boulevard is not regulated by the USACE as a "Water of the U.S." under the Clean Water Act. The culvert under 80th Avenue may be slightly perched which contributes to the loss of flow south of Nob Hill Boulevard. Still, this ditch and the ditch that turns east from 80th Avenue to connect to Wide Hollow Creek create a significant nexus between Shaw Creek and Wide Hollow Creek during periodic

flooding events (Figure 4). As such, the delineated portion of Shaw Creek is regulated by the USACE as a "Water of the U.S." under the Clean Water Act.

Photo 8. Shaw Creek ditch south of Nob Hill Blvd approaching Wide Hollow Rd

The alignment of Shaw Creek has been significantly altered from its historical course in order to provide irrigation to the surrounding area (Figure 5). Prior to being diverted for irrigation, Shaw Creek followed a path more similar to the one proposed for the relocation channel as part of the Shaw Creek Flood Mitigation project (Yakima County 2012). Since the creek has been diverted, channelized, and straightened, there is a lack of native stream cobble within the study area reach and the stream substrate is almost completely muck where there is a discernable OHWM. In addition, the delineated reach that would be bypassed by the proposed relocation channel has an extremely limited functional buffer as it flows through residential areas with grazed pastures and mowed lawns. A majority of the area below the OHWM is also densely vegetated with primarily yellowflag iris (OBL), due largely to the inverted hydrograph of the stream. In addition, Shaw Creek east of 96th Avenue is 303(d) listed by the Washington State Department of Ecology (WSDOE) as a Category 5 water for bacteria (WSDOE 2012).

There is very minimal wildlife utilization of Shaw Creek in its present alignment as there is little native vegetation, minimal vegetated upland buffer, and lack of open water. In

addition, flow is extremely seasonal as it is dependent on irrigation water. Therefore, utilization by fish and other aquatic species is extremely limited. There is no documented utilization of Shaw Creek by any listed species or anadromous fish species (WDFW 2014a, 2014b).

As a majority of Shaw Creek within the study area will be bypassed and abandoned by the proposed flood mitigation project, mitigation will be undertaken in accordance with USACE guidelines. It is anticipated that the proposed Shaw Creek relocation channel and associated buffer will be used as compensatory mitigation for any unavoidable impacts to Shaw Creek as a result of the proposed project.

Shaw Creek Flood Channel

A flood channel for Shaw Creek was also delineated in the vicinity of the proposed northern stream relocation channel connection location (Figure 4). The OHWM was subsequently surveyed by Yakima County Public Services. The delineated portion of this flood channel has a surface area of 10,563 sq. ft. (0.24 acre). As an extension of Shaw Creek, which is a constructed irrigation feature, this flood channel has no regulated buffer.

This channel was likely once part of the historical alignment of Shaw Creek (Yakima County 2012) (Figure 5). At the time of the October, 2014 site visit the area directly south of Shaw Creek still had some ponded water, while the area south of this ponding consisted of deep muck substrate which indicates prolonged inundation in this area as well. The center of this channel is generally free of vegetation, except for some cattails (OBL) at the far southern end of the delineated channel. The relatively steep banks are characterized by dense yellowflag iris (OBL) with scattered Pacific crabapple (FAC) and Russian olive (FAC). There is an abrupt transition to a grazed pasture of upland grasses and weeds on the east side of the channel, while the west side of the channel transitions into the grazed pasture portion of Wetland A.

As water from this flood channel significantly contributes to Shaw Creek and Shaw Creek has a significant nexus to Wide Hollow Creek, a tributary of the Yakima River, this flood

channel is regulated by the USACE as a "Water of the U.S." under the Clean Water Act. As such, any unavoidable impacts to this flood channel as a result of the proposed flood mitigation project will be mitigated for in accordance with USACE guidelines. It is anticipated that the proposed Shaw Creek relocation channel and associated buffer will be used as compensatory mitigation for any unavoidable impact to this flood channel.

Wide Hollow Creek

The entire reach of Wide Hollow Creek within the proposed project boundaries has a discernable OHWM (Figure 4). The OHWM of the reach from south of Wide Hollow Road to the bridge at 72nd Avenue was marked with sequentially numbered pin flags and subsequently surveyed by Yakima County Public Services. The surface area of the delineated reach of Wide Hollow Creek is 126,121 sq. ft. (2.90 acre). An additional 830-foot reach of Wide Hollow Creek north of Wide Hollow Road was approximated based on aerial imagery and site reconnaissance but was unable to be surveyed due to refusal of access by the property owner of the subject parcel (Parcel # 18133031001) (Figure 4). This reach has an approximated surface area of 19,831 sq. ft. (0.46 acre). The true OHWM is likely more constrained than indicated by this approximated area. As a Type 2 stream (Yakima County Code 16C Appendix A), Wide Hollow Creek has a standard regulated buffer width of 75 feet.

Vegetation below the OHWM, where present, consists primarily of cattails (OBL), yellowflag iris (OBL), and reed canarygrass (FACW). A majority of the area below the OHWM of Wide Hollow Creek is characterized by partially-embedded or completely-embedded small to medium-sized stream cobble. Much of the streambank of Wide Hollow Creek is characterized by the exposed red roots of crack willows. The OHWM is very conspicuous for most of this stream reach and was largely delineated based on the boundary between the exposed willow roots and persistent non-obligate vegetation. There are some areas where the banks are less steep and the OHWM extends into areas of persistent vegetation dominated by the above mentioned species (Photo 9).

Photo 9. Wider section of Wide Hollow Creek with yellowflag iris below the OHWM

Wide Hollow Creek generally follows along its natural course, however the reach within the study area has been moved slightly north to provide greater irrigation benefits (Yakima County 2012) (Figure 5). This is especially evidenced by the large amount of stream cobble substrate in the adjacent uplands south of the existing creek. Like Shaw Creek, Wide Hollow Creek has an inverted hydrograph in which flows are actually higher during the summer when there is significant irrigation influence. Unlike Shaw Creek, there is still some flow in Wide Hollow Creek during the non-irrigation season due to a combination of groundwater springs, irrigation seepage, and precipitation as well as snowmelt in the spring.

Most of Wide Hollow Creek within the study area has a cobble substrate with little vegetation. However, in areas with dense non-native willows, the significant amount of leaf litter and woody debris input has resulted in a series of log jams with associated muck substrate (Photo 10). These areas are significant barriers to fish passage and create increased flooding risk along this section of the creek. In addition, there is an Alaska Steep Pass fishway at the mouth of Wide Hollow Creek that provides fish passage for adult salmonids but not juveniles or small resident fish (Yakima County 2012). This limits the potential of Wide Hollow Creek to provide spawning and rearing habitat for salmonids. Otherwise, this creek could provide good to excellent spawning and rearing habitat due to

the groundwater influence, sufficient stream cobble, and vegetated buffer for much of its length.

Photo 10. Log jam along Wide Hollow Creek with muck accumulation upstream

In addition to these fish passage barriers, Wide Hollow Creek is 303(d) listed as a Category 5 water for temperature and bacteria (WSDOE 2012). Nonetheless, the creek is listed by WDFW for potential utilization by threatened summer steelhead trout (*Oncorhynchus mykiss* – Middle Columbia River ESU) as well as Coho salmon (*Oncorhynchus kisutch*) (WDFW 2014a). It is also designated as critical habitat for summer steelhead (USFWS 2014b), even though the fishway at the mouth likely precludes successful outmigration of juvenile steelhead. Rainbow trout (non-anadromous *Oncorhynchus mykiss*) are also documented as utilizing Wide Hollow Creek (WDFW 2014b) and dead mountain whitefish (*Prosopium williamsoni*) were observed in the completely dry portion of Wide Hollow Creek east of 80th Avenue. Other wildlife that would likely utilize Wide Hollow Creek and the limited vegetated buffer include songbirds, birds of prey, waterfowl, and small mammals. Beavers have been documented in the past and there were abundant raccoon tracks throughout the investigated stream reach.

As Wide Hollow Creek is a tributary of the Yakima River, a traditional navigable water, it is regulated by the USACE as a "Water of the U.S." under the Clean Water Act. As such,

any unavoidable impacts to Wide Hollow Creek as a result of the proposed flood mitigation project will be mitigated for in accordance with USACE guidelines. It is anticipated that the restoration of Wide Hollow Creek and its associated buffer will be self-mitigating actions that will not require any further compensatory mitigation.

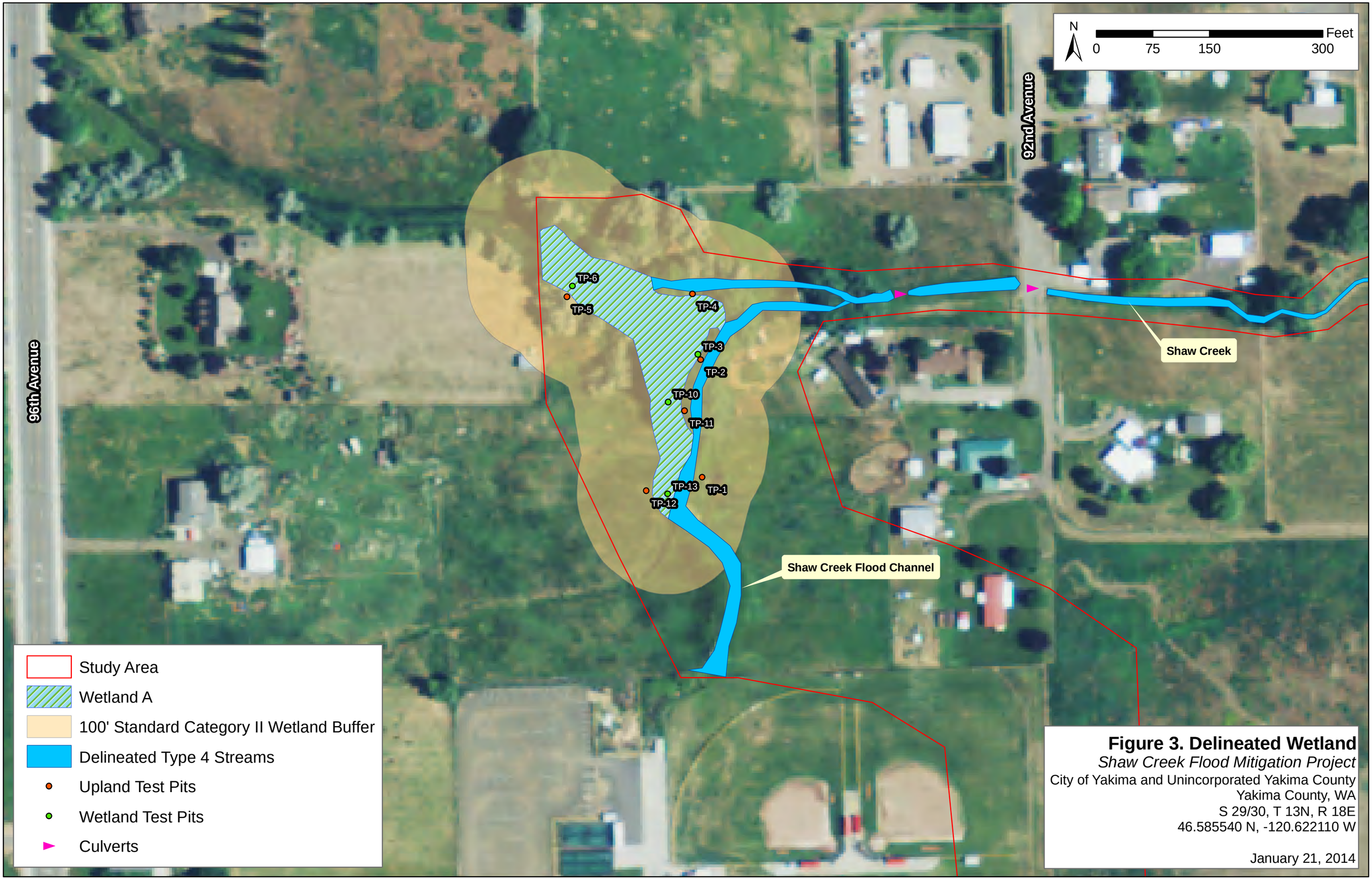


Figure 3. Delineated Wetland

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 21, 2014

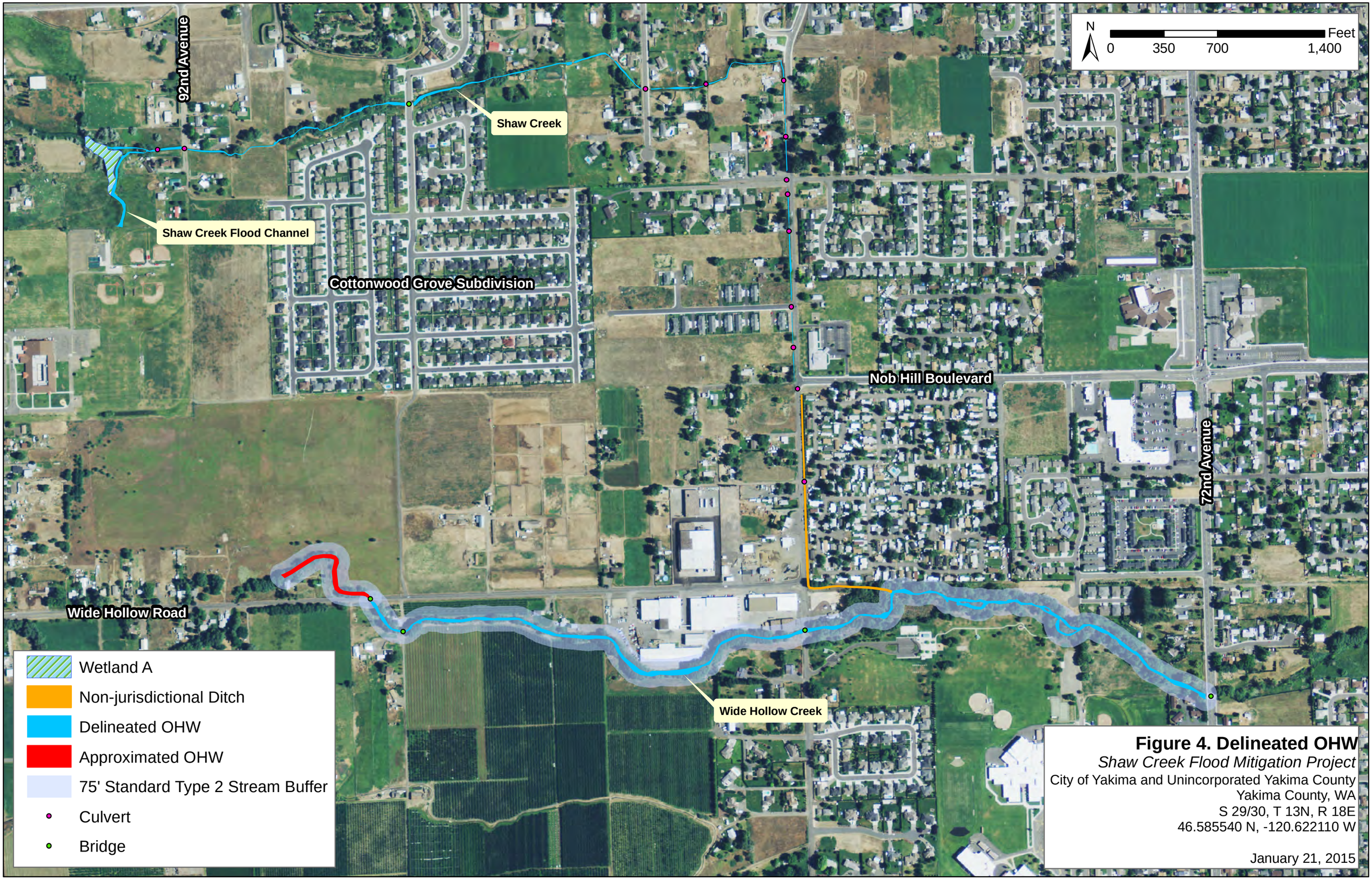
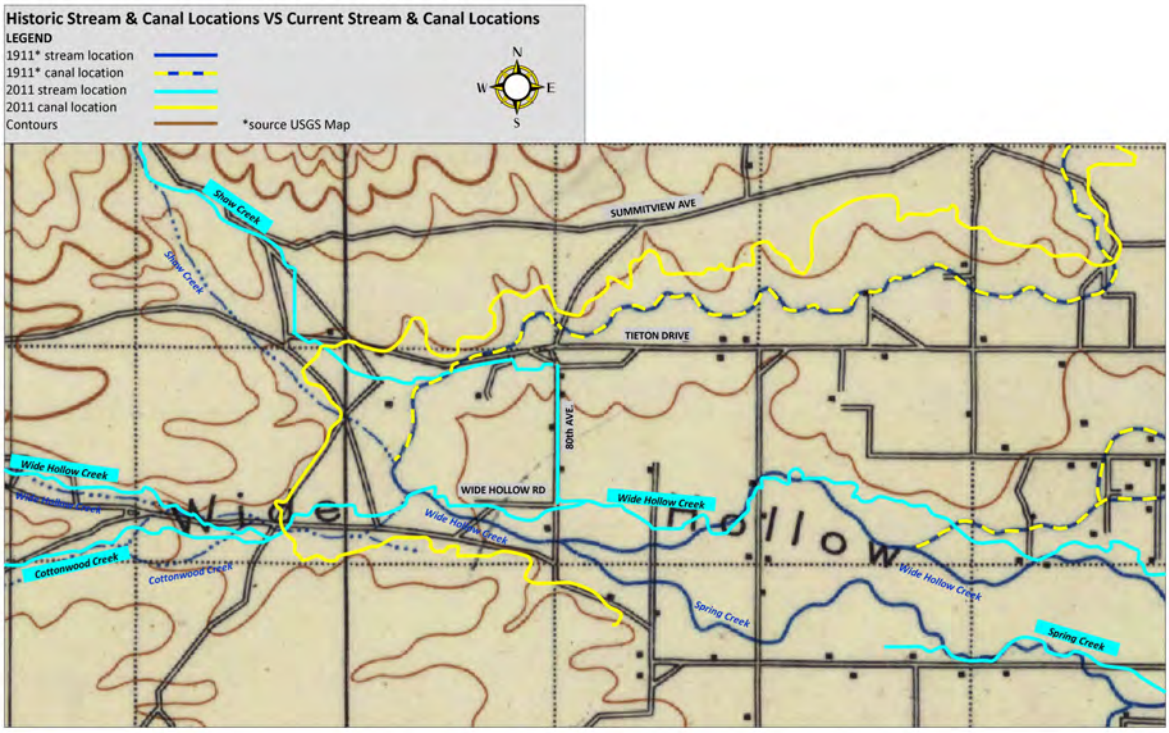


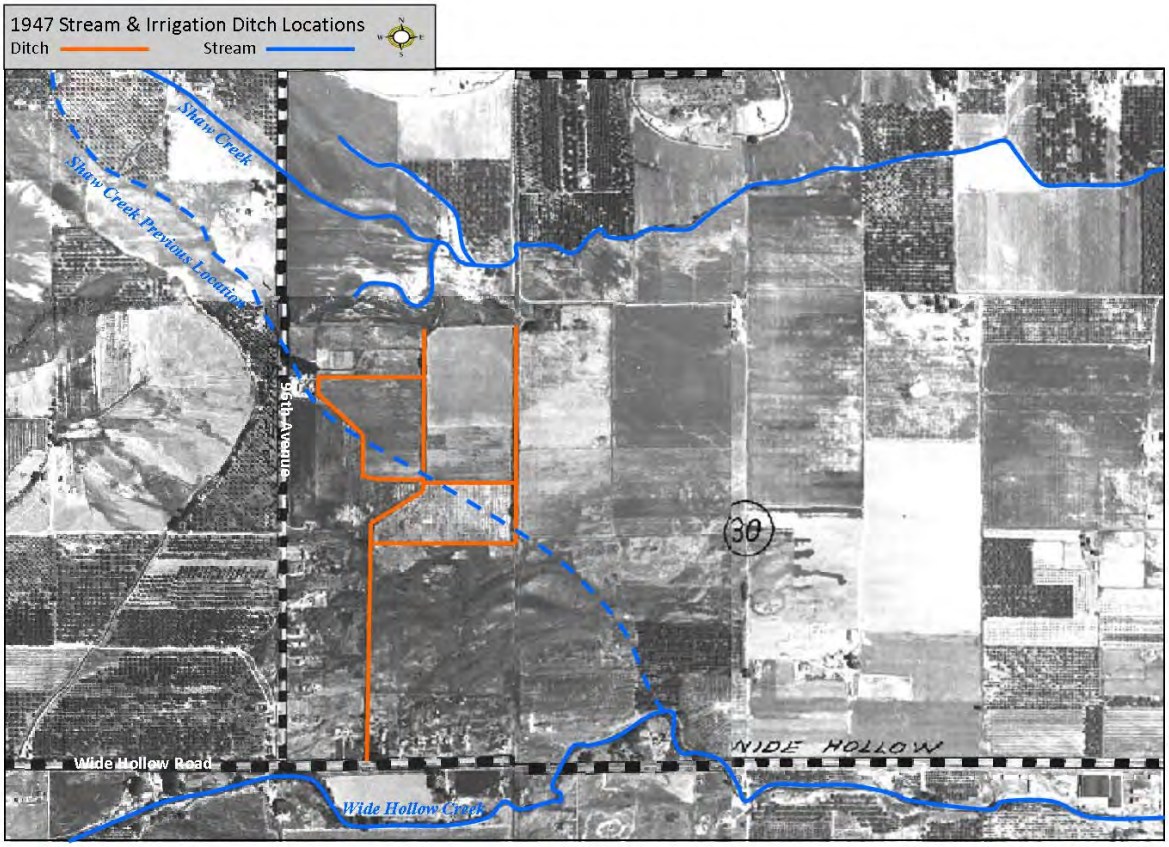
Figure 4. Delineated OHW

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 21, 2015


Historic Stream & Canal Locations VS Current Stream & Canal Locations
LEGEND
1911* stream location
1911* canal location
2011 stream location
2011 canal location
Contours
*source USGS Map
N
W
E
S
Shaw Creek
Shaw Creek
SUMMITVIEW AVE
TIETON DRIVE
80th AVE.
WIDE HOLLOW RD
Wide Hollow Creek
Wide Hollow Creek
Wide Hollow Creek
Wide Hollow Creek
Wide Hollow Creek
Cottonwood Creek
Cottonwood Creek
Spring Creek
Spring Creek


1947 Stream & Irrigation Ditch Locations
Ditch
Stream
Shaw Creek
Shaw Creek Previous Location
95th Avenue
30
NIDE HOLLOW
Wide Hollow Road
Wide Hollow Creek

5 Conclusion

Based on the data collected prior to and during site visits, one Category II palustrine forested wetland exists within the footprint of the proposed flood mitigation project. Wetland A (0.64 acre) is located at the northern end of the proposed Shaw Creek relocation channel. Wetland A has an intermittent surface water connection to Shaw Creek, which has a significant nexus with Wide Hollow Creek, a tributary of the Yakima River. As the Yakima River is a traditional navigable waterway, Wetland A is therefore regulated by the USACE under the Clean Water Act.

Both Shaw and Wide Hollow Creeks, as well as the delineated Shaw Creek flood channel, are hydrologically connected to the Yakima River, which is considered a traditional navigable water. As such, all three of these waterways are regulated by the USACE as "Waters of the U.S." under the Clean Water Act.

Once impacts to jurisdictional streams, wetlands, and their regulated buffers have been identified and quantified, mitigation will be undertaken in accordance with USACE guidelines. This report documents the investigation, best professional judgment, and conclusions of the investigator. It should be considered a preliminary jurisdictional determination until it has been reviewed and approved in writing by the US Army Corps of Engineers in accordance with Section 404 of the Clean Water Act.

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Appendix A: Wetland Determination Data Sheets

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-1

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): concave | Slope (%): ____

Subregion (LRR): B | Lat: 46.589487 | Long: -120.632295 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: **A portion of the sample plot, including a majority of the herbaceous stratum, is within a regularly grazed pasture**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *none*			
2.			
3.			
4.			
50% = ____, 20% = ____		= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *Elaeagnus angustifolia*	5	no	FAC
2. *Rubus armeniancus*	5	no	FACU
3. *Salix fragilis*	5	no	FAC
4.			
5.			
50% = ____, 20% = ____	15	= Total Cover	
Herb Stratum (Plot size:5')			
1. *Cirsium arvense*	5		FACU
2. *Conzya canadensis*	20		FACU
3. *Plantago major*	5		FAC
4. *Dipsacus fullonum*	5		FAC
5. *Plantago lanceolata*	10		FAC
6. *Iris pseudacorus*	5		OBL
7. *misc. grasses*	40		NI
8.			
50% = ____, 20% = 1	90	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 10		% Cover of Biotic Crust ____	

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	5	x1 =	5
FACW species	____	x2 =	____
FAC species	30	x3 =	90
FACU species	30	x4 =	120
UPL species	____	x5 =	____
Column Totals:	65 (A)		215 (B)

Prevalence Index = B/A = 3.31

Hydrophytic Vegetation Indicators:

☐ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☐ No ☒**

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100					sandy si lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-2

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): convex | Slope (%): ____

Subregion (LRR): B | Lat: 46.589996 | Long: -120.632375 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes** ☐ **No** ☒
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix fragilis*	75	yes	FAC
2.			
3.			
4.			
50% = 1, 20% = ____	75	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *Malus fusca*	5	no	FAC
2. *Prunus virginiana*	10	no	FAC
3. *Salix fragilis*	5	no	FAC
4.			
5.			
50% = ____, 20% = ____	20	= Total Cover	
Herb Stratum (Plot size:5')			
1. *Equisetum arvense*	20	yes	FAC
2. *Unidentified grass sp.*	5	no	NI
3.			
4.			
5.			
6.			
7.			
8.			
50% = ____, 20% = 1	25	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 75	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100					loamy cl	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-3

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): concave | Slope (%): ____

Subregion (LRR): B | Lat: 46.589999 | Long: -120.632429 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soil Present?	Yes	☒	No	☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Wetland Hydrology Present?	Yes	☒	No	☐	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix fragilis*	75	yes	FAC
2.			
3.			
4.			
50% = 1, 20% = ____	75	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *Malus fusca*	10	no	FAC
2. *Prunus virginiana*	5	no	FAC
3. *Salix fragilis*	5	no	FAC
4.			
5.			
50% = ____, 20% = ____	20	= Total Cover	
Herb Stratum (Plot size:5')			
1. *Equisetum arvense*	20	yes	FAC
2. *Lemna sp.*	30	yes	OBL
3. *Typha sp.*	1	no	OBL
4. *Solanum dulcamara*	5	no	FAC
5.			
6.			
7.			
8.			
50% = ____, 20% = 2	56	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 44	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of :	Multiply by:
OBL species ____	x1 = ____
FACW species ____	x2 = ____
FAC species ____	x3 = ____
FACU species ____	x4 = ____
UPL species ____	x5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	Gley1 2.5/10Y	100					muck	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☒ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☒	No	☐	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes	☒	No	☒	Depth (inches): 0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-4

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): convex | Slope (%): ____

Subregion (LRR): B | Lat: 46.590342 | Long: -120.632182 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐		
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes** ☐ **No** ☒
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix fragilis*	60	yes	FAC
2. *Elaeagnus angustifolia*	20	yes	FAC
3. ____	____	____	____
4. ____	____	____	____
50% = 1, 20% = 1	80	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *Salix fragilis*	5	no	FAC
2. ____	____	____	____
3. ____	____	____	____
4. ____	____	____	____
5. ____	____	____	____
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *Solanum dulcamara*	20	yes	FAC
2. *misc. grasses*	50	no	NI
3. ____	____	____	____
4. ____	____	____	____
5. ____	____	____	____
6. ____	____	____	____
7. ____	____	____	____
8. ____	____	____	____
50% = ____, 20% = 1	70	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1. ____	____	____	____
2. ____	____	____	____
50% = ____, 20% = ____	____	= Total Cover	
% Bare Ground in Herb Stratum 30	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/2	100					loamy cl	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-5

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): convex | Slope (%): ____

Subregion (LRR): B | Lat: 46.590427 | Long: -120.633121 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Elaeagnus angustifolia*	50	yes	FAC
2.			
3.			
4.			
50% = 1, 20% = ____	50	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *none*			
2.			
3.			
4.			
5.			
50% = ____, 20% = ____		= Total Cover	
Herb Stratum (Plot size:5')			
1. *Cirsium vulgare*	5	no	FACU
2. *Cirsium arvense*	5	no	FACU
3. *misc. grasses*	90	no	NI
4.			
5.			
6.			
7.			
8.			
50% = 0, 20% = 0	100	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100					clayey lo	
16-20	Gley1 2.5/10Y	100					clayey lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches): _____
Water Table Present?	Yes	☐	No	☒	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-6

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): convex | Slope (%): ____

Subregion (LRR): B | Lat: 46.590464 | Long: -120.633046 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soil Present?	Yes	☒	No	☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Wetland Hydrology Present?	Yes	☒	No	☐	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Elaeagnus angustifolia*	50	yes	FAC
2.			
3.			
4.			
50% = 1, 20% = ____	50	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *none*			
2.			
3.			
4.			
5.			
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *Phalaris arundinacea*	70	yes	FACW
2. *Iris pseudacorus*	5	no	OBL
3. *Cirsium vulgare*	5	no	FACU
4. *Cirsium arvense*	3	no	FACU
5. *Conzya canadensis*	5	no	FACU
6.			
7.			
8.			
50% = 1, 20% = ____	88	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 12	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	Gley1 2.5/10Y	100					muck	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☒ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☒ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☒	No	☐	Depth (inches): 8
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches): 0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation City/County: /Yakima Sampling Date: 10/23/14

Applicant/Owner: Yakima County State: WA Sampling Point: TP-10

Investigator(s): Jason Cade, Widener and Associates Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): ____

Subregion (LRR): B Lat: 46.589926 Long: -120.632617 Datum: ____

Soil Map Unit Name: Outlook silt loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soil Present?	Yes	☒	No	☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Wetland Hydrology Present?	Yes	☒	No	☐	

Remarks: **Herb stratum is located within a regularly mowed and grazed pasture**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix fragilis*	40	yes	FAC
2.			
3.			
4.			
50% = ____, 20% = 1	40	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *none*			
2.			
3.			
4.			
5.			
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *misc. mowed herbs/grasses*	90	no	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50% = ____, 20% = ____	90	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 10	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL Sampling Point: TP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/1	100					silty cl	
3-8	2.5Y 3/2	100					silty cl	
8-20	2.5Y 3/2	90	Gley1 3/10Y	10	D	M	clayey si lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☒ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):	
Water Table Present?	Yes	☐	No	☒	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches):	0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-11

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): none | Slope (%): ____

Subregion (LRR): B | Lat: 46.589911 | Long: -120.632499 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soil Present?	Yes	☐	No	☒	**Is the Sampled Area within a Wetland?** **Yes** ☐ **No** ☒
Wetland Hydrology Present?	Yes	☐	No	☒	

Remarks: **Herb stratum is located within a regularly mowed and grazed pasture**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix fragilis*	50	yes	FAC
2.			
3.			
4.			
50% = 1, 20% = ____	50	= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *none*			
2.			
3.			
4.			
5.			
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *misc. mowed herbs/grasses*	90	no	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
50% = ____, 20% = ____	90	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 10	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL Sampling Point: TP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	2.5Y 3/2	100					cl lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-12

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): none | Slope (%): ____

Subregion (LRR): B | Lat: 46.589594 | Long: -120.632686 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: **Herb stratum is located within a regularly grazed pasture**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *none*			
2.			
3.			
4.			
50% = ____, 20% = ____		= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *none*			
2.			
3.			
4.			
5.			
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *misc. grazed herbs/grasses*	90	no	NI
2. *Carex sp.*	10	no	NI
3.			
4.			
5.			
6.			
7.			
8.			
50% = ____, 20% = ____	100	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

☐ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☐ No ☒**

Remarks:

Project Site: Shaw Creek Relocation

SOIL

Sampling Point: TP-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 3/3	100					sandy si lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Shaw Creek Relocation | City/County: /Yakima | Sampling Date: 10/23/14

Applicant/Owner: Yakima County | State: WA | Sampling Point: TP-13

Investigator(s): Jason Cade, Widener and Associates | Section, Township, Range: 30, 13N, 18E

Landform (hillslope, terrace, etc.): floodplain | Local relief (concave, convex, none): concave | Slope (%): ____

Subregion (LRR): B | Lat: 46.589564 | Long: -120.632558 | Datum: ____

Soil Map Unit Name: Outlook silt loam | NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☒, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	☒	No	☐	
Hydric Soil Present?	Yes	☒	No	☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Wetland Hydrology Present?	Yes	☒	No	☐	

Remarks: **Herb stratum is located within a regularly grazed pasture**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *none*			
2.			
3.			
4.			
50% = ____, 20% = ____		= Total Cover	
Sapling/Shrub Stratum (Plot size:15')			
1. *Elaeagnus angustifolia*	2	no	FAC
2.			
3.			
4.			
5.			
50% = ____, 20% = ____	5	= Total Cover	
Herb Stratum (Plot size:5')			
1. *misc. grazed grasses*	45	no	NI
2. *Carex sp.*	50	yes	NI
3. *Juncus effusus*	5	no	FACW
4.			
5.			
6.			
7.			
8.			
50% = ____, 20% = ____	100	= Total Cover	
Woody Vine Stratum (Plot size:____)			
1.			
2.			
50% = ____, 20% = ____		= Total Cover	
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust ____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ____ (A)

Total Number of Dominant Species Across All Strata: ____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ____ (A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	____	x1 =	____
FACW species	5	x2 =	10
FAC species	2	x3 =	6
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	7 (A)		16 (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

☐ Dominance Test is >50%

☒ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

Project Site: Shaw Creek Relocation

SOIL Sampling Point: TP-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	Gley1 3/10Y	100					clayey si lo	
4-20	10YR 3/2	80	Gley1 3/10Y	20	D	M	clayey si lo	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (Inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☒ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☒ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☒	No	☐	Depth (inches): 0

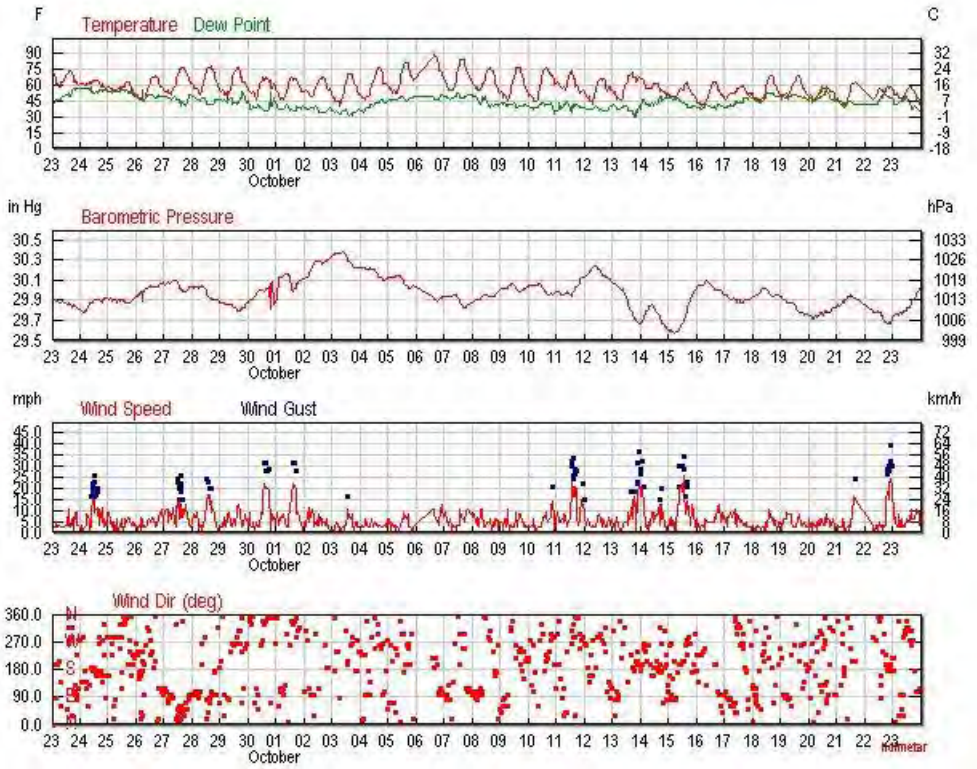
Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix B: Hydrologic Data

Temperature				
Max Temperature	**88** °F	**70** °F	**58** °F	
Mean Temperature	**78** °F	**59** °F	**51** °F	
Min Temperature	**66** °F	**48** °F	**39** °F	
Degree Days				
Heating Degree Days (base 65)	14	7	0	208
Cooling Degree Days (base 65)	14	1	0	19
Growing Degree Days (base 50)	28	9	1	274
Dew Point				
Dew Point	**58** °F	**44** °F	**29** °F	
Precipitation				
Precipitation	**0.24** in	**0.02** in	**0.00** in	**0.74** in
Snowdepth	-	-	-	-
Wind				
Wind	**25** mph	**5** mph	**0** mph	
Gust Wind	**39** mph	**20** mph	**13** mph	
Sea Level Pressure				
Sea Level Pressure	**30.38** in	**29.95** in	**29.57** in	



2014	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Sep	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
23	73	65	57	57	52	44	88	61	37	29.91	29.86	29.81	10	10	10	10	4	-	0.02	Rain
24	65	60	57	58	55	52	94	80	63	29.92	29.87	29.77	10	10	9	18	6	25	0.24	Rain
25	64	57	51	56	54	49	96	88	67	29.93	29.89	29.87	10	10	6	9	4	-	0.20	Rain
26	69	56	45	54	48	45	100	83	49	30.08	30.00	29.89	10	7	0	10	4	-	0.01	Fog
27	77	64	51	50	45	41	84	49	28	30.10	30.04	29.99	10	7	0	15	9	25	0.00	
28	78	64	50	49	45	41	83	55	28	30.04	29.97	29.88	10	10	10	17	7	24	0.00	
29	77	62	48	54	46	42	84	59	28	29.88	29.84	29.79	10	10	10	13	5	18	0.00	Rain
30	77	56	45	54	40	35	76	53	31	30.08	29.95	29.81	10	10	10	22	7	31	0.00	Rain
2014	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Oct	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	69	56	45	41	38	35	73	52	33	30.16	30.09	29.90	10	10	10	22	8	31	0.00	
2	67	58	50	40	37	34	66	48	29	30.34	30.25	30.13	10	10	10	12	5	13	0.00	
3	72	55	39	37	34	31	76	48	23	30.38	30.31	30.22	10	10	10	10	3	16	0.00	
4	76	60	45	46	41	35	72	52	31	30.23	30.17	30.10	10	10	10	6	3	-	0.00	Rain
5	81	66	51	50	47	45	80	55	28	30.14	30.09	30.02	10	10	10	9	4	-	0.00	
6	88	78	66	51	48	46	56	36	24	29.94	29.92	29.89	10	10	10	13	8	14	0.00	
7	84	70	55	52	49	47	77	54	28	29.95	29.89	29.82	10	10	10	10	6	14	0.00	
8	76	64	52	50	44	39	75	53	27	30.00	29.94	29.88	10	10	10	10	6	-	0.00	
9	77	61	45	43	41	38	82	54	25	30.06	30.02	29.98	10	10	10	10	4	-	0.00	
10	76	60	44	44	40	33	80	50	29	30.07	30.01	29.96	10	10	10	14	4	21	0.00	
11	73	62	52	45	40	35	61	47	24	30.13	30.01	29.93	10	10	10	23	9	33	0.00	
12	68	54	42	41	38	35	82	54	33	30.24	30.16	30.08	10	10	10	8	4	-	0.00	
13	71	58	46	42	37	29	75	46	24	30.07	29.86	29.67	10	10	10	21	6	37	0.00	
14	65	58	51	50	45	38	91	67	36	29.85	29.73	29.60	10	10	3	20	9	32	0.08	Rain
15	63	56	44	49	44	38	96	76	44	30.01	29.71	29.57	10	10	8	25	7	34	0.00	Rain
16	63	51	39	42	39	36	93	70	37	30.09	30.02	29.96	10	10	10	13	5	16	0.00	
17	60	52	45	49	44	39	90	72	55	29.96	29.91	29.87	10	10	10	10	6	-	0.05	Rain
18	69	56	44	53	48	43	96	82	56	30.02	29.97	29.94	10	10	7	10	3	17	0.00	
19	70	58	48	51	49	45	92	78	48	29.93	29.84	29.75	10	10	9	9	5	-	0.00	
20	58	52	45	54	48	44	94	86	72	29.83	29.77	29.72	10	10	5	8	4	-	0.07	Rain
21	62	51	41	45	42	39	100	86	47	29.95	29.90	29.84	10	7	0	16	4	24	0.00	Fog
22	59	52	46	52	48	41	94	76	63	29.80	29.72	29.66	10	10	10	24	6	39	0.04	Rain
23	58	52	41	49	43	36	93	77	47	30.01	29.82	29.74	10	10	10	10	5	-	0.03	Rain

USDA Field Office Climate Data

WETS Station : YAKIMA AIR TERMINAL, WA243 Creation Date: 11/13/2014
Latitude: 4634 Longitude: 12033 Elevation: 01064
State FIPS/County(FIPS): 53077 County Name: Yakima
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	37.7	20.5	29.1	1.17	0.56	1.43	4	6.8
February	45.6	24.7	35.2	0.80	0.44	1.00	3	3.2
March	56.0	28.9	42.5	0.70	0.29	0.85	3	1.3
April	64.1	33.2	48.7	0.53	0.17	0.64	2	0.0
May	72.4	40.0	56.2	0.51	0.24	0.63	2	0.0
June	79.6	46.2	62.9	0.62	0.20	0.74	2	0.0
July	87.2	50.9	69.1	0.22	0.06	0.27	1	0.0
August	86.5	50.1	68.3	0.36	0.05	0.41	1	0.0
September	77.6	42.3	60.0	0.39	0.10	0.47	1	0.0
October	64.3	32.9	48.6	0.53	0.20	0.65	2	0.2
November	47.7	26.3	37.0	1.05	0.62	1.31	3	3.2
December	37.1	20.5	28.8	1.38	0.56	1.68	4	8.9
Annual	-----	-----	-----	------	6.87	9.34	--	----
Average	63.0	34.7	48.9	------	------	------	--	----
Average	-----	-----	-----	8.26	------	------	27	21.9

GROWING SEASON DATES

Probability	Temperature 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	3/28 to 10/28 213 days	4/21 to 10/14 175 days	5/13 to 9/30 139 days
70 percent *	3/22 to 11/ 3 226 days	4/16 to 10/19 185 days	5/ 9 to 10/ 4 148 days

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 * Percent chance of the growing season occurring between the Beginning
   and Ending dates.

total 1946-2014 prcp

Station : WA243, YAKIMA AIR TERMINAL
-------   Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
46									M0.15	0.70	1.18	0.11	2.14
47	0.41	0.35	0.42	0.23	0.03	1.74	0.53	0.13	0.86	1.83	0.73	0.22	7.48
48	1.52	0.86	0.29	0.46	2.76	2.39	0.17	0.60	0.73	0.40	1.12	1.34	12.64
49	0.13	0.88	1.06	0.04	0.14	0.02	0.00	0.42	0.16	0.13	1.50	0.15	4.63
50	2.45	1.16	0.72	0.40	0.08	1.60	0.33	0.00	0.18	2.22	1.21	1.34	11.69
51	1.87	0.40	0.89	0.14	0.81	2.03	0.13	0.38	0.19	1.08	1.47	0.85	10.24
52	1.12	0.71	0.13	0.04	0.50	1.48	0.00	0.38	0.03	0.01	0.52	1.18	6.10
53	2.67	0.25	0.24	1.09	0.92	0.38	0.00	0.59	0.00	0.13	1.18	0.94	8.39
54	1.98	0.49	0.51	0.03	0.36	0.39	0.03	0.20	0.83	0.27	1.13	0.33	6.55
55	0.58	0.25	0.69	1.41	0.41	0.41	0.43	0.00	0.48	1.24	2.57	3.22	11.69
56	3.25	0.81	0.21	0.00	0.48	1.81	0.02	0.10	0.54	0.35	0.09	0.55	8.21
57	0.56	0.87	2.63	0.93	1.19	1.26	0.01	0.20	0.98	1.40	0.10	0.83	10.96
58	1.37	1.84	0.81	0.81	0.59	0.21	0.22	0.16	0.05	0.29	1.14	0.82	8.31
59	2.03	1.12	0.80	0.05	0.14	0.20	0.00	0.04	0.52	0.42	0.40	0.35	6.07
60	0.89	1.43	0.65	0.54	0.87	0.19	0.05	0.25	0.11	0.16	1.55	0.90	7.59
61	0.55	2.46	2.04	0.86	0.96	0.52	0.25	0.22	0.00	0.31	0.51	1.27	9.95
62	0.16	1.48	0.65	0.62	1.09	0.07	0.01	0.33	0.30	1.49	0.79	0.47	7.46
63	1.42	0.52	0.84	1.62	0.43	0.26	0.69	0.13	0.08	0.05	1.13	1.00	8.17
64	0.60	0.00	0.14	0.25	0.03	1.18	0.08	0.20	0.03	0.15	0.70	4.19	7.55
65	1.33	0.08	0.10	0.48	0.05	0.51	0.27	0.21	0.04	0.06	1.43	1.39	5.95
66	1.73	0.11	0.81	0.00	0.10	0.17	0.71	0.00	0.87	0.41	2.14	0.95	8.00
67	0.60	0.00	0.45	1.03	0.16	1.12	0.00	0.01	0.09	0.21	0.30	0.55	4.52
68	1.76	0.88	0.11	0.00	0.47	0.02	0.02	1.71	0.32	0.94	1.32	1.91	9.46
69	1.52	0.91	0.16	0.27	0.54	0.61	0.00	0.01	0.32	0.24	0.08	2.28	6.94
70	3.66	0.49	0.22	0.16	0.06	0.01	0.13	0.00	0.07	0.54	1.25	1.41	8.00
71	1.48	0.00	1.56	0.47	0.54	0.20	0.04	0.14	0.73	0.27	0.97	1.45	7.85
72	0.88	0.31	1.05	0.09	0.60	1.50	0.04	0.65	0.06	0.12	0.72	1.31	7.33
73	1.19	0.24	0.01	0.04	0.08	0.02	0.00	0.01	0.81	1.52	2.83	2.22	8.97
74	1.67	0.85	1.21	1.46	0.80	0.12	0.18	0.00	0.02	0.45	0.30	1.14	8.20
75	2.28	1.16	0.49	0.40	0.23	0.22	0.18	2.10	0.00	0.79	0.43	0.55	8.83
76	0.56	0.78	0.70	0.33	0.09	0.69	0.26	0.50	0.13	0.07	0.00	0.07	4.18
77	0.13	0.69	0.23	0.01	0.68	0.46	0.00	1.16	0.89	0.17	0.70	2.80	7.92
78	2.30	1.30	0.52	0.91	0.28	0.32	0.29	0.38	0.64	0.00	0.94	0.14	8.02
79	0.91	0.54	0.23	0.14	0.04	0.57	0.04	0.42	0.36	0.74	1.53	1.33	6.85
80	2.23	1.30	0.29	0.80	0.84	1.12	0.00	0.29	0.48	0.23	1.00	2.69	11.27
81	0.95	0.65	0.10	0.01	0.68	0.39	0.29	0.09	0.59	1.16	1.36	2.38	8.65
82	0.58	1.48	0.34	0.30	0.37	1.70	0.12	0.39	1.08	1.46	0.90	2.15	10.87
83	1.97	1.59	1.95	0.66	0.30	0.77	0.29	0.44	0.33	0.23	2.77	1.92	13.22
84	0.13	0.92	1.04	1.05	0.51	1.45	0.13	0.04	0.46	0.16	2.62	0.51	9.02
85	0.09	0.68	0.62	0.00	0.46	0.37	0.12	0.03	0.84	0.75	0.92	1.02	5.90
86	1.82	1.26	0.54	0.05	0.94	0.08	0.25	0.11	2.07	0.38	0.64	0.89	9.03
87	1.46	0.25	1.44	0.57	0.10	0.05	0.40	0.00	0.00	0.02	0.68	3.30	8.27
88	0.68	0.00	0.21	1.41	0.18	1.00	0.00	0.00	0.13	0.05	1.12	0.67	5.45
89	0.19	1.29	1.71	0.85	0.63	0.05	0.07	0.41	0.09	0.67	0.72	0.21	6.89
90	1.47	0.11	0.21	0.18	1.13	0.31	0.02	2.00	0.04	0.45	0.00	0.24	6.16

91	0.34	0.23	1.16	0.61	0.17	2.53	0.18	0.06	0.08	0.73	1.24	0.28	7.61
92	0.27	0.62	0.41	0.96	0.04	1.25	0.44	0.25	0.28	0.68	0.98	2.33	8.51
93	0.91	0.66	0.62	0.50	0.43	0.72	0.58	0.17	0.03	0.07	0.21	1.02	5.92
94	0.36	1.05	0.04	0.90	1.22	0.66	0.05	0.06	0.09	1.36	0.69	1.27	7.75
95	3.68	0.32	1.28	1.83	0.62	0.62	0.69	0.14	0.74	0.27	1.54	2.15	13.88
96	1.31	1.81	0.57	0.22	1.24	0.04	0.48	0.02	0.36	0.55	2.59	5.59	14.78
97	1.15	0.19	0.60	0.29	0.22	0.89	0.04	0.22	0.24	1.72	1.13	0.19	6.88
98	1.96	1.43	1.09	0.21	1.20	0.10	0.64	0.03	0.06	0.19	0.83	0.69	8.43
99	1.37	1.32	0.15	0.14	0.26	0.17	0.64	0.75	0.00	0.40	0.53	0.27	6.00
0	1.65	1.01	0.60	0.53	0.54	0.13	0.05	0.00	0.18	0.32	0.70	0.70	6.41
1	0.54	0.26	0.47	0.51	0.01	1.03	0.03	0.30	0.14	0.36	1.96	1.12	6.73
2	0.33	0.84	0.21	0.80	0.69	0.71	0.12	0.00	0.10	0.09	0.46	3.49	7.84
3	2.21	0.28	0.36	1.28	0.16	0.00	0.00	0.44	0.05	0.20	0.10	2.05	7.13
4	1.55	1.39	0.44	0.25	0.43	0.57	0.46	1.19	0.15	0.62	0.08	1.12	8.25
5	1.07	0.15	0.56	0.72	1.17	0.09	0.12	0.09	0.37	0.23	1.60	2.38	8.55
6	1.81	0.64	0.44	0.59	0.82	0.69	0.06	0.00	0.55	0.26	1.14	2.56	9.56
7	0.30	0.84	0.12	0.25	0.32	0.21	0.01	0.12	0.19	0.56	1.50	1.25	5.67
8	0.81	0.51	0.27	0.13	0.21	0.29	0.05	0.32	0.19	0.44	0.98	0.83	5.03
9	0.97	0.67	0.84	0.25	0.76	0.52	0.03	0.09	0.43	0.89	0.55	0.97	6.97
10	1.97	1.01	0.14	0.53	1.46	1.07	0.08	0.05	0.88	0.74	0.83	2.38	11.14
11	0.61	0.29	1.11	0.32	2.55	0.21	0.46	0.00	0.07	0.90	0.48	0.34	7.34
12	1.37	0.78	1.44	0.81	0.16	0.85	0.26	0.00	0.04	1.01	0.66	2.13	9.51
13	0.10	0.03	0.77	0.40	2.48	0.39	0.00	0.19	0.30	0.13	0.38	0.32	5.49
14	0.30	1.43	0.60	0.46	0.13	0.08	0.06	0.90	0.46	0.86	M0.10		5.38

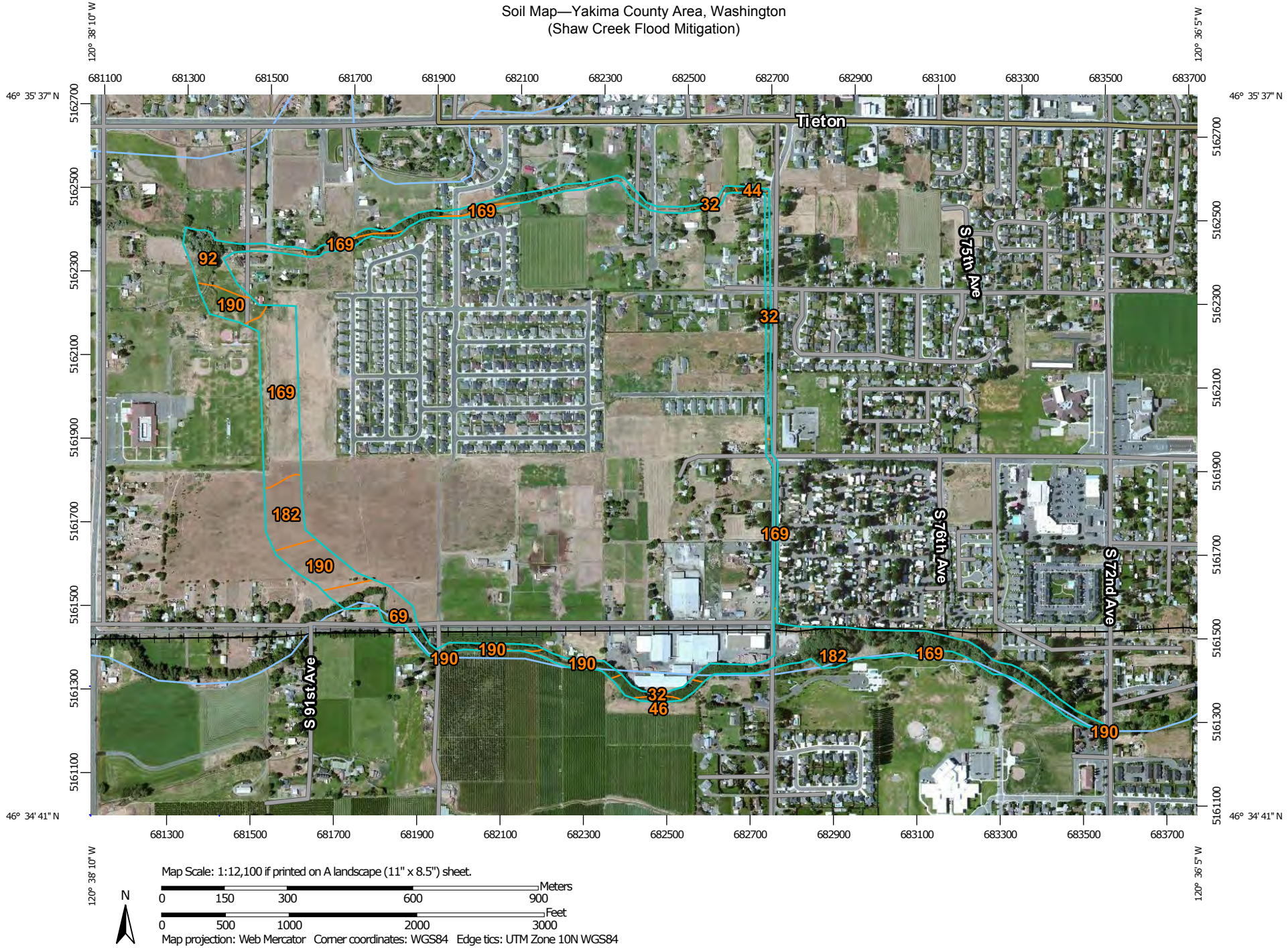
Appendix C: Observed Plants

Plants observed at Shaw Creek Flood Mitigation

Scientific Name	Common Name	Type	Indicator
Populus balsamnifera	Black Cottonwood	Tree	FAC
Salix fragilis	Crack Willow	Tree	FAC
Salix lasiolepis	Arroyo Willow	Tree	FACW
Salix alba	White Willow	Tree	FACW
Elaeagnus angustifolia	Russian Olive	Tree	FAC
Ulmus pumilla	Siberian Elm	Tree	UPL
Rubus armeniacus	Himalayan Blackberry	Shrub	FACU
Malus fusca	Pacific Crabapple	Shrub	FAC
Prunus virginiana	Chokecherry	Shrub	FAC
Cornus sericea	Redosier Dogwood	Shrub	FACW
Acer glabrum	Rocky Mountain Maple	Shrub	FAC
Cirsium arvense	Canada Thistle	Herb	FACU
Artemesia absinthium	Absinthe Wormwood	Herb	NI
Conzya canadensis	Horsetail	Herb	FACU
Dipsacus fullonum	Common Teasel	Herb	FAC
Bassia scoparia	Kochia	Herb	FAC
Centaurea diffusa	Diffuse Knapweed	Herb	UPL
Phalaris arundinacea	Reed Canarygrass	Herb	FACW
Rumex crispus	Curly Dock	Herb	FAC
Malva neglecta	Common Mallow	Herb	UPL
Typha latifolia	Broadleaf Cattail	Herb	OBL
Iris pseudacorus	Yellowflag Iris	Herb	OBL
Sonchus arvensis	Field Sowthistle	Herb	FACU
Verbascum thapsus	Common Mullein	Herb	FACU
Juncus effusus	Common Rush	Herb	FACW
Bromus tectorum	Cheat Grass	Herb	UPL
Plantago major	Common Plantain	Herb	NI
Plantago lanceolata	Narrowleaf Plantain	Herb	FAC
Solanum dulcamara	Bittersweet Nightshade	Herb	FAC
Asclepias speciosa	Showy Milkweed	Herb	FAC
Salsola kali	Prickly Russian Thistle	Herb	FACU
Mentha arvensis	Wild Mint	Herb	FACW
Equisetum arvense	Field Horsetail	Herb	FAC
Arctium minus	Lesser Burdock	Herb	FACU
Carex sp.	Sedge	Herb	OBL
Lemna sp.	Duckweed	Herb	OBL

Appendix D: Yakima County Soil Survey Data

Soil Map—Yakima County Area, Washington
(Shaw Creek Flood Mitigation)



Map Scale: 1:12,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 19, 2010—Aug 19, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Yakima County Area, Washington (WA677)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
32	Esquatzel silt loam, 0 to 2 percent slopes	6.6	13.2%
44	Gorst loam, 15 to 30 percent slopes	0.3	0.5%
46	Harwood loam, 2 to 5 percent slopes	0.3	0.6%
69	Logy silt loam, 0 to 2 percent slopes	4.8	9.6%
92	Outlook silt loam	4.0	8.1%
169	Umapine silt loam, drained, 0 to 2 percent slopes	11.7	23.6%
182	Weirman fine sandy loam	15.3	30.7%
190	Yakima silt loam	6.8	13.7%
Totals for Area of Interest		**49.8**	**100.0%**

Yakima County Area, Washington

32—Esquatzel silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 29ss
Elevation: 300 to 2,900 feet
Mean annual precipitation: 6 to 12 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 130 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Esquatzel and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Esquatzel

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 17 inches: silt loam
H2 - 17 to 60 inches: silt loam
H3 - 60 to 64 inches: stratified fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): 2c
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

44—Gorst loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 29t6
Elevation: 1,200 to 2,900 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Gorst and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gorst

Setting

Landform: Terraces
Parent material: Loess and old alluvium

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 15 inches: loam
H3 - 15 to 19 inches: cemented material

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 12 to 20 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Dry stony 10-16 pz (R008XY201WA)

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

46—Harwood loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 29t8
Elevation: 1,200 to 2,000 feet
Mean annual precipitation: 8 to 12 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 135 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Harwood and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harwood

Setting

Landform: Terraces
Parent material: Loess and old alluvium

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 26 inches: loam
H3 - 26 to 30 inches: gravelly loam
H4 - 30 to 34 inches: cemented material

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: Loamy 10-16 pz (R008XY102WA)

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

69—Logy silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 29v2
Mean annual precipitation: 6 to 10 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Logy and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Logy

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 33 inches: extremely gravelly loam
H3 - 33 to 60 inches: extremely gravelly coarse sand, extremely cobbly coarse sand
H3 - 33 to 60 inches:

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B

Minor Components

Weirman

Percent of map unit: 5 percent

Landform: Flood plains

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

92—Outlook silt loam

Map Unit Setting

National map unit symbol: 29vx
Elevation: 300 to 2,000 feet
Mean annual precipitation: 6 to 12 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Outlook, drained, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Outlook, Drained

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 12 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C

Minor Components

Sinloc

Percent of map unit: 5 percent
Landform: Depressions

Outlook, undrained
Percent of map unit: 5 percent
Landform: Alluvial cones

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

169—Umapine silt loam, drained, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 29rf
Elevation: 250 to 3,500 feet
Mean annual precipitation: 6 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Umapine, drained, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Umapine, Drained

Setting

Landform: Flood plains, terraces
Parent material: Alluvium

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

Minor Components

Toppenish

Percent of map unit: 5 percent
Landform: Depressions

Kittitas

Percent of map unit: 5 percent
Landform: Flood plains

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

182—Weirman fine sandy loam

Map Unit Setting

National map unit symbol: 29rx
Elevation: 400 to 2,500 feet
Mean annual precipitation: 7 to 14 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Weirman and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Weirman

Setting

Landform: Flood plains, terraces
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 21 inches: loamy fine sand
H3 - 21 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A

Minor Components

Zillah

Percent of map unit: 5 percent

Landform: Alluvial cones

Data Source Information

Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Yakima County Area, Washington

190—Yakima silt loam

Map Unit Setting

National map unit symbol: 29s6
Elevation: 500 to 1,600 feet
Mean annual precipitation: 9 to 14 inches
Mean annual air temperature: 54 to 55 degrees F
Frost-free period: 120 to 195 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Yakima and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yakima

Setting

Landform: Flood plains
Parent material: Alluvium

Typical profile

H1 - 0 to 13 inches: silt loam
H2 - 13 to 30 inches: gravelly very fine sandy loam
H3 - 30 to 60 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B

Data Source Information

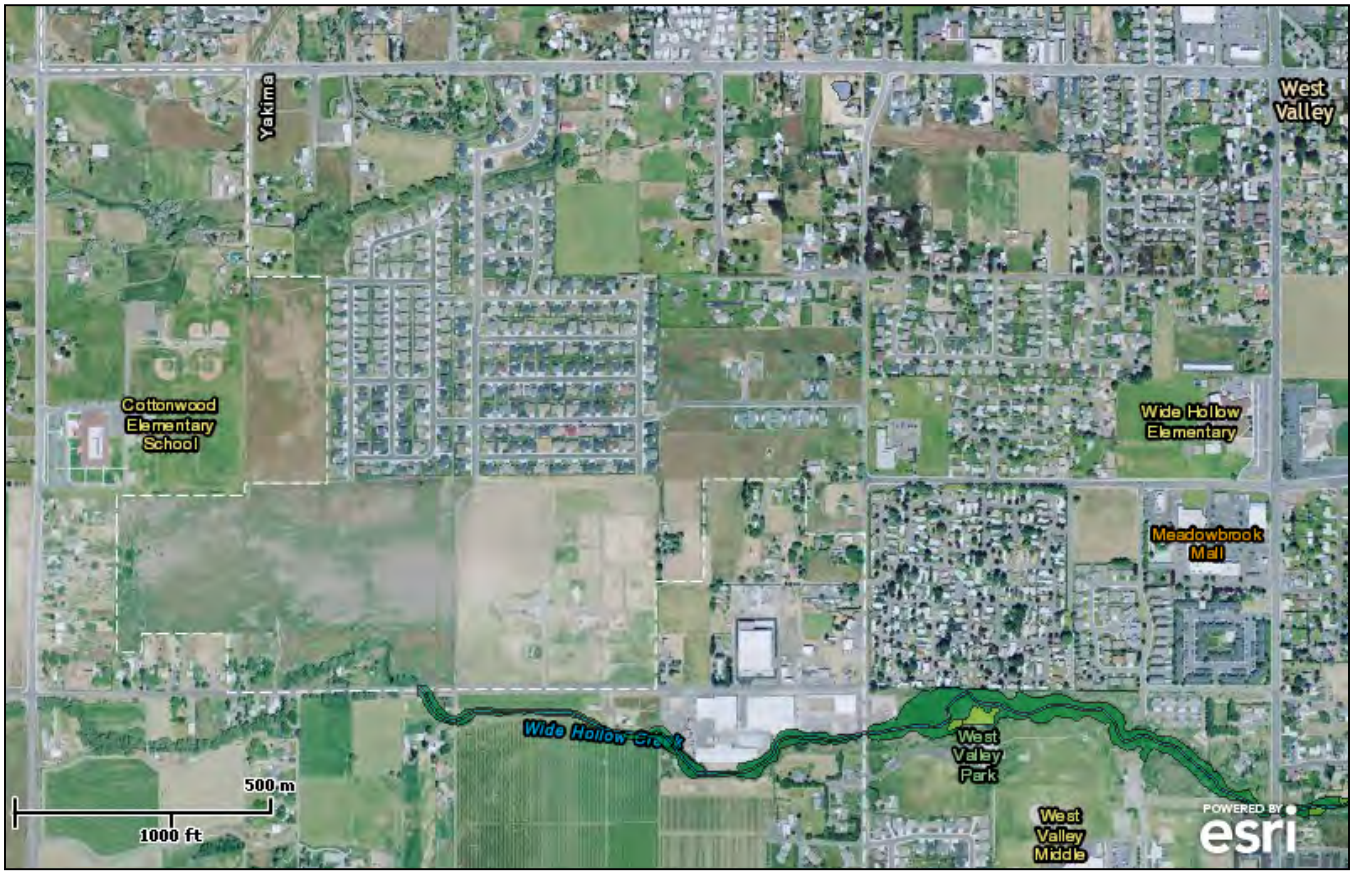
Soil Survey Area: Yakima County Area, Washington
Survey Area Data: Version 14, Sep 17, 2014

Appendix E: National Wetlands Inventory Map

U.S. Fish and Wildlife Service
National Wetlands Inventory

Shaw Creek Relocation NWI

Nov 13, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

User Remarks:

Appendix F: Wetland Rating Forms

Wetland name or number A

RATING SUMMARY – Eastern Washington

Name of wetland (or ID #): Wetland A Date of site visit: 10/23/14

Rated by Jason Cade, Widener and Assoc. Trained by Ecology? __ Yes ✓ No Date of training_____

HGM Class used for rating Depressional Wetland has multiple HGM classes? ✓ Y ___N

NOTE: Form is not complete without the figures requested (*figures can be combined*).

Source of base aerial photo/map 2013 National Agriculture Imagery Program

OVERALL WETLAND CATEGORY II (based on functions ✓ or special characteristics ✓)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 22-27

✓ **Category II** – Total score = 19-21

_____**Category III** – Total score = 16-18

_____**Category IV** – Total score = 9-15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	(H) M L	H (M) L	H (M) L	
Landscape Potential	H (M) L	H (M) L	H M (L)	
Value	(H) M L	(H) M L	H (M) L	TOTAL
Score Based on Ratings	8	7	5	20

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY *Circle the appropriate category*
Vernal Pools	II III
Alkali	I
Wetland of High Conservation Value	I
Bog and Calcareous Fens	I
Old Growth or Mature Forest – slow growing	I
Aspen Forest	I
Old Growth or Mature Forest – fast growing	II
Floodplain forest	(II)
None of the above	

Wetland name or number A

Maps and figures required to answer questions correctly for Eastern Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	D 1.3, H 1.1, H 1.5	1
Hydroperiods (including area of open water for H 1.3)	D 1.4, H 1.2, H 1.3	2
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	2
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	1
Map of the contributing basin	D 5.3	3
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	4
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	5
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	D 3.3	6

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of wetland vs. width of stream *(can be added to another figure)*	R 4.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	L 1.1, L 4.1, H 1.1, H 1.5	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes and classes of emergents	H 1.1, H 1.5	
Hydroperiods	H 1.2, H 1.3	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants *(can be added to figure above)*	S 4.1	
Boundary of area within 150 ft of the wetland (*can be added to another figure*)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which wetland is found (website)	S 3.3	

Wetland name or number A

HGM Classification of Wetland in Eastern Washington

For questions 1-4, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-4 apply, and go to Question 5.

1. Does the entire unit **meet both** of the following criteria?
   ___The vegetated part of the wetland is on the water side of the Ordinary High Water Mark of a body of permanent open water (without any plants on the surface) that is at least 20 ac (8 ha) in size
   ___At least 30% of the open water area is deeper than 10 ft (3 m)

   (NO) - go to 2 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

2. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks;
   ___The water leaves the wetland **without being impounded**.

   (NO) - go to 3 YES – The wetland class is **Slope**
   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 foot deep).

3. Does the entire wetland unit **meet all** of the following criteria?
   ___ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river;
   ___ The overbank flooding occurs at least once every 10 years.

   (NO) - go to 4 YES – The wetland class is **Riverine**
   NOTE: The Riverine wetland can contain depressions that are filled with water when the river is not flooding.

4. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

   (NO) - go to 5 YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-4 APPLY TO DIFFERENT AREAS IN THE WETLAND UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

Wetland name or number A

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the wetland unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM Class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine (the riverine portion is within the boundary of depression)	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number A

DEPRESSIONAL WETLANDS **Water Quality Functions** - Indicators that the site functions to improve water quality	Points (only 1 score per box)
D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland has no surface water outlet — points = 5 (Wetland has an intermittently flowing outlet) — points = 3 Wetland has a highly constricted permanently flowing outlet — points = 3 Wetland has a permanently flowing, unconstricted, surface outlet — points = 1	3
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions of soils)* (YES) = 3 NO = 0	3
D 1.3. Characteristics of persistent vegetation (Emergent, Scrub-shrub, and/or Forested Cowardin classes) (Wetland has persistent, ungrazed, vegetation for > $^2/_3$ of area) — points = 5 Wetland has persistent, ungrazed, vegetation from $^1/_3$ to $^2/_3$ of area — points = 3 Wetland has persistent, ungrazed vegetation from $^1/_{10}$ to < $^1/_3$ of area — points = 1 Wetland has persistent, ungrazed vegetation < $^1/_{10}$ of area — points = 0	5
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.* Area seasonally ponded is > ½ total area of wetland — points = 3 Area seasonally ponded is ¼ - ½ total area of wetland — points = 1 Area seasonally ponded is < ¼ total area of wetland — points = 0	3
Total for D 1 — Add the points in the boxes above	14

Rating of Site Potential If score is: ✓ **12- 16 = H** ___ **6- 11 = M** ___ **0- 5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland receive stormwater discharges? Yes = 1 (No) = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? (Yes) = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 (No) = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1- D 2.3? Source Upstream agriculture (Yes) = 1 No = 0	1
Total for D 2 — Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 or 4 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, or lake that is on the 303(d) list? (Yes) = 1 No = 0	1
D 3.2. Is the wetland in a basin or sub-basin where water quality is an issue in some aquatic resource [303(d) list, eutrophic lakes, problems with nuisance and toxic algae]? (Yes) = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the drainage or basin in which the wetland is found*)? (Yes) = 2 No = 0	2
Total for D 3 — Add the points in the boxes above	4

Rating of Value If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number A

DEPRESSIONAL WETLANDS **Hydrologic Functions** - Indicators that the site functions to reduce flooding and erosion.	Points (only 1 score per box)
D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland has no surface water outlet — points = 8 (Wetland has an intermittently flowing outlet) — points = 4 Wetland has a highly constricted permanently flowing outlet — points = 4 Wetland has a permanently flowing unconstricted surface outlet — points = 0 *(If outlet is a ditch and not permanently flowing treat wetland as "intermittently flowing")*	4
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or deepest part (if dry).* Seasonal ponding: > 3 ft above the lowest point in wetland or the surface of permanent ponding — points = 8 Seasonal ponding: 2 ft - < 3 ft above the lowest point in wetland or the surface of permanent ponding — points = 6 The wetland is a headwater wetland — points = 4 (Seasonal ponding: 1 ft - < 2 ft) — points = 4 Seasonal ponding: 6 in - < 1 ft — points = 2 Seasonal ponding: < 6 in or wetland has only saturated soils — points = 0	4
Total for D 4 — Add the points in the boxes above	8

Rating of Site Potential If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

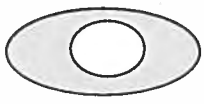
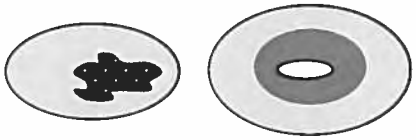
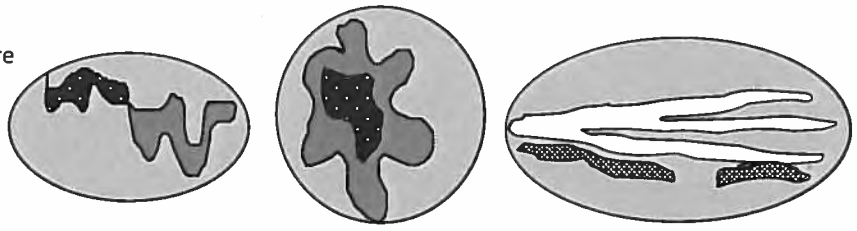
D 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 (No) = 0	0
D 5.2. Is > 10% of the area within 150 ft of the wetland in a land use that generates runoff? (Yes) = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses? (Yes) = 1 No = 0	1
Total for D 5 — Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The wetland is in a landscape that has flooding problems. Choose the description that best matches conditions around the wetland being rated. *Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds), AND (Flooding occurs in sub-basin that is immediately down-gradient of wetland) — points = 2 Surface flooding problems are in a sub-basin farther down-gradient — points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ — points = 0 There are no problems with flooding downstream of the wetland — points = 0	2
D 6.2. Has the site has been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 (No) = 0	0
Total for D 6 — Add the points in the boxes above	2

Rating of Value If score is: ✓ **2-4 = H** ___ **1 = M** ___ **0 = L** *Record the rating on the first page*

Wetland name or number A

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	(only 1 score per box)
H 1.0. Does the wetland have the potential to provide habitat for many species?	
H 1.1. Structure of the plant community: *Check the Cowardin vegetation classes present and categories of emergent plants. Size threshold for each category is >= ¼ ac or >= 10% of the wetland if wetland is < 2.5 ac.* ____Aquatic bed ____Emergent plants 0-12 in (0-30 cm) high are the highest layer and have > 30% cover __✓__Emergent plants >12-40 in (>30-100 cm) high are the highest layer with >30% cover ____Emergent plants > 40 in (> 100 cm) high are the highest layer with >30% cover ____Scrub-shrub (areas where shrubs have >30% cover) __✓__Forested (areas where trees have >30% cover) 4 or more checks: points = 3 3 checks: points = 2 2 checks: points = 1 1 check: points = 0	1
H 1.2. Is one of the vegetation types Aquatic Bed? Yes = 1 (No) = 0	0
H 1.3. Surface water H 1.3.1. Does the wetland have areas of open water (without emergent or shrub plants) over at least ¼ ac **OR** 10% of its area during the March to early June **OR** in August to the end of September? ***Answer YES for Lake Fringe wetlands.*** (Yes) = 3 points & go to H 1.4 No = go to H 1.3.2 H 1.3.2. Does the wetland have an intermittent or permanent, and unvegetated stream within its boundaries, or along one side, over at least ¼ ac or 10% of its area? *Answer yes only if H 1.3.1 is No.* Yes = 3 No = 0	3
H 1.4. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. D*ifferent patches of the same species can be combined to meet the size threshold. You do not have to name the species.* *Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Russian olive, Phragmites, Canadian thistle, yellow-flag iris, and saltcedar (Tamarisk)* # of species 8 Scoring: > 9 species: points = 2 4-9 species: points = 1 < 4 species: points = 0	1
H 1.5. Interspersion of habitats Decide from the diagrams below whether interspersion among types of plant structures (described in H 1.1), and unvegetated areas (open water or mudflats) is high, moderate, low, or none. *Use map of Cowardin and emergent plant classes prepared for questions H 1.1 and map of open water from H 1.3. If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **High** = 3 points  Riparian braided channels with 2 classes	Figure 1 2

Wetland name or number A

H 1.6. Special habitat features *Check the habitat features that are present in the wetland. The number of checks is the number of points.* ____Loose rocks larger than 4 in OR large, downed, woody debris (> 4 in diameter) within the area of surface ponding or in stream. __✓__Cattails or bulrushes are present within the wetland. ____Standing snags (diameter at the bottom > 4 in) in the wetland or within 30 m (100 ft) of the edge. ____Emergent or shrub vegetation in areas that are permanently inundated/ponded. ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 45 degree slope) OR signs of recent beaver activity ____ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*	1
Total for H 1 — Add the points in the boxes above	1

Rating of Site Potential If score is:___**15-18 = H** ✓**7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support habitat functions of the site?	
H 2.1. Accessible habitat (only area of habitat abutting wetland). If total accessible habitat is: *Calculate:* % undisturbed habitat 0.24 + [(% moderate and low intensity land uses)/2] ____ = 0.24 % > 1/3 (33.3%) of 1 km Polygon — points = 3 20-33% of 1km Polygon — points = 2 10-19% of 1km Polygon — points = 1 (<10% of 1km Polygon) — points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around wetland. *Calculate:* % undisturbed habitat 10.5 + [(% moderate and low intensity land uses)/2] ____ = 10.5 % Undisturbed habitat > 50% of Polygon — points = 3 (Undisturbed habitat 10 - 50% and in 1-3 patches) — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of Polygon — points = 0	2
H 2.3. Land use intensity in 1 km Polygon: > 50% of Polygon is high intensity land use — points = (- 2) Does not meet criterion above — points = 0	-2
H 2.4. The wetland is in an area where annual rainfall is less than 12 in, and its water regime is not influenced by irrigation practices, dams, or water control structures. *Generally, this means outside boundaries of reclamation areas, irrigation districts, or reservoirs* Yes = 3 (No) = 0	0
Total for H 2 — Add the points in the boxes above	

Rating of Landscape Potential If score is:___**4-9 = H** ___**1-3 = M** ✓**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose the highest score that applies to the wetland being rated* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see Appendix B) — It provides habitat for Threatened or Endangered species (any plant or animal on state or federal lists) — It is mapped as a location for an individual WDFW species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan (Site has 1 or 2 priority habitats within 100 m (see Appendix B)) — points = 1 Site does not meet any of the criteria above — points = 0	1

Rating of Value If score is:___**2 = H** ✓**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland meets the attributes described below and circle the appropriate category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All wetlands should also be characterized based on their functions.

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Vernal pools Is the wetland **less than 4000 ft²**, and does it meet at least **two** of the following criteria? — Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input. — Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. *If you find perennial, obligate, wetland plants, the wetland is probably NOT a vernal pool.* — The soil in the wetland is shallow [< 1 ft (30 cm)deep] and is underlain by an impermeable layer such as basalt or clay. — Surface water is present for less than 120 days during the wet season. Yes – Go to **SC 1.1** (No) = **Not a vernal pool** SC 1.1. Is the vernal pool relatively undisturbed in February and March? Yes – Go to **SC 1.2** (No) = **Not a vernal pool with special characteristics**	
SC 1.2. Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 mi (other wetlands, rivers, lakes etc.)? Yes = **Category II** No = **Category III**	**Cat. II** **Cat. III**
SC 2.0. Alkali wetlands Does the wetland meet **one** of the following criteria? — The wetland has a conductivity > 3.0 mS/cm. — The wetland has a conductivity between 2.0 and 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as "alkali" species (see Table 4 for list of plants found in alkali systems). — If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt. **OR** does the wetland unit meet two of the following three sub-criteria? — Salt encrustations around more than 75% of the edge of the wetland — More than ⅔ of the plant cover consists of species listed on Table 4 — A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands. Yes = **Category I** (No) = **Not an alkali wetland**	**Cat. I**
SC 3.0. Wetlands of High Conservation Value (WHCV) SC 3.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 3.2** (No) – Go to **SC 3.3** SC 3.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 3.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 3.4** (No) = **Not a WHCV** SC 3.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and it is listed on their website? Yes = **Category I** No =**Not a WHCV**	**Cat. I**

Wetland name or number A

SC 4.0 Bogs and Calcareous Fens Does the wetland (or any part of the wetland unit) meet both the criteria for soils and vegetation in bogs or calcareous fens? *Use the key below to identify if the wetland is a bog or calcareous fen.* ***If you answer yes you will still need to rate the wetland based on its functions.*** SC 4.1. Does an area within the wetland have organic soil horizons (i.e., layers of organic soil), either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? *See Appendix C for a field key to identify organic soils.* (Yes) – Go to **SC 4.3** No – Go to **SC 4.2** SC 4.2. Does an area within the wetland have organic soils, either peats or mucks, that are less than 16 in deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 4.3** (No) = **Is not a bog for rating** SC 4.3. Does an area within the wetland have more than 70% cover of mosses at ground level AND at least 30% of the total plant cover consists of species in Table 5? Yes = **Category I bog** No – Go to **SC 4.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 5 are present, the wetland is a bog. SC 4.4. Is an area with peats or mucks forested (> 30% cover) with subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 5 provide more than 30% of the cover under the canopy? Yes = **Category I bog** No – Go to **SC 4.5** SC 4.5. Do the species listed in Table 6 comprise at least 20% of the total plant cover within an area of peats and mucks? Yes = **Is a Calcareous Fen for purpose of rating** (No) – Go to **SC 4.6** SC 4.6. Do the species listed in Table 6 comprise at least 10% of the total plant cover in an area of peats and mucks, AND one of the two following conditions is met: — Marl deposits [calcium carbonate ($CaCO_3$) precipitate] occur on the soil surface or plant stems — The pH of free water is ≥ 6.8 AND electrical conductivity is ≥ 200 uS/cm at multiple locations within the wetland Yes = **Is a Category I calcareous fen** (No) = **Is not a calcareous fen**	**Cat. I** **Cat. I**

SC 5.0. Forested Wetlands Does the wetland have an area of forest rooted within its boundary that meets **at least one** of the following three criteria? (*Continue only if you have identified that a forested class is present in question H 1.1*) ✓ The wetland is within the 100 year floodplain of a river or stream — Aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species — There is at least ¼ ac of trees (even in wetlands smaller than 2.5 ac) that are "mature" or "old-growth" according to the definitions for these priority habitats developed by WDFW *(see definitions in question H3.1)* (Yes) – Go to **SC 5.1** No = **Not a forested wetland with special characteristics**	
SC 5.1. Does the wetland have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees (*see Table 7*)? Yes = **Category I** (No) – Go to **SC 5.2**	**Cat. I**
SC 5.2. Does the wetland have areas where aspen (*Populus tremuloides*) represents at least 20% of the total cover of woody species? Yes = **Category I** (No) – Go to **SC 5.3**	**Cat. I**
SC 5.3. Does the wetland have at least ¼ acre with a forest canopy where more than 50% of the tree species (by cover) are fast growing species (*see Table 7*)? (Yes) = **Category II** No – Go to **SC 5.4**	**Cat. II**
SC 5.4. Is the forested component of the wetland within the 100 year floodplain of a river or stream? (Yes) = **Category II** No = **Not a forested wetland with special characteristics**	**Cat. II**
Category of wetland based on Special Characteristics *Choose the highest rating if wetland falls into several categories* If you answered No for all types, enter "Not Applicable" on Summary Form	II

Appendix B: WDFW Priority Habitats in Eastern Washington

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland: ***NOTE:*** *This question is independent of the land use between the wetland and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Old-growth/Mature forests:** Old-growth east of Cascade crest – Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 10 trees/ac (25 trees/ha) that are > 21 in (53 cm) dbh, and 1-3 snags/ac (2.5-7.5 snags/ha) that are > 12-14 in (30-35 cm) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west and 80-160 years old east of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

✓ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

✓ **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 12 in (30 cm)in eastern Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

— **Shrub-steppe:** A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).

— **Eastside Steppe:** Nonforested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often the prevailing cover component along with Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa secunda*), rough fescue (*F. campestris*), or needlegrasses (*Achnatherum* spp.).

— **Juniper Savannah:** All juniper woodlands.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

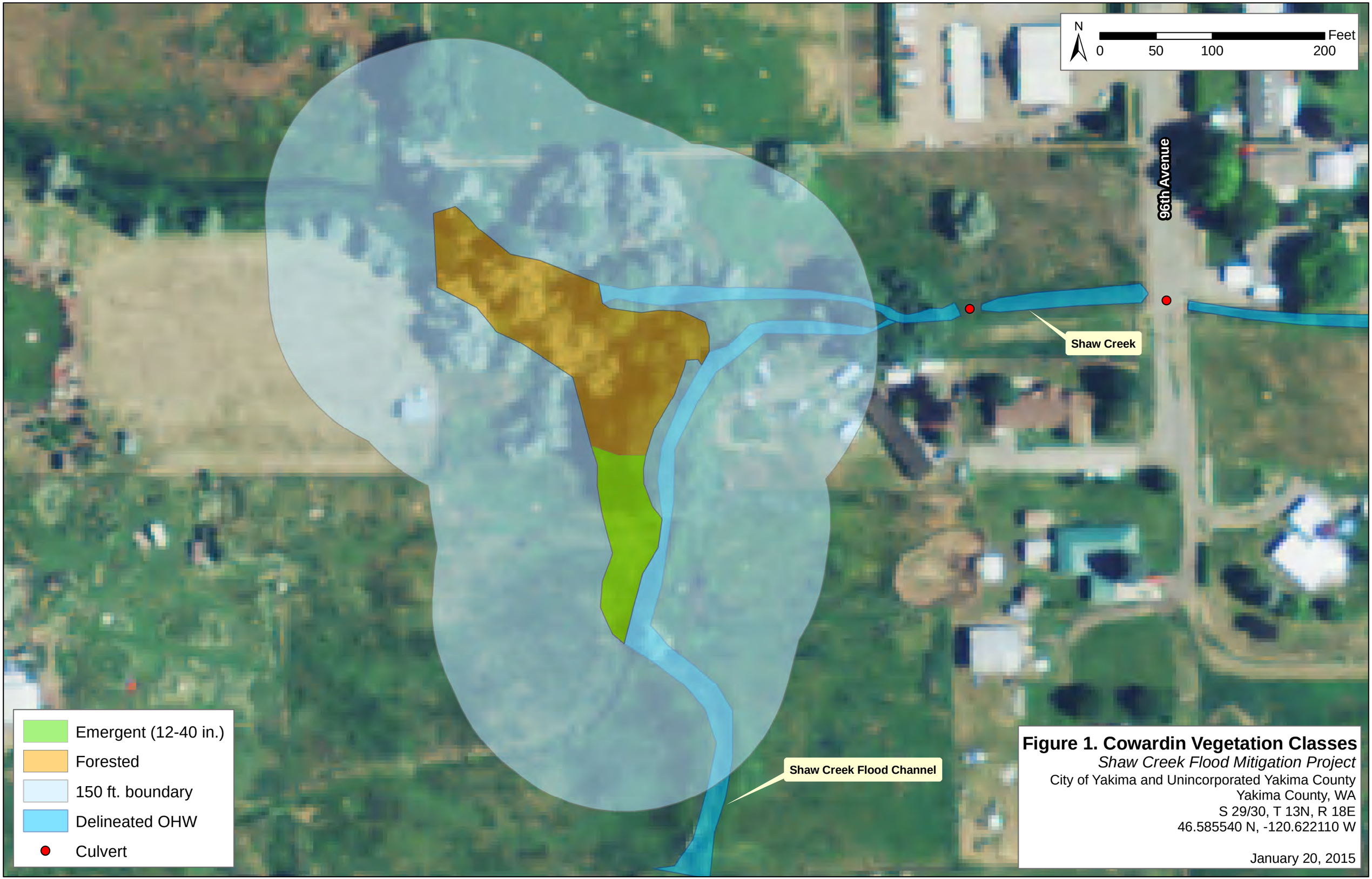


Figure 1. Cowardin Vegetation Classes
Shaw Creek Flood Mitigation Project
City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 20, 2015

Figure 2. Hydroperiods and Outlets

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 20, 2015

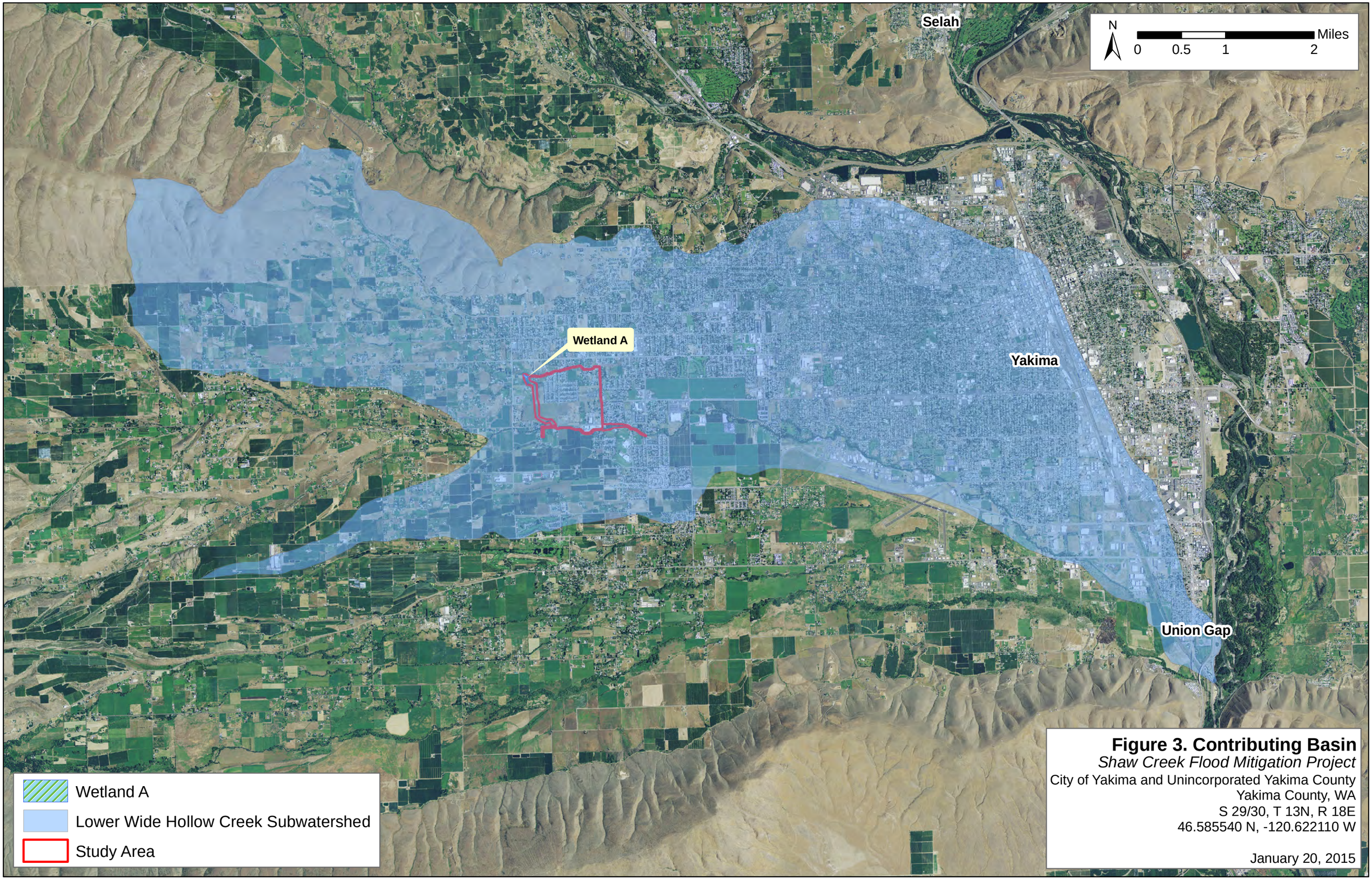


Figure 3. Contributing Basin
Shaw Creek Flood Mitigation Project
City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 20, 2015

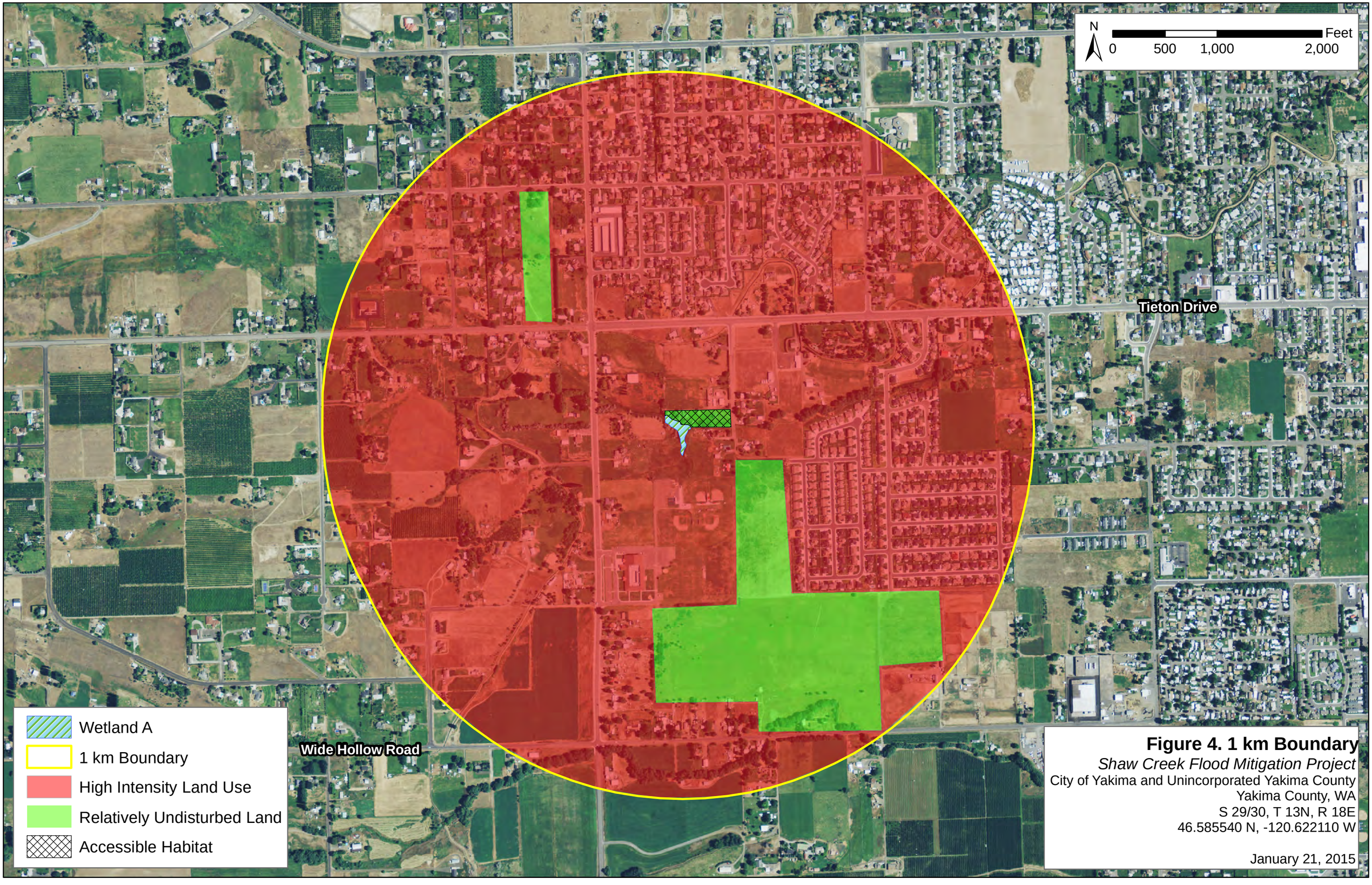


Figure 4. 1 km Boundary

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 21, 2015

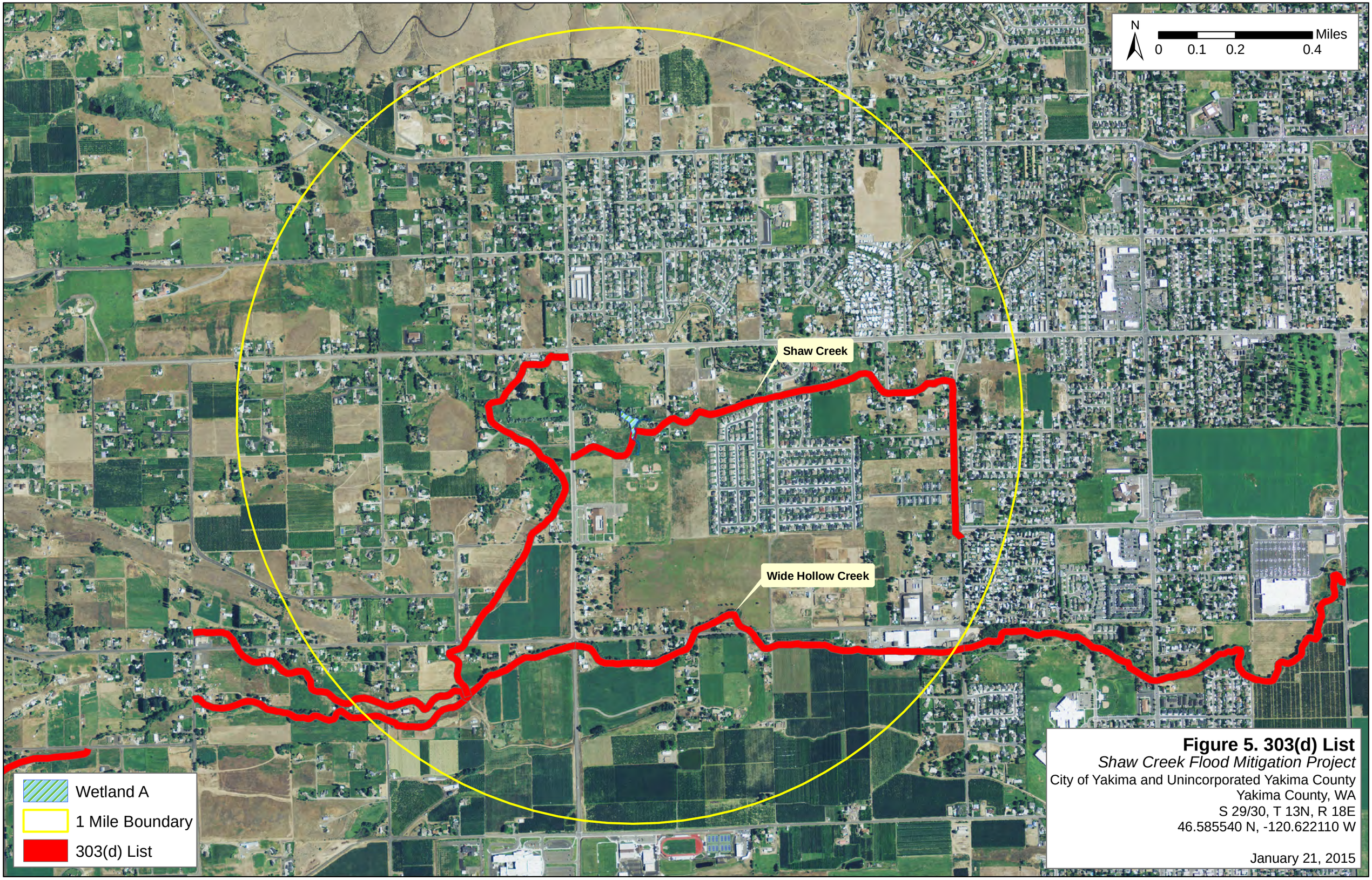


Figure 5. 303(d) List

Shaw Creek Flood Mitigation Project

City of Yakima and Unincorporated Yakima County
Yakima County, WA
S 29/30, T 13N, R 18E
46.585540 N, -120.622110 W

January 21, 2015

Figure 6. WRIA 37 TMDL List

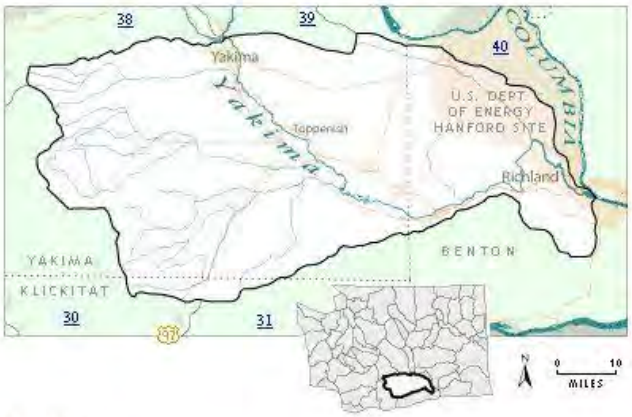
Water Quality Improvement Projects (TMDLs)

Water Quality Improvement > Water Quality Improvement Projects by WRIA > WRIA 37: Lower Yakima

WRIA 37: Lower Yakima

The following table lists overview information and links to specific water quality improvement projects (including total maximum daily loads, or TMDLs) for this water resource inventory area (WRIA). Please use links (where available) for more information on a project.

Yakima River basin project index:



www.ecy.wa.gov/programs/wq/tmdl/yakima_wq/index.html

Counties

- Benton
- Klickitat
- Yakima

Waterbody Name	Pollutant(s)	Status**	TMDL Lead
Granger Drain	Fecal Coliform	EPA approved Has an implementation plan	Greg Bohn 509-454-4174
Griffin Lake	Total Phosphorus	Under development	Terry Wittmeier 509-574-3991
Yakima River, Mid Basin Tributaries	Fecal Coliform Moxie Drain Wide Hollow Cowiche Creek	Under development	Greg Bohn 509-454-4174
	Temperature Moxie Drain Wide Hollow	Under development	Laine Young 509-575-2642
Yakima River	Toxics	Under development	Jane Creech 509-454-7860
Yakima River, Lower	DDT Turbidity	EPA approved	Jane Creech 509-454-7860

** ***Status*** *will be listed as one of the following: Approved by EPA, Under Development or Implementation. No status means project work has not yet started.*

Appendix D
Executive Order 11988 – Floodplain Management Eight-Step Decision-Making Process

Executive Order 11988 (Floodplain Management) requires federal agencies:

… to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of the floodplain and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

FEMA's implementing regulations at 44 CFR Part 9 include an eight-step decision making process for compliance with this part. This eight-step process was applied to the proposed Shaw and Wide Hollow Creeks Flood Control Project. Portions of the project area are within the 100- and 500-year floodplains of Shaw and Wide Hollow Creeks.

Below is a summary of the EA analysis reflected in the 8 step decision making process:

Step 1: Determine if the Proposed Action is located in the Base Floodplain.

The Proposed Action involves relocating Shaw Creek, conveyance improvements in Wide Hollow Creek including removing crack willow, replacing two bridges, a bridge culvert addition and constructing an overflow channel.

The project area is not depicted on the 1974 Flood Hazard Flood Boundary map of the area but is included in the revised Flood Insurance Rate Map completed in 2010 with assistance from FEMA and the Washington State Department of Ecology (Ecology). Portions of the project area are in Zone AE, floodways, and Zone X (Flood Insurance Rate Map Panels 53077C1009E and 53077C1028E, effective July 17, 2012). Zone AE is an area within the base floodplain (100-year or 1-percent-annual-chance) where base flood elevations (BFEs) have been determined. Zone X is an area that is determined to be outside the 500-year or 0.2-percent-annual-chance floodplain. Along Shaw Creek, BFEs range from 1,230 feet above sea level (asl) at the western edge of the project area to 1,186 feet asl at the eastern edge of the project area.

Project activities in Wide Hollow Creek and the northern and southern portions of the channel relocation would take place within Zone AE and the floodway. Access and staging areas would be located inside the floodplain except at the staging area for the channel relocation which would occur outside the existing floodplain.

According to the USFWS National Wetlands Inventory, there are wetlands assoicated with Wide Hollow Creek (USFWS 2013). Wetland "A" was identified at the upstream end of the Shaw Creek channel relocation area. The wetland is a 0.64-acre Category II depressional wetland with shallow standing water, likely fed by agricultural runoff (see Appendix C).

Step 2: Conduct early public review (Preliminary Public Notice).

Several outreach activities associated with this project have occurred. During the 5-year planning process for the *Ahtanum-Wide Hollow Comprehensive Flood Hazard Management Plan*, many public meetings were held to identify flooding problems and possible solutions. Press releases and two project-specific public meetings were held in 2008 to solicit input from adjacent landowners. Adjacent landowners and homeowners

of nearby residences received NEPA scoping notices in June 2014 and a public notice was published in the *Yakima Herald-Republic* on June 2, 2014. The scoping comment period ended on July 8, 2014. A public notice will be published in this newspaper notifying the public of the availability of the draft EA and a public meeting will be held. The *Yakima Herald-Republic* is the local newspaper for the City of Yakima, including the project area.

Step 3: Identify and evaluate alternatives to locating in the base floodplain.

The purpose of the Proposed Action is to protect existing residences and remove approximately 493 existing and future residential lots from the floodplain. The Proposed Action would include relocating Shaw Creek, conveyance improvements in Wide Hollow Creek including removing crack willow, replacing two bridges, a bridge culvert addition and constructing an overflow channel. The project activities cannot be done outside the Zone AE floodplain and are thus functionally dependent on the floodplain. For this project, there is no practicable alternative site location outside the floodplain.

Other alternatives considered in the draft EA include the No Action Alternative and the Overflow Bypass Channel Alternative.

Under the No Action Alternative, Shaw and Wide Hollow Creeks would continue to flood. Nearby populations, residential structures, and bridges would continue to be at risk from flooding. Flooding in Shaw Creek would continue to result in streambank erosion, sediment loading, and loss of associated vegetation and wildlife habitat in Wide Hollow Creek. Shaw Creek has little capacity (approximately 5 cfs) and hydrologic and hydraulic modeling by WEST Consultants, Inc. (WEST), predicted flows in excess of 349 cfs for the 100-year flow. With peak discharges, Shaw Creek overflows and cannot enter Wide Hollow Creek at their confluence. As the floodplain in the project area changes, flood damage risks would continue to be unpredictable. The No Action Alternative is considered an impractical alternative due to urban development in the project area and the potential for population growth.

Under Alternative 2B, a channel relocation similar to the Proposed Action would be constructed to carry flood flows and flood events greater than 5 cfs south to Wide Hollow Creek, but seasonal flows less than 5 cfs in Shaw Creek would continue. There would largely be the same project components except construction of the Shaw Creek channel relocation would not completely block flow and divert Shaw Creek. Similar work would be required in Zone AE of the floodplain and in the floodway.

Water quality concerns in Shaw Creek include road surface contaminants, sediment discharge from ditch cleaning, periodic flood erosion, sediment from driveway culverts, and illegal dumping of fill debris and yard waste. Groundwater infiltration is also affected by unauthorized water diversions in Shaw Creek. Effects to water quality also occur

downstream in Wide Hollow Creek. Shaw and Wide Hollow Creeks are listed as Section 303(d) streams for certain pollutants.

Washington State Department of Fish and Wildlife (WDFW) has stated that the Overflow Bypass Channel Alternative provides little or no opportunity for restoration or enhancement because of existing infrastructure, homes and roads within close proximity to Shaw Creek.

FEMA has determined that no practicable alternatives to avoid the floodplain exist.

Step 4: Identify impacts of the Proposed Action associated with occupancy or modification of the floodplain.

The effects of the Proposed Action are based on hydraulic analysis using the U.S. Army Corps of Engineer's computer modeling program Hydrologic Engineering Centers River Analysis System (HEC-RAS), and LOMR in 2012.

Once the Proposed Action is complete, there would be a decreased risk of flood losses and minimized impact of floods through better conveyance of the 100-year flood (an increase of 133 to 136 cfs) in the Wide Hollow Creek reach. Wide Hollow Creek improvements would occur so that the current 100-year water surface elevation would not rise. According to WEST, Wide Hollow Creek would have side slopes varying from 2H:1V or less steep and the bottom width would range from 10 to 65 feet. Maintaining the existing channel invert is necessary to maintain the channel slope. However, for approximately 400 feet upstream of the confluence with the Shaw Creek channel relocation, a slight deepening (less than or equal to 1foot) of the invert would be required to maintain no rise during the 100-year flood event.

According to the HEC-RAS hydraulic model WEST developed for the Proposed Action, the Proposed Action would reduce the existing 100-year floodplain by 1,104 acres (Yakima County 2014). See draft EA, Appendix A, Figure 3. There would be new floodplain along the relocation channel. The Proposed Action would help restore the function and values of the 100-year floodplain. However, the Proposed Action could facilitate an increase in population and housing in the Cottonwood Grove, Westbrook, or Clinton Way subdivisions outside the proposed 100 year floodplain. The project is not expected to increase development in the proposed 100-year floodplain.

The channel relocation is anticipated to improve water quality for Shaw Creek and consequently Wide Hollow Creek. There would be a minor beneficial effect to water quality due to the diversion and improved stream conditions in the channel relocation. Sediment loads could temporarily increase in Wide Hollow Creek from crack willow removal. Low flows during winter would not have the volume and velocity to carry sediment very far downstream, and the resulting turbidity from construction activities would likely settle out within a short distance from the input source. The moderate flows in summer could result in turbidity from bridge replacement work without suitable measures to minimize erosion.

The channel relocation would originate from the area surrounding Wetland A. The wetland would remain and drain south through the channel relocation instead of draining east through Shaw Creek. A berm would likely be located on the east side of the wetland along the south side of the Shaw Creek ditch and a portion of the wetland may become cut off from a water source.

Step 5: Design or modify the Proposed Action to minimize threats to life and property and preserve its natural and beneficial floodplain values.

The Proposed Action, given its purpose, is designed using bio-engineering techniques and to minimize 100-year flood impacts while improving the floodplain functions and values. Vulnerable floodplain properties to be mitigated near the project area include about 516 existing and potential future parcels that may be damaged from floods.

The County would be responsible for following a temporary erosion and sediment control plan with BMPs including installing silt fencing, mulch or straw bales, and covering material stockpiles. Effects to water quality during construction are anticipated to be minor and temporary if avoidance and minimization measures are taken and BMPs are properly implemented. Any potential adverse impact to Wetland A would be mitigated, as determined necessary, through the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permitting process. A possible mitigation site may be at the lower reach of the channel relocation, if mitigation is required.

While most staging and access areas would be inside of the floodplain, no excess fill would be stock-piled in the floodplain. Site work mitigation measures and best management practices provided through permitting from the U.S. Army Corps of Engineers (USACE), WDFW, Ecology, and Yakima County would be followed to minimize wetland and associated floodplain impacts to Shaw and Wide Hollow Creeks. Restoration would occur above and below the OHWM and annual maintenance would consist of debris removal, irrigation and weed abatement as needed. No impacts to Wetland A are anticipated.

Step 6: Re-evaluate the Proposed Action.

The Proposed Action is the best practicable alternative within the current floodplain. It would not expose any segment of the population to flood hazards because it does not include a housing component and would not facilitate increased development in the new floodplain. The project would not aggravate the current flood hazard because the project is designed to facilitate, not impede flood flows, up to the 500-year flood event. The project would not disrupt floodplain values because it would not increase water levels in the floodplain. The Proposed Action would promote restoration of floodplain functions iof Shaw Creek and preserve floodplains in Wide Hollow Creek. Therefore, it is still practicable to construct the Proposed Action within the floodplain and all practicable means would be used to minimize harm to or within the floodplain.

Previously considered alternatives identified in Step 3 would not create greater benefit to the floodplains, nor does the potential harm from the Proposed Action outweigh the No Action alternative.

Step 7: Present findings and public explanation (Final Notification).

After the alternatives, including impacts and mitigation opportunities, were evaluated, the Proposed Action was determined to be the most practicable alternative. Notification of the draft EA for the project will be published in the *Yakima Herald-Republic*. The public, Tribes, and agencies had the opportunity to comment on the EA for 30 days after publication of the notice. The notice identified the action, location of the proposed site, participants, location of the draft EA, and who to write with comments. A public meeting will also held during the comment period to allow the public to comment. FEMA has reviewed all written comments for issues that need to be addressed with Yakima County and has incorporated any resolutions into the final EA, as appropriate. The USACE and the County will also conduct public involvement activities associated with their jurisdictional authorities and approvals.

Step 8: Implement the Proposed Action.

The Proposed Action will be constructed in accordance with the final design, including monitoring and maintenance of native plantings, applicable floodplain development requirements, and permit requirements. Once the project is complete, in accordance with its compliance with the National Flood Insurance Program, the County will complete the LOMR.

The following permits would need to be obtained: Nationwide Permit 27 from the USACE, Washington State Hydraulic Code Permit from the WDFW, stormwater permit from Ecology, Low Erosivity Waiver Certification from the Environmental Protection Agency (EPA), and grading and flood hazard permits from Yakima County.

Construction of the Proposed Action and native replanting would take place over approximately 3 years. Construction for the channel relocation, conveyance improvements, and the bridge culvert addition would occur between October and March, during low flow in Shaw and Wide Hollow Creeks. Construction of the bridges would occur between June and September.

Construction of the approximately 3,600-foot channel relocation is expected to take one fall season. Conveyance improvements in Wide Hollow Creek are expected to take two seasons. Construction of the channel relocation and conveyance improvements in Wide Hollow Creek would begin at approximately the same time.

Removal of crack willow is anticipated to occur in January and February (i.e., the driest time) over two seasons. Vegetation planting could occur in the spring or fall and would likely occur in both seasons because of the amount of area that would require revegetation and to check tree/plant mortality.

Replacement of the two bridges could start when design and permitting are completed. Construction of the bridges would last approximately 3 to 4 months during the summer. Construction would occur in the summer so that road closures would minimize detour impacts to school and agricultural harvest traffic.

After construction, weed control and native planting would occur in the fall and spring in Shaw and Wide Hollow Creeks. Irrigation and weed abatement would continue for at least 2 years to protect riparian plant establishment.

Appendix E
Migratory Bird Species List

The following migratory bird species are common to the region that includes Yakima County.

Common Name	Scientific Name
Bald eagle	Haliaeetus leucocephalus
Black swift	Cypseloides niger
Brewer's sparrow	Spizella breweri
Calliope hummingbird	Stellula calliope
Caspian tern	Hydroprogne caspia
Cassin's finch	Carpodacus cassinii
Eared grebe	Podiceps nigricollis
Ferruginous hawk	Buteo regalis
Flammulated owl	Otus flammeolus
Fox sparrow	Passerella liaca
Lewis’s woodpecker	Melanerpes lewis
Loggerhead shrike	Lanius ludovicianus
Long-billed curlew	Numenius americanus
Olive-sided flycatcher	Contopus cooperi
Peregrine falcon	Falco peregrinus
Purple finch	Carpodacus purpureus
Rufous hummingbird	Selasphorus rufus
Sage thrasher	Oreoscoptes montanus
Short-eared owl	Asio flammeus
Swainson’s hawk	Buteo swainsoni
White-headed woodpecker	Picoides albolarvatus
Williamson’s sapsucker	Sphyrapicus thyroideus
Willow flycatcher	Empidonax traillii

Source: USFWS (2014)

Appendix F
Agency Consultation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, Washington 98115

Refer to NMFS No:
WCR 2015-3017

July 17, 2015

Mark G. Eberlein
Regional Environmental Officer
U.S. Department of Homeland Security
FEMA Region X
Federal Regional Center
130 228th St. SW
Bothell, Washington 98021-8627

Re: Endangered Species Act Section 7(a)(2) Concurrence and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Shaw Creek Relocation Project, Yakima County, WA. (Sixth Field HUC: 170300030205 - Lower Wide Hollow Creek)

Dear Mr. Eberlein:

On July 6, 2015, NOAA's National Marine Fisheries Service (NMFS) received your request to initiate formal consultation with the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding the funding of the Shaw Creek Relocation Project. This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the Endangered Species Act (ESA), implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. In this case, NMFS concluded the action would not adversely affect EFH. Thus, consultation under the MSA is not required for this action.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System (Refer to NMFS No: WCR-2015-3017). A complete record of this consultation is on file at the Columbia Basin Branch in Ellensburg, WA.

Consultation History

On July 6, 2015, NMFS received a letter requesting consultation and a biological assessment (BA) from FEMA for the Shaw Creek Relocation Project. In the letter requesting consultation, FEMA determined that the proposed action is Not Likely to Adversely Affect (NLAA) Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*), but is Likely to Adversely Affect (LAA) critical habitat of MCR steelhead. The BA concludes that the proposed action is LAA both MCR steelhead and their critical habitat.

Proposed Action

The FEMA proposes to fund Yakima County to take actions to reduce the risk of flood damage and future flood damage claims through FEMA's Pre-Disaster Mitigation (PDM) grant program. Widespread flooding in the Wide Hollow basin, including lower Shaw Creek, occurs during 10-year and larger floods. Unnaturally extensive flooding is due to a combination of dense urbanization in the area, watershed degradation further upstream, and the historical relocation of parts of Shaw Creek. The goal of the project is to reconfigure drainage routes to convey up to the 500-year flood through the project area and remove 550 acres from the 100-year floodplain.

Elements of the project include:

1. Relocating lower Shaw Creek and its confluence with Wide Hollow Creek to their approximate historical location. Lower Shaw Creek was rerouted into an irrigation distribution network in the early 20th century that changed its grade and that now runs through residential lots adjacent to Tieton Drive and South 80th Avenue in Yakima, Washington. Yakima County proposes to relocate the lower portion of Shaw Creek by constructing a 3,600 foot-long conveyance channel to Wide Hollow Creek through a large grassy swale that is the presumed historical location of Shaw Creek. Berms would be constructed to contain the 500-year flood and the channel will be 70-100 feet wide in most places.
2. Improving conveyance in Wide Hollow Creek. Yakima County will replace two bridges, install an additional overflow channel and bridge culvert, and remove invasive crack willow trees from the floodway of Wide Hollow Creek to increase conveyance of flood waters in a 6,050 foot-long reach. Removal of the trees will be accompanied by reestablishment of native tree species. Removal of trees will be phased over approximately 10 years such that willow trees will be removed as native species attain sufficient height to provide shade to the creek.
3. Maintenance. Annual maintenance will include weed control until native species are established in the 20-acre planting area. Removal of debris from the Shaw and Wide Hollow creek work areas will occur as needed.

Standard construction best management practices (BMPs) will be observed and include, but are not limited to, implementation of an erosion and sediment control plan, leak and spill containment, isolation of work areas from flowing water, and fish rescue as necessary. Most work below the ordinary high water mark (OHWM) of creeks will occur during winter, when flows are low or nonexistent. In-water work at the bridge replacement sites will occur during summer to avoid disruption of school traffic.

Action Area
The action area includes all proposed construction areas, the segment of Shaw Creek to be abandoned, and Wide Hollow Creek for a distance of 1,000 feet downstream of the construction area. The downstream extent of the action area is FEMA's estimate of how far water quality effects from project construction may occur based on past projects.

Species and Critical Habitat in the Action Area
Presence of MCR steelhead in the action area is unlikely. Passage barriers are present in Wide Hollow Creek below the action area. At least two of these barriers are complete barriers to upstream passage of juvenile steelhead. Both are at least partial barriers to adult steelhead and one may be a complete barrier. Steelhead spawning has not been documented in Wide Hollow Creek for years and a recent radiotelemetry study of adult steelhead in the Yakima basin did not find any use of Wide Hollow Creek. Although none of the preceding observations definitively rules out any possibility of steelhead presence in the action area, the available evidence in total indicates that steelhead presence in the action area is improbable. Therefore, NMFS assumes that the nearest steelhead presence to the action area is below the Fines diversion, approximately two miles downstream.

The action area includes the upstream-most extent of critical habitat for MCR steelhead in Wide Hollow Creek. Critical habitat in the action area is of poor quality due to a severely disturbed hydrograph and a variety of deleterious effects resulting from agriculture and urban development.

Action Agency's Effects Determination
The FEMA determined that the proposed action is likely to adversely affect MCR steelhead and their critical habitat.

ENDANGERED SPECIES ACT

Effects of the Action
Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Because the action area includes critical habitat, but is not occupied by MCR steelhead, the following analysis focuses on the effects of the action on critical habitat. Effects of the action include changes to stream channels in the work area and changes in water quality in the action area downstream of the work area.

Temporary effects to physical habitat in the work area include disturbance of the bed of Wide Hollow Creek as part of the conveyance improvement. In general, temporary disturbance to critical habitat can lead to adverse effects by impacting primary constituent elements (PCEs) and therefore impacting the ability of critical habitat to support the listed species. However, because MCR steelhead will not be present in the area during construction, effects on critical habitat that occur only during construction have no potential to meaningfully impact the ability of critical habitat to support PCEs. Therefore, these temporary effects are insignificant.

Within the work area, long-term effects to the physical habitat will be beneficial, because widening of bridges, realignment of Shaw Creek, removal of crack willow root mass from the channel bed, and establishment of native vegetation will remove partial passage barriers and improve streambank stability and channel substrate. Beneficial effects will accrue to critical habitat in the long term by improving the function of freshwater rearing and freshwater migration PCEs to support recovery of MCR steelhead.

The project has the potential to affect water quality throughout the action area in the short and long terms. Work below OHWM of both creeks and in the new channel alignment will result in increased turbidity, and possibly very slightly increased concentrations of oil or hydraulic fluids, during in-water construction and episodically during the following season as creek flows increase and resuspension of disturbed sediment occurs. The application of BMPs proposed in the BA is expected to limit potential short-term degradation of water quality to an extent that effects will be insignificant.

Long-term effects to water quality throughout the action area may be caused by application of aquatic-labelled herbicides to riparian areas and by removal of shading from crack willows. However, compliance with herbicide label requirements for low toxicity herbicides and phasing crack willow removal over time is anticipated to reduce potential for impact such that effects will not meaningfully affect PCEs and therefore effects to critical habitat will be insignificant.

Long-term beneficial effects to water quality will accrue through relocating Shaw Creek from its current location along roads and residential areas into a dedicated vegetated floodplain. Frequent flooding of urbanized areas washes high concentrations of pollutants into the creek regularly, and state fisheries staff have observed numerous instances of residents dumping debris and fill into the creek. Routing the creek through a dedicated swale will reduce these inputs and improve water quality in lower Shaw and Wide Hollow creeks.

In the event that downstream passage barriers in Wide Hollow Creek are repaired and MCR steelhead occupy the action area in the future, the long-term effects of the project will provide beneficial effects as described above for critical habitat.

Conclusion

Based on this analysis, NMFS concludes that the proposed action is not likely to adversely affect MCR steelhead or their critical habitat.

Reinitiation of Consultation
Reinitiation of consultation is required and shall be requested by FEMA or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or if (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct questions regarding this letter to Sean Gross of the Columbia Basin Branch in Ellensburg, Washington at (509) 962-8911 x225 or email at sean.gross@noaa.gov.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

February 24, 2014

Ms. Science Kilner
Deputy Environmental Officer
FEMA
130 228th Street SW
Bothell, WA 98021

In future correspondence please refer to:
Log: 022414-08-FEMA
Property: Yakima County Shaw and Wide Hollow Creeks Flood Control Projects
Re: NOT Eligible

Dear Ms. Kilner:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The above referenced property has been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

Research indicates that the above referenced property is not currently listed in the Washington Heritage Register or National Register of Historic Places. We concur with your consultant's professional opinion that the referenced properties are NOT ELIGIBLE for the National Register of Historic Places under criterion C. As a result of this finding, further contact with DAHP is not necessary. However, if additional information on the property becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. Should you have any questions, please contact me.

Sincerely,

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

Appendix G
Tribal Consultation

U.S. Department of Homeland Security
FEMA Region X
Federal Regional Center
130 228th Street, SW
Bothell, WA 98021-8627

FEMA

June 5, 2014

Honorable Michael O. Finley
Chairman, Business Council
The Confederated Tribes of the Colville Reservation
PO Box 150
1 Colville Street
Nespelem, Washington 99155

Re: FEMA Pre Disaster Mitigation Grant Program FY2011
Shaw and Wide Hollow Creeks Flood Control Project, Yakima County

Dear Chairman Finley:

Please consider this follow-up to our letter of February 9, 2012, and February 10, 2014, regarding the cultural resources evaluation for the above project. The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has received a funding request from Yakima County (County) for a flood control project. This funding is available from the Pre-Disaster Mitigation Grant Program for FY2011. An Environmental Assessment (EA) is being prepared per the National Environmental Policy Act for the proposed action. The scoping notice for the EA is enclosed and we welcome any comments the Tribe may have regarding this project; the comment period closes on July 8. Once a draft of the EA is complete, anticipated late this summer, we will also provide the Tribe an opportunity to comment on it. Should you have any questions, please contact Ms. Science Kilner, Deputy Regional Environmental Officer at (425) 487-4713 or science.kilner@fema.dhs.gov. Thank you.

Sincerely,

Mark Eberlein
Regional Environmental Officer

Enclosure

cc: Randall Friedlander, Colville Tribe (via email)

SK:bb

U.S. Department of Homeland Security
FEMA Region X
Federal Regional Center
130 228th Street, SW
Bothell, WA 98021-8627

FEMA

June 5, 2014

Honorable Harry Smiskin
Chair, Confederated Tribes and Bands of the Yakama Nation
PO Box 151
Toppenish, Washington 98948

Re: FEMA Pre Disaster Mitigation Grant Program FY2011
Shaw and Wide Hollow Creeks Flood Control Project, Yakima County

Dear Chair Smiskin:

Please consider this follow-up to our letter of February 9, 2012, and February 10, 2014, regarding the cultural resources evaluation for the above project. The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has received a funding request from Yakima County (County) for a flood control project. This funding is available from the Pre-Disaster Mitigation Grant Program for FY2011. An Environmental Assessment (EA) is being prepared per the National Environmental Policy Act for the proposed action. The scoping notice for the EA is enclosed and we welcome any comments the Tribe may have regarding this project; the comment period closes on July 8. Once a draft of the EA is complete, anticipated late this summer, we will also provide the Tribe an opportunity to comment on it. Should you have any questions, please contact Ms. Science Kilner, Deputy Regional Environmental Officer at (425) 487-4713 or science.kilner@fema.dhs.gov. Thank you.

Sincerely,

Mark Eberlein
Regional Environmental Officer

Enclosure

cc: Phillip Rigdon, Yakama Nation (via email)

SK:bb

Appendix H
Scoping Notice and Scoping Report

Draft Scoping Summary Report

Shaw and Wide Hollow Creeks Flood Control Project

Yakima County, WA

PDMC-PJ-10-WA-2011-001

August 5, 2014

FEMA

Federal Emergency Management Agency
Department of Homeland Security
500 C Street, SW
Washington, DC 20472

This document was prepared for:

FEMA Region X
130 - 228th Street, SW
Bothell, WA 98021

by:

URS Group, Inc.
1501 4th Avenue, Suite 1400
Seattle, WA 98101

Contract No. HSFEHQ-06-D-1130
Task Order HSFEHQ-11-J-0026

15702626

APPENDICES

SECTION ONE INTRODUCTION

FEMA initiated the NEPA scoping process by sending out a scoping notice on May 30, 2014, to agencies and interested parties. The scoping letter and fact sheet were sent to 417 property owners, four state agencies, and one Tribe: the US Army Corps of Engineers, US Fish and Wildlife Service, Washington Department of Ecology, Washington Department of Fish and Wildlife, and the Yakama Nation Tribe. The scoping notice was also published on June 6, 2014 in the Yakima Herald-Republic and posted on May 30, 2014 on the Yakima County project website (http://www.yakimacounty.us/surfacewater/SCFMP/index.php). It explained the proposed action for the Shaw and Wide Hollow Creeks Flood Control Project.

Shaw Creek would be relocated through a new channel on existing undeveloped lands and would be replanted with natural vegetation. Wide Hollow Creek improvements would include a new bypass (overflow) channel (west of South 88th Street and south of the creek), channel excavation to increase capacity, replacement of bridges and installation of a culvert, and acquisition of properties and easements.

The purpose of the scoping process was to inform agencies and stakeholders about the proposed project and allow the public, organizations, agencies, and Tribes to provide comments regarding the scope of the project, the proposed alternatives, and any issues of concern that should be considered in the NEPA Draft EA. There was a 30-day period for scoping comments which ended on July 8, 2014. The scoping letter, fact sheet, and comment letters are included in Appendices A through C.

SECTION TWO SCOPING SUMMARY

Comments were received from two state agencies, one business, and 10 individuals or households. The comments expressed concerns about alternatives and potential impacts to property owners, floodplains, soils, water quality, irrigation and water supply, wildlife and vegetation, and wetlands. Table 1 summarizes the scoping comments.

Table 1. Summary of Scoping Comments

Commenter	Comment Summary
Agencies	
Washington Department of Ecology	▪ Request a map showing areas that meet the definition of a biological wetland and that will have a direct or indirect impact from elimination of water or reestablishment of water for each of the alternatives ▪ Request a formal wetland delineation and rating report for each of the alternatives ▪ Request a wetland mitigation plan achieving “no net loss” of wetland function in conformance with the local critical area ordinance for each of the alternatives

Commenter	Comment Summary
Washington Department of Fish & Wildlife	▪ Supports the re-establishment of a more natural, bottomland route for the watercourse ▪ Concerned that the existing Shaw Creek watercourse has never functioned to convey its flood waters, and while the historical agricultural use benefited under these conditions, existing residential development is imperiled by it ▪ Concerned that Hydraulic Project Approval permitting has been a poor fit for the protection of water quality in the existing Shaw Creek ▪ Concerned about wildlife, water quality, unauthorized water withdrawal, groundwater infiltration, evapotranspiration, and local critical area ordinance enforcement at the existing Shaw Creek location and how these issues contributes to Wide Hollow Creek ▪ Concerned that the existing Shaw Creek artificial channel is not recognized as a protected waters of the State ▪ Recommends fenced 100-foot-wide corridor, minimizing vegetation thinning and dredging for flood conveyance, and signage to protect new channel water quality and habitat as Critical Area functions
Business	
West Valley Farm and Ranch, LLC	▪ Request clarification on floodplain risk ▪ Request clarification on historical location of Shaw Creek and proposes alternatives ▪ Concerned about requirements, damages, and compensation on property affected by the proposed Shaw Creek
Individual or Household	
Bainter, Gregory and Adele	▪ Concerned about flooding at the existing Shaw Creek location and supportive of relocation
Beddoe, Margaret	▪ Scoping notice sent to wrong address
Dixon, Joann	▪ Concerned about what will happen to existing Shaw Creek and easements once relocated ▪ Concerned about what will happen to wildlife, livestock, and irrigation systems that use existing Shaw Creek
Longee, Lynette	▪ Request clarification on historical location of Shaw Creek and the need to relocate ▪ Concerned about what will happen to animal and plant species that use existing Shaw Creek location ▪ Concerned about water supply if well runs dry
Miller, Jennifer	▪ Concerned about property access to Wide Hollow Creek and how project will affect property
Radke, Glen and Kellie	▪ Concerned about flooding at the existing Shaw Creek location and supportive of relocation
Reierson, Timothy	▪ Concerned about existing location of Shaw Creek and easements once relocated ▪ Concerned about irrigation use in existing Shaw Creek location
Running, Lloyd	▪ Concerned about existing location of Shaw Creek and

Commenter	Comment Summary
	easements once relocated ▪ Concerned about irrigation use in existing Shaw Creek location
Seaman, Matthew	▪ Request Environmental Impact Statement for project ▪ Request clarification on historical location of Shaw Creek and the need to relocate ▪ Concerned about impacts to the existing Shaw Creek, including: critical areas, wildlife, wetlands, floodplains, ground water, water quality, soils, and air quality ▪ Concerned project will lead to rapid urban development on existing Shaw Creek floodplain ▪ Request clarification on native vegetation that will be planted on proposed Shaw Creek
Walker, Terry and Carol	▪ Concerned about vegetation removal on Shaw Creek and the potential impacts it could have on wildlife and habitat, privacy, windbreak, and beauty ▪ Concerned the project is paving the way for more development ▪ Concerned about current flood designation on property and wonder how project would change existing floodplain ▪ Request clarification on difference between proposed action and alternative action (overflow channel)

SECTION THREE SUMMARY OF ISSUES

FEMA identified a number of issues that need to be addressed in the Draft EA. The Draft EA will address specific concerns related to irrigation use, groundwater, and the potential for floodplain changes due to future development and resulting cumulative effects. Many commenters expressed concerns about irrigation use along the existing Shaw Creek channel and how it would be affected by the proposed channel. Commenters were concerned about groundwater changes surrounding the existing Shaw Creek channel and potential effects on water wells. Commenters also expressed concerns about changes in floodplains and any effects that could result on future development in the area. A Hydrologic and Hydraulic Study is being prepared for the project and incorporated into the Draft EA. The study assesses future water resource conditions from the Proposed Action including surface water flow and floodplains.

A description of the historical modifications to the watershed will be provided to assist in describing the purpose and need of the project as several commenters provided information or questions on this topic.

Based upon a preliminary screening of resources in the project area and issues identified from scoping comments, the Draft EA will include an analysis of the following resources for the proposed alternatives:

- Geology and soils
- Climate change
- Surface water, water quality, wetlands, and floodplains
- Vegetation, terrestrial wildlife, and fish
- Cultural resources
- Socioeconomics and environmental justice
- Cumulative impacts

Resources evaluated during the screening process, but determined not to be affected by the project, included: recreation, visual resources, transportation, public services and utilities, land use, and noise.

Scoping Report
APPENDIX A
SCOPING LETTER

INITIAL PUBLIC NOTICE

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) is proposing to fund Yakima County for the Shaw and Wide Hollow Creeks Flood Control Project (Project). Funding would be provided by the Pre-Disaster Mitigation–Competitive (PDM-C) grant program as authorized by §203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act, 42 U.S. Code.

FEMA gives notice of the intent to prepare an Environmental Assessment (EA) for the Shaw and Wide Hollow Creeks Flood Control Project (Project). This public notice is issued in compliance with the National Environmental Policy Act (NEPA); Executive Order (EO) 11988, Floodplain Management; EO 11990, Wetlands Protection; and EO 12898, Environmental Justice.

Yakima County has applied for PDM-C grant funding from FEMA to help fund the Project; with matching funds provided by the Yakima County Flood Control Zone and the City of Yakima. The purpose of the project is to reduce flood losses for existing residences and remove approximately 550 acres and 1,000 existing and future residential lots from the floodplain and floodway. The project is needed in order to provide for the safety of the community and to alleviate losses due to flooding in the project area. The proposed action includes the relocation of Shaw Creek to existing undeveloped lands. This would be done by the construction of a new channel approximately 3,500 feet in length. The action would include the planting of natural vegetation along the new creek, with the objective of improving water quality and fish habitat.

In addition, a new bypass (overflow) channel would be constructed south of Wide Hollow Creek (west of South 88th Street). Other improvements of the proposed action along Wide Hollow Creek include an increase in channel capacity through channel excavation, replacement of the South 80th Avenue Bridge, installation of a box culvert on South 88th Avenue, replacement of the bridge on Wide Hollow Road, acquisition of properties, and purchase of easements. The project area is located in or affects the floodplain of Shaw and Wide Hollow Creeks, Lower Yakima Watershed. Wetlands may be present along Wide Hollow Creek and would be affected by the proposed bypass. Comments concerning the proposed action, alternatives, and preliminary identification of environmental issues; will be accepted from the affected public; local, state and federal agencies; Tribes; and other interested parties in order to scope the EA and inform decision-making. Comments should be made in writing, sent to the FEMA contact listed below. Comments must be received by July 8, 2014 to be considered.

Additional information about the project, including a project area map, conceptual design, and scoping information, can be obtained from the Yakima County Project Website (http://www.yakimacounty.us/surfacewater/SCFMP/index.php), at the Yakima County Flood Control District Office (128 N. 2nd Street, 4th Floor Courthouse, Yakima, WA), and by contacting the applicant contact below. Once complete, the draft EA will be made available for public comment.

Responsible Official:	**Applicant Contact:**
Science Kilner Deputy Regional Environmental Officer FEMA Region 10 130 228th St SW Bothell, WA 98021-9796 science.kilner@dhs.gov (425) 487-4613 fax	Cliff Bennett Program Coordinator Yakima County 128 N 2nd Street, 4th Floor Courthouse Yakima, WA 98901 cliff.bennett@co.yakima.wa.us (509) 574-2301 fax

Scoping Report
APPENDIX B
FACT SHEET

SHAW CREEK FLOOD MITIGATION PROJECT

What is the project?

The purpose of the Project is to mitigate potential flood losses for more than 300 houses in the Cottonwood Grove development which was approved and constructed prior to FEMA flood mapping. The Project would remove approximately 550 acres and 1,000 existing and future residential lots from the floodplain and floodway. The project is needed in order to provide for the safety of the community and to alleviate potential losses due to flooding in the project area. Funding for the project will come from the Pre-Disaster Mitigation–Competitive grant program of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), and matching funds from the Yakima County Flood Control Zone and the City of Yakima.

Why is an Environmental Assessment required?

The National Environmental Policy Act (NEPA) requires federal agencies to review impacts to the natural and human environment prior to undertaking a federal action.

There are two federal agency actions triggering NEPA review for the proposed project:

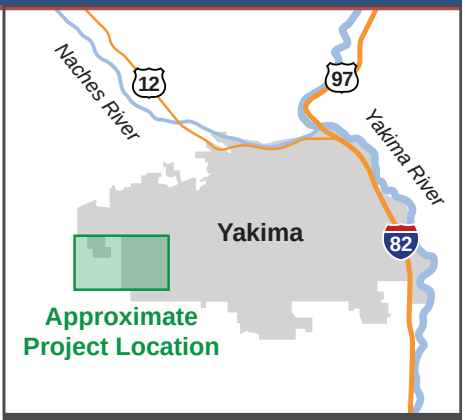
1. FEMA – Providing federal funding to complete the project.
2. U.S. Army Corps of Engineers – A permit is required for activities within wetlands.

What is an Environmental Assessment?

An Environmental Assessment (EA) is completed to determine if the project requires a more in-depth assessment of environmental impacts. The main purpose of the EA is to explain the environmental effects of the proposed action and identified alternative actions, and to identify any mitigation necessary to avoid significant impacts to the human or natural environment. The EA may conclude that the project does not significantly impact the environment.

What key issues are associated with this project?

- There is a high potential for residential flooding to a minimum of 48 residences and potentially 300 houses in the Cottonwood Grove Subdivision as a result of flood waters from Shaw Creek.
- Several residences in the Cottonwood Grove Subdivision below the present location of Shaw Creek have recently been incurring flooding in the crawl spaces and damage to the houses below grade. The source of the flooding appears to be a high water table and wetlands that are located on Shaw Creek above the recent residential development. There is the opportunity to address this problem with this project and funding source.
- Shaw Creek at its present location is an artificial stream. Relocation of Shaw Creek to its historic location will provide positive benefits to water quality and fish habitat for Wide Hollow Creek.



Opportunities for Public Comment

The public will have two opportunities to provide comments on the project. The first will occur during the scoping phase where the public is invited to comment on the scope of the EA, the proposed project, and alternatives via e-mail or letter.

A 30-day public comment period will follow the completion of the draft EA. The public can then offer input on the information and analysis provided in the EA.

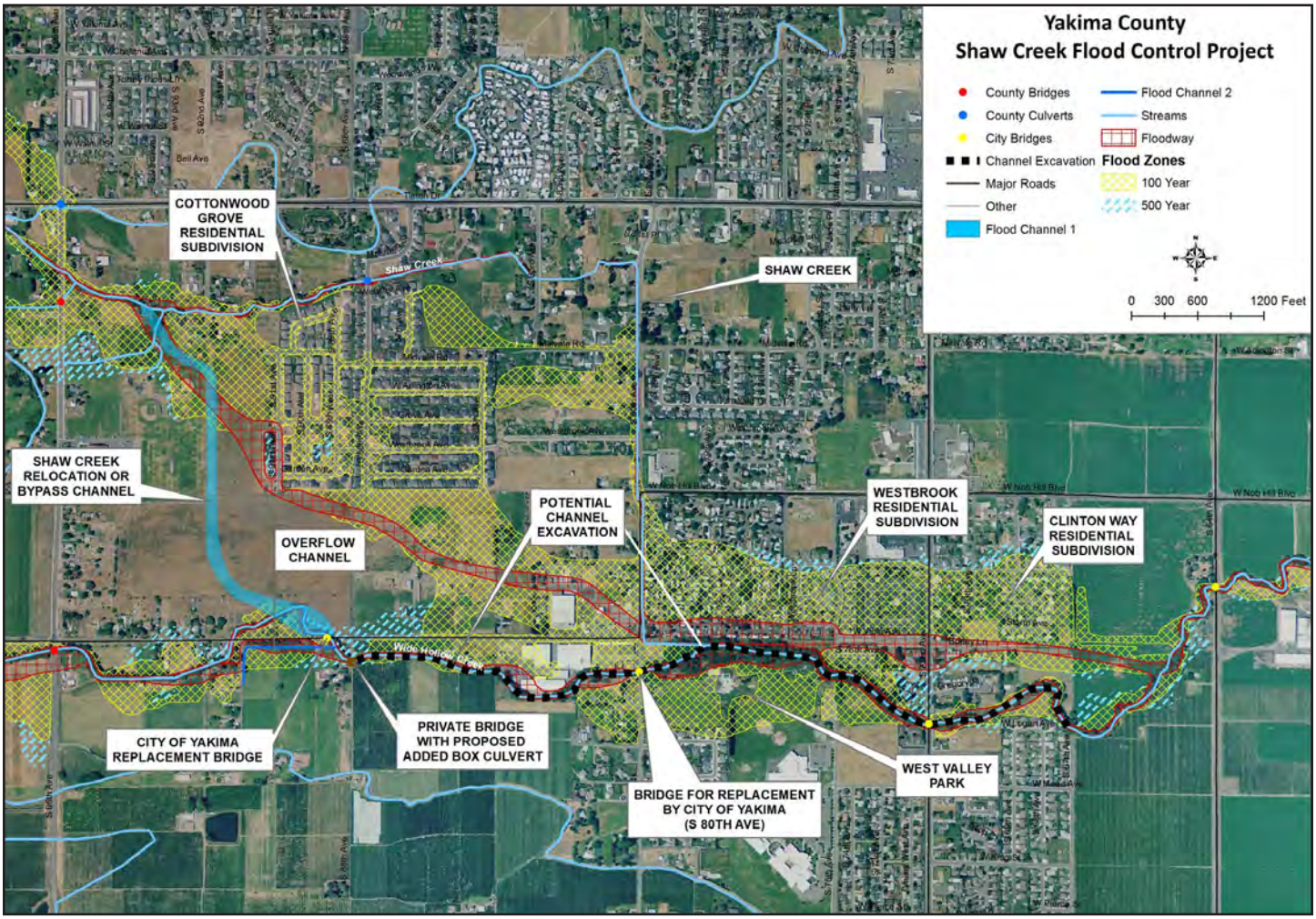
For more information, contact:

Cliff Bennett
Yakima County
128 N. 2nd Street
4th Flr Courthouse
Yakima, WA 98901

cliff.bennett@co.yakima.wa.us

FEMA

YAKIMA COUNTY



- Wetlands are present along Wide Hollow Creek and would be affected by the proposed bypass.
- The project will require acquisition of seven properties, purchase of six easements, and demolition of two structures.
- Work would occur near potentially historic archaeological resources.
- Bridge replacement associated with the project has the potential to impact traffic.

Alternatives Considered

NEPA requires that a range of reasonable alternatives be evaluated. The No Action Alternative is included as a comparison with the other, proactive options.

Proposed Action

The Proposed Project includes the relocation of Shaw Creek to existing undeveloped lands. Work along Wide Hollow Creek would include construction of a bypass channel south of Wide Hollow Road, improvements to the channel capacity of Wide Hollow Creek, replacement of the South 80th Avenue Bridge and replacement of the bridge at Wide Hollow Road and approximately South 89th Avenue, installation of a box culvert adjacent to the South 88th Avenue Bridge, and acquisition of seven properties and purchase of six easements.

No Action Alternative

No improvements to Shaw Creek and Wide Hollow Creek would occur. Repetitive flooding and flood losses would continue. No FEMA funds would be received.

Overflow Channel

This alternative involves construction of an approximately 3,500 foot long overflow channel from Shaw Creek to Wide Hollow Creek. The overflow channel would be located through existing undeveloped lands and would be approximately 100 feet wide and approximately 5 – 7 feet deep. It would be active only when flood waters from Shaw Creek are present.

Scoping Report
APPENDIX C
COMMENT LETTERS

Appendix I
Summary of Comments on the Draft Environmental Assessment

SUMMARY OF COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT

ID Number	Name	Organization	Category	Comment	Response
1	Abarta, Steve and Lisa		flooding	Supports 2A. Property on Shaw Creek and experienced flooded basement in Sep 2013 due to unmaintained buildup of sediment/debris and invasive.	noted
2	Abrams, Barb		Flood insurance	Has to pay flood insurance because wide hollow creek is "not maintained" due to beaver dams, trees, etc.	Noted
3	Brownell, Doris		Shaw Creek ditch/ Yakima Valley Canal	Asks if Homeowners can be compensated by the grant to fill in the ditch to allow grass to grow after the Shaw Creek is diverted. Also, as a shareholder with Yakima County, has placement of a pipe in the creek bed for bringing water to shareholders along Shaw Creek ditch been considered. Supports Reierson's statements.	The grant has a maximum amount to be spent, and filing in the ditch is not budgeted in the grant. The County did not consider the placement of a pipe in the ditch. The County is not responsible for water conveyance to irrigation users. Landowners must address the Canal Company for claims for conveyance. The cost of filling in the ditch or providing a pipeline is not budged in the federal grant.
4	Congleton, Lora		Alternatives	Totally supports the project, supports 2A over 2B.	Noted
5	Fulton, Erin and Nate		Flood zone, invasives	Supports the project. Unhappy with flood zone designation after they had purchased property. Requests school path from Cottonwood Grove to elementary school be paved to minimize spread of invasives (goat heads).	We will forward your comments regarding paving the path on to the School Board. Yakima County does not own the easement the path is located on. The school ownes this parcel. County is providing a pedestrian bridge over the new relocation channel.
6	Helms, Betty		Project design/floodplain	Supports project reconnect with Wide Hollow and bridge replacement, as well as elimination of floodplain in area.	noted
7	Holtzinger, Mike		schedule	Update project timeline and keep updated	Noted and timeline updated on web-page.
8	Karacick, Molly		flooding	Supports project because of flooding of neighbors caused by unmaintained creek and increase in vegetation in the creek	noted
9	Unsigned		critical area	Supports project because it completely removes northern properties on 89th from critical areas.	noted
10	Bainter, Greg and Adele		flooding/alternatives	Supports Project 2A. Shaw Creek is a drainage ditch that dries up except during irrigation or winter run off (flooding). Unmaintained creek channel causes flooding on property and neighbors, bringing financial costs. Alternative 2B would still cause flooding due to capacity and invasive vegetation. Property owners should have greater say than non-impacted property owners.	Noted in EA.
11	Baker, Paula		flooding	Does not support project. Flooding has not occurred and the effort is a scam for another land grab. Supports Alt 1. Existing easements already accommodate runoff.	Historical photos and records document flooding in the area.
12	Erlewine, Lyle		flooding	Regarding the Wide Hollow Creek Overflow Channel, the Wide Hollow Road bridge just west of 91st ave is inadequate and causes the flooding along Wide Hollow Creek. Recommends bridge replacement similar to the proposed bridge replacements. Requests pedestrian travel be considered in bridge design with the increased traffic and growth in the area. In lieu of replacement, proposes an overflow culvert under 91st similar to 88th bridge replacement design. Project purpose seems to promote more development resulting in higher values resulting in more tax revenue so seems reasonable to address property owners concerns along S 91st.	The proposed action will replace the bridge at south 91st avenue with a 55 foot wide bridge that will provide conveyance to remove any flooding. City of Yakima codes requires a minimum width of 28 Feet with a 5 foot sidewalk on one side.
13	Fawcett, Robert		Alternatives	Supports 2A.	noted
14	Hansen, Jessica	Estate of Alvin Norman	Alternatives	Supports 2A. Developed Meadowview and platted Annalisa subdivision before flood map for Shaw Creek. Project would remove both properties from the floodplain. Does not support Alternative 2B as it does not alleviate all the impacts, particularly with urban street standards overlaid with critical areas.	noted

SUMMARY OF COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT

ID Number	Name	Organization	Category	Comment	Response
15	Reierson, Tim	Streamline Water Consulting, Inc., on behalf of David and Keely Teske, Property owners	Irrigation	No discussion of impacts to irrigation shareholders for Alternative 2A. Status and condition of the Creek will change. Need to acknowledge the use of the current channel for conveying irrigation water. Association formed and suggests two goals: (1) To obtain easements between the main canal and Shaw Ditch. This is necessary because delivery from canal to ditch will now need to be made downstream of the new Shaw Creek channel location; and (2) To protect existing easements and secure other needed easements, if any, along the alignment of Shaw Ditch. This will allow the unimpeded delivery of water to current and future shareholders along Shaw Ditch. Offers up an option for conveying canal water under Alternative 2A and desires to work with the County, City and agencies to address this need.	Blocking of Shaw Creek west of South 92nd avenue wall not restrict irrigation flows in Shaw Creek. The ditch will not be filled in, so irrigation water can still be conveyed. There are presently 1 or 2 pipes providing irrigation conveyance from Yakima Canal Company to Shaw Creek.
16	Ricard, Richard		alternatives, flooding	Supports Alternative 1. Area is not a flood zone. Existing easements already accommodate runoff.	Noted. Photo documentation of flood history supports the project. There are no existing flood easements.
17	Schlepp, JoAnn		Alternatives	Supports Alternative 2B, assuming irrigation water to current recipients continues.	noted
18	Fawcett, Christine		Alternatives	Supports Alternative 2A.	noted
19	Hicks, William E.	West Valley Farm & Ranch LLC	alternatives, flooding, agriculture	Questions allowance of development if a flood threat existed. Shaw Ditch flooding as depicted by FEMA map and associated potential property damage does not exist, as confirmed by local knowledge. FEMA H&H models were modified based upon predicted flows and not based upon historical validity. DEA did not address climate change of warming trend with less snow within the watershed which invalidates the "predicted" increase flow. Alternative 2A is not based upon historical or geological evidence for the relocated Shaw Creek channel. Undeveloped land within the proposed channel relocation has been in agriculture production for over 100 years and the area is prime agricultural land classified as Farm and Agricultural Land/Open Space per RCW 84.34. "Adamantly opposed to the proposed relocation of Shaw ditch, the severance and taking of our property, along with the significant damages and impacts to our current farming operation and to future land use plans." Offers another alternative: reroute from SE school property due west to existing Yakima Valley Canal Company R/W, then south in R/W to its confluence with Wide Hollow Creek. This would eliminate need for replacing bridge on 89th Ave. Demands reinstatement of 1974 FIRM.	Analyzed 3 variations of this proposed alternative after the scoping notice was published. They were considered and dismissed due to several reasons; the proposed alternative is not feasible due to the 90 degree bends, the lack of right of way width, the very deep channel that would be necessary, and the increased cost due to additional bridges. The parcels are in City of Yakima jurisdiction and are designated as R-1 single family residential.
20	Gwen Clear	WA DOE	Wetlands, Riparian	Anticipates an individual 401 Water quality certification will be needed. Project may not alleviate flooding due to groundwater sources. New channel should include sufficiently sized riparian buffers. DEA does not clarify riparian size (35-100 ft.) as total width of stream corridor or distance from OHWM on one side. DEA does not explain reason for range of riparian size. States definition for OHWM should be consistent with Yakima County critical area ordinance definition. States area of planting in wetlands may be required than the disturbed area for an acceptable wetland mitigation plan. Recommends mulching crack willow onsite unless regeneration can occur.	These issues will be addressed in the 401 water certification approval process. We are presently in discussion with DOE on the widths of the buffers.