

## Appendix E. Supporting Information

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Appendix E1: Historic Flooding Documentation



**Chief Terry S. Cochran**  
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April 11, 2019

RE: FLOOD INFORMATION from flood on April 9, 2019

City of Cottonwood-

Cottonwood Creek drainage was observed at the intersection of Lewiston x Front St beginning at 1700, April 8, 2019. This is the area where the creek enters a large culvert and has a history of floods during high water events. This culvert was checked by engineers after the last flood event and found to have numerous defects. It was then temporarily repaired using a 'slurry' type system and a hydrological study as well as the grant process was begun to replace this culvert. It goes under portions of Lewiston, Main, and Front St. as well as underneath a gas station and a grocery store. The foot bridge referenced in the photos is downstream, directly behind Riener's Grocery Store and has been used as a improvised flood gauge for years. When the water hits that bridge, it will flood. This, along with the headwall of the culvert was checked at two hour intervals during the night, as well as local weather stations to determine an estimated time for cresting of the creek.

At 0220 on April 9, 2019 CPD Chief Cochran checked the headwall and found the water within 4 inches of going over the top of the sidewalk at the headwall. He contacted Public Works Supervisor Roy Uhlenkott and City Mayor Pepper Harman to respond. I also requested Idaho County Dispatch to page Cottonwood Fire Department for manpower assistance.

In preparation for flooding Cottonwood had two five ton trailers loaded with pallets of filled sand bags, as well as multiple other pallets of sandbags stored. We had one trailer attached to a road grader to facilitate movement, we had pallet forks on the front of a backhoe, we had a UNIMOG with pallet forks on it, and Mayor Harman had a tracked skid steer with pallet forks on it. We had pre-positioned multiple cement "jersey barriers" similar to ones found as guard rails for highway safety, near the headwall area of the creek as well.

Roy Uhlenkott began moving Jersey Barriers to the south side of Front Street, at the intersection of Lewiston St to prevent water from entering the first buildings downstream from the headwall, and to 'push' the water toward the center of the roadway. Historically the water travels from the headwall directly across Front St, then down the south side of Main Street where it enters businesses.

Chief Cochran met with CFD Chief Danly and organized fire crews to place sand bags from pre positioned pallets along the curb at Lewiston and Front, and Front and Main. They then placed Sandbags on Main Street from Broadway to Idaho Street. Mayor Harman and Public Works Employee Waller utilized the Unimog and skidsteer to move pallets of sand bags and jersey barriers to needed areas. Firefighter Clinton Riener, who is also a Cottonwood Highway District employee, operated the road grader to tow the trailer of sand bags down Main while fire crews placed the sand bags. When the trailer was emptied the mentioned fork lifts were used to reload it with stored pallets of sand bags.

Fire Crews placed sandbags at Goldstone and Main, a known area where the water crosses Main and floods a house. We were notified of water coming into a house at Goldstone and Junction St. (reference green house in photos) and responded with multiple pallets of sandbags which were placed between

the creek and house to prevent further damage. During that time it was discovered that the culvert system (2 side by side) at Goldstone was failing. There was a small 'sinkhole' on the west wall of the culvert, the ground on the west side of the roadway was soft enough that a person's foot would sink in while walking there indicating water was bypassing the culvert and washing underneath the roadway. Goldstone was closed at Junction and also at Main St.

Due to debris and trees in Cottonwood Creek east of Goldstone, the creek came out of its channel and flooded the open area near the intersection of Main and Hwy 95

During this time the open grate over the creek at Front x Main (the location of the Tire Guy repair and gas station) had water coming out and splashing up approximately 12" into the air. (reference Tire Guy photos for debris locations).

On 4/10/19 it was discovered that the bridge referenced behind Riener's Grocery store had failed and was falling into Cottonwood Creek. City Crews as well as the landowner successfully removed the wood and cement from the creek channel. It was also discovered that water had washed behind the retaining wall and created a large hole behind the wall next to a north/south drainage culvert. We also found a culvert adjacent to Front Street which accessed a residence as well as the back of St Marys Hospital had failed (reference photos) resulting in washing out the east side of the roadway and leading to closing that road.





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June 2, 2022

RE: Flood Information from flood on May 6, 2022

Cottonwood Creek Drainage was observed at the intersection of Lewiston x Front Street at approximately 1700, with the water being 6 to 8 inches below the top of the "Jersey Barrier" that is placed at the head of the culvert, which goes under Lewiston Street. This barrier is approximately 12-18 inches below the top of the sidewalk.

This is the area where the creek enters the large culvert which goes East under Lewiston Street, Front Street, The Tire Guy building, King Street and Reiner's Grocery. This area has a history of flooding, and the City of Cottonwood has made temporary improvements to this culvert, as well as the open creek area west of Reiner's Grocery and behind Main Street businesses after previous flooding in 2019.

Due to a history of flooding in this area, the City has acquired 2-5 ton flatbed trailers and has approximately 1000 filled sand bags on pallets on these 2 trailers. In February CPD contacted North Idaho Correctional Institute and had inmates from their facility unstack, re-bag, and restack one of the trailers and checked the second trailer to ensure all bags were usable in the event of a flood.

At 2115 CPD Chief Cochran checked the water level at this location; it was approximately 2 inches from the top of the Jersey barrier, but still rising and raining hard. CPD contacted Public Works employee Mac Hankins to request he begin placing jersey barriers on Front Street to Main Street to divert the initial brunt of water in preparation. Mac used the DPW forklift and barriers were moved approximately 2 blocks from storage and placed on the South west side of the intersection, along front street then out partially into the roadway of Main Street to divert any water away from Fred's Body Shop, Cottonwood Fire Station, and the intersection of Main x Broadway where water historically begins flooding into downtown businesses.

CPD continued to watch the creek at this location throughout the night. At 2337 a photo was taken at the culvert head showing the water an estimated 14 inches from the top, at 1152 a photo was taken of a bridge on the East side of Reiner's Grocery, which had previously been used as a gauge to predict flooding. This picture shows the water an estimated 6 to 8 inches from touching the bridge. Historically, if the water reaches that bridge, Main Street would flood.

At 0108 a picture was taken of the head of the culvert area showing an estimated 8 to 10 inches remaining. While it had recently stopped raining, but with another storm predicted, CPD paged Cottonwood Fire at 0146 to respond and assist with placing sand bags on Main St. DPW Hankins, Dallas Paul and Supervisor Pat Enneking were contacted to operate equipment to move the trailers with sandbags and forklifts to unload the pallets.

At 0242 a photo was taken with CFD members standing at the culvert head. This photo shows the water just cresting over the top of the sidewalk. Sandbagging began at that time, starting at Lewiston x Front and continuing East down Main St. at 0257 a photo was taken showing CFD members placing sand bags on the east side of the intersection of Main x Broadway.

At approximately 0130 the rain had stopped. We did not know the time that it would take for the rain that fell on Cottonwood Butte and Cottonwood Creek drainage to make it to the culvert head on Lewiston Street, so we began sandbagging in preparation. At that time, the water was at the top of the sidewalk on Lewiston St and just barely running over a portion of the sidewalk, it is estimated that the amount was less than 2 gallon of water.

While sandbags were being placed, we also kept an eye on the culvert head. At approximately 0400 it was discovered that the water level at that location had actually went down several inches. Based on that information, it appears that with the water cresting at 0257, and the rain stopping at about 0130, we have an estimated 2 hours from when heavy rain stops, until the water reaches the culvert head. It should also be noted that the next round of storms predicted for the early hours of May 7 did not materialize. Cottonwood Creek did not flood out of its banks during the event.

Terry S. Cochran

[https://www.idahocountyfreepress.com/news/a-river-runs-through-it-snowmelt-deluge-floods-cottonwood-s/article\\_5ecae736-a099-59b4-b82e-37eb8aa019b0.html](https://www.idahocountyfreepress.com/news/a-river-runs-through-it-snowmelt-deluge-floods-cottonwood-s/article_5ecae736-a099-59b4-b82e-37eb8aa019b0.html)

## A river runs through it : Snowmelt, deluge floods Cottonwood's Main Street

David Rauzi

Mar 5, 2014



Sandbags line the south side of Cottonwood's Main Street during a Monday evening, March 3, flooding event.

C OTTONWOOD – Main Street turned into a river Monday evening as rainfall coupled with snowmelt overwhelmed both Cottonwood Creek and city storm drains.

As of press time Tuesday, no flood damage was so far being reported by downtown businesses from the March 3 event, according to Cottonwood Police Chief Terry Cochran.



"I'm just glad we had plans in place to deal with it," Cochran said, "otherwise, we would have had water in those businesses."

Those plans kicked in starting around 4 to 4:30 p.m. when runoff from snowmelt was aggravated by a deluge of rain, according to Cochran, and flooding was reported on the west end of town.

"We notified NICI [North Idaho Correctional Institution] as part of our city emergency plan," he said, which sent an 11-man inmate work crew for sandbag filling and placement duty. By 5:30 p.m., Cottonwood Creek started overflowing over the top of the culvert at Main and Lewiston streets, and water was soon knee deep downtown.

"Water was coming out of the storm drains," Cochran said at multiple locations. "It was more than they could handle."

Along with NICI, crews with the Cottonwood Highway District, City of Cottonwood, volunteers and business owners worked placing hundreds of sandbags one to two high, along with straw bales, along the south side block of Main Street. As well, sandbags were placed at the front of Lewiston Street to divert waters into the roadway. Some flooding entered into Fred's Body Shop, however, sandbags were placed in front that prevented water entering further in the building, according to Cochran.

"It got pretty deep for a while," along Main Street, Cochran said, and it was by 7:30 p.m. the waters receded.

No city property was reported damaged, apart from a 20- to 30-foot washout around the Maple Street culvert. Runoff across this street was reported at 4 to 6 inches deep, he said. City crews were currently working to clear out storm drains.

"We're going to leave the sandbags in place, just in case," Cochran said, as weather forecasts were calling for more rain and warmer temperatures.

The National Weather Service in Missoula was reporting changing conditions through the region this week due to warmer air eroding colder valley air. Rapidly changing precipitation from snow to rain to freezing rain will be common. Wet snow and rain on snow-drifted roofs could result in increased weight and loading.

Farther north, the Idaho County Sheriff's Office received a report that Ferdinand's Main Street was flooded under the bridge near the intersection with U.S. Highway 95. No further reports were available.

June 4, 1908

# Lewiston Evening Teller

THIRTY-SECOND YEAR—NO. 134.

LEWISTON, IDAHO, THURSDAY, JUNE 4, 1908.

## **Rushing Torrents in All Canyons.**

**COTTONWOOD, Ida., June 4.—**  
Heavy rains in all sections of the Camas prairie country have filled

the streams to overflowing, and the dry canyons leading to the Clearwater river are today rushing torrents.

The streets of **Cottonwood** are today filled with water, and the rain continues to fall. The excellent drainage provided by **Cottonwood creek** will prevent serious damage from **flood** waters, but all lines of business are generally depressed, and few people from the farming section are visiting the town.

- AT HOME AT THE CROSSROADS -

by SEMI-DT1 DARRIN DA, 1989,  
PUBLISHED BY LEARNING ESTABLISHMENT, LTD

Right after World War II some of the fellas stayed around and tried to make a go of a Rock Crushing Enterprise, but it didn't pan out. Four or five young Gls invested their money on it... the rock crusher was out where McHugh's live now. . . . There was no lumber mill here then. [You could find work] if you were a teacher or had little business down on main street. The [Benedictine Sisters at Saint Mary's] hospital had several [lay] nurses hired. That was about the extent of it.

In 1948 Mother Nature delivered weather extremes that tempted some villagers to sever their ties with their hometown and move to a milder climate. The spring thaw, coupled with rain, brought about the famous flood of 22 May 1948. Most of the businesses long main street were flooded by water that poured through a break in the creek bank near the old brewery building and flowed down main street. The flood water, which was described as looking very much like a river, extended from curb to curb and was over a foot deep. Many businesses on the south side of Main sandbagged their doors in an effort to prevent water damage, but the water in the interior of the Cottonwood Selling Company reached a depth of 33 inches, while Armstrong's grocery was also flooded.<sup>271</sup> The damage was costly in both the destruction of goods and in the time it took to clean up the mess in the aftermath of the flood. Cottonwood residents worked together until the village was cleared of debris, then they discussed the likelihood of such a flood occurring again. Their discussion soon focused on the highway running through the center of town. Sudden warming trends combined with spring deluges could not be avoided, but the flood damage would have been less severe if that highway had not been so "high centered." The decision was made to dig up the road bed and resurface it at a considerably lower elevation.

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Felix and Agnes Hutchins:

Felix: We had floods down Main Street, water running in the back of the store and out the front end, which it did here a time or two. [The 1948 flood] didn't really damage us [at the Farmer's Store] but it did most every store in town.

Agnes: We were lucky

Felix: Then the water was that deep on Main Street, just like a river... At that time the highway came down through there and they had kept putting a coat on every couple of years and that raised it up. The center of the street was so high that it [the water] come down and run everything off of the sidewalks you see . . . now right where the fire station is now, there was a grocery store and a plumbing shop—

Agnes: Armstrong's. He and his wife, her name was Queen.

Felix: Well, this rain was coming down and I always came down early to open my store. . . . I came down and the water was that deep in his store and you know, (indicates a height of about two feet with his hand) the coffee cans and the crackers and everything from the shelves were floating on the water. And I went down to the store, I had hip boots on and I went down to see how I was doing, but it

wasn't on my floor. I wasn't having any trouble there. It was coming out of Hoene Hardware, out the front door.

So I called this Armstrong up . . . and I told him to get down here quick. He had—everybody had these little charge books see, the carbon copy . . . the way he kept books, everybody had a book with your name on it and he had them all under the counter. They was all floating on the water out there. I went down there and I went in and picked up all those charge books . . . put them up high and dry on the counter and I told him to take them home and throw them, scatter them around on the carpet and let them dry out because he wasn't going to be able to save them. They would all want to stick together.

The bank was next door to me . . . the First National Bank . . . W.W. Flint was the owner.

. . . Carl Schmidt had a job working at the bank. He had just got it . . . he was over on the corner on the Shell Service Station corner, . . . and you know the water was so deep, he was wondering how he was going to get to his job. I went over there and got him piggy back like a little kid . . . and I packed him across the street and put him on the steps going into the bank so he could get to work.<sup>272</sup>

The spring flood was followed by a seemingly innocuous summer and fall, then 1948 closed with the beginning of a whopping winter season. Unlike typical winters, thawing did not occur between snow storms and the snow piled deeper and deeper. Snow removal in those days was generally done with a Caterpillar tractor and a blade. By February of 1949 snow accumulations along highways resembled tunnels to passing motorists.

Dolores Seubert: Oh, I'll never forget that winter. We have never really had a winter like that since. The snow just kept piling up on side of the road, snow was so high it just looked like you were going through a tunnel down there. That year the snow did not melt off in the meantime, it just kept getting worse and it was cold . . . We used to figure the worst winter months were December and January. Ed Hoene's got married January the tenth, and we thought the weather couldn't get any worse. We kept thinking it would get better, but we just had one blizzard after another, and it just didn't let up. We [Dolores and Jimmy Seubert] got married February 8, 1949. We waited at the church after the ten o'clock wedding, for the photographer to come from Grangeville but he got stuck at Fenn and couldn't get no farther. When driving from church in Greencreek to my parents' home for the dinner, Maurice Wimer got out and walked in front of the car because it was snowing and blowing so hard, and we couldn't see in front of the car. We got as far as Carl Jentges' and we just waited for about an hour. Lona Schmidt was one of the cooks for the wedding, she could tell some good stories about



Cottonwood Chronicle

Page 3 of 3

1948



Don Nixoll brought by the above two photos from the 1948 flood in Cottonwood. The upper photo shows Cottonwood Creek where the Nixoll Shell warehouse is now and the lower photo shows the Main St.-Broadway intersection, looking up Broadway. The dark building on the right is where the fire station is now.

<http://www.cottonwoodchronicle.com/2014/03/06/14/one.html>

10/11/2017

### Local Event History

Idaho County has experienced a long history of high magnitude floods, typically by "50 and 100-year" levels. The diverse landscape and weather patterns within Idaho County are the triggers for those high magnitude floods. Rain-on-snow events and above normal high spring temperatures are very typical throughout the county in the spring and late winter. The combination of the above two events are devastating and can cause extraordinary flooding events.

- ✓ **May 23 to June 5, 1948** - The 1948 flood was caused by abnormal snowmelt augmented by rainstorms in the latter part of May and in June. The floods caused contamination of the water system, which left residents without drinking water. Over \$3,700,000 damage to roads and highways. \$30 Million damage to crops.

A total of 300 people were estimated to be without living quarters in Stites and 100 from Kooskia. Cottonwood Creek flooded Cottonwood's Main Street. Water supply was cut off to 400 people in and near Riggins when flooding tore out the city's pipelines. Residents were left isolated. Flood Emergency Declared.

**December, 1955** - Flooding was extensive in both Adams and Idaho Counties. Riggins lost power, telephone service, and transportation to and from the townsite for approximately three months. They also had difficulty providing fresh water to residents. A huge ice jam at Smokey Boulder near the lower end of New Meadows valley broke loose between Christmas and New Years causing severe damage to infrastructure downstream on the Little Salmon River.

- ✓ **May 21, 1956** - Floodwaters washed over 6,500 acres of farmland. The drinking water became polluted and made it necessary to bring in water from other places. The Clearwater River flooded basements in Orofino.
- ✓ **February 4, 1963** - Cold weather created ice jams and cloudbursts created flooding throughout several counties in the Panhandle. President Kennedy authorized \$250,000 in flood relief loans. \$4.7 million in damage throughout the state this year. A rock and mud slide 1.5 miles north of Riggins blocked traffic. About 50 families were marooned in the airport area after a pier was washed out.

**January 28 to February 3, 1963** - The Lapwai Valley was inundated with flooding after rain and melting snow coursed its way through causing \$2 million in damages. The \$2 million includes loss of roadways, railroad trackage, livestock, buildings, and personal belongings. Extensive flooding occurred in all streams in the Kooskia, Stites, and Kamiah areas.

**January 15, 1974** - Flood waters isolated much of the Coeur d'Alene mining district. The waters burst dams, blocked major roadways, and forced evacuation of at least 1,000 persons. About \$65 million in damages were reported. Shoshone and Benewah Counties were the hardest hit. \$9.5 million in damage to road systems. \$51.4 million in damage to private property. Governor Andrus declared the counties disaster areas. More than 30 bridges were destroyed in 3 counties.

Idaho County incurred about \$80,000 in damages. Heavy damage occurred to residential and ranch property and US Highway 95 when the Little Salmon River exploded near Riggins. Additionally, the Lake Creek dam six miles up the Main Salmon River from Riggins failed resulting in severe damage to the River Road.

**February 7, 1979** - Melting snow flooded several counties in North Idaho. Many roads were washed out. Schools were shut down and families were evacuated.

Highway 95 was closed by a rockslide near the Idaho-Adams County line. Water was 2 feet deep in Grangeville; however, minimal damage was reported.

**August 29, 1986** - Heavy rain flooded city streets in north Idaho. Lightning struck power poles. Gusts of wind were reported as high as 70 mph. About 3.5 inches of rain was dumped in 20 minutes. One person reported having 12 inches of standing water in his garage that left behind 6-7 inches of mud. Highway 62 was flooded about 15 miles south of Kamiah. 8 people were stranded by the wash-out. Drinking water was contaminated from the muddy runoff.

**February 11, 1996** - A combination of existing snow, ten inches of new snow, and single digit temperatures the last week of January caused ice to form on many rivers. This was followed by a warming pattern the first week of February and resulted in flooding in the northern panhandle counties. The overall disaster damages exceeded \$100 million.

In Idaho County, Cottonwood Creek near the town of Stites overflowed its banks and water crossed Highway 12. Three railroad cars were welded together to make a temporary bridge on Highway 12 over Cottonwood Creek. Roads near Lowell were closed due to mudslides.

✓ **January 1 to 5, 1997** - New Year's day floods in the Weiser, Payette and Salmon River drainages of southwestern Idaho caused record flooding and numerous mudslides. Warm temperatures combined with a rainfall 4-6 times the normal amount; the resulting snowmelt triggered devastating floods, mudslides and avalanches, extensively damaging communities and infrastructure throughout Idaho. The community of South Banks was condemned because of extensive slide damage. Over 400 miles of roads and several railroad lines were blocked or destroyed, stranding over 10,000 holiday travelers in western Idaho. Residents of McCall, Cascade, Banks, Lowman and Garden Valley were isolated. Rivers were "running like chocolate," carrying huge trees, mud and boulders; the Snake River at Hells Canyon Dam crested at 101,728 cfs January 1, nearly 30,000 cfs over its previous record level on 2/23/82. The crash of a plane carrying 5 people from Boise to McCall, killing all, was a result of the weather. Power and telephone services were cut in the Riggins area. Slides closed Highways 64 and 162.

Governor Batt declared 13 counties a disaster: Gem, Adams, Washington, Idaho, Clearwater, Valley, Payette, Elmore, Latah, Boundary, Bonner, Shoshone and Boise. A Federal disaster was declared on January 4, 1997. The total cost of the disaster was \$65,000,000.00 with \$2,731,796 of that damage occurring in Idaho County.

Water was 4 to 6 inches deep across Maple Street in Cottonwood during a Monday evening, March 3, flooding event. A 20- to 30-foot washout was reported around the culvert in this location.

COTTONWOOD – Main Street turned into a river Monday evening as rainfall coupled with snowmelt overwhelmed both Cottonwood Creek and city storm drains.

As of press time Tuesday, no flood damage was so far being reported by downtown businesses from the March 3 event, according to Cottonwood Police Chief Terry Cochran.

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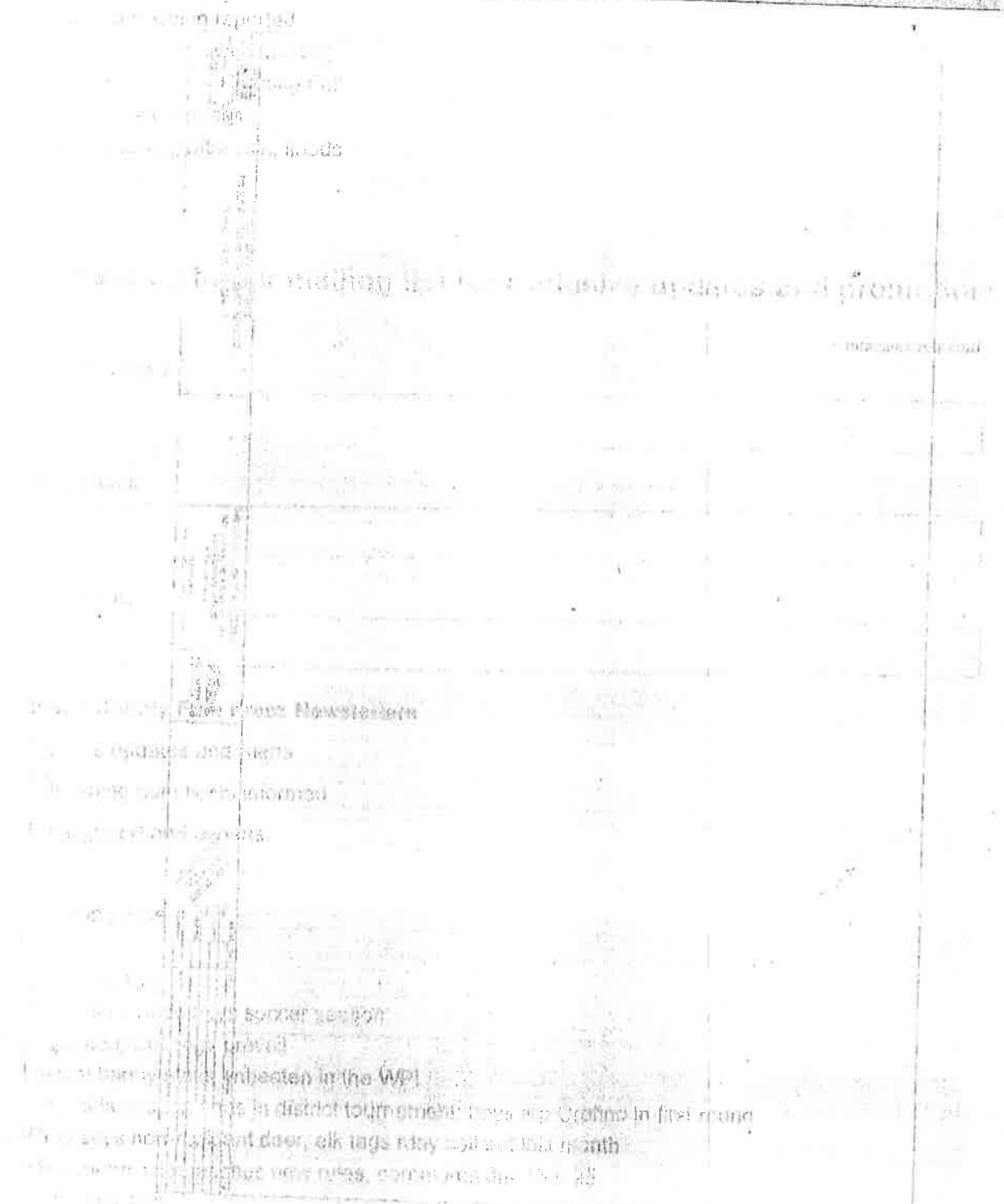
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• Scorecard



# COTTONWOOD CHRONICLE

Voice of the Camas Prairie



Updated March 5, 2014

## Flooding hits area

A combination of lots of snow, warmer temperatures and heavy rain led to flooding on the Prairie Monday afternoon and evening. . . .

[Read full story]



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## Pastor's Column

## Community Events at a Glance

(if you have an event you want on the events calendar, contact Carol Altman at Cottonwood City Hall at [cottonwd@idaho.net](mailto:cottonwd@idaho.net))

## Classified Ads

## Subscription Info

## Previous Updates

## Local Links

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Template Designed by:



## Pirates, Patriots at State

The Prairie Pirates and Summit Patriots have both qualified for the State Tournament in Caldwell this week. . . .

[Read full story]

*A river of water flows past Fred's Body Shop in downtown Cottonwood at about 6 p.m. Monday evening. Cottonwood Police Chief Terry Cochran reported Tuesday morning that apparently little water got into any of the Main St. buildings thanks in large part to their plan of action for such a situation. Some water got into the Fred's Body Shop before they got a dam built up in front of the doors. At Harman Agency water got right up to the lip of the doorway but didn't get in. Donn Clark set up a loader in front of Hoene Hardware to divert water from the store. Photo by Judy Klapprich Uhlenkott. See article at left for more photos. Click on the photo for a larger view.*

## March is Red Cross Month

Each year, the President of the United States proclaims the month of March as "Red Cross Month," to honor the lifesaving work the organization does throughout the year. . . .

[Read full story]



*The Prairie Pirates won the District Championship over Lapwai last Wednesday, Feb. 26. It is the third District title in the past 5 years for the Pirates after going 28 years without one. In front with the trophy is Willie Wilson. Kneeling from left are Terran Peery, Bryson Higgins,*

## Week 8 of 10-week shoot

<http://www.cottonwoodchronicle.com/2014/030614/>

10/11/2017

# COTTONWOOD CHRONICLE

*Voices of the Camas Prairie*

## Flooding hits area

A combination of lots of snow, warmer temperatures and heavy rain led to flooding on the Prairie Monday afternoon and evening.

The amount of water flowing into area creek drainages had the creeks overflowing their banks leading to flooding.

Both downtown Cottonwood and Ferdinand had volunteers sandbagging to protect homes and businesses.

For Cottonwood it was the first case of flooding on Main Street since similar conditions occurred in 1996.

Cottonwood Creek was overflowing the culvert at the intersection of Front St. and Lewiston St. causing flooding on Main St. There was also flooding reported in the northwest portion of town from the creek that flows there.

Cottonwood City Maintenance Supervisor Roy Uhlenkott said it was fortunate the rain stopped when it did or it could have been worse. The rain stopped about 4:30 and it wasn't until well after 5 that the flooding hit.

Much of Main Street was flooded, especially along the south side of the street with water a foot deep in places.

Cottonwood Creek was roaring behind Riener's Grocery where it surfaces again after going into culverts under Nuxoll Shell. Much of Gary Riener's yard was flooded.

On Tuesday morning Main St. had a lot of debris and many of the buildings still had sandbags in front of them.



*Cottonwood Creek was overflowing its banks behind Riener's Grocery at 5 p.m. Monday and flooding the yards of a couple of houses including Gary Riener's. Gary says that footbridge is his line of demarcation. If the creek starts lapping over it, Main Street starts getting flooded, which happened later in the evening.*

Weather ☁

Home

Classified Ads

COTTONWOOD  
CHRONICLE

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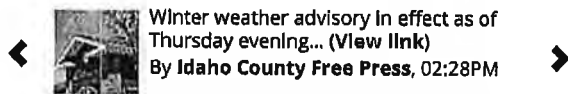
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Winter weather advisory in effect as of  
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By Idaho County Free Press, 02:28PM

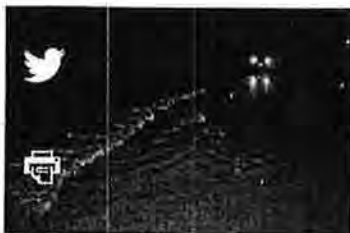
## A river runs through it : Snowmelt, deluge floods Cottonwood's Main Street

By David Rauzi

Wednesday, March 5, 2014



Sandbags line the south side of Cottonwood's Main Street during a Monday evening, March 3, flooding event.



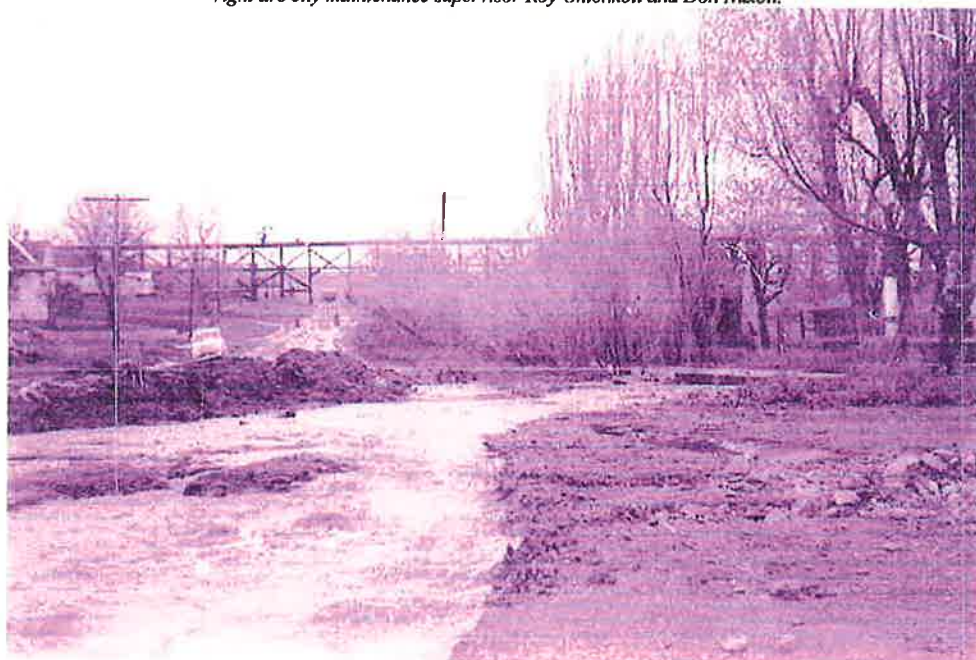
Contributed photo / Chief Terry Cochran, CPD



6

3-3  
2014

*Cottonwood Fire Chief Greg Sonnen, left and Ed Holthaus keep watch on the flood waters in front of the fire station. At right are city maintenance supervisor Roy Uhlenkott and Don Nuxoll.*



5/23-6/5  
1948

# COTTONWOOD

Vol. 11, No. 11.

## WINTER VAGARIES THREATEN PROBLEMS

**HIGHWAYS, FLOODS AND ICE  
MAY CAUSE HEAVY DAM-  
AGE IN PARTS OF AREA**

Following a snow storm, some temperatures and then freezing and a sudden drop in temperature, last Wednesday night, all highways and roads in the north Idaho area became a glare of Thursday morning. Conditions so serious in some areas that buses could not operate and schools had to remain closed Saturday and Friday. The ice was the worst seen in the entire area in many years and motorists warned to stay off the roads. Trips were absolutely necessary. The condition began to ease Saturday as ice began to melt in some areas, but traffic was hazardous throughout the day. A strong wind and mild temperatures over the Prairie country Saturday cleared many of the roads of ice. Traffic was able to proceed in a normal manner that day. Mild temperatures continued Saturday evening and have prevailed since that time, the mercury reaching 31 degrees at Cottonwood Monday morning, Tuesday, with no freezing at

### Floods Occur

Although the ice was gone from the roads, the frost remained in the ground. The sudden moderation resulted in the snow pack covering the roads to melt rapidly and by Sunday morning water was running off the roads. Creeks were soon running high and by noon a flooding condition was apparent at Cottonwood. The creek from the north end of the town rose so rapidly the culverts were unable to carry the water and flooding occurred at the Trailer Court near the pump house in the north end of town. Water soon began to back up in the lots between Smith and Bash streets and flooded the basement of the William Entrup house. By mid-afternoon the run-off had subsided sufficient to permit Mr. Entrup to begin pumping out the basement.

Cottonwood creek also went out of its bed about noon and the overflow ran down Main street. Water

backing was reported in many sections of the prairie, although damage to property was not extensive. A considerable amount of erosion occurred in many fields, with top-soil loss the most serious damage.

Mild temperature Monday erased all signs of snow from the prairie and a rain that evening virtually completed the job. The rain was accompanied by a very strong wind tore roofing off some buildings. At the Roger Styner home in the east part of town, the wind tore a roof built over a patio on the east side of the home, tore it and whipped it completely over the house roof and deposited on the east side of the structure. Mr. Styner reported the metal apparently was not damaged severely, although the wooden work will have to be replaced.

**Ice Jams Clearwater River**  
A big thaw over the week end created a real traffic problem in the Clearwater river area between Lapwai and Lewiston. Ice began to melt Sunday and by Monday morning a big jam had formed at the Spalding bridge on U. S. Highway 10 miles south of Lewiston. Mid-afternoon motorists were being urged to stay off the highway as ice cakes were being blown onto the highway and water was running across the road in several places. The condition steadily

Ice caused a barrier at the mouth of Lapwai creek and as the stream backed up it caused flooding of the Spalding park and museum as well as the town of Spalding. The community was evacuated as a safety measure. A cloudburst in the Webb ridge area Monday night also caused a flood at Lapwai that forced evacuation of several homes in that village.

The ice jams formed in the Clearwater river between Spalding and Orofino resulted in flooding of the Lewis and Clark highway near Lenore and halted traffic along the Lewis and Clark between Lewiston and Orofino. Reports revealed the ice was breaking up all the way from Lowell, on the Middle Fork, to Lewiston. Tuesday and Wednesday all traffic in and out of Lewiston south and east had to be routed over country roads from Sweetwater and Lapwai to Lewiston. Reports stated rail lines also were tied up with tracks under water in a number of places, and ice piled high across the tracks in other areas. A railroad trestle upstream a short distance above the Spalding bridge was virtually submerged Tuesday and it will not be known if it sustained damage until the high water and ice subside. All reports stated the ice flow in the Clearwater is the worst experienced

February 4, 1963

# D CHRONICLE

FRIDAY, MAY 24, 1956

SUBSCRIPTION \$3.00 PER YEAR

## Heavy Storm Punishes Area

MAY 1956

The beautiful weather of the past two weeks was rudely interrupted Wednesday afternoon when clouds overcast the sky and shortly after 2 o'clock a severe wind, rain and hail storm lashed the Cottonwood area.

The storm started with a severe wind and soon torrents of rain and hail were falling. In a matter of minutes gutters along the streets were overflowing. The flood waters poured off roofs and along Main street of Cottonwood water swept into the buildings from the rear as gutters were unable to handle the run-off. The storm appeared to be centered over Cottonwood and swung out in a northeasterly direction but apparently didn't cover too much area. The Chronicle was unable to learn full extent of the area hit as most telephone service was disrupted by the force of the storm. However, it is believed the brunt of the storm struck an area not more than two or three miles square.

Louis Klappich, local weather bureau observer, reported 1.82 inches of rain fell here during the Wednesday afternoon downpour — in less than an hour's time. This probably set a precipitation record for this community. Other reports from various parts of town stated the wind and hail did considerable damage to shrubs, plants and trees. Gardens in particular were hard hit, many garden plots being extensively eroded.

Preliminary investigation indicates heaviest damage was caused by erosion, with gardens and fields badly cut up in some sections. Some street repairs made in Cottonwood following the high water earlier this spring were wiped out and the work will have to be done over.

After the first downpour ended, skies became overcast over the entire prairie and Wednesday evening a general rain was in progress, but apparently was not developing into cloudburst proportions in any area. The warm weather the latter part of last week and the first few days this week caused drivers to rise to flood stage as the snow pack began to leave the mountains. Some minor flooding was reported at Orofino and Lewiston, but damage was not extensive. Reports Wednesday morning indicated the crests had been reached on the Salmon, Snake and Clearwater rivers and streams were dropping slightly to ease flood threats. However, continued rains could swell the streams and bring in new flood



# Central Idaho Suffers Heavy Damage

## Cottonwood Business District When Creek Broke Bank

Store Flooded and Damage Heavy as Flood  
Swept Main Street; Highway and Bridges  
Washed Out; Gentrys Lost Home in Canyon

Rains that swept over north-central Idaho area all day and Saturday, and rapid snow in the mountains created conditions that resulted in heavy highway damage that hundreds of thousands of dollars at Cottonwood were lost of the flood conditions. Early morning when a torrent was noticed sweeping down street. The swollen Cottonwood creek had gone over its banks and the old brewery building was pouring into the Cottonwood Co. building. Edgar Gentry, manager of the firm, said together with employees the company he was soon attempting to stem the flow of the building. The highway patrol and a "dozer" in operation to throw up a dike to divert the water down the street. Water in the store had a depth of about three feet and was pouring into the building.

This was taking place as houses were busy putting up dikes to keep the flood from entering the buildings. The exception of the Cottonwood Co., little damage was done as water did sweep into the store. The store flood damaged at approximately 10 a.m. Merchandise was scattered and tipped over. Water did untold damage. When the front of the building were opened to escape, packaged goods and many other things were carried out of the building and were being carried by the raging creek. Highway patrol took out many cars across Cottonwood town. Flood waters on highways in nearly all cases road damage was repaired. Some damage was done at end of Main street but repairs were effected to permit traffic over the street.

the day residents of

Central Idaho Suffers Heavy Damage as Result of Flood

COTTONWOOD, IDAHO, THURSDAY, MAY 27, 1948.

COTTONWOOD CHRONICLE

## Central Idaho Area Swept by Cloudbursts and Floods

(Continued from page one)

ing and grabbing some clothes they left the building and waded to safety on the hillside. In a matter of seconds the house turned on its side, broke up and was carried away on the crest of the flood. Every building with the exception of small chicken house and a small woodshed on the hillside, was swept from the Gentry homestead. Even their car fell prey to the water and was carried to Salmon river. Adding to the loss of their property was the fact that Mr. Gentry was stricken with a cold as a result of chilling from the water. He was brought out to Cottonwood Sunday morning by saddle horse, over old trails, and was taken to the hospital for treatment.

Property damage at all places in Rocky canyon was heavy. Oren Hollandsworth lost a new hay barn valued at about \$2,000, but most other places escaped loss of buildings. The erosion damage was extremely high in the canyon and destruction of the road cuts off all communication to the Plains country except by airplane.

On the Plains side of Salmon river all bridges over Rice creek were

swept away on the crest of flood waters.

### Other Prairie Towns Hit

Rains of cloudburst proportions were reported from all districts of the prairie. At Craigmont the highway was reported under four feet of water at the underpass and traffic had to be detoured around that section. Erosion of farm lands was the greatest loss at Craigmont.

Raging creeks at Nezperce flooded main street of that city and many basements were flooded. Some residents in the lower elevation of the city had to evacuate their homes.

A slide blocked the North & South highway near the steel railroad bridge in Lawyer's Canyon, for a short time Saturday morning, but maintenance crews soon had one-way traffic going through. The swollen creek did heavy damage to the road-way. Traffic was halted at Eller crossing, with approaches at both ends of the bridge washed away. Most bridges across Lawyer's canyon are gone.

Near Kanniah a large portion of the Seven Mile canyon road is gone and considerable damage is reported to most farm-to-market roads in that area.

High Water at Grangerville  
Reports from Grangerville stated

that city also experienced a high water flood condition Saturday afternoon as creeks overflowed banks and inundated some of the business district on Main street. Several basements were flooded, but most stocks of perishable goods had been removed before water entered the buildings. Consequently loss was held to a minimum.

### White Bird Reported Hard Hit

Cloudbursts and melting snow in the White Bird creek area, brought that stream to flood stage Saturday morning, with bridges going out in several sections. Several buildings along the creek were reported washed away and many homes in the village of White Bird were damaged by the flood. The highway from White Bird to Salmon river was badly damaged and traffic was halted for a time. High water on the main Salmon river has caused partial destruction of the North & South highway in some sections; slides occurred in other spots, and bridges washed out in still other areas has resulted in tie-up of heavy traffic over the route. Cars and light vehicles have been able to get through, but most heavy traffic is routed elsewhere.

Clearwater River goes on Rampage  
A cloudburst in the Blk City district, together with rapidly melting snow in the mountains, caused the South Fork river to reach peak flood stage Saturday. Reports from Stites and Kooskia revealed that damage in both those towns was extremely high. At Stites water boiled through the business district as well as the residential area and only five buildings in the village escaped damage. The swollen South Fork river swirled through Stites, practically destroying the main street. Bridges across the river were washed away and property damage at stores and homes was extremely high.

Reports from Kooskia revealed almost identical conditions existed there, although that village is not believed quite as hard hit as Stites.

From Orofino, reports stated the swollen Clearwater river had gone over its banks, flooding the athletic field and fair grounds, a portion of the business district of the city, and even reaching the ground floor of the court house building. Damage was estimated at many thousands of dollars.

As the flood crest approached Lewiston, all gates and needle beams at the dam were opened to reduce pressure against the dam. Crews were kept busy at dikes in north Lewiston and flood damage in the valley city was held to a minimum.

Warm weather following the heavy rain, has kept all rivers at flood stage as snow in the high mountains is melting. All cities along the river are watching for another flood crest as the streams are remaining at the high water stage. People are digging in to meet whatever situation might

time, with streams steadily rising as snow leaves the mountains. The situation remains critical and no relief is in sight for the immediate present.

### HIGHLIGHTS OF THE FLOOD

Felix Hutchins solved transportation problems for Carl Schmidt and other unprepared early commuters by carrying them piggy-back across the stream flowing down main street.

John Jenny was seen fishing (with rod, no line, but creel) near Simon Bros. market late in the afternoon. Other people were seen fishing without rod or line during the day.

Honors for messenger service go to Mike Hilbert who mailed parcels and ran errands for people on the North side of Main street as he was the only one there equipped with fisherman's boots.

Nomination for the cleanest man in town goes to Mayor Wm. E. Simon, who reported three changes of clothes during the day.

As there was no water shortage Arnold Holthaus decided to "enjoy" a plunge near Cottonwood Selling Co. building. Several youngsters also took plunges—unpremeditated—as their bikes tumbled in the water.

Kelly Kurdy was seen conducting a door-step taxi service.

Honors for extraordinary service in line of duty go to Marshall Ed Tautfest, and to all employees of the Cottonwood Selling Co.

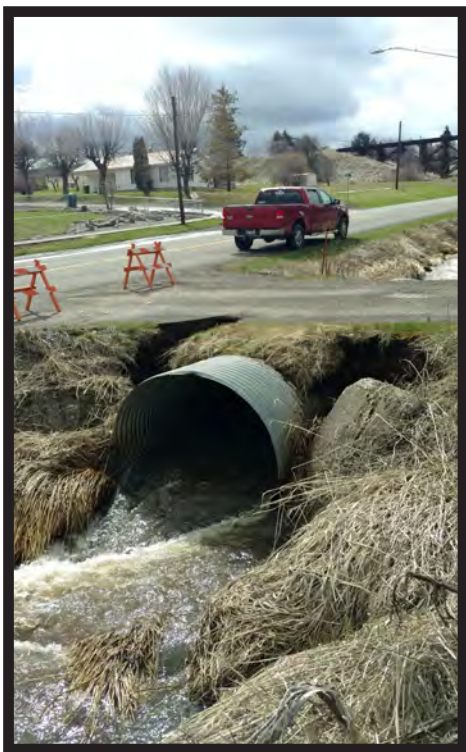
Urban Lester reported his cows didn't get milked until 2 p.m. It was a case of "war of wills"—the cows wouldn't ford the stream to come home and Urban wouldn't go after them. Finally the cows gave in.

Lewis McKay, when first viewing the stream, decided the Cottonwood Water Co. had finally struck an artesian well.

Pithy advice heard on the street: "Well, why don't you do something about it? Don't just stand there looking at it."



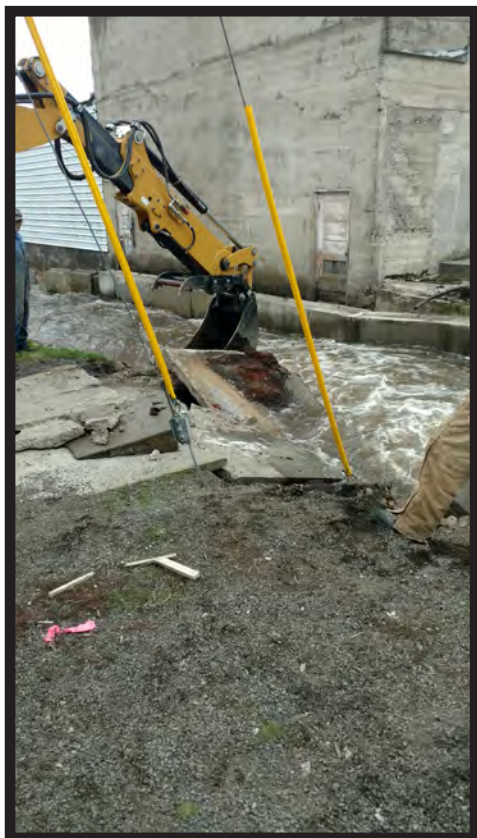
## April 2019 Flood



Front St. Culvert Hole



Main Street flooding in front of Arnzen Drug



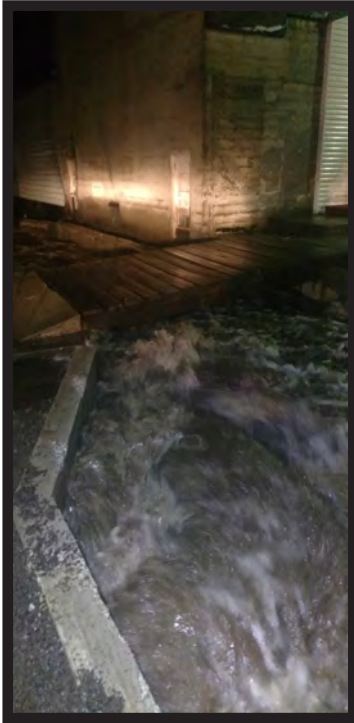
Behind Riener's Grocery



Lewiston Street Headwall



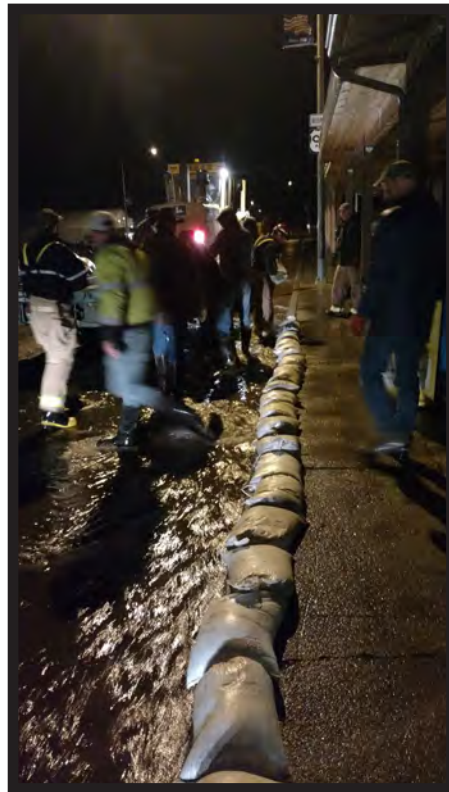
# April 2019 Flood



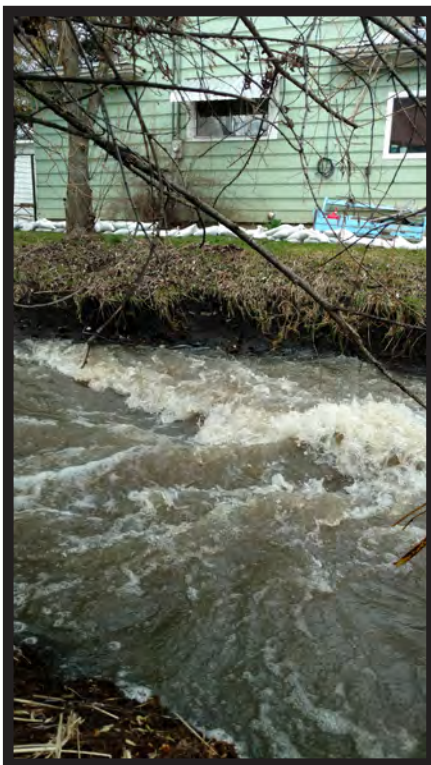
Bridge behind Rieners Grocery



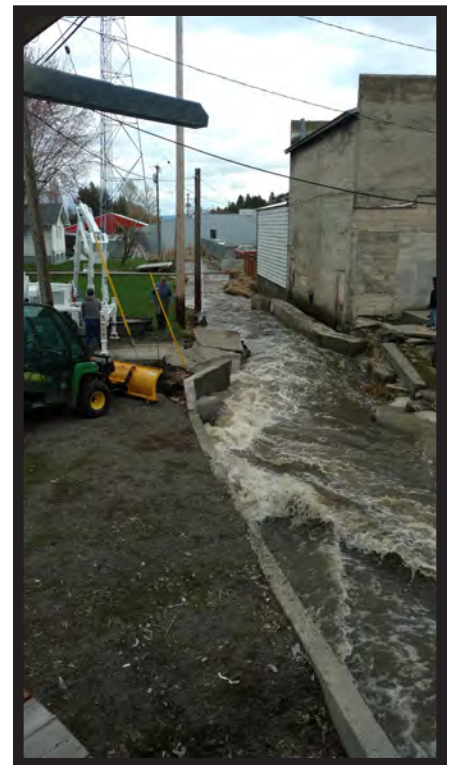
Front St. Culvert Hole



Main Street

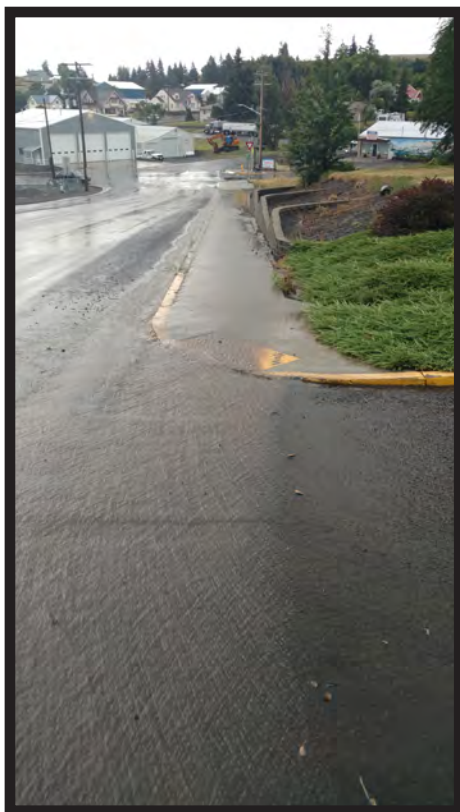


Forsmann House 24 hours after

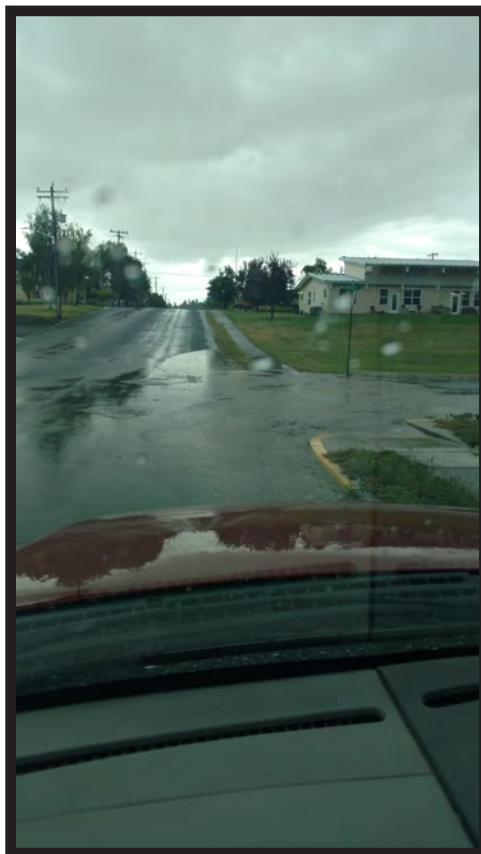


Behind Rieners Grocery

## August 2019 Flood



Intersection of Lewiston Street  
and Gilmore Street



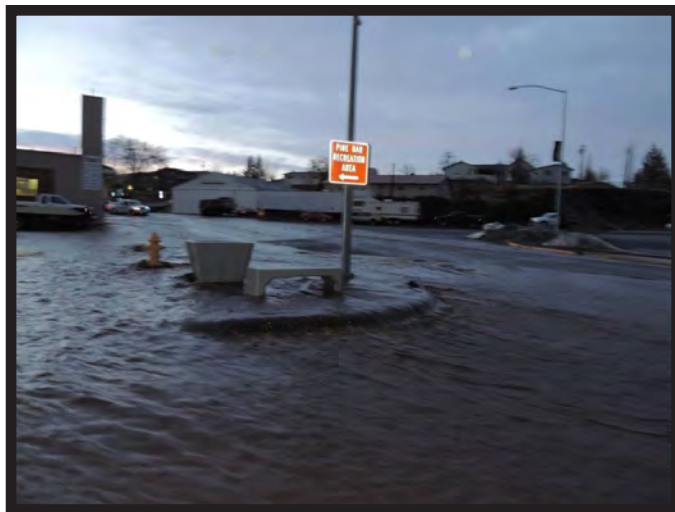
Intersection of Lewiston Street  
and Garrett Street



Storage units in north Cottonwood



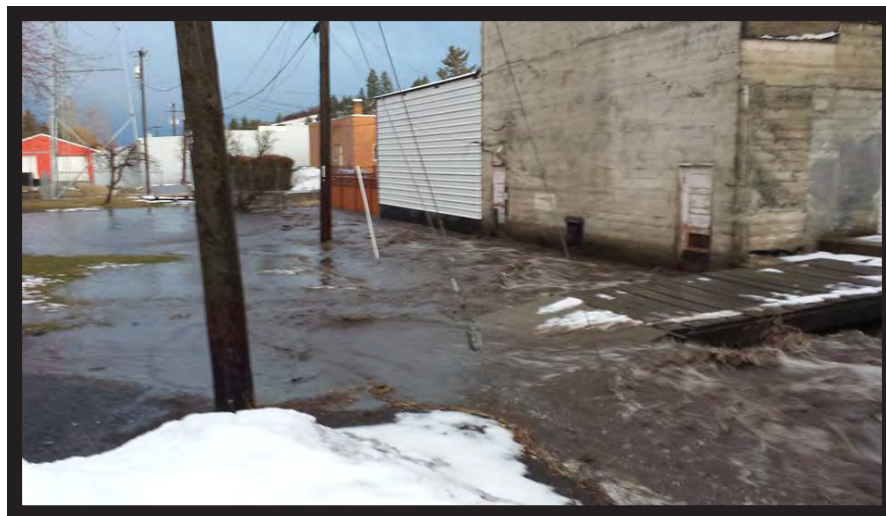
## Historic Flooding



Intersection of Broadway and Main Street Looking West down Main Street



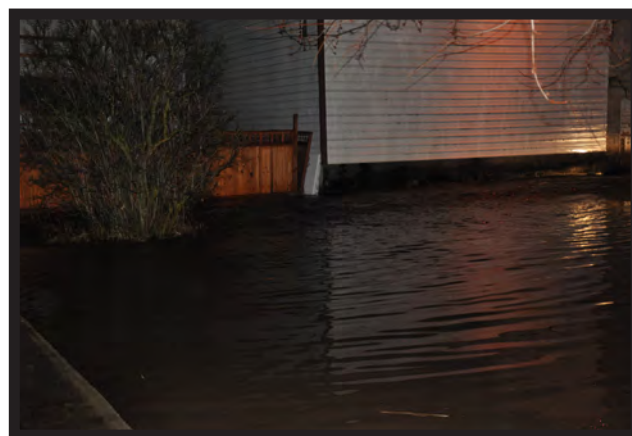
Intersection of Broadway and Main Street Looking East down Main Street



Behind Riener's Grocery



Flooded home at the intersection of Goldstone and Main Street (Looking East)



Building flooding



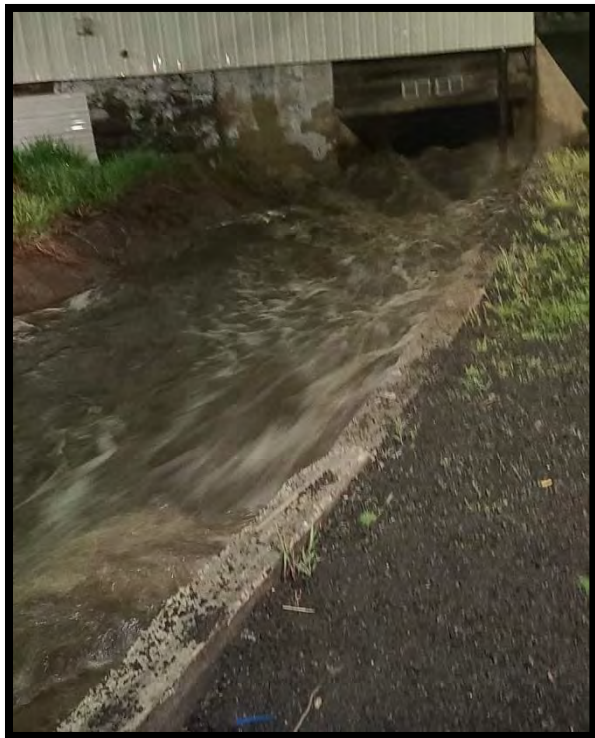
May 2022



Lewiston Street Headwall and Grate



Lewiston Street Headwall and Grate



Culvert under Riener's Grocery



Bridge behind Riener's Grocery



# June 2022



Near the intersection of Butler St. and King St.



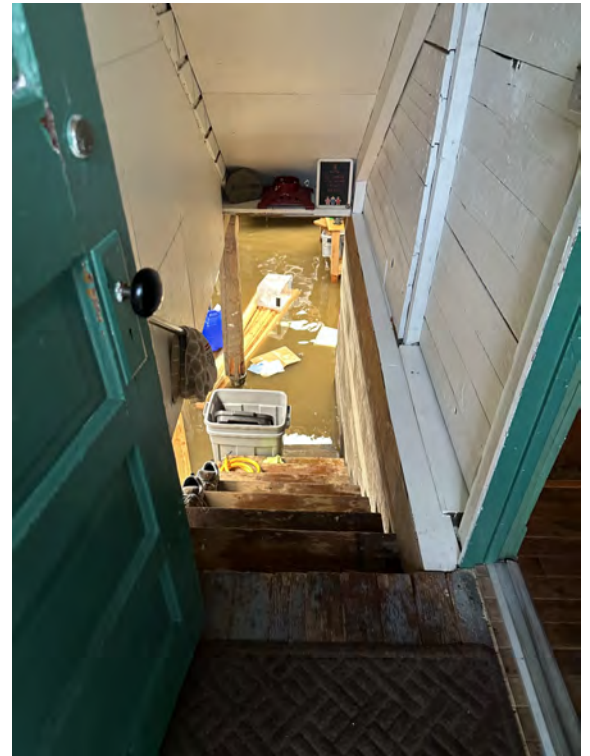
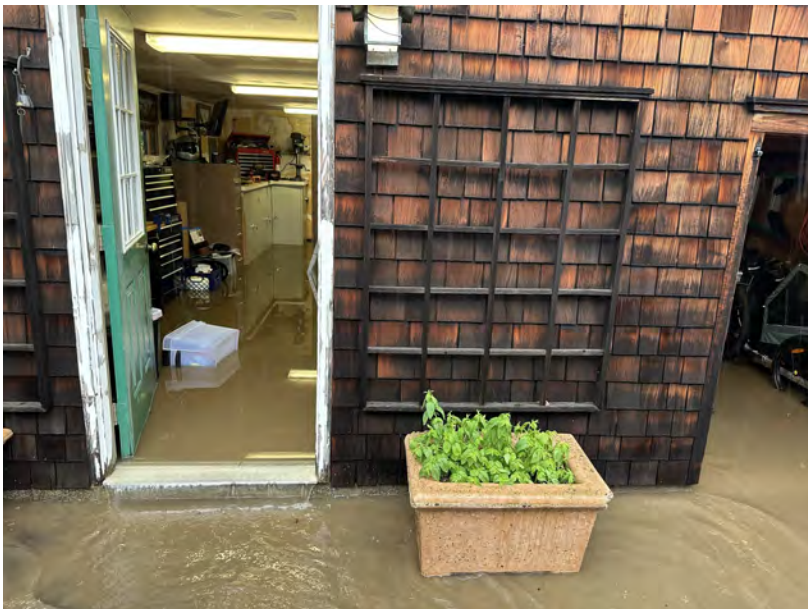
Intersection of Butler St. and King St.



Flooding in a yard directly north of Butler St.



# Flooding at 504 Garrett





# Historic Flooding



DTD inspection

**IDAHO TRANSPORTATION DEPARTMENT  
SPECIAL INSPECTION  
DISTRICT NO. 2**

**BRIDGE KEY:** N/A

**STRUCTURE NO:** N/A; US-95 Business Loop

**CROSSING:** N/A

**FEATURES INTERSECTED:** Cottonwood Creek

**LOCATION:** In city of Cottonwood

**DATE:** 7/24/17

**INSPECTORS:** Alan Buehrig and Anthony Beauchamp

**CULVERT:** The culvert is approximately 580 feet long and includes 5 distinct sections along its length. Several defects were noted in the culvert, however no distress or movement was observed in the pavement along the alignment.

**Under Roadway (Lewiston & Front Street) section:** The section from the inlet to about 327 feet is a corrugated metal "squash" pipe. It is approximately 44-inches tall and 71.25-inches wide. The corrugations are 3" x 1/2-inch deep and it is approximately 1/8-inch thick. The pipe along this section is considered in "Serious Condition" or an NBI rating of a "3." The pipe is made up of approximately 20 foot lengths of pipe. The transition at many of these pipe splices is poor and misaligned with exposed voids and/or reduced dimensions restricting flow.

***Scour Defect:*** A severe scour has developed above the headwall at the inlet roadway embankment fill. The hole is about 1 foot in diameter and extends about 2 feet deep through the roadway fill terminating at the top of the culvert. City officials onsite during the visit explained that during the last high flow event this head wall scour hole maintained a vortex water flow feature. This may be indicative of underlying scour around the circumference of the pipe for some distance under the road.

***Distortion Defect:*** The culvert has extreme distortion and deflection (up to 6-inch bulges/heaves) along the top and bottom of the pipe for a total of approximately 9 feet. The section from 28 to 35 feet is considered the most severe. The distortion in the top of the culvert from 28 to 31 feet appears to have been caused from construction damage, as there are no signs of surface distress in the roadway above this section. The heaving of the culvert bottom from 31 to 35 feet occurs over a 2 foot width and coincides with a pipe to pipe splice as well as advanced section loss of the bottom of the pipe. The heaving of the floor may be attributed to bed load forces during high flows with material pushing under the culvert bottom at this transition.

***Corrosion Defect:*** The pipe is typically rust stained along the entire width from haunch to haunch. Over a 4 foot width along the invert, there is heavy corrosion associated with minor to complete section loss. The complete section loss over the 4 foot width is typically less than 10 percent by area and is generally located within the troughs of the corrugations. The holes vary up to 2 feet in width and are typically no more than 4 inches long. There are some isolated sections of heavy section loss with up to 60 percent of the area over a 4 foot width gone. This occurs from 30 to 35 feet and at 151 feet. From 170 feet to 174 feet there is complete section loss over an entire area. Along the left side wall, extending into the wall, from 170 to 174 there are voids up to 36 inches deep. A section of the culvert floor appears to have been mechanically removed from approximately 173 to 178; the section measures approximately 12 inches wide and removed at a 30 degree angle looking down station. (Refer to drawing for more information.)

**Under Sidewalk Section:** From 327 to 366 the culvert is a cast in place concrete box. The box is in "Fair Condition" or an NBI rating of "5" with only minor cracking, abrasion and spalling.



**Under Parking Lot Section:** The section from 366 feet to 499 feet is a corrugated metal “squash” pipe. It is approximately 44-inches wide, 74 inches wide. The corrugations are 3” x ½-inch deep and it’s approximately 1/8-inch thick. The pipe along this section is in considered in “Poor Condition” or an NBI rating of a “4.” The pipe is made up of approximately 20 foot lengths of pipe. The transition at many of these pipe splices is poor and misaligned with exposed voids and/or restricted width.

***Corrosion Defect:*** The pipe is typically rust stained along the entire width from haunch to haunch. Over a 4 foot width along the invert, there is heavy corrosion associated with minor section to complete section loss. The complete section loss is typically limited to periodic holes up to 2-inches in diameter.

**Under Roadway (US-95 Business) Section:** The section from 499 to 544 feet consists of a cast in place concrete box. The walls appear to be motor and stacked rock. The floor and deck appear newer and poured in place.

***Abrasion Defect:*** There is abrasion of the sidewalls full length of the section. Coarse aggregate has popped out of the concrete matrix due to abrasion. Up to 10-voids measured from face of the wall.

**Under Building Section:** The section from 544 to 580 feet consists of a cast in place concrete box. The walls appear to be motor and stacked rock. The floor appears poured in place. The top appears to be the floor of the building above.

***Abrasion Defect:*** There is abrasion of the sidewalls full length of the section. Coarse aggregate has popped out of the concrete matrix due to abrasion.

**CHANNEL:** The stream channel upstream and downstream of the bridge has been heavily channelized in an urban environment. There is moderate erosion along the channel and several stream control devices upstream and downstream of the culver have been installed. This includes a trash rack, riprap and a headwall at the inlet. At the outlet there are several iterations of concrete cast in place and precast walls to protect the embankment. All appear stable expect the headwall at the inlet. The wall has significant cracking and spalling. It was overtopped during spring flooding. Above the headwall is 1ft in diameter scour hole through which embankment material was piping along the backfill.

**NOTES:** None.

**MISCELLANEOUS ITEMS:** None.

**WORK ACCOMPLISHED:** None.

**MTCE RECOMMENDATIONS:**

Short-term:

- 1.) Repair scour hole above inlet and armor inlet around headwall.
- 2.) Grout the floor of the culvert in the major areas of section loss.

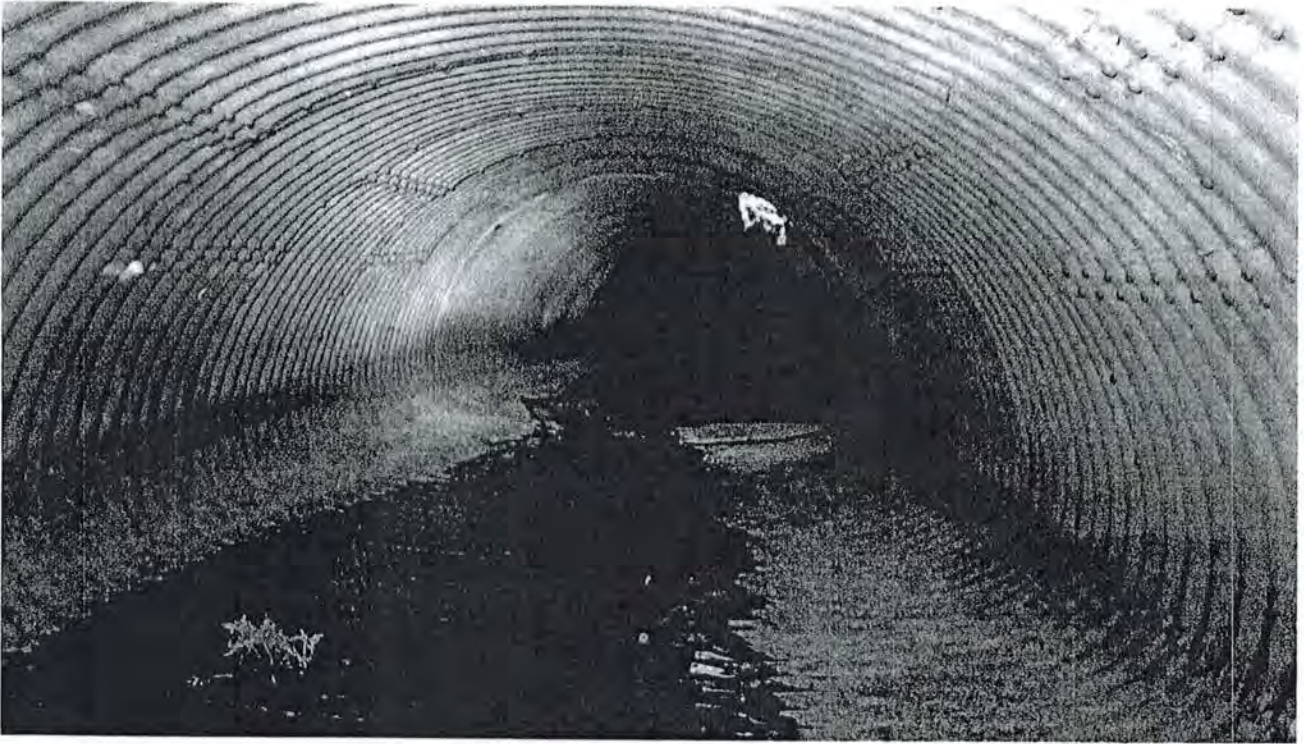
Long-term:

- 3.) Consider relining the entire alignment.
- 4.) Consider a diversion structure and separate alignment for high flow events.

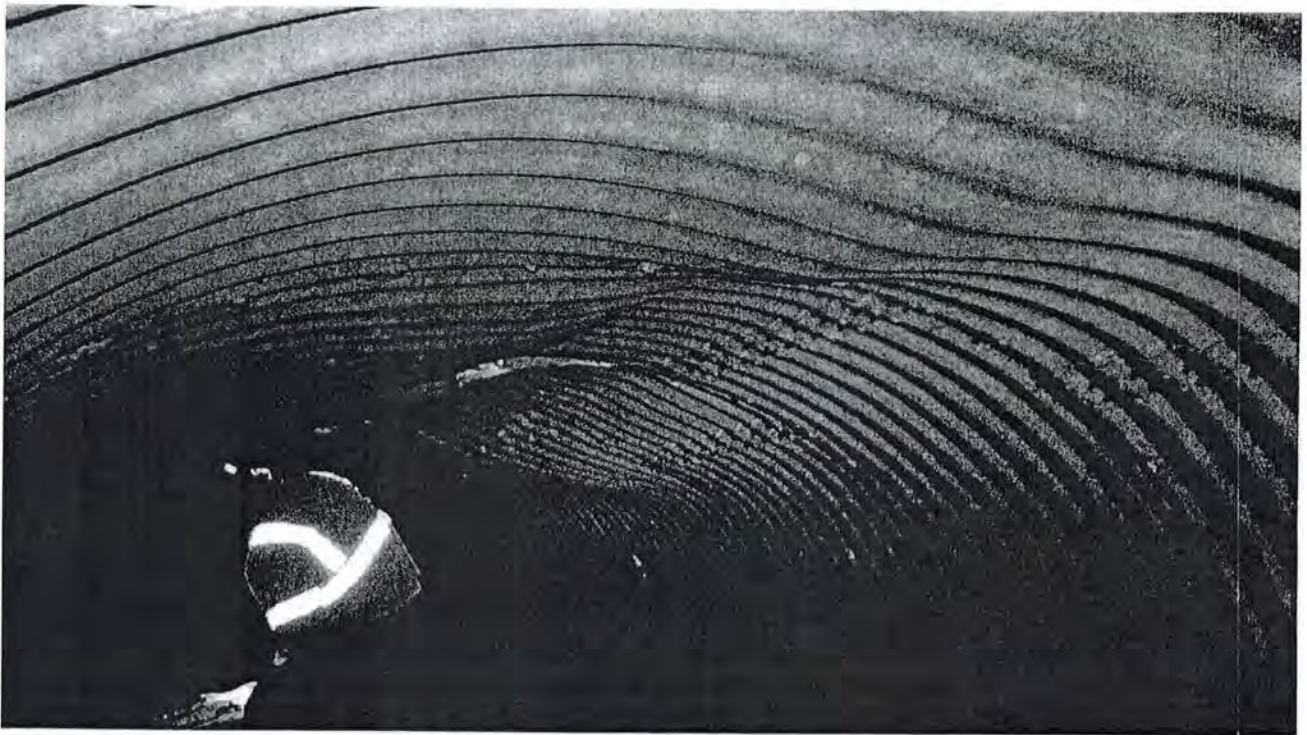
INSPECTOR'S SIGNATURE: Alan Buehrig Digitally signed by Alan Buehrig  
DN: cn=Alan Buehrig, o=ITD, ou=Bridge,  
email=alan.buehrig@itd.idaho.gov, c=US  
Date: 2017.08.01 07:47:29 -0500 DATE: \_\_\_\_\_

Hours spent on inspection: 4 hrs



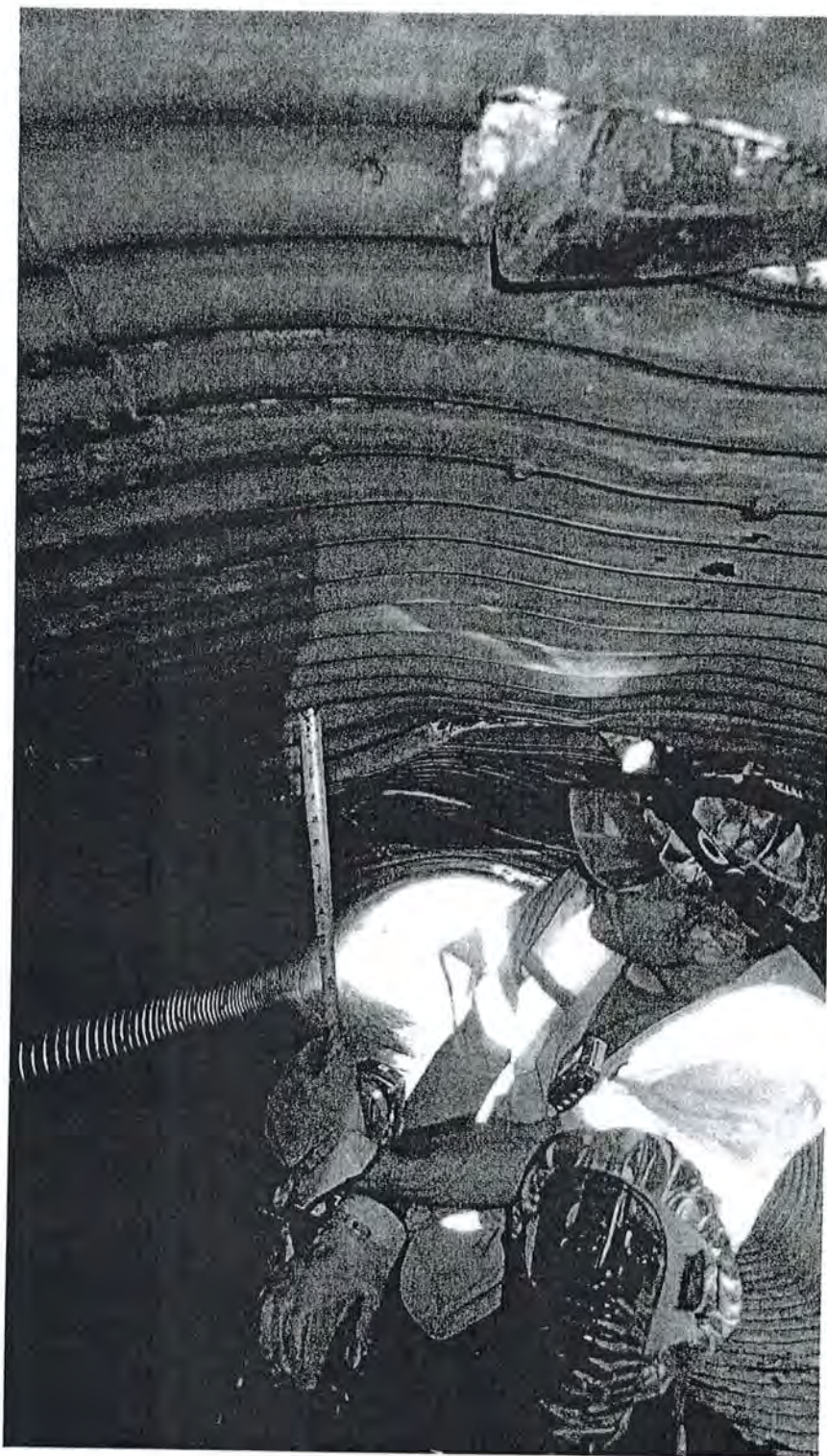


**Figure 1:** Typical Culvert Section Under Roadway  
(Lewiston and Front Street)



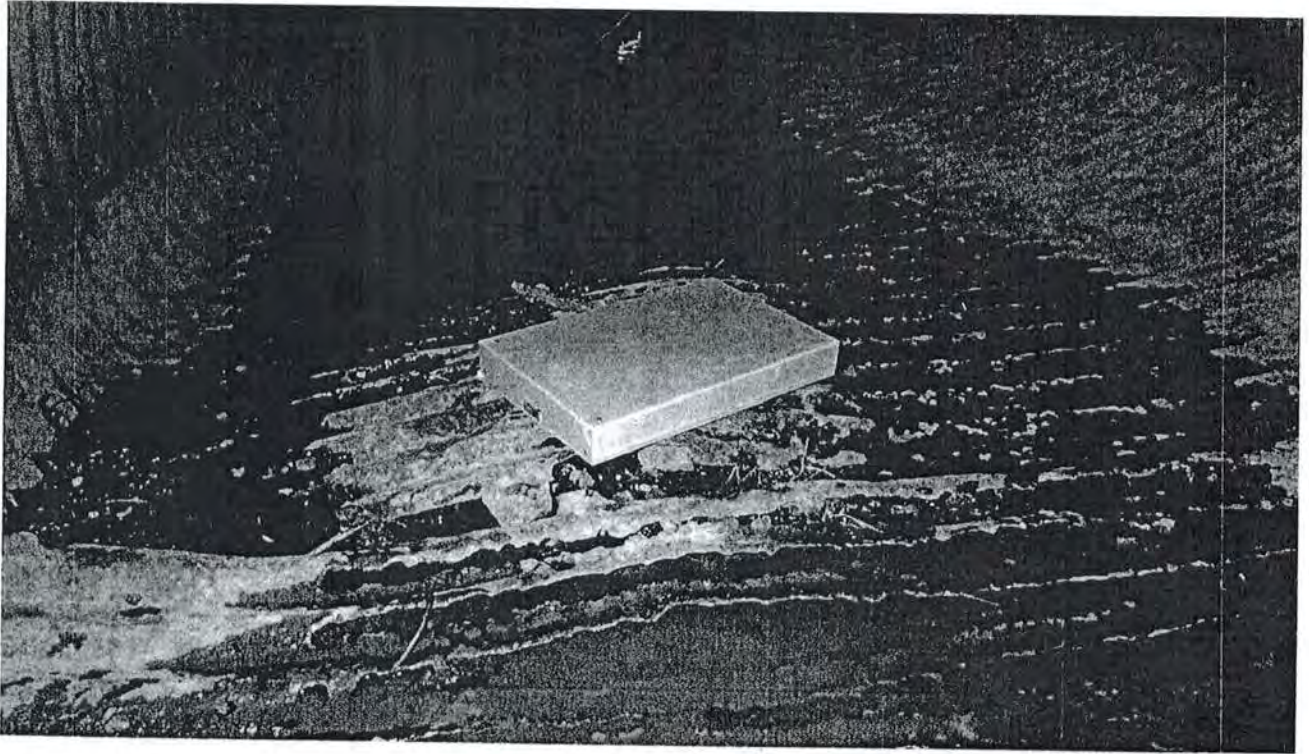
**Figure 2:** Distortion, Bulges and Protrusions Into Top of  
Culvert at 28 to 31 feet.



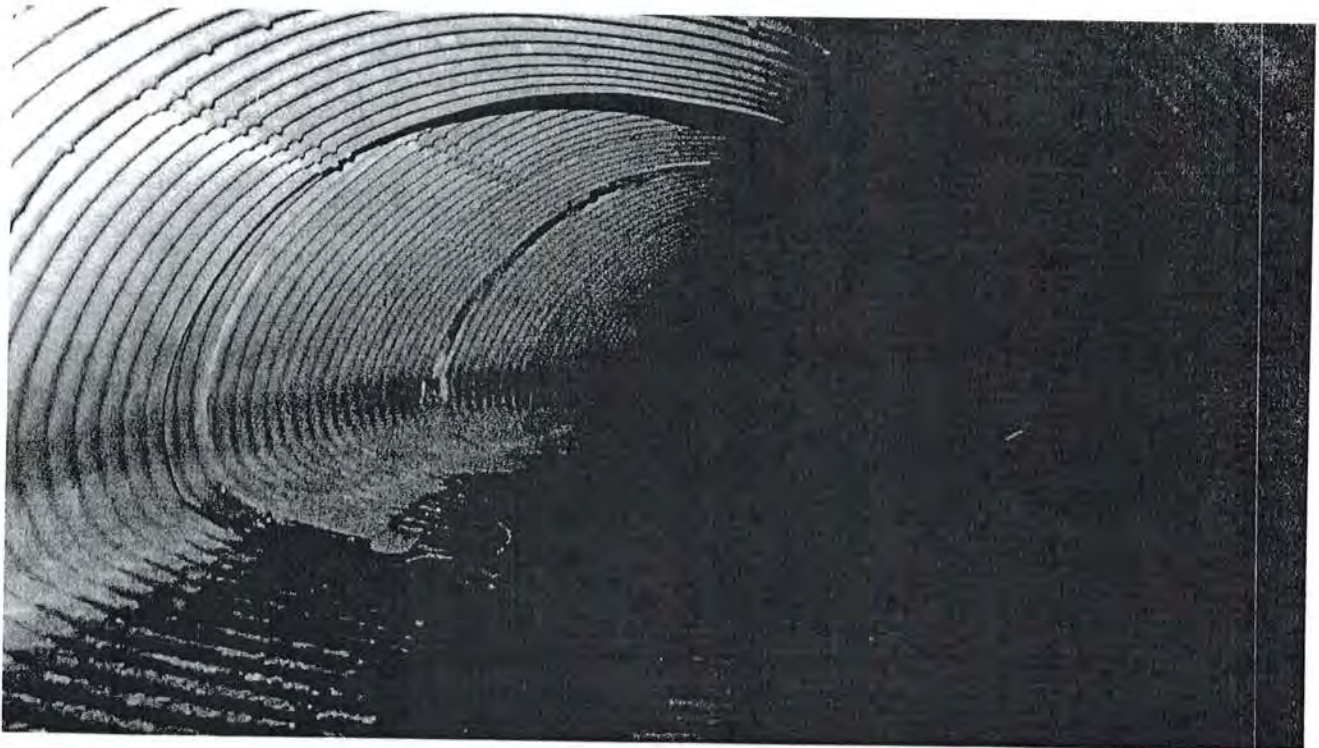


**Figure 3:** Distortion, Bulges and Protrusions into top of Culvert at 28 to 31 feet.





**Figure 4:** Area of Floor Heaving and Complete Section Loss at 31 to 35 feet.

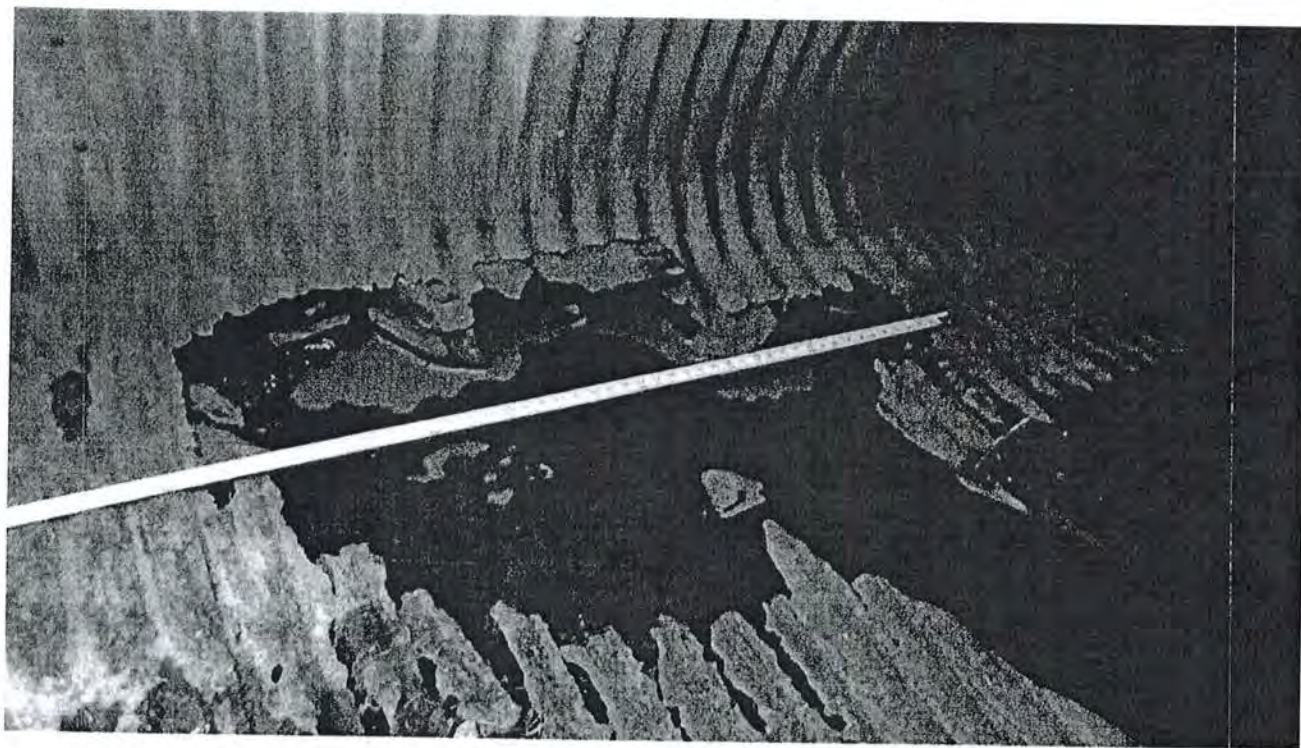


**Figure 5:** Pipe Changes Direction in Horizontal Alignment Near 79 feet with Poor Splice Transition Restricting Hydraulic Flow.





**Figure 6:** Poor Pipe Splice Transition at 100 feet.

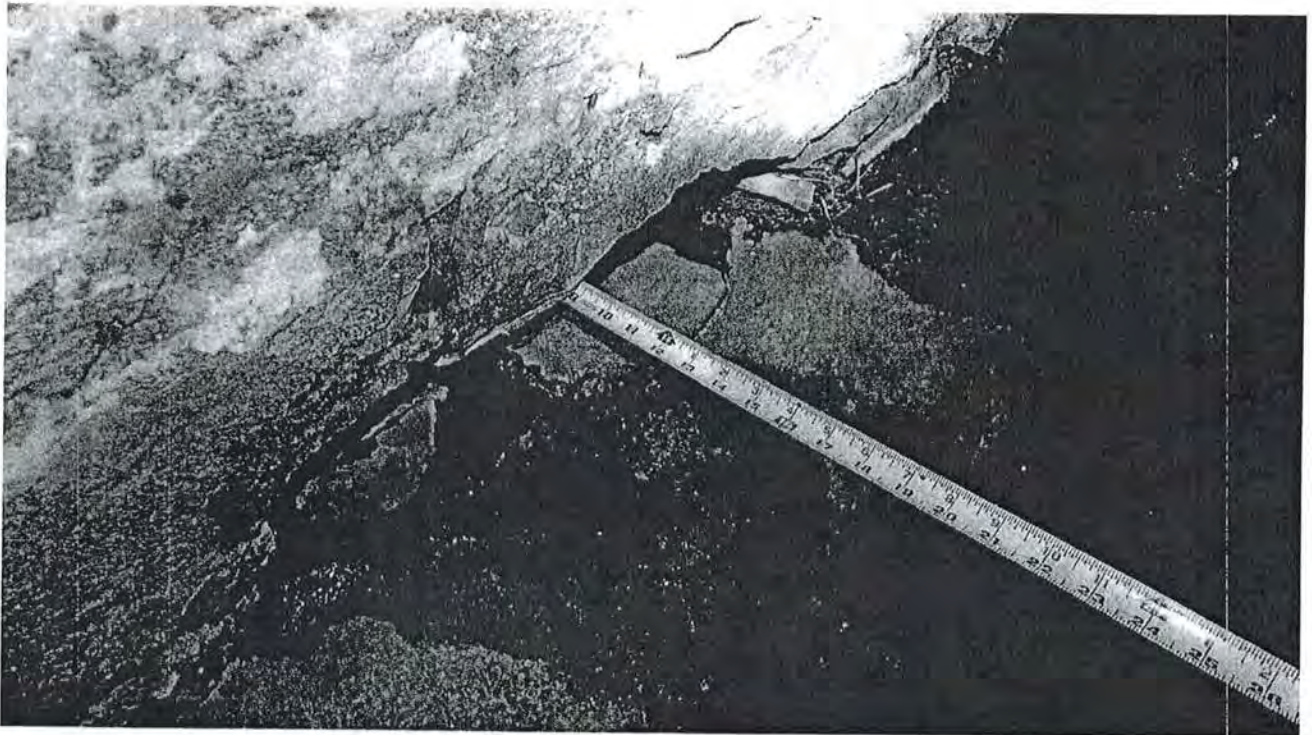


**Figure 7:** Complete Section Loss at 170 to 174 feet.



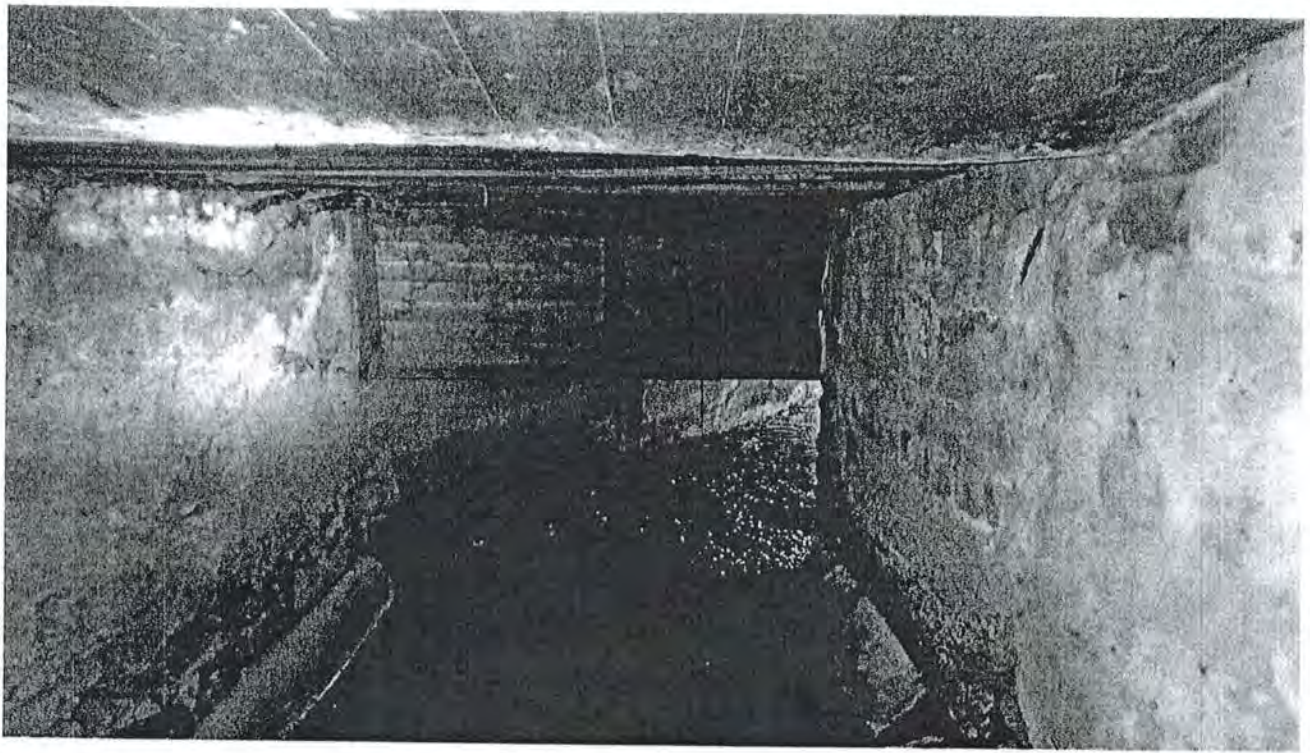


**Figure 8:** Typical Section Under Roadway (US-95 Business Loop).



**Figure 9:** Abrasion Along Concrete Walls , Up to 10-inches of Loss Measured From Face.





**Figure 10:** Looking Towards Under Building Section.





366 FT  
END CONCRETE BOX, BEGIN CMP.

499  
END CMP, BEGIN CONCRETE  
CAST-IN-PLACE CULVERT.

544 FT  
CULVERT BENDS TO RIGHT &  
REDUCES TO 37 IN. TALL

OUTLET OF  
COTTONWOOD CREEK

|           |            |                                  |                 |
|-----------|------------|----------------------------------|-----------------|
| REVISIONS |            | SCALES: SHOW<br>MFC FOR 3" x 24" |                 |
| NO.       | DATE       | DESCRIPTION                      | BY              |
| 1         | 10/20/2017 | ISSUED FOR CONSTRUCTION          | BRIDGE ENGINEER |
| 2         |            | REVISED                          |                 |
| 3         |            | REVISED                          |                 |
| 4         |            | REVISED                          |                 |
| 5         |            | REVISED                          |                 |
| 6         |            | REVISED                          |                 |
| 7         |            | REVISED                          |                 |
| 8         |            | REVISED                          |                 |
| 9         |            | REVISED                          |                 |
| 10        |            | REVISED                          |                 |
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Appendix E2: Elevation Data Sources





## Appendix E2 Elevation Data Source

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| <b>Date:</b>    | 6/1/2022                                                    |
| <b>To:</b>      | Bruce Sandoval, PE – NRCS State Conservation Engineer       |
| <b>Cc:</b>      |                                                             |
| <b>From:</b>    | John Watson, PE – J-U-B Engineers                           |
| <b>Project:</b> | Cottonwood Creek Flood Prevention and Water Quality Project |
| <b>Subject:</b> | Elevation Data Source                                       |

The following data sources for the survey and imagery were utilized for this study:

| <b>Data</b>                         | <b>Source</b>                            | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aerial Imagery                      | Aero-Graphics;<br>Geospatial<br>Services | Aerial imagery was obtained for the project in November, 2020 using a turbocharged aircraft. Digital orthorectified photography flown at a nominal ground sample distance of 0.43'. TIF and SID format at 0.25' pixel resolution. Three flight lines and 20 exposures were completed.                                                                                                                                            |
| DTM Surface Data                    | Aero-Graphics;<br>Geospatial<br>Services | DTM data was obtained for the project in November, 2020 using a turbocharged aircraft. Planimetry and DTM data consisting of break lines, mass points and spot elevations, at a map scale of 1"=200' was obtained. Five foot contours were generated from surface data. Three flight lines and 20 exposures were completed. Twenty-three ground targets/control points were placed by J-U-B Engineers (control points attached). |
| Survey Data                         | J-U-B<br>Engineers                       | Additional topographic surveys using conventional GPS field survey equipment were completed in areas requiring additional detail. These areas include existing Cottonwood channel and flood conveyance piping and structures, existing flood conveyance structures on the King Street route, and specific sanitary sewer manholes.                                                                                               |
| City of Cottonwood Utility GIS Data | J-U-B<br>Engineers                       | Previously obtained sanitary sewer distribution system and water distribution system location data obtained from mapping grade hand-held GPS equipment (sub 1' horizontal and sub 3'                                                                                                                                                                                                                                             |

|  |  |                                                                                              |
|--|--|----------------------------------------------------------------------------------------------|
|  |  | vertical accuracy). Data compiled in ArcView was inserted into the project AutoCAD base map. |
|--|--|----------------------------------------------------------------------------------------------|

VERTICAL DATUM  
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BASED UPON STATIC GPS OBSERVATIONS TO JUB CONTROL POINT NO. 1, PROCESSED THROUGH THE NATIONAL GEODETIC SURVEY (NGS) ONLINE POSITIONING USERS SYSTEM (OPUS) SYSTEM

PROJECT BENCH MARK  
5/8" IRON PIN WITH RED PLASTIC CAP, MARKED "JUB ENGINEERS CONTROL POINT" LOCATED AT LATITUDE N46°02'32.30711", LONGITUDE W116°20'23.21395".

ID WEST STATE PLANE, NAD 83  
NORTHING: 1595505.25'  
EASTING: 2474904.86'  
ELEVATION: 3444.65'

Appendix E3: Geotechnical Evaluation





GEOTECHNICAL | ENVIRONMENTAL  
MATERIALS TESTING | SPECIAL INSPECTION

AN EMPLOYEE-OWNED COMPANY

August 6, 2021

J-U-B Engineers, Inc.  
201 S. Jackson Street  
Moscow, Idaho 83843

Attention: Ms. Amy Uptmor, P.E.

RE: Geotechnical Evaluation  
Cottonwood Stormwater and Wastewater System Improvements  
Various Streets  
Cottonwood, Idaho  
ALLWEST Project No. 320-167G

Ms. Uptmor,

**ALLWEST** has completed the authorized geotechnical evaluation for the Cottonwood stormwater and wastewater system improvements located on various streets in Cottonwood, Idaho. The purpose of this evaluation was to characterize the soil and geologic conditions in the project area and prepare the attached report with the results of the field evaluation and our geotechnical recommendations to assist with design and construction of the proposed project.

We appreciate the opportunity to provide services you on this project. If you have any questions or need additional information, please call.

Sincerely,

**ALLWEST**

Prepared by:



**Shawn Turpin, P.E.**  
Senior Geotechnical Engineer

Reviewed by:

A blue ink signature, "JAMES THOMASSON", written in a cursive style.

**James Thomasson, P.E.**  
Senior Geotechnical Engineer

2705 E. Main Street, Lewiston, ID 83501  
Phone: 208.743.5710 • Fax: 208.743.8270

Hayden, ID • Lewiston, ID • Meridian, ID • Spokane Valley, WA • Missoula, MT  
[www.allwesttesting.com](http://www.allwesttesting.com)

**GEOTECHNICAL EVALUATION  
COTTONWOOD STORMWATER AND WASTEWATER SYSTEM  
IMPROVEMENTS  
VARIOUS STREETS  
COTTONWOOD, IDAHO  
ALLWEST PROJECT NO. 320-167G**

August 6, 2021

**Prepared for:**  
J-U-B ENGINEERS, INC.  
201 S. JACKSON STREET  
MOSCOW, IDAHO 83843

**Prepared by:**  
ALLWEST  
2705 E. MAIN STREET  
LEWISTON, IDAHO 83501



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## EXECUTIVE SUMMARY

**ALLWEST** has completed the authorized geotechnical evaluation for the Cottonwood Stormwater and Wastewater System Improvements project located on various streets in Cottonwood, Idaho. The purpose of this evaluation was to assess the subsurface conditions on the project site with respect to the planned development. This report details the results of the field evaluation and laboratory testing and presents our geotechnical recommendations to assist the design and construction of the planned improvements. The following geotechnical considerations were identified:

- ◆ Foundations supporting the planned construction that bear on natural gravel or structural fill may be designed with an ultimate bearing capacity of 9,000 pounds per square foot (psf). The ultimate bearing capacity may be increased to 21,000 psf for footings constructed directly upon basalt rock.
- ◆ Pavement placed to patch trench excavations and culverts should match the existing pavement sections. Existing pavement sections observed in the borings are summarized in Section 6.10 *Pavement*.
- ◆ The native soils in the areas of the proposed new culverts are “corrosive” to “very corrosive” to metal based on the soil resistivity test results. Resistivity values ranging from 200 to 1,800 ohm-cm were measured. If metal culverts are used, they should be properly protected from corrosion. Consideration may also be given to backfilling culverts with less corrosive imported soil.

Our services were provided in accordance with our proposal number 320-167G dated September 18, 2020. Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. If we are not retained to provide required construction observation and materials testing services, we cannot be responsible for soil engineering related construction errors or omissions. This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. Section 8.0 *EVALUATION LIMITATIONS* should be read for an understanding of the report limitations.

**GEOTECHNICAL EVALUATION  
COTTONWOOD STORMWATER AND WASTEWATER SYSTEM IMPROVEMENTS  
VARIOUS STREETS  
COTTONWOOD, IDAHO**

## **1.0 PROJECT DOCUMENTS**

ALLWEST was provided verbal guidance and an aerial photograph of the project area with requested exploration locations to assist in developing our scope of services.

## **2.0 PROJECT DESCRIPTION**

Detailed plans for the proposed improvements were not available at the time this report was prepared. We understand improvements to the stormwater system may include construction of retention/detention structures. The improvements are also likely to include relocation of existing storm drain and/or construction of new storm drain along Main Street. Additionally, the existing concrete culverts located on E Road and Airport Road near the intersection with E Road are being considered for replacement. Planned improvements to the wastewater system include construction of a large wastewater lagoon southeast of Cottonwood near Cottonwood Creek. Wastewater from the lagoon is planned for irrigation use.

## **3.0 EVALUATION PROCEDURES**

To complete this evaluation, we reviewed soil and geologic literature for the project site and surrounding area. We evaluated the subsurface conditions at the site by drilling four borings and excavating five test pits at locations requested by J-U-B Engineers. Information obtained from the field evaluation, laboratory testing, and geotechnical analyses was utilized to develop the recommendations presented in this report.

## **4.0 SITE CONDITIONS**

The project site is comprised of asphalt paved city streets. Existing concrete culverts, which are being considered for replacement, are located on E Road, approximately  $\frac{1}{2}$  of a mile east of the intersection with Highway 95, and Airport Road near the intersection of E Road. Existing wastewater lagoons are located at the southwest corner of the intersection of E Road and Airport Road and approximately  $\frac{1}{4}$  of a mile east of this intersection.

## 4.1 Subsurface Conditions

### 4.1.1 Published Geologic and Soil Information

Geologic conditions in the project areas are mapped on the “Geologic Map of the Cottonwood Quadrangle, Idaho County, Idaho”, Idaho Geological Survey, prepared by Kauffman, J.D., et al (2004), as Grande Ronde Basalt (Tgn<sub>1</sub>).

The USDA Natural Resources Conservation Service (NRCS) has mapped the soils along King Street as Meland silt loam, 7 to 25 percent slopes; Nez Perce silt loam, 2 to 7 percent slopes; and Westlake silt loam. Main Street E Road, and the easternmost wastewater lagoons are mapped as Westlake silt loam. The Meland and Nez Perce silt loam units are described as loess and/or colluvium derived from basalt. The Westlake silt loam unit is described as silty alluvium and/or loess.

### 4.1.2 Subsurface Exploration Program

We observed the drilling of four borings and excavation of five test pits at the site on July 1, 2021, and July 20, 2021, respectively. The borings were drilled with a CME truck-mounted drill rig equipped with hollow-stem augers. The test pits were excavated with a John Deere 310G rubber-tired backhoe with a 24-inch toothed excavation bucket. The approximate locations of the borings and test pits are shown on Figures A-2a and A-2b, Boring and Test Pit Location Maps in Appendix A. The subsurface conditions observed in the borings and test pits were visually described and classified in general accordance with ASTM D2488 and the subsurface profiles were logged.

Detailed descriptions of the soil observed within the borings and test pits are presented on individual boring and test pit logs in Appendix B of this report. The descriptive soil terms used on the boring and test pit logs, and in this report, can be referenced by the *Unified Soil Classification System (USCS)*. A summary of the USCS is included in Appendix B. The subsurface conditions may vary between exploration locations; such changes in subsurface conditions may not be apparent until construction.

In general, the subsurface profile observed in the borings consisted of asphalt pavement underlain by base course. The soils underlying the base course consisted of silty to clayey gravel, silt, and silty sand. Practical auger refusal was encountered on basalt in each of the borings, except boring B-4, at depths ranging from approximately 6½ to 10¼ feet. The subsurface soils observed in the test pits varied from topsoil, lean to fat clay, silty to clayey gravel, overlying basalt. Practical excavator refusal on basalt was encountered in each test pit, except test pit TP-3 (which was a log of the channel sidewall and not a test pit), at depths ranging from approximately 7 to 8½ feet.

## 4.2 Groundwater Conditions

Groundwater was observed in borings B-3 and B-4 at depths ranging from approximately 3½ to 5½ feet and in test pits TP-2, TP-4, and TP-5 at depths ranging from approximately 2½ to 7 feet. Surface water was observed in areas of the culverts at the time of excavation. Changes in precipitation, irrigation, construction, or other factors may impact depth to groundwater and the surface water flow on the property and therefore, conditions may be different during construction.



## 5.0 LABORATORY TESTING

We performed laboratory testing to supplement field classifications and to assess some of the soil engineering properties and parameters. The laboratory testing included moisture content (ASTM D2216), gradation (ASTM D6913), fines content (ASTM D1140), Atterberg limits (ASTM D4318), pH (ASTM D4972), resistivity (ASTM G187) tests. The laboratory test results are included in Appendix C of this report, and some results are also summarized on the test pit logs in Appendix B.

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on our stated understanding and assumptions of the proposed construction and our observation of surface and subsurface conditions. If the proposed construction changes or if unforeseen conditions are encountered, we request the opportunity to review the new information and, if necessary, update our recommendations. Additionally, we request the opportunity to review the plans and specifications to determine whether the recommendations presented in this report were properly incorporated.

### 6.1 Site Preparation

Clearing and Stripping: Once temporary erosion and sediment control (TESC) measures are installed, we expect site preparation to continue with clearing and grubbing brush and stripping of organic-rich topsoil. Based on our explorations, the stripping depth for topsoil removal (observed in test pits TP-4 and TP-5) is estimated to be approximately 1 to 2½ feet. Buried topsoil was observed in boring B-4 below the base course. This topsoil should be removed from below utilities. Clearing and stripping debris should be wasted off-site or used for topsoil within non-structural/landscape areas.

Fill should be removed its full-depth below the planned culverts if present and replaced with properly compacted structural fill.

Subgrade Preparation: ALLWEST defines the subgrade as the native soil exposed at the base of excavation prior to placement of fill or concrete. The subgrade requires an evaluation by the geotechnical engineer of record or staff under their supervision to confirm the site conditions are consistent with those observed during our geotechnical evaluation. The subgrade should be moisture conditioned to within two percentage points of the optimum moisture content for compaction. The subgrade should then be compacted to a firm and unyielding condition.

In the event the exposed subgrade becomes unstable, yielding, or unable to be compacted due to high moisture conditions or construction traffic, we recommend that the materials be removed to a sufficient depth to develop stable subgrade soils that can be compacted to the minimum recommended levels. The severity of construction problems will be dependent, in part, on the precautions that are taken by the contractor to protect the subgrade soils.

## 6.2 Excavation and Dewatering

Based on the conditions observed within our explorations, we anticipate excavation of the on-site soil can be achieved with typical excavation equipment. Excavations which extend into the basalt and/or basalt residuum may require heavy duty excavation equipment. Temporary excavation slope stability is a function of many factors, including:

- ◆ The presence and abundance of groundwater;
- ◆ The type and density of the various soil strata;
- ◆ The depth of cut;
- ◆ Surcharge loadings adjacent to the excavation; and
- ◆ The length of time the excavation remains open.

It is exceedingly difficult under the variable circumstances to pre-establish a safe and “maintenance-free” temporary cut slope angle. Therefore, it is the responsibility of the contractor to maintain safe temporary slope configurations since the contractor is continuously at the job site, able to observe the nature and condition of the cut slopes, and able to monitor the subsurface materials and groundwater conditions encountered. Unsupported vertical slopes or cuts deeper than 4 feet are not recommended if worker access is necessary. The cuts should be adequately sloped, shored, or supported to prevent injury to personnel from local sloughing and spalling. The excavation should conform to applicable federal, state, and local regulations. Regarding trench wall support, the site soil is considered Type C soil according to OSHA guidelines and therefore should not exceed a 1.5H:1V (horizontal to vertical) temporary slope.

We recommend that all permanent cut or fill slopes constructed in native soils be designed at a 2H:1V inclination or flatter. All permanent cut and fill slopes should be adequately protected from erosion both temporarily and permanently. Prior to construction ALLWEST should be provided a copy of the final grading plan to determine whether the proposed site grading will affect the recommendations provided in this report.

Dewatering will likely be required for the planned culvert replacement excavations, and along Main Street and E Road. The method of dewatering should be left to the discretion of the contractor.

## 6.3 Materials

The fill and native soils are generally unsuitable for use as structural fill. The topsoil is unsuitable for use as fill. The existing soils can be used as utility trench backfill. However, the presence of groundwater and fine-grained gradation of the majority of these soils will make them difficult to compact in trenches. Consideration should be given to backfilling utility trenches with imported fill.

Import materials should consist of granular soil, free of organics, debris, and other deleterious material and meet the following criteria. Import materials should be approved by the Geotechnical Engineer prior to delivery to the site.

| Fill Type                                            | Criteria                                                                                                                             |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Structural Fill                                      | Maximum size $\leq$ 3 inches;<br>Retained on $\frac{3}{4}$ -inch sieve $<30\%$<br>Passing No. 200 Sieve $\leq 10\%$ ;<br>Non-plastic |
| Utility Trench Backfill<br>(Above groundwater level) | Maximum size $\leq$ 2 inches;<br>Passing No. 200 Sieve $\leq 15\%$ ;<br>Non-plastic                                                  |
| Utility Trench Backfill<br>(Below groundwater level) | Maximum size $\leq$ 2 inches;<br>Passing No.4 Sieve $\leq 5\%$ ;<br>Non-plastic                                                      |
| Base Course                                          | Idaho Transportation Department (ITD)<br>$\frac{3}{4}$ -inch Type B Base Course Standard<br>Specification 703.04                     |

Table 1 – Imported fill recommendations

The native soils in the areas of the proposed new culverts are “corrosive” to “very corrosive” to metal based on the soil resistivity test results. Resistivity values ranging from 200 to 1,800 ohm-cm were measured. If metal culverts are used, they should be properly protected from corrosion. Consideration may also be given to backfilling culverts with less corrosive imported soil.

#### 6.4 Fill Placement and Compaction

Fill should be placed in lift thicknesses which are appropriate for the compaction equipment used. Typically, eight-inch loose lifts are appropriate for typical rubber tire and steel drum compaction equipment. Lift thicknesses should be reduced to four inches for hand operated compaction equipment. Fill should be moisture conditioned to within two percentage points of the optimum moisture content prior to placement to facilitate compaction. Structural fill and utility trench backfill should be compacted to a minimum of 95 percent of the maximum dry density determined by ASTM D1557 (modified Proctor).

#### 6.5 Wet Weather Construction

Due to the climatic effects in this region during late fall, winter, and spring (generally wet conditions), we recommend construction (especially site grading) take place during the summer and early fall season, if possible. If construction occurs during or immediately after excessive precipitation, it may be necessary to over-excavate and replace wet subgrade soil which might otherwise be suitable.

We recommend earthwork for this site be scheduled for the drier seasons of the year. If construction is undertaken in wet periods of the year, it will be important to slope the ground surface to provide drainage away from construction.



## 6.6 Cold Weather Construction

Foundations should be embedded adequately to protect against frost action as recommended in section 6.7 *Foundation Recommendations* of this report.

If site grading and construction are anticipated during cold weather, we recommend good winter construction practices be observed. Snow and ice should be removed from excavated and fill areas prior to additional earthwork or construction. Footings or structural portions of the construction should not be placed on frozen ground; nor should the supporting soils for buildings be permitted to freeze during or after construction. Frozen soils should not be used as backfill or fill.

## 6.7 Foundation Recommendations

The proposed culverts may be supported on conventional spread footings bearing entirely on basalt rock; entirely on undisturbed, dense natural gravel; or entirely on a minimum of one foot of properly compacted structural fill which extends to basalt rock or undisturbed, dense natural gravel. The following recommendations are provided for foundations based on the subsurface conditions observed and the stated assumptions:

- ◆ Shallow footings bearing entirely on basalt rock; entirely on undisturbed, dense natural gravel; or entirely on a minimum of one foot of properly compacted structural fill which extends to basalt rock or undisturbed, dense natural gravel, may be designed for the following ultimate bearing capacities depending on bearing material.

| Culvert Location | Anticipated Bearing Material     | Ultimate Bearing Capacity (psf) | Bearing Capacity Resistance Factor | Cast-in-Place Sliding Resistance Factor | Precast Sliding Resistance Factor |
|------------------|----------------------------------|---------------------------------|------------------------------------|-----------------------------------------|-----------------------------------|
| E Road           | Basalt                           | 21,000                          | 0.45                               | 0.80                                    | 0.90                              |
| Airport Road     | Clayey gravel or Structural Fill | 9,000                           | 0.45                               | 0.80                                    | 0.90                              |

*Table 2 – Bearing Capacity*

ALLWEST should be notified when culvert depths and loads are known so we may review our recommendations and revise if appropriate.

- ◆ Unless specified by project engineer or governing codes, continuous footings should be a minimum of 18 inches in width.
- ◆ Foundation bearing surfaces should be free of loose soil and debris.
- ◆ Footings should be embedded at least 24 inches below finished exterior ground surface to help protect against frost action. Foundations should also be embedded sufficient depth to protect from scour.

- ◆ We recommend backfill placed adjacent to foundations and culverts be placed uniformly on both sides of the foundations/culverts to reduce the potential for displacement.
- ◆ If the previous recommendations are implemented, it is our opinion the total settlement will be less than one inch and differential settlement will be less than ½-inch in 30 feet.
- ◆ The overburden pressure on the culverts may be calculated using a soil unit weight of 140 pcf.

### 6.8 Lateral Earth Pressures

We anticipate the new culverts will include wing walls at the inlets and outlets. Retaining walls should be designed to resist lateral earth pressures. Equivalent fluid pressures for native silt/clay and structural fill for calculation of lateral earth pressures are provided in the following table.

| Condition | Equivalent Fluid Pressure<br>Native Silt/Clay (pcf) | Equivalent Fluid Pressure<br>Structural Fill (pcf) |
|-----------|-----------------------------------------------------|----------------------------------------------------|
| At-rest   | 70                                                  | 50                                                 |
| Active    | 50                                                  | 30                                                 |
| Passive   | 200                                                 | 400                                                |

*Table 3 - Lateral earth pressures for native silt/clay and structural fill.*

The above values are for level backfill only and do not account for hydrostatic forces. Walls should be provided with adequate drainage so hydrostatic forces do not adversely affect the walls. We recommend placement of gravel behind walls and/or weep holes to assist with drainage and reduce the potential for the buildup of hydrostatic pressures. Walls that are braced in a manner that does not allow any rotational movement (rigid) (e.g., box culvert walls) should be designed using the given “at-rest” equivalent fluid pressure. The active and at-rest pressures should be increased by an equivalent fluid weight of 10 pounds per cubic foot (pcf) and the passive pressure should be reduced by 10 pcf for seismic design. The dynamic component of the active pressure acts at a height of approximately 0.6 times the height of the wall.

## 6.9 Seismicity

The soil at the culvert sites can be characterized as Site Class C for seismic design.

Seismic parameters that were calculated using USGS U.S. Seismic Design Maps are presented in the following table. The latitude and longitude for the site were used to specify the location of the subject property.

| Latitude<br>(degrees)       | Longitude<br>(degrees)        | Spectral Accelerations |                | Site Coefficients |                | PGA   |
|-----------------------------|-------------------------------|------------------------|----------------|-------------------|----------------|-------|
|                             |                               | S <sub>s</sub>         | S <sub>1</sub> | F <sub>a</sub>    | F <sub>v</sub> |       |
| 46.041597<br>(E Road)       | -116.335883<br>(E Road)       | 0.291g                 | 0.102g         | 1.3               | 1.5            | 0.13g |
| 46.041597<br>(Airport Road) | -116.327078<br>(Airport Road) |                        |                |                   |                |       |

Table 4 - Seismic design parameters.

## 6.10 Pavement

We anticipate paving for the project will consist of patching trenches and replacement of pavement over the planned new culverts. We recommend new pavement sections match the existing pavement sections. The 5-inch thick base course layer observed in one of the main Street borings is not acceptable. We recommend the minimum base course thickness in Main Street be 14 inches.

| Roadway     | Flexible Pavement |                      |
|-------------|-------------------|----------------------|
|             | Asphalt<br>(in.)  | Base Course<br>(in.) |
| King Street | 11 – 12           | 19 - 24              |
| Main Street | 10 – 13½          | 5 - 14               |

Table 5 – Observed Pavement Section Thicknesses.

We recommend specifying crushed aggregate base meeting the requirements of Idaho Transportation Department (ITD) Standard Specification 703.04 for ¾-inch Type B untreated base course. We recommend the asphalt concrete pavement meet the requirements of ITD Standard Specification Section 405 for hot mix asphalt concrete pavements. We recommend the crushed aggregate base be compacted to a minimum of 95 percent of the modified Proctor maximum dry density (ASTM D1557). We recommend the asphaltic concrete surface be compacted to minimum of 92 percent of the Rice density.

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the crushed aggregate base section.



The pavement sections provided in this report represent minimum recommended thicknesses. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g., crack, and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

## **7.0 ADDITIONAL RECOMMENDED SERVICES**

We recommend ALLWEST be retained to provide construction materials testing and observation to verify the soil and geologic conditions and the report recommendations are incorporated into the actual construction. The design engineer of record should determine applicable testing and special inspection requirements in accordance with the governing code documents. If we are not retained to provide required construction observation and materials testing services, we cannot be responsible for soil engineering related construction errors or omissions.

## **8.0 EVALUATION LIMITATIONS**

This report has been prepared to assist the planning and design for the Cottonwood Stormwater and Wastewater System Improvements project located on various streets in Cottonwood, Idaho. Reliance by any other party is prohibited without the written authorization of ALLWEST. Our services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in the local area at the time this report was prepared. This acknowledgement is in lieu of all warranties, express or implied.

The following appendices complete this report:

Appendix A – Vicinity Map, Boring and Test Pit Location Maps

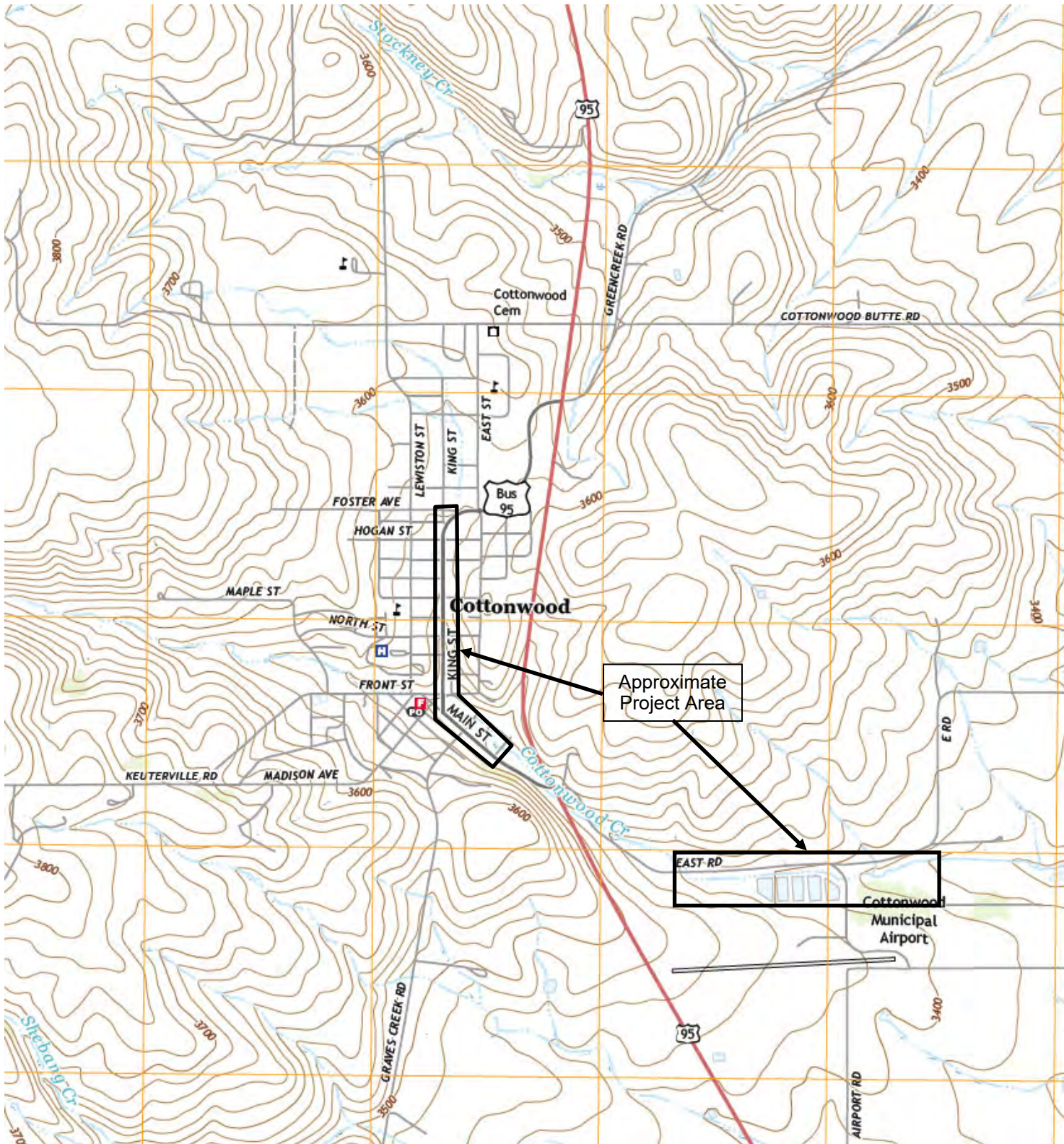
Appendix B – Boring Logs, Test Pit Logs, Unified Soil Classification System

Appendix C – Laboratory Test Results

**Appendix A**

**Vicinity Map**

**Boring and Test Pit Location Maps**



USGS 7.5 MINUTE SERIES TOPOGRAPHIC MAP  
COTTONWOOD, IDAHO, QUADRANGLE  
2020

DIAGRAM IS FOR GENERAL LOCATION ONLY

|                                                                                    |                                                                                                              |                                                          |              |                       |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------|-----------------------|
|  |                           | <b>FIGURE A-1 - VICINITY MAP</b>                         |              |                       |
|                                                                                    |                                                                                                              | Cottonwood Stormwater and Wastewater System Improvements |              |                       |
|                                                                                    |                                                                                                              | Various Streets                                          |              |                       |
|                                                                                    |                                                                                                              | Cottonwood, Idaho                                        |              |                       |
|                                                                                    | 2705 E. Main Street<br>Lewiston, Idaho<br><a href="http://www.allwesttesting.com">www.allwesttesting.com</a> |                                                          | Client Name: | J-U-B Engineers, Inc. |
|                                                                                    |                                                                                                              |                                                          | Project No.: | 320-167G              |
|                                                                                    |                                                                                                              |                                                          | Date:        | August 2021           |





GOOGLE EARTH, 2021  
(Image date July 30, 2016)

DIAGRAM IS FOR GENERAL LOCATION ONLY



2705 E. Main Street  
Lewiston, Idaho  
[www.allwesttesting.com](http://www.allwesttesting.com)

#### FIGURE A-2a - BORING AND TEST PIT LOCATION MAP

Cottonwood Stormwater and Wastewater System Improvements

Various Streets

Cottonwood, Idaho

Client Name: J-U-B Engineers, Inc.

Project No.: 320-167G

Date: August 2021

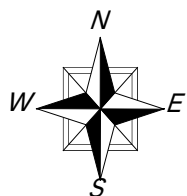




 Approximate test pit location

GOOGLE EARTH, 2021  
(Image date July 30, 2021)

DIAGRAM IS FOR GENERAL LOCATION ONLY



2705 E. Main Street  
Lewiston, Idaho  
[www.allwesttesting.com](http://www.allwesttesting.com)

#### FIGURE A-2b: TEST PIT LOCATION MAP

Cottonwood Stormwater and Wastewater System Improvements

Cottonwood, Idaho

Client Name: J-U-B Engineers, Inc.

Project No.: 320-167G

Date: August 2021

**Appendix B**

**Boring Logs**  
**Test Pit Logs**  
**Unified Soil Classification System**



|                                                                         |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
|-------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--|--------------|------------|
| ALLWEST<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>BORING LOG</b> |                                                                    |                         | DATE STARTED: 7/1/2021<br>DATE FINISHED: 7/1/2021<br>DRILLER: JA<br>COMPANY: Haztech Drilling<br>LOGGER: ST<br>WEATHER: Sunny |         | <b>BORING B-1</b><br>DRILL: CME-75<br>HAMMER: Automatic<br>DRILLING METHOD: 9" Hollow-stem<br>augers |                                                                               |  |              |            |
| PROJECT: 320-167G<br>Cottonwood Stormwater and Wastewater Improvements  |                                                                    |                         | NOTES: 85 feet north of Bash Street and 10 feet west of east C&G                                                              |         |                                                                                                      |                                                                               |  |              |            |
| DEPTH (ft)                                                              | TOTAL DEPTH: 10¼'                                                  | GRAPHIC LOG             | SAMPLE #                                                                                                                      | SAMPLER | FIELD BLOW COUNT (Corrected)                                                                         | ▼ WATER CONTENT (%)<br>PLASTIC LIMIT — LIQUID LIMIT<br>● BLOW COUNT (N-VALUE) |  |              | DEPTH (ft) |
|                                                                         | DESCRIPTION                                                        |                         |                                                                                                                               |         |                                                                                                      | 0204060                                                                       |  |              |            |
| 0                                                                       | ASPHALT pavement; 12" thick, good condition, black                 |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 0.0        |
| 1                                                                       | FILL; 3/4" BASE COURSE; well compacted, moist, brown               |                         | 1                                                                                                                             |         | 15-20-20 (40)                                                                                        |                                                                               |  |              | 1.8        |
| 2                                                                       |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 3                                                                       | Clayey GRAVEL (GC); dense, moist, angular, gray                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 3.6        |
| 4                                                                       |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 5                                                                       | Sandy SILT (ML); stiff, moist, medium plastic, gray mottled orange |                         | 2                                                                                                                             |         | 3-5-6 (11)                                                                                           |                                                                               |  |              | 5.4        |
| 6                                                                       |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 7.2        |
| 7                                                                       |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 8                                                                       | BASALT; hard to very hard, slightly fractured, moist, gray         |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 9.0        |
| 9                                                                       |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 10.8       |
| 10                                                                      | Practical auger refusal on basalt at 10¼ feet.                     |                         | 3                                                                                                                             |         | 50/4"                                                                                                |                                                                               |  |              | 12.6       |
| 11                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 14.4       |
| 12                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 16.2       |
| 13                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              | 18.0       |
| 14                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 15                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 16                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 17                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| 18                                                                      |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| WATER LEVELS                                                            |                                                                    | 2" OD Split Spoon (SPT) |                                                                                                                               | 050100  |                                                                                                      | RQD (%)                                                                       |  | RECOVERY (%) |            |
| ☒ WHILE DRILLING                                                        |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| ☒ AT COMPLETION                                                         |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |
| ☒ AFTER DRILLING                                                        |                                                                    |                         |                                                                                                                               |         |                                                                                                      |                                                                               |  |              |            |

|                                                                         |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
|-------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------|
| ALLWEST<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>BORING LOG</b> |                                                        |                         | DATE STARTED: 7/1/2021<br>DATE FINISHED: 7/1/2021<br>DRILLER: JA<br>COMPANY: Haztech Drilling<br>LOGGER: ST<br>WEATHER: Sunny |                | <b>BORING B-2</b><br>DRILL: CME-75<br>HAMMER: Automatic<br>DRILLING METHOD: 9" Hollow-stem<br>augers |                                                        |            |
| PROJECT: 320-167G<br>Cottonwood Stormwater and Wastewater Improvements  |                                                        |                         | NOTES: 105 feet south of North Street and 5 feet west of east C&G                                                             |                |                                                                                                      |                                                        |            |
| DEPTH (ft)                                                              | TOTAL DEPTH: 6½'                                       | GRAPHIC LOG             | SAMPLE #                                                                                                                      | SAMPLER        | FIELD BLOW COUNT (Corrected)                                                                         | ▼ WATER CONTENT (%)                                    | DEPTH (ft) |
|                                                                         | DESCRIPTION                                            |                         |                                                                                                                               |                |                                                                                                      | PLASTIC LIMIT — LIQUID LIMIT<br>● BLOW COUNT (N-VALUE) |            |
| 0                                                                       | ASPHALT pavement; 11" thick, good condition, black     |                         |                                                                                                                               |                |                                                                                                      |                                                        | 0.0        |
| 1                                                                       | FILL; 3/4" BASE COURSE; well compacted, moist, gray    |                         | 1                                                                                                                             |                | 10-20-11 (31)                                                                                        |                                                        | 1.8        |
| 2                                                                       |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 3                                                                       | Clayey GRAVEL (GC); medium dense, moist, gray to brown |                         |                                                                                                                               |                |                                                                                                      |                                                        | 3.6        |
| 4                                                                       |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 5                                                                       |                                                        |                         | 2                                                                                                                             |                | 6-11-11 (22)                                                                                         |                                                        | 5.4        |
| 6                                                                       |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 7                                                                       | Practical auger refusal on basalt at 6½ feet.          |                         |                                                                                                                               |                |                                                                                                      |                                                        | 7.2        |
| 8                                                                       |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 9                                                                       |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 9.0        |
| 10                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 11                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 10.8       |
| 12                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 12.6       |
| 13                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 14                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 14.4       |
| 15                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 16                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 16.2       |
| 17                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |
| 18                                                                      |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        | 18.0       |
| WATER LEVELS                                                            |                                                        | 2" OD Split Spoon (SPT) |                                                                                                                               | 0 50 100       |                                                                                                      |                                                        |            |
| ☒ WHILE DRILLING                                                        |                                                        |                         |                                                                                                                               | ☒ RQD (%)      |                                                                                                      |                                                        |            |
| ▼ AT COMPLETION                                                         |                                                        |                         |                                                                                                                               | ☒ RECOVERY (%) |                                                                                                      |                                                        |            |
| ▼ AFTER DRILLING                                                        |                                                        |                         |                                                                                                                               |                |                                                                                                      |                                                        |            |

|                                                                         |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------|------------------------|------------|
| ALLWEST<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>BORING LOG</b> |                                                                                   |                         | DATE STARTED: 7/1/2021<br>DATE FINISHED: 7/1/2021<br>DRILLER: JA<br>COMPANY: Haztech Drilling<br>LOGGER: ST<br>WEATHER: Sunny |              | <b>BORING B-3</b><br>DRILL: CME-75<br>HAMMER: Automatic<br>DRILLING METHOD: 9" Hollow-stem<br>augers |                        |            |
| PROJECT: 320-167G<br>Cottonwood Stormwater and Wastewater Improvements  |                                                                                   |                         | NOTES: 50 feet north of King Street and 5 feet west of east C&G                                                               |              |                                                                                                      |                        |            |
| DEPTH (ft)                                                              | TOTAL DEPTH: 8¼'                                                                  | GRAPHIC LOG             | SAMPLE #                                                                                                                      | SAMPLER      | FIELD BLOW COUNT (Corrected)                                                                         | ▼ WATER CONTENT (%)    | DEPTH (ft) |
|                                                                         | PLASTIC LIMIT    LIQUID LIMIT                                                     |                         |                                                                                                                               |              |                                                                                                      |                        |            |
|                                                                         | DESCRIPTION                                                                       |                         |                                                                                                                               |              |                                                                                                      | ● BLOW COUNT (N-VALUE) |            |
| 0                                                                       | ASPHALT PAVEMENT; 10" thick, good condition, black                                |                         |                                                                                                                               |              |                                                                                                      |                        | 0.0        |
| 1                                                                       | FILL; 3/4" BASE COURSE; well compacted, moist, brown                              |                         | 1                                                                                                                             |              | 12-10-6 (16)                                                                                         |                        | 1.8        |
| 2                                                                       | Silty GRAVEL (GM); dense, moist to wet, angular, gray                             |                         |                                                                                                                               |              |                                                                                                      |                        | 3.6        |
| 3                                                                       |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        | 5.4        |
| 4                                                                       |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        | 7.2        |
| 5                                                                       |                                                                                   |                         | 2                                                                                                                             |              | 10-26-21 (47)                                                                                        |                        | 9.0        |
| 6                                                                       |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        | 10.8       |
| 7                                                                       | BASALT; hard to very hard, wet, gray                                              |                         |                                                                                                                               |              |                                                                                                      |                        | 12.6       |
| 8                                                                       | Practical auger refusal on basalt at 8¼ feet.<br>Groundwater observed at 3½ feet. |                         | 3                                                                                                                             |              | 50/3"                                                                                                |                        | 14.4       |
| 9                                                                       |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        | 16.2       |
| 10                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        | 18.0       |
| 11                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 12                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 13                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 14                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 15                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 16                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 17                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| 18                                                                      |                                                                                   |                         |                                                                                                                               |              |                                                                                                      |                        |            |
| WATER LEVELS                                                            |                                                                                   | 2" OD Split Spoon (SPT) |                                                                                                                               | 0 50 100     |                                                                                                      |                        |            |
| 3½'                                                                     | ⚡ WHILE DRILLING                                                                  |                         |                                                                                                                               | RQD (%)      |                                                                                                      |                        |            |
|                                                                         | ⚡ AT COMPLETION                                                                   |                         |                                                                                                                               | RECOVERY (%) |                                                                                                      |                        |            |
|                                                                         | ⚡ AFTER DRILLING                                                                  |                         |                                                                                                                               |              |                                                                                                      |                        |            |



|                                                                         |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------|--|------------|
| ALLWEST<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>BORING LOG</b> |                                                                                  |                         |          | DATE STARTED: 7/1/2021<br>DATE FINISHED: 7/1/2021<br>DRILLER: JA<br>COMPANY: Haztech Drilling<br>LOGGER: ST<br>WEATHER: Sunny |                                       | <b>BORING B-4</b><br>DRILL: CME-75<br>HAMMER: Automatic<br>DRILLING METHOD: 9" Hollow-stem<br>augers |  |            |
| PROJECT: 320-167G<br>Cottonwood Stormwater and Wastewater Improvements  |                                                                                  |                         |          | NOTES: 100 feet northwest of Goldstone Street and 5 feet west of east C&G                                                     |                                       |                                                                                                      |  |            |
| DEPTH (ft)                                                              | TOTAL DEPTH: 16½'                                                                | GRAPHIC LOG             | SAMPLE # | SAMPLER                                                                                                                       | FIELD<br>BLOW<br>COUNT<br>(Corrected) | ▼ WATER CONTENT (%)<br>PLASTIC LIMIT — LIQUID LIMIT<br>● BLOW COUNT (N-VALUE)                        |  | DEPTH (ft) |
|                                                                         | DESCRIPTION                                                                      |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 0                                                                       | ASPHALT pavement; 13½" thick, good condition, black                              |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 0.0        |
| 1                                                                       | FILL; ¾" BASE COURSE; well compacted, moist, brown                               |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 2                                                                       | Topsoil; lean CLAY (CL); stiff, moist, medium plastic, roots and organics, black |                         | 1        |                                                                                                                               | 14-9-3<br>(12)                        |                                                                                                      |  | 1.8        |
| 3                                                                       |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 3.6        |
| 4                                                                       | Silty SAND (SM); medium dense, moist to wet, brown                               |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 5                                                                       |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 5.4        |
| 6                                                                       |                                                                                  |                         | 2        |                                                                                                                               | 2-9-12<br>(21)                        |                                                                                                      |  | 7.2        |
| 7                                                                       | SILT (ML); stiff to very stiff, wet, low plastic, brown to black to gray         |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 9.0        |
| 8                                                                       |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 9                                                                       |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 10.8       |
| 10                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 12.6       |
| 11                                                                      |                                                                                  |                         | 3        |                                                                                                                               | 2-5-9<br>(14)                         |                                                                                                      |  | 14.4       |
| 12                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 13                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  | 16.2       |
| 14                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 15                                                                      |                                                                                  |                         | 4        |                                                                                                                               | 2-4-19<br>(23)                        |                                                                                                      |  | 18.0       |
| 16                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 17                                                                      | Boring terminated at 16½ feet.<br>Groundwater observed at 5½ feet.               |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| 18                                                                      |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |
| WATER LEVELS                                                            |                                                                                  | 2" OD Split Spoon (SPT) |          | 0 50 100                                                                                                                      |                                       | RQD (%)<br>RECOVERY (%)                                                                              |  |            |
| 5½' ▽ WHILE DRILLING<br>▽ AT COMPLETION<br>▼ AFTER DRILLING             |                                                                                  |                         |          |                                                                                                                               |                                       |                                                                                                      |  |            |

|                                                                                                       |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------|--|
| <div>ALLWEST</div> <div>LEWISTON, IDAHO</div> <div>GEOTECHNICAL SECTION</div> <div>TEST PIT LOG</div> |                                                                                                                                                             |                                                                                                        | <div>DATE STARTED: 7/20/2021</div> <div>DATE FINISHED: 7/20/2021</div> <div>OPERATOR: -</div> <div>COMPANY: City of Cottonwood</div> <div>LOGGER: ST</div> <div>WEATHER: Sunny</div> |                | <div>TP - 1</div> <div>EXCAVATOR: John Deere 310SG</div> <div>EXCAVATION METHOD: 2-ft wide bucket</div> |  |
| <div>PROJECT: 320-167G</div> <div>Cottonwood Stormwater and Wastewater Improvements</div>             |                                                                                                                                                             |                                                                                                        | <div>NOTES: 5 feet south of Butler Street and 65 feet west of King Street</div>                                                                                                      |                |                                                                                                         |  |
| DEPTH (ft)                                                                                            | USCS                                                                                                                                                        | TOTAL DEPTH: 7'                                                                                        | GRAPHIC LOG                                                                                                                                                                          | SAMPLE         | NOTES                                                                                                   |  |
|                                                                                                       |                                                                                                                                                             | DESCRIPTION                                                                                            |                                                                                                                                                                                      |                |                                                                                                         |  |
| 0                                                                                                     | FILL                                                                                                                                                        | FILL; silty GRAVEL with cobbles (GC); moderately compacted, moist, coarse-grained, angular, dark brown |                                                                                                     |                |                                                                                                         |  |
| 1                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 2                                                                                                     | CH                                                                                                                                                          | Fat CLAY (CH); very stiff, moist, high plastic, gray-brown                                             |                                                                                                     | Bulk           |                                                                                                         |  |
| 3                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 4                                                                                                     | GM                                                                                                                                                          | Silty GRAVEL with cobbles (GM) (basalt residuum); dense, moist, coarse-grained, angular, yellow-brown  |                                                                                                    | Bulk<br>(4-7') |                                                                                                         |  |
| 5                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 6                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 7                                                                                                     |                                                                                                                                                             | Practical excavator refusal on basalt at 7 feet.                                                       |                                                                                                                                                                                      |                |                                                                                                         |  |
| 8                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 9                                                                                                     |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 10                                                                                                    |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 11                                                                                                    |                                                                                                                                                             |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
| 12                                                                                                    | WATER LEVELS                                                                                                                                                |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |
|                                                                                                       | <div><input type="checkbox"/> WHILE EXCAVATING</div> <div><input type="checkbox"/> AT COMPLETION</div> <div><input type="checkbox"/> AFTER EXCAVATING</div> |                                                                                                        |                                                                                                                                                                                      |                |                                                                                                         |  |

|                                                                                                        |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
|--------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------|--|
| <div>ALLWEST</div> <div>LEWISTONN, IDAHO</div> <div>GEOTECHNICAL SECTION</div> <div>TEST PIT LOG</div> |                    |                                                                                                   | <div>DATE STARTED: 7/20/2021</div> <div>DATE FINISHED: 7/20/2021</div> <div>OPERATOR: -</div> <div>COMPANY: City of Cottonwood</div> <div>LOGGER: ST</div> <div>WEATHER: Sunny</div> |        | <div>TP - 2</div> <div>EXCAVATOR: John Deere 310SG</div> <div>EXCAVATION METHOD: 2-ft wide bucket</div> |  |
| <div>PROJECT: 320-167G</div> <div>Cottonwood Stormwater and Wastewater Improvements</div>              |                    |                                                                                                   | <div>NOTES: 40 feet north of culvert and north end of road</div>                                                                                                                     |        |                                                                                                         |  |
| DEPTH (ft)                                                                                             | USCS               | TOTAL DEPTH: 8½'                                                                                  | GRAPHIC LOG                                                                                                                                                                          | SAMPLE | NOTES                                                                                                   |  |
|                                                                                                        |                    | DESCRIPTION                                                                                       |                                                                                                                                                                                      |        |                                                                                                         |  |
| 0                                                                                                      | CL                 | Sandy lean CLAY (CL); some gravel; stiff, moist, medium plastic, organics, dark brown             |                                                                                                    |        |                                                                                                         |  |
| 1                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 2                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 3                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 4                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 5                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 6                                                                                                      | GM                 | Silty GRAVEL with cobbles (GM) (basalt residuum); dense, wet, coarse-grained, angular, dark brown |                                                                                                   |        |                                                                                                         |  |
| 7                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 8                                                                                                      |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 9                                                                                                      |                    | Practical excavator refusal on basalt at 8½ feet.<br>Groundwater observed at 6½ feet.             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 10                                                                                                     |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 11                                                                                                     |                    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 12                                                                                                     | WATER LEVELS       |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
| 6½'                                                                                                    | ▽ WHILE EXCAVATING |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
|                                                                                                        | ▼ AT COMPLETION    |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |
|                                                                                                        | ▼ AFTER EXCAVATING |                                                                                                   |                                                                                                                                                                                      |        |                                                                                                         |  |



|                                                                                                        |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>ALLWEST</div> <div>LEWISTONN, IDAHO</div> <div>GEOTECHNICAL SECTION</div> <div>TEST PIT LOG</div> |                    |                                                                                                                | <div>DATE STARTED: 7/20/2021</div> <div>DATE FINISHED: 7/20/2021</div> <div>OPERATOR: -</div> <div>COMPANY: City of Cottonwood</div> <div>LOGGER: ST</div> <div>WEATHER: Sunny</div> |                                                                                    | <div>TP - 3</div> <div>EXCAVATOR: John Deere 310SG</div> <div>EXCAVATION METHOD: 2-ft wide bucket</div> |                                                                                                                                                           |
| <div>PROJECT: 320-167G</div> <div>Cottonwood Stormwater and Wastewater Improvements</div>              |                    |                                                                                                                | <div>NOTES: South side of E Road culvert</div>                                                                                                                                       |                                                                                    |                                                                                                         |                                                                                                                                                           |
| DEPTH (ft)                                                                                             | USCS               | TOTAL DEPTH: 8½'                                                                                               |                                                                                                                                                                                      | GRAPHIC LOG                                                                        | SAMPLE                                                                                                  | NOTES                                                                                                                                                     |
|                                                                                                        |                    | DESCRIPTION                                                                                                    |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 0                                                                                                      | FILL               | FILL; silty GRAVEL with cobbles (GM); moderately compacted, moist, fine to coarse-grained, angular, dark brown |                                                                                                                                                                                      |   |                                                                                                         | Test pit 3 is a log of exposed sidewall of channel adjacent west side of culvert on south side of roadway. This area was not accessible to the excavator. |
| 1                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 2                                                                                                      | TOPSOIL            | Topsoil; SILT with sand (ML); stiff, moist, low plastic, roots and organics, dark brown                        |                                                                                                                                                                                      |   |                                                                                                         |                                                                                                                                                           |
| 3                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 4                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 5                                                                                                      | BASALT             | BASALT; hard to very hard, fractured, gray                                                                     |                                                                                                                                                                                      |  |                                                                                                         |                                                                                                                                                           |
| 6                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 7                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 8                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 9                                                                                                      |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 10                                                                                                     |                    | Bottom of channel at 8½ feet.                                                                                  |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 11                                                                                                     |                    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
| 12                                                                                                     | WATER LEVELS       |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
|                                                                                                        | ☒ WHILE EXCAVATING |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
|                                                                                                        | ☒ AT COMPLETION    |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |
|                                                                                                        | ☒ AFTER EXCAVATING |                                                                                                                |                                                                                                                                                                                      |                                                                                    |                                                                                                         |                                                                                                                                                           |

|                                                                                                       |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------|--|
| <div>ALLWEST</div> <div>LEWISTON, IDAHO</div> <div>GEOTECHNICAL SECTION</div> <div>TEST PIT LOG</div> |                                                                                        |                                                                                                             | <div>DATE STARTED: 7/20/2021</div> <div>DATE FINISHED: 7/20/2021</div> <div>OPERATOR: -</div> <div>COMPANY: City of Cottonwood</div> <div>LOGGER: ST</div> <div>WEATHER: Sunny</div> |        | <div>TP - 4</div> <div>EXCAVATOR: John Deere 310SG</div> <div>EXCAVATION METHOD: 2-ft wide bucket</div> |  |
| <div>PROJECT: 320-167G</div> <div>Cottonwood Stormwater and Wastewater Improvements</div>             |                                                                                        |                                                                                                             | <div>NOTES: 20 feet north of culvert and 30 feet east of Airport Road</div>                                                                                                          |        |                                                                                                         |  |
| DEPTH (ft)                                                                                            | USCS                                                                                   | TOTAL DEPTH: 10'                                                                                            | GRAPHIC LOG                                                                                                                                                                          | SAMPLE | NOTES                                                                                                   |  |
|                                                                                                       |                                                                                        | DESCRIPTION                                                                                                 |                                                                                                                                                                                      |        |                                                                                                         |  |
| 0                                                                                                     | TOPSOIL                                                                                | Topsoil; fat CLAY (CH); very stiff, slightly moist, high plastic, roots and organics, dark brown            |                                                                                                     |        |                                                                                                         |  |
| 1                                                                                                     | FILL                                                                                   | FILL; fat CLAY with GRAVEL (CH); some cobbles; moderately compacted, moist, high plastic, brown             |                                                                                                     |        |                                                                                                         |  |
| 2                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 3                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 4                                                                                                     | CH                                                                                     | Fat CLAY (CH); very stiff, moist, moist, high plastic, dark brown to gray-brown                             |                                                                                                    |        |                                                                                                         |  |
| 5                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 6                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 7                                                                                                     | GC                                                                                     | Clayey GRAVEL with cobbles (GC) (basalt residuum); dense to very dense, wet, coarse-grained, angular, black |                                                                                                   |        |                                                                                                         |  |
| 8                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 9                                                                                                     |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 10                                                                                                    |                                                                                        |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 11                                                                                                    |                                                                                        | Practical excavator refusal on basalt/basalt residuum at 10 feet. Groundwater observed at 7 feet.           |                                                                                                                                                                                      |        |                                                                                                         |  |
| 12                                                                                                    | WATER LEVELS                                                                           |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |
| 7'                                                                                                    | <div>▽ WHILE EXCAVATING</div> <div>▽ AT COMPLETION</div> <div>▽ AFTER EXCAVATING</div> |                                                                                                             |                                                                                                                                                                                      |        |                                                                                                         |  |

|                                                                                                       |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
|-------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------|--|
| <div>ALLWEST</div> <div>LEWISTON, IDAHO</div> <div>GEOTECHNICAL SECTION</div> <div>TEST PIT LOG</div> |                    |                                                                                                                                                                     | <div>DATE STARTED: 7/20/2021</div> <div>DATE FINISHED: 7/20/2021</div> <div>OPERATOR: -</div> <div>COMPANY: City of Cottonwood</div> <div>LOGGER: ST</div> <div>WEATHER: Sunny</div> |        | <div>TP - 5</div> <div>EXCAVATOR: John Deere 310SG</div> <div>EXCAVATION METHOD: 2-ft wide bucket</div> |  |
| <div>PROJECT: 320-167G</div> <div>Cottonwood Stormwater and Wastewater Improvements</div>             |                    |                                                                                                                                                                     | <div>NOTES: 50 feet north and 10 feet west of northwest corner of building</div>                                                                                                     |        |                                                                                                         |  |
| DEPTH (ft)                                                                                            | USCS               | TOTAL DEPTH: 7'                                                                                                                                                     | GRAPHIC LOG                                                                                                                                                                          | SAMPLE | NOTES                                                                                                   |  |
|                                                                                                       |                    | DESCRIPTION                                                                                                                                                         |                                                                                                                                                                                      |        |                                                                                                         |  |
| 0                                                                                                     | TOPSOIL            | Topsoil; lean CLAY with sand (CL); medium stiff, moist to very moist, medium plastic, roots and organics, black                                                     |                                                                                                    |        |                                                                                                         |  |
| 1                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 2                                                                                                     | GC                 | Clayey GRAVEL with cobbles (GC) (basalt residuum); occasional boulders (up to 3 feet longest dimension), medium dense to dense, wet, coarse-grained, angular, black |                                                                                                    |        |                                                                                                         |  |
| 3                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 4                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 5                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 6                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 7                                                                                                     |                    | Practical excavator refusal on basalt at 7 feet.<br>Groundwater observed at 2½ feet.                                                                                |                                                                                                                                                                                      |        |                                                                                                         |  |
| 8                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 9                                                                                                     |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 10                                                                                                    |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 11                                                                                                    |                    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 12                                                                                                    | WATER LEVELS       |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
| 2½'                                                                                                   | ▽ WHILE EXCAVATING |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
|                                                                                                       | ▼ AT COMPLETION    |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |
|                                                                                                       | ▼ AFTER EXCAVATING |                                                                                                                                                                     |                                                                                                                                                                                      |        |                                                                                                         |  |



# Unified Soil Classification System

| MAJOR DIVISIONS      |                                                         |                    | SYMBOL               | TYPICAL NAMES                                                    |
|----------------------|---------------------------------------------------------|--------------------|----------------------|------------------------------------------------------------------|
| COARSE GRAINED SOILS | GRAVELS                                                 | CLEAN GRAVELS      | GW                   | Well-Graded Gravel, Gravel-Sand Mixtures.                        |
|                      |                                                         |                    | GP                   | Poorly-Graded Gravel, Gravel-Sand Mixtures.                      |
|                      |                                                         | GRAVELS WITH FINES | GM                   | Silty Gravel, Gravel-Sand-Silt Mixtures.                         |
|                      |                                                         |                    | GC                   | Clayey Gravel, Gravel-Sand-Clay Mixtures.                        |
|                      | SANDS                                                   | CLEAN SANDS        | SW                   | Well-Graded Sand, Gravelly Sand.                                 |
|                      |                                                         |                    | SP                   | Poorly-Graded Sand, Gravelly Sand.                               |
|                      |                                                         | SANDS WITH FINES   | SM                   | Silty Sand, Sand-Silt Mixtures.                                  |
|                      |                                                         |                    | SC                   | Clayey Sand, Sand-Clay Mixtures.                                 |
| FINE GRAINED SOILS   | SILTS AND CLAYS<br><br>LIQUID LIMIT<br>LESS THAN 50%    |                    | ML                   | Inorganic Silt, Silty or Clayey Fine Sand.                       |
|                      |                                                         |                    | CL                   | Inorganic Clay of Low to Medium Plasticity, Sandy or Silty Clay. |
|                      |                                                         |                    | OL                   | Organic Silt and Clay of Low Plasticity.                         |
|                      | SILTS AND CLAYS<br><br>LIQUID LIMIT<br>GREATER THAN 50% |                    | MH                   | Inorganic Silt, Elastic Silt, Micaceous Silt, Fine Sand or Silt. |
|                      |                                                         |                    | CH                   | Inorganic Clay of High Plasticity, Fat Clay.                     |
|                      |                                                         |                    | OH                   | Organic Clay of Medium to High Plasticity.                       |
|                      |                                                         |                    | Highly Organic Soils |                                                                  |

## **Appendix C**

### **Laboratory Test Results**

**Table C-1: Summary of Laboratory Test Results**

| Boring /<br>Test<br>Pit<br>No. | Depth<br>(feet) | Water<br>Content<br>(%) | Gradation      |               |             |                    | Atterberg Limits       |                            | pH  | Resistivity<br>(ohm-cm) | Sample Classification          |
|--------------------------------|-----------------|-------------------------|----------------|---------------|-------------|--------------------|------------------------|----------------------------|-----|-------------------------|--------------------------------|
|                                |                 |                         | Cobbles<br>(%) | Gravel<br>(%) | Sand<br>(%) | Silt / Clay<br>(%) | Liquid<br>Limit<br>(%) | Plasticity<br>Index<br>(%) |     |                         |                                |
| B-1                            | 1               | 4                       |                |               |             | 13                 |                        |                            |     |                         | FILL; ¾" base course           |
| B-1                            | 5               | 17                      |                |               |             | 52                 | 45                     | 16                         |     |                         | Sandy silt (ML)                |
| B-2                            | 1               | 6                       |                |               |             | 14                 |                        |                            |     |                         | FILL; ¾" base course           |
| B-2                            | 5               | 36                      |                |               |             | 42                 |                        |                            |     |                         | Clayey gravel (GC)             |
| B-3                            | 1               | 4                       |                |               |             | 10                 |                        |                            |     |                         | FILL; ¾" base course           |
| B-3                            | 5               | 10                      |                |               |             | 13                 |                        |                            |     |                         | Silty gravel (GM)              |
| B-4                            | 1               | 28                      |                |               |             | 58                 |                        |                            |     |                         | Topsoil; lean clay (CL)        |
| B-4                            | 5               | 13                      |                |               |             | 15                 |                        |                            |     |                         | Silty sand (SM)                |
| TP-1                           | 3               |                         |                |               |             | 89                 | 51                     | 26                         |     |                         | Fat clay (CH)                  |
| TP-1                           | 4 - 7           |                         | 7              | 70            | 10          | 13                 |                        |                            |     |                         | Silty gravel with cobbles (GM) |
| TP-3                           | 2               |                         |                |               |             |                    |                        |                            | 5.5 | 200                     | Silt (ML)                      |
| TP-4                           | 5               |                         |                |               |             |                    |                        |                            | 6.4 | 1,800                   | Fat clay (CH)                  |

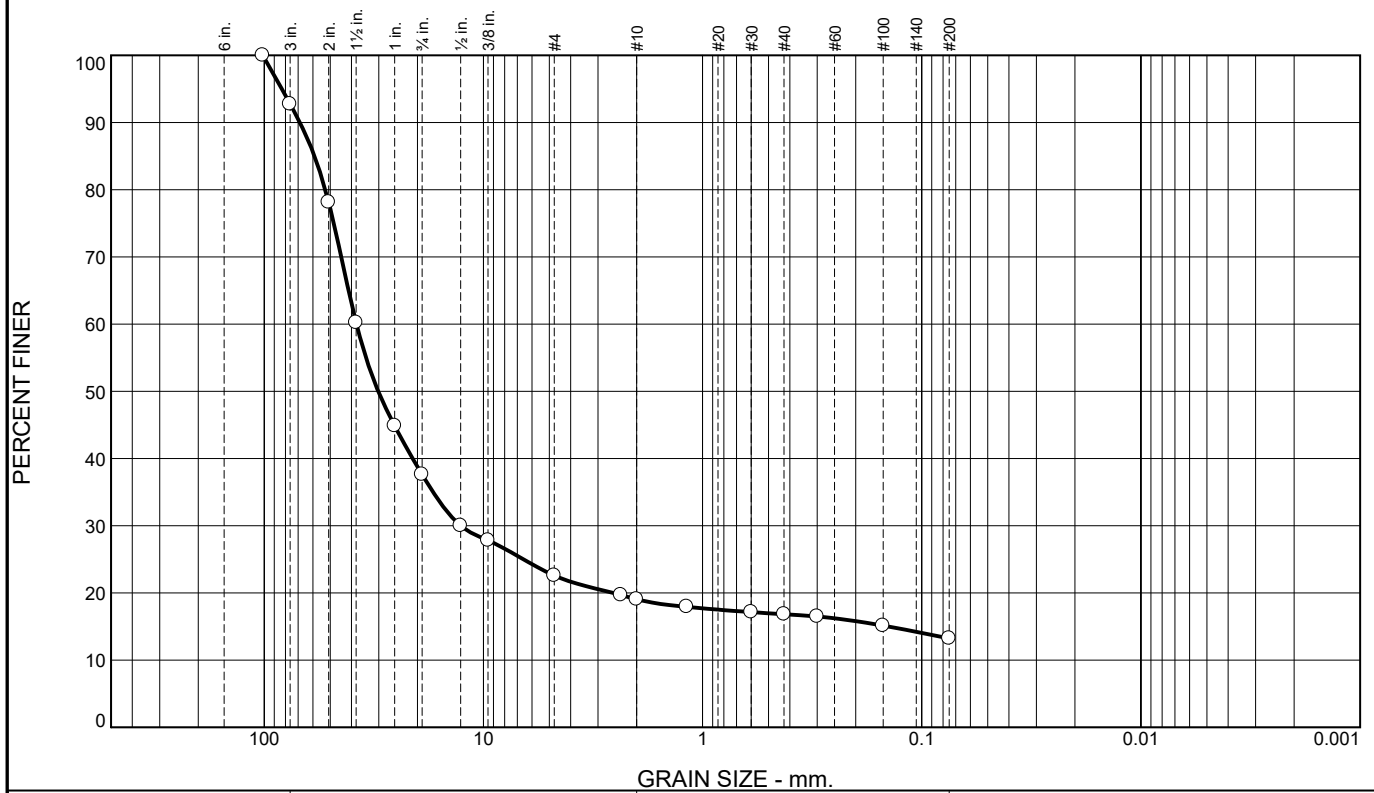
NP = non-plastic



Summary of Laboratory Test Results  
 Cottonwood Stormwater and Wastewater System Improvements  
 Cottonwood, Idaho

ALLWEST Project No.: 320-167G

## Particle Size Distribution Report



| % +3" | % Gravel | % Sand |      | % Fines |      |
|-------|----------|--------|------|---------|------|
|       |          | Coarse | Fine | Silt    | Clay |
| 7     | 74       | 2      | 4    | 13      |      |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|------------|---------------|----------------|--------------|
| 4"         | 100           |                |              |
| 3"         | 93            |                |              |
| 2"         | 78            |                |              |
| 1 1/2"     | 60            |                |              |
| 1"         | 45            |                |              |
| 3/4"       | 38            |                |              |
| 1/2"       | 30            |                |              |
| 3/8"       | 28            |                |              |
| #4         | 23            |                |              |
| #8         | 20            |                |              |
| #10        | 19            |                |              |
| #16        | 18            |                |              |
| #30        | 17            |                |              |
| #40        | 17            |                |              |
| #50        | 16            |                |              |
| #100       | 15            |                |              |
| #200       | 13            |                |              |

\* (no specification provided)

Location: TP-1 @ 4-7'  
Sample Number: S321-0389

Date: 7/20/21



Client: J-U-B Engineers, Inc  
Project: Cottonwood Stormwater & Wastewater Improvements

Project No: 320-167G

Figure C-1

### Material Description

Silty gravel with cobbles

### Atterberg Limits

PL= NT

LL= NT

PI= NT

### Coefficients

D<sub>90</sub>= 68.7632D<sub>85</sub>= 58.9793D<sub>60</sub>= 37.9570D<sub>50</sub>= 30.1898D<sub>30</sub>= 12.7215D<sub>15</sub>= 0.1425D<sub>10</sub>=C<sub>u</sub>=C<sub>c</sub>=

### Classification

USCS= GM

AASHTO= A-1-a

### Remarks

Sampled by: Shawn Turpin

Tested By: B. Eikum

Checked By: S. Turpin



September 21, 2021

Ms. Amy Uptmor, P.E.  
J-U-B Engineers, Inc.  
201 S. Jackson Street  
Moscow, Idaho 83843

**RE: Environmental Services  
Proposed Cottonwood Stormwater and Wastewater System Improvements  
Cottonwood, Idaho  
ALLWEST Project No. 320-167E**

Ms. Uptmor:

**ALLWEST** has completed environmental sampling and testing for the above referenced project. Our observations, sampling, and laboratory test results are summarized in this report.

#### **SCOPE OF SERVICES**

Our scope of services included the following:

1. Hand augered and obtained samples of the soils in the area south of Nuxoll Road and east of Airport Road in three locations selected by J-U-B Engineers. Three soil samples were collected from each hand auger excavation. The sampling intervals were from approximately 0-12 inches, 12-24 inches, and 24-36 inches, as requested. If rock was encountered within these depths, the hand auger excavation was terminated.
2. The samples were placed in laboratory supplied sample containers and immediately placed on ice. The samples were shipped overnight to Pace Analytical in Mount Juliet, Tennessee with chain-of-custody documentation for testing.
3. The samples were tested for ammonia, nitrate, pH, phosphorous, conductivity, and total solids, as requested.
4. Preparation of this report.

### **SUBSURFACE PROFILE**

The subsurface soil profile observed in the hand auger excavations generally consisted of approximately 1 to 1½ feet overlying silt and/or fat clay to the maximum depth explored, approximately 3 feet. Practical hand auger refusal was encountered on hard clay at a depth of approximately 2½ feet in hand auger excavation HA-2. Detailed descriptions of the soils observed are presented on the attached hand auger excavation logs.

### **SAMPLING AND LABORATORY TESTING**

Three composite soil samples were obtained from each hand auger excavation at the approximate depth intervals of 0 to 1 foot, 1 to 2 feet, and 2 to 3 feet. The soil samples were collected in laboratory supplied containers and placed in a cooler with ice. The samples were shipped overnight with chain-of-custody documentation to Pace Analytical in Mount Juliet, Tennessee. The approximate sample locations are shown on Figure 2, attached.

A summary of the laboratory analytical test results are provided on Table 1, attached. The laboratory analytical report and chain-of-custody documentation are attached after Table 1.

### **INVESTIGATION SUMMARY**

A summary of our findings follows:

- Ammonia nitrogen was not detected in any of the samples.
- The results for nitrate testing indicate concentration ranging from not detected to 24.6 milligrams per kilogram (mg/kg).
- Total phosphorous test results indicate concentrations ranging from 110 to 368 mg/kg.
- pH test results range from 4.94 to 8.48. The soils are generally more acidic near the surface (cultivated soil) and become basic with depth.
- Specific conductance test results range from 56.9 to 530 (µmhos/cm).

### **LIMITATIONS**

The findings provided in this report are based on a limited number of samples at the approximate locations and depths indicated. Our services consist of professional opinions and conclusions made in accordance with generally accepted environmental evaluation principles and practices. This acknowledgement is in lieu of all warranties, express or implied.

If you have questions or require additional information, please do not hesitate to contact our office at (208) 743-5710.

**Sincerely,**

Prepared by:

A blue ink signature of Shawn Turpin, consisting of stylized initials 'ST' followed by a surname.

**Shawn Turpin, P.E.**  
Environmental Professional

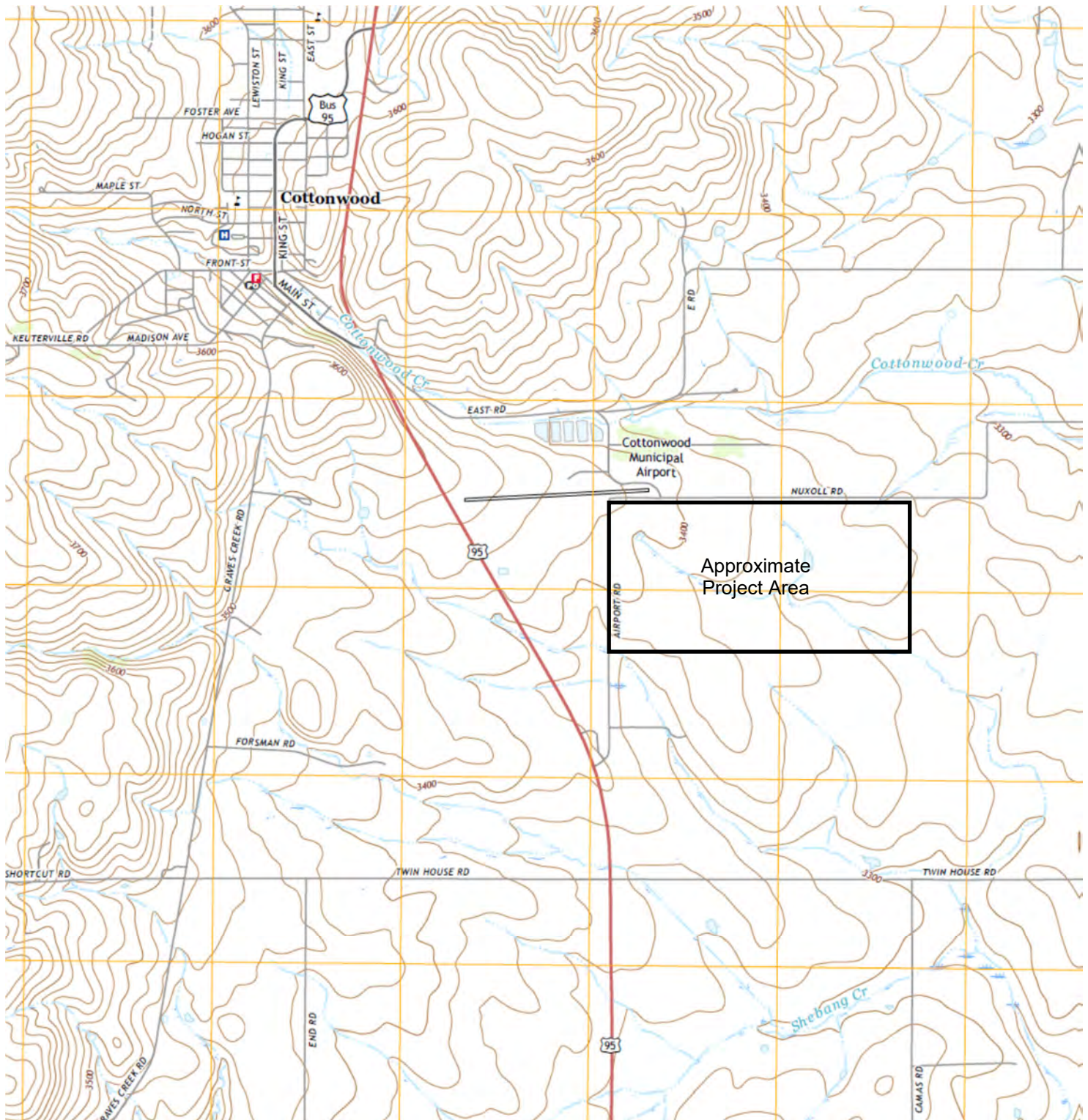
Reviewed by:

A blue ink signature of Kevin Aardahl, written in a cursive style.

**Kevin Aardahl**  
Sr. Environmental Professional

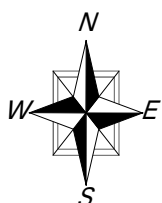
Attachments:

Figure 1 – Vicinity Map  
Figure 2 – Sample Location Diagram  
Table 1 – Summary of Laboratory Analytical Test Results  
Hand Auger Logs  
Laboratory Analytical Report



USGS 7.5 MINUTE SERIES TOPOGRAPHIC MAP  
COTTONWOOD, IDAHO, QUADRANGLE  
2020

DIAGRAM IS FOR GENERAL LOCATION ONLY



2705 E. Main Street  
Lewiston, Idaho  
[www.allwesttesting.com](http://www.allwesttesting.com)

#### FIGURE 1 - VICINITY MAP

Cottonwood Stormwater and Wastewater System Improvements

Nuxoll Road & Airport Road

Cottonwood, Idaho

Client Name: J-U-B Engineers, Inc.

Project No.: 320-167G

Date: September 2021





● Approximate hand auger location

GOOGLE EARTH, 2021  
(Image date July 30, 2016)

DIAGRAM IS FOR GENERAL LOCATION ONLY



2705 E. Main Street  
Lewiston, Idaho  
[www.allwesttesting.com](http://www.allwesttesting.com)

**FIGURE 2 - HAND AUGER LOCATION MAP**

Cottonwood Stormwater and Wastewater System Improvements

Nuxoll Road and Airport Road

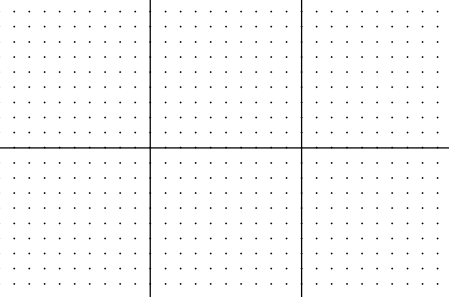
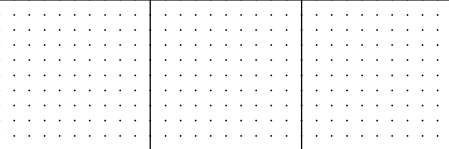
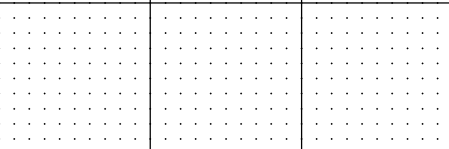
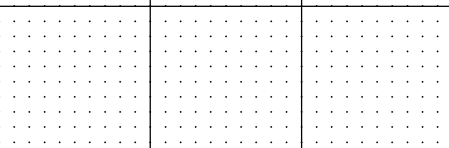
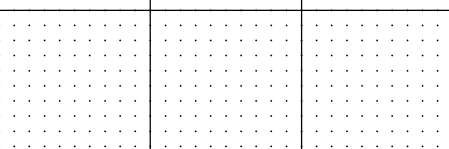
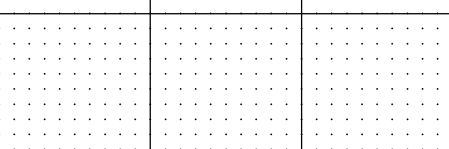
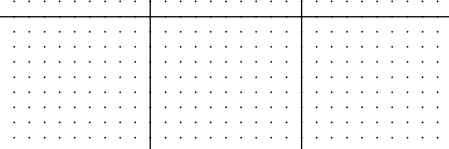
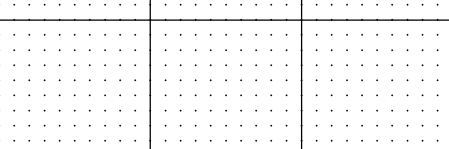
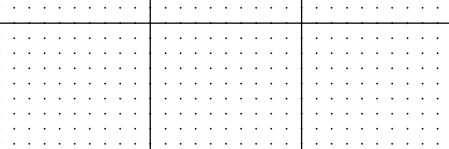
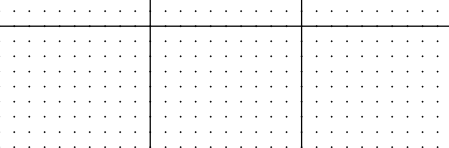
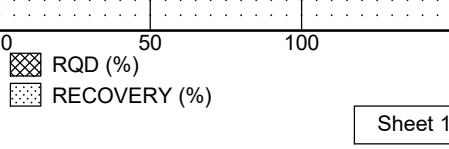
Cottonwood, Idaho

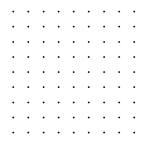
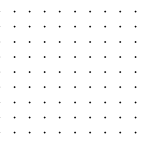
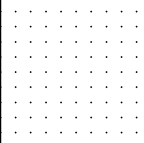
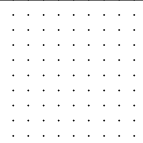
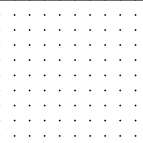
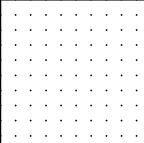
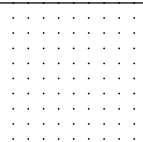
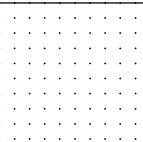
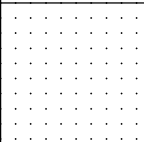
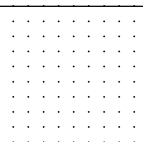
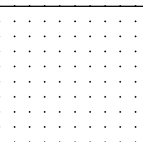
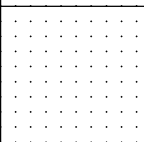
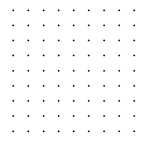
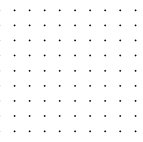
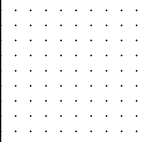
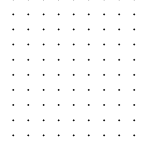
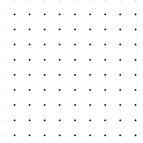
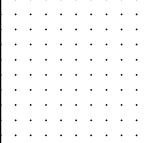
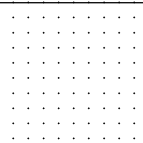
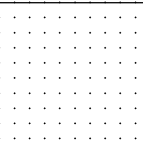
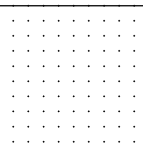
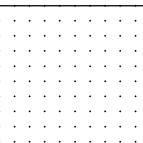
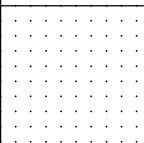
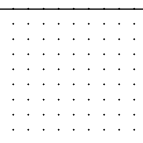
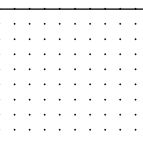
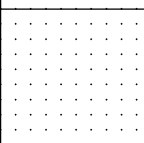
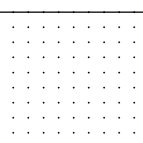
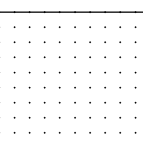
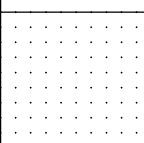
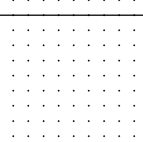
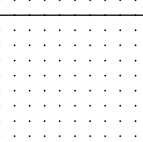
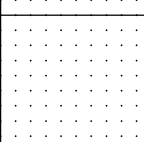
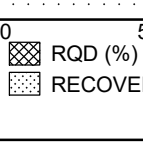
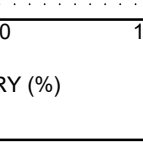
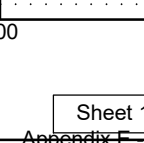
Client Name: J-U-B Engineers, Inc.

Project No.: 320-16E

Date: September 2021

|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--|--|----------------------|
| ALLWEST TESTING & ENGINEERING<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>HAND AUGER LOG</b> |                                                                                              |             | DATE STARTED: 9/9/2021<br>DATE FINISHED: 9/9/2021<br>DRILLER: Shawn Turpin<br>COMPANY: ALLWEST<br>LOGGER: ST<br>WEATHER: Sunny |         | <b>HAND AUGER HA-1</b><br>DRILL: Hand Auger<br>HAMMER:<br>DRILLING METHODS: 4" Hand Auger |                                                                           |  |  |                      |
| PROJECT: 320-167E Cottonwood Stormwater and Wastewater Improvements                               |                                                                                              |             | NOTES:                                                                                                                         |         |                                                                                           |                                                                           |  |  |                      |
| DEPTH (ft)                                                                                        | TOTAL DEPTH: 3'                                                                              | GRAPHIC LOG | SAMPLE #                                                                                                                       | SAMPLER | FIELD BLOW COUNT (Recovery)                                                               | ▼ WATER CONTENT (%)<br>PLASTIC LIMIT    LIQUID LIMIT<br>● FIELD "N" VALUE |  |  | DEPTH (ft)           |
|                                                                                                   | 0                      20                      40                      60                    |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
| 1                                                                                                 | Cultivated soil; lean CLAY (CL); stiff, dry, roots and organics, medium plastic, dark brown. |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  | 0.0                  |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 0.5                                                                       |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 1.0                                                                       |  |  |                      |
| 2                                                                                                 | SILT (ML); stiff, dry, low plastic, light brown.                                             |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  | 1.5                  |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 2.0                                                                       |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 2.5                                                                       |  |  |                      |
| 3                                                                                                 | Fat CLAY (CH); stiff to very stiff, slightly moist to moist, high plastic, brown.            |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  | 3.0                  |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 3.5                                                                       |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 4.0                                                                       |  |  |                      |
| 4                                                                                                 | Hand auger excavaton terminated at 3'                                                        |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  | 4.5                  |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           | 5.0                                                                       |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
| 5                                                                                                 |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
|                                                                                                   |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  |                      |
| WATER LEVELS                                                                                      |                                                                                              |             |                                                                                                                                |         | 0                      50                      100                                        |                                                                           |  |  |                      |
| ☒ WHILE DRILLING                                                                                  |                                                                                              |             |                                                                                                                                |         | RQD (%)                                                                                   |                                                                           |  |  | Sheet 1 of 1         |
| ☒ AT COMPLETION                                                                                   |                                                                                              |             |                                                                                                                                |         | RECOVERY (%)                                                                              |                                                                           |  |  |                      |
| ☒ AFTER DRILLING                                                                                  |                                                                                              |             |                                                                                                                                |         |                                                                                           |                                                                           |  |  | Appendix E - Page 84 |

|                                                                                                   |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                       |  |  |            |              |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|--|------------|--------------|
| ALLWEST TESTING & ENGINEERING<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>HAND AUGER LOG</b> |                                                                                                             |                                                                                    | DATE STARTED: 9/9/2021<br>DATE FINISHED: 9/9/2021<br>DRILLER: Shawn Turpin<br>COMPANY: ALLWEST<br>LOGGER: ST<br>WEATHER: Sunny |         | <b>HAND AUGER HA-2</b><br>DRILL: Hand Auger<br>HAMMER:<br>DRILLING METHODS: 4" Hand Auger |                                                                                       |  |  |            |              |
| PROJECT: 320-167E Cottonwood Stormwater and Wastewater Improvements                               |                                                                                                             |                                                                                    | NOTES:                                                                                                                         |         |                                                                                           |                                                                                       |  |  |            |              |
| DEPTH (ft)                                                                                        | TOTAL DEPTH: 2½'                                                                                            | GRAPHIC LOG                                                                        | SAMPLE #                                                                                                                       | SAMPLER | FIELD BLOW COUNT (Recovery)                                                               | ▼ WATER CONTENT (%)<br>PLASTIC LIMIT    LIQUID LIMIT<br>● FIELD "N" VALUE             |  |  | DEPTH (ft) |              |
|                                                                                                   | 0                      20                      40                      60                                   |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                       |  |  |            |              |
| 1                                                                                                 | Cultivated soil; fat CLAY (CH); stiff to very stiff, dry to moist, roots and organics, black.               |   |                                                                                                                                |         |                                                                                           |    |  |  | 0.0        |              |
|                                                                                                   |                          |                                                                                    |                                                                                                                                |         |                                                                                           | 0.5                                                                                   |  |  |            |              |
| 2                                                                                                 | Fat CLAY (CH); very stiff to hard, moist, high plastic, slightly calcareous, brown mottled black and white. |  |                                                                                                                                |         |                                                                                           |    |  |  | 1.0        |              |
|                                                                                                   |                         |                                                                                    |                                                                                                                                |         |                                                                                           | 1.5                                                                                   |  |  |            |              |
|                                                                                                   |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 2.0        |              |
|                                                                                                   |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 2.5        |              |
| 3                                                                                                 | Practical hand auger refusal on hard clay at 2½'                                                            |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 3.0        |              |
|                                                                                                   |                        |                                                                                    |                                                                                                                                |         |                                                                                           | 3.5                                                                                   |  |  |            |              |
| 4                                                                                                 |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 4.0        |              |
|                                                                                                   |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 4.5        |              |
| 5                                                                                                 |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |  |  |  | 5.0        |              |
| WATER LEVELS                                                                                      |                                                                                                             |                                                                                    |                                                                                                                                |         | 0                      50                      100                                        |                                                                                       |  |  |            |              |
| ☒ WHILE DRILLING                                                                                  |                                                                                                             |                                                                                    |                                                                                                                                |         | ☒ RQD (%)                                                                                 |                                                                                       |  |  |            | Sheet 1 of 1 |
| ☒ AT COMPLETION                                                                                   |                                                                                                             |                                                                                    |                                                                                                                                |         | ☒ RECOVERY (%)                                                                            |                                                                                       |  |  |            |              |
| ☒ AFTER DRILLING                                                                                  |                                                                                                             |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                       |  |  |            |              |

|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                                                                                                           |                                                                                       |                                                                                       |            |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------|
| ALLWEST TESTING & ENGINEERING<br>LEWISTON, IDAHO<br>GEOTECHNICAL SECTION<br><b>HAND AUGER LOG</b> |                                                                                              |                                                                                    | DATE STARTED: 9/9/2021<br>DATE FINISHED: 9/9/2021<br>DRILLER: Shawn Turpin<br>COMPANY: ALLWEST<br>LOGGER: ST<br>WEATHER: Sunny |         | <b>HAND AUGER HA-3</b><br>DRILL: Hand Auger<br>HAMMER:<br>DRILLING METHODS: 4" Hand Auger |                                                                                                                                                                                                                                                           |                                                                                       |                                                                                       |            |
| PROJECT: 320-167E Cottonwood Stormwater and Wastewater Improvements                               |                                                                                              |                                                                                    | NOTES:                                                                                                                         |         |                                                                                           |                                                                                                                                                                                                                                                           |                                                                                       |                                                                                       |            |
| DEPTH (ft)                                                                                        | TOTAL DEPTH: 3'                                                                              | GRAPHIC LOG                                                                        | SAMPLE #                                                                                                                       | SAMPLER | FIELD BLOW COUNT (Recovery)                                                               | ▼ WATER CONTENT (%)<br>PLASTIC LIMIT    LIQUID LIMIT<br>● FIELD "N" VALUE                                                                                                                                                                                 |                                                                                       |                                                                                       | DEPTH (ft) |
|                                                                                                   | 0                      20                      40                      60                    |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                                                                                                           |                                                                                       |                                                                                       |            |
| 1                                                                                                 | Cultivated soil; lean CLAY (CL); stiff, dry, medium plastic, roots and organics, dark brown. |   |                                                                                                                                |         |                                                                                           |                                                                                                                                                                        |    |    | 0.0        |
|                                                                                                   |           |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                        |    | 0.5                                                                                   |            |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                        |    |    | 1.0        |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                       |   |   | 1.5        |
| 2                                                                                                 | SILT (ML); stiff to very stiff, dry to slightly moist, low plastic, light brown.             |  |                                                                                                                                |         |                                                                                           |                                                                                                                                                                       |   |   | 2.0        |
|                                                                                                   |         |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  | 2.5                                                                                   |            |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  | 3.0        |
|                                                                                                   | Hand auger excavation terminated at 3'                                                       |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  | 3.5        |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  | 4.0        |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  | 4.5        |
| 4                                                                                                 |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  | 5.0        |
|                                                                                                   |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                      |  |  |            |
| 5                                                                                                 |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           | 0                      50                      100<br> RQD (%)<br> RECOVERY (%) |                                                                                       |                                                                                       |            |
| WATER LEVELS<br>▽ WHILE DRILLING<br>▽ AT COMPLETION<br>▽ AFTER DRILLING                           |                                                                                              |                                                                                    |                                                                                                                                |         |                                                                                           |                                                                                                                                                                                                                                                           |                                                                                       |                                                                                       |            |





# ANALYTICAL REPORT

September 22, 2021

Revised Report

## AllWest Testing & Eng. - Idaho

Sample Delivery Group: L1401907  
Samples Received: 09/10/2021  
Project Number: 320-167E  
Description: Cottonwood SW + WW Improvements

Report To: Shawn Turpin  
2705 E. Main St.  
Lewiston, ID 83501

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

Entire Report Reviewed By:

A handwritten signature in blue ink that reads "Chris Ward".

Chris Ward  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

### Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 [www.pacenational.com](http://www.pacenational.com)

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## SAMPLE SUMMARY

## HA-1 @ 0-1' L1401907-01 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 09:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741282 | 1        | 09/17/21 09:21        | 09/17/21 09:31     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:15     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 5        | 09/15/21 08:12        | 09/15/21 18:59     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1739083 | 1        | 09/14/21 16:00        | 09/14/21 18:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 17:33     | ELN     | Mt. Juliet, TN |

<sup>1</sup> Cp<sup>2</sup> Tc<sup>3</sup> Ss<sup>4</sup> Cn<sup>5</sup> Sr<sup>6</sup> Qc<sup>7</sup> Gl<sup>8</sup> Al<sup>9</sup> Sc

## HA-1 @ 1-2' L1401907-02 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 09:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741282 | 1        | 09/17/21 09:21        | 09/17/21 09:31     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:19     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 2        | 09/15/21 08:12        | 09/15/21 19:06     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 17:50     | ELN     | Mt. Juliet, TN |

## HA-1 @ 2-3' L1401907-03 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 09:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741282 | 1        | 09/17/21 09:21        | 09/17/21 09:31     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:20     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 1        | 09/15/21 08:12        | 09/15/21 18:38     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 5        | 09/15/21 07:42        | 09/15/21 18:06     | ELN     | Mt. Juliet, TN |

## HA-2 @ 0-1' L1401907-04 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 10:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741282 | 1        | 09/17/21 09:21        | 09/17/21 09:31     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:21     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 1        | 09/15/21 08:12        | 09/15/21 18:40     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 18:23     | ELN     | Mt. Juliet, TN |

## HA-2 @ 1-2' L1401907-05 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 10:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741282 | 1        | 09/17/21 09:21        | 09/17/21 09:31     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:25     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 1        | 09/15/21 08:12        | 09/15/21 18:41     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 18:39     | ELN     | Mt. Juliet, TN |

## HA-2 @ 2-2 1/2' L1401907-06 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 10:00

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741283 | 1        | 09/17/21 09:10        | 09/17/21 09:19     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:26     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 1        | 09/15/21 08:12        | 09/15/21 18:45     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 18:55     | ELN     | Mt. Juliet, TN |

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

## HA-3 @ 0-1' L1401907-07 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 11:15

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741283 | 1        | 09/17/21 09:10        | 09/17/21 09:19     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:28     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 2        | 09/15/21 08:12        | 09/15/21 18:54     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 19:45     | ELN     | Mt. Juliet, TN |

## HA-3 @ 1-2' L1401907-08 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 11:15

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741283 | 1        | 09/17/21 09:10        | 09/17/21 09:19     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:29     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 2        | 09/15/21 08:12        | 09/15/21 19:03     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 20:01     | ELN     | Mt. Juliet, TN |

## HA-3 @ 2-3' L1401907-09 Solid

Collected by  
Shawn Turpin

Collected date/time  
09/09/21 11:15

Received date/time  
09/10/21 09:45

| Method                             | Batch     | Dilution | Preparation date/time | Analysis date/time | Analyst | Location       |
|------------------------------------|-----------|----------|-----------------------|--------------------|---------|----------------|
| Total Solids by Method 2540 G-2011 | WG1741283 | 1        | 09/17/21 09:10        | 09/17/21 09:19     | CMK     | Mt. Juliet, TN |
| Wet Chemistry by Method 350.1      | WG1740247 | 1        | 09/15/21 02:38        | 09/16/21 02:30     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 365.4M     | WG1740164 | 1        | 09/15/21 08:12        | 09/15/21 19:04     | SDL     | Mt. Juliet, TN |
| Wet Chemistry by Method 9045D      | WG1741187 | 1        | 09/16/21 07:00        | 09/16/21 10:00     | MRM     | Mt. Juliet, TN |
| Wet Chemistry by Method 9050AMod   | WG1740293 | 1        | 09/15/21 08:00        | 09/16/21 13:00     | BMD     | Mt. Juliet, TN |
| Wet Chemistry by Method 9056A      | WG1739837 | 1        | 09/15/21 07:42        | 09/15/21 20:17     | ELN     | Mt. Juliet, TN |



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris Ward  
Project Manager

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Report Revision History

Level II Report - Version 1: 09/20/21 10:44

Project Narrative

Regenerated for updated sample ID.

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 89.5   |           | 1        | 09/17/2021 09:31     | <a href="#">WG1741282</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier          | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|--------------------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            | <a href="#">J6</a> | 7.82      | 11.2      | 1        | 09/16/2021 02:15     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 368          |           | 27.9      | 112       | 5        | 09/15/2021 18:59     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 6.10   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-01 WG1741187: 6.1 at 21.3C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 69.2   |           | 10.0 | 1        | 09/14/2021 18:00     | <a href="#">WG1739083</a> |

#### Sample Narrative:

L1401907-01 WG1739083: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier         | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-------------------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | 0.763        | <a href="#">J</a> | 0.623     | 11.2      | 1        | 09/15/2021 17:33     | <a href="#">WG1739837</a> |

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 93.0   |           | 1        | 09/17/2021 09:31     | <a href="#">WG1741282</a> |

1 Cp

2 Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U                  |           | 7.53            | 10.8            | 1        | 09/16/2021 02:19     | <a href="#">WG1740247</a> |

3 Ss

4 Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Phosphorus, Total | 212                |           | 10.8            | 43.0            | 2        | 09/15/2021 19:06     | <a href="#">WG1740164</a> |

5 Sr

6 Qc

### Wet Chemistry by Method 9045D

| Analyte | Result su | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|-----------|--------------------|----------|----------------------|---------------------------|
| pH      | 7.43      | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7 Gl

8 Al

9 Sc

#### Sample Narrative:

L1401907-02 WG1741187: 7.43 at 21.3C

### Wet Chemistry by Method 9050AMod

| Analyte              | Result umhos/cm | Qualifier | RDL umhos/cm | Dilution | Analysis date / time | Batch                     |
|----------------------|-----------------|-----------|--------------|----------|----------------------|---------------------------|
| Specific Conductance | 56.9            |           | 10.0         | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-02 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|----------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Nitrate as (N) | U                  |           | 0.599           | 10.8            | 1        | 09/15/2021 17:50     | <a href="#">WG1739837</a> |

Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 84.6   |           | 1        | 09/17/2021 09:31     | <a href="#">WG1741282</a> |

1  
Cp

2  
Tc

Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            |           | 8.27      | 11.8      | 1        | 09/16/2021 02:20     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 113          |           | 5.91      | 23.6      | 1        | 09/15/2021 18:38     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 8.08   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

Sample Narrative:

L1401907-03 WG1741187: 8.08 at 21.3C

9  
Sc

Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 195    |           | 10.0 | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

Sample Narrative:

L1401907-03 WG1740293: at 25C

Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | U            |           | 3.29      | 59.1      | 5        | 09/15/2021 18:06     | <a href="#">WG1739837</a> |



### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 85.7   |           | 1        | 09/17/2021 09:31     | <a href="#">WG1741282</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            |           | 8.17      | 11.7      | 1        | 09/16/2021 02:21     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 167          |           | 5.83      | 23.3      | 1        | 09/15/2021 18:40     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 6.23   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-04 WG1741187: 6.23 at 21.1C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 530    |           | 10.0 | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-04 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier         | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-------------------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | 4.05         | <a href="#">J</a> | 0.650     | 11.7      | 1        | 09/15/2021 18:23     | <a href="#">WG1739837</a> |

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 81.5   |           | 1        | 09/17/2021 09:31     | <a href="#">WG1741282</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            |           | 8.59      | 12.3      | 1        | 09/16/2021 02:25     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 110          |           | 6.14      | 24.5      | 1        | 09/15/2021 18:41     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 8.24   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-05 WG1741187: 8.24 at 20.7C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 335    |           | 10.0 | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-05 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier         | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-------------------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | 4.44         | <a href="#">J</a> | 0.683     | 12.3      | 1        | 09/15/2021 18:39     | <a href="#">WG1739837</a> |

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 78.7   |           | 1        | 09/17/2021 09:19     | <a href="#">WG1741283</a> |

1 Cp

2 Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U                  |           | 8.89            | 12.7            | 1        | 09/16/2021 02:26     | <a href="#">WG1740247</a> |

3 Ss

4 Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Phosphorus, Total | 156                |           | 6.35            | 25.4            | 1        | 09/15/2021 18:45     | <a href="#">WG1740164</a> |

5 Sr

6 Qc

### Wet Chemistry by Method 9045D

| Analyte | Result su | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|-----------|--------------------|----------|----------------------|---------------------------|
| pH      | 8.48      | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7 Gl

8 Al

#### Sample Narrative:

L1401907-06 WG1741187: 8.48 at 20.8C

9 Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result umhos/cm | Qualifier | RDL umhos/cm | Dilution | Analysis date / time | Batch                     |
|----------------------|-----------------|-----------|--------------|----------|----------------------|---------------------------|
| Specific Conductance | 313             |           | 10.0         | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-06 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) mg/kg | Qualifier         | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|----------------|--------------------|-------------------|-----------------|-----------------|----------|----------------------|---------------------------|
| Nitrate as (N) | 1.54               | <a href="#">J</a> | 0.707           | 12.7            | 1        | 09/15/2021 18:55     | <a href="#">WG1739837</a> |

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 88.5   |           | 1        | 09/17/2021 09:19     | <a href="#">WG1741283</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            |           | 7.91      | 11.3      | 1        | 09/16/2021 02:28     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 316          |           | 11.3      | 45.2      | 2        | 09/15/2021 18:54     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 4.94   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-07 WG1741187: 4.94 at 20.8C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 292    |           | 10.0 | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-07 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | 24.6         |           | 0.629     | 11.3      | 1        | 09/15/2021 19:45     | <a href="#">WG1739837</a> |



### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 89.4   |           | 1        | 09/17/2021 09:19     | <a href="#">WG1741283</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U                  |           | 7.83            | 11.2            | 1        | 09/16/2021 02:29     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) mg/kg | Qualifier | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------------|-----------|-----------------|-----------------|----------|----------------------|---------------------------|
| Phosphorus, Total | 282                |           | 11.2            | 44.7            | 2        | 09/15/2021 19:03     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result su | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|-----------|--------------------|----------|----------------------|---------------------------|
| pH      | 7.09      | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-08 WG1741187: 7.09 at 20.7C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result umhos/cm | Qualifier | RDL umhos/cm | Dilution | Analysis date / time | Batch                     |
|----------------------|-----------------|-----------|--------------|----------|----------------------|---------------------------|
| Specific Conductance | 120             |           | 10.0         | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-08 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) mg/kg | Qualifier         | MDL (dry) mg/kg | RDL (dry) mg/kg | Dilution | Analysis date / time | Batch                     |
|----------------|--------------------|-------------------|-----------------|-----------------|----------|----------------------|---------------------------|
| Nitrate as (N) | 3.10               | <a href="#">J</a> | 0.623           | 11.2            | 1        | 09/15/2021 20:01     | <a href="#">WG1739837</a> |

### Total Solids by Method 2540 G-2011

| Analyte      | Result | Qualifier | Dilution | Analysis date / time | Batch                     |
|--------------|--------|-----------|----------|----------------------|---------------------------|
| Total Solids | 88.5   |           | 1        | 09/17/2021 09:19     | <a href="#">WG1741283</a> |

1  
Cp

2  
Tc

### Wet Chemistry by Method 350.1

| Analyte          | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Ammonia Nitrogen | U            |           | 7.91      | 11.3      | 1        | 09/16/2021 02:30     | <a href="#">WG1740247</a> |

3  
Ss

4  
Cn

### Wet Chemistry by Method 365.4M

| Analyte           | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|-------------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Phosphorus, Total | 194          |           | 5.65      | 22.6      | 1        | 09/15/2021 19:04     | <a href="#">WG1740164</a> |

5  
Sr

6  
Qc

### Wet Chemistry by Method 9045D

| Analyte | Result | Qualifier          | Dilution | Analysis date / time | Batch                     |
|---------|--------|--------------------|----------|----------------------|---------------------------|
| pH      | 7.64   | <a href="#">T8</a> | 1        | 09/16/2021 10:00     | <a href="#">WG1741187</a> |

7  
Gl

8  
Al

#### Sample Narrative:

L1401907-09 WG1741187: 7.64 at 20.9C

9  
Sc

### Wet Chemistry by Method 9050AMod

| Analyte              | Result | Qualifier | RDL  | Dilution | Analysis date / time | Batch                     |
|----------------------|--------|-----------|------|----------|----------------------|---------------------------|
| Specific Conductance | 127    |           | 10.0 | 1        | 09/16/2021 13:00     | <a href="#">WG1740293</a> |

#### Sample Narrative:

L1401907-09 WG1740293: at 25C

### Wet Chemistry by Method 9056A

| Analyte        | Result (dry) | Qualifier | MDL (dry) | RDL (dry) | Dilution | Analysis date / time | Batch                     |
|----------------|--------------|-----------|-----------|-----------|----------|----------------------|---------------------------|
| Nitrate as (N) | U            |           | 0.629     | 11.3      | 1        | 09/15/2021 20:17     | <a href="#">WG1739837</a> |

Method Blank (MB)

|                                |           |                     |        |        |
|--------------------------------|-----------|---------------------|--------|--------|
| (MB) R3705752-1 09/17/21 09:31 |           |                     |        |        |
|                                | MB Result | <u>MB Qualifier</u> | MB MDL | MB RDL |
| Analyte                        | %         |                     | %      | %      |
| Total Solids                   | 0.000     |                     |        |        |

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1401876-25 Original Sample (OS) • Duplicate (DUP)

|                                                                   |                 |            |          |         |                      |                |
|-------------------------------------------------------------------|-----------------|------------|----------|---------|----------------------|----------------|
| (OS) L1401876-25 09/17/21 09:31 • (DUP) R3705752-3 09/17/21 09:31 |                 |            |          |         |                      |                |
|                                                                   | Original Result | DUP Result | Dilution | DUP RPD | <u>DUP Qualifier</u> | DUP RPD Limits |
| Analyte                                                           | %               | %          |          | %       |                      | %              |
| Total Solids                                                      | 84.1            | 83.7       | 1        | 0.557   |                      | 10             |

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

Laboratory Control Sample (LCS)

|                                 |              |            |          |             |                      |
|---------------------------------|--------------|------------|----------|-------------|----------------------|
| (LCS) R3705752-2 09/17/21 09:31 |              |            |          |             |                      |
|                                 | Spike Amount | LCS Result | LCS Rec. | Rec. Limits | <u>LCS Qualifier</u> |
| Analyte                         | %            | %          | %        | %           |                      |
| Total Solids                    | 50.0         | 50.0       | 100      | 85.0-115    |                      |

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3705744-1 09/17/21 09:19

|              | MB Result | <u>MB Qualifier</u> | MB MDL | MB RDL |
|--------------|-----------|---------------------|--------|--------|
| Analyte      | %         |                     | %      | %      |
| Total Solids | 0.000     |                     |        |        |

L1401907-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1401907-06 09/17/21 09:19 • (DUP) R3705744-3 09/17/21 09:19

|              | Original Result | DUP Result | Dilution | DUP RPD | <u>DUP Qualifier</u> | DUP RPD Limits |
|--------------|-----------------|------------|----------|---------|----------------------|----------------|
| Analyte      | %               | %          |          | %       |                      | %              |
| Total Solids | 78.7            | 78.6       | 1        | 0.170   |                      | 10             |

Laboratory Control Sample (LCS)

(LCS) R3705744-2 09/17/21 09:19

|              | Spike Amount | LCS Result | LCS Rec. | Rec. Limits | <u>LCS Qualifier</u> |
|--------------|--------------|------------|----------|-------------|----------------------|
| Analyte      | %            | %          | %        | %           |                      |
| Total Solids | 50.0         | 50.0       | 100      | 85.0-115    |                      |

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

|                                |           |              |        |        |
|--------------------------------|-----------|--------------|--------|--------|
| (MB) R3704903-1 09/16/21 02:10 |           |              |        |        |
| Analyte                        | MB Result | MB Qualifier | MB MDL | MB RDL |
|                                | mg/kg     |              | mg/kg  | mg/kg  |
| Ammonia Nitrogen               | U         |              | 7.00   | 10.0   |

L1401907-01 Original Sample (OS) • Duplicate (DUP)

|                                                                   |                       |                  |          |         |               |                |
|-------------------------------------------------------------------|-----------------------|------------------|----------|---------|---------------|----------------|
| (OS) L1401907-01 09/16/21 02:15 • (DUP) R3704903-3 09/16/21 02:16 |                       |                  |          |         |               |                |
| Analyte                                                           | Original Result (dry) | DUP Result (dry) | Dilution | DUP RPD | DUP Qualifier | DUP RPD Limits |
|                                                                   | mg/kg                 | mg/kg            |          | %       |               | %              |
| Ammonia Nitrogen                                                  | U                     | U                | 1        | 0.000   |               | 20             |

L1402616-01 Original Sample (OS) • Duplicate (DUP)

|                                                                   |                 |            |          |         |               |                |
|-------------------------------------------------------------------|-----------------|------------|----------|---------|---------------|----------------|
| (OS) L1402616-01 09/16/21 02:37 • (DUP) R3704903-5 09/16/21 02:41 |                 |            |          |         |               |                |
| Analyte                                                           | Original Result | DUP Result | Dilution | DUP RPD | DUP Qualifier | DUP RPD Limits |
|                                                                   | mg/kg           | mg/kg      |          | %       |               | %              |
| Ammonia Nitrogen                                                  | 128             | 137        | 1        | 6.48    |               | 20             |

Laboratory Control Sample (LCS)

|                                 |              |            |          |             |               |
|---------------------------------|--------------|------------|----------|-------------|---------------|
| (LCS) R3704903-2 09/16/21 02:11 |              |            |          |             |               |
| Analyte                         | Spike Amount | LCS Result | LCS Rec. | Rec. Limits | LCS Qualifier |
|                                 | mg/kg        | mg/kg      | %        | %           |               |
| Ammonia Nitrogen                | 500          | 495        | 99.0     | 90.0-110    |               |

L1401907-01 Original Sample (OS) • Matrix Spike (MS)

|                                                                  |                    |                       |                 |         |          |             |              |
|------------------------------------------------------------------|--------------------|-----------------------|-----------------|---------|----------|-------------|--------------|
| (OS) L1401907-01 09/16/21 02:15 • (MS) R3704903-4 09/16/21 02:18 |                    |                       |                 |         |          |             |              |
| Analyte                                                          | Spike Amount (dry) | Original Result (dry) | MS Result (dry) | MS Rec. | Dilution | Rec. Limits | MS Qualifier |
|                                                                  | mg/kg              | mg/kg                 | mg/kg           | %       |          | %           |              |
| Ammonia Nitrogen                                                 | 559                | U                     | 357             | 63.8    | 1        | 80.0-120    | J6           |

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1402616-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1402616-01 09/16/21 02:37 • (MS) R3704903-6 09/16/21 02:42 • (MSD) R3704903-7 09/16/21 02:43

| Analyte          | Spike Amount<br>mg/kg | Original Result<br>mg/kg | MS Result<br>mg/kg | MSD Result<br>mg/kg | MS Rec.<br>% | MSD Rec.<br>% | Dilution | Rec. Limits<br>% | <u>MS Qualifier</u> | <u>MSD Qualifier</u> | RPD<br>% | RPD Limits<br>% |
|------------------|-----------------------|--------------------------|--------------------|---------------------|--------------|---------------|----------|------------------|---------------------|----------------------|----------|-----------------|
| Ammonia Nitrogen | 500                   | 128                      | 587                | 589                 | 91.8         | 92.2          | 1        | 80.0-120         |                     |                      | 0.294    | 20              |

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3704836-1 09/15/21 18:19

| Analyte          | MB Result<br>mg/kg | MB Qualifier | MB MDL<br>mg/kg | MB RDL<br>mg/kg |
|------------------|--------------------|--------------|-----------------|-----------------|
| Phosphorus,Total | U                  |              | 5.00            | 20.0            |

L1399669-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1399669-01 09/15/21 18:22 • (DUP) R3704836-3 09/15/21 18:23

| Analyte          | Original Result<br>mg/kg | DUP Result<br>mg/kg | Dilution | DUP RPD<br>% | DUP RPD<br>Limits<br>% |
|------------------|--------------------------|---------------------|----------|--------------|------------------------|
| Phosphorus,Total | 182                      | 178                 | 1        | 2.03         | 25                     |

L1401907-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1401907-01 09/15/21 18:59 • (DUP) R3704836-6 09/15/21 19:00

| Analyte          | Original Result<br>(dry)<br>mg/kg | DUP Result<br>(dry)<br>mg/kg | Dilution | DUP RPD<br>% | DUP RPD<br>Limits<br>% |
|------------------|-----------------------------------|------------------------------|----------|--------------|------------------------|
| Phosphorus,Total | 368                               | 346                          | 5        | 6.20         | 25                     |

Laboratory Control Sample (LCS)

(LCS) R3704836-2 09/15/21 18:20

| Analyte          | Spike Amount<br>mg/kg | LCS Result<br>mg/kg | LCS Rec.<br>% | Rec. Limits<br>% | LCS Qualifier |
|------------------|-----------------------|---------------------|---------------|------------------|---------------|
| Phosphorus,Total | 126                   | 120                 | 95.1          | 83.3-116         |               |

L1399669-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1399669-01 09/15/21 18:22 • (MS) R3704836-4 09/15/21 18:24 • (MSD) R3704836-5 09/15/21 18:26

| Analyte          | Spike Amount<br>mg/kg | Original Result<br>mg/kg | MS Result<br>mg/kg | MSD Result<br>mg/kg | MS Rec.<br>% | MSD Rec.<br>% | Dilution | Rec. Limits<br>% | MS Qualifier | MSD Qualifier | RPD<br>% | RPD Limits<br>% |
|------------------|-----------------------|--------------------------|--------------------|---------------------|--------------|---------------|----------|------------------|--------------|---------------|----------|-----------------|
| Phosphorus,Total | 200                   | 182                      | 279                | 305                 | 48.6         | 61.6          | 1        | 50.0-150         | E J6         | E             | 8.88     | 25              |

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1401907-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1401907-06 09/16/21 10:00 • (DUP) R3705136-2 09/16/21 10:00

| Analyte | Original Result | DUP Result | Dilution | DUP RPD | DUP Qualifier | DUP RPD Limits |
|---------|-----------------|------------|----------|---------|---------------|----------------|
| pH      | 8.48            | 8.46       | 1        | 0.236   |               | 1              |

Sample Narrative:  
OS: 8.48 at 20.8C  
DUP: 8.46 at 20.9C

L1401907-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1401907-09 09/16/21 10:00 • (DUP) R3705136-3 09/16/21 10:00

| Analyte | Original Result | DUP Result | Dilution | DUP RPD | DUP Qualifier | DUP RPD Limits |
|---------|-----------------|------------|----------|---------|---------------|----------------|
| pH      | 7.64            | 7.68       | 1        | 0.522   |               | 1              |

Sample Narrative:  
OS: 7.64 at 20.9C  
DUP: 7.68 at 21C

Laboratory Control Sample (LCS)

(LCS) R3705136-1 09/16/21 10:00

| Analyte | Spike Amount | LCS Result | LCS Rec. | Rec. Limits | LCS Qualifier |
|---------|--------------|------------|----------|-------------|---------------|
| pH      | 10.0         | 10.0       | 100      | 99.0-101    |               |

Sample Narrative:  
LCS: 10.04 at 20.7C

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc



Method Blank (MB)

(MB) R3704283-1 09/14/21 18:00

| Analyte              | MB Result<br>umhos/cm | MB Qualifier | MB MDL<br>umhos/cm | MB RDL<br>umhos/cm |
|----------------------|-----------------------|--------------|--------------------|--------------------|
| Specific Conductance | U                     |              | 10.0               | 10.0               |

Sample Narrative:  
BLANK: at 25C

L1401867-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1401867-10 09/14/21 18:00 • (DUP) R3704283-3 09/14/21 18:00

| Analyte              | Original Result<br>umhos/cm | DUP Result<br>umhos/cm | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------------|-----------------------------|------------------------|----------|--------------|---------------|------------------------|
| Specific Conductance | 550                         | 568                    | 1        | 3.22         |               | 20                     |

Sample Narrative:  
OS: at 25C  
DUP: at 25C

L1401870-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1401870-08 09/14/21 18:00 • (DUP) R3704283-4 09/14/21 18:00

| Analyte              | Original Result<br>umhos/cm | DUP Result<br>umhos/cm | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------------|-----------------------------|------------------------|----------|--------------|---------------|------------------------|
| Specific Conductance | 723                         | 697                    | 1        | 3.66         |               | 20                     |

Sample Narrative:  
OS: at 25C  
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3704283-2 09/14/21 18:00

| Analyte              | Spike Amount<br>umhos/cm | LCS Result<br>umhos/cm | LCS Rec.<br>% | Rec. Limits<br>% | LCS Qualifier |
|----------------------|--------------------------|------------------------|---------------|------------------|---------------|
| Specific Conductance | 899                      | 890                    | 99.0          | 85.0-115         |               |

Sample Narrative:  
LCS: at 25C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3705163-1 09/16/21 13:00

| Analyte              | MB Result<br>umhos/cm | MB Qualifier | MB MDL<br>umhos/cm | MB RDL<br>umhos/cm |
|----------------------|-----------------------|--------------|--------------------|--------------------|
| Specific Conductance | U                     |              | 10.0               | 10.0               |

Sample Narrative:  
BLANK: at 25C

L1401907-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1401907-04 09/16/21 13:00 • (DUP) R3705163-3 09/16/21 13:00

| Analyte              | Original Result<br>umhos/cm | DUP Result<br>umhos/cm | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------------|-----------------------------|------------------------|----------|--------------|---------------|------------------------|
| Specific Conductance | 530                         | 527                    | 1        | 0.568        |               | 20                     |

Sample Narrative:  
OS: at 25C  
DUP: at 25C

L1402252-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1402252-04 09/16/21 13:00 • (DUP) R3705163-4 09/16/21 13:00

| Analyte              | Original Result<br>umhos/cm | DUP Result<br>umhos/cm | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------------|-----------------------------|------------------------|----------|--------------|---------------|------------------------|
| Specific Conductance | 1770                        | 1690                   | 1        | 4.86         |               | 20                     |

Sample Narrative:  
OS: at 25C  
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3705163-2 09/16/21 13:00

| Analyte              | Spike Amount<br>umhos/cm | LCS Result<br>umhos/cm | LCS Rec.<br>% | Rec. Limits<br>% | LCS Qualifier |
|----------------------|--------------------------|------------------------|---------------|------------------|---------------|
| Specific Conductance | 899                      | 907                    | 101           | 85.0-115         |               |

Sample Narrative:  
LCS: at 25C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3705230-1 09/15/21 11:46

| Analyte        | MB Result<br>mg/kg | MB Qualifier | MB MDL<br>mg/kg | MB RDL<br>mg/kg |
|----------------|--------------------|--------------|-----------------|-----------------|
| Nitrate as (N) | U                  |              | 0.557           | 10.0            |

L1401297-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1401297-01 09/16/21 12:33 • (DUP) R3705230-6 09/15/21 21:39

| Analyte        | Original Result<br>(dry) | DUP Result<br>(dry) | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------|--------------------------|---------------------|----------|--------------|---------------|------------------------|
| Nitrate as (N) | 4.02                     | 1.15                | 1        | 111          | J P1          | 15                     |

L1401231-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1401231-01 09/15/21 14:49 • (DUP) R3705230-3 09/15/21 15:06

| Analyte        | Original Result<br>(dry) | DUP Result<br>(dry) | Dilution | DUP RPD<br>% | DUP Qualifier | DUP RPD<br>Limits<br>% |
|----------------|--------------------------|---------------------|----------|--------------|---------------|------------------------|
| Nitrate as (N) | 36.8                     | 35.7                | 1        | 2.96         |               | 15                     |

Laboratory Control Sample (LCS)

(LCS) R3705230-2 09/15/21 12:02

| Analyte        | Spike Amount<br>mg/kg | LCS Result<br>mg/kg | LCS Rec.<br>% | Rec. Limits<br>% | LCS Qualifier |
|----------------|-----------------------|---------------------|---------------|------------------|---------------|
| Nitrate as (N) | 20.0                  | 18.4                | 92.1          | 80.0-120         |               |

L1402616-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1402616-01 09/15/21 20:34 • (MS) R3705230-4 09/15/21 20:50 • (MSD) R3705230-5 09/15/21 21:07

| Analyte        | Spike Amount<br>mg/kg | Original Result<br>mg/kg | MS Result<br>mg/kg | MSD Result<br>mg/kg | MS Rec.<br>% | MSD Rec.<br>% | Dilution | Rec. Limits<br>% | MS Qualifier | MSD Qualifier | RPD<br>% | RPD Limits<br>% |
|----------------|-----------------------|--------------------------|--------------------|---------------------|--------------|---------------|----------|------------------|--------------|---------------|----------|-----------------|
| Nitrate as (N) | 50.0                  | 2.34                     | 52.6               | 50.3                | 101          | 95.9          | 1        | 80.0-120         |              |               | 4.47     | 15              |

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (dry)                        | Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].                                                                                                                                                                                                                                                                                                                                                                                                   |
| MDL                          | Method Detection Limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| MDL (dry)                    | Method Detection Limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| RDL                          | Reported Detection Limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| RDL (dry)                    | Reported Detection Limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Rec.                         | Recovery.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| RPD                          | Relative Percent Difference.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| SDG                          | Sample Delivery Group.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| U                            | Not detected at the Reporting Limit (or MDL where applicable).                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Analyte                      | The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.                                                                                                                                                                                                                                                                                                                                                                                                 |
| Dilution                     | If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.                                                                                    |
| Limits                       | These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.                                                                                                                                                                                                                                                      |
| Original Sample              | The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.                                                                                                                                                                                                                                                                                                                            |
| Qualifier                    | This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.                                                                                                                                                                  |
| Result                       | The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte. |
| Uncertainty (Radiochemistry) | Confidence level of 2 sigma.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Case Narrative (Cn)          | A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.                                                                                                                                                                          |
| Quality Control Summary (Qc) | This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.                                                                                                                                                                                              |
| Sample Chain of Custody (Sc) | This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.                                                              |
| Sample Results (Sr)          | This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.                                                                                                                                                                                             |
| Sample Summary (Ss)          | This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.                                                                                                                                                                                                                                                                                                                                                            |

| Qualifier | Description                                                                                                                                 |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------|
| E         | The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL). |
| J         | The identification of the analyte is acceptable; the reported value is an estimate.                                                         |
| J6        | The sample matrix interfered with the ability to make any accurate determination; spike value is low.                                       |
| P1        | RPD value not applicable for sample concentrations less than 5 times the reporting limit.                                                   |
| T8        | Sample(s) received past/too close to holding time expiration.                                                                               |

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



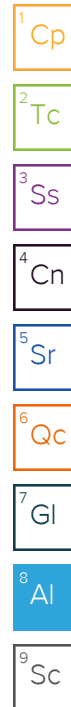
## Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

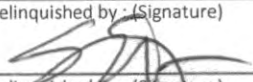
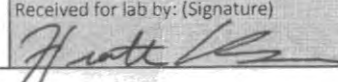
|                               |             |                             |                  |
|-------------------------------|-------------|-----------------------------|------------------|
| Alabama                       | 40660       | Nebraska                    | NE-OS-15-05      |
| Alaska                        | 17-026      | Nevada                      | TN000032021-1    |
| Arizona                       | AZ0612      | New Hampshire               | 2975             |
| Arkansas                      | 88-0469     | New Jersey–NELAP            | TN002            |
| California                    | 2932        | New Mexico <sup>1</sup>     | TN00003          |
| Colorado                      | TN00003     | New York                    | 11742            |
| Connecticut                   | PH-0197     | North Carolina              | Env375           |
| Florida                       | E87487      | North Carolina <sup>1</sup> | DW21704          |
| Georgia                       | NELAP       | North Carolina <sup>3</sup> | 41               |
| Georgia <sup>1</sup>          | 923         | North Dakota                | R-140            |
| Idaho                         | TN00003     | Ohio–VAP                    | CL0069           |
| Illinois                      | 200008      | Oklahoma                    | 9915             |
| Indiana                       | C-TN-01     | Oregon                      | TN200002         |
| Iowa                          | 364         | Pennsylvania                | 68-02979         |
| Kansas                        | E-10277     | Rhode Island                | LA000356         |
| Kentucky <sup>1,6</sup>       | KY90010     | South Carolina              | 84004002         |
| Kentucky <sup>2</sup>         | 16          | South Dakota                | n/a              |
| Louisiana                     | AI30792     | Tennessee <sup>1,4</sup>    | 2006             |
| Louisiana                     | LA018       | Texas                       | T104704245-20-18 |
| Maine                         | TN00003     | Texas <sup>5</sup>          | LAB0152          |
| Maryland                      | 324         | Utah                        | TN000032021-11   |
| Massachusetts                 | M-TN003     | Vermont                     | VT2006           |
| Michigan                      | 9958        | Virginia                    | 110033           |
| Minnesota                     | 047-999-395 | Washington                  | C847             |
| Mississippi                   | TN00003     | West Virginia               | 233              |
| Missouri                      | 340         | Wisconsin                   | 998093910        |
| Montana                       | CERT0086    | Wyoming                     | A2LA             |
| A2LA – ISO 17025              | 1461.01     | AIHA-LAP, LLC EMLAP         | 100789           |
| A2LA – ISO 17025 <sup>5</sup> | 1461.02     | DOD                         | 1461.01          |
| Canada                        | 1461.01     | USDA                        | P330-15-00234    |
| EPA–Crypto                    | TN00003     |                             |                  |

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> Wastewater n/a Accreditation not applicable

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

\* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



| Company Name/Address:<br><b>AllWest Testing &amp; Eng. - Idaho</b><br><br>2705 E. Main St.<br>Lewiston, ID 83501                  |           |                                             |       | Billing Information:<br><b>Pamela DeMarcus</b><br>690 West Capstone Court<br>Hayden, ID 83835                                                                                                                                                                                                           |      |                                                                                                                          |   | Analysis / Container / Preservative                                                                                                                                                                                                                                                                                                                                                           |   |                                                                                               |  | Chain of Custody Page ____ of ____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Report to:<br><b>Shawn Turpin</b>                                                                                                 |           |                                             |       | Email To: <b>STurpin@allwesttesting.com</b>                                                                                                                                                                                                                                                             |      |                                                                                                                          |   | <br>12065 Lebanon Rd Mount Juliet, TN 37122<br>Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <a href="https://info.pacelabs.com/hubs/pas-standard-terms.pdf">https://info.pacelabs.com/hubs/pas-standard-terms.pdf</a> |   |                                                                                               |  | SDG # <b>21461907</b><br><b>F017</b><br>Acctnum: <b>ALLWESTID</b><br>Template: <b>T192014</b><br>Prelogin: <b>P862557</b><br>PM: 824 - Chris Ward<br>PB:<br>Shipped Via: <b>FedEX Ground</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |
| Project Description:<br><b>COTTONWOOD Silt + WW IMPROVEMENTS</b>                                                                  |           | City/State Collected: <b>COTTONWOOD, ID</b> |       | Please Circle:<br>PT MT CT ET                                                                                                                                                                                                                                                                           |      |                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                               |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| Phone: <b>208-743-5710</b>                                                                                                        |           | Client Project #<br><b>320-167E</b>         |       | Lab Project #<br><b>ALLWESTID-TURPIN</b>                                                                                                                                                                                                                                                                |      | P.O. #<br><b>320-167E</b>                                                                                                |   | Quote # <b>—</b>                                                                                                                                                                                                                                                                                                                                                                              |   | NH <sub>3</sub> , NITRATE 4ozClr-NoPres<br>PH, PTMAR 2ozClr-NoPres<br>SPCON, TS 4ozClr-NoPres |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| Collected by (print):<br><b>SHAWN TURPIN</b>                                                                                      |           | Site/Facility ID # <b>—</b>                 |       | Rush? (Lab MUST Be Notified)<br><input type="checkbox"/> Same Day <input type="checkbox"/> Five Day<br><input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only)<br><input type="checkbox"/> Two Day <input type="checkbox"/> 10 Day (Rad Only)<br><input type="checkbox"/> Three Day |      | Date Results Needed<br><b>STANDARD TAT</b>                                                                               |   | No. of Cntrs                                                                                                                                                                                                                                                                                                                                                                                  |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| Immediately Packed on Ice N <input type="checkbox"/> Y <input checked="" type="checkbox"/>                                        |           |                                             |       |                                                                                                                                                                                                                                                                                                         |      |                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                               |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| Sample ID                                                                                                                         | Comp/Grab | Matrix *                                    | Depth | Date                                                                                                                                                                                                                                                                                                    | Time |                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                               |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| HA-1 @ 0-1'                                                                                                                       | Comp      | SS                                          | 0-1'  | 9-9-21                                                                                                                                                                                                                                                                                                  | 0900 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -01 |
| HA-1 @ 1-2'                                                                                                                       |           | SS                                          | 1-2'  |                                                                                                                                                                                                                                                                                                         | 0900 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -02 |
| HA-1 @ 2-3'                                                                                                                       |           | SS                                          | 2-3'  |                                                                                                                                                                                                                                                                                                         | 0900 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -03 |
| HA-2 @ 0-1'                                                                                                                       |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1000 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -04 |
| HA-2 @ 1-2'                                                                                                                       |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1000 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -05 |
| HA-2 @ 2-2 1/2'                                                                                                                   |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1000 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -08 |
| MA-3 @ 0-1'                                                                                                                       |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1115 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -07 |
| MA-3 @ 1-2'                                                                                                                       |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1115 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -08 |
| HA-3 @ 2-3'                                                                                                                       |           | SS                                          |       |                                                                                                                                                                                                                                                                                                         | 1115 | 3                                                                                                                        | X | X                                                                                                                                                                                                                                                                                                                                                                                             | X |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -09 |
| * Matrix: SS - Soil AIR - Air F - Filter<br>GW - Groundwater B - Bioassay<br>WW - WasteWater<br>DW - Drinking Water<br>OT - Other |           |                                             |       |                                                                                                                                                                                                                                                                                                         |      |                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                               |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
| Remarks:                                                                                                                          |           |                                             |       | pH _____ Temp _____                                                                                                                                                                                                                                                                                     |      |                                                                                                                          |   | Flow _____ Other _____                                                                                                                                                                                                                                                                                                                                                                        |   |                                                                                               |  | Sample Receipt Checklist<br>COC Seal Present/Intact: <input type="checkbox"/> NP <input checked="" type="checkbox"/> Y <input type="checkbox"/> N<br>COC Signed/Accurate: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>Bottles arrive intact: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>Correct bottles used: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>Sufficient volume sent: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>If Applicable<br>VOA Zero Headspace: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>Preservation Correct/Checked: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N<br>RAD Screen <0.5 mR/hr: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N |     |
| Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier                |           |                                             |       | Tracking # <b>5016 1236 8829</b>                                                                                                                                                                                                                                                                        |      |                                                                                                                          |   |                                                                                                                                                                                                                                                                                                                                                                                               |   |                                                                                               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |
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Appendix E4: Aquatic Resources Delineation

**Aquatic Resources Delineation Report for the  
Cottonwood Creek Watershed Flood Protection & Agricultural  
Water Management Project**  
*Idaho County, Idaho*

Prepared for  
Natural Resources Conservation Service

Prepared by  
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2760 W. Excursion Lane, Suite 400  
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**June 2025**

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## Executive Summary

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), along with the City of Cottonwood are proposing the Cottonwood Creek Watershed Flood Protection & Agricultural Water Management Project (Proposed Project) in Idaho County, Idaho. The Proposed Project would include the following elements:

- **Main Street Alignment**—Realign the main channel beneath Main Street. Work would include a new reinforced concrete box conduit and new inlet structures. The new alignment would re-route the main channel flow from the west end of the city to the existing Cottonwood Creek channel near U.S. Highway 95.
- **King Street Improvements**—Upgrade flood conveyance to pass floodwaters from the northwest boundary of the city through the fairgrounds and along King Street to Cottonwood Creek.
- **Creek Crossings and Channel Enhancement**—Replace two culverts at creek crossings and conduct creek improvements along East Road between the crossings. Replace one culvert at Maple Street, where flooding has been observed upstream of this culvert, due to inadequate capacity.
- **Channel Enhancements** – Remove select Cottonwood trees, stumps, and flood debris within the Cottonwood Creek channel along East Road to improve safety and access during high water events. Vegetation along the Cottonwood Creek would be added to restabilize the bank and improve fish and wildlife habitat.
- **Lagoon Protection** —Armor existing lagoon treatment facilities to mitigate erosion of the stream into the facility embankments, reducing potential for discharge of raw sewage into the stream.

Three J-U-B biologist/wetland specialists conducted a field investigation on August 11 and 12, and September 29, 2021, to identify and delineate wetlands and waters in and near the 1,099 - acre Study Area using routine delineation methodology. The delineation was conducted in a manner to ensure 100 percent visual coverage of the Study Area. The Study Area was evaluated for the presence of wetlands and natural drainages, and the delineation was conducted in accordance with methods described in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the most recent version of the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

Four types of water features were mapped in the Study Area: wetlands, streams, ditches, and ponds. Two wetlands, one stream, five ditches, and two ponds were mapped in the Study Area. Collectively, 0.22 acres of wetlands, 6.14 acres of linear features, and 9.08 acres of ponds for a total of 15.44 acres of aquatic resources were mapped within the Study Area. Cottonwood Creek is a tributary to the South Fork Clearwater River, which is a jurisdictional water of the U.S. (WOTUS). As such, Cottonwood Creek is a WOTUS. Because Wetland 1 is adjacent to Cottonwood Creek, it would also be a jurisdictional WOTUS. Wetland 2 is an isolated feature and lacks connection with other WOTUS. As such, Wetland 2 is not a jurisdictional WOTUS. Ditches 2 and

3 appear to connect with Cottonwood Creek; Ditch 4 connects with Shebang Creek, which is connected to Cottonwood Creek. Accordingly, under pre-2015 rules, Ditches 2-5 are jurisdictional WOTUS. Ditch 1 and the ponds are non-jurisdictional as they lack a connection to a WOTUS.

Proposed Project implementation could potentially result in permanent impacts to federal and/or state jurisdictional wetlands and other waters identified in the Study Area. Impacts to jurisdictional waters would require preparing a Joint Application for Permits for submittal to USACE (Section 404 permit), Idaho Department of Water Resources (Stream Channel Alteration Permit), and Idaho Department of Environmental Quality (Water Quality Certification).

## 1.1 Introduction

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), along with the City of Cottonwood are proposing the Cottonwood Creek Watershed Flood Protection & Agricultural Water Management Project (Proposed Project) in Idaho County, Idaho (Figure 1). The Proposed Project would: replace and relocate the existing concrete box culvert beneath Main Street; install approximately 5,855 linear feet of storm pipe to convey flood water from the north end of the City; improve existing flooded area structures to decrease peak flows and debris entering the system; construct a 170 ac-ft agricultural reservoir and pump station to store treated effluent; install site piping, transfer structures, irrigation pivots, and seasonal handline for land application; armor the storage lagoon embankments; replace two culvert bridge crossings near Airport Road; selectively remove trees from Cottonwood Creek, and clear flood debris from the Cottonwood Creek channel; and construct a recreational sidewalk/trail to connect the existing ball fields on the west end of the City to residential and downtown areas.

The Proposed Project Study Area (Study Area) encompasses 1,099 acres and occurs on either side of U.S. Route 95 (US-95). The Study Area encompasses the Proposed Project footprint, staging areas, and a buffer around the footprint and around Cottonwood Creek. (Figure 2). The Study Area occurs within Sections 5, 8, and 9 of Township 31 North, Range 1 East, Boise Meridian.

This report includes the results of a delineation of wetlands and waters that J-U-B ENGINEERS, Inc. (J-U-B) conducted in the Study Area. The delineation and report were completed for the Proposed Project to:

- Document existing site conditions;
- Determine the presence of wetlands and waters that occur in the Study Area using standardized diagnostic criteria; and,
- Delineate wetland and ordinary high water mark boundaries for features that may be under the jurisdictional authority of the U.S. Army Corps of Engineers (USACE).

Tasks that were completed include:

- Reviewing previous environmental reports, topographic maps and aerial photography;
- Reviewing National Wetlands Inventory (NWI) data and maps, National Hydrography Dataset (NHD) and topographic maps, and published soil survey data and maps;
- Conducting a field survey of the Study Area to locate and map all potential waters of the U.S., including wetlands;
- Documenting soil conditions, hydrological conditions, and plant community composition of potential wetlands in accordance with the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008a), and using the *National Wetland Plant List: 2018 Wetland Ratings* to determine plant wetland status (USACE 2018); and,

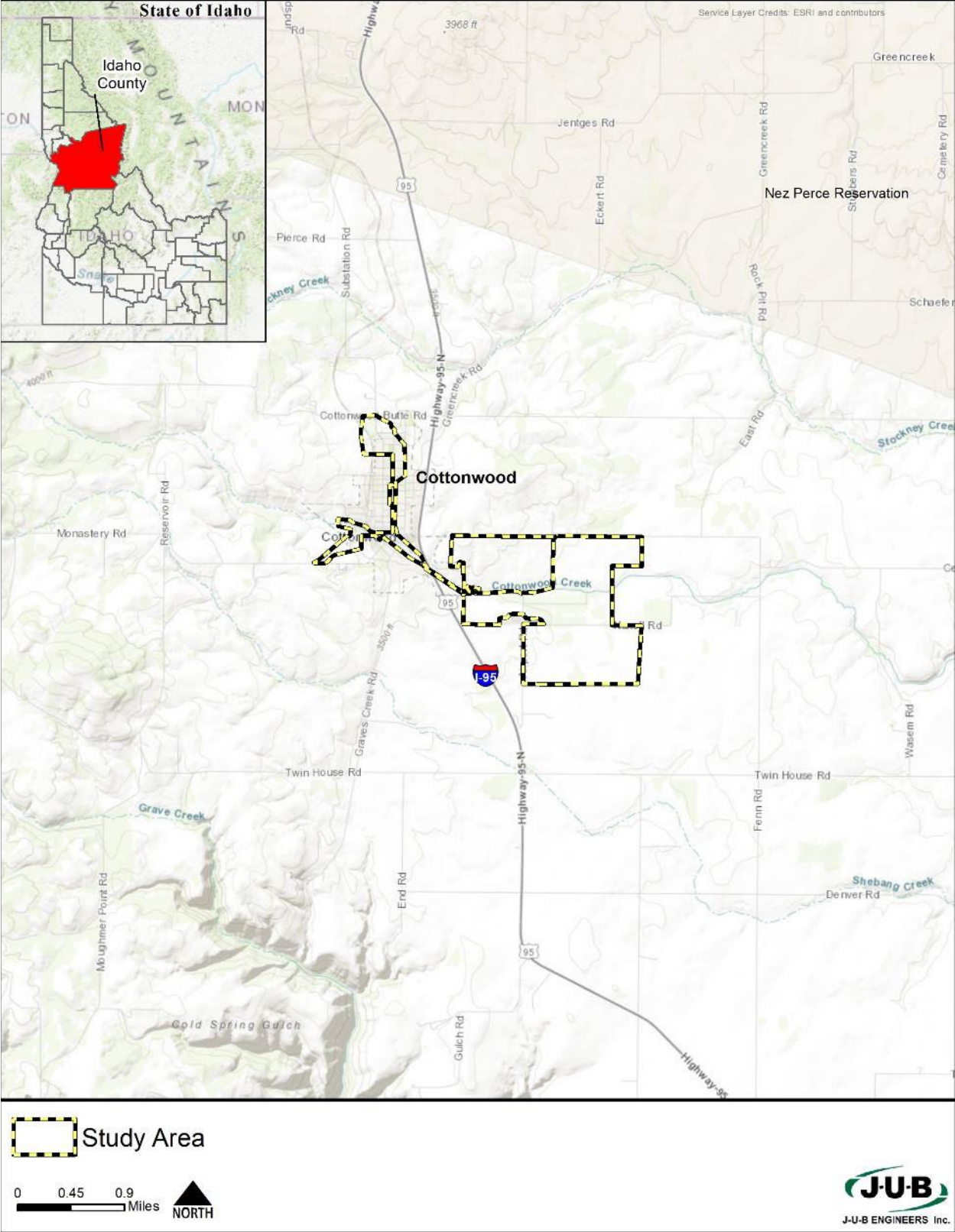


Figure 1: Vicinity Map



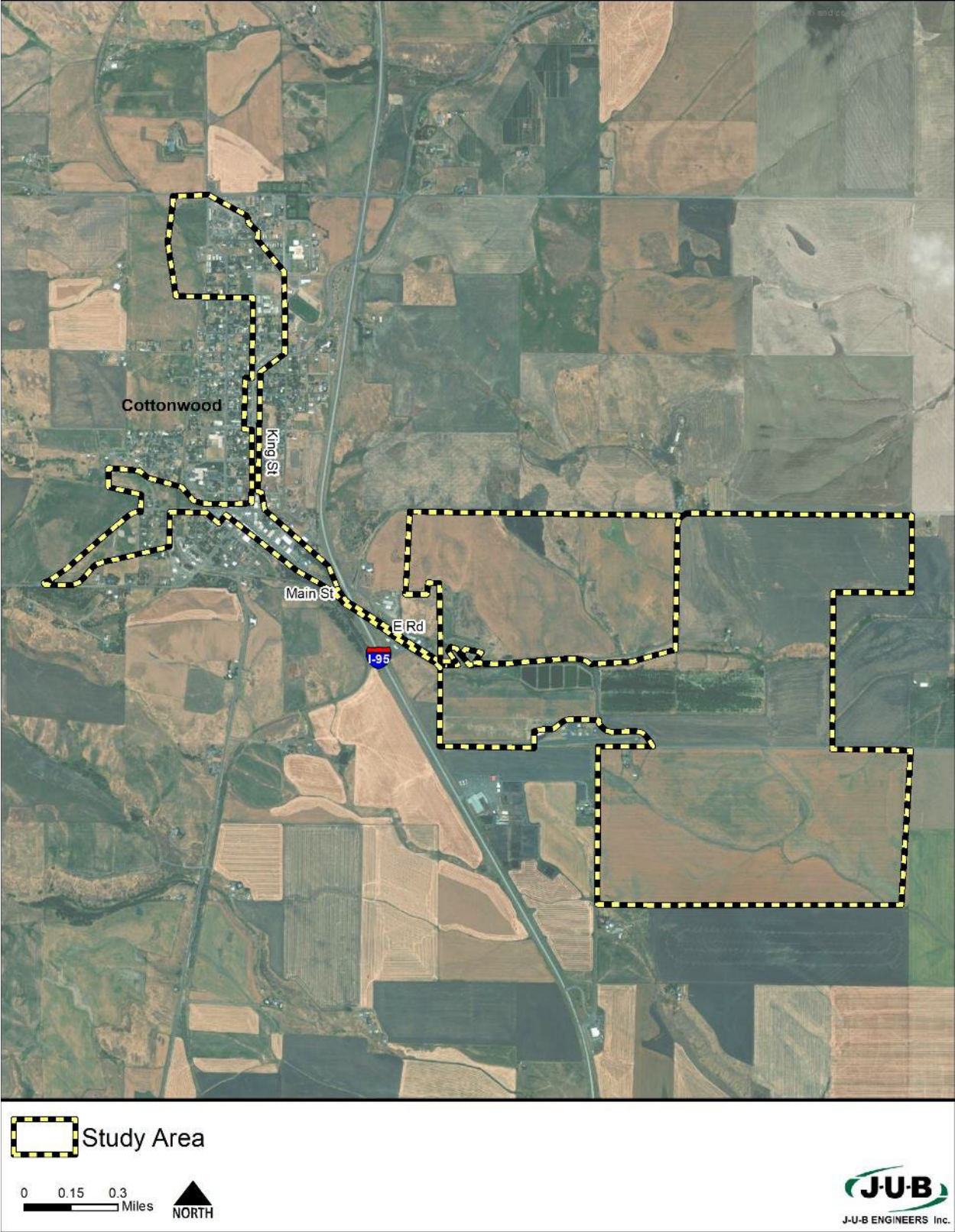


Figure 2: Study Area



- Determining potential waters of the U.S. at the Ordinary High Water Mark (OHWM) using *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b).

This report summarizes the distribution of wetland and water features that were found in the Study Area. It follows the minimum standards for delineation guidelines outlined by the USACE Walla Walla District (USACE 2019).

## 1.2 Contact Information

The Proposed Project applicant is the City of Cottonwood. The contact is Carol Altman, who can be reached at:

Mailing address: 506 King Street, POB 571

Email address: cottonwd@idaho.net

Phone number: 208-962-3231

## 1.3 Survey Area Location

The Study Area is in Idaho County and includes the City of Cottonwood on the west side and unincorporated Idaho County on the east side (see Figures 1–2). Most of the boundary of Cottonwood occurs west of US-95. The western portion of the Study Area predominantly occurs in residential and commercially developed areas with some recreational, agricultural, and undisturbed areas. The eastern portion of the Study Area predominantly occurs in agricultural land with some rural residential areas and wastewater structures also present.

To access the western portion of the Study Area, head west off of US-95 to Main Street and drive along the main roads in Cottonwood, including Main Street, Front Street, King Street, Maple Street, and Lewiston Street (above Myrtle Street). To access the eastern portion of the Study Area, take E Road off of US-95 and follow that road along the Study Area boundary. Also, drive past the airport on Airport Road to see the Study Area to the east.

# 2 Methods

A literature review and database search were conducted prior to performing field investigations. The NWI (USFWS 2021) was searched for known and estimated occurrences of wetlands, and USGS 7.5-minute topographic maps and the NHD were evaluated for the presence of known natural drainage features and other potential waters occurring in and near the Study Area (USGS 2021). Aerial imagery was reviewed to identify differences in vegetative cover, slope, and general terrain that can be indicative of the presence of waters (ArcGIS Online 2021; Google Earth 2021). Weather and precipitation data were obtained from the Western Regional Climate Center (WRCC; WRCC 2021) and soils data were obtained from the Web Soil Survey (USDA-NRCS 2021a).

Three J-U-B biologist/wetland specialists conducted a field investigation on August 11 and 12, and September 29, 2021, to identify and delineate wetlands and waters in and near the Study

Area using routine delineation methodology. The delineation was conducted in a manner to ensure 100 percent visual coverage of the Study Area. The Study Area was evaluated for the presence of wetlands and natural drainages, and the delineation was conducted in accordance with methods described in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the most recent version of the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008a).

The Study Area was inspected for wetland indicators such as hydric soils, hydrophytic vegetation, and hydrology. When potential wetland conditions were identified, paired sample points were located in the wetland and upland sides of the feature to characterize existing conditions and to identify and refine the wetland boundary. At each sample point, the presence or absence of hydrologic indicators was noted, soils were characterized, and vegetation was analyzed following standard procedures. These data were recorded in USACE Arid West Region Wetland Determination Data Forms (Appendix A).

Sample points and wetland boundaries were mapped with an EOS Arrow 100 Geographic Positioning System (GPS) unit to collect sub-meter accurate data points. Representative photographs of delineated waters were recorded (Appendix B). Delineation maps were produced by overlaying the survey GPS data with recent color aerial imagery (Appendix C: Map Book).

## **2.1 Hydrophytic Vegetation**

Hydrophytic plants are those adapted to wet conditions. Dominant plant species were identified in accordance with the USACE 50/20 Rule. The *2018 National Wetland Plant List* was used to determine the wetland indicator classification of plant species identified at the sampling points and throughout the Study Area (USACE 2018). As necessary, plant species were identified using *Weeds of the West* (Whitson et al. 2012) and descriptions from the U.S. Department of Agriculture-Natural Resources Conservation Service Plants Database (USDA-NRCS 2021b).

## **2.2 Wetland Hydrology**

Analysis of wetland hydrology examines the presence, behavior, and indicators of water movement in wetlands. The *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* separates wetland hydrologic indicators into four groups (USACE 2008a):

- Group A: direct observation of surface water or groundwater
- Group B: evidence the area is subject to flooding or ponding
- Group C: evidence the soil is, or was recently, saturated
- Group D: vegetation and soil features that indicate recent (rather than historical) wet conditions

Within each group, indicators are divided into primary or secondary. In the absence of a primary indicator, two secondary indicators must be identified. These categories were used when determining if hydrologic indicators were present.

## 2.3 Hydric Soils

The NRCS defines hydric soils as those that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile (above 12- to 20-inch depth, depending on soil texture) (NRCS 2010). Soil samples were excavated, and soils were inspected to characterize soil profiles at each sample plot, when possible. Soil horizonation, texture, moisture content, depth to saturation, and/or standing water was noted for each soil pit. The presence or absence of particulate organic matter, redoximorphic features, depleted matrices, and other diagnostic characteristics were noted, as appropriate. Soil colors were determined using Munsell soil-color charts (*sensu* Munsell 2009).

## 2.4 Ordinary High Water Mark

Linear water features were assessed using methodologies and diagnostic characteristics presented in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b). The OHWM is delineated by identifying a variety of physical characteristics, primarily a topographic break in slope, change in vegetation characteristics, and change in sediment characteristics. Supporting indicators include drift/wrack, erosion/scour, bank undercutting, root exposure, point bars, water staining, litter removal, silt deposits, shelving, headcut, and macroinvertebrates (USACE 2008b).

# 3 Existing Conditions

## 3.1 Topography and Land Use

Land use in the eastern area is predominantly agricultural, including actively farmed areas, a balsam poplar (*Populus balsamifera*) stand, irrigation ditches, and storage lagoons. Surrounding land use includes additional agricultural land. Rural residential properties are sparsely scattered throughout the area. Land use in the eastern area is predominantly residential with some commercial property. An RV dump site and Cottonwood City Park occur within the northwestern portion of this area. Open natural areas occur in the southwestern portion of this area and are associated with a ditch that runs from west to east. Two baseball fields also occur in this area. Topography includes gently rolling hills with gradual changes in elevation. Elevation in the Study Area ranges from 3,720 feet in the southwest portion to 3,340 feet in the southeast portion of the Study Area.

## 3.2 Climate

Climatic data was obtained from the WRCC Cooperative Observer Program ID: 102159, located at Cottonwood 2 WSW, Idaho station, which is in Cottonwood. On average, temperatures at this station range from an average minimum of 23.5 degrees Fahrenheit (°F) in January to an average maximum of 79.6 °F in August (WRCC 2021). The average annual precipitation is 22.12 inches, with rain occurring throughout the year (WRCC 2021). The average annual snowfall is 45.6 inches and occurs primarily from November to March (WRCC 2021).

The NRCS WETS table for Cottonwood 2 WSW, Idaho is the nearest WETS station. The WETS table indicated that the growing season extends from April 18 to October 27 during the normal growing period (28°F or higher @ 70 percent) (NRCS-USDA 2021c). The maximum temperature during the survey was 101°F (during both survey days), which is higher than the average high temperature of 83° for those dates (NRCS-USDA 2021c). The month of July in 2021 was warmer than average.

### 3.3 Floodplains

The Study Area occurs in FIRM Panel 1600670005B. The Study Area occurs in Flood Zone A, which is defined as an area with 1% chance of annual flood, or 100-year flood zones (FEMA 2021). The Flood Zone A area, within the Study Area, occurs along Cottonwood Creek.

### 3.4 Soils

Nine soil types occur in the Study Area (Table 1; USDA-NRCS 2021a). Nez Perce silt loam occurs in 61.1% of the Study Area and the next most prevalent soil type is Westlake silt loam with only 10.2% of the Study Area (Table 1; Figure 3). None of the soil types are considered hydric (USDA-NRCS 2021a).

**Table 1: Soil Types in the Study Area**

| Soil Type                                   | Acres | Percent of Study Area |
|---------------------------------------------|-------|-----------------------|
| Fenn silty clay, 2 to 7 percent slopes      | 52.2  | 4.8%                  |
| Ferdinand silt loam, 7 to 25 percent slopes | 66.1  | 6.0%                  |
| Ferdinand-Flybow-Riggins complex            | 0.2   | <0.1%                 |
| Ferdinand-Riggins complex                   | 92.9  | 8.5%                  |
| Meland silt loam, 7 to 25 percent slopes    | 9.9   | 0.9%                  |
| Nez Perce silt loam, 2 to 7 percent slopes  | 671   | 61.1%                 |
| Shebang silt loam, 2 to 7 percent slopes    | 44.6  | 4.1%                  |
| Uhlorn silt loam, 2 to 7 percent slopes     | 49.4  | 4.5%                  |
| Westlake silt loam                          | 112.3 | 10.2%                 |

### 3.5 USGS Topographic Drainages and National Wetlands Inventory

The NHD and topographic map depict 16 features as crossing through the Study Area (Figure 4). However, it should be noted that the NHD divides singular features, such as rivers, into multiple segments such that a single river can be made up of multiple features in the NHD. Of these 16 features, three are associated with Cottonwood Creek, and 13 are associated with unnamed features, which appear to be predominantly irrigation ditches. Cottonwood Creek enters the Study Area from the west and travels east outside the Study Area and eventually connects with the South Fork Clearwater River.

The NWI database identified 10 features as occurring within the Study Area. Five features are freshwater emergent wetlands (PEM1C), three features are freshwater ponds (two PABHh and one PABKx), one feature is a freshwater forested/shrub wetland (PSSA), and one feature is a riverine wetland (R4SBCx). PEM1C features are classified as palustrine, emergent, persistent,

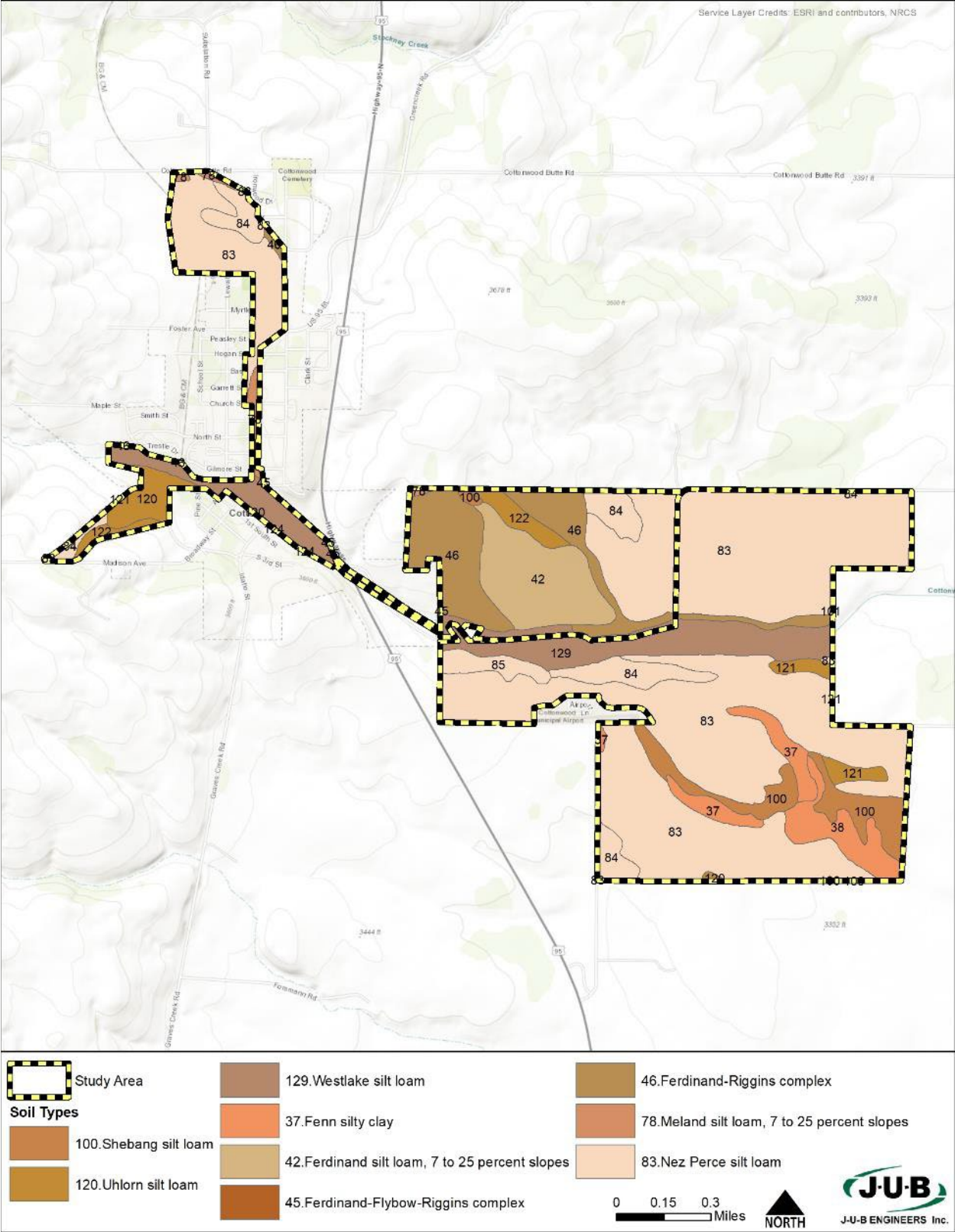
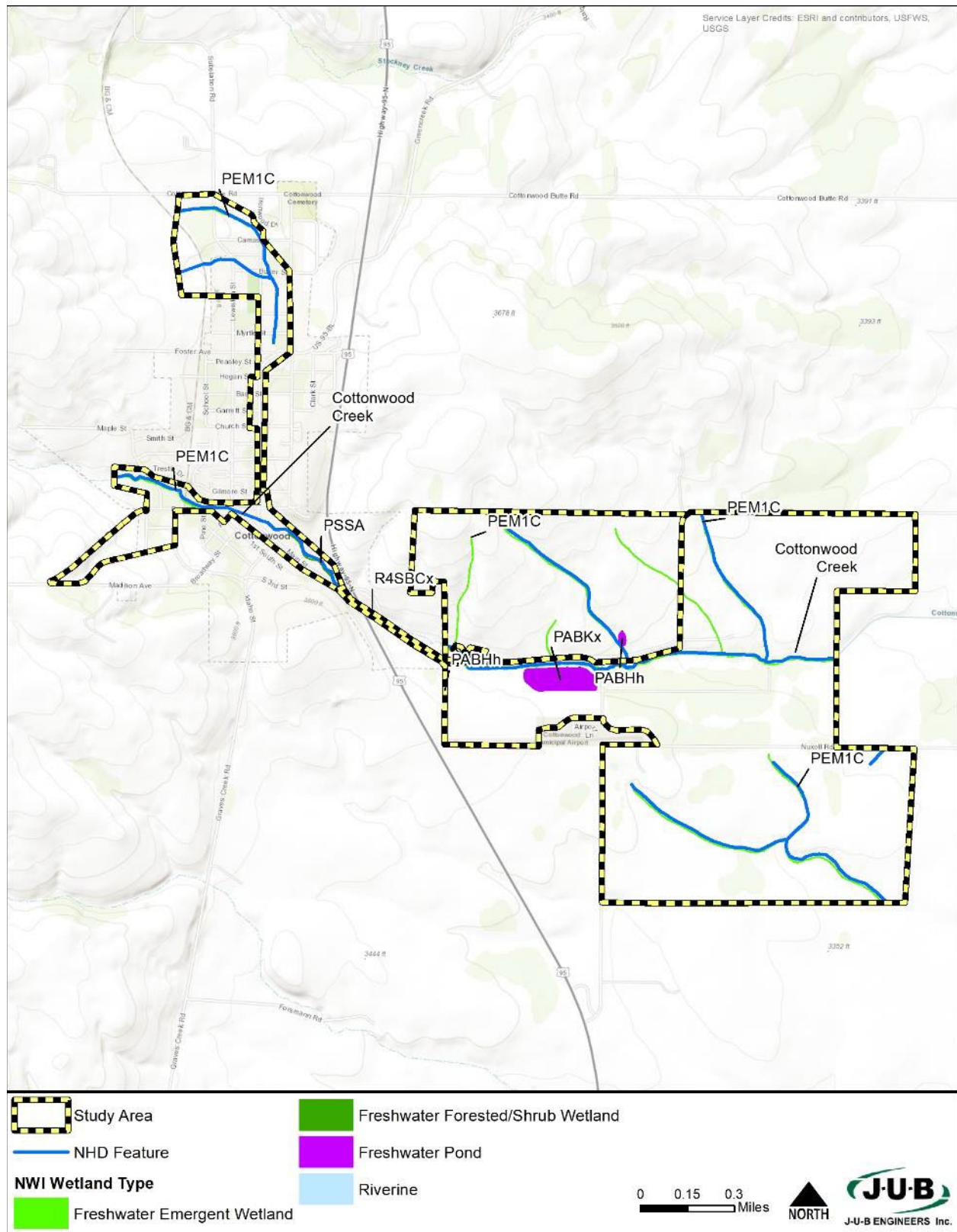


Figure 3: Soils Map





**Figure 4: National Hydrography Dataset and National Wetland Inventory**

seasonally flooded wetlands. PABHh features are classified as palustrine, aquatic bed, permanently flooded, and diked impounded ponds. PABKx features are classified as palustrine, aquatic bed, artificially flooded, and excavated ponds. PSSA features are classified as palustrine, scrub-shrub, and temporary flooded wetlands. Lastly, R4SBCx features are classified as riverine, intermittent, streambed, seasonally flooded, and excavated features (Cowardin et al. 1979).

In general, the riverine feature roughly matched the NHD feature. The emergent wetlands, forested/shrub wetland, and one of the three pond features were not field-confirmed as occurring in the NWI location. The pond feature is extant, but it occurs outside the Study Area. The NWI wetland areas lacked wetland indicators and were generally found to contain desiccated vegetation or disturbance from past agricultural activities.

## 4 Aquatic Resources

### 4.1 Type and Condition of Aquatic Resources

Four types of water features were mapped in the Study Area: wetlands, streams, ditches, and ponds (Table 2; Figure 5; Appendix C: Wetland Map Book). Two wetlands, one stream, five ditches, and two ponds were mapped in the Study Area. Wetland boundaries generally matched where vegetation transitions occurred, and upland or riparian species began to dominate. Collectively, 0.22 acres of wetlands, 6.14 acres of linear features, and 9.08 acres of ponds for a total of 15.44 acres of aquatic resources were mapped within the Study Area (Table 2; Figure 5; Appendix C: Wetland Map Book).

Wetland 1 and Wetland 2 are classified as PEM1C wetlands. Wetland 1 occurs north and upland of Cottonwood Creek. It receives water from upslope runoff and an irrigation pipe that occurs at the north end of the wetland (outside the Study Area). Wetland 1 encompasses approximately 0.15 acres within the Study Area, but it extends north of the Study Area. This wetland was dominated by cattails (*Typha latifolia*) and sedge (*Carex* sp.)

Wetland 2 occurs in an undisturbed area surrounded by agriculture. It receives water from upslope runoff that forms a non-wetland swale, which abuts the wetland. This wetland is an isolated feature. Wetland 2 encompasses approximately 0.06 acres within the Study Area. This wetland was dominated by Baltic rush (*Juncus balticus*).

Pond 1 comprises five separate wastewater lagoons. Together, these lagoons encompass approximately 8.84 acres. Reed canarygrass (*Phalaris arundinacea*) grew in high density around the lagoons, mostly to the south and to the east between the eastern most lagoon and Airport Road. Pond 2 is an agricultural pond with mostly ruderal vegetation and agricultural land around it. It encompasses approximately 0.24 acres.

The one stream in the Study Area is Cottonwood Creek. It flows through the City, past the lagoons, and off site. Portions of the creek have been channelized. Cottonwood Creek

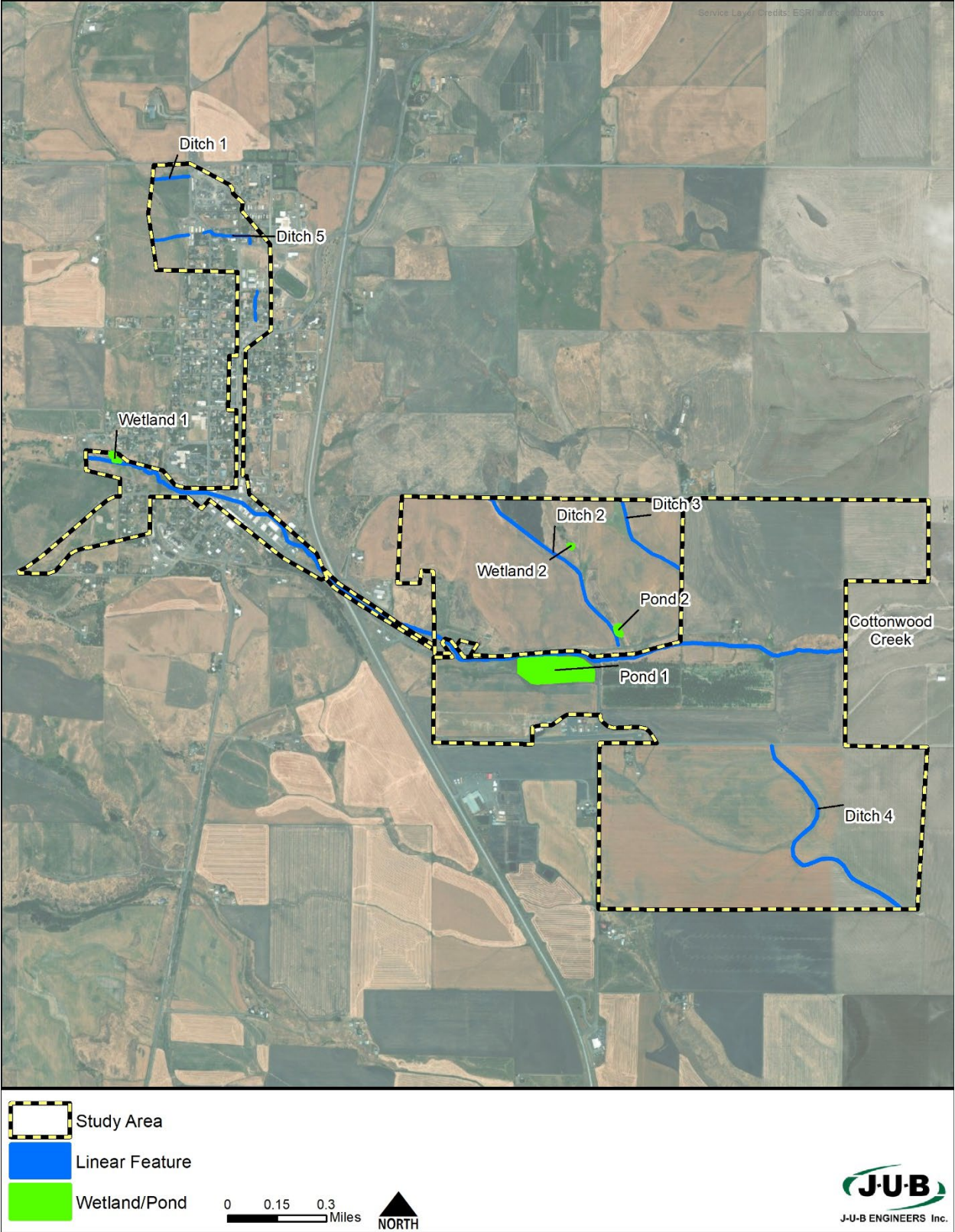


Figure 5: Delineated Features



encompasses 3.94 acres within the Study Area and extends approximately 13,090 feet (2.48 miles) across the Study Area.

Five ditches and one stream occur in the Study Area (Table 2). Ditches 1 and 5 occur on the northwest portion of the Study Area. Ditches 2 and 3 occur on the eastern portion of the Study Area, north of Cottonwood Creek. Ditch 2 passes near Pond 2. Ditch 4 also occurs on the eastern portion of the Study Area, south of Cottonwood Creek. A swale from the northwest leads to Ditch 4, but the swale lacks bed and bank.

**Table 2: Aquatic Resources Mapped in Study Area**

| Feature ID                  | Acreeage        | Length<br>(feet)   | Classification<br>(Cowardin) | Latitude<br>(midpoint) | Longitude<br>(midpoint) | WOTUS |
|-----------------------------|-----------------|--------------------|------------------------------|------------------------|-------------------------|-------|
| Cottonwood Creek            | 3.94            | 13,090             | Intermittent                 | 46.044558              | -116.336028             | Yes   |
| Ditch 1                     | 0.09            | 584                | Intermittent                 | 46.033914              | -116.312697             | No    |
| Ditch 2                     | 0.50            | 3,281              | Intermittent                 | 46.046946              | -116.324149             | Yes   |
| Ditch 3                     | 0.23            | 1,513              | Intermittent                 | 46.045863              | -116.329498             | Yes   |
| Ditch 4                     | 1.30            | 4,303              | Intermittent                 | 46.062758              | -116.354232             | Yes   |
| Ditch 5                     | 0.09            | 1,866              | Intermittent                 | 46.060195              | -116.353772             | Yes   |
| <b>Linear Feature Total</b> | <b>6.14 ac</b>  | <b>25,233 feet</b> |                              |                        |                         |       |
| Pond 1                      | 8.84            | NA                 | PABKx                        | 46.041215              | -116.329684             | No    |
| Pond 2                      | 0.24            | NA                 | PABHh                        | 46.042985              | -116.325717             | No    |
| <b>Pond Feature Totals</b>  | <b>9.08 ac</b>  |                    |                              |                        |                         |       |
| Wetland 1                   | 0.15            | NA                 | PEM1C                        | 46.050443              | -116.357674             | Yes   |
| Wetland 2                   | 0.06            | NA                 | PEM1C                        | 46.046670              | -116.328738             | No    |
| <b>Wetland Total</b>        | <b>0.22 ac</b>  |                    |                              |                        |                         |       |
| <b>Grand Total</b>          | <b>15.44 ac</b> | <b>25,233 feet</b> |                              |                        |                         |       |

Cottonwood Creek is a tributary to the South Fork Clearwater River, which is a jurisdictional water of the U.S. (WOTUS). As such, Cottonwood Creek is a WOTUS. Because Wetland 1 is adjacent to Cottonwood Creek, it would also be a jurisdictional WOTUS. Ditches 2, 3, and 5 appear to connect with Cottonwood Creek; Ditch 4 connects with Shebang Creek, which is connected to Cottonwood Creek. Accordingly, under pre-2015 rules, Ditches 2-4 are jurisdictional WOTUS.

#### 4.2 Non-jurisdictional Aquatic Resources

Wetland 2 is an isolated feature and lacks connection with other WOTUS. As such, Wetland 2 is not a jurisdictional WOTUS. Ditch 1 is not jurisdictional as it does not connect with any WOTUS. Pond 1 and Pond 2 are non-jurisdictional as they are artificial features and lack connection with a WOTUS.

#### 4.3 Wetland Hydrology

The primary hydrologic indicators observed in the field were saturation (A3) and hydrogen sulfide odor (C1). Secondary indicators included a combination of saturation visible on aerial imagery (C9) and the FAC-Neutral test (D5). Wetland 1 occurs on a slope and at the toe of the slope and receives water from runoff and a ditch north of the wetland and Study Area. Wetland 2 occurs in

a swale that conveys water from areas north of the Study Area down to the wetland. Hydrologic data collected at the sampling points are provided in Appendix A.

#### 4.4 Hydric Soil

The primary hydric soil indicators observed in the field were loamy mucky mineral (F1), hydrogen sulfide (A4), and redox dark surface (F6). Indicator F1 is a layer of mucky loamy material at least four inches thick containing organic carbon of at least eight percent in mineral soils (USACE 2008b). Indicator A4 has soils with a hydrogen sulfide (rotten egg) odor within 12 inches of the soil surface, and it is often found in areas that are permanently saturated or inundated, where the odor is due to sulfur reduction (USACE 2008b). Indicator F6 is a layer at least four inches thick with, in this case, a matrix value of three or less and chroma of two or less with five percent or more redox concentrations (USACE 2008b). Hydric soil data collected at the sampling points are provided in Appendix A.

#### 4.5 Hydrophytic Vegetation

Three vegetation communities occur in the Study Area: wetland, riparian, and grasslands. Wetland vegetation primarily included sedge (*Carex* sp.), Baltic rush (*Juncus balticus*), cattail (*Typha latifolia*), and reed canarygrass (*Phalaris arundinacea*). Riparian vegetation primarily included reed canarygrass, willow (*Salix* sp.) and serviceberry (*Amelanchier alnifolia*). Grassland vegetation primarily included cheatgrass (*Bromus tectorum*) and squirreltail (*Elymus elymoides*). Ruderal plants occurred throughout the Study Area and the most common were cheatgrass, Russian thistle (*Salsola tragus*) and rush skeletonweed (*Chondrilla juncea*).

All plant species identified during the survey are listed in Table 3 below.

**Table 3: Plant Species Recorded within the Study Area**

| Scientific Name              | Common Name          | Wetland Indicator Status |
|------------------------------|----------------------|--------------------------|
| <i>Amelanchier alnifolia</i> | Serviceberry         | FACU                     |
| <i>Asclepias speciosa</i>    | Showy milkweed       | FAC                      |
| <i>Agropyron cristatum</i>   | Crested wheatgrass   | UPL                      |
| <i>Agrostis capillaris</i>   | Common bent          | FAC                      |
| <i>Bassia scoparia</i>       | Kochia               | FAC                      |
| <i>Bromus tectorum</i>       | Cheatgrass           | UPL                      |
| <i>Carex</i> sp.             | Sedge                | OBL                      |
| <i>Centaurea melitensis</i>  | Maltese star-thistle | UPL                      |
| <i>Chondrilla juncea</i>     | Rush skeletonweed    | UPL                      |
| <i>Cirsium arvense</i>       | Canada thistle       | FACU                     |
| <i>Elymus elymoides</i>      | Squirreltail         | FACU                     |
| <i>Equisetum hyemale</i>     | Scouring rush        | FACW                     |
| <i>Juncus balticus</i>       | Baltic rush          | FACW                     |
| <i>Lactuca serriola</i>      | Prickly lettuce      | FACU                     |
| <i>Liatris punctata</i>      | Dotted blazing star  | UPL                      |
| <i>Medicago sativa</i>       | Alfalfa              | UPL                      |
| <i>Melilotus albus</i>       | White sweetclover    | UPL                      |
| <i>Mentha</i> sp.            | Mint                 | FACW                     |



|                                   |                      |      |
|-----------------------------------|----------------------|------|
| <i>Phalaris arundinacea</i>       | Reed canarygrass     | FACW |
| <i>Populus balsamifera</i>        | Balsam poplar        | FAC  |
| <i>Salix exigua</i>               | Coyote willow        | FACW |
| <i>Salsola tragus</i>             | Russian thistle      | FACU |
| <i>Scirpus microcarpus</i>        | Smallfruit bulrush   | OBL  |
| <i>Triticum sp.</i>               | Wheat                | UPL  |
| <i>Typha latifolia</i>            | Cattail              | OBL  |
| <i>Veronica anagalis aquatica</i> | Blue water speedwell | OBL  |
| <i>Verbascum Thapsus</i>          | Common mullein       | FACU |

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## 5 Conclusions

Two wetlands, Cottonwood Creek, five ditches, and two ponds were mapped in the Study Area (see Table 2; Figure 5; Appendix C). Collectively, 0.22 acres of wetlands, 6.14 acres of linear features, and 9.08 acres of ponds for a total of 15.44 acres of aquatic resources were mapped within the Study Area. Cottonwood Creek is a tributary to the South Fork Clearwater River, which is a jurisdictional water of the U.S. (WOTUS). As such, Cottonwood Creek is a WOTUS. Because Wetland 1 is adjacent to Cottonwood Creek, it would also be a jurisdictional WOTUS. However, Wetland 2 is not a jurisdictional WOTUS because it is an isolated feature, lacking connection with other WOTUS. Ditches 2, 3, and 5 appear to connect with Cottonwood Creek; Ditch 4 connects with Shebang Creek, which is connected to Cottonwood Creek. Accordingly, under pre-2015 rules, Ditches 2-5 are jurisdictional WOTUS. Ditch 1 and the ponds are non-jurisdictional as they lack a connection to a WOTUS.

Proposed Project implementation could potentially result in permanent impacts to federal and/or state jurisdictional wetlands and other waters identified in the Study Area. Impacts to jurisdictional waters would require preparing a Joint Application for Permits for submittal to USACE (Section 404 permit), Idaho Department of Water Resources (Stream Channel Alteration Permit), and Idaho Department of Environmental Quality (Water Quality Certification). It should be noted that the final authority regarding jurisdictional determination and wetland delineations rests with the appropriate regulatory agencies.

## 6 References

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**Appendix A: Wetland Determination Data Forms**

## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: W1  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S5 T31N R01E  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 5  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.050326 Long: -116.357621 Datum: NAD 1983  
 Soil Map Unit Name: Westlake silt loam NWI classification: \_\_\_\_\_  
 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 <input type="radio"/> No <input checked="" type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                                                 | Absolute % Cover                | Dominant Species? | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>2</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> % (A/B)                                                                                                                                                                                                                                                                                                                                           |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
|------------------------------------------------------------------------------------------------------|---------------------------------|-------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--|-------------|----|----------|--------------|----|----------|-------------|--|---------|--------------|--|---------|-------------|--|---------|----------------|---------|---------|
| 1. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 2. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 3. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 4. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Sapling/Shrub Stratum                                                                                |                                 |                   |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th colspan="2">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td>90</td> <td>x 1 = 90</td> </tr> <tr> <td>FACW species</td> <td>10</td> <td>x 2 = 20</td> </tr> <tr> <td>FAC species</td> <td></td> <td>x 3 = 0</td> </tr> <tr> <td>FACU species</td> <td></td> <td>x 4 = 0</td> </tr> <tr> <td>UPL species</td> <td></td> <td>x 5 = 0</td> </tr> <tr> <td>Column Totals:</td> <td>100 (A)</td> <td>110 (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>1.1</u> | Total % Cover of: | Multiply by: |  | OBL species | 90 | x 1 = 90 | FACW species | 10 | x 2 = 20 | FAC species |  | x 3 = 0 | FACU species |  | x 4 = 0 | UPL species |  | x 5 = 0 | Column Totals: | 100 (A) | 110 (B) |
| Total % Cover of:                                                                                    | Multiply by:                    |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| OBL species                                                                                          | 90                              | x 1 = 90          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| FACW species                                                                                         | 10                              | x 2 = 20          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| FAC species                                                                                          |                                 | x 3 = 0           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| FACU species                                                                                         |                                 | x 4 = 0           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| UPL species                                                                                          |                                 | x 5 = 0           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Column Totals:                                                                                       | 100 (A)                         | 110 (B)           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Total Cover: _____ %                                                                                 |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Herb Stratum                                                                                         |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 1. <i>Carex sp.</i>                                                                                  | 60                              | Yes               | OBL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 2. <i>Typha latifolia</i>                                                                            | 30                              | Yes               | OBL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 3. <i>Mentha sp.</i>                                                                                 | 10                              | No                | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 4. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 5. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 6. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 7. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 8. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Total Cover: <u>100</u> %                                                                            |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Woody Vine Stratum                                                                                   |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 1. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| 2. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Total Cover: _____ %                                                                                 |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| % Bare Ground in Herb Stratum _____ %                                                                | % Cover of Biotic Crust _____ % |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| <b>Hydrophytic Vegetation Present?</b> Yes <input type="radio"/> No <input checked="" type="radio"/> |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |
| Remarks: <u>mentha either M. arvensis or M. aquatica, both FACW</u>                                  |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |  |         |                |         |         |

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## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: W2  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S9 T31N R01E  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 2  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.046609 Long: -116.328685 Datum: NAD 1983  
 Soil Map Unit Name: Ferdinand-riggins complex NWI classification: NA  
 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 <input type="radio"/> No <input checked="" type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                              | Absolute % Cover           | Dominant Species? | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>1</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> % (A/B)                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|----------------------------|-------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Sapling/Shrub Stratum</b>                                                      |                            |                   |                  | <b>Prevalence Index worksheet:</b><br>Total % Cover of: Multiply by:<br>OBL species <u>    </u> x 1 = <u>0</u><br>FACW species <u>95</u> x 2 = <u>190</u><br>FAC species <u>    </u> x 3 = <u>0</u><br>FACU species <u>    </u> x 4 = <u>0</u><br>UPL species <u>5</u> x 5 = <u>25</u><br>Column Totals: <u>100</u> (A) <u>215</u> (B)<br>Prevalence Index = B/A = <u>2.15</u>                                                                                                                 |
| 1.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Herb Stratum</b>                                                               | Total Cover: <u>    </u> % |                   |                  | <b>Hydrophytic Vegetation Indicators:</b><br><input checked="" type="checkbox"/> Dominance Test is >50%<br><input checked="" type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup><br><input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)<br><input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)<br><br><sup>1</sup> Indicators of hydric soil and wetland hydrology must be present. |
| 1. <i>Juncus balticus</i>                                                         | 95                         | Yes               | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2. <i>Unknown aster</i>                                                           | 5                          | No                | UPL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 7.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Woody Vine Stratum</b>                                                         | Total Cover: <u>100</u> %  |                   |                  | <b>Hydrophytic Vegetation Present?</b> Yes <input type="radio"/> No <input checked="" type="radio"/>                                                                                                                                                                                                                                                                                                                                                                                           |
| 1.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2.                                                                                |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| % Bare Ground in Herb Stratum <u>    </u> % % Cover of Biotic Crust <u>    </u> % |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Remarks:                                                                          |                            |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: U1  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S5 T31N R01E  
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 2  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.049091 Long: -116.353946 Datum: NAD 1983  
 Soil Map Unit Name: Westlake silt loam NWI classification: NA  
 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 <input type="radio"/> No <input checked="" type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                                                 | Absolute % Cover                | Dominant Species?  | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>1</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> % (A/B)                                                                                                                                                                                                                                                                                                                                                                                                           |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
|------------------------------------------------------------------------------------------------------|---------------------------------|--------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--|-------------|--|----------------|--------------|-----------|------------------|-------------|--|----------------|--------------|-----------|-----------------|-------------|--|----------------|----------------|------------|--------------------|
| 1. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 2. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 3. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 4. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Sapling/Shrub Stratum                                                                                |                                 |                    |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th colspan="2">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species</td> <td><u>90</u></td> <td>x 2 = <u>180</u></td> </tr> <tr> <td>FAC species</td> <td></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species</td> <td><u>10</u></td> <td>x 4 = <u>40</u></td> </tr> <tr> <td>UPL species</td> <td></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals:</td> <td><u>100</u></td> <td>(A) <u>220</u> (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>2.2</u> | Total % Cover of: | Multiply by: |  | OBL species |  | x 1 = <u>0</u> | FACW species | <u>90</u> | x 2 = <u>180</u> | FAC species |  | x 3 = <u>0</u> | FACU species | <u>10</u> | x 4 = <u>40</u> | UPL species |  | x 5 = <u>0</u> | Column Totals: | <u>100</u> | (A) <u>220</u> (B) |
| Total % Cover of:                                                                                    | Multiply by:                    |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| OBL species                                                                                          |                                 | x 1 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| FACW species                                                                                         | <u>90</u>                       | x 2 = <u>180</u>   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| FAC species                                                                                          |                                 | x 3 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| FACU species                                                                                         | <u>10</u>                       | x 4 = <u>40</u>    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| UPL species                                                                                          |                                 | x 5 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Column Totals:                                                                                       | <u>100</u>                      | (A) <u>220</u> (B) |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Total Cover: _____ %                                                                                 |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Herb Stratum                                                                                         |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 1. <i>Phalaris arundinaceae</i>                                                                      | <u>90</u>                       | Yes                | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 2. <i>Cirsium arvense</i>                                                                            | <u>10</u>                       |                    | FACU             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 3. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 4. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 5. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 6. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 7. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 8. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Total Cover: <u>100</u> %                                                                            |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Woody Vine Stratum                                                                                   |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 1. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| 2. _____                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Total Cover: _____ %                                                                                 |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| % Bare Ground in Herb Stratum _____ %                                                                | % Cover of Biotic Crust _____ % |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| <b>Hydrophytic Vegetation Present?</b> Yes <input type="radio"/> No <input checked="" type="radio"/> |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |
| Remarks:                                                                                             |                                 |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |  |                |              |           |                  |             |  |                |              |           |                 |             |  |                |                |            |                    |

US Army Corps of Engineers

Arid West - Version 11-1-2006





## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: U2  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S5 T31N R01E  
 Landform (hillslope, terrace, etc.): toe of slope Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 1  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.050307 Long: -116.357622 Datum: NAD 1983  
 Soil Map Unit Name: Westlake silt loam NWI classification: NA  
 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 <input type="radio"/> No <input checked="" type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                                                 | Absolute % Cover                | Dominant Species? | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>1</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> % (A/B)                                                                                                                                                                                                                                                                                                                                                                                  |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
|------------------------------------------------------------------------------------------------------|---------------------------------|-------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--|-------------|----|----------|--------------|----|----------|-------------|--|---------|--------------|--|---------|-------------|----|-----------|----------------|-----|-------------|--------------------------------------|--|--|
| 1. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 2. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 3. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 4. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Sapling/Shrub Stratum                                                                                |                                 |                   |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th colspan="2">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td>12</td> <td>x 1 = 12</td> </tr> <tr> <td>FACW species</td> <td>10</td> <td>x 2 = 20</td> </tr> <tr> <td>FAC species</td> <td></td> <td>x 3 = 0</td> </tr> <tr> <td>FACU species</td> <td></td> <td>x 4 = 0</td> </tr> <tr> <td>UPL species</td> <td>80</td> <td>x 5 = 400</td> </tr> <tr> <td>Column Totals:</td> <td>102</td> <td>(A) 432 (B)</td> </tr> <tr> <td colspan="3">Prevalence Index = B/A = <u>4.24</u></td> </tr> </tbody> </table> | Total % Cover of: | Multiply by: |  | OBL species | 12 | x 1 = 12 | FACW species | 10 | x 2 = 20 | FAC species |  | x 3 = 0 | FACU species |  | x 4 = 0 | UPL species | 80 | x 5 = 400 | Column Totals: | 102 | (A) 432 (B) | Prevalence Index = B/A = <u>4.24</u> |  |  |
| Total % Cover of:                                                                                    | Multiply by:                    |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| OBL species                                                                                          | 12                              | x 1 = 12          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| FACW species                                                                                         | 10                              | x 2 = 20          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| FAC species                                                                                          |                                 | x 3 = 0           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| FACU species                                                                                         |                                 | x 4 = 0           |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| UPL species                                                                                          | 80                              | x 5 = 400         |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Column Totals:                                                                                       | 102                             | (A) 432 (B)       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Prevalence Index = B/A = <u>4.24</u>                                                                 |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Total Cover: _____ %                                                                                 |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Herb Stratum                                                                                         |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 1. <i>Carex sp.</i>                                                                                  | 10                              | No                | OBL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 2. <i>Melilotus albus</i>                                                                            | 80                              | Yes               | UPL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 3. <i>Equisetum hyemale</i>                                                                          | 10                              | No                | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 4. <i>Scirpus microcarpus</i>                                                                        | 2                               | No                | OBL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 5. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 6. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 7. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 8. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Total Cover: <u>102</u> %                                                                            |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Woody Vine Stratum                                                                                   |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 1. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| 2. _____                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Total Cover: _____ %                                                                                 |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| % Bare Ground in Herb Stratum _____ %                                                                | % Cover of Biotic Crust _____ % |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| <b>Hydrophytic Vegetation Present?</b> Yes <input type="radio"/> No <input checked="" type="radio"/> |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |
| Remarks:                                                                                             |                                 |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |    |          |              |    |          |             |  |         |              |  |         |             |    |           |                |     |             |                                      |  |  |

US Army Corps of Engineers

Arid West - Version 11-1-2006



## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: U3  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S5 T31N R01E  
 Landform (hillslope, terrace, etc.): toe of slope Local relief (concave, convex, none): \_\_\_\_\_ Slope (%): 1  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.046517 Long: -116.328739 Datum: NAD 1983  
 Soil Map Unit Name: Ferdinand-riggin complex NWI classification: NA  
 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 <input type="radio"/> No <input checked="" type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)      | Absolute % Cover                | Dominant Species?            | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>2</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> % (A/B)                                                                                                                                                                                                                                                                                                                                                                                 |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
|-------------------------------------------|---------------------------------|------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--|-------------|-------|----------|--------------|-------|-----------|-------------|-------|----------|--------------|-------|----------|-------------|-------|------------|----------------|--|------------------------------|
| 1. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 2. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 3. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 4. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Sapling/Shrub Stratum                     |                                 |                              |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> <th></th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td>x 1 =</td> <td><u>0</u></td> </tr> <tr> <td>FACW species</td> <td>x 2 =</td> <td><u>60</u></td> </tr> <tr> <td>FAC species</td> <td>x 3 =</td> <td><u>0</u></td> </tr> <tr> <td>FACU species</td> <td>x 4 =</td> <td><u>0</u></td> </tr> <tr> <td>UPL species</td> <td>x 5 =</td> <td><u>300</u></td> </tr> <tr> <td>Column Totals:</td> <td></td> <td><u>90</u> (A) <u>360</u> (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>4</u> | Total % Cover of: | Multiply by: |  | OBL species | x 1 = | <u>0</u> | FACW species | x 2 = | <u>60</u> | FAC species | x 3 = | <u>0</u> | FACU species | x 4 = | <u>0</u> | UPL species | x 5 = | <u>300</u> | Column Totals: |  | <u>90</u> (A) <u>360</u> (B) |
| Total % Cover of:                         | Multiply by:                    |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| OBL species                               | x 1 =                           | <u>0</u>                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| FACW species                              | x 2 =                           | <u>60</u>                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| FAC species                               | x 3 =                           | <u>0</u>                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| FACU species                              | x 4 =                           | <u>0</u>                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| UPL species                               | x 5 =                           | <u>300</u>                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Column Totals:                            |                                 | <u>90</u> (A) <u>360</u> (B) |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 1. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 2. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 3. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 4. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 5. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Herb Stratum                              |                                 |                              |                  | <b>Hydrophytic Vegetation Indicators:</b><br><input checked="" type="checkbox"/> Dominance Test is >50%<br><input checked="" type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup><br><input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)<br><input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)<br><br><sup>1</sup> Indicators of hydric soil and wetland hydrology must be present.                                                                                                                                           |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 1. <i>Juncus balticus</i>                 | 30                              | Yes                          | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 2. <i>Bromus tectorum</i>                 | 45                              | Yes                          | UPL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 3. <i>Liatis punctuata</i>                | 15                              |                              | UPL              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 4. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Total Cover: _____ %                      |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Woody Vine Stratum                        |                                 |                              |                  | <b>Hydrophytic Vegetation Present?</b> Yes <input type="radio"/> No <input checked="" type="radio"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 1. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| 2. _____                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Total Cover: _____ %                      |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| % Bare Ground in Herb Stratum <u>10</u> % | % Cover of Biotic Crust _____ % |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |
| Remarks:                                  |                                 |                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |       |          |              |       |           |             |       |          |              |       |          |             |       |            |                |  |                              |

US Army Corps of Engineers

Arid West - Version 11-1-2006





## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: U4  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S10 T31N R01E  
 Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): convex Slope (%): 2  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.041837 Long: -116.316045 Datum: NAD 1983  
 Soil Map Unit Name: Westlake silt loam NWI classification: PEM1C  
 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 <input checked="" type="radio"/> No <input type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                                                 | Absolute % Cover                      | Dominant Species?  | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>1</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> % (A/B)                                                                                                                                                                                                                                                                                                                                                                                                |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
|------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|--|-------------|--|----------------|--------------|------------|------------------|-------------|--|----------------|--------------|--|----------------|-------------|--|----------------|----------------|------------|--------------------|
| 1.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 2.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 3.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 4.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Sapling/Shrub Stratum                                                                                |                                       |                    |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th colspan="2">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species</td> <td><u>100</u></td> <td>x 2 = <u>200</u></td> </tr> <tr> <td>FAC species</td> <td></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species</td> <td></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species</td> <td></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals:</td> <td><u>100</u></td> <td>(A) <u>200</u> (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>2</u> | Total % Cover of: | Multiply by: |  | OBL species |  | x 1 = <u>0</u> | FACW species | <u>100</u> | x 2 = <u>200</u> | FAC species |  | x 3 = <u>0</u> | FACU species |  | x 4 = <u>0</u> | UPL species |  | x 5 = <u>0</u> | Column Totals: | <u>100</u> | (A) <u>200</u> (B) |
| Total % Cover of:                                                                                    | Multiply by:                          |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| OBL species                                                                                          |                                       | x 1 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| FACW species                                                                                         | <u>100</u>                            | x 2 = <u>200</u>   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| FAC species                                                                                          |                                       | x 3 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| FACU species                                                                                         |                                       | x 4 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| UPL species                                                                                          |                                       | x 5 = <u>0</u>     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Column Totals:                                                                                       | <u>100</u>                            | (A) <u>200</u> (B) |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Total Cover: <u>    </u> %                                                                           |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Herb Stratum                                                                                         |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 1. <i>Phalaris arundinacea</i>                                                                       | <u>100</u>                            | <u>Yes</u>         | <u>FACW</u>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 2.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 3.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 4.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 5.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 6.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 7.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 8.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Total Cover: <u>100</u> %                                                                            |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Woody Vine Stratum                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 1.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| 2.                                                                                                   |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Total Cover: <u>    </u> %                                                                           |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| % Bare Ground in Herb Stratum <u>    </u> %                                                          | % Cover of Biotic Crust <u>    </u> % |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| <b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="radio"/> No <input type="radio"/> |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |
| Remarks:                                                                                             |                                       |                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |            |                    |

US Army Corps of Engineers

Arid West - Version 11-1-2006





## WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Cottonwood Watershed Project City/County: Cottonwood/Idaho Sampling Date: 08/11/2021  
 Applicant/Owner: City of Cottonwood State: ID Sampling Point: 15  
 Investigator(s): Tyler Schade, Lexie Conley Section, Township, Range: S10 T31N R01E  
 Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): convex Slope (%): 2  
 Subregion (LRR): B - Columbia/Snake River Plateau Lat: 46.041256 Long: -116.327053 Datum: NAD 1983  
 Soil Map Unit Name: Westlake silt loam NWI classification: NA  
 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 ☐  
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## SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

|                                 |                                                               |                                                                                                        |
|---------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Hydrophytic Vegetation Present? | Yes <input checked="" type="radio"/> No <input type="radio"/> | Is the Sampled Area<br>within a Wetland? Yes <input type="radio"/> No <input checked="" type="radio"/> |
| Hydric Soil Present?            | Yes <input type="radio"/> No <input checked="" type="radio"/> |                                                                                                        |
| Wetland Hydrology Present?      | Yes <input checked="" type="radio"/> No <input type="radio"/> |                                                                                                        |
| Remarks:                        |                                                               |                                                                                                        |

## VEGETATION

| Tree Stratum (Use scientific names.)                                                 | Absolute % Cover | Dominant Species? | Indicator Status | <b>Dominance Test worksheet:</b><br>Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)<br>Total Number of Dominant Species Across All Strata: <u>1</u> (B)<br>Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> % (A/B)                                                                                                                                                                                                                                                                                                                                                                                                |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
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| 4.                                                                                   |                  |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| Sapling/Shrub Stratum                                                                |                  |                   |                  | <b>Prevalence Index worksheet:</b><br><table border="1"> <thead> <tr> <th>Total % Cover of:</th> <th colspan="2">Multiply by:</th> </tr> </thead> <tbody> <tr> <td>OBL species</td> <td></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species</td> <td><u>100</u></td> <td>x 2 = <u>200</u></td> </tr> <tr> <td>FAC species</td> <td></td> <td>x 3 = <u>0</u></td> </tr> <tr> <td>FACU species</td> <td></td> <td>x 4 = <u>0</u></td> </tr> <tr> <td>UPL species</td> <td></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals:</td> <td><u>100</u> (A)</td> <td><u>200</u> (B)</td> </tr> </tbody> </table> Prevalence Index = B/A = <u>2</u> | Total % Cover of: | Multiply by: |  | OBL species |  | x 1 = <u>0</u> | FACW species | <u>100</u> | x 2 = <u>200</u> | FAC species |  | x 3 = <u>0</u> | FACU species |  | x 4 = <u>0</u> | UPL species |  | x 5 = <u>0</u> | Column Totals: | <u>100</u> (A) | <u>200</u> (B) |
| Total % Cover of:                                                                    | Multiply by:     |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| OBL species                                                                          |                  | x 1 = <u>0</u>    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| FACW species                                                                         | <u>100</u>       | x 2 = <u>200</u>  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| FAC species                                                                          |                  | x 3 = <u>0</u>    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| FACU species                                                                         |                  | x 4 = <u>0</u>    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| UPL species                                                                          |                  | x 5 = <u>0</u>    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| Column Totals:                                                                       | <u>100</u> (A)   | <u>200</u> (B)    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
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| Herb Stratum                                                                         |                  |                   |                  | <b>Hydrophytic Vegetation Indicators:</b><br><input checked="" type="checkbox"/> Dominance Test is >50%<br><input checked="" type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup><br><input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)<br><input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)                                                                                                                                                                                                                                                |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| 1. <i>Phalaris arundinacea</i>                                                       | <u>100</u>       | Yes               | FACW             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
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| Woody Vine Stratum                                                                   |                  |                   |                  | <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present.<br><br><b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="radio"/> No <input type="radio"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| 1.                                                                                   |                  |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
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| Total Cover: <u>100</u> %                                                            |                  |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| % Bare Ground in Herb Stratum <u>    </u> %    % Cover of Biotic Crust <u>    </u> % |                  |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |
| Remarks:                                                                             |                  |                   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |              |  |             |  |                |              |            |                  |             |  |                |              |  |                |             |  |                |                |                |                |

US Army Corps of Engineers

Arid West - Version 11-1-2006



**Appendix B: Representative Photographs**





**Photograph 1: West view of Wetland 1**



**Photograph 2: Southeast view of Wetland 2**





**Photograph 3: South view of City of Cottonwood along Business US-95/King Street**



**Photograph 4: East view of Cottonwood Creek on left in image**





**Photograph 5: East view of Cottonwood Creek and culvert, near Wetland 1**



**Photograph 6: South view of agricultural land in Study Area, from northeast area**





**Photograph 7: West view of lagoons with reed canarygrass on edges**



**Photograph 8: East view of balsam poplars in area east of lagoons**





**Photograph 9: West view of Ditch 1**



**Photograph 10: Southeast view of Ditch 4**

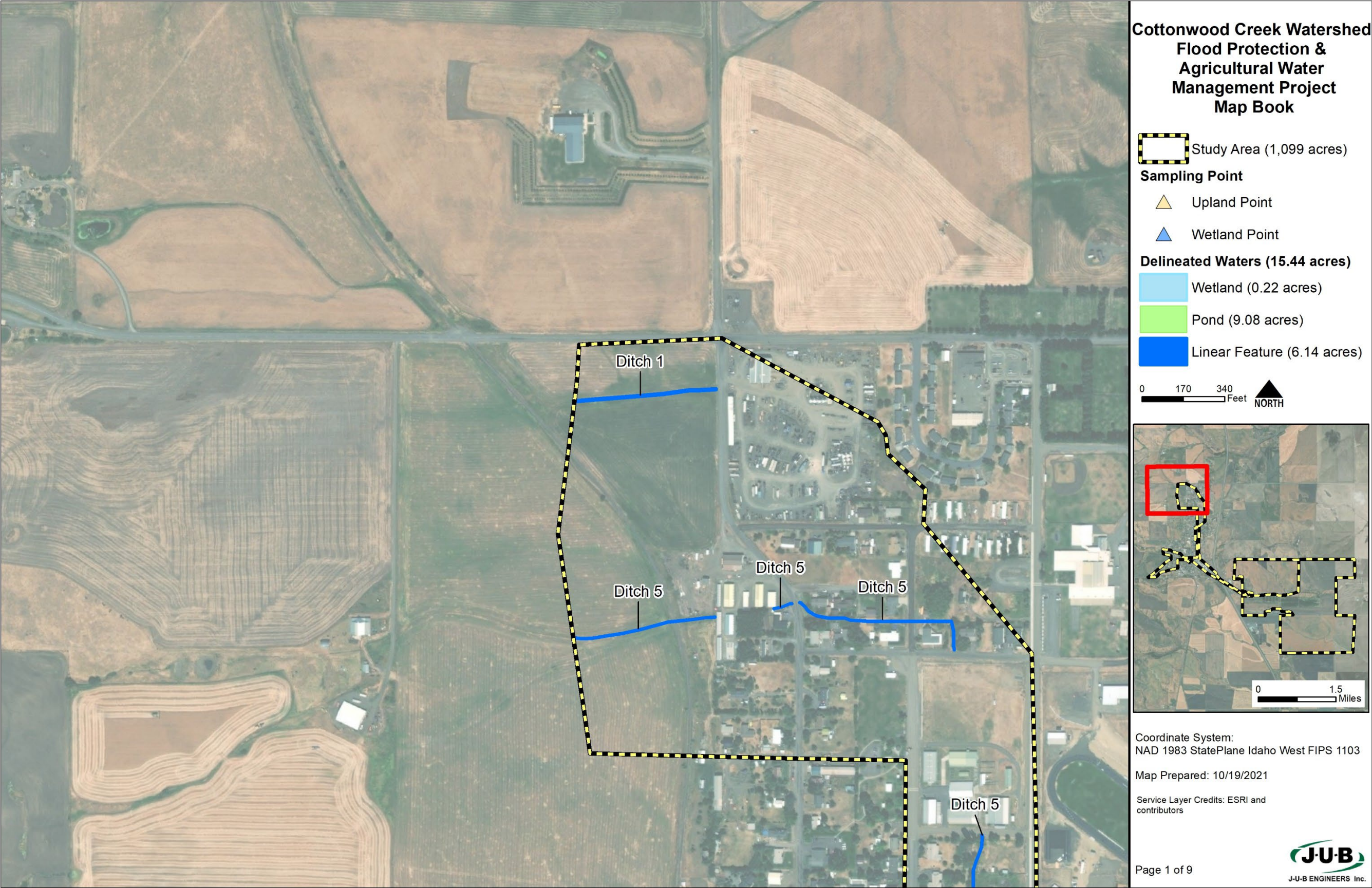


**Photograph 11: Northwest view of swale feature that joins with Ditch 4**



**Appendix C: Wetland Delineation Map Book**





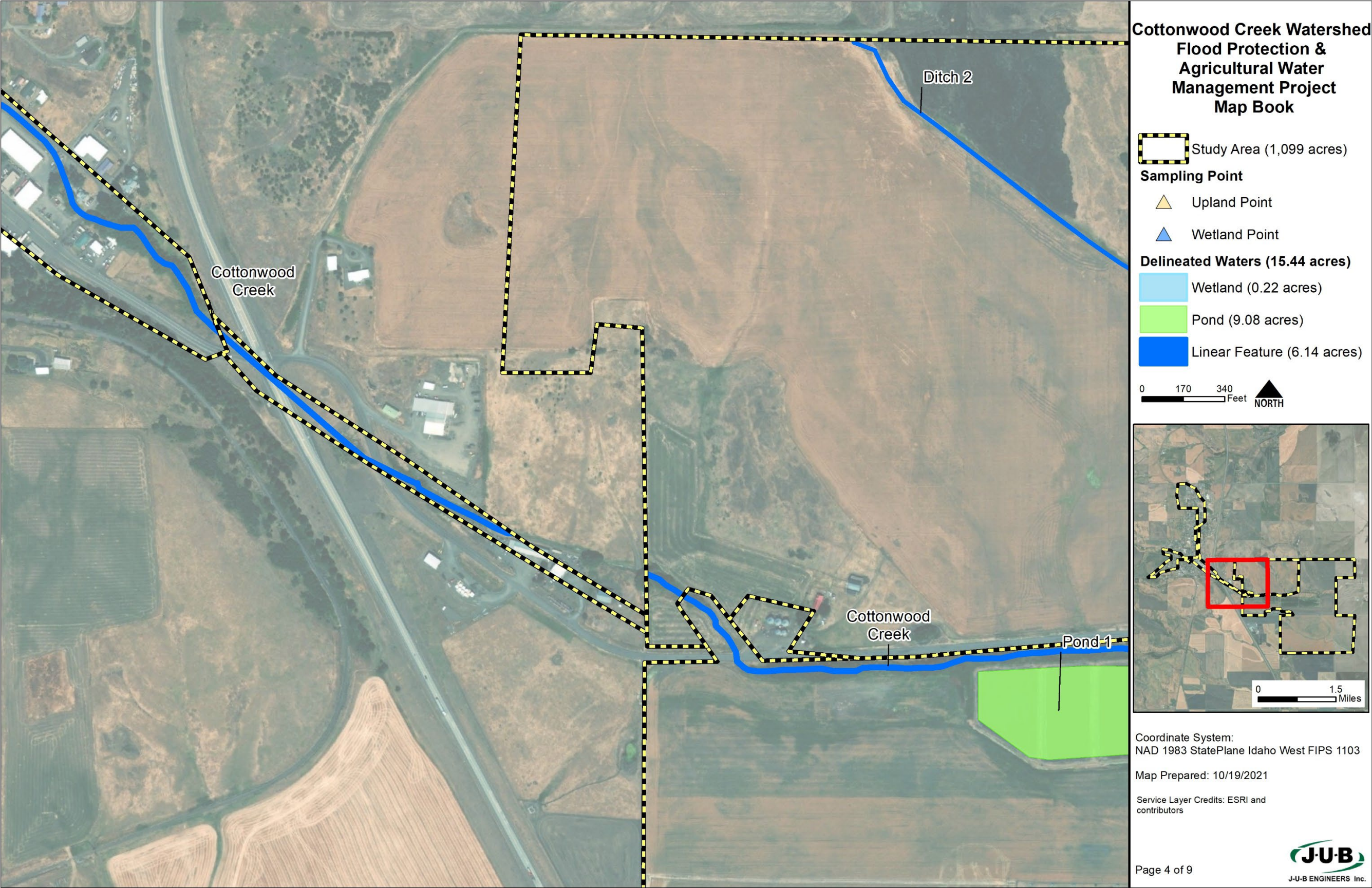
































Appendix E5: Biological Analysis Report

**Biological Analysis Report for the  
Cottonwood Creek Watershed Flood Protection & Agricultural Water  
Management Project**

*Idaho County, Idaho*

Prepared for  
Natural Resources Conservation Service

Prepared by

J-U-B ENGINEERS, Inc.  
392 E. Winchester St., Suite 300  
Salt Lake City, UT 84107

July 2025



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Appendix 1: Watershed Map & Preferred Alternative Map

Appendix 2: IPaC Report (Dated: June 16, 2025)  
Appendix 3: IFWIS Species Occurrence Data Discussion  
Appendix 4: Photo Inventory  
Appendix 5: USFWS Coordination  
Appendix 6: Spalding's Catchfly Survey Memo

# 1 Introduction

This biological analysis report (BAR) was prepared for the proposed Cottonwood Creek Watershed Flood Protection & Agricultural Water Management Project (Proposed Project) located in Idaho County, Idaho. This BAR was prepared on behalf of the City of Cottonwood for the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The City of Cottonwood secured funding for the Proposed Project through the Watershed Protection and Flood Prevention Act [Public Law (PL) 83-566]. This BAR was prepared in compliance with Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1536(c)) to sufficiently document and review the Proposed Project's Action Area (Action Area) to assess the degree to which the Proposed Project may affect: federally threatened or endangered species, or species proposed for listing; designated and proposed critical habitat; State Sensitive Species under Conservation Agreements; state species of greatest conservation need, and essential fish habitat (EFH) as required by the Magnuson Stevens Fishery Conservation and Management Act (16 USC 1801 et seq.). This BAR serves as supporting documentation for the Watershed Plan-Environmental Assessment for the Proposed Project, and as supporting rationale for effect determinations for ESA consultation purposes.

## Project Area & Action Area

The Proposed Project is located in the Cottonwood Creek Watershed (HUC 1706030508) within the South Fork Clearwater Sub-Basin (HUC 17060305) of the Clearwater Basin (Watershed Map & Preferred Alternative Map, Appendix 1). The Cottonwood Creek Watershed includes portions of two subwatersheds: Upper Cottonwood Creek Subwatershed (HUC 170603050802) and Stockney Creek Subwatershed (HUC 170603050803). These Subwatershed boundaries cover a combined area of approximately 29,934 acres (USGS 2021b). The Proposed Project occurs within the City of Cottonwood, Idaho and in unincorporated Idaho County. The Proposed Project is contained within Sections 5, 8, and 9 of Township 31 North, Range 1 East, Boise Meridian.

The Action Area would encompass approximately 1,099 acres across several portions of the City of Cottonwood and Idaho County. The Action Area includes flood control improvements, which would occur on approximately 40 acres of land within downtown Cottonwood City and Cottonwood Creek off E Road. The Action Area encompasses the project footprint, including staging areas, plus additional areas no longer being considered for project improvements. Four specific locations within the Action Area were established with a 300-foot survey buffer due to the potential for Spalding's catchfly habitat, and to meet the guidelines set forth by the U.S. Fish and Wildlife Service (USFWS) protocol for the Spalding's catchfly survey.

## Proposed Action

The Proposed Project would improve the existing infrastructure with actions consisting of flood prevention and flood reduction activities. The Proposed Project incorporates the following elements:

- **Main Street Alignment**—Realign the main channel beneath Main Street. Work would include a new reinforced concrete box conduit and new inlet structures. The new alignment would re-route the main channel flow from the west end of the city to the existing Cottonwood Creek channel near U.S. Highway 95.
- **King Street Improvements**—Upgrade flood conveyance to pass floodwaters from the northwest boundary of the city through the fairgrounds and along King Street to Cottonwood Creek.



- Creek Crossings and Channel Enhancement—Replace two culverts at creek crossings and conduct creek improvements along East Road between the crossings. Replace one culvert at Maple Street, where flooding has been observed upstream of this culvert, due to inadequate capacity.
- Channel Enhancements – Remove select Cottonwood trees, stumps, and flood debris within the Cottonwood Creek channel along East Road to improve safety and access during high water events. Vegetation along the Cottonwood Creek would be added to restabilize the bank and improve fish and wildlife habitat.
- Lagoon Protection —Armor existing lagoon treatment facilities to mitigate erosion of the stream into the facility embankments, reducing potential for discharge of raw sewage into the stream.

Backhoes, excavators, haul trucks, and other smaller construction vehicles and equipment would be used to complete the Proposed Project. Work within Cottonwood Creek would be conducted either when the channel is dry, or as determined by coordination with National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS).

Construction would take place from late summer to early winter over a two-year span. Vegetation removal would occur at proposed culvert improvements and proposed channel improvements. The Proposed Project would require the removal of poplar and cottonwood trees along Cottonwood Creek..

## 2 Conservation Measures

Construction Best Management Practices (BMPs) are standard requirements and would be required during the implementation of the Proposed Project. BMPs would include, but are not limited to, soil and erosion control devices, noxious weed prevention and control, construction timing to minimize or avoid breeding and nesting season for migratory birds, as well as Standard Operating Procedures required by NRCS. Coordination with NOAA NMFS on recent projects within Cottonwood Creek led to the inclusion of several of the identified BMPs. The following BMPs and conservation measures are intended to minimize effects on listed species and their habitats, as well as to protect water quality and minimize disturbance to soils and vegetation.

1. Complete all work within the designated Action Area during established working hours.
2. Contain all work activities, including those within staging areas, to upland areas to minimize potential impacts to surface water quality, whenever feasible.
3. Ensure all applicable local or state water quality permits are in place, and where applicable, obtain an EPA Construction General Permit for the Proposed Project. Meet associated permit conditions during construction operations.
4. Ensure the contractor develops and follows an approved Stormwater Pollution Prevention Plan (SWPPP) and a Spill Prevention, Control and Countermeasure (SPCC) plan or other similar plan.
5. Comply with all measures in the associated SWPPP and SPCC plan when fueling, performing cleaning and maintenance, and storing or disposing of hazardous materials.
6. Comply with all measures in the associated SWPPP or similar document for implementing temporary erosion and sediment controls (TESCs), covering and storing materials, and other erosion prevention measures. Do not perform construction activities during extreme wet weather conditions, whenever practicable. If heavy precipitation is predicted to occur within 24 hours, take appropriate measures to cover up any stockpiles and check that TESCs are functioning.

7. Perform pre-construction surveys for migratory birds and raptors in all areas where vegetation removal will occur. These surveys should occur no more than 7 days before vegetation removal and disturbance., when construction activities or vegetation removal would occur during the breeding and nesting season of migratory birds (March–September) or eagles (December–August). Repeat surveys if construction and vegetation removal are paused and resumed. If an active nest is discovered within the Action Area, halt construction and/or vegetation removal and contact the appropriate regulatory agency for guidance.
8. Rehabilitate all areas of ground disturbance. Spread or grade stockpiled materials and use a native seed mix (99.9% noxious weed-free seed) approved by the NRCS to reseed all areas where ground disturbance has occurred. Ensure the seed mix and plants are appropriate to the region and include milkweed species (*Asclepias sp.*) when appropriate to the site.
  - a. If appropriate for the area, apply seed by hydroseeding, using a temporary erosion control mulch tackifier to provide stabilization, eliminate erosion concerns, and create vegetation recruitment opportunities.
9. Clean equipment of mud and other debris to avoid noxious weed or seed dispersal within or near the Action Area. Use pressure washing where appropriate to remove soil, plant parts, or other materials that may carry invasive and noxious weed seeds before arriving at the Action Area. Ensure this cleaning occurs each time equipment is brought into the Action Area from a different location.
  - a. Ensure the contractor provides the site inspector with the opportunity to inspect the equipment before unloading at the construction site. If upon inspection, dirt, debris, and seeds are visible, ensure the contractor immediately removes the equipment from the Action Area and rewashes it. Ensure the equipment is clean by having the site inspector re-inspect the equipment.
10. Protect native site vegetation and plant communities, including wetland vegetation and milkweed, when practicable. Clearly mark, flag, or fence areas where vegetation is to be protected.
11. Dispose of excavated sediment and debris at a pre-approved area more than 200 feet from any surface water feature.
12. Maintain adequate response equipment (i.e., spill kits and cleanup materials) onsite at all times to avoid chemical contamination in the event of a spill. Clean all spills immediately.
  - a. When not in use, store construction equipment away from concentrated flows of stormwater, drainage courses, and inlets.
13. Do not allow uncured concrete or form materials to enter the active stream channel. (In-water work and/or sensitive fisheries)
14. Locate borrow areas outside the 100-year floodplain or greater than 200 feet from any identified waters within the Action Area, whichever is greater.
15. Use vegetable-based hydraulic fluid in equipment operating in or near a waterbody.
16. The Proposed Project may include a stream diversion around the work area and dewatering of a portion of the channel for work area isolation. Dewatering would pump water over land at a slow rate and far enough from the existing channel to avoid surface erosion and return flow to the channel before percolation. Pumps would be screened with 3/32-inch mesh. Disturbed areas in the channel would be restored with the appropriate gradation of streambed material. Post construction, the work area would be wetted and any turbid water pumped over land prior to

returning the creek to its natural channel. The creek would be turned back to the natural channel slowly to minimize turbidity plumes.

#### BMPs Associated with the Preservation and Retention of Existing Vegetation:

1. Habitat types discussed in this BAR combined with the plant list below constitute the pre-disturbance existing conditions.
2. Areas where vegetation is to be protected will be clearly marked, flagged, or fenced.
3. Appropriate buffer zones will be established to protect sensitive vegetation (i.e., native riparian vegetation). Berms, fencing, signs, etc. will be used to demarcate the buffer limits.
4. Work within wetland areas will be avoided.
5. Construction staging areas, waste areas, etc. will be located away from sensitive vegetation and at least 200 feet from any surface water.
6. Undisturbed areas will be maximized within Action Area boundaries to retain vegetation for erosion control purposes.
7. Native site vegetation and plant communities, including milkweed and wetland vegetation, will be protected.

### 3 Methodology

An Official Species List from the USFWS Information for Planning and Consultation (IPaC) system was updated for the Action Area on June 16, 2025 (Appendix 2). The IDFG Idaho Fish and Wildlife Information System (IFWIS) was also consulted to determine records of occurrence for ESA-listed and SGCN species in the vicinity of the Proposed Project (IDFG 2025). The IFWIS data resulted in 15 Species of Greatest Conservation Need (SGCN) species occurring within 2 miles of the Action Area (Appendix 3).

A desktop analysis of the Action Area was conducted using maps and data in ArcGIS. This analysis evaluated aerial imagery with habitat information, elevation data, species range, landscape topography, the National Wetlands Inventory (NWI; USFWS 2021c), and the National Hydrography Dataset (NHD; USGS 2021a). Various sources (e.g., species recovery plans, research papers) from agencies and field experts were also used to analyze species and their habitats in respect to the Action Area.

A field survey to assess impacts for all ESA-listed species identified by the IPaC, a protocol level survey for Spalding's catchfly, and an evaluation of suitable habitat were conducted by environmental specialists with J-U-B ENGINEERS, Inc. (J-U-B) on August 11 and 12, 2021 and September 29, 2021 to assess existing environmental conditions in the Action Area. An additional field verification survey was conducted on June 23, 2025, to verify if site conditions had changed. Aerial imagery was used prior to the survey to determine undisturbed areas throughout the Action Area with the potential to contain Spalding's catchfly; these areas were surveyed to evaluate habitat suitability and for species presence.

### 4 Existing Environmental Conditions

The City of Cottonwood is situated in the Nez Perce Prairie Ecoregion (10j) (McGrath et al. 2002). The Nez Perce Prairie is part of the Columbia Plateau, which is characterized by an arid grassland and sagebrush steppe, that is surrounded by predominantly forested, mountainous ecoregions. The Nez Perce Prairie has been extensively cultivated. In general, the landscape in the Action Area is heavily influenced by agricultural practices (McGrath et al. 2002). The elevation of the Action Area ranges from 3,720 feet above

mean sea level (AMSL) on the southwest portion to 3,340 feet AMSL on the southeast portion. Land use in the Action Area consists of City roadways, residential, agricultural, industrial wastewater facilities, and undeveloped uses. Surrounding land uses are predominantly agricultural. Staging areas would be situated in upland areas, dominated by cheatgrass (*Bromus tectorum*) and upland plants. For representative photos of the Action Area, refer to the Photo Inventory (Appendix 4).

Vegetation within downtown Cottonwood and along City roads consisted of mowed lawn grasses, ornamental shrubs and trees, as well as upland and weedy vegetation. Vegetation along Cottonwood Creek was dominated by reed canarygrass (*Phalaris arundinacea*), while agricultural lands primarily contained agricultural species such as alfalfa (*Medicago sativa*). A balsam poplar (*Populus balsamifera*) land application site is situated in the Action Area, near the existing wastewater facilities. It is anticipated that numerous cultivated poplar trees would be removed during construction of the agricultural storage reservoir.

In general, dominant vegetation within the Action Area consisted of:

- Reed canarygrass (*Phalaris arundinacea*)
- Rush skeletonweed (*Chondrilla juncea*)
- Cheatgrass (*Bromus tectorum*)
- Serviceberry (*Amelanchier alnifolia*)
- Scouring rush (*Equisetum hyemale*)
- Balsam poplar (*Populus balsamifera*)
- Alfalfa (*Medicago sativa*)
- Wheat (*Triticum* sp.)
- Squirreltail (*Elymus elymoides*)
- Canada thistle (*Cirsium arvense*)

Nine soil types are found throughout the Action Area. Soils are predominantly silt loam in texture. The dominant soil types in the Action Area are Nez Perce silt loam, Westlake silt loam, and Ferdinand-Riggins complex (USDA-NRCS 2021a).

Climate data was obtained from the WRCC Cooperative Observer Program ID: 102159, located at Cottonwood 2 WSW, Idaho station, which is in Cottonwood. On average, temperatures at this station range from an average minimum of 23.5 degrees Fahrenheit (°F) in January to an average maximum of 79.6 °F in August (WRCC 2021). The average annual precipitation is 22.12 inches, with rain occurring throughout the year (WRCC 2021). The average annual snowfall is 45.6 inches and occurs primarily from November to March (WRCC 2021). The maximum temperature during the survey was 101°F (during both survey days), which is higher than the average high temperature of 83° for those dates (NRCS-USDA 2021b).

## 5 Status of Species and Habitat

### Agency Coordination and Species of Concern

Two ESA-listed species and two ESA proposed species were identified by the IPaC Report (Dated: June 16, 2025) as potentially occurring in the Action Area (Appendix 2). The NOAA NMFS was contacted on October 21, 2021 to obtain data for listed fish species and Essential Fish Habitat (EFH) species in the Action Area. As of the writing of this BAR, NMFS has not responded regarding fish presence for species of concern; however, previous projects involving Cottonwood Creek (downstream of the Action Area) indicated that steelhead (*Oncorhynchus mykiss*) historically occur in portions of Cottonwood Creek. StreamNet was utilized to determine fish presence in the reach involved in the Proposed Project. Data obtained from StreamNet indicates that Snake River Basin steelhead occur in Cottonwood Creek approximately 18.1



miles downstream of the Action Area, to the northeast (StreamNet 2019). Table 1 summarizes the federally listed species with the potential to occur in the Action Area.

**Table 1. Federally-Listed Species with the Potential to Occur in the Action Area**

| Common Name                 | Scientific Name            | ESA Status          | Critical Habitat in the Action Area? |
|-----------------------------|----------------------------|---------------------|--------------------------------------|
| North American wolverine    | <i>Gulo gulo luscus</i>    | Threatened          | No                                   |
| Monarch butterfly           | <i>Danaus plexippus</i>    | Proposed Threatened | No                                   |
| Suckley's cuckoo bumble bee | <i>Bombus suckleyi</i>     | Proposed Endangered | No                                   |
| Spalding's catchfly         | <i>Silene spaldingii</i>   | Threatened          | No                                   |
| Steelhead                   | <i>Oncorhynchus mykiss</i> | Threatened          | No                                   |

No proposed or designated critical habitat occurs in the Action Area. However, critical habitat for steelhead occurs approximately 9.6 miles downstream of the Action Area in Cottonwood Creek (NOAA 2021a). According to the IDFG IFWIS, there are records of Spalding's catchfly in Idaho County, Idaho (IDFG 2025). EFH for coho and chinook salmon occurs in the South Fork Clearwater Sub-Basin (NOAA 2021b).

### Species Descriptions

The following sections briefly discuss North American wolverine, monarch butterfly, Suckley's cuckoo bumble bee, Spalding's catchfly, and Snake River Basin steelhead.

#### North American Wolverine

The North American wolverine was listed as threatened by the ESA on January 2, 2024. The North American Wolverine is the largest terrestrial member of the weasel family. They are opportunistic feeders, primarily scavenging carrion, but also feed on small animals, birds, fruits, berries, and insects. Persistent spring snowpack levels are the strongest indicator of suitable habitat for the North American wolverine. They require a minimum snowpack depth of 60 inches lasting until April-May for successful denning (USFWS 2025b). In southern portions of the species' range in the U.S., where ambient temperatures are warmest, wolverine distribution is restricted to high elevations. The primary threat to the North American wolverine is from habitat and range loss due to development and climate change. Climate changes are predicted to reduce wolverine habitat and range by 23 percent over the next 30 years and 63 percent over the next 75 years (USFWS 2025b).

#### Monarch Butterfly

The monarch butterfly was proposed for listing as a threatened species under the ESA on December 12, 2024. Adult monarch butterflies are large, highly visible insects with bright orange wings surrounded by a black border with black veins. The bright coloring of the monarch is aposematic and serves as a warning to predators that eating them can be toxic (USFWS 2020). The black border on the upper side of its wings is lined with a double row of white spots. In many regions, monarchs breed year-round. Milkweed is a critical aspect of the monarch butterfly's lifecycle. Breeding monarchs lay their eggs in milkweed plants (*Asclepias* spp.), with larvae emerging two to five days later. After larvae have emerged, they will feed on milkweed as they develop into a chrysalis. Nectar and milkweed resources for monarch butterflies are often associated with riparian corridors. Monarchs in western North America migrate long distances to

their overwintering site and can live up to nine months (USFWS 2021b). In Idaho, monarchs typically migrate to California. Roosting trees can also be important along migration routes. In the west, monarchs will roost in conifers and deciduous trees along their migration routes.

#### Suckley's Cuckoo Bumble Bee

The Suckley's cuckoo bumble bee was proposed for listing as an endangered species under the ESA on December 17th, 2024. Bumble bees require below-ground micro-sites for overwintering and nesting, including logs, stumps, and abandoned rodent and ground-nesting bird nests. This species is a parasitic bee that usurps nests of other bees, where host workers provide for their young. Hosts include Western bumble bees (*Bombus occidentalis*) and Nevada bumble bees (*Bombus nevadensis*), and other potential hosts occur in subgenus *Bombus*. This species has been found in a variety of habitat types including prairies, grasslands, meadows, woodlands and agricultural and urban areas. The Suckley's cuckoo bumble bee has been sampled in different habitats across various elevations, ranging from 6 feet to 10,500 feet AMSL. This species faces a population decline due to climate change, which affects their host species by changing temperatures that create unsuitable conditions for bees to complete their lifecycles (USFWS 2024).

#### Spalding's Catchfly

Spalding's catchfly, sometimes called Spalding's *silene*, is listed as threatened under the ESA. Critical habitat has been proposed for this species, but the location of the critical habitat is not currently available. This plant is endemic to portions of Idaho, Montana, Oregon, Washington, and British Columbia (USDA 2010). The species is an herbaceous perennial, 8–24 inches tall, typically with one stem, bearing 4 to 8 pairs of leaves 2 to 3 inches in length (Hitchcock et al. 1964). The light green foliage and stem are lightly to more typically densely covered with sticky hairs. The cream-colored flowers are arranged in a spiral at the top of the stem. The species begins to flower in mid-to-late July, with some individuals still flowering by early September. Spalding's catchfly generally occurs in native grasslands that are in reasonably good ecological condition. It is found most commonly in sites that are dominated by Idaho fescue (*Festuca idahoensis*) and have sparse cover of common snowberry (*Symphoricarpos albus*) (Washington Natural Heritage Program 2001). Populations have been found on all aspects, although there seems to be a preference for north-facing slopes. Spalding's catchfly tends to be found in areas that range from 1,900 feet to 3,600 feet in elevation (USDA 2010). Soils are almost always productive silts/loams (loess) that are moderately deep and sometimes gravelly (Gamon 1991).

Due to the soils and elevation of the Action Area, the general geographic location of the project, and lack of any nearby surveys, a Spalding's catchfly survey was deemed necessary to evaluate habitat suitability for the species. The closest known population identified by USFWS and the IFWIS lies near Lawyer Creek and Craigmont, Idaho, approximately 10 miles to the northwest of the Proposed Project. The USFWS was contacted prior to the survey to confirm the accepted survey window (Appendix 5). A rare plant survey was conducted by Autumn Foushee Davies, a qualified botanist, on August 11 and 12, 2021 to determine if the Proposed Project would impact the species or any suitable habitat (Appendix 6).

The reference site on Lawyer Creek with known occurrences of Spalding's catchfly was evaluated to document the current stage class of a known population. Without specific individual reference points, a known Spalding's catchfly individual was not located in the reference population survey area. Another catchfly (*Silene*) species was noted amongst the assemblage of grasses and forbs. Species in the reference

area around the catchfly species included white campion (*Silene latifolia*), Missouri goldenrod (*Solidago missouriensis*), reed canarygrass, nettleleaf giant hyssop (*Agastache urticifolia*) and common snowberry.

### Steelhead

Snake River Basin steelhead are a salmonid species and cold-water fish. The species lives in a relatively narrow range of temperatures, which limits the species distribution in fresh water to northern latitudes and higher elevations. These steelhead migrate up to 930 miles from the ocean and occur in habitat that is considerably warmer and drier than other steelhead population segments. Adult Snake River Basin steelhead are generally classified as summer-run because they return to the Snake River Basin from late summer through fall, where they hold in larger rivers for several months before moving upstream into smaller tributaries (NOAA 2017). A small number of fish return in the following spring, just prior to spawning. Most of the adult steelhead disperse into tributaries from March through May, with earlier dispersal at lower elevations, and later dispersal at higher elevations (NOAA 2017).

Using her fin, a female steelhead digs depressions (redds) in the gravel and deposits hundreds of eggs in each redd to be fertilized. Each redd is placed immediately upstream from the last to allow the stream current to deposit gravel on top of the previous redd (NOAA 2017). A female steelhead typically lays between 2,000 and 5,000 eggs. The eggs hatch as alevins and, following yolk sac absorption, emerge from the gravel as fry, at which point they begin actively feeding. Rearing of steelhead occurs in cool, clear, fast-flowing permanent streams and rivers where riffles predominate and there is enough cover from riparian vegetation or undercut banks, and where a diverse and abundant number of invertebrates are available as prey. After rearing, steelhead fry undergo a physiological transformation (smolting) that allows them to migrate.

## 6 Effects of the Action

Effect analyses for ESA species, EFH, and species protected under the Migratory Bird Treaty Act (MBTA) are detailed in the following sections. Effect analyses and determinations for NMFS species of concern and EFH are subject to agency review, pending coordination with NMFS. Analyses are determined with the assumption that all BMPs would be implemented and adhered to throughout the duration of the Proposed Project. A summary of the effect analyses for each species can be found in Table 3.

### North American Wolverine

The average annual snowfall that occurs within the Action Area is approximately 45.6 inches and does not persist late into the year, which is less than what is required by the wolverine for suitable denning habitat. Additionally, human activity is common throughout the Action Area. Because there is no suitable denning habitat with the Action Area and there is high disturbance as a result of human activity, the Proposed Project will result in No Effect to the North American wolverine.

### Monarch Butterfly

Although milkweed is known to occur in the area, no milkweed was found within the Action Area. Some vegetation would be disturbed and removed during construction activities. According to the IFWIS data there are no recorded sightings of the monarch butterfly within 2 miles of the Proposed Project. The implementation of BMPs and conservation measures would reduce impacts to vegetation. Disturbed areas within riparian zones or wetland areas would be revegetated with native plants including milkweed species. Native site vegetation and plant communities, would be protected whenever practicable.

Because no milkweed was identified within the Action Area and because of efforts to revegetate areas disturbed by Proposed Project activities using native seed, which will include milkweed species, it is reasonable to determine the Proposed Project will have No Effect to the monarch butterfly.

#### Suckley's Cuckoo Bumble Bee

Potential habitat, including nectarous plant species, for Suckley's cuckoo bumble bee occurs within the Action Area. The Action Area occurs near a dense agricultural area with a high likelihood of pesticide usage, which would not be the preferred habitat for Suckley's cuckoo bumble bee. BMPs such as site revegetation with native plants and pollinator species and therefore reduce potential impacts to the Suckley's cuckoo bumble bee, during construction. Therefore, the Proposed Project will have No Effect to the Suckley's cuckoo bumble bee.

#### Spalding's Catchfly

Soils within the Action Area are predominately silt loam, which is consistent with suitable habitat for the species. The elevation of the Action Area ranges from 3,720 feet AMSL on the southwest portion to 3,340 feet AMSL on the southeast portion; therefore, portions of the Action Area are within the upper end of the elevation range typical of Spalding's catchfly habitat. However, all four of the Spalding's catchfly survey areas were still within the species' preferred elevation range. Although soils and elevation in the survey area are suitable for the species, the four areas specifically surveyed for Spalding's catchfly were not north-facing and the vegetative assemblage was not conducive to the species presence. In general, vegetation within these areas was dominated by aggressive species, agricultural species, or upland and weedy species, including reed canarygrass, alfalfa, wheat (*Triticum* sp.), squirreltail (*Elymus elymoides*), rush skeletonweed (*Chondrilla juncea*), and cheatgrass. The aspects of the four sites were roughly east, west, and south-facing. One area was north-facing, but vegetation was dominated by reed canarygrass. The elevation of the Action Area was within the upper end of the elevation range typical of Spalding's catchfly habitat. No evidence of Spalding's catchfly occurrence in any stage class (rosette of basal leaves, non-flowering stem, or flowering stem) was observed during the plant survey. Given the lack of suitable habitat in the Action Area, and lack of observed individuals, the Proposed Project will have No Effect on Spalding's catchfly or its habitat.

#### Steelhead

Communication with NOAA NMFS is ongoing for the Proposed Project. Correspondence with NOAA NMFS for previous projects involving Cottonwood Creek (downstream of the Action Area) indicated that steelhead historically occur in portions of Cottonwood Creek. However, data obtained from StreamNet indicates that steelhead occur in Cottonwood Creek approximately 18.1 miles downstream of the Action Area, to the northeast (StreamNet 2019). Critical habitat for Snake River Basin steelhead occurs approximately 9.6 miles downstream of the Action Area. Cottonwood Creek is also a tributary to the South Fork Clearwater River, which contains designated critical habitat for steelhead.

Stressors that could affect fish include contaminants (e.g., fuels, oils, hydraulic fluids, and sediment) that could potentially enter the creek from leaks in construction equipment, or spills during storage or transportation, or vehicle/equipment refueling. BMPs (e.g., spill prevention) to reduce or avoid contaminant spills are standard requirements and would protect steelhead even though the species is not anticipated to be present in the Action Area. IWWW are unnecessary (unless directed by IDFG/NMFS) because no fish are known to occur in this reach of the stream.



Ground disturbance in the channel could cause sediment to enter the stream. Sediment entering the stream can degrade water quality, affecting turbidity, dissolved oxygen levels, and temperature in the immediate vicinity of the Action Area. Implemented BMPs such as silt fences, fiber wattles, and other erosion control measures would reduce or avoid sedimentation. Background water quality levels are anticipated to return to existing conditions within 500 feet of the Action Area and would not reach areas of Cottonwood Creek where steelhead are known to occur.

Steelhead are not known to occur in the reach of Cottonwood Creek involved in the Proposed Project. Implementation of avoidance and minimization measures, SWPPP protocols and BMPs would avoid and/or minimize the potential for release of and exposure to contaminants and sedimentation. The Proposed Project would not result in a substantial loss of habitat (creek bed, channel, or bank) and would be anticipated to benefit fish habitat, water quality and stream flow by upsizing the culverts that convey Cottonwood Creek. As such, it has been determined that the Proposed Project would have No Effect on steelhead or its critical habitat.

### Essential Fish Habitat

EFH for coho and chinook salmon is present in the South Fork Clearwater Sub-Basin, in which the Proposed Project occurs. As discussed above, the Proposed Project would involve work within Cottonwood Creek, which is a tributary to the South Fork of the Clearwater River. Proposed construction activities may temporarily impact EFH in and near the Action Area during construction by degrading water quality during the installation of the culverts, or from potential contaminants and sedimentation associated with in-stream and near-channel work. Implementation of avoidance and minimization measures, SWPPP protocols and BMPs would avoid and/or minimize the potential for release of and exposure to contaminants, sedimentation, and vegetation removal.

The Proposed Project would permanently impact EFH in Cottonwood Creek by replacing and relocating the Main Street box culvert; however, the relocation of the culvert would marginally decrease the quantity of EFH. As such, the Proposed Project could have a non-substantive adverse effect to EFH. No significant changes to water quality, stream morphology, or stream vegetation are anticipated to result from the Proposed Project. Rather, the proposed improvements would have a beneficial impact on fish habitat in the watershed by upsizing the culverts that convey Cottonwood Creek thereby improving water quality and stream flow in and downstream of the Action Area (J. Mital, personal communication, November 8 2021). Although the Proposed Project would temporarily impact EFH during construction and would permanently relocate a box culvert, the Proposed Project would have a beneficial effect on fish habitat and is not anticipated to permanently impact the long-term function of EFH in Cottonwood Creek. Therefore, it has been determined that the Proposed Project may have a non-substantive adverse effect to EFH.

### Migratory Bird Treaty Act & Bald and Golden Eagle Protection Act

The IPaC report dated June 16, 2025, identified fifteen migratory bird species (Table 2) protected under the MBTA. The IFWIS also identified records of occurrence of bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) within Idaho County. No nests (recent or historical) were observed in the Action Area during the field survey, but red-tailed hawks (*Buteo jamaicensis*) were observed in the Action Area.

**Table 2. Migratory Bird Species in IPaC Report**

| Common Name            | Scientific Name                   | Breeding Period    | Habitat*                                                                                                               | Nesting Habitat Present? |
|------------------------|-----------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------|
| American Avocet        | <i>Recurvirostra americana</i>    | April 21–August 10 | Beaches, flats, shallow lakes, prairie ponds.                                                                          | No                       |
| American White Pelican | <i>Pelecanus erythrorhynchos</i>  | April 1–August 31  | Lakes, marshes, salt bays, isolated islands.                                                                           | No                       |
| Black Tern             | <i>Chlidonias niger</i>           | May 15–August 20   | Fresh marshes, lakes, wet meadow, coasts, winters in tropical coastal regions.                                         | No                       |
| California Gull        | <i>Larus californicus</i>         | March 1–July 31    | Coasts, lakes, farms, urban centers, marshes, and rivers.                                                              | Yes                      |
| Calliope Hummingbird   | <i>Selasphorus calliope</i>       | May 1–August 15    | Mountains, forest glades, canyons, open shrubby areas, breeds from 4,000 feet of elevation, winters in pine oak woods. | No                       |
| Cassin's Finch         | <i>Carpodacus cassinii</i>        | May 15–July 15     | Conifers in high mountains, winters in lower mountain forests and open woods in valleys.                               | No                       |
| Evening Grosbeak       | <i>Coccythraustes vespertinus</i> | May 15–August 10   | Conifer and mixed forests, winters in deciduous groves in woodlands and semi-open country.                             | No                       |
| Forster's Tern         | <i>Sterna forsteri</i>            | March 1–August 15  | Freshwater and saltwater marshes, lakes, bays, beaches, winters in coastal areas.                                      | No                       |
| Franklin's Gull        | <i>Leucophaeus pipixcan</i>       | May 1–July 31      | Prairies, inland marshes, foraging/migrating in agricultural fields, prairie, and flooded pasture.                     | Yes                      |

| Common Name        | Scientific Name                  | Breeding Period      | Habitat*                                                                                                             | Nesting Habitat Present? |
|--------------------|----------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------|
| Golden Eagle       | <i>Aquila chrysaetos</i>         | January 1–August 31  | Open mountains, foothills, plains, and open country, including prairie, rangeland, and desert.                       | No                       |
| Lesser Yellowlegs  | <i>Tringa flavipes</i>           | Breeds Elsewhere     | Coasts and shorelines, fields, meadows, freshwater wetlands, ponds, rivers, saltwater wetlands, and boreal habitats. | No                       |
| Northern Harrier   | <i>Circus hudsonius</i>          | April 1–September 15 | Coasts, shorelines, fields, meadows, grasslands, wetlands, saltwater wetlands, farmland, shrublands, and thickets.   | Yes                      |
| Pectoral Sandpiper | <i>Calidris melanotos</i>        | Breeds Elsewhere     | Prairie pools, muddy shores, fresh and tidal marshes.                                                                | No                       |
| Rufous Hummingbird | <i>Selasphorus rufus</i>         | April 15–July 15     | Forest edges, streamsides, mountain meadows, and brushy second growth.                                               | No                       |
| Western Grebe      | <i>Aechmophorus occidentalis</i> | June 1–August 31     | Lakes, sloughs, bays, ocean, marshes.                                                                                | Yes                      |

\* Audubon 2025

The Proposed Project would require the removal of poplar trees located within the current land application site and cottonwood trees along Cottonwood Creek. These trees could provide habitat for protected avian species although no nests or individuals were noted during the field survey. The Action Area should be surveyed for any migratory bird or eagle nests prior to the removal of any trees in areas of suitable habitat. Surveys for raptors and nests can be conducted prior to construction in the winter or spring, if feasible. Surveys for migratory birds and nests can be conducted prior to construction, typically within 10 days of disturbance in suitable nesting areas. If a nest is identified within the Action Area, the NRCS Biologist and/or USFWS should be notified immediately to discuss the appropriate course of action.

## 7 Determination of Effects

After considering the available scientific information regarding the biological requirements and the status of ESA-listed species considered in this BAR, the environmental baseline for the Action Area, and the potential effects of the Proposed Project within the Action Area, the following effect determinations for the North American wolverine, monarch butterfly, Suckley's cuckoo bumble bee, Spalding's catchfly, and Snake River Basin steelhead were made:

**Table 3. Federally-Listed Species Effects Determination Summary**

| Common Name                 | Scientific Name            | ESA Status          | Effect Determination |
|-----------------------------|----------------------------|---------------------|----------------------|
| North American wolverine    | <i>Gulo gulo luscus</i>    | Threatened          | No Effect            |
| Monarch butterfly           | <i>Danaus plexippus</i>    | Proposed Threatened | No Effect            |
| Suckley's Cuckoo Bumble Bee | <i>Bombus suckleyi</i>     | Proposed Endangered | No Effect            |
| Spalding's catchfly         | <i>Silene spaldingii</i>   | Threatened          | No Effect            |
| Steelhead                   | <i>Oncorhynchus mykiss</i> | Threatened          | No Effect            |

The Proposed Project is anticipated to temporarily impact EFH for coho and chinook salmon during construction, and the Proposed Project could have a non-substantive adverse effect to EFH, but long-term negative impacts to EFH are not anticipated. Clearance surveys for nests or nesting birds and appropriate avoidance mitigation, if required, would avoid and minimize potential impacts to migratory birds or eagles. Additional conservation measures may be included in permits and certifications issued for the Proposed Project by regulatory agencies.

It should be noted that the final authority regarding species effect determinations rests with the appropriate regulatory authority.



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# Appendix 1: Watershed Map & Preferred Alternative Map

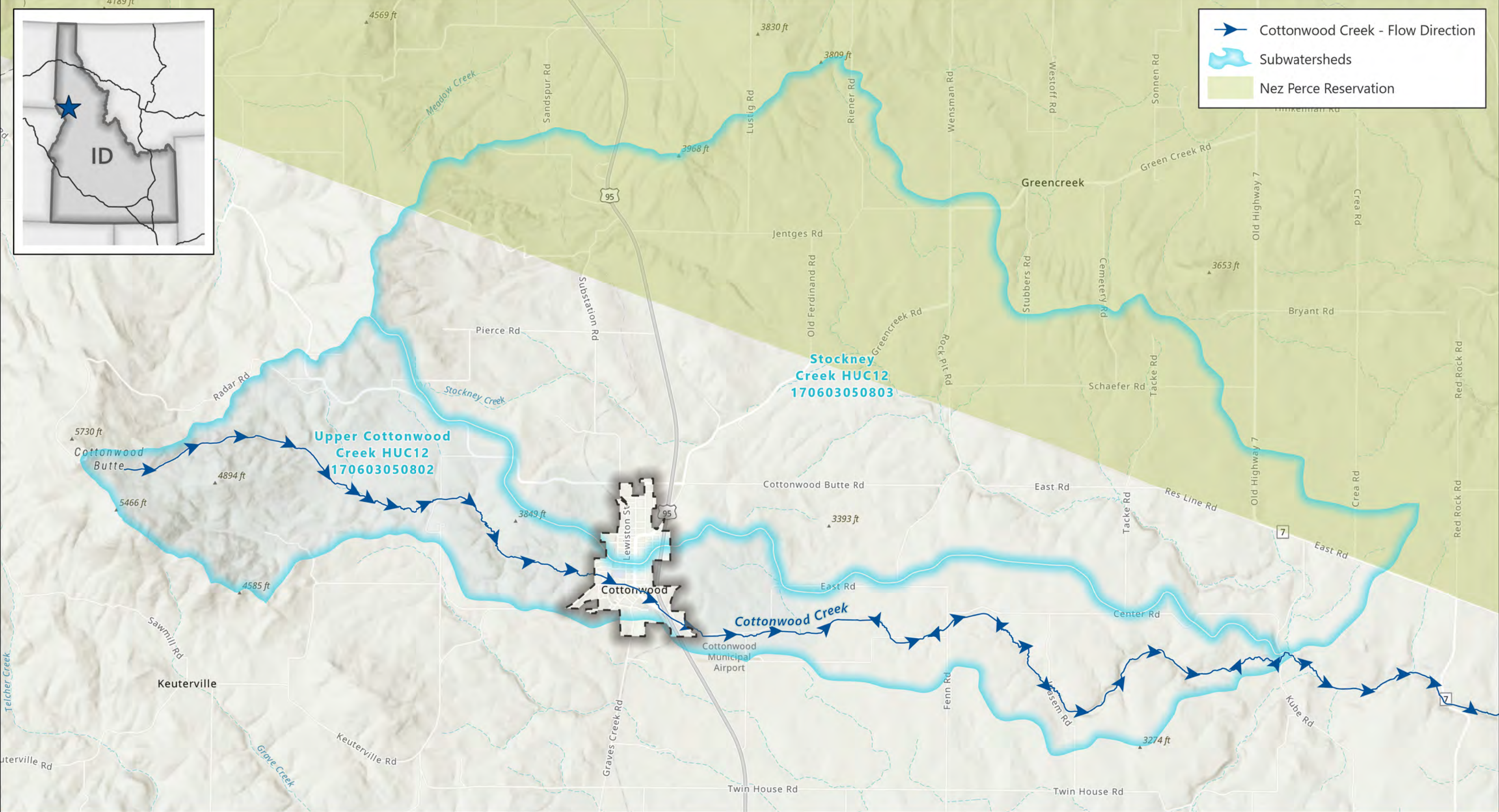




 Cottonwood Creek - Flow Direction

 Subwatersheds

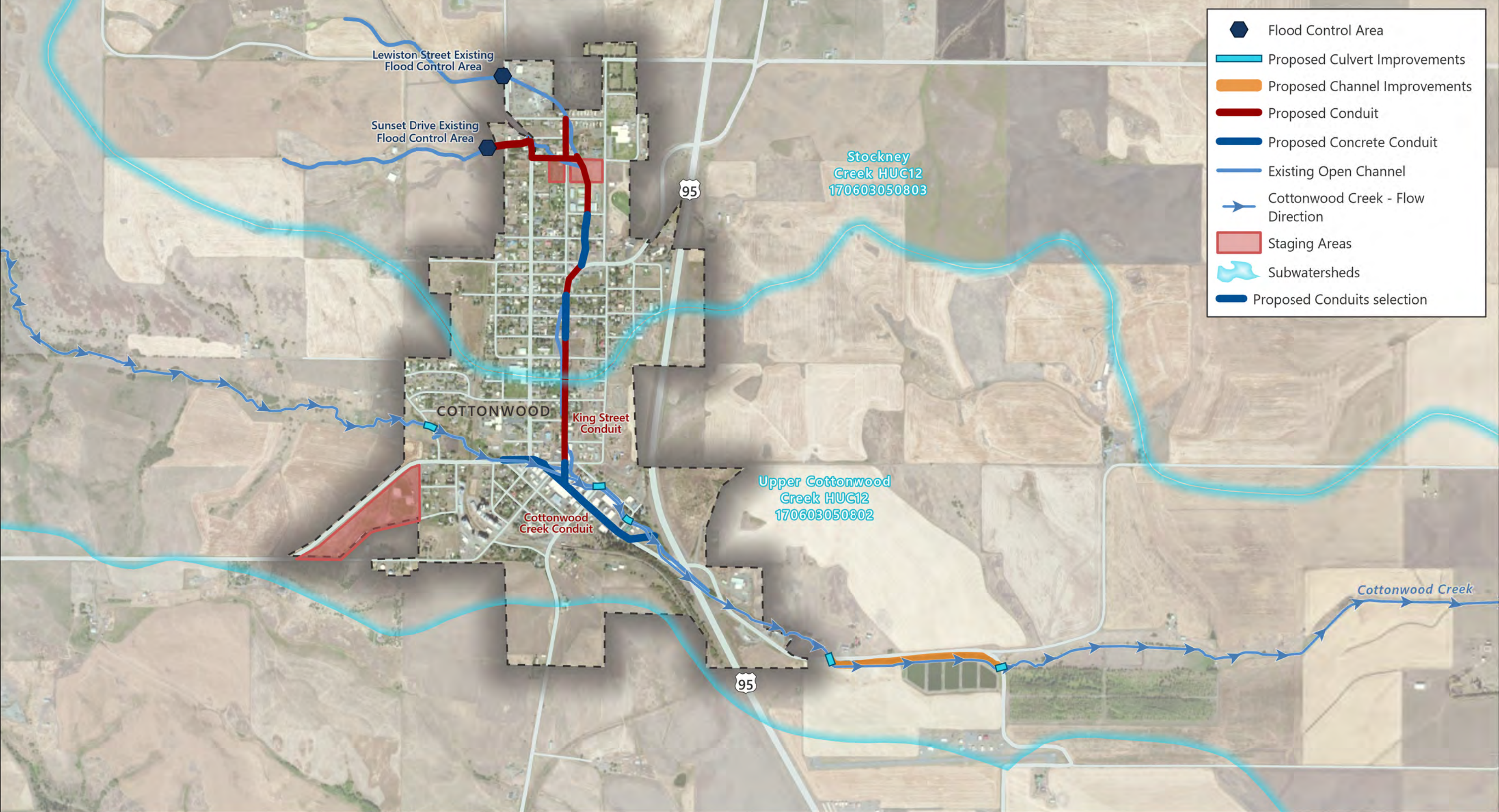
 Nez Perce Reservation



Feb 2024

# WATERSHED MAP





- Flood Control Area
- Proposed Culvert Improvements
- Proposed Channel Improvements
- Proposed Conduit
- Proposed Concrete Conduit
- Existing Open Channel
- Cottonwood Creek - Flow Direction
- Staging Areas
- Subwatersheds
- Proposed Conduits selection

0 1,200 2,400  
Feet



Mar 2024

## PROJECT MAP

Cottonwood Creek Watershed Plan-EA



Appendix 2: IPaC Report (Dated: June 16, 2025)



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

Idaho Fish And Wildlife Office  
1387 South Vinnell Way, Suite 368  
Boise, ID 83709-1657  
Phone: (208) 378-5243 Fax: (208) 378-5262



In Reply Refer To:

06/16/2025 18:10:14 UTC

Project Code: 2025-0092169

Project Name: Cottonwood Creek Watershed Plan EA

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

**Migratory Birds:** In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List



- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

## OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Idaho Fish And Wildlife Office**  
1387 South Vinnell Way, Suite 368  
Boise, ID 83709-1657  
(208) 378-5243

## PROJECT SUMMARY

Project Code: 2025-0092169

Project Name: Cottonwood Creek Watershed Plan EA

Project Type: Flooding

Project Description: The Proposed Project would improve the existing infrastructure for flood prevention and flood reduction. This includes the Main Street alignment, King Street improvements, creek crossings and channel enhancement, and lagoon protection.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.04175285,-116.33156513750001,14z>



Counties: Idaho County, Idaho

## ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

| NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | STATUS     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <p>North American Wolverine <i>Gulo gulo luscus</i></p> <p>No critical habitat has been designated for this species.</p> <p>This species only needs to be considered under the following conditions:</p> <ul style="list-style-type: none"> <li>Species may be present based on transient occurrence as it moves through or too suitable habitat. Effects should be considered to species and projects should consult with the Service, however, depending on the project, consultation may not be necessary.</li> </ul> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/5123">https://ecos.fws.gov/ecp/species/5123</a></p> <p>General project design guidelines: <a href="https://ipac.ecosphere.fws.gov/project/RQNVE6J5VRHNFASF5B4GHSVG5Y/documents/generated/7151.pdf">https://ipac.ecosphere.fws.gov/project/RQNVE6J5VRHNFASF5B4GHSVG5Y/documents/generated/7151.pdf</a></p> | Threatened |

## INSECTS

| NAME                                                                                                                                                                                                                                                                                       | STATUS                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| <p>Monarch Butterfly <i>Danaus plexippus</i></p> <p>There is <b>proposed</b> critical habitat for this species. Your location does not overlap the critical habitat.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a></p> | Proposed<br>Threatened |
| <p>Suckley's Cuckoo Bumble Bee <i>Bombus suckleyi</i></p> <p>Population:</p> <p>No critical habitat has been designated for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/10885">https://ecos.fws.gov/ecp/species/10885</a></p>                          | Proposed<br>Endangered |

## FLOWERING PLANTS

| NAME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | STATUS     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <p>Spalding's Catchfly <i>Silene spaldingii</i></p> <p>There is <b>proposed</b> critical habitat for this species.</p> <p>Species profile: <a href="https://ecos.fws.gov/ecp/species/3681">https://ecos.fws.gov/ecp/species/3681</a></p> <p>General project design guidelines: <a href="https://ipac.ecosphere.fws.gov/project/RQNVE6J5VRHNFASF5B4GHSVG5Y/documents/generated/7151.pdf">https://ipac.ecosphere.fws.gov/project/RQNVE6J5VRHNFASF5B4GHSVG5Y/documents/generated/7151.pdf</a></p> | Threatened |

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.



## USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

## BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act <sup>2</sup> and the Migratory Bird Treaty Act (MBTA) <sup>1</sup>. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

- 
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
  2. The [Migratory Birds Treaty Act](#) of 1918.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your [project](#) area.

### Measures for Proactively Minimizing Eagle Impacts

For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the [National Bald Eagle Management Guidelines](#). You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#).

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

If disturbance or take of eagles cannot be avoided, an [incidental take permit](#) may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the [Do I Need A Permit Tool](#). For assistance making this determination for golden eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

### Ensure Your Eagle List is Accurate and Complete

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information](#)



Non-BCC  
Vulnerable

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

## MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) <sup>1</sup> prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

| NAME                                                                                                                                                                                                                                                                                   | BREEDING SEASON         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>American Avocet <i>Recurvirostra americana</i></b><br>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA<br><a href="https://ecos.fws.gov/ecp/species/11927">https://ecos.fws.gov/ecp/species/11927</a>        | Breeds Apr 21 to Aug 10 |
| <b>American White Pelican <i>pelecanus erythrorhynchos</i></b><br>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA<br><a href="https://ecos.fws.gov/ecp/species/6886">https://ecos.fws.gov/ecp/species/6886</a> | Breeds Apr 1 to Aug 31  |
| <b>Black Tern <i>Chlidonias niger surinamenis</i></b><br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br><a href="https://ecos.fws.gov/ecp/species/3093">https://ecos.fws.gov/ecp/species/3093</a>                             | Breeds May 15 to Aug 20 |

| NAME                                                                                                                                                                                                                                                                                                                                                                     | BREEDING SEASON         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <p>California Gull <i>Larus californicus</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/10955">https://ecos.fws.gov/ecp/species/10955</a></p>                                                                                                          | Breeds Mar 1 to Jul 31  |
| <p>Calliope Hummingbird <i>Selasphorus calliope</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9526">https://ecos.fws.gov/ecp/species/9526</a></p>                                                                                                     | Breeds May 1 to Aug 15  |
| <p>Cassin's Finch <i>Haemorhous cassinii</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9462">https://ecos.fws.gov/ecp/species/9462</a></p>                                                                                                            | Breeds May 15 to Jul 15 |
| <p>Evening Grosbeak <i>Coccothraustes vespertinus</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9465">https://ecos.fws.gov/ecp/species/9465</a></p>                                                                                                   | Breeds May 15 to Aug 10 |
| <p>Forster's Tern <i>Sterna forsteri</i></p> <p>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p> <p><a href="https://ecos.fws.gov/ecp/species/11953">https://ecos.fws.gov/ecp/species/11953</a></p>                                                                                           | Breeds Mar 1 to Aug 15  |
| <p>Franklin's Gull <i>Leucophaeus pipixcan</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/10567">https://ecos.fws.gov/ecp/species/10567</a></p>                                                                                                        | Breeds May 1 to Jul 31  |
| <p>Golden Eagle <i>Aquila chrysaetos</i></p> <p>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p> <p><a href="https://ecos.fws.gov/ecp/species/1680">https://ecos.fws.gov/ecp/species/1680</a></p> | Breeds Jan 1 to Aug 31  |
| <p>Lesser Yellowlegs <i>Tringa flavipes</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9679">https://ecos.fws.gov/ecp/species/9679</a></p>                                                                                                             | Breeds elsewhere        |
| <p>Northern Harrier <i>Circus hudsonius</i></p> <p>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p> <p><a href="https://ecos.fws.gov/ecp/species/8350">https://ecos.fws.gov/ecp/species/8350</a></p>                                                                                          | Breeds Apr 1 to Sep 15  |
| <p>Pectoral Sandpiper <i>Calidris melanotos</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9561">https://ecos.fws.gov/ecp/species/9561</a></p>                                                                                                         | Breeds elsewhere        |



| NAME                                                                                                                                                                                                                                                | BREEDING SEASON         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Rufous Hummingbird <i>Selasphorus rufus</i><br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br><a href="https://ecos.fws.gov/ecp/species/8002">https://ecos.fws.gov/ecp/species/8002</a>    | Breeds Apr 15 to Jul 15 |
| Western Grebe <i>aechmophorus occidentalis</i><br>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.<br><a href="https://ecos.fws.gov/ecp/species/6743">https://ecos.fws.gov/ecp/species/6743</a> | Breeds Jun 1 to Aug 31  |

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

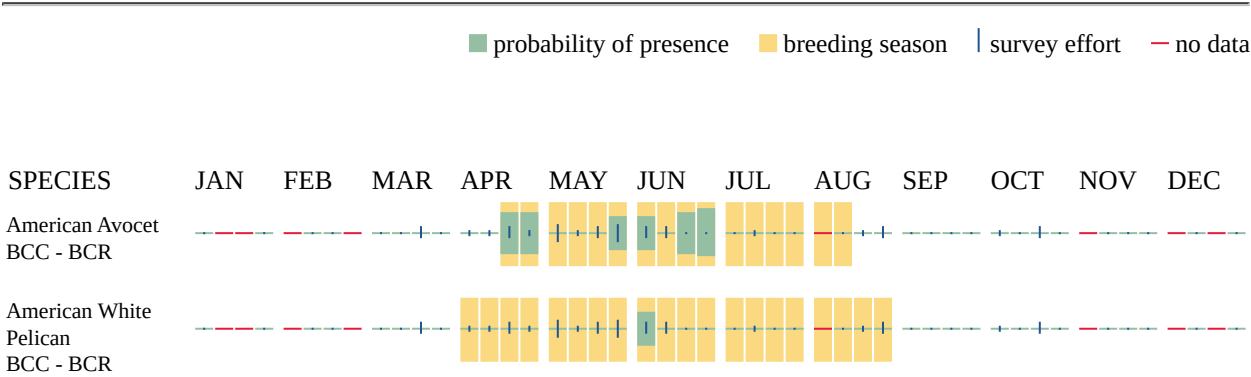
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds

- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

## WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

### FRESHWATER EMERGENT WETLAND

- PEM1C

### FRESHWATER FORESTED/SHRUB WETLAND

- PSSA

## **IPAC USER CONTACT INFORMATION**

Agency: J-U-B Engineers Inc.  
Name: Sydney Allen  
Address: 392 E Winchester St Suite 300  
City: Salt Lake City  
State: UT  
Zip: 84107  
Email: seallen@jub.com  
Phone: 8018669052

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Natural Resources Conservation Service



## Appendix 3: IFWIS Species Occurrence Data Discussion

## Idaho Fish and Wildlife Information System Species Occurrence Data Discussion

Of the 127 special status species occurring within 2 miles of the Action Area listed in the Idaho Fish and Wildlife Information System (IFWIS) data, 15 species are Species of Greatest Conservation Need (SGCN) as cross referenced with the State Wildlife Action Plan (SWAP) (IDFG 2025). See the list below with common names, scientific names, and the conservation status rank per the SWAP. The state conservation ranks the status of species from 1 to 5. Some species have different ranking based on breeding population (B) and nonbreeding population (N).

| Common Name            | Scientific Name                   | State Conservation Rank |
|------------------------|-----------------------------------|-------------------------|
| American Pipit         | <i>Anthus rubescens</i>           | S3B                     |
| American White Pelican | <i>Pelecanus erythrorhynchos</i>  | S3B                     |
| Black Tern             | <i>Chilodonia niger</i>           | S1B                     |
| Cassin's Finch         | <i>Haemorhous cassinii</i>        | S3                      |
| Cinnamon Teal          | <i>Anas cyanoptera</i>            | S3B                     |
| Eared Grebe            | <i>Podiceps nigricollis</i>       | S3B, S3N                |
| Evening Grosbeak       | <i>Coccothraustes vespertinus</i> | S4                      |
| Franklin's Gull        | <i>Leucophaeus pipixcan</i>       | S2B                     |
| Lewis's Woodpecker     | <i>Melanerpes lewis</i>           | S3B                     |
| Northern Pintail       | <i>Anas acuta</i>                 | S3N, S3B                |
| Ring-billed Gull       | <i>Larus delawarensis</i>         | S3B, S5N                |
| Western Grebe          | <i>Aechmophorus occidentalis</i>  | S2B                     |
| White-faced Ibis       | <i>Plegadis chihi</i>             | S3B                     |
| Wilson's Warbler       | <i>Cardellina pusilla</i>         | S3B                     |

MBTA species identified by the IPaC have been discussed in the BAR and removed from this analysis. All of the species (8) that remain are species of birds. See the list below:

- American Pipit (*Anthus rubescens*) — S3B
- Cinnamon Teal (*Anas cyanoptera*) — S3B
- Eared Grebe (*Podiceps nigricollis*) — S3B, S3N
- Lewis's Woodpecker (*Melanerpes lewis*) — S3B
- Northern Pintail (*Anas acuta*) — S3N, S3B
- Ring-billed Gull (*Larus delawarensis*) — S3B, S5N
- White-faced Ibis (*Plegadis chihi*) — S3B
- Wilson's Warbler (*Cardellina pusilla*) — S3B

The American pipit prefers bare terrestrial habitats, including human-made habitats such as harvested agricultural fields, and winter wheat fields. American Pipits nest on the ground typically in meadows or open environments. The Wilson's warbler prefers scrub habitat. The cinnamon teal, northern pintail, and white-faced ibis have the potential to occur in marshlands within the Project Area. The American pipit, Wilson's warbler, cinnamon teal, northern pintail, and white-faced ibis all nest on the ground. Best management practices (BMPs) will be implemented to reduce impacts to these species and include completing ground nesting surveys within 7 days of construction.

The eared grebe and ring-billed gull may occur within the two ditches in the Action Area. The eared grebe prefers lakes or large ponds with extensive marshy borders. Because the ditches in the Action Area are relatively narrow without a lot of vegetation there is not habitat for the eared grebe in the Action Area. Whereas the ring-billed gull nest on the ground near freshwater. BMPs will be implemented to reduce impacts to these species and will include completing ground nesting surveys within 7 days of construction.

The Lewis's woodpecker breeds in open ponderosa pine forests with a high density of standing snags, as well as woodlands near streams, oak woodlands, orchards, and pinyon-juniper woodlands. The Action Area does not contain breeding habitat for Lewis's woodpecker, but does provide stopover habitat along Cottonwood Creek. The Action Area does not contain suitable habitat for the species.

## Appendix 4: Photo Inventory



### **Photo Inventory**

The following photos were taken during a site visit conducted on August 11 and 12, 2021.



Photo 1: South view of City of Cottonwood along Business US-95/King Street



Photo 2: East view of Cottonwood Creek





Photo 3: East view of Cottonwood Creek and culvert



Photo 4: Agricultural field within the Action Area





Photo 5: West view of lagoons with reed canarygrass on edges



Photo 6: East view of balsam poplars in area east of lagoons

## Appendix 5: USFWS Coordination



## Lexie Conley

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**Subject:** RE: [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

---

**From:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Sent:** Tuesday, July 6, 2021 7:44 AM

**To:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** Re: [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

---

### External Email

Tyler,

Yes, mid July to mid Aug is still the best time to survey for Spalding's Catchfly.

With large projects like yours, I usually suggest you work with a botanist to do an initial habitat survey in order to determine if/where there is appropriate habitat that will need a Spalding's catchfly survey. There is no reason to do surveys in habitat types not known to support Spalding's catchfly.

Below is a description of habitat you are looking for as described in the species recovery plan:

"In general *Silene spaldingii* is found in open, mesic (moist) grassland communities or sagebrush-steppe communities. However, the species is occasionally found within open pine forests. The bunchgrass grasslands where *S. spaldingii* primarily occurs are characterized by either *Festuca idahoensis* (Idaho fescue) or *F. idahoensis* (Idaho fescue) with *Agropyron spicatum* = *Pseudoroegneria spicata* (bluebunch wheatgrass) except in Montana where the dominant bunchgrass is *F. scabrella* (rough fescue)."

Let me know if you have any questions,

Ken King

Fish and Wildlife Biologist

U.S. Fish and Wildlife Service

Idaho Fish and Wildlife Office

3232 W. Nursery Road

Coeur d'Alene, ID 83815

Ph: 208-769-5115

[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)

---

**From:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Sent:** Friday, July 2, 2021 10:38 AM

**To:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Thanks Ken. When would you prefer surveys be conducted? Is the usual timeline of Mid-July to mid-August still sufficient?

Best Regards,

Tyler

Tyler Schade

Environmental Specialist/Biologist

p 208 376 7330 Ext 1035 c 208 509 2715

---

**From:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Sent:** Thursday, July 1, 2021 11:00 AM

**To:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** Spalding's Catchfly survey - thoughts without knowing the action

External Email

Hi Tyler,

The entire polygon is in Spalding's range. If the action may impact the species, we generally ask for surveys to be conducted by a qualified botanist to determine if it is present or not. The disturbed city areas in the polygon (parking lots, roads, houses, gravel lots, airports) do not need to be surveyed since they are not adequate habitat. The surveys would be looking for the species in relatively intact mesic Idaho fescue or mesic prairie June grass communities.

Does this help?

Ken King

Fish and Wildlife Biologist

U.S. Fish and Wildlife Service

Idaho Fish and Wildlife Office

3232 W. Nursery Road

Coeur d'Alene, ID 83815

Ph: 208-769-5115

[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)



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LANGDON  
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## Appendix 6: Spalding's Catchfly Survey Memo

## MEMORANDUM

DATE: December 21, 2021

TO: Jennifer Skeldon, State Biologist (Natural Resources Conservation Service)

CC: Marti Hoge, Environmental Lead (J-U-B ENGINEERS, Inc.)

FROM: Autumn Foushee, Senior Biologist (J-U-B ENGINEERS, Inc.)

SUBJECT: Cottonwood Creek Watershed Flood Protection & Agricultural Water Management Project

---

A Spalding's catchfly (*Silene spaldingii*) protocol-level plant survey was completed for four areas of potentially suitable habitat within the approximate 1,099-acre Proposed Project Action Area in Cottonwood, Idaho. The field survey was completed for the proposed Cottonwood Creek Watershed Flood Protection & Agricultural Water Management Project (Proposed Action) on behalf of the City of Cottonwood for the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The City of Cottonwood secured funding for the Proposed Action through the Watershed Protection and Flood Prevention Act [Public Law (PL) 83-566]. This survey was completed in accordance with the U.S. Fish and Wildlife (USFWS) Idaho Fish and Wildlife Office *Rare Plant Inventory Guidelines* (USFWS 2001). The USFWS guidelines were implemented in the survey efforts. The USFWS was contacted prior to the survey to confirm the accepted survey window (USFWS Coordination, Attachment 1). Autumn Foushee, Senior Biologist (J-U-B ENGINEERS, Inc.) conducted the field investigation on August 11 and 12, 2021 during the accepted flowering period for the species (Attachment 1).

The following section provides a brief description of Spalding's catchfly, as well as the typical habitat requirements of the species. This information was used to ensure that the rare plant survey was completed in an efficient and comprehensive manner.

### Species Description

Spalding's catchfly (*Silene spaldingii*), sometimes called Spalding's *silene*, is listed as threatened under the Endangered Species Act (ESA). Critical habitat has been proposed for this species, but the location of the critical habitat is not currently available. This plant is endemic to portions of Idaho, Montana, Oregon, Washington, and British Columbia (USDA 2010). The species is an



herbaceous perennial, 8-24 inches tall, typically with one stem, bearing 4 to 8 pairs of leaves 2 to 3 inches in length (Hitchcock et al. 1964). The light green foliage and stem are lightly to more typically densely covered with sticky hairs. The cream-colored flowers are arranged in a spiral at the top of the stem. The species begins to flower in mid-to-late-July, with some individuals still flowering in early September. Spalding's catchfly generally occurs in native grasslands that are in reasonably good ecological condition. It is found most commonly in sites that are dominated by Idaho fescue (*Festuca idahoensis*) and have sparse cover of common snowberry (*Symphoricarpos albus*) (Washington Natural Heritage Program 2001). Populations have been found on all aspects, although there seems to be a preference for north-facing slopes. Spalding's catchfly tends to be found in areas that range from 1,900 feet to 3,600 feet in elevation (USDA 2010). Soils are almost always productive silts/loams (loess) that are moderately deep and sometimes gravelly (Gamon 1991).

The closest known population, which serves as a reference site, identified by USFWS and the Idaho Fish and Wildlife Information System lies near Lawyer Creek in Craigmont, Idaho, approximately 10 miles northwest of the Proposed Action. The reference site was evaluated to document the current stage class of a known population. Without specific individual reference points, a known Spalding's catchfly individual was not located in the reference population survey area. Another catchfly (*Silene*) species was noted amongst the assemblage of grasses and forbs. Species in the general area included white campion (*Silene latifolia*), Missouri goldenrod (*Solidago missouriensis*), reed canarygrass (*Phalaris arundinacea*), nettleleaf giant hyssop (*Agastache urticifolia*), and common snowberry.

### Site Evaluation & Survey Results

The approximate 1,099-acre Action Area for the Proposed Action encompasses the project footprint, including staging areas. Four specific locations within the Action Area were established with a 300-foot buffer due to the potential for Spalding's catchfly habitat, and to meet the guidelines set forth by the USFWS protocol for the Spalding's catchfly survey. No evidence of Spalding's catchfly occurrence in any stage class (rosette of basal leaves, non-flowering stem, or flowering stem) was observed during the plant survey. Soils within the Action Area are predominately silt loam, which is consistent with suitable habitat for the species. The elevation of the Action Area ranges from 3,720 feet above mean sea level (AMSL) on the southwest portion to 3,340 feet AMSL on the southeast portion; therefore, portions of the Action Area are within the upper end of the elevation range typical of Spalding's catchfly habitat. However, all

four of the Spalding's catchfly survey areas were still within the species' preferred elevation range. Although soils and elevation of the survey area are suitable for the species, the four areas specifically surveyed for Spalding's catchfly were not north-facing and the vegetative assemblage was not conducive to the species presence. The aspects of the four sites were roughly east, west, and south-facing. One area was north-facing, but vegetation was dominated by reed canarygrass. Existing conditions in the survey area are dominated by aggressive plant species, agricultural crop species, and upland and weedy vegetation. Dominant species included reed canarygrass, alfalfa (*Medicago sativa*), wheat (*Triticum* sp.), squirreltail (*Elymus elymoides*), rush skeletonweed (*Chondrilla juncea*), and cheatgrass (*Bromus tectorum*).

The attached Spalding's Catchfly Survey Exhibit illustrates the locations of the Spalding's catchfly survey areas (Attachment 2). The attached Photo Inventory captures the pertinent habitat conditions encountered during the survey (Attachment 3).

## Conclusion

Four areas within the 1,099-acre Action Area were surveyed for potential Spalding's catchfly suitable habitat and the presence of Spalding's catchfly. The field investigation did not locate any Spalding's catchfly within the survey area. The survey area does not appear to contain suitable habitat for Spalding's catchfly given the locations exhibited a vegetative assemblage of aggressive plant species, non-northerly aspects, and elevations at the upper end of the species accepted range.

If you have any questions regarding the information presented herein, please do not hesitate to contact me at: [afoushee@jub.com](mailto:afoushee@jub.com) or via phone at 801-886-9052.

## Attachments

1. USFWS Coordination
2. Spalding's Catchfly Survey Exhibit
3. Photo Inventory



## References

- Gamon, J. 1991. "Report on the status of *Silene spaldingii* Wats. In Washington." Washington Natural Heritage Program, Department of Natural Resources, Olympia, Washington.
- Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1964. Vascular Plants of the Pacific Northwest, Part 2: Salicaceae to Saxifragaceae. University of Washington Press, Seattle.
- U.S. Department of Agriculture (USDA). 2010. Spalding's Catchfly (*Silene spaldingii* S. Watson). USDA NRCS Idaho Plant Materials Program. February, 2010.
- Washington Natural Heritage Program. 2001. *Field Guide to Selected Rare Vascular Plants of Washington*. Washington Department of Natural Resources. Accessed October 20, 2021. <http://www.dnr.wa.gov>.
- U.S. Fish and Wildlife (USFWS). 2001. *Rare Plant Inventory Guidelines*. USFWS, Idaho Fish and Wildlife Office. [https://www.fws.gov/idaho/documents/RarePlantGuidelines\\_IFWO.pdf](https://www.fws.gov/idaho/documents/RarePlantGuidelines_IFWO.pdf).

## **Attachment 1: USFWS Coordination**



## Lexie Conley

---

**Subject:** RE: [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

---

**From:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Sent:** Tuesday, July 6, 2021 7:44 AM

**To:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** Re: [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

---

### External Email

Tyler,

Yes, mid July to mid Aug is still the best time to survey for Spalding's Catchfly.

With large projects like yours, I usually suggest you work with a botanist to do an initial habitat survey in order to determine if/where there is appropriate habitat that will need a Spalding's catchfly survey. There is no reason to do surveys in habitat types not known to support Spalding's catchfly.

Below is a description of habitat you are looking for as described in the species recovery plan:

"In general *Silene spaldingii* is found in open, mesic (moist) grassland communities or sagebrush-steppe communities. However, the species is occasionally found within open pine forests. The bunchgrass grasslands where *S. spaldingii* primarily occurs are characterized by either *Festuca idahoensis* (Idaho fescue) or *F. idahoensis* (Idaho fescue) with *Agropyron spicatum* = *Pseudoroegneria spicata* (bluebunch wheatgrass) except in Montana where the dominant bunchgrass is *F. scabrella* (rough fescue)."

Let me know if you have any questions,

Ken King

Fish and Wildlife Biologist

U.S. Fish and Wildlife Service

Idaho Fish and Wildlife Office

3232 W. Nursery Road

Coeur d'Alene, ID 83815

Ph: 208-769-5115

[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)

---

**From:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Sent:** Friday, July 2, 2021 10:38 AM

**To:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** [EXTERNAL] RE: Spalding's Catchfly survey - thoughts without knowing the action

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Thanks Ken. When would you prefer surveys be conducted? Is the usual timeline of Mid-July to mid-August still sufficient?

Best Regards,

Tyler

Tyler Schade

Environmental Specialist/Biologist

p 208 376 7330 Ext 1035 c 208 509 2715

---

**From:** King, Kenneth G <[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)>

**Sent:** Thursday, July 1, 2021 11:00 AM

**To:** Tyler Schade <[tschade@jub.com](mailto:tschade@jub.com)>

**Cc:** Colson, Karen <[karen\\_colson@fws.gov](mailto:karen_colson@fws.gov)>

**Subject:** Spalding's Catchfly survey - thoughts without knowing the action

External Email

Hi Tyler,

The entire polygon is in Spalding's range. If the action may impact the species, we generally ask for surveys to be conducted by a qualified botanist to determine if it is present or not. The disturbed city areas in the polygon (parking lots, roads, houses, gravel lots, airports) do not need to be surveyed since they are not adequate habitat. The surveys would be looking for the species in relatively intact mesic Idaho fescue or mesic prairie June grass communities.

Does this help?

Ken King

Fish and Wildlife Biologist

U.S. Fish and Wildlife Service

Idaho Fish and Wildlife Office

3232 W. Nursery Road

Coeur d'Alene, ID 83815

Ph: 208-769-5115

[kennith\\_king@fws.gov](mailto:kennith_king@fws.gov)



THE  
LANGDON  
GROUP



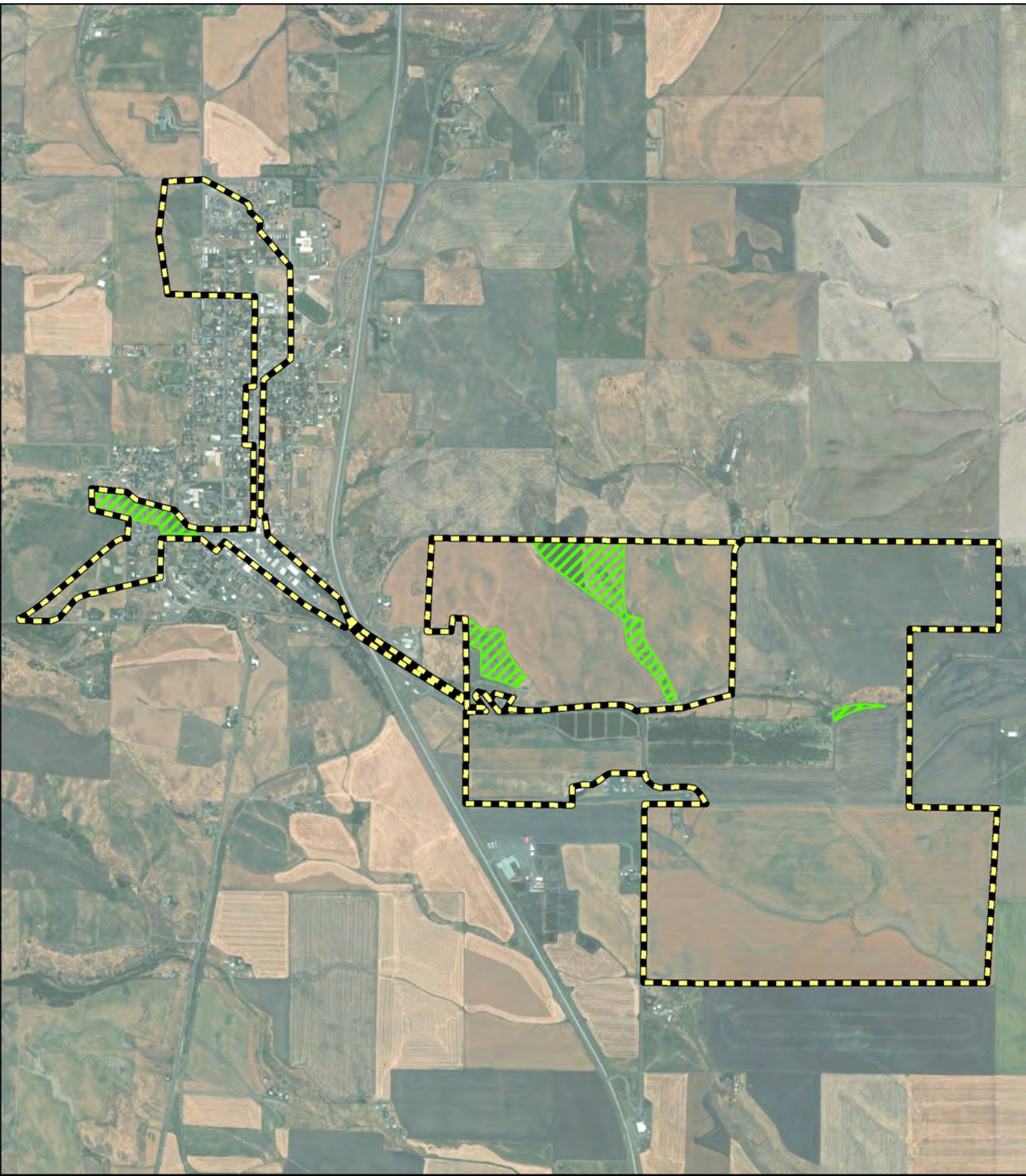
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## **Attachment 2: Spalding's Catchfly Survey Exhibit**

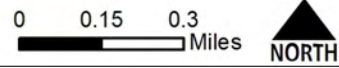




Study Area



Silene Spaldingii Survey Area





## **Attachment 3: Photo Inventory**

### Photo Inventory

The following photos were taken during field investigations on August 11 and 12, 2021.



Photo 1: The reference site near Craigmont, Idaho was evaluated to document the current stage class of a known population. Vegetation at the reference site was dominated by reed canarygrass (*Phalaris arundinacea*), Missouri goldenrod (*Solidago missouriensis*), nettleleaf giant hyssop (*Agastache urticifolia*) and common snowberry (*Symphoricarpos albus*).



Photo 2: Another catchfly species (*Silene latifolia*) was noted amongst the assemblage of grasses and forbs.





Photo 3: The survey area was dominated by aggressive species, such as reed canarygrass.

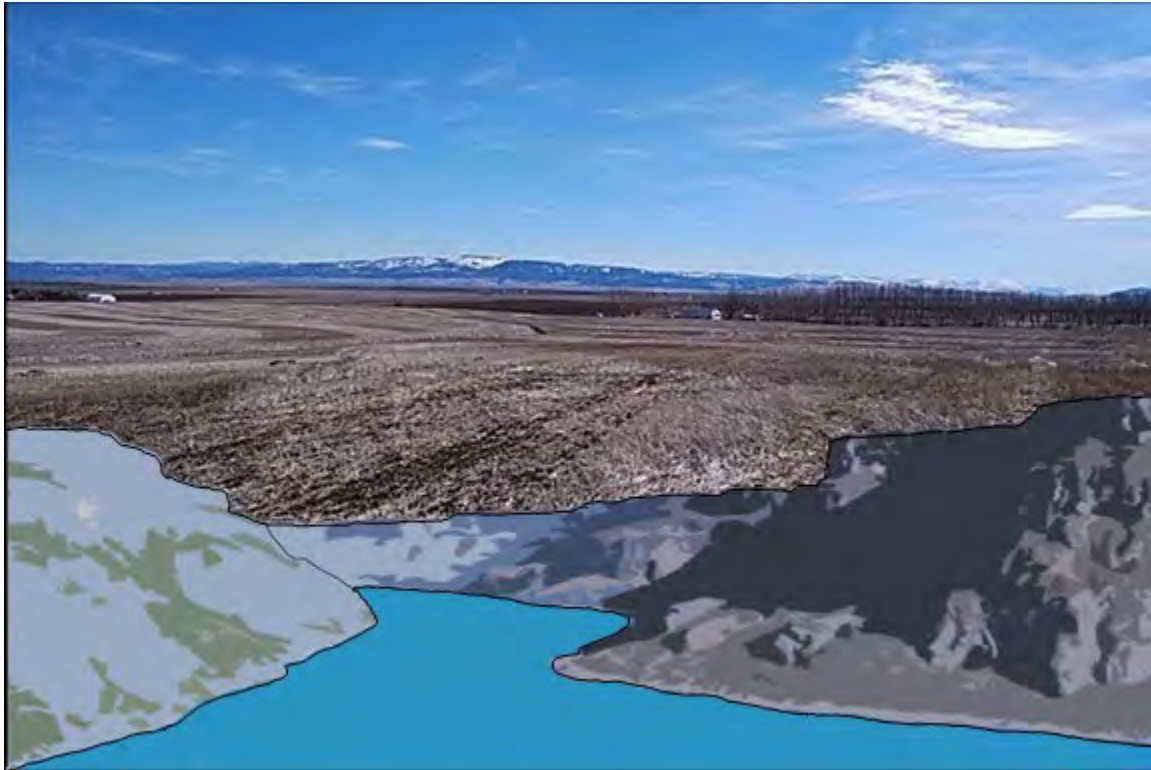


Photo 4: Southeast view of one of the Spalding's catchfly survey areas. Although soils and elevation in the survey area are suitable for the species, the four areas specifically surveyed for Spalding's catchfly did not contain suitable habitat due to aspect and vegetative assemblage.

Appendix E6: Cultural Resources Report, redacted



# A Cultural Resources Inventory for the Cottonwood Flood Control Plan and Environmental Compliance Project, Idaho County, Idaho



***Report No.***

November 17, 2022

***By:***

***A. Craig Hauer, MA, RPA and JoEllen Ross-Hauer, MS***

ARH Archaeology and Architectural History, LLC.  
4747 N. Glenwood Street  
Building A, Suite 104  
Garden City, Idaho  
83714

ARH Project. No. 2024-015

---

## Abstract

In September of 2021, ARH Archaeology was contracted JUB, to complete a cultural resources inventory for the Cottonwood Flood Control Plan and Environmental Compliance Project (Project) near Cottonwood, Idaho. This project consists of performing environmental compliance and planning to improve flood control within the City of Cottonwood and water quality of Cottonwood Creek as part of the Watershed Protection and Flood Prevention Act (Public Law [PL] 83-566). In total, 12,387 feet (ft., 1.76 acres) and 720 acres (ac.) maybe impacted by linear and area disturbances. Per Idaho State Historic Preservation Office (Idaho SHPO) guidance, portions of the project where components will be buried and/or temporary easements are needed were subject to reconnaissance level inventory.

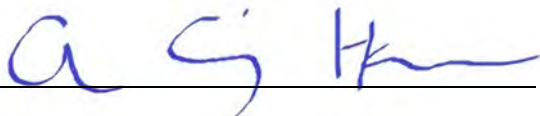
The survey resulted in the recordation of 5 isolated resources, and 7 sites. Cultural sites are historic-aged and include a residence, fair grounds, shooting range, farmsteads, a culvert, and a debris scatter. In addition, 51 historic-aged resources were noted during the reconnaissance and minimally recorded. Isolates are also historic in age. Six noted, but not recorded (NBNR) were observed during the inventory and reconnaissance survey.

All newly recorded archaeological and architectural sites and isolated resources are recommended not eligible to the National Register of Historic Places (NRHP) under any criteria. The Camas Prairie Railroad (10IH2775) was determined eligible to the NRHP under Criteria A and C. The segment of the railroad updated (a portion of the berm, culvert (F-01), and signal sign (F-02)) is recommended contributing under Criterion A and a non-contributing element of the site under Criterion C. Current plans will not modify the berm in the recorded segment of 10IH2775 but will minimally modify the metal plate of the culvert. Considering that the segment is non-contributing to the sites NRHP characteristics under Criterion C, a finding of **No Adverse Effect** is appropriate for direct project impacts. Pipelines and sidewalks will not result in visual impacts. As such, overall, project actions will result in **No Adverse Effect**. Due to previous disturbance, there is a low potential for the presence of sub-surface historic or prehistoric archaeological material. However, it is appropriate for a qualified archaeologist should be present to monitor ground disturbance activities in areas where there is minimal existing disturbances. If any cultural materials are encountered during the project in areas not monitored by an archaeologist, all ground-disturbing activities will cease until a qualified Natural Resources Conservation Service (NRCS) cultural resource specialist is consulted.

---

## Certification of Results

---



Signature of Principal Investigator

05/18/2022

Date



---

# Key Information

## PROJECT NAME

A Cultural Resources Inventory for the Cottonwood Flood Control Plan and Environmental Compliance Project, Idaho County, Idaho

## PROJECT NUMBER(S)

## LOCATION

Idaho County

## USGS QUADS

Cottonwood, ID (1995) 7.5' topographic maps.

## LEGAL LOCATION OF SURVEY

T31N R1E NW 1/4 of the SE 1/4 of Section 9, NE 1/4 of The NE 1/4 of the NE 1/4 Section 5, SE 1/4 of the NE 1/4 of the NE 1/4 Section 5, SE 1/4 of The NW 1/4 of the NE 1/4 Section 5, NE 1/4 of the NW 1/4 Section 8, NE 1/4 of the NE 1/4 of Section 10, SE 1/4 of the SE 1/4 of Section 10, NE 1/4 of the NE 1/4 of Section 15, NW 1/4 of the NE 1/4 of Section 10, SW 1/4 of the NE 1/4 of Section 10, NW 1/4 of the SE 1/4 of Section 10, SW 1/4 of the SE 1/4 of Section 10, NW 1/4 of the NE 1/4 of Section 15, NE 1/4 of the NW 1/4 of Section 10, SE 1/4 of the NW 1/4 of Section 10, NE 1/4 of the SW 1/4 of Section 10, SE 1/4 of the SW 1/4 of Section 10, NE 1/4 of the NW 1/4 of Section 15, NW 1/4 of the SW 1/4 of Section 10, SW 1/4 of the SW 1/4 of Section 10, NW 1/4 of the NW 1/4 of Section 15, NE 1/4 of the SW 1/4 of Section 9, and NW 1/4 of the SW 1/4 of Section 9

## PROJECT AREA

737.24 ac.

## AREA SURVEYED

735.48 Acres Intensive Survey

1.76 Acres Reconnaissance Survey

## PROJECT DATA

1 Previously recorded cultural resource

58 New cultural resources (7 fully recorded, 51 minimally recorded)

5 Isolated resources

6 NBNRs

## AUTHORS

A. Craig Hauer, M.A. and JoEllen Ross-Hauer, M.S.

## FEDERAL AGENCY

US. Department of Agricultural

## REPORT PREPARED FOR

Natural Resources Conservation Service (NRCS)

## REPOSITORY

ARH Archaeology and Architectural History, LLC, Boise, Idaho

## PRINCIPAL INVESTIGATOR

A. Craig Hauer, M. A., RPA

## DATE

05/18/2022

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## Project Description

In October of 2021 and March of 2022, ARH conducted a cultural resources inventory of 737.24 acres for the Cottonwood Project within and near the city of Cottonwood, Idaho (Maps 1-3). The inventory was conducted in support of preparation of a Watershed Plan and associated Environmental Assessment Plan (EA). The plan and EA are funded through the Watershed Protection and Flood Prevention Act (Public Law [PL] 83-566) and is sponsored by the United States Department of Agriculture Natural Resources Conservation Service (NRCS), with the City of Cottonwood and co-sponsored by Cottonwood Highway District and the Idaho Transportation Department.

The plan is meant to address the following needs:

- Undersized and aged piping cannot handle peak flows, resulting in flooding of areas near the fairgrounds and along King and Main Streets during flooding events.
- Treated water discharge from the wastewater lagoons to Cottonwood Creek does not satisfy State & Federal water quality standards.
- There is no pedestrian connectivity from the center of town to a city park and baseball fields.

The Project will develop and evaluate alternatives to mitigate flooding, including (1) installing piping beneath Main Street, King Street, and other impacted streets to convey floodwaters; and (2) consider the use of retention basins to decrease peak flows, thereby reducing the size of piping needed along Main and King Streets to convey floodwater; and, (3) consider improvements to the Cottonwood Creek channel to reduce sediment load and reduce/prevent flooding, such as bank stabilization, culvert improvements. In addition, the project will evaluate alternatives for agricultural water storage and irrigation improvements to reduce or eliminate treated water discharge, improve agricultural water management, and satisfy water quality criteria through improvement of water quality in Cottonwood Creek. The project will also consider options to provide safe, pedestrian access as part of a recreational component of PL-566 funds to connect a city park and baseball fields to the center of town. These actions will be confined to the City of Cottonwood and a large block of agricultural land to the east of the city (Figure 1).

---

## Project Area of Potential Effect

The Project Area of Potential Effect (APE) consists of a direct APE of 737.24 acres (ac.). This includes 12,387 ft. of potential pipelines and sidewalks, staging areas (19 ac.), floodwater detention basins (2 ac.), and a 709-ac. area of environmental study. Proposed areas of stormwater pipe improvements are considered a temporary impact and were subject to a reconnaissance survey. All other areas were intensively inventoried (Maps 2 and 3). Considering that the proposed pipelines and staging areas are temporary impacts, the visual direct effects APE is considered the same as the direct APE boundaries.

---

## Environmental Setting

The project area is located within and to the east of the town of Cottonwood, Idaho. The project area is characterized by rolling hills that have been farmed (Figure 1).

---



**Figure 1. Project Area Overview in Rural Areas.**

Major creeks within the project area include Cottonwood Creek, Shebang Creek, and Stockney Creek. The Salmon River is to the west of the project area. Agricultural use of the area has impacted the natural courses of these creeks and the landscape has been heavily modified.

## Geology

The project area is composed of Tertiary-aged Columbia River flood basalts overlayed by loess. Also present are islands of older metavolcanic and volcanic rocks of Kamiah Volcanics and Seven Devils group.

Seven soil types are present in the project area. These are the Fenn, Ferdinand/Flyboy, Meland, Nez Perce, Shebang, Uhlorn, and Westlake. Nez Perce

silt loam is the most common sediment type. This is a Loess derived from basalt that can be up to 60 inches in depth. The sediment transitions from silt loam to silty clay and is moderately well drained.

## Ecoregions

Ecoregions are defined as areas of similar ecosystems and in type, quantity, and quality of environmental resources (Omernik 2004). The Environmental Protection Agency has defined 10 ecoregions within Idaho, which have been divided into 71 sub-regions (McGrath et al. 2002; Omernik and Griffith 2014). Ecoregions provide a special framework for analysis and are used to describe the natural environment of the project area for this report. The project area is within the Nez Perce Prairie. The prairie is a loess-covered plateau. Fescue and bluebunch wheatgrass are native, but cropland is now extensive. Wheat, barley, peas, and hay are the primary crops (McGrath et al. 2002).

## Vegetation

The project area falls within the Camas Prairie, which is bounded by the Nez Perce National Forest to the east, west, and south and the Clearwater National Forest to the north. Forested lands are scarce in the area, however some ponderosa pine and Douglas fir were observed. The Camas Prairie subsection consists of a 573,513-acre area of mostly grassland (Lichthardt & Mosley 1997: 5) such as Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Agropyron spicatum*), Sandberg bluegrass (*Poa secunda*), and junegrass (*Koeleria macrantha*) (Weddell & Lichthardt 2000: 2). The area has been heavily farmed with mostly barley, hay, lentils, peas, and wheat (McNab et al. 2007: 32; USDA-NRCS 2001: 19). Riparian environments, especially along Cottonwood Creek are dominated by reed canarygrass and some woody vegetation.

## Fauna

Large mammals in the area include elk (*Cervus canadensis*), white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), black bear (*Ursus americanus*), and mountain lion (*Felis concolor*), mountain sheep (*Ovis canadensis*), (Sisson 1985:14), moose (*Alces americanus*), and gray wolf (*Canus lupus*). Smaller mammals include bobcat (*Felis rufus*), coyote (*Canis latrans*), skunk (*Mephitis mephitis*), fox (*V.*



*vulpes*), badger (*Taxidea taxus*), mink (*V. vison*), porcupine (*Erethizon dorsatum*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and river otter (*Lutra canadensis*) (USDA-NRCS 2001: 16). In addition, several species of fish, birds, and reptiles are present.

---

## Climate/Paleoclimate

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Winter temperatures rarely dip below 0° F while summer temperatures frequently rise above 100° F (Western Regional Climate Center 2017). November through January are the wettest months while July-September are the driest. Precipitation is approximately 11 inches per year.

Paleoclimate data indicates a gradual warming trend over the past 12,000 years that has been punctuated by several periods of cool, moist climates (Butler 1978; Goebel et al. 2011; Shuman and Marsicek 2016). The Younger Dryas (ca. 13,000–10,000 B.P.) was a period of increased temperature and aridity compared to the rest of the Late Pleistocene. During this period, the climate shifted from cool summers to more mesic conditions with higher temperatures and greater aridity (Goebel et al. 2011). In the northwestern United States, this change appears to be abrupt (Fulkerson 2012). Fulkerson (2012:21) notes that there are also fluctuations during this period, and in the Central Mountains, glacial activity increased on several occasions around ca. 11,000 cal B.P. With increasing temperatures, it is likely that artiodactyls increased in abundance due to favorable conditions (Broughton et al. 2008). With the onset of the Early Holocene, climate gradually warmed; however, cooling events occurred between ca. 8500–8000 B.P. and ca. 5500–4700 B.P. Also, starting around ca. 5500 B.P., a series of droughts occurred between ca. 4700–4000 B.P., 3600–3300 B.P., 3000–2400 B.P. and 750–300 B.P. (Jones et al. 1999; Shuman and Marsicek 2016).

# Cultural Setting

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## Prehistoric Overview

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The project area is situated between the Salmon and Clearwater River drainages. Archaeological studies within these drainages indicate that the area was accessed by prehistoric groups with cultural similarities to the northwest Plateau (Andrefsky 2004; Sappington 1994; Roll and Hackenberger 1998). As such, the following context draws mostly from Idaho sources and is supplemented with work along the lower Snake and Columbia Rivers.

Within the region, evidence of human occupation extends back approximately 13,000 years (Table 1). The cultural chronology of the area stems from Swanson (1962a, 1962b) and was latter modified by Sappington (1994). Four cultural phases are identified for the Clearwater River region. These are the Early Prehistoric (ca. 13,000-7500 cal B.P.), Middle Prehistoric (ca. 7500-2500 cal B.P.), Late Prehistoric (ca. 5000-2500 cal B.P.), and Protohistoric (ca. 300 B.P. to Historic era). These phases are based on shifts in technology, house form, and settlement patterns (Andrefsky 2004; Sappington 1994).

### Early Prehistoric Period

The Early Prehistoric period includes the Paleoindian, Windust, and part of the Cascade phases and is based on shifts in lithic technology. Paleoindian phase sites contain fluted projectile points, Windust Phase sites are distinguished by the presence of stemmed projectile points, and Cascade Phase sites have leaf shaped, lanceolate projectile points. Traditionally, it was perceived that each of these sub-periods were sequential; however, recent work at Paisley Cave, Cooper's Ferry, as well as obsidian hydration data, suggest that stemmed projectile points were likely in use contemporaneous with fluted points (Beck et al.

2012; Davis et al. 2012; Sappington 1994). This data calls into question this dichotomy and suggests contemporaneous use of these different lithic technologies (Beck et al. 2012; Jenkins et al. 2010) rather than succession. Based on carbon dated archaeological sites, use of the Clearwater area was sporadic.

Fluted points are minimally represented in the region and are predominantly located to the south of the project area. Sappington (1994:104) reports a single isolated Clovis point found at the Smithsonian Institution and believed to have been collected by an Army doctor stationed at Fort Lapwai. In Washington, the Richie Roberts Site contained fluted points, debitage, lithic tools, and decorated bone. Fluted Clovis and Folsom spear points are large, well-made points with distinctive basal thinning scars referred to as flutes. The frequent use of collateral and overshot flaking during the final stages of biface reduction is also seen as a hallmark of the Clovis technological system (Davis et al. 2012:54). Other aspects of the Clovis lithic technology include the reliance on bifacial cores, use of a formalized core and macro blade technology, and reliance on bifacial reduction (Davis et al. 2012:54; Beck et al. 2012). Reid et al.'s (2015) recent summary of Clovis-age resources in Idaho and Oregon indicates a date range between ca. 13,000 and 10,000 cal B.P. Analysis of lithic provenience of Clovis points indicates a reliance on local obsidian sources (Reid et al. 2015:56–61).

Very little information concerning the diet of fluted point peoples has been recovered from the archaeological record. Isotope analysis of the Buhl Burial (ca. 10,675 B.P.), Spirit Cave Man (ca. 10,600 B.P.), and Kennewick Man (ca. 9400 B.P.) suggests diets emphasizing meat and fish (Smith and Morgan 2015:61). Plants likely also played a role, but to a lesser degree. This conclusion is partially supported by the lack of ground stone in Paleo-Indian assemblages. Other faunal evidence suggests a more diversified diet than traditionally thought, leading some to propose Paleo-Indians west of the Rockies were more generalized foragers than specialized large game hunters (Madsen 1999; Smith and Morgan 2015; Waguespack 2007). While recent work at the Wasden site associates Folsom points with *Bison Antiquus*, this association may be the result of targeted procurement of high-ranked subsistence resources (Henrikson et al. 2017).

Windust or Western Stemmed projectile points generally represent a significantly different lithic technology than Clovis (Beck et al. 2012:28–32; Reid et al. 2015). Stemmed projectile points differ in that they are thick, well-flaked, but unfluted and often stemmed lanceolate points. Technological strategies reflect utilitarian tactics, with greater variability in flake blank production (i.e., use of unidirectional blade cores, bifacial cores, and multidirectional cores). Macro blades are not formally produced and are usually smaller than Clovis counterparts, and unifacial cores are often multifunctional (Davis et al. 2012:52). There is a general relationship between size and age (Beck et al. 2012). In addition, an increase in diversity of toolkits suggests a broader diet (Willig and Aikens 1988). Based on radiocarbon dating at Paisley Cave and obsidian hydration data, stemmed projectile points likely were in use from ca. 10,000-7500 B.P. Stemmed points attributed to the Windust phase have also been recovered from Hatwai (10NP143), and as isolated occurrences along the North Fork of the Clearwater River (Sappington 1994). Also, at 10NP143, Ames et al. (1981) excavated part of a living surface dated to 9,160 B.P. (TX-3085). In addition, radiocarbon dates from associated sediments indicate use of Hatwai from ca. 11,000-7,000 B.P. (Ames et al. 1981:62–69, Table 2)

Archaeological evidence from Windust-age sites indicates that these peoples were broad-spectrum foragers who utilized most topographic provenances. Subsistence remains recovered from Windust sites include buffalo, elk, deer, smaller mammals such as rabbit, fish, and fresh water mussel. Indirect evidence of plant processing is also evident (Sappington 1994:98). Sites in the area are within river basins, but upland sites have also been noted (Sappington 1994). At the Spaulding site (10NP102), archaeologists excavated a living surface suspected to date to the Windust phase. This surface was composed of concentrations of fire cracked rock thought to represent discarded boiling stones and possibly a female activity area.

The Cascade Phase is divided into two periods. The early period (ca. 8000-6700 B.P.) is characterized by the presence of Cascade projectile points, which are small foliate lanceolate points (Ames et al. 2010;

Sappington 1994). Later Cascade Phase (ca. 6700-4500 B.P.) sites have large side-notched points analogous to Northern Side-Notched or Birch Creek projectile points in addition to Cascade points. Other than the appearance of large side-notched points, assemblages are statistically similar and include tabular and keeled end scrapers, utilized flakes, cobble tools, small hand stones, and edge ground cobbles (Sappington 1994:101). In addition, a Levallois-like core reduction technology was employed.

Flora and faunal evidence suggest a broad-spectrum diet which included elk, deer, and other large mammals, as well as small game, and fish. Plants utilized likely included various grasses, camas, and berries, but there is little archaeological evidence of this. Land use was riverine focused. Groups occupied large habitation sites along the river from which smaller groups exploited upland resources (Andrefsky 2004; Sappington 1994:102–103).

## Middle Prehistoric

The Middle Prehistoric corresponds with a general warming and drying trend, culminating in the modern distribution of fauna and flora. Despite this general trend, paleo-climatic studies have demonstrated that this span was punctuated by several mesic reversals (ca. 8000-6500 B.P. and 5500-4000 B.P.) and droughts (ca. 4500, 3500, 2400, and 1000 B.P.) (Table 1; (Broughton et al. 2008; Fulkerson 2012; Grayson 2011; Keene 2016; Jenkins et al. 2004). Within the Clearwater drainage, the Middle Prehistoric is comprised of the late Cascade phases (ca. 6700-4500) and Tucannon (4500-2500 B.P.) (Sappington 1994:142). The early portion of the Middle Prehistoric period may have been a period of instability or population shifts. Evidence from the upper Columbia River suggests that some sites were abandoned from ca. 6000-4500 B.P. (Sappington 1994:139), while others remain occupied. Within the Clearwater region, carbon dating data suggests a hiatus prior to the beginning of the Middle Prehistoric, but relative stability and a steady increase in population. This stability may also be reflected in the fairly uniform occurrence of large side-notched projectile points in late Cascade assemblages for the entire upper and lower reaches of the Columbia, lower Snake River, the Hells Canyon area, and Blue Mountains (Andrefsky 2004; Davis 2001). Settlement and subsistence data suggest a continuation of the broad-spectrum foraging pattern described for the Windust and early Cascade phases. Use of the area is continuous, but sporadic based on carbon dates (Figure 4; Sappington 1994:Tables 6.1). House pits also become visible in the archaeological record early in the Middle Prehistoric (Andrefsky 2004; Davis 2001; Sappington 1994). Excavations at Hatwai exposed one of the earliest house pits in the area dating to 5050 B.P. (Ames et al. 1981:128).

Starting around ca. 5,000 B.P., a marked increase in datable features is seen, possibly indicating population growth. This increase in datable features roughly corresponds to the start of the Tucannon phase. By 4500 B.P., village sites become prevalent throughout the plateau (Davis 2001; Sappington 1994). These village sites are also situated in different areas than Cascade phase habitation areas (Lucas 1994). Assemblages included sinkers, hopper mortars, and cobble spall tools. Projectile points include short contracting stemmed points and short expanding stemmed points. A broad-spectrum diet included small and large game, salmon and freshwater mussels. However, evidence of camas acquisition and processing, which appeared ca. 5500 B.P., was most intense between 3,500-2,500 B.P. (Andrefsky 2004). Settlement patterns during the Tucannon phase resemble those of the ethnographic Nez Perce. Groups aggregated in large villages near the confluences of major rivers and tributaries. House structures have evidence of internal spatial patterning and activity areas are private, as well as public (Lucas 1994). This may suggest shifts in social structure during this phase. Two types of house structures are present in the archaeological assemblage. These are a sub-square house with a bench around the entire circumference and a sub-rectangular to circular house without a bench (Ames et al. 1981:120–122; Lucas 1994). There is also evidence of storage features at sites dating to this period. Tucannon subsistence appears to have been oriented toward the use of plateaus and canyons (Sappington 1994:186). Fishing and plant processing appear to be more emphasized than in past phases. Together, these archaeological signatures indicate a shift toward a collector settlement and subsistence system (cf. Binford 1980).

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## Late Prehistoric

Another shift in hunting and residential technology follows during the Late Prehistoric (Ahsahka phase, 2000-250 B.P.), characterized by the appearance of small arrow points, including corner-notched, side-notched, and basally notched variants (Sappington 1994). These small points are thought to represent the adoption of bow-and-arrow technology. East of the project area, this transition appears to have happened between ca 3,000 and 1200 B.P., while to the west it appears to have taken place slightly earlier (ca. 2300-1500 B.P.) (Ames et al. 2010; Holmer 2009). However, a recent study on the Columbia Plateau suggests that the transition may have started as early as 4,300 B.P. (Ames et al. 2010). Pit house villages with between 10-100 house structures begin to appear in the record. Clear evidence of population increases is seen, with houses varied in shape and size, but it appeared the deeply excavated pit houses were generally replaced by shallower ones. Late Archaic villages are also located on islands, and in steep sided canyons. This, in conjunction with the adoption of bow and arrow technology, may indicate increased warfare. Population increases are associated with intensification of anadromous fish harvesting and proliferation of datable features. Artifact assemblages are characterized by ground stone, flaked stone tools, and a variety of botanical and faunal remains. Lithic raw material utilized consists of mostly local sources and lithic reduction is flake blank based (Sappington 1994:323). Large game animals continue to be important (Andrefsky 2004; Chadez and Sappington 2017). According to Sappington (1994:330), "bison were important along the lower Clearwater while bear and elk were more important to groups living along the Middle Fork and the Lochsa. Intensification of the use of plant resources, presumably roots such as camas and couse seems widespread based on the recovery of plant processing tools." Groups continued to forage in wide-ranging areas.

## Protohistoric

As far as can be determined from the examination of features and material culture, protohistoric activities were similar to those in the late prehistoric period. With the exception of the artifacts of European and Euroamerican origin, the cultural material from the Kooskia phase was identical to that discussed for the late prehistoric period. Technology and activities are similar as far as can be determined by lithic and antler artifacts (Sappington 1994). Small side-notched projectile points clearly predominate. The adoption of the horse likely increased mobility and allowed for greater range of mobility. This is reflected in the adoption of portable dwellings, such as tipis.

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## Ethnographic Overview

In the centuries preceding Lewis and Clark and the Corps of Discovery's arrival in 1805, the region was utilized by several aboriginal cultures that were finely tuned to the resources and seasonal rhythm of their respective areas. The project area has been the traditional homeland of the Nez Perce Tribe for at least the last 10,000 years. However, other neighboring groups also utilized the area for hunting, fishing and gathering. Groups known historically as the Bitterroot Salish (Pend d' Oreille and Flathead), Coeur d' Alene and Northern Shoshone Indians were most prominent among these. Today, these Native groups retain an ongoing vibrant culture with a continuous link to the area (Nez Perce-Clearwater N.F. 2014).

Traditionally, the project area has been the territory of the Nez Perce Indians. The Nez Perce traveled and hunted in the Bitterroot Mountains and utilized the main Bitterroot Valley on the way to buffalo country in Montana. Nez Perce buffalo hunting parties were often accompanied by the Bitterroot Salish and Kootenai Indians. The Southern Nez Perce Trail, which extended east from Grangeville to modern day Nez Perce Pass in Montana, was an important travel route for Native American people, explorers, miners, and settlers. For thousands of years, the Nez Perce used the southern trail to access the various resources in the area. The Shoshone and Bannock tribes also traveled through the area on hunting and foraging excursions. The area was used seasonally by all these groups for resource procurement and as a travel corridor. They resided in the lower canyons during winter and moved to the higher elevations as snow melted and resources became available (Nez Perce-Clearwater N.F. 2014).

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The Nee Mee Poo or, “the People”, have occupied north-central Idaho, southeastern Washington, and northeastern Oregon for countless generations. Nez Perce territory, centered on the middle Snake and Clearwater Rivers and the northern portion of the Salmon River basin, supported diverse flora and fauna. Characterized by sharp variations in elevation, the area’s mountainous terrain, upland meadows, streams, rivers, and deep canyons provided a myriad of resources as well as protection from enemies. Walker and Jones (2003) note that over 70 permanent villages were present in the region in the early 1800s, ranging from 30 to 200 individuals. Dependent on the season and type of social grouping, the Nez Perce seasonally migrated throughout their territory to take advantage of various resources. Salmon and other fish, mountain goats and sheep, bear, moose, elk, deer, small game, and birds were among the primary subsistence resources. As noted above, the Nez Perce also traveled to the Great Plains in search of buffalo. Plant resources included camas bulbs, bitterroot, bark, pine nuts, sunflower seeds, wild carrots, wild onions, and several varieties of berries.

The Nez Perce generally lived in small villages along the many streams and rivers that cut through their aboriginal territory (Schacher 2004). The Nez Perce settlement pattern generally consisted of a system of permanent winter villages in canyons and temporary summer camps at higher elevations. Winter villages were found at lower elevations along the Clearwater, Salmon, and Snake Rivers. For example, a Nez Perce winter village called *lamáta* was located at the confluence of White Bird Creek and the Salmon River, to the west of the project area. The seasonal timing of resource availability within a watershed largely predicated the movement of groups as well as the type of resource exploitation activity. During the summer and fall, food was prepared and stored for use during the winter months. Winter hunting was limited to localized deer drives. Subsistence patterns throughout the spring, summer, and fall were dependent upon the availability of plant, fish, and game resources. Small, extended family groups oriented themselves to a given watershed area and obtained the necessary resources to live throughout the year. Winter was a more sedentary time generally spent at villages along the lower stream courses subsisting largely on stored foods (Nez Perce N.F. 2014).

The acquisition of the horse in the early 18th century notably transformed this subsistence cycle. The increased mobility that the horse allowed expanded use areas, altered relationships amongst Tribes and transformed the Nez Perce way of life. The arrival of the horse beginning around 1730 forever changed the Nez Perce culture, allowing for increasing trade among native groups and the potential for conflicts between neighboring tribes. Introduction of the horse changed nearly every aspect of Nez Perce life and culture, including trade practices, warfare, marriage relationships, hunting techniques, social stratification, and ease of travel. The Nez Perce welcomed the horse and its assistance in getting themselves and their equipment up the steep mountains and across the plateau country to the Camas Prairie. The Nez Perce immediately took to riding, especially those who had to travel long distances, such as war parties and hunting groups. By the mid-eighteenth century, “the Nez Perce were a mounted people (Joseph 1997).”

The arrival of the Corps of Discovery to the area in 1805 also dramatically changed Nez Perce culture. While Euro-American trade items, the acquisition of the horse and communicable diseases had reached the area prior to the Corps’ arrival, the succeeding 75 years had the most profound affect. In 1836, Henry Harmon Spalding established a Nez Perce Indian mission at Lapwai. In 1855, U.S. officials persuaded the Nez Perce to sign the Walla Walla Treaty. The treaty ordered the Nez Perce to relinquish their ancestral territory and move to Oregon’s Umatilla Reservation with the Walla Walla, Cayuse, and Umatilla Tribes. However, all the tribes so opposed this plan that Territorial Governor Isaac Stevens granted the Nez Perce the right to remain in their own territory, on the condition that they relinquish nearly 13 million acres to the U.S. government. A large reservation (10,000 square miles) was established across central Idaho and into the Wallowa Valley of Oregon. The Nez Perce War of 1877, which is detailed below, along with the forced relocation to the Lapwai reservation that same year, largely brought an end to the lifeways which had characterized Nez Perce culture for centuries.

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## Historic Overview

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From the early 1800s, the impenetrability of Idaho's central interior posed challenges to European settlement and development. Characterized by rugged mountains, deep canyons, and swift rivers, north central Idaho's economic growth was stunted by its geography, even as more accessible areas to the north and south, such as Lewiston and Boise, participated in the nation's western expansion through settlement and growth (Baldwin and Stevens 2017).

### Early Exploration

The arrival of the Lewis and Clark Expedition in 1805 marked the beginning of the historic period for central Idaho. The Corps of Discovery soon brought an influx of fur trappers to the Northwest in search of beaver. In 1811, Donald McKenzie of the Pacific Fur Company led a small contingent of trappers to Fort Astoria on the Oregon coast following a route along the western flank of the Nez Perce National Forest through Hells Canyon. The following year the Pacific Fur Company established a small post near present day Lewiston, Idaho along the Clearwater River. John Work of the Hudson's Bay Company led a trapping expedition east across the Lolo Trail corridor into Montana in 1831.

In 1835, Presbyterian minister Samuel Parker traversed the Southern Nez Perce Trail as he travelled west on a reconnaissance mission for the American Board of Commissioners for Foreign Missions (Parker 1967). In 1836, the Protestant missionary Henry Spalding settled the Lapwai Valley area. This initiated a continuous wave of immigrants from the east, beginning in the early 1840s. Between 1850 and 1863, Major John Owen of Fort Owen, traversed the Lolo Trail corridor several times to other trading centers in the region (McLeod 1984). John Mullan also travelled westward on the Lolo Trail corridor in 1854 as part of a railroad survey for the War Department (Schacher 2004; Baird and Baird 2003). However, by the 1860s, the northern Mullan Route became the primary thoroughfare to the Columbia River corridor.

### Settlement

Following the discovery of gold near current day Pierce in 1860 and a year later at Elk City and Florence, thousands of miners and settlers began flocking to the region. This new era of settlement and land use transformed the region. Makeshift towns sprang up overnight along with a burgeoning transportation network. Almost 10 million dollars in gold was extracted from the Florence Basin in the 1860s, which helped to fund the Union cause during the Civil War. This was the economic and political impetus for the formation of the Idaho Territory in 1863, and later for Idaho becoming a State in 1890 (Nez Perce-Clearwater N.F. 2014).

With the institution of the Homestead Act of 1862, which offered settlers 160 acres of public land for a nominal fee after five years of residence, settlement in central Idaho increased rapidly. Land on the Nez Perce Reservation was not open to the settlers until the government reneged on a treaty with the Nez Perce Tribe ceding a part of their land to the Federal Government (Kemp 1904). The new-found ability to possess and farm one's own land gave rise to the growth of agriculture. Several who had come to Idaho to seek their fortune in gold decided instead to reap the rewards of the fertile soil and favorable climatic conditions. By 1864 ranches were scattered over the Camas Prairie and along the rivers (Idaho County 2018).

Idaho County was founded in 1864. Some of the first settlements to be established in the county were the communities of Pierce, Elk City, and Florence, which became the first county seat. Mount Idaho, mainly a stop on the way to the gold fields, developed into a prosperous town. In 1875, a special election was held that established Florence as the county seat. Idaho County's boundaries changed often as shifting settlement patterns prompted the territorial legislature to establish new adjacent counties. By 1875, however, the present-day boundaries were largely in place. The Idaho County seat had been in three different locations, including Florence, Warren's (aka Washington), and Mt. Idaho, until it was moved to

Grangeville in 1902. Between 1890 and 1900, the population of Idaho county tripled as the county's growing agricultural and mining sectors drew new residents. After 1900, the majority of residents in communities such as Clearwater, Kamiah, Kooskia, White Bird, and Cottonwood, were primarily farm families (Preservation Solutions 2015).

The arrival of the Northern Pacific Railroad to Idaho County in 1898 brought access to distant markets. This led to a shift from subsistence farming and supplying miners to a full-fledged export industry. Grangeville became the trading and commercial hub of the surrounding agricultural area. The arrival of the Camas Prairie Railroad to Grangeville in 1908 solidified the community's role as Idaho County's center for transport of agricultural products, timber, and minerals. In 1917, with the establishment of Valley County, Idaho County's boundaries were finalized as the largest county in Idaho (Preservation Solutions 2015).

## The Nez Perce War

The uncontrolled influx of miners and settlers into the area eventually led to war. The Nez Perce War began in June of 1877, with the battle of White Bird Canyon, which took place near the present-day town of White Bird. The Nez Perce War pitted several bands of the Nez Perce tribe and their allies, against the United States Army. The conflict, fought between June and October 1877, stemmed from the refusal of several bands of the Nez Perce, dubbed "non-treaty Indians," to give up their ancestral lands in the Pacific Northwest and move to an Indian reservation in Idaho. This forced removal was in violation of the 1855 Treaty of Walla Walla, which granted the tribe 7.5 million acres in their ancestral lands and the right to hunt and fish in lands ceded to the government. The Nez Perce defeated Captain David Perry at the Battle of White Bird Canyon and began their long flight eastward to escape from the U.S. soldiers.

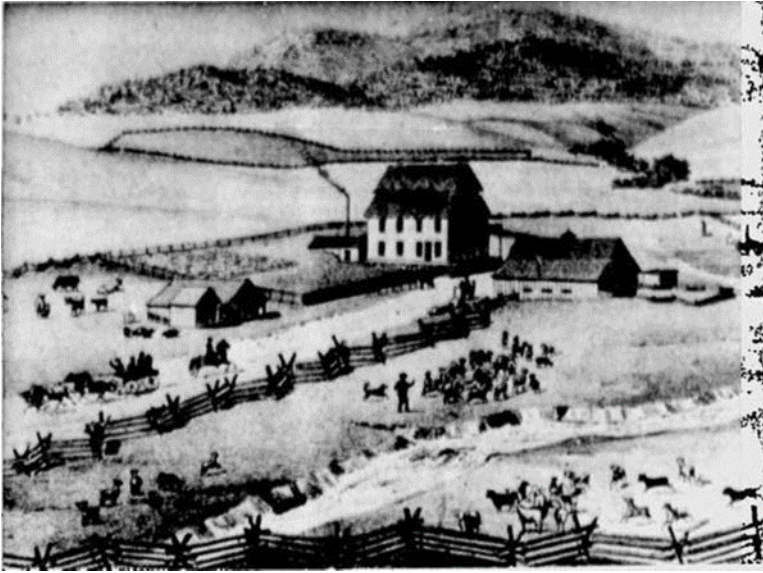
The Nez Perce retreated, led by Chief Joseph and White Bird, who were later joined by Looking Glass's band. After several battles and skirmishes in Idaho during the next month, approximately 250 Nez Perce warriors, and 500 women and children, along with more than 2000 head of horses and other livestock, began a remarkable fighting retreat. They fled east along White Bird Canyon over Lolo Pass into Montana Territory, traveling southeast, crossing into Yellowstone National Park and then back north into Montana, a distance of roughly 1,170 miles. Attempting to seek refuge with the Crow Nation, who rebuffed them, the Nez Perce ultimately decided to try to reach safety in Canada (Josephy 2007).

In total, the Nez Perce engaged 2,000 American soldiers of different military units, as well as their Indian auxiliaries. They fought "eighteen engagements, including four major battles and at least four fiercely contested skirmishes (Josephy 1997)." Chief Joseph surrendered on October 5, 1877 and declared in his famous surrender speech that he would "fight no more forever"(Beal 1963).

Soon after the first battle at Whitebird, June 14, 1877, hostile Indians came up the trail to Cottonwood. U. S. Army troops had been stationed at Cottonwood House, a roomy log structure with stables large enough to accommodate horses. Here on July 3, 1877, the "Rains Massacre" occurred. Indians "molested" the troops all day but made no direct attack. On July 5, the "Brave 17" battle – wiping out an entire detachment dispatched to meet the Indians – was fought at what is now the southeast limits of Cottonwood. Today, a highway marker is located at the site.

## History of Cottonwood, Idaho

The town of Cottonwood is one of the oldest towns in central Idaho, first established in the 1860s as a stage station on the Lewiston-Florence Road (Kemp 1904). At that time, it was composed of a hotel and saloon and one or two dwellings. The first building constructed in Cottonwood was a combination store, saloon, hotel, stage station and stable opened by an enterprising man named Allen in 1862. The "Cottonwood House" was an important stop for miners travelling to the placer diggings at Florence and Ek City. In 1863, Wheeler & Toothacher were in charge of the Cottonwood station. L. P. Brown purchased the majority of the townsite and constructed the Cottonwood House at a cost of \$10,000. By 1883, the town had grown to become a center for annual livestock roundups as well as an overnight stopping



**Figure 2. 1883 Charcoal drawing of Cottonwood; Drawing supplied by Sister M. Alfreda of St. Gertrude's Academy, Cottonwood (Lewiston Morning Tribune , 6 October, 1955)**

place (Kemp 1904). A drawing of Cottonwood from the time depicting sheep, hogs and cattle illustrates Cottonwood's importance as a way station and center of commerce (Figure 2). Army troops were stationed there at the start of the Nez Perce War on July 3, 1877 (Lewiston Morning Tribune October, 1955). The Nez Perce called Cottonwood "Kap-kap-peen," meaning "village in a hole".

Cottonwood became an important stopping point for teams traveling from Lewiston to Grangeville, Mount Idaho, and the Florence mines. A post office was established in 1880. The first businesses included a blacksmith shop and the store of F. B. King, which opened in ca. 1880. By 1887, there was a saloon and a carpenter shop, and by 1893 a restaurant and a pork packing plant, run by Dunham & Company of Chicago,

were in operation. The packing plant only operated for a few years and eventually failed. The building was later used as a slaughter house (Western Historical Publishing Company, 1903). In 1892, a fire destroyed much of the town, including several businesses and residences. The first newspaper of the town, the Cottonwood Report, made its debut in 1893.

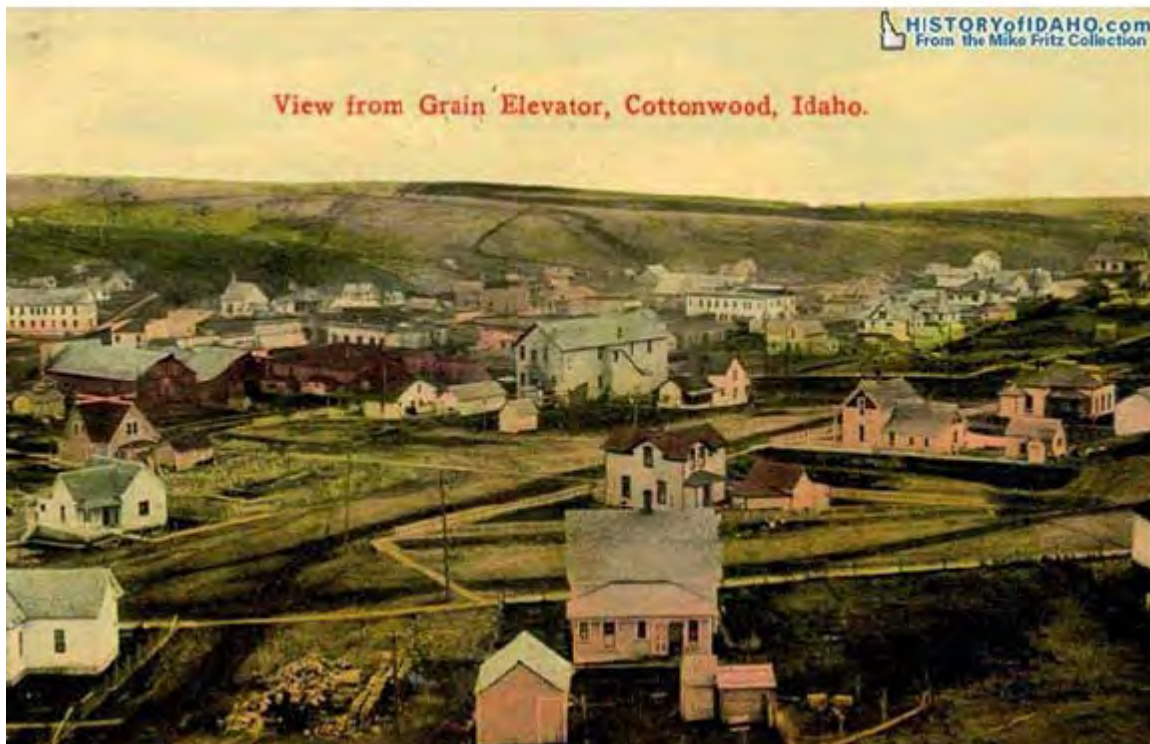
In 1895, the town began building rapidly, and soon boasted three merchandise stores; three livery stables, two drug stores; a bank, three saloons and a brewery. The St. Albert hotel and the Cottonwood Hotel (which closed by 1903) were constructed and a planing mill, sash and door factory; a flourmill; blacksmiths; a meat market; millinery and dress making, a bakery, a barber, a hardware store, and a newspaper (Camas Prairie Chronicle) were fixtures of the town. Cottonwood had daily stage connections with Grangeville, Lewiston and Keuterville, and tri-weekly with Kamiah. There were eight sawmills within eight miles of the town.

By the early 1900s, Cottonwood's business district included a sawmill and lumber company, a flour mill, three mercantile stores, three livery stables, two hotels, two banks, a brewery, hardware store, furniture store, newspaper and printing shop, millinery shop, and a bakery. In 1905, business leaders in Cottonwood pledged \$40,000 for the development of the electric railroad between Lewiston and Grangeville. The project never came to fruition, but the Camas Prairie Railroad finally provided a major transportation link between Grangeville, Cottonwood, and Lewiston in 1908.

In 1904, the town had 600 inhabitants and was one of the most prosperous towns in the county, with a schoolhouse, three churches, two large halls, two hotels, a restaurant, three general merchandise stores, three millinery stores, a confectionery store, two drug stores, a harness shop, meat market, a barber shop, a flour mill, a sash and door factory, lumber yard, a brewery and four saloons (Kemp 1904:50). A newspaper called the Camas Prairie Chronicle, was also in operation (Kemp 1904).

In 1908, Cottonwood again succumbed to fire and the entire business section of the town and some residences were destroyed (Idaho County Free Press July 23, 1908). The fire destroyed many downtown businesses. Cottonwood's business district was quickly rebuilt after the Camas Prairie Railroad came through the town and completed its connection to Lewiston. The railroad link provided better access to broader business markets and helped stimulate further growth in Idaho County. Local wheat production





**Figure 3. View from Grain Elevator, Cottonwood, Idaho ca. 1914**

also boomed after 1908, when Camas Prairie farmers were finally able to ship their crops from Cottonwood to other cities by rail (Buckendorf 2003).

#### *Ranching and Farming*

Beginning in the 1880s, Cottonwood became a livestock roundup center. Horse thieves found the area profitable as early as the 1870s. Many hogs were fattened by grain farmers in the early days and driven overland to a rail point at Genesee for shipment. The coming of the railroad in 1908 increased Cottonwood's importance as a livestock sale point. By 1914, more grain and livestock was shipped from Cottonwood than any other point on the line between Lewiston and Grangeville (Figure 3, Lewiston Morning Tribune, 6 October, 1955).

St. Gertrude's Convent, 2 1/2 miles south of the town, is an imposing structure of native blue porphyry overlooking the Camas Prairie. The convent was completed in 1924. A large brick addition was finished in 1949. In the spring of 1930, the Sisters opened Our Lady of Consolation Hospital which has continued since to serve the Cottonwood area. A new co-educational St. Gertrude's Academy was dedicated at the Convent in May of 1954. The former academy had served since August of 1927 (Lewiston Morning Tribune, 6 October, 1955).

## Pre-Field Research

A records search of a 1-mile buffer around the Area of Potential Effect (APE) was requested from the Idaho State Historical Society on October 13, 2021 (Records search 22016). The results of this record search

are summarized below. In addition, several General Land Office (GLO) plat maps for the project area were consulted. Details on what is depicted on these maps are provided in Table 1.

**Table 1. GLO Plat Maps depicting the APE**

| GLO Plat  | Years       | Sec. | Potential Historic Features within/near APE                                              |
|-----------|-------------|------|------------------------------------------------------------------------------------------|
| T31N, R1E | 1869 & 1880 | 5    | Northwest-southeast trail<br>Land Patents: Peter Bies (Lot 1) & Andrew Vanness (Lot 2)   |
| T31N, R1E | 1869 & 1880 | 8    | Lewiston & Florence Road                                                                 |
| T31N, R1E | 1869 & 1880 | 9    | Lewiston & Mountain House Road, large fenced area, and an east-west trail                |
| T31N, R1E | 1869 & 1880 | 10   | Lewiston & Mountain House Road, large fenced area, and north-south and east-west trails, |
| T31N, R1E | 1869 & 1880 | 15   | Lewiston & Mountain House Road and north-south trail                                     |

Plat maps indicate that several historic roads, trails, and homestead entry patents are located in the APE. Roads include the "Lewiston & Florence Road" and the "Lewiston & Mountain House Road", shown on the 1869 and 1880 GLO plats for T31N, R1E. It also shows a trail bearing east-west from the Lewiston & Mountain House Road along the south bank of Cottonwood Creek; it also passes south of a large fenced area in sections 9 and 10. A north-south trail from the aforementioned trail crosses over to the north side of Cottonwood Creek and through the northeast  $\frac{1}{4}$  of section 10. unnamed roads are shown in sections 5, 9, 10, and 15. Another trail passes through sections 10 and 15 and crosses over the Lewiston & Mountain House Road. There are eight homesteads that were granted land patents from 1882 to 1908 (Table 2). Most of Peter Bies's homestead was acquired in 1958 by a General Services Administration deed; otherwise, the other patents have remained intact.

**Table 2. Patented Homesteads in APE**

| Names              | Date       | Patent # | Township, Range | Aliquots                                                                                                   | Sec. # | Acres |
|--------------------|------------|----------|-----------------|------------------------------------------------------------------------------------------------------------|--------|-------|
| Bies, Peter        | 8/24/1908  | 9501     | T31N, R1E       | Lot 1 NE $\frac{1}{4}$<br>NE $\frac{1}{4}$                                                                 | 5      | 39.8  |
| Vanness, Andrew J  | 12/5/1884  | 958      | T31N, R1E       | Lot 2 NE $\frac{1}{4}$<br>NE $\frac{1}{4}$                                                                 | 5      | 39.66 |
| Wilson, Harry L    | 9/15/1882  | 574      | T31N, R1E       | N $\frac{1}{2}$ NW $\frac{1}{4}$                                                                           | 8      | 80    |
| Williams, Thomas J | 2/10/1883  | 41       | T31N, R1E       | N $\frac{1}{2}$ SE $\frac{1}{4}$                                                                           | 9      | 80    |
| Fain, James F      | 12/31/1889 | 840      | T31N, R1E       | S $\frac{1}{2}$ SW $\frac{1}{4}$ S<br>$\frac{1}{2}$ SE $\frac{1}{4}$                                       | 10     | 160   |
| Holohan, Peter J   | 1/31/1889  | 456      | T31N, R1E       | E $\frac{1}{2}$ NW $\frac{1}{4}$ N<br>$\frac{1}{2}$ NE $\frac{1}{4}$                                       | 10     | 160   |
| Rice, James H      | 6/1/1882   | 463      | T31N, R1E       | N $\frac{1}{2}$ SW $\frac{1}{4}$<br>NW $\frac{1}{4}$ SE $\frac{1}{4}$<br>SW $\frac{1}{4}$ NE $\frac{1}{4}$ | 10     | 160   |
| Yandell, Thomas J  | 6/21/1890  | 738      | T31N, R1E       | N $\frac{1}{2}$ NW $\frac{1}{4}$ N<br>$\frac{1}{2}$ NE $\frac{1}{4}$                                       | 15     | 160   |

## Previous Cultural Resources Studies

A records search was performed on October 13, 2021 (No. 22016) by the Idaho SHPO. A total of 19 previous archaeological inventories and studies have been completed within one-half mile of the Cottonwood Creek Watershed Project Area (Table 3). The reports date from 1989 through 2018 and are



being used to supplement this current inventory. Only historic sites have been documented in the project area. Some of these sites have been determined eligible for the National Register of Historic Places, while others have not been formally evaluated for their National Register eligibility.

**Table 3. Previously completed Cultural Resources Investigations within One-Mile of the Project Area.**

| Report No | Date | Author                       | Title                                                                                                                               | Project No   | Agency                       | Survey Ac. |   |
|-----------|------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------|------------|---|
| 1990/286  | 1989 | Sappington, Lee              | An Archaeological Assessment of the Proposed Cottonwood Wastewater Expansion Project Near Cottonwood, Idaho.                        |              | U of I                       | 40         | 0 |
| 2019/145  | 2000 | Foster, Dan                  | Digital Photography to Detect Resource Change Over Time at Nez Perce National Historical Park.                                      |              | National Parks Service       | 0          | 0 |
| 2001/773  | 2001 | Sappington, R. L.            | City of Cottonwood Water System Improvement Project                                                                                 |              | RD                           | 12         |   |
| 2002/218  | 2001 | Miss, C., N. Renk, L. Hudson | Camas Prairie Railroad, Second Subdivision, Spalding to Grangeville, ID. NWAA, Inc., Seattle, WA.                                   |              | Surface Transportation Board | 79<br>3    |   |
| 2002/21   | 2002 | Sisson, Dave                 | Cottonwood Joint School District Sports Complex Report Prepared for Idaho Army National Guard and Cottonwood Joint School District. |              | Department of Defense        | 7          |   |
| 2003/290  | 2002 | Sappington, R.L.             | City of Cottonwood Well No. 5 Drilling and Completion Project RD.                                                                   |              | RD                           | 5          |   |
| 2005/94   | 2002 | Miss, C., N. Renk, L. Hudson | Heritage Resources Assessment of the Camas Prairie Railroad, Second Subdivision, Spalding to Grangeville, Idaho.                    |              | Camas Prairie RailNet        |            |   |
| 2004/403  | 2003 | Sappington, R.               | Camas Prairie Rest Area near Cottonwood                                                                                             | NH-4110(143) | ITD                          | 10         |   |
| 2004/451  | 2004 | Munch, M.                    | Twin House Road Turnbays. ITD, Boise, ID.                                                                                           | ST-4110(678) | ITD                          | 1          |   |
| 2004/315  | 2004 | Flatter, D.                  | Tim Seubert, NRCS.                                                                                                                  | NRCS-04-4878 | NRCS                         | 1          |   |
| 2019/135  | 2006 | Julin, Suzanne               | Idaho County Agricultural Buildings Windshield Survey.                                                                              |              | Idaho County CLG             |            |   |
| 2007/563  | 2007 | Everhart, D                  | Storage Tanks, Cottonwood. Idaho Transportation Department                                                                          | A101(467)    | ITD                          | 1          |   |
| 2008/795  | 2008 | Stegner, M.                  | Proposed Verizon Wireless, Cottonwood Site, Cottonwood                                                                              |              | Other                        |            |   |
| 2010/275  | 2010 | Sappington, L                | Lewiston St. to Camas Dr.; Cottonwood. Sappington, Moscow, ID.                                                                      | A011(942)    | ITD                          | 3          |   |



**Table 3. Previously completed Cultural Resources Investigations within One-Mile of the Project Area.**

| Report No | Date | Author            | Title                                                                                                                                                               | Project No  | Agency                                        | Survey Ac. |   |
|-----------|------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------|------------|---|
| 2014/492  | 2014 | Sisson, Dave      | Cottonwood Building Construction                                                                                                                                    | ID6-2014-04 | BLM                                           | 2          |   |
| 2014/379  | 2014 | Huntley, James G. | Lewiston-Mountain House Wagon Road: A Mapping and Location of the Road and Associated Sites in Idaho County.                                                        |             | Idaho County Historic Preservation Commission |            |   |
| 2018/109  | 2016 | Huntley, James G. | The Florence Trail: The Mapping and Location of the Trail and Associated Sites in Idaho County.                                                                     |             | Idaho County Historic Preservation Commission | 0          | 0 |
| 2018/100  | 2017 | Huntley, James G. | Assessment of The Lewiston-Elk City Trails: The Mapping and Location of the Elk City Trails and Associated Sites in Idaho, Nezperce, Lewis and Clearwater Counties. |             | Idaho County Historic Preservation Commission | 0          | 0 |
| 2018/505  | 2018 | Huntley, James G. | Assessment of Nee Me Poo Trail Dug Bar, Oregon to Musselshell Ranger Station, Nez Perce-Clearwater National Forest, Idaho.                                          |             | National Forest Service                       |            |   |

A total of 23 cultural resources were identified as a result of the previous inventories (Table 4, Appendix A, Map 4). Two of these resources are historic debris scatters, ten are historic habitations and structures, eight are associated with the Camas Prairie Railroad and the Lawyers Canyon Railroad, one is a historic skirmish, one historic highway, and one historic trail. None of these resources are located within the current APE. The Camas Prairie Railroad, which travels through Cottonwood, borders the survey area. While no prehistoric artifacts were noted in the record search, precontact peoples have utilized resources along Cottonwood Creek.

**Table 4. Previously Recorded Sites.**

| State Site No. | Agency No. | Description                                                                                                             | NRHP       | In APE |
|----------------|------------|-------------------------------------------------------------------------------------------------------------------------|------------|--------|
| 10IH2776       |            | Historic scatter of domestic origin; farm machinery parts, stove parts, wash tub, glass, ceramics, wire, rope, concrete | Ineligible | No     |
| 10IH2777       |            | Historic debris; cans, glass                                                                                            | Ineligible | No     |
|                | 49-379     | Cottonwood house                                                                                                        | N/A        | No     |
|                | 49-777     | Cottonwood Skirmishes site                                                                                              | Eligible   | No     |
|                | 49-1321    | Lawyers Canyon railroad bridge                                                                                          | N/A        | No     |
|                | 49-1431    | Farm                                                                                                                    | N/A        | No     |
|                | 49-2117    | Jenny Barn                                                                                                              | N/A        | No     |
|                | 49-6236    | Rain's site                                                                                                             | N/A        | No     |



Table 4. Previously Recorded Sites.

| State Site No. | Agency No. | Description                                           | NRHP       | In APE |
|----------------|------------|-------------------------------------------------------|------------|--------|
|                | 49-17945   | Bridge 52, Camas Prairie railroad, Second subdivision | Eligible   | No     |
|                | 49-17946   | Bridge 51, Camas Prairie Railroad, second subdivision | Eligible   | No     |
|                | 49-17947   | Cottonwood Foundation                                 | Ineligible | No     |
|                | 49-17948   | Bridge 50, Camas Prairie Railroad, second subdivision | Eligible   | No     |
|                | 49-17949   | Culvert, Camas prairie railroad, second subdivision   | Eligible   | No     |
|                | 49-17950   | Culvert, Camas prairie railroad, second subdivision   | Eligible   | No     |
|                | 49-17951   | Bridge 48, Camas Prairie Railroad, second subdivision | Eligible   | No     |
|                | 49-17952   | Foundation and quarry                                 | Ineligible | No     |
|                | 49-17968   | James V. and Sophia Baker house                       | NR listed  | No     |
|                | 49-17996   | Greencreek Rd. Farmstead                              | N/A        | No     |
|                | 49-18046   | Madden Shop                                           | Ineligible | No     |
|                | 49-18047   | Schnider Farm                                         | Ineligible | No     |
| 10IH3373       |            | US Highway 95                                         | Ineligible | No     |
| 10IH2775       |            | Camas Prairie Railroad                                | Eligible   | No     |
| 10IH3193       |            | Florence Trail                                        | N/A        | No     |

### Expected Cultural Resources

The project area is known to be in the vicinity of many historic related sites such as the Camas Prairie Railroad, historic roads, and farmsteads. Precontact peoples inhabited the area and there is a probability of finding prehistoric resources. Historic-aged resources are more diverse but are likely to include historic debris scatters, historic habitations, and historic trails and ditches.

## Field Methodology

ARH conducted a pedestrian inventory following the guidance from the Idaho State Historic Preservation Office. Architectural inventory was conducted for the entire NEPA boundary. The archaeological inventory was confined to portions of the NEPA boundary which have not been disturbed by urban development. These areas include agricultural fields, green fields, and undeveloped areas within the city of Cottonwood. Within these areas survey transects were less than 30 m apart.

Field crew included Cameron Hogan and Franki Sesker (field technicians) and was led by A. Craig Hauer. A. Craig Hauer, JoEllen Ross-Hauer, Brady McGirr, and Cameron Hogan prepared the report and site records.

Dates of survey: 3/21-25/2022.

Isolated resources were defined as a single artifact. Noted, not recorded resources were artifacts or features post-dating 1970. Architectural resources located adjacent to the project APE, but that will not be directly impacted by the project, were noted but not recorded; only those architectural resources for which permanent easements would be required were formally documented, per direction from the Idaho State Historic Preservation Office (SHPO).

Archaeological sites were defined through close interval survey. Site boundaries, loci, concentrations, features, and diagnostic artifacts were mapped using sub-meter accurate Global Positioning Units. In addition, archaeological sites were recorded on ASI forms, and diagnostic artifacts photographed. Artifacts were described, and samples of debitage were analyzed using a three-stage system based on dorsal surface complexity and platform morphology. Projectile points were identified using a modified typology based on regional and state research (Holmer 2009; Justice 2002; Sappington 1994; Thomas 1981). Bifaces are staged using a modified five-stage system based on Andrefsky (1998:181, Table 7.7), and Callahan (1979). All other tools were described morphologically.

In order to simplify NRHP eligibility determinations and facilitate analysis a site typology was employed using the following criteria in Table 6.

**Table 5. Site Type Definitions**

| Type                       | Characteristics                                                                                                    | Artifacts and Features Present                                                                                                                                |
|----------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Historic Road/Trail        | Roadbed with associated generalized historic debris. Road should be near those depicted in historic documentation. | Road grades, retaining walls, culverts, cans, bottles, automotive or wagon parts                                                                              |
| Historic Habitation Site   | Tent platform(s) or dugout(s) with domestic debris.                                                                | Cans, bottles, ceramics, personal items.                                                                                                                      |
| Historic Settlement        | Associated habitation sites with centralized debris scatter and possibly roads.                                    | Domestic debris, personal items, construction materials, and foundations                                                                                      |
| Historic Agricultural Site | Cleared fields, irrigation features/impoundment basins, ditches with or without historic debris.                   | Cans, bottles, tools, wire, rock alignments, fence posts, dams, constructed ditches or channels, check dams, water diversion features, agricultural equipment |
| Historic Ranching Site     | Debris scatter with associated ranching related artifacts or features                                              | Food/beverage-related debris with items such as sheep bells, brands, sheep dip troughs, or corrals.                                                           |
| Historic Mining Site       | Debris scatter with associated mining related artifacts or features                                                | Prospects, shafts, adits, trams, placers, waste rock, tailings, mining equipment.                                                                             |
| Unassociated Trash Scatter | Historic artifact concentrations not characteristic of a theme or function.                                        |                                                                                                                                                               |

## NRHP Evaluation and Integrity

National Register of Historic Places (NRHP) eligibility recommendations are developed for archaeological sites using the appropriate aspects of the cultural background developed above. Site eligibility is based on property type, resource(s) present, and association with Time, Place, and Themes important to local, state, or national history.

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The Keeper of the Register (National Park Service [NPS]) noted, “The significance of a historic property can be judged and explained only when it is evaluated within its historic context. Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history or prehistory is made clear” ((Andrus and Shrimpton 2002:Part V, No. 1). A historic property is:

any prehistoric or historic district, site, building, structure, or object included in the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and the national register criteria (Advisory Council on Historic Preservation 2004:36CRF800.16 (i) 1).

As defined in 36 CFR Part 60.4 and stipulated in the NPS guidelines for a site to be eligible for the NRHP, a property must be at least 50 years old and meet at least one of four criteria (Andrus and Shrimpton 2002:Part II). Specifically, they state:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. That are associated with the lives of significant persons in our past; or
- C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. That has yielded or may be likely to yield, information important in history or prehistory.

Integrity of a property – the ability of a resource to convey its importance – is also considered to determine eligibility. There are seven aspects of integrity (Andrus and Shrimpton 2002: Part VIII):

Location is the place where the historic property was constructed or the place where the historic event occurred. The relationship between the property and its location is often important to understanding why the property was created or why something happened.

Design is the combination of elements that create the form, plan, space, structure, and style of a property. It results from conscious decisions made during the original conception and planning of a property (or its significant alteration) and applies to activities as diverse as community planning, engineering, architecture, and landscape architecture. Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials.

Setting is the physical environment of a historic property. Whereas location refers to the specific place where a property was built or an event occurred, setting refers to the character of the place in which the property played its historical role.

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. A property must retain the key exterior materials dating from its historic period.

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. It is the evidence of artisans’ labor and skill in constructing or altering a building, structure, object, or site. Workmanship can apply to the property as a whole or to its individual components.

Feeling is a property’s expression of the aesthetic or historic sense of a particular period. It results from the presence of physical features that, taken together, convey the property’s historic character.

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Association is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character.

Because Feeling and Association depend on individual perceptions, their retention alone is never sufficient to support eligibility of a property for the NRHP. If an archaeological resource meets the above criteria, it is termed a "historic property."

## Results

As a result of the cultural resources inventory conducted for the project, one previously recorded site was updated, and seven newly identified sites were documented. In addition, five isolated resources were documented.

### Cultural Resources Site Descriptions

Fully recorded cultural resource sites consist of a single archaeological site (ACH-01) and seven architectural sites (Table 7). Of the seven architectural sites, all but one is newly recorded. In addition, 51 built environment resources were identified as being over 50 years in age during the reconnaissance survey. These resources are within a temporary easement or outside the APE and were minimally recorded (Table 7). This section describes all sites recorded within the APE, with brief descriptions of the non-relocated sites. Site location maps are provided in Appendix A, Maps 4 and 5. Resources identified during the reconnaissance survey are provided in Appendix A, Maps 6 and 7.

**Table 6. Recorded Resources.**

| Resource Number                     | Type                                                                          | Comment                                            |
|-------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------|
| <b>Fully Recorded Resources</b>     |                                                                               |                                                    |
| 10IH2775/49-17964                   | Historic Railroad                                                             | Railroad berm and culvert.                         |
| ACH-001                             | Unassociated Historic Debris Scatter                                          | Glass, ceramic, and personal items                 |
| ACH-002                             | ████████ Cottonwood Gun Club                                                  | Shooting range and club house                      |
| ACH-004                             | ████████ Historic Farmstead                                                   | Six features                                       |
| ACH-005                             | Culvert                                                                       | 1 extant culvert, culvert remnant, and artifacts   |
| ACH-006                             | ████████ Historic Farmstead                                                   | Six Features                                       |
| JRH-001                             | ████████ Idaho County Fair Grounds                                            | 11 Structures                                      |
| JRH-002                             | ████████ Ranch-Style House                                                    | Converted to Funeral Home                          |
| <b>Minimally Recorded Resources</b> |                                                                               |                                                    |
| NBNR-004                            | Railroad Trestle                                                              | Recon. Survey, Year Built:1909, Outside APE        |
| NBNR-005                            | ████████ Residence                                                            | Recon. Survey, Year Built:1930, Outside APE        |
| NBNR-008                            | ████████ St. Mary's Catholic Church                                           | Recon. Survey, Year Built:1971, Temporary Easement |
| NBNR-009                            | ████████ Residence with new vinyl windows and a new addition to the south end | Recon. Survey, Year Built:1916, Temporary Easement |
| NBNR-010                            | ████████ House on Southeast corner of King and Bash streets                   | Recon. Survey, Year Built:1956, Outside APE        |



Table 6. Recorded Resources.

| Resource Number | Type                                               | Comment                                            |
|-----------------|----------------------------------------------------|----------------------------------------------------|
| NBNR-011        | House                                              | Recon. Survey, Year Built:1905, Outside APE        |
| NBNR-014        | Residence                                          | Recon. Survey, Year Built:1972, Outside APE        |
| NBNR-016        | Residence                                          | Recon. Survey, Year Built:1910, Outside APE        |
| NBNR-017        | Residence                                          | Recon. Survey, Year Built:1901, Outside APE        |
| NBNR-020        | Residence                                          | Recon. Survey, Year Built:1914, Temporary Easement |
| NBNR-021        | Residence                                          | Recon. Survey, Year Built:1961, Outside APE        |
| NBNR-022        | Residence                                          | Recon. Survey, Year Built:1957, Outside APE        |
| NBNR-023        | Residence                                          | Recon. Survey, Year Built:1913, Outside APE        |
| NBNR-025        | Reiner's Grocery                                   | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-026        | The Habit Coffee Shop                              | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-027        | HUB International                                  | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-028        | Commercial                                         | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-029        | Commercial                                         | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-030        | Wolf Track Brewing                                 | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-031        | Cottonwood City Hall                               | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-032        | Residence                                          | Recon. Survey, Year Built:1920, Outside APE        |
| NBNR-033        | Residence                                          | Recon. Survey, Year Built:1930, Outside APE        |
| NBNR-034        | Residence                                          | Recon. Survey, Year Built:1929, Outside APE        |
| NBNR-035        | Residence                                          | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-036        | Residence                                          | Recon. Survey, Year Built:1901, Outside APE        |
| NBNR-038        | Residence                                          | Recon. Survey, Year Built:1942, Outside APE        |
| NBNR-039        | Residence                                          | Recon. Survey, Year Built:1937, Outside APE        |
| NBNR-040        | Residence                                          | Recon. Survey, Year Built:1949, Outside APE        |
| NBNR-041        | Residence                                          | Recon. Survey, Year Built:1903, Outside APE        |
| NBNR-042        | Residence                                          | Recon. Survey, Year Built:1910, Outside APE        |
| NBNR-043        | Residence                                          | Recon. Survey, Year Built:1968, Outside APE        |
| NBNR-044        | Residence                                          | Recon. Survey, Year Built:1919, Outside APE        |
| NBNR-047        | Residence                                          | Recon. Survey, Year Built:1972, Outside APE        |
| NBNR-049        | Residence                                          | Recon. Survey, Year Built:1950, Outside APE        |
| NBNR-058        | Residence                                          | Recon. Survey, Year Built:1957, Temporary Easement |
| NBNR-059        | Residence                                          | Recon. Survey, Year Built:1916, Outside APE        |
| NBNR-062        | Cottonwood Community Credit Union                  | Recon. Survey, Year Built: Pre 1974, Outside APE   |
| NBNR-069        | Red Gate Enterprises LLC Brick Commercial Building | Recon. Survey, Year Built: Pre 1974, Outside APE   |

**Table 6. Recorded Resources.**

| Resource Number | Type                       | Comment                                             |
|-----------------|----------------------------|-----------------------------------------------------|
| NBNR-070        | Her's & Sir's Beauty Salon | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-071        | Forsmann Accounting LLC    | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-073        | C'est la V's               | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-075        | Blue Camas Salon           | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-076        | Harman Agency LLC          | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-079        | Point S. Gas Station       | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-080        | Fred's Body Shop           | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-083        | City Electric              | Recon. Survey, Year Built: Pre 1974, Outside APE    |
| NBNR-084        | Residence                  | Recon. Survey, Year Built: 1950, Outside APE        |
| NBNR-085        | Residence                  | Recon. Survey, Year Built: 1919, Temporary Easement |
| NBNR-086        | Residence                  | Recon. Survey, Year Built: 1919, Temporary Easement |
| NBNR-087        | Residence                  | Recon. Survey, Year Built: 1905, Temporary Easement |
| NBNR-088        | Residence and shed         | Recon. Survey, Year Built: 1900, Temporary Easement |

10IH2775/49-17964

This is a segment of the Camas Prairie Railroad which enters the City of Cottonwood. The segment is an earthen berm with a culvert and signal (F-01).

The tracks have been removed and a two-track road is along the former railroad bed.

The Camas Prairie Railroad was originally recorded by Hudson et al. (2001). At that time, they recorded the segment from Spalding to Grangeville, Idaho. During that recordation, they inventoried 337 features including buildings, structures, bridges, sidings, signals, and culverts. The current updated segment is north of the City of Cottonwood. Besides the culvert and signal, no cultural material was noted. Feature 1 is a small culvert with a metal headgate of the railroad berm and metal pipe. It is 24 in. in diameter. It is likely F-233 recorded by Hudson et al. (2001). The Signal (F-01) is a fixed vane-type post signal painted yellow. It likely is a caution signal indicating a reduced speed area ahead.

#### NRHP

The Camas Prairie Railroad is eligible to the NRHP under Criteria A and C. ARH concurs with the recommendation for the railroad in whole but recommends the updated segment is contributing to the NRHP under Criterion A and non-contributing under Criterion C. The segment cannot be associated with any locally, regionally, or nationally important person and is non-contributing under Criterion B. The segment consists of the berm, a culvert, and signal no other cultural material was noted. The segment is associated associated with the railroad as it is part of the route between Grangeville and Lewiston (contributing under Criterion A). However, the berm and associated features are not unique, nor excellent examples of berms within the site (non-contributing under Criterion C). Furthermore, the

segment does not possess any attributes which can contribute to current research agendas within the region and the current recordation captures any research potential of the segment (non-contributing under Criterion D).

### Idaho County Fairgrounds (JRH-001)

The Idaho County Fairgrounds, located near [REDACTED] in Cottonwood, Idaho, was first built in ca. 1961 (Figure 4). The Fairgrounds are used annually for the County Fair and Stock Show held every August.

In 1960 the Idaho County Stock Show moved from Main Street in Cottonwood to its present location. At that time the Cottonwood Chronical reported that a pole frame building was to be constructed for the exhibit hall on the Idaho County Stock Show Ground. Later in 1961, the Spokane Chronical (September 4, 1961: 3) reports that the exhibition hall was constructed by 17 volunteers from the Cottonwood Grange. The structure was 95 x 50 ft. with a poured concrete foundation that was furnished by Reiner Brothers. Aerial photographs show the progress of construction. In 1961 the Joe Enneking 4-H Building and Carl Jentges Building/Livestock Barn were constructed. A third building, the Joe Reiner Building/Open Class, was constructed by 1966. Two additional buildings, the John C. Schmidt Building/Arena Office and Joe Reiner Building/Open Class, were constructed by 1981. In 1998 the Vern Agee Livestock pavilion was constructed and an addition was completed on the Joe Reiner Building. By 2009 the county fairgrounds contained all the buildings currently present.

#### Building A

This is the Joe Enneking 4-H Building, built in 1965, as stated on a plaque on the north elevation. Joe Enneking was a 4-H leader in Kueterville for many years. The building is gabled, with a metal roof and is clad in standing seam metal siding. There are two metal sliding barn type doors on the north elevation with a single person door to the west. The south elevation has a shed addition without any doors or windows. The east and west elevations do not have any doors or windows. The building is of pole frame construction, with a concrete foundation.

#### Building B

Building B is the John C. Schmidt Building/Arena Office; built in 1969. The building is gabled, with a metal roof and is clad in standing seam metal siding. There are double metal doors in the north elevation, and in the south. There are no windows or doors in the east or west elevations. The east elevation has a covered patio area with an overhanging shed roof.



**Figure 4. The Idaho County Fairgrounds  
Historic Aerial Photo 1961**

#### Building C

Building C is the Carl Jentges Building/Livestock Barn, built in 1965, as stated on a sign on the front (north) side of the building. The barn is of pole frame construction and is clad in metal siding; the metal roof is side gabled. There is a patio/picnic area on the east side, covered by a metal shed roof. The foundation is concrete. There are two metal sliding barn type doors in the north elevation, and two in the south.

#### Building D

Building D is the Joe Reiner Building/Open Class built in 1965. There is a plaque on the North elevation stating this. The building is gabled with a metal roof and



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standing seam metal siding. There are double metal doors in the north elevation. A shed roofed extension with a single door is in the south elevation. There are no windows or doors in the east or west elevations. The building is pole frame construction with a concrete foundation. There is a shed roofed building just east of this building that is also clad in metal siding.

#### Building E

Building E is the Vern Agee Livestock pavilion built in 1994. It is a side-gabled barn, with standing seam metal siding and metal roof. There is a double metal person door and sliding barn doors in the north elevation; the west elevation has several stalls for livestock and a shed-roofed overhang supported by wooden posts. The east elevation has no fenestration, and the south elevation has an awning running the length of the building. This awning shelters a livestock holding area.

#### Building F

Building F is the Enid Newman Building built in 2009. It is a rectangular, gabled barn with standing seam metal siding and metal roof and a concrete foundation. There is an oversized rolling overhead door on the north side, with a person door at the west end. The east and west elevations have no openings, while the south elevation is the same as the northern elevation.

#### Building G

Building G is a food court building and associated gazebo. The shed building is a standing seam metal siding with a metal roof and concrete foundation. A series of shuttered windows is along the eastern elevation and a single person door is present on the southern elevation. The northern elevation has a single window and a long, covered awning with a concrete pad and picnic tables.

#### Building H

Building H is a small livestock shed constructed from standing seam metal siding and metal roof. It is open to the north and south with a central wall.

#### Building I

Building I is a rectangular side gabled shed with an awning on the southern elevation. It has a standing seam metal siding and metal roof on a concrete foundation. There is a sliding door on the west and south elevations and two windows on the north elevation.

#### Structure J (Pavilion)

Structure J is a pavilion with a shed roof and concrete stage. It has a metal roof and wood frame and was recently constructed.

#### Building K

Building K is the Idaho Farm and Ranch Museum built after 1966. It is a rectangular, gabled barn with standing seam metal siding and metal roof and a concrete foundation. There is a large double barn door on the northern elevation. The eastern elevation is a recent addition with no windows or doors. The southern elevation has another barn door and there is an awning on the west elevation.

#### NRHP

The Idaho County Fairgrounds are recommended not eligible to the NRHP under any criteria. The Fairgrounds represents a continual expansion of the property to accommodate livestock and exhibits

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since 1960. Prior to that the Idaho County Fair was held in the City of Cottonwood. While the Idaho County Fair is important to the community, the current fairgrounds are not associated with significant events or persons that initiated the fair. Instead, the fair was moved to the current location to allow it to expand (not eligible under Criterion A). In addition, the site is not associated with any locally, regionally, or nationally important individuals or groups (not eligible under Criterion B). The buildings and structures on the property are not unique and are utilitarian in nature; and they are not representative of a particular architectural type (not eligible under Criterion C). In addition, any informational value of the property has been sufficiently captured during the current recordation (not eligible under Criterion D).

[REDACTED] (JRH-002)

This is the Uhlorn Funeral Home [REDACTED] Cottonwood, Idaho, first constructed in 1956. The Uhlorn Funeral Home is a two-story, ranch style house with low, horizontal massing. It is clad in brick veneer with a cross-hipped roof, which is clad in wood shingles. There is an addition on the north end that was added between 1981 and 1998, based on historic aerial photos. The front (south) elevation has a large horizontal chimney in the center, and a large picture window. There is an attached two car garage on the west end of the south elevation, and four additional attached garages on the north end. The west elevation has three fixed vertical windows at the south end, and three garages at the north end. These are later additions. Access to the backyard was not granted and the north elevation is not described. The east elevation has several fixed picture windows: three in the upper story and three in the lower, including fixed multi-light steel windows. This has been a funeral home since 1987.

#### NRHP

This ranch-style home is recommended not eligible to the NRHP under any criteria. The property cannot be associated with nationally, regionally, or locally important events or people (not eligible under Criteria A or B). Constructed or engineered features were not noted, and the site is not a unique resource (not eligible under Criterion C). Artifacts noted during recordation show not patterning and the lack of diversity and sparse nature of the assemblage indicate minimal potential to encounter buried deposits. As such, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

#### ACH-001

This is a sparse historic debris scatter [REDACTED]. Vegetation consists of hay stubs, which were recently cut. Sediments are a silt loam. The site area is impacted by plowing.

The site includes two artifacts (A-01 and A-02) and very fragmented historic debris with no clear patterning. A-01 is a clear glass bottle body fragment with "AL/ER" embossed on the body. A-02 is a white glass 4-hole button. Also present are four metal fragments: a bolt, a wrench, a nail, and a piece of unidentified flat metal. There are 13 clear, brown, and blue glass fragments, and 24 white ceramic fragments consisting of a plate, a water jug handle fragments, and a cup handle.

#### NRHP

This historic debris scatter is recommended not eligible to the NRHP under any criteria. The surface assemblage includes ceramics, glass, and metal fragments with no clear temporal or functional characteristics. The artifacts cannot be associated with nationally, regionally, or locally important events or people (not eligible under Criteria A or B). Constructed or engineered features were not noted, and the site is not a unique resource (not eligible under Criterion C). Artifacts noted during recordation show not patterning and the lack of diversity and sparse nature of the assemblage indicate minimal potential to encounter buried deposits. As such, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

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## ACH-002

This site is the Cottonwood Rod & Gun club, which consists of the clubhouse (Feature 1) and the shooting stations (Feature 2). The Cottonwood Rod & Gun club is located [REDACTED] in Cottonwood.

Feature 1 is the clubhouse, a side gabled building with a metal roof and a cinder block chimney in the southwest corner. The front (north) elevation has 10 fixed windows and two doors with windows. The front elevation siding is T-1-11 plywood. All other elevations are sheet metal with no windows. There is a small gabled shed addition in the east elevation with two metal doors. The gun club was constructed sometime after 1966 based on aerial photographs, most likely in the late 1970s or early 1980s. No other information could be found on the property.

Feature 2 is the shooting stations. There are five stations; all are the same. They consist of a 10-by-10-ft. concrete platform (for the skeet machine and a concrete and trapezoidal-shaped gravel station for the shooter (30 by 40 ft.). There are five stations in the shooting area. The concrete border is 2 feet wide and is numbered 17 through 72. The gun and skeet platforms are about 20 ft. apart.

### NRHP

The Cottonwood Gun Club facilities are recommended not eligible to the NRHP under any criteria. The gun club cannot be associated with any significant nationally, regionally, or locally important events or people (not eligible under Criteria A or B). The clubhouse is a simple Ranch Style and is not unique, nor was it designed by anyone of note (not eligible under Criterion C). In addition, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

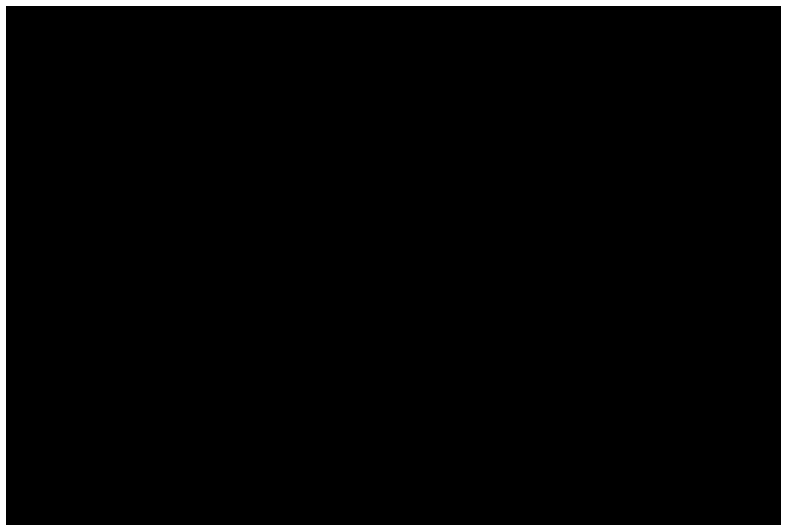
## ACH-004

This is the farmstead [REDACTED]. The yard is landscaped with grass and large shade trees. Soils are a silt loam with cobbles. The site area is impacted by structural decay. The exact date of construction could not be established. The farmstead is present on aerial photographs dating to 1946. The Metzger map dating to 1939 does not indicate any structure at the current position of the farmstead (Figure 5).

By 1946, five structures were present on the aerial (Figure 6). These structures remained until 1981 when a large barn to the south of the house, and outbuilding

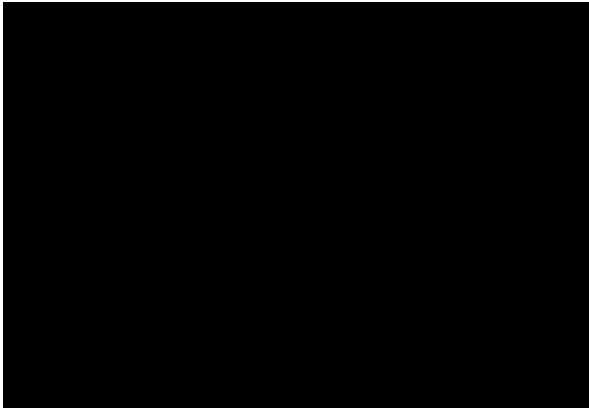
east of the house, and a stable southwest of the house appear to have been raised.

The site consists of six features: a farmhouse (F-01), two outhouses (F-02), a shed and chicken coop (F-03), a barn (F-04), a modern metal shed (F-05), and a granary ruin (F-06). The farmhouse is north of the described features. Farther south (150 ft.) are pastures, a small man-made pond and Cottonwood Creek.



**Figure 5. 1939 Metzger Map.**

Feature 1 is a two-story cross gabled house with a metal roof and vinyl siding. The cross gabled portion of the house appears to be an addition. All gables are enclosed, and all windows are 1/1 light modern vinyl windows. The front elevation (south) is an enclosed porch with three large windows to the left of the door and three smaller windows to the right. The porch has a shed roof. The second story has a single window with 2 lights. The west elevation has eight windows on the first story, and three on the second. Two 1/1 light windows are in the enclosed porch and there are two sets of 1/1 light windows on either side of a fixed window along the 1st story. The second story has a dormer with fixed window toward the front and two 1/1 light windows near the back. The north elevation has two 1/1 light windows on the first story and a diamond shaped decorative window on the second. The east elevation has an addition (possible enclosed wrap-around porch) in the south with a patio roof extending off it. There are three 1/1 light windows and a door on the addition near the front. Another dormer similar to the one described for the east façade is present. There are five windows near the back, all of which are 1/1 lights. Two are on the second story and three on the first.



**Figure 6. 1946 Aerial Photograph.**

Feature 2 consists of two outhouses converted into sheds. The out buildings may have been moved to their current location. One is to the west (F-02a) and the other to the east (F-02b). The western one (5x5x7 ft.) has a metal shed roof, wood lap siding, and a wood door. The eastern one (8x4x10 ft.) is a front gabled wood shingle shed with wood siding.

Feature 3 is a shed and chicken coop. The shed roof is metal and it has wooden lap siding. There is a dormer to the west and wire and wood enclosure on the east side.

Feature 4 is a front gabled barn with a shed roof extension to the south. The west elevation has a barn door and two windows above it, and three small windows and a door in the shed portion. The south elevation has five windows. The north side has three possible tack rooms. There is also an interior roof above the main barn area.

Feature 5 is a modern metal shed.

Feature 6 is a concrete foundation for a granary and associated structure. The granary foundation is 4 ft. tall and 15 ft. in diameter. Surrounding this is a rectangular concrete footing of the barn. The structure appears to have been raised prior to 1981. The pastures have been used as equipment storage areas and farm equipment dating between 1970 to the 1990s are present. In addition, there is recent and modern debris present.

#### NRHP

This farmstead is recommended not eligible to the NRHP under any criteria. The farmstead is on property owned by J John Horene in the 1930s and the farmstead and the structures appear to have been built prior to 1948. The property cannot be associated with nationally, regionally, or locally important events or people (not eligible under Criteria A or B). Constructed or engineered features were not noted, and the site is not a unique resource (not eligible under Criterion C). Artifacts noted during recordation show not patterning and the lack of diversity and sparse nature of the assemblage indicate minimal potential

to encounter buried deposits. As such, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

In addition, the farmhouse lacks integrity of workmanship and materials, but retains all other aspects of integrity.

#### ACH-005

This is a culvert Cottonwood Creek near [REDACTED]. Vegetation is riparian including tall grasses and reeds, some forbs, and a few willow trees. Lichen is prevalent on the older culvert. Ground visibility is about 25 percent. Soils are a silt loam with riprap placed along the road shoulder and along the sides of the newer culvert. The site area is impacted by demolition as fragments of the old culvert were found on both sides of the creek banks.

The site includes two features – a newer culvert (F-01) and a culvert remnant (F-02), along with some metal car parts. Feature 1 is a poured concrete culvert on the current alignment of Airport Road. It measures 10 by 8 ft and has 6-ft. long wings on the inlet and outflow. Feature 2 is the remnant of an older concrete culvert. It is 30 ft. wide with an arched interior (10 ft. wide) and is on the southern side of the current creek. The metal car parts consist of a door and two unknown fragments. These are on the north side of the creek.

#### NRHP

This culvert site is recommended not eligible to the NRHP under any criteria. The feature lacks temporal and functionally diagnostic artifacts or features and cannot be associated with nationally, regionally, or locally important events or people (not eligible under Criteria A or B). The features are not unique resources, nor are they exceptional examples of culverts (not eligible under Criterion C). Artifacts noted during recordation show not patterning and the lack of diversity and sparse nature of the assemblage indicate minimal potential to encounter buried deposits. As such, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

#### ACH-006

This farmstead is located at [REDACTED]. Vegetation is landscaped with grass, cherry trees, and large shade trees. The site area is impacted by structural decay and is surrounded by agricultural fields. The site consists of six features: a farmhouse (F-01), an old well shed and tower (F-02), a garage (F-03), a barn (F-04), a Quasit-style barn (F-05), and a loading ramp (F-06). There are several automobiles by Features 3 and 4. It is visible on the 1946 aerial and a house is noted in the general area on the 1939 Metzger Map and the land is attributed to a Mr. John J. Schneider. Online research indicates that the farmhouse was built ca. 1920. Features 1 through 4 are present on an aerial photograph that dates to 1946 (Figure 7). In addition, a large barn was present to the east of F-04 and F-05 is not present. In 1948 a small structure is present in the general area of F-05, and by 1955 F-05 had been constructed. The large structure noted east of F-04 appears to have been raised between 1981 and 1998.

Feature 1 is a two-story cross gabled house with a metal roof and two brick chimneys. The siding is vinyl, and all windows are newer metal framed replacements. Most of the windows have decorative shutters. There appears to be a basement and the foundation is concrete. The front elevation (north) has a concrete porch and

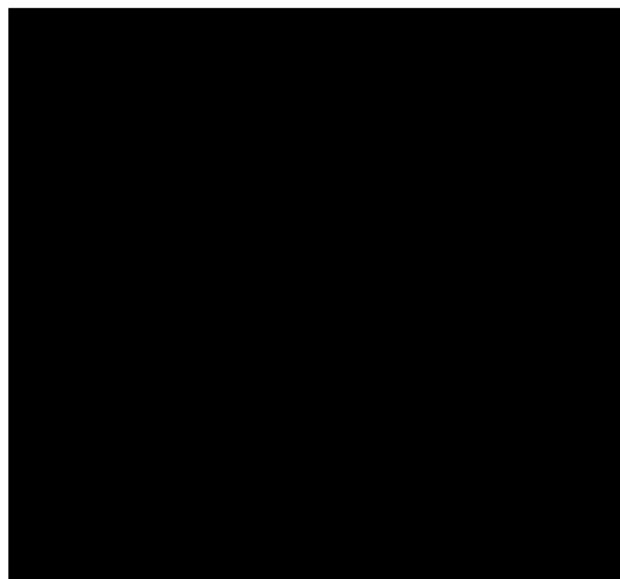


Figure 7. 1946 Aerial Photograph



porch deck on the second floor. The front door is in the center and new. Windows (1/1 light) are on either side of the door for both stories. The east elevation appears have an addition to the south. It has a large, fixed window to the north with two 1/1 light windows above it on the second story. The addition is a partially enclosed porch with two small, fixed windows. Above the addition is a small 1:1 window. The south elevation has two 1/1 light windows on the ground floor and a single 1/1 light window on the second floor. The west elevation has an addition to the south. Toward the north there is a single side by side window and two 1/1 light windows on the second level. The addition has a sliding door and a portico. Two 1/1 light windows are on the second story.

Feature 2 is an old well shed with a metal framed weather vane tower. The shed is a front gabled, asphalt shingle roof with lap siding. The door and a small four light window are on the south side.

Feature 3 is a side gabled garage with a metal roof and wood lap siding. The front (east) elevation has two sliding garage bays to the south and a boarded-up window and a door to the north. The west elevation has a 4-light window to the north and a large and small fixed window to the south. The south elevation has two newer side by side windows. There are no windows on the north elevation.

Feature 4 is a side gabled barn with a wood shingle roof and wood siding. Two sliding barn doors are on the north elevation. The south elevation has a single door. The east elevation has a hay door and two small four light windows on the second story. There appear to be three stalls.

Feature 5 is a Quonset style barn with sheet metal siding that is open to the east. It is visible in the 1955 Aerial photograph of the site.

Feature 6 is a poured concrete loading ramp.

#### NRHP

This farmstead is recommended not eligible to the NRHP under any criteria. The farmstead is on property owned by John J. Schneider in the 1930s and the farmstead and the structures appear to have been built prior to 1946. The property cannot be associated with nationally, regionally, or locally important events or people (not eligible under Criteria A or B). Constructed or engineered features were not noted, and the site is not a unique resource (not eligible under Criterion C). Artifacts noted during recordation show not patterning and the lack of diversity and sparse nature of the assemblage indicate minimal potential to encounter buried deposits. As such, the data potential of the site has been sufficiently captured through the current recordation and the site is not eligible under Criterion D.

In addition, the farmhouse lacks integrity of workmanship and materials, but retains all other aspects of integrity.

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## Isolated Finds and NBNRs

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Isolates recorded during survey include two white ceramic fragments (ISO-ACH-001), a single white ceramic fragment (ISO-ACH-002), a cut metal disk (ISO-ACH-003), a metal weathervane with "SPOKANE/LUIS & MITCHELL" (ISO-ACH-004), and a complete brown glass screw-top bottle with "OLD THOMPSON" printed on cap. The shoulders are embossed with "FEDERAL LAW FORBIDS/RESALE 4/5 QUART", the base is embossed with "C2/D8/ 56 62 [I in an O symbol]" with stippling (ISO-ACH-005), (Appendix A, Map 8). Noted, but not recorded resources (n=6) were observed during the reconnaissance survey (Appendix: Map X) and the intensive survey (Table 8, Appendix A., Map 9). These resources are less than 50 years old and within the temporary easement for the project, or within the APE.

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Table 7. Noted, but Not Recorded Resources.

| Resource Number | Type                           | Comment                                                  |
|-----------------|--------------------------------|----------------------------------------------------------|
| NBNR-001        | RF Auto Sales                  | Recon. Survey, Year Built: 1985, Temporary Easement      |
| NBNR-002        | Mobile Home Park               | Recon. Survey, Year Built: 1976, Temporary Easement      |
| NBNR-055        | Residence                      | Recon. Survey, Year Built: 1994, Temporary Easement      |
| NBNR-056        | Camas Prairie<br>Mini Storage  | Recon. Survey, Year Built: Post 1974, Temporary Easement |
| NBNR-ACH-001    | Post 1960s Sanitary cans (n=2) | Recon. Survey, Year Built: ca. 1960, APE                 |
| NBNR-ACH-002    | 1970s Farm equipment           | Recon. Survey, Year Built: ca. 1970, APE                 |

## Management Recommendations

The Cottonwood Flood Control Plan will consist of improving flood control and drainage within the City of Cottonwood and improving water quality in Cottonwood Creek. For the most part flood control consists of improving underground pipes in the city. These improvements will not impact the characteristics of the built environment within the town.

A total of eight cultural resources were recorded during the inventory. Seven of these resources are not eligible to the NRHP under any criteria. One resource (10IH2775/49-17964) was previously recommended eligible to the NRHP under Criteria A and C. The updated segment is recommended as contributing under Criterion A and a non-contributing segment of the site under Criterion C. the updated segment is a portion of railroad berm, culvert (F-01) and signal sign. As ARH understands the project, flood control improvements will not modify the railroad berm, but the culvert (F-01) will be slightly modified to better control flow, and ultimately protect the berm from damage due to water overtopping it. Considering that no NRHP eligible properties were identified in the APE, a finding of **No Adverse Effect** to historic properties is appropriate for this undertaking.

## Conclusions

In the fall of 2021 and spring of 2022 ARH conducted an archaeological and architectural inventory of over 720 ac. in and around the City of Cottonwood. The survey resulted in the recordation of 5 isolated resources, and 7 sites. Archaeological sites are historic-aged and include a residence, fair grounds, shooting range, farmsteads, a culvert, and a debris scatter. Isolates are also historic in age. In addition, 51 historic-aged resources were noted during the reconnaissance and minimally recorded. Isolates are also historic in age. Six noted, but not recorded (NBNR) were observed during the inventory and reconnaissance survey.

All newly recorded archaeological and architectural sites and isolated resources are recommended not eligible to the National Register of Historic Places (NRHP) under any criteria. The Camas Prairie Railroad (10IH2775) was determined eligible to the NRHP under Criteria A and C. The segment of the railroad updated (a portion of the berm, culvert (F-01), and signal sign (F-02)) is recommended contributing under

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Criterion A and a non-contributing element of the site under Criterion C. Noted, but not recorded resources were not evaluated. Current plans will not modify the berm in the recorded segment of 10IH2775 but will minimally modify the metal plate of the culvert. Considering that the segment is non-contributing to the sites NRHP characteristics under Criterion C, a finding of **No Adverse Effect** is appropriate for direct project impacts. Pipelines and sidewalks will not result in visual impacts. As such, overall, project actions will result in **No Adverse Effect**. Due to previous disturbance, there is a low potential for the presence of sub-surface historic or prehistoric archaeological material. However, it is appropriate for a qualified archaeologist should be present to monitor ground disturbance activities in areas where there is minimal existing disturbances. If any cultural materials are encountered during the project in areas not monitored by an archaeologist, all ground-disturbing activities will cease until a qualified Natural Resources Conservation Service (NRCS) cultural resource specialist is consulted.

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# Appendices

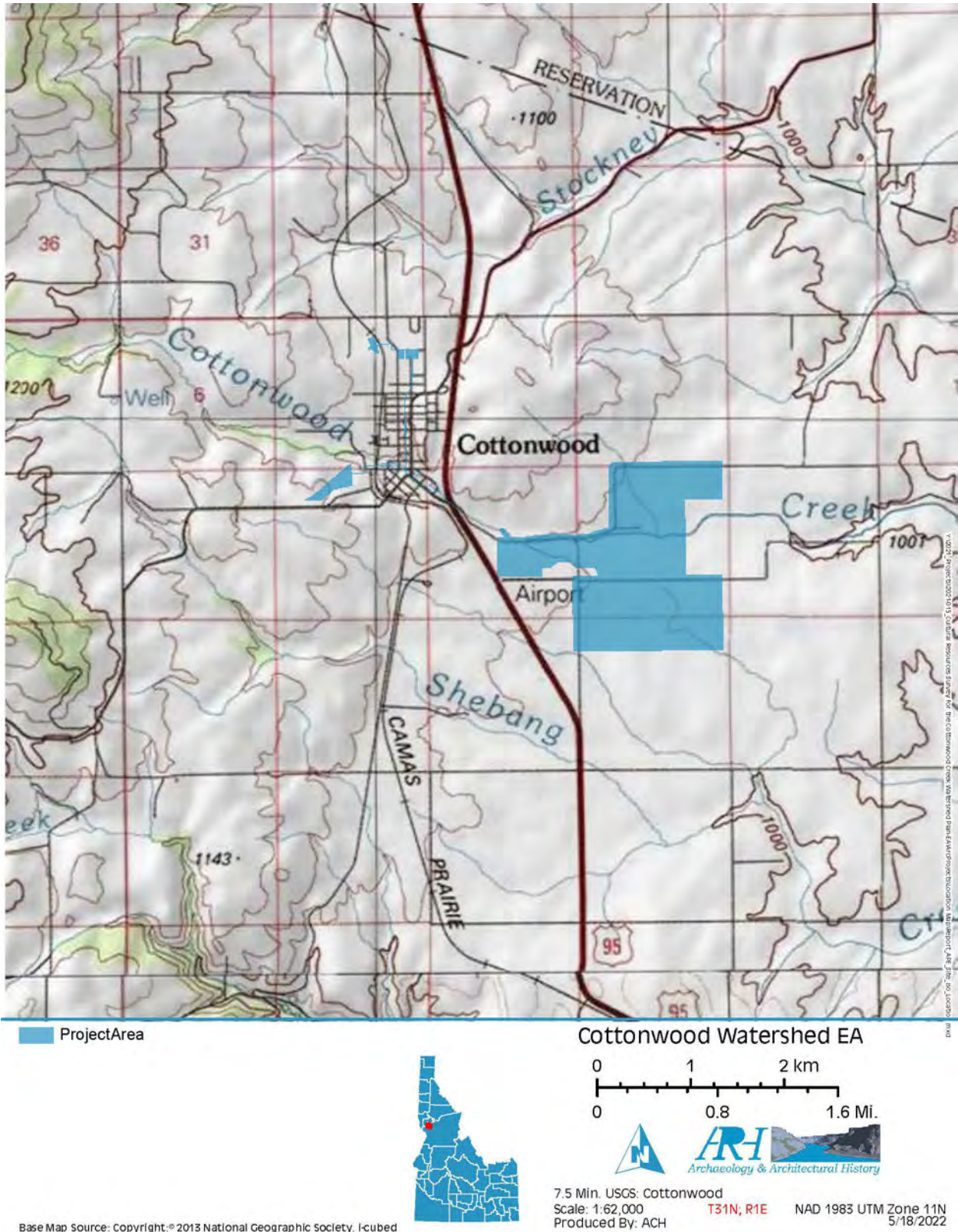
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Appendix A: Maps

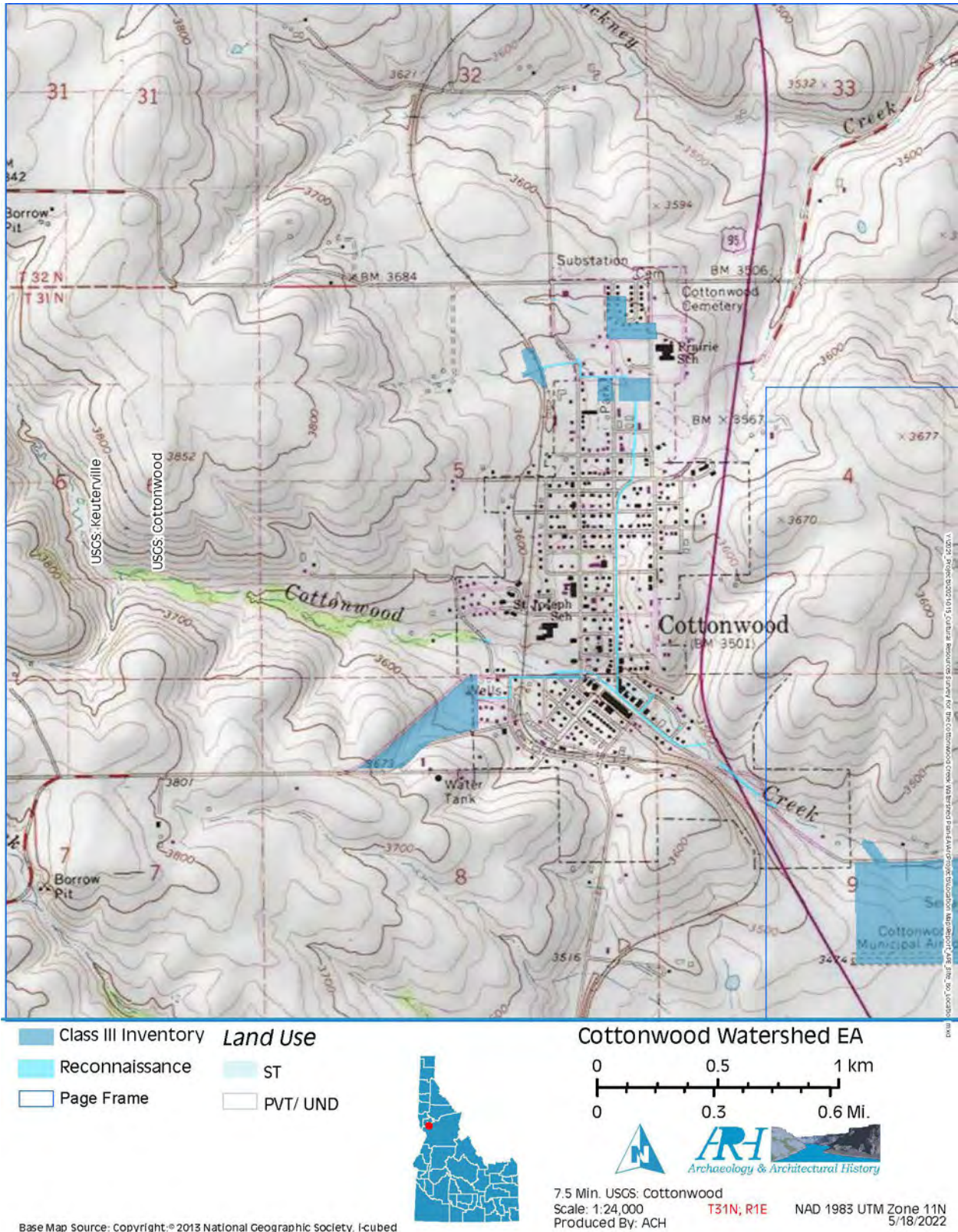
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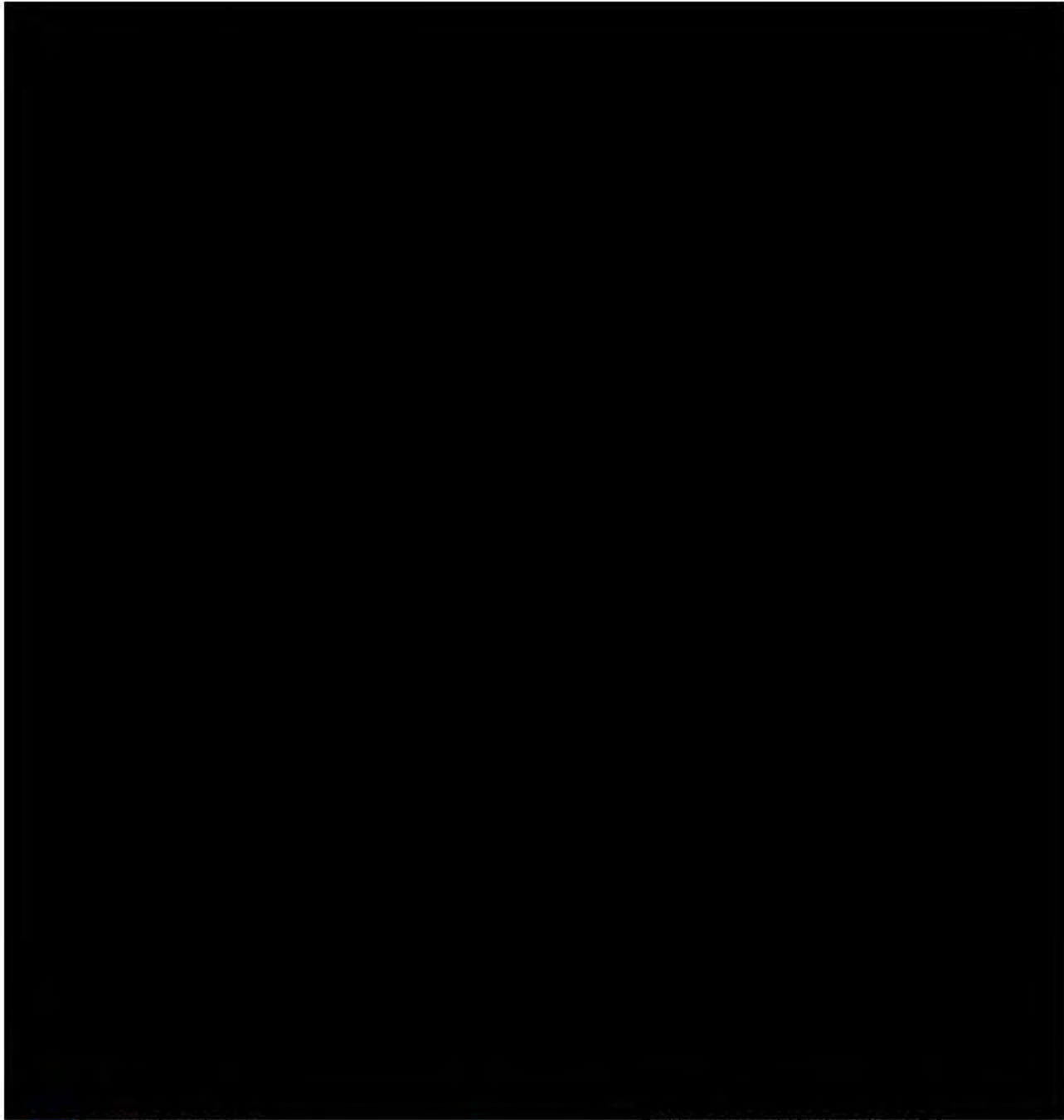




Map 2. APE in the Area of the City of Cottonwood.



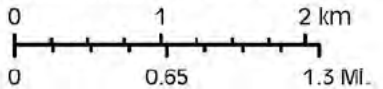
### Map 3. APE in Rural Areas.



- Records Search Area
- IHSI
- ASI
- Linear
- Class
- ProjectArea



Cottonwood Watershed EA



7.5 Min. USGS: Cottonwood  
Scale: 1:52,000  
Produced By: ACH  
T31N, R1E NAD 1983 UTM Zone 11N  
5/18/2022

Base Map source: Copyright:© 2013 National Geographic Society, I-cubed

Map 4. Records Search Map.





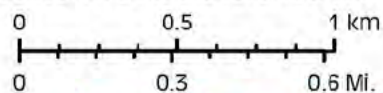
- Linear Site
- Site Boundary
- Class III Inventory
- Reconnaissance
- Page Frame

**Land Use**

- ST
- PVT/UND



**Cottonwood Watershed EA**



7.5 Min. USGS: Cottonwood  
Scale: 1:24,000  
Produced By: ACH

T31N, R1E

NAD 1983 UTM Zone 11N  
5/18/2022

Base Map Source: Copyright: © 2013 National Geographic Society, I-cubed

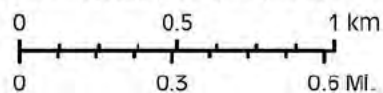
**Map 5. Site Location Map, City of Cottonwood.**



- Linear Site
  - Site Boundary
  - Class III Inventory
  - Reconnaissance
  - Page Frame
- Land Use**
- PVT/ UND



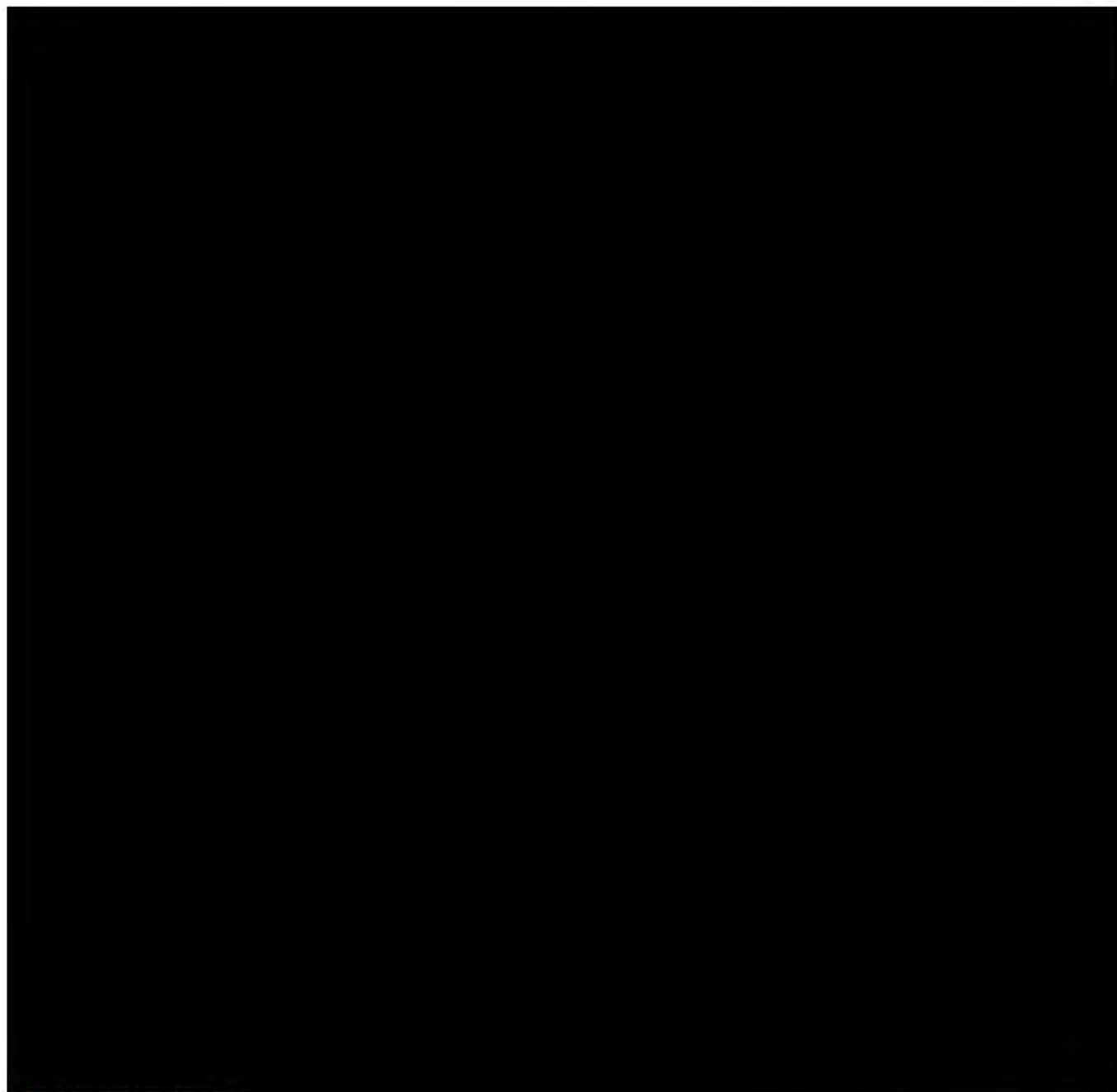
Cottonwood Watershed EA



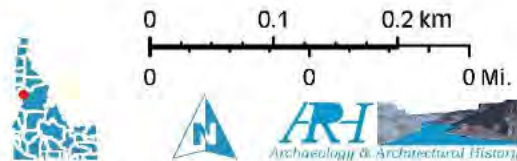
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Scale: 1:24,000  
Produced By: ACH  
T31N, R1E NAD 1983 UTM Zone 11N  
5/18/2022

Base Map Source: Copyright: © 2013 National Geographic Society, I-cubed

**Map 6. Site Location Map, Rural Areas.**



- Class III Inventory
- Reconnaissance
- Recon. Survey Resources
- NBNR

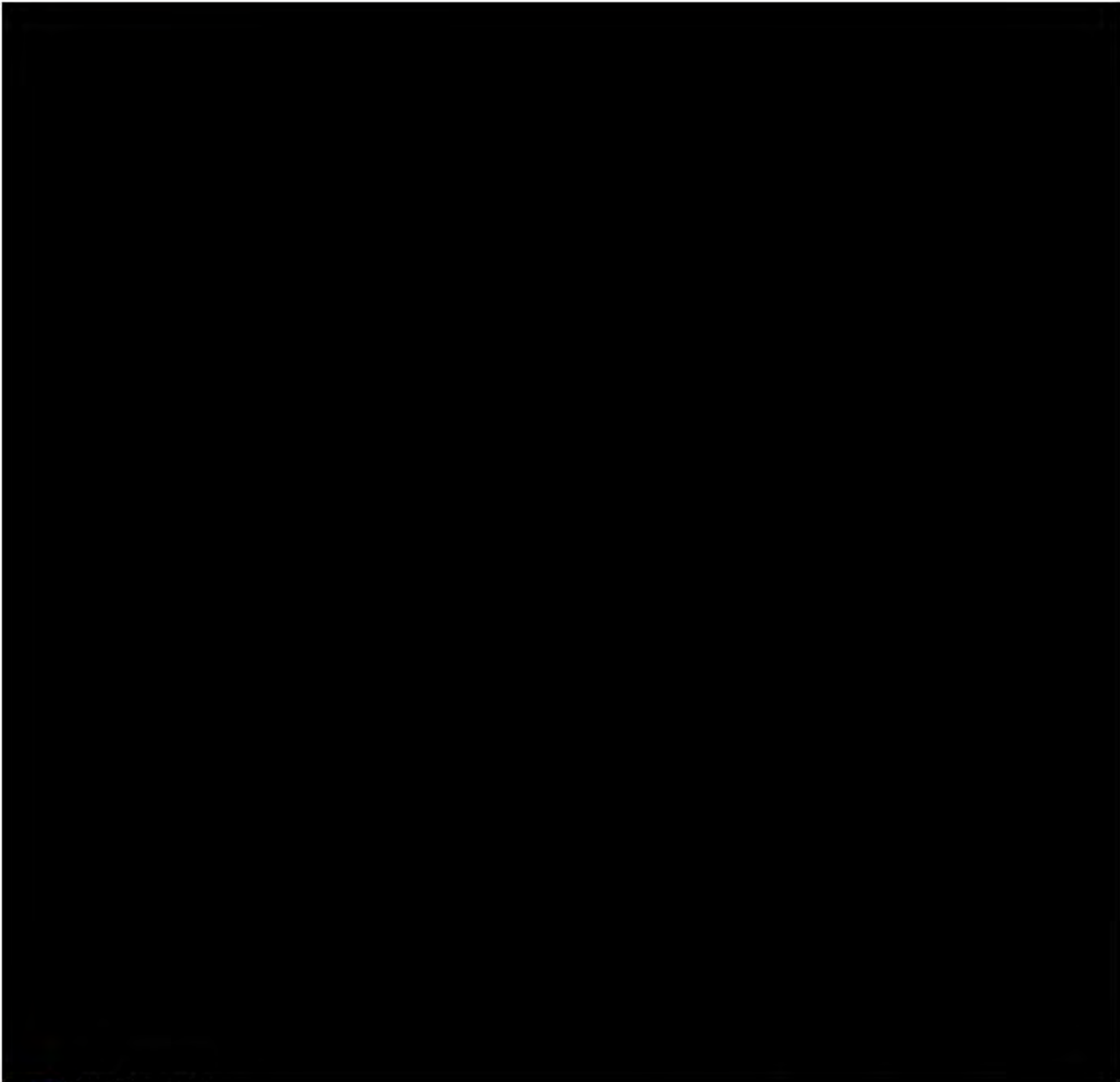


7.5 Min. USGS: Cottonwood  
Scale: 1:6,100  
Produced By: ACH

NAD 1983 UTM Zone 11N  
9/3/2024

Copyright: © 2013 National Geographic Society, I-cubed

**Map 7. Detail of Reconnaissance Level Resources in the City of Cottonwood (North).**



- Class III Inventory
- Reconnaissance
- ▲ Recon. Survey Resources



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0000 Mi.



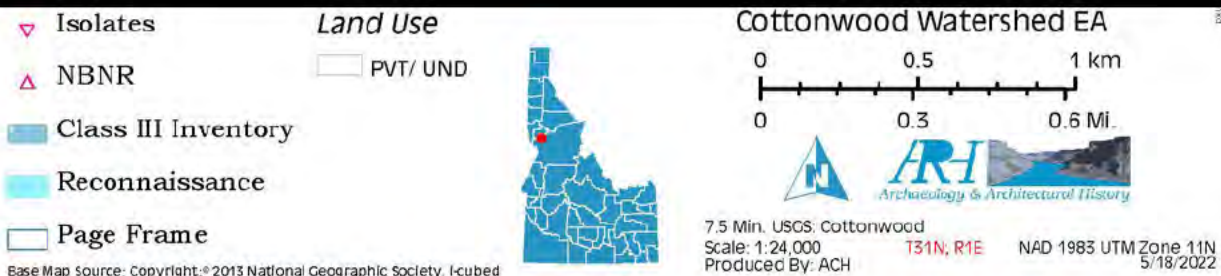
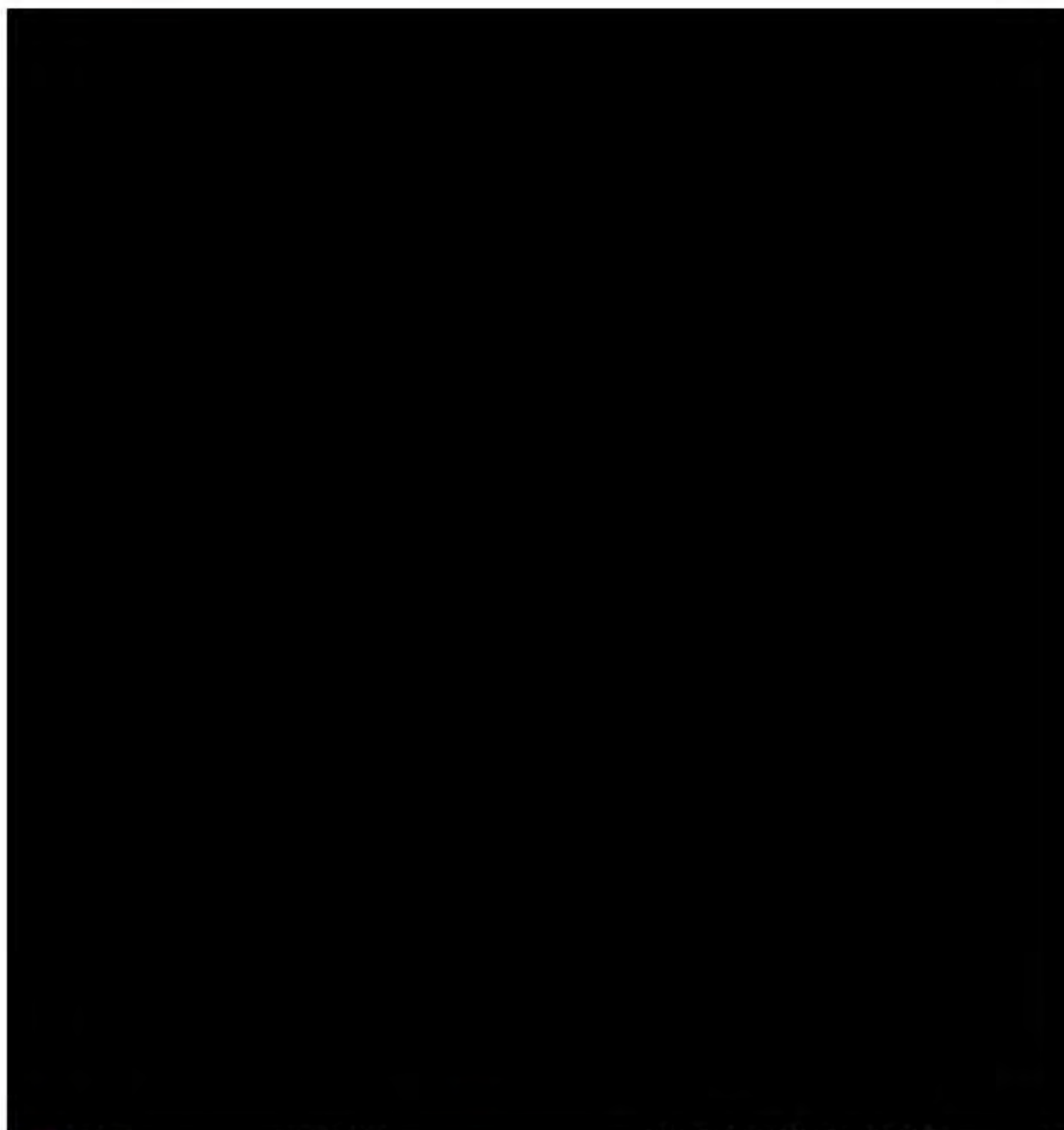
7.5 Min. USGS: Cottonwood  
Scale: 1:6,100  
Produced By: ACH

T31N; R1E

NAD 1983 UTM Zone 11N  
9/3/2024

Map 8. Reconnaissance Level Resources Location Map, City of Cottonwood (South).





**Map 9. Isolate and Reconnaissance Level Resources Location Map, Rural Area.**



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Appendix B: ASI and IHSI Site Records

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Forms are redacted for confidentiality purposes



Appendix E7: Technical Memoranda

Technical Memorandum 001—Hydraulics and Hydrology



## TECHNICAL MEMORANDUM 001

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| <b>Date:</b>    | February 2024                                         |
| <b>To:</b>      | Bruce Sandoval, PE – NRCS State Conservation Engineer |
| <b>Cc:</b>      |                                                       |
| <b>From:</b>    | Garrett Frei, PE – JUB Engineers                      |
| <b>Project:</b> | Cottonwood Creek Flood Prevention Project             |
| <b>Subject:</b> | Hydraulics & Hydrology                                |
| <b>Note:</b>    | Referenced Figures are located in <b>Appendix C</b> . |

### 1.0 Introduction

Hydraulics is the study of water movement within a specific conduit. Conduits can be naturally occurring, such as a stream channels, or manmade such as reinforced concrete box conduits or pipes. Using equations developed from mathematical derivations and laboratory testing data, hydraulics can be used to predict the capacity of a specific conduit and the behavior of flow through it.

Hydrology is the study of the movement of water on earth in a large scale, such as water movement through a watershed. Hydrologic analysis utilizes historical data and statistical analysis to predict the volume and flow rates of water in a watershed for a specific storm event.

This technical memorandum examines the hydraulics and hydrology of the Cottonwood Creek watershed and its effects on the City of Cottonwood's floodwater prevention system and city-wide flooding.

### 1.1 Purpose and Need

The purpose of this technical memorandum (TM001) is to present the hydraulics and hydrology analysis conducted for the Cottonwood Creek Watershed Plan-EA. The information presented in this TM is used for the purposes of Flood Protection Design (TM002). The Technical Memorandums are provided in **Appendix E**.

A hydrologic study of a watershed is needed to determine the anticipated volume of water that will be discharged by an area during a specific storm event and how this volume moves through the watershed over time. A hydraulic study is needed to determine the appropriate conduit to convey the predicted volume of runoff. Within the study area the size, shape, slope, and material properties of the conduits are evaluated to determine runoff carrying capacity.

### 1.2 Historic Conditions & Flooding

Cottonwood Creek historically flowed through a natural channel from west to east along the southern part of the city until the early 1900s when it was diverted and altered to accommodate Business District growth. Cottonwood Creek currently flows through the city in a mix of open channel

and underground conduit systems. The existing flood protection system is identified in **Appendix C, Figure C1-2**. Conduits located beneath the City's Main Street Business District Corridor are a mix of concrete and corrugated metal sections varying in size, shape, and age. The age of the oldest concrete sections are estimated to be 100 years old, while the corrugated metal portions are estimated at over 50 years old. The varying age and shape of the flood system can be attributed to piecemeal improvements constructed over decades as the city grew to accommodate more development in the Main Street Business District.

During peak water events that frequently occur in the spring, the conduits along and in Main Street are insufficient to handle the water event flow, and floodwaters run onto and down Main Street causing extensive flooding to businesses. Flooding in the City has been well documented, with reports dating back to 1908, with the most recent occurrence being in April 2019 causing severe damage to roads and properties. Photos of existing conditions within the City can be seen in **Appendix E**.

Cottonwood Creek also accepts floodwater from a northern drainage that is collected and directed through the City beneath King Street. The northern drainage discharges into Cottonwood Creek near the intersection of King and Main Streets contributing to the hydraulic overloading of Cottonwood Creek. Additionally, many of the floodwater conveyance conduits throughout the city are under-sized and not capable of handling storm events with a return period of 5 to 10-years. As a result of these two factors, flooding in the City of Cottonwood is not isolated to the Main Street business corridor but also occurs along and north of King Street, flooding residential properties and large areas within the County's fairground facilities.

From a conditional standpoint, an inspection report completed by the Idaho Department of Transportation (See **Appendix E**) provides additional documentation on the condition of these systems. The report utilizes the National Bridge Inspection (NBI) rating scale and has rated the conditions of portions of the existing system as in "serious condition". Although the systems currently remain operable, failure of the system could be detrimental to the city as portions of the flood control system are located beneath existing structures and businesses.

### 1.3 Floodwater Protection Policies

The City of Cottonwood Ordinance #254, Flood Ordinance, assists the city in regulating development within and alterations of floodplains. The U.S. Highway 95 Business Loop within the City is part of the Idaho Transportation Department (ITD) right-of-way and design methodology will at a minimum follow ITD Roadway Design Manual policies/guidance for improvements. In general, ITD specifies that conduits 12 feet wide and over shall have a minimum 1 foot of clearance above the water elevation for a 50-year flood event and shall pass a 100-year flood without overtopping the roadway. For circular conduits, reinforced concrete box conduits, and pipe arches under 12 feet wide that have a closed bottom, they shall be designed so that the ratio of headwater to diameter during a 25-year event is less than or equal to 1.25 and the headwater from a 100 year event will not top the roadway. The ITD Roadway Design Manual also references FHWA Urban Drainage Design Manual, HEC-22 for guidance on urban drainage design standards.

### 1.4 Previous Studies

ITD performed a special inspection in 2017 on the section along Cottonwood Creek between Lewiston Street and King Street. In the ITD special inspection report numerous defects were identified including heavy corrosion, extreme distortion and deflection in the structure top, scour, holes, and cracking. ITD provided two recommendations, one being relining the entire alignment and the second being adding a diversion structure and separate alignment for high flow events.

In 2018 a study was conducted by Great West Engineering titled "City of Cottonwood Flood



Mitigation Improvements Preliminary Engineering Report”. In the preliminary engineering report (PER) Great West Engineering developed four alternatives that would reduce the risk of flooding downtown. In general, the PER recommended to upsize and realign the conduits along the south end of King, Front, and Main Street. The options proposed removing or filling the existing conduits with concrete if they cannot be removed. The other two options would line the existing flood protection structures with HDPE pipe along Front Street and Main Street. Ultimately the City did not select an alternative at that time and no improvements were completed or carried forward.

## 2.0 Watershed Description

### 2.1 General

The Cottonwood Creek Watershed is located in north central Idaho. The watershed originates approximately 5 miles west of the city in a mountainous area with forested cover (Cottonwood Butte) ranging in slope from 5% to 20%. Cottonwood Creek then proceeds east through the city and continues east winding through the Camas Prairie farmlands that have an average slope of 3% and ultimately flows down rugged and steep canyons to the South Fork of the Clearwater River. The water shed map can be seen in **Appendix C3, Figure C3.1-1**.

The city is located approximately 5 miles east of the base of the Cottonwood Butte where the topography transitions to Camas Prairie farmland with rolling hills. Cottonwood Creek flows through most of the city in an open channel at the bottom of a natural draw between hills. The channel is trapezoidal in shape and highly vegetated with grass and trees with an average slope of 3%. As the creek leaves town to the east the topography levels out as it flows through farmland and past the existing City wastewater lagoons and reuse site.

### 2.2 Climate, Terrain, Soils, and Land Use

The City of Cottonwood and the surrounding area typically have mild dry summers with cold wet winters. Summer temperatures for the months of June through August widely vary with the average low in the mid-60's°F and the average highs in the mid 90's°F. Winter temperatures, December through February, are more consistent with the average low in the low 20's°F and average high in the upper 30's°F. Annual precipitation is approximately 24 inches with 6.2 inches occurring between March, April, and May. May and June are on average the wettest months of the year with 2.6 and 2.61 inches of precipitation respectively. In addition, the region also experiences short duration thunderstorms in June through August, which produces short duration flooding the colder temperatures and the wet late winter/early spring months present opportunity for rain-on-snow runoff events. Additionally, much of the runoff is experienced during periods of little to no vegetative growth.

The watershed terrain in the study area includes a steeper mountainous forested area (Cottonwood Butte and foothills) on the western 1/3. The eastern 2/3rds are rolling hills of heavy cultivated farm ground, pasture, and the city proper. The Cottonwood Creek channel generally has cut through the upper layers of soil and runs along the interface of the underlaying basalt bedrock. Shallow groundwater also tends to seep along the soil/bedrock interface and daylights throughout the length of Creek in the channel sidewall. During the dry season, the creek flows are predominantly groundwater derived.

Approximately 6,500 acres of the upper end of the watershed was analyzed in the study area. The Natural Resources Conservation Service (NRCS) arm of the United States Department of Agriculture (USDA) has developed soil data maps covering the United States in an online web application. The application allows the user to view descriptions of project area soils and download the soil data to delineate the hydraulic soil groups.

Hydrologic soil groups generally describe soil texture and soil drainage capacity. The four soil groups are described as:

- Group A: Deep sand, deep loess, aggregated silts; low runoff potential when thoroughly wet
- Group B: Shallow loess, sandy loam; moderately low runoff potential when thoroughly wet
- Group C: Clay loams, shallow sandy loam, soils low in organic content, and soils usually high in clay; moderately high runoff potential when thoroughly wet
- Group D: Soils that swell significantly when wet, heavy plastic clays, and certain saline soils; high runoff potential when thoroughly wet
- Split group soils (i.e., A/D, B/D, C/D) identify areas with high groundwater that reduces the soil's ability to percolate water through the soil. The first letter in the split group provides the soil group if the high-water table is kept at least 24 inches below the ground surface (NEH Part 630 Chapter 7, May 2007), otherwise the Group D soil is used.

The watershed study area soil group breakdown is shown in Table 1 below. The predominate soil group is Group C soils with almost 50% of the watershed in this group. About 84% of the watershed is Group C and D soils, both of which have high runoff potential. This predominance of high runoff potential soils limit the ability for runoff reduction through tillage practices and/or alternative crop types.

**Table 1: Soil Group Percentages**

| Hydraulic Soil Group | Percentage of Watershed |
|----------------------|-------------------------|
| B                    | 15.2%                   |
| C                    | 45.2%                   |
| D                    | 15.0%                   |
| B/D                  | 3.4%                    |
| C/D                  | 21.2%                   |

Land use types delineate the type of cover on the soil and range from fully developed urban areas to native grass and forest with many conditions in-between. City zoning maps are used to help developed land use boundaries for larger developed areas. The City of Cottonwood does maintain a zoning map and information from the zoning map was used to develop land use type. In conjunction with the zoning map, land use was also determined by analyzing aerial imagery and known business practices. Eight land use types were used to describe the watershed in the study area. The land use types are: Agricultural, Forest, Open, School, Industrial, Low Density Residential, No Flow, and Commercial. Many of the descriptions are straight forward and indeed represent the land use given in the name. For example, Agricultural representing an area of land currently used for agricultural practices of growing and harvesting crops. Open areas and no flow areas are used to describe the following:

- Open area: area that generally does not have impervious surfaces but is no longer in a native condition but includes vegetation in a variety of conditions.
- No Flow area: used only for the existing wastewater treatment lagoons that do not release precipitation back into the creek channel

A breakdown of the various land uses is presented in Table 2. Agricultural is the largest land use type followed by forest area, with the combination of those two types occupying all most 90% of the watershed. Both agricultural and forest land use have little to no impervious area, which generally produce less runoff than areas with high percentages of impervious area. However, the presence of the high runoff soils tempers the land use impact to runoff. The remaining land use types only comprise about 10% of the watershed area and are concentrated in the city limits. Typical "Best Management Practices" (BMP's) are encouraged but will have limited impact on the total volume of

stormwater runoff generated because of the low percentage of the area within City limits. A few best management practices that can be used in Cottonwood is maintaining the vegetated strip between nonpermeable surfaces and Cottonwood Creek, installing catch basin inserts, and restoration of vegetation along Cottonwood Creek.

**Table 2: Land Use**

| Use                     | Percentage of Watershed |
|-------------------------|-------------------------|
| Agricultural            | 54.9%                   |
| Forest                  | 34.9%                   |
| Open                    | 4.4%                    |
| Low Density Residential | 4.2%                    |
| Industrial              | 0.9%                    |
| School                  | 0.3%                    |
| Commercial              | 0.3%                    |
| No Flow                 | 0.2%                    |

Figures showing the distribution of the hydraulic soil groups and land use can be seen in **Appendix C3, Figures C3.1-2 and Figure C3.1-3.**

### 3.0 Model Development

Analysis of large drainage areas is usually completed with a computer aid modeling system. The computational requirements of developing multiple hydrographs and routing them through a system network requires the processing power of computers to complete the design and develop and review alternatives.

#### 3.1 Methodology

The computer modeling software, InfoSWMM Suite 14.7, developed by Innovyze was utilized to conduct the floodwater analysis of the study area. InfoSWMM is a fully GIS integrated, highly advanced, and comprehensive hydrologic, hydraulic, and water quality simulation model that is used for the management of floodwater, stormwater, and wastewater collection systems. InfoSWMM can be used to model the entire land phase of the hydrologic cycle as applied to floodwater collection systems. The model can perform a single event or long-term (continuous) rainfall-runoff simulations accounting for climate, soil, antecedent moisture, land use, and topographic conditions of the watershed. In addition to simulating runoff quantity, InfoSWMM can also predict runoff quality including buildup and washoff of pollutants from primarily urban watersheds. Once runoff quantity and quality are simulated, and floodwater loads at receiving nodes are determined, the routing portion transports floodwater using either steady flow routing, kinematic wave routing, or dynamic wave routing, the flow through a conveyance system of conduits, channels, storage/treatment devices, pumps, and hydraulic regulators such as weirs and orifices (Innovyze, 2019).

#### 3.2 Model Parameters and Assumptions

The InfoSWMM software offers 12 different choices for modeling surface runoff and three methods for infiltration. The Soil Conservation Service (SCS) method was selected for this model to capture the spatial variation in the watershed and take advantage of the soil data available in the area. Additionally, the SCS method is widely used in practice and can be used to predict both peak flow rates and total storm volumes. The general rule to be able to utilize the SCS method is that the drainage area be greater than 20 acres, curve numbers be greater than 50 and the time of concentration be greater than 0.1 hour and less than 10 hours. The Cottonwood watershed meets

these requirements.

### 3.2.1 Model Assumptions

A hydrologic/hydraulic model of a system is based on assumptions that characterize the area and system under study. The assumptions used in a model are typically based on learned characteristics of the system, discussions with City staff, and a general knowledge of storm flow characteristics gained through experience with monitoring flows and modeling other floodwater systems. Rain-on-snow events are not modeled, and antecedent moisture conditions are modeled at an average moisture condition, which is normally used for annual peak flood estimates. Rain-on-snow events were not analyzed for three reasons: the first being that data for rain-on-snow events in the Cottonwood Creek watershed area are non-existent; the second is that peak runoffs calculated for the watershed for any given storm event exceeds the peak runoffs for the same storm event generated using the United States Geological Survey Stream Stats program; and the third and final reason is that when the existing system was analyzed with a storm event the model predicted flooding in the same areas with the same magnitude as what has been document from past real storm events providing confidence that modeling rain-on-snow events was not required to produce valid results.

### 3.2.2 Model Parameters

Land use and soil data was applied to the model through an ArcGIS platform. The watershed boundary was defined from a digital elevation model (DEM) data analysis and sub-basins were developed from local topography and contour maps. Areas east of Highway 95 were included to provide flow information in Cottonwood Creek to the end of the proposed reuse land application storage area. Model network conduits and channels were developed from J-U-B field survey, ITD Record Drawings, and a topography fly over done by Areographics. Natural creek channels were assumed as trapezoidal or were modeled from cross-sections available through J-U-B survey. Bottom widths were determined from the survey or assumed from Areographics data set.

Time of concentration was developed from the SCS lag equation which was originally developed from agricultural watershed data. The SCS lag equations has been tested and validated for use on a variety of non-agricultural watersheds and is a widely accepted method for determining time of concentration. The time of concentration formula is:

$$t_c = \frac{100L^{0.8} \left( \left( \frac{1000}{CN} \right) - 9 \right)^{0.7}}{1900S^{0.5}} 100$$

Where:

L = hydraulic length of watershed (longest flow path), ft

CN = SCS runoff curve number

S = average watershed slope, %

The watershed is modeled with multiple subcatchments to represent the spatial distribution of flow entering the city conduit network. Precipitation is modeled from a 24-hour duration storms for multiple return periods. Evaporation and infiltration are modeled within the SCS curve number method. Surface detention and depression storage is based on typical values for standard conditions listed in Table 3 below. Surface detention and depression storage can be thought of as the amount of water that gets trapped in dips, bumps, vegetation, and plant debris that does not contribute to the volume of runoff.



**Table 3: Depression Storage**

| Surface Condition   | Depression Storage |
|---------------------|--------------------|
| Impervious Surfaces | 0.05-0.10 Inches   |
| Lawns               | 0.10-0.20 Inches   |
| Pasture             | 0.20 Inches        |
| Forest Litter       | 0.30 Inches        |

The model values for surface detention and depression storage are calculated by multiplying the value from Table 3 for each condition by the equation  $((1000/CN)-10) \times \text{Depression Storage}$ .

### 3.3 Subcatchment Basins

Watersheds are divided into drainage basins based on topography relief. By dividing the watershed into basins, it allows for a more accurate representation of flow from a rain event through the watershed. Each basin will have a unique water volume generated and amount of time it takes for the storm event to flow through it. Drainage basins can be large or small. They are delineated based on the spatial discretization required to model flow additions to the conduits under study in the system network. In this study, basins range from 4,260 acres to 3 acres based on the need to quantify accumulated input flows to various locations in the floodwater system.

At the subcatchment level, every combination of hydraulic soil group and land use type are determined to allow the development of a composite curve number for that subcatchment. Additionally, the hydraulic length of the subcatchment and average slope is determined to allow for independent hydrograph development. The subcatchments are connected to the floodwater network at the outfall to route the flows through the city network to include both spatial and temporal components.

### 3.4 Curve Numbers

Curve numbers (CN) are utilized to predict runoff or infiltration from rainfall for each subcatchment basin. Curve numbers are determined based on the hydraulic soil group and land use. For soil types with split codes, (i.e. C/D) the average of the C and D soil CN values (Table 8.7.3 in Water Resources Engineering, Mays 2005, Pg 265) are applied. CN values are widely published for various soil conditions and range from about 40 to 98. The curve number for each subcatchment is then determined from a weighted average of the area of each combination of hydraulic soil group and land use. The weighted average curve number is used for all computations involving CN. The Soil Conservation Service (SCS) CN model estimates precipitation excess as a function of cumulative precipitation, soil cover, land use, and antecedent moisture, using the following equations:

$$P_e = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

$$S = \frac{1000}{CN} - 10$$

Where:

$P_e$  = accumulated precipitation excess (runoff) at time  $t$ ;

$P$  = accumulated rainfall depth at time  $t$ ;

$S$  = potential maximum retention, a measure of the ability of a watershed to abstract and retain storm precipitation and  $0.2S$  = the initial abstraction (initial loss).

Until the accumulated rainfall exceeds the initial abstraction, the precipitation excess, and hence the runoff, will be zero.

### 3.5 Storm Frequency

Storm frequencies are determined through statistical analysis to predict the probability a storm with a specific intensity will occur or be exceeded in any one year. The reciprocal of the probability is the return period of the storm and the average interval between storms of a given size. For this study the 2-year, 5-year, 10-year, 25-year, 50-year, 100-year, and 500-year storm events were analyzed. Precipitation depths for each storm frequency are from National Oceanic and Atmospheric Administration (NOAA) Atlas 2 Volume 5 for the 24-hour storm duration. Table 4 below provides the total depth of precipitation for each return period storm.

**Table 4: Storm Precipitation**

| Return Period | Precipitation Depth (In) |
|---------------|--------------------------|
| 2-year        | 1.7                      |
| 5-year        | 2.1                      |
| 10-year       | 2.5                      |
| 25-year       | 2.9                      |
| 50-year       | 3.2                      |
| 100-year      | 3.5                      |
| 500-year      | 4.3                      |

The 500-year storm precipitation depth was not available in the NOAA Atlas 2 Volume 5 Iso-pluvial maps. To determine the 500-year storm precipitation the known storms were plotted in Microsoft Excel and a trend line fit to the existing data. An equation was then developed for the trend line. Using the equation, the 500-year storm event projection was developed. J-U-B presented this method to members of the NRCS located in Idaho. The method and precipitation depth was confirmed and validated by members of the NRCS located in Idaho. The graph used to determine the 500-Year precipitation depth can be seen in **Appendix C3, Figures C3.1-4**.

### 3.6 Storm Distribution

Storm distributions describe how the intensity of a storm is distributed over time, often developed for 6-hours or 24-hours. Storms often start with low intensity, build up to peak intensity, and then decrease in intensity. Storm data covering the United States was analyzed by the SCS to develop synthetic storm hyetographs (storm intensity over time). The SCS developed four 24-hour distributions called Types I, IA, II, and III. Types I and IA are for the Pacific maritime climate, Type III is for the Gulf of Mexico and Atlantic coastal areas, and Type II is for the remainder of the nation. For our study area both a Type II SCS Storm and Type 1A SCS Storm distribution were analyzed. The Type II storm shape has a very sharp peak that is common in thunderstorms. During model analysis the Type II storm overpredicted the flows observed by the city and was replaced with the Type IA storm distribution which has less of a peak but larger initial rainfall. This distribution matches the large winter and early spring rainstorms typical in the area. Additionally, the Stormwater Management Manual for Eastern Washington Table 4.3 states the Type II storm distribution does not match historical records for the storms typical in eastern Washington. Table 4.3 in the Stormwater Management Manual for Eastern Washington recommends using the Type IA storm or modified Type IA storm to match historical storm patterns more closely. Cottonwood Idaho's geographic location, climate, elevation and rainfall patterns closely match those of eastern Washington and therefore the Type IA storm was used to model runoff. The storm distributions can be seen in **Appendix C3, Figures C3.1-5**.

### 3.7 Model Calibration

The InfoSWMM model was calibrated based on reports of recent storm event flooding patterns and depths. The city experiences flooding at relatively low return period storms (i.e. 5-year and 10-year) which have been fairly common with a roughly 5-year return period storm in April of 2019. The locations the city reported flooding from these storms were predicted in the model for the same size event. Additionally, the model was checked for numerical stability using the instability index which counts the number of time steps in which the conduit's flow is either higher or lower than the flows in the previous and next time steps. A lower instability index indicates little change and relatively stable model. Larger numbers indicate major fluctuation in flow over time and possibly an unstable condition. Conduits with short lengths, restricted inlet conditions, and flows switching between gravity and pressurized regimes can cause instability. Model results for this study have instability indexes of 10 or less for all conduits in the existing system.

### 4.0 Analysis Results

Analysis results are presented below for the existing system. The results are presented for locations where floodwater enters into the city floodwater system. For the Main Street Cottonwood Creek arm of the system this is at the culvert under Maple Street. For the King Street arm the flows from two subcatchments near the north end of Lewiston Street are summed to provide the total flow shown in Table 5 below. See **Appendix C3, Figure C3.1-1** for the locations of the storm comparison hydrographs.

#### 4.1 Peak Flows

Peak flows for King Street were determined by adding the peak runoff of the two northwest subcatchments King Street A and King Street B. The subcatchments run parallel to each other and not in series. The subcatchments for Main Street run in series and peak flows were determined from in channel flows to include routing. Total storm volume is determined by summing the accumulated runoff of each drainage basin multiplied by the timestep (5 minutes) for the storm event duration.

**Table 5: Peak Flow and Volume**

| Storm Return Period | Peak Runoff Rate (cfs) |         | Total Storm Volume (Ac ft) |         |
|---------------------|------------------------|---------|----------------------------|---------|
|                     | King St                | Main St | King St                    | Main St |
| 2-year              | 16.0                   | 59.4    | 12.6                       | 64.0    |
| 5-year              | 29.5                   | 108.4   | 19.8                       | 131.6   |
| 10-year             | 42.4                   | 155.4   | 26.3                       | 200.8   |
| 25-year             | 59.6                   | 242.1   | 34.8                       | 299.2   |
| 50-year             | 72.4                   | 336.8   | 40.9                       | 374.2   |
| 100-year            | 86.0                   | 452.9   | 47.5                       | 456.5   |
| 500-year            | 128.0                  | 860.0   | 67.5                       | 719.7   |

**TM002** and **Appendix C** present additional system results and inundation maps for the area in the City of Cottonwood impacted by floodwater.

### 5.0 Statement of Limitations

The hydrologic/hydraulic model used in this analysis was created based on land use and hydrologic soil group conditions at the time of the study, of which land use is especially prone to change over time. Since the model is based on these parameters, it is critical to update the model over time to reflect up-to-date conditions. The model is considered sufficiently accurate for its intended purpose on the date this report was submitted.

The slopes used for the existing pipes are based on elevations gathered from previous reports and current survey; supplemental information was gathered through the course of this project. Remaining unknown rim and invert elevations were supplemented by ground surface grades and approximated invert of existing channels. Conduit slopes and depths for the proposed alternative conduit alignments are based on digital elevation models supplemented by visual field observations and survey data. Flows and conduit capacities for all alternatives are, therefore, approximate and are intended to be used for planning purposes only. Field verification of all data must be performed prior to final design of any system improvements.

It is important to emphasize the intent of the alignments, depths, and invert elevations. The alignments are a planning tool to guide system improvements, but the elevations are not intended to serve as final design elevations. Depths in the model should be considered as minimums only and may be affected by several factors, including the accuracy of base mapping or variations in floodwater alignments, development patterns, utility conflicts, physical features, and other assumptions made throughout this study.

Model output from this study will be available to the City and is expected to include peak flow, maximum depth over diameter, and reserve capacity for the Master Plan Model scenario. This information is intended for use by City staff for overall system management. The limitations described above apply to the model output as well.

## 6.0 References

Part 630 Hydrology, National Engineering Handbook, Chapter 7 Hydrologic Soil Groups, United State Department of Agriculture, Natural Resources Conservation Service, May 2007

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Eastern Washington stormwater Management Manual, Department of Ecology State of Washington, August 2019.

Idaho Transportation Department, Roadway Design Manual, 2013

FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, 2009



Technical Memorandum 002—Flood Control Design



## TECHNICAL MEMORANDUM 002

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| <b>Date:</b>    | February 2024                                         |
| <b>To:</b>      | Bruce Sandoval, PE – NRCS State Conservation Engineer |
| <b>Cc:</b>      |                                                       |
| <b>From:</b>    | Garrett Frei, PE – JUB Engineers                      |
| <b>Project:</b> | Cottonwood Creek Flood Prevention Project             |
| <b>Subject:</b> | Flood Protection Design                               |
| <b>Note:</b>    | Referenced Figures are located in <b>Appendix C</b> . |

### 1.0 Introduction

This technical memorandum is the flood protection design of the Cottonwood Creek Watershed Plan-EA. The flood protection system consists of new inlets, weirs, diversions, debris grates, conduits, culverts, and headwalls to convey flood waters through the project area and the City of Cottonwood (City). The project area is identified in **Appendix C, Figure C1-1**.

### 1.1 Purpose and Need

The purpose of this technical memorandum is to present the design methodology and technical analysis used to develop and size the flood protection project presented in the Cottonwood Creek Watershed Plan-EA. This is needed because the existing flood protection system in the project area is undersized and not capable of handling storm events with a return period of 5 to 10-years. This results in City wide flooding. The information presented herein is utilized for the economic analysis, breach, and inundation analysis.

### 2.0 Existing System

The topography of Cottonwood generally routes floodwaters from the west and northern areas of the community towards the southeast extents of the City. Naturally flowing portions of Cottonwood Creek were diverted in the early 1900's to accommodate growth of the downtown business district. Sections of the creek channel are now immediately against the foundations of homes and commercial buildings. Portions of the creek were also routed under business. The existing system is identified in **Appendix C1, Figure C1-2** and shows a series of conduit and open channel sections along the Cottonwood Creek alignment generally flowing easterly through the City. Floodwaters north of Main Street are generally conveyed toward the south through the fair grounds and along King Street to Cottonwood Creek. Documentation of historical flooding is provided in **Appendix E**. Further, the Idaho Transportation Department (ITD) completed an inspection of the Cottonwood Creek alignment in 2017 which rated portions of the conduit on a scale of 0-9 in accordance with Natural Bridge Inventory (NBI) standards. Ratings of the conduit ranged from "3" (serious condition) to "5" (fair condition). A NBI rating of "3" is defined as a loss of section, deterioration, spalling, or scour seriously affecting primary structural components. Local failures are possible, and sheer cracks in concrete may be present. The ITD inspection report is provided in **Appendix E**.

The existing system is hydraulically insufficient to handle storm events with a return period of 5- to 10-years with larger storms causing extensive flooding to Main Street businesses and residences and other structures throughout the city. See the flood inundation maps provided in **Appendix C3, Figures 3.2-1 through 3.2-4** for more details on the areas of the City that flood under the existing conditions.

### 3.0 Project Overview

The flood protection project would provide an alternate alignment along the Main Street corridor, shifting the flood protection infrastructure from beneath existing structures to a location within City right-of-way. The Main Street corridor will likely include the use of existing flooding areas, trash racks, inlet structures, catch basins, weirs, and conduits. The Main Street corridor will convey floodwater entering the west side of the City in the natural stream channel to the east side of the City where it will be returned to the natural stream channel.

The King Street corridor alignment addresses a series of undersized conduits to convey floodwaters from the northwest boundary of the City to Cottonwood Creek or the Main Street Corridor alignment. The King Street Corridor will likely include the use of existing flooding areas, trash racks, inlet structures, catch basins, weirs, open channel sections, and conduits.

The project also includes replacing three culverts along Cottonwood Creek inside the City limits and two Cottonwood Highway District road crossings on East Road and Airport Road near the City's wastewater lagoon site.

### 4.0 Design Criteria

Design Criteria used to model and size the flood protection project was generally developed in TM001-Hydraulics and Hydrology. Conduit design criteria is based on passage of the 50-year storm while limiting damage to structures and topping of roadways under a 100-year storm. The 50-year storm was chosen based on the conveyance flow for Cottonwood Creek is a primary drainageway and warrants a 50-year design flow, rather than a typical 25-year flow as designated in the ITD Design Manual for Urban areas.

**Table 1 - Design Criteria Summary**

| Description             | Design Criteria/Data Source                                        |
|-------------------------|--------------------------------------------------------------------|
| Storm Distribution      | SCS Type IA<br>Reference <b>TM001 – Hydraulics &amp; Hydrology</b> |
| Design Storm            | 50 Year Recurrence<br>Reference <b>Appendix C3, Figure C3.1-5</b>  |
| Elevation Data Source   | Reference <b>Appendix E3.</b>                                      |
| <b>Model Parameters</b> |                                                                    |
| Soil Conditions         | Reference <b>Section 2.1</b>                                       |
| Land Use                | Reference <b>Section 2.6.7</b>                                     |
| Climate                 | Reference <b>Section 2.3.2</b>                                     |
| Outlet Controls         | Drainage within 72 hours of storm completion                       |
| Energy Dissipation      | FHWA HEC 14 analysis                                               |

### 4.1 Methodology

The analysis utilized a Soil Conservation Service (SCS) Unit Hydrograph model and dynamic wave routing in the software published by InfoSWMM to calculate peak flood rates and flood

volumes for each storm event. See TM001 for hydrologic modeling inputs and results. Flood rates were then loaded into a 2-directional hydraulic surface-water model to determine the impacts of the flood flows.

HEC-RAS version 6.1.0 was used to model the flood flows using the unsteady 2-dimensional solver. The model uses steady and unsteady free surface flow through open-channels and floodplains to identify the number of structures and agricultural land that would be flooded under each storm event. Hydrographs from the hydrologic modeling were used for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm event and the slope of the channels as the inflow and outflow boundary condition. See Table 3 of this report for a summary of the results for existing conditions and Table 5 of this report for a summary of the results for the preferred alternative.

## 4.2 Alternative Analysis Summary

A summary of results from the No Action system model is given in the following tables.

**Table 2 – No Action Totalized Flooding**

| Storm Event     | Sum Peak Flooding (cfs) | Flooding Volume (ac ft) | Peak Time (hrs) <sup>a</sup> | Flooding Duration (hrs) |
|-----------------|-------------------------|-------------------------|------------------------------|-------------------------|
| <b>2-Year</b>   | 10                      | 5                       | 10.3                         | 16.2                    |
| <b>5-Year</b>   | 25                      | 13                      | 10.5                         | 17.4                    |
| <b>10-Year</b>  | 59                      | 35                      | 9.4                          | 18.1                    |
| <b>25-Year</b>  | 166                     | 130                     | 8.9                          | 19.3                    |
| <b>50-Year</b>  | 277                     | 208                     | 8.7                          | 19.6                    |
| <b>100-Year</b> | 414                     | 294                     | 8.7                          | 20.0                    |
| <b>500-Year</b> | 973                     | 567                     | 8.9                          | 20.8                    |

<sup>a</sup> Hours after storm event began

**Table 3 – No Action Summary of Flooding Impacts**

| Flooded Structures/Land                | Depth (ft) | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|----------------------------------------|------------|--------|--------|---------|---------|---------|----------|----------|
| <b>Number of Residential Homes</b>     | <1         | 0      | 0      | 3       | 14      | 12      | 13       | 13       |
|                                        | 1-3        | 0      | 0      | 0       | 2       | 5       | 5        | 6        |
|                                        | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 1        |
| <b>Number of Commercial Structures</b> | <1         | 1      | 1      | 6       | 36      | 35      | 30       | 21       |
|                                        | 1-3        | 0      | 1      | 0       | 4       | 9       | 14       | 23       |
|                                        | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| <b>Number of Other Structures</b>      | <1         | 9      | 11     | 12      | 17      | 14      | 12       | 11       |
|                                        | 1-3        | 0      | 0      | 0       | 1       | 4       | 5        | 6        |
|                                        | >3         | 0      | 0      | 0       | 0       | 0       | 1        | 1        |
| <b>Number of Roadways</b>              | <1         | 0      | 2      | 2       | 19      | 21      | 22       | 24       |
|                                        | 1-3        | 0      | 0      | 0       | 1       | 1       | 1        | 6        |
|                                        | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| <b>Agricultural</b>                    | <1         | 0.38   | 0.62   | 1.19    | 8.85    | 12.35   | 15.15    | 19.30    |



| Flooded Structures/Land (Acres) | Depth (ft) | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|---------------------------------|------------|--------|--------|---------|---------|---------|----------|----------|
|                                 | 1-3        | 0.86   | 0.98   | 0.77    | 1.65    | 2.12    | 2.97     | 7.24     |
|                                 | >3         | 0.04   | 0.09   | 0.42    | 0.59    | 0.86    | 1.01     | 1.25     |

See **Appendix C3, Figures C3.2-1 through C3.2-4** for flood inundation maps of the no action alternative.

### 4.3 Preferred Alternative

After completing the analysis, the preliminary results were discussed with City staff. The City chose to utilize specific existing flooded areas because it controls flooding along Main Street and King Street drainages, provides the best protection of property, simplifies the routing and provides a low maintenance system. The Main Street existing flooding area, west of the Maple Street crossing within Cottonwood Creek did not reduce pipe sizes downstream, therefore Main Street existing flooding areas will not be part of the preferred alternative. The King Street existing flooding areas will be utilized in the preferred alternative. Both are existing naturally occurring features. The outlet for the area located off Sunset Drive will need modified as part of this project. See **Appendix C1, Figure C1-6 and Figure C1-7** for the map layout of the preferred alternative and the tables below and on the following page for a summary of results from the Preferred Alternative system model.

**Table 4 – Preferred Alternative Totalized Flooding**

| Storm Event | Sum Peak Flooding (cfs) | Flooding Volume (ac ft) | Peak Time (hrs) <sup>a</sup> | Flooding Duration (hrs) |
|-------------|-------------------------|-------------------------|------------------------------|-------------------------|
| 2-Year      | 0                       | 0                       | 0                            | 0                       |
| 5-Year      | 0                       | 0                       | 0                            | 0                       |
| 10-Year     | 0                       | 0                       | 0                            | 0                       |
| 25-Year     | 0                       | 0                       | 0                            | 0                       |
| 50-Year     | 0                       | 0                       | 0                            | 0                       |
| 100-Year    | 312                     | 55                      | 10.6                         |                         |
| 500-Year    | 839                     | 452                     | 10.17                        | 15.9                    |

<sup>a</sup> Hours after storm event began

**Table 5 – Preferred Alternative Summary of Flooding Impacts**

| Flooded Structures/Land         | Depth (ft) | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|---------------------------------|------------|--------|--------|---------|---------|---------|----------|----------|
| Number of Residential Homes     | <1         | 0      | 0      | 0       | 0       | 0       | 24       | 39       |
|                                 | 1-3        | 0      | 0      | 0       | 0       | 0       | 3        | 20       |
|                                 | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| Number of Commercial Structures | <1         | 0      | 0      | 0       | 0       | 0       | 20       | 21       |
|                                 | 1-3        | 0      | 0      | 0       | 0       | 0       | 3        | 15       |
|                                 | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| Number of Other                 | <1         | 0      | 0      | 0       | 0       | 0       | 3        | 5        |

| Flooded Structures/Land     | Depth (ft) | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year | 500 Year |
|-----------------------------|------------|--------|--------|---------|---------|---------|----------|----------|
| <b>Structures</b>           | 1-3        | 0      | 0      | 0       | 0       | 0       | 0        | 3        |
|                             | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| <b>Number of Roadways</b>   | <1         | 0      | 0      | 0       | 0       | 0       | 12       | 19       |
|                             | 1-3        | 0      | 0      | 0       | 0       | 0       | 0        | 1        |
|                             | >3         | 0      | 0      | 0       | 0       | 0       | 0        | 0        |
| <b>Agricultural (Acres)</b> | <1         | 0.36   | 0.54   | 0.88    | 2.15    | 5.52    | 7.78     | 8.82     |
|                             | 1-3        | 0.84   | 0.98   | 0.76    | 0.84    | 1.28    | 2.28     | 6.00     |
|                             | >3         | 0.04   | 0.06   | 0.41    | 0.56    | 0.91    | 1.02     | 1.32     |

## 5.0 Design Considerations

### 5.1 Inlet and Outlet Design

Federal Highway Administration (FHWA) Hydraulic Design Series Number 5 (HDS5) Hydraulic Design of Highway Culverts was used to model conduit and culvert inlets to take advantage of improved inlets reducing upstream flooding. These inlets will be constructed of cast-in-place concrete. The inlet of the Cottonwood Creek conduit alignment will be outfitted with a metal debris rack that can be removed to be cleaned and repaired. Conduit and culvert outlets will have a precast concrete headwall. The headwall will aid in preventing erosion of backfill material around the outlet of the structure.

### 5.2 Catch Basin Design

Street catch basins will be installed along the King and Main Street alignments. Catch basins will be precast square concrete structures with metal grates on top. The catch basins will capture and convey flood water off the street surface and into the flood protection system.

### 5.3 Piping and Manhole Design

Conduits were sized using a modeling software published by InfoSWMM. The model can perform single event or long-term (continuous) rainfall-runoff simulations accounting for climate, soil, antecedent moisture, land use, and topographic conditions of the watershed. Once runoff quantity and quality is simulated, and floodwater loads at receiving nodes are determined, the routing portion transports floodwater using dynamic wave routing, the flow through a conveyance system of conduits, channels, storage/treatment devices, and regulators such as weirs and orifices. The sizing of the flood protection conduit system is an iterative process that requires the user to assume a pipe size and slope, run the model, evaluate the results and adjust the sizes and slopes until the system meets or exceeds the design performance requirements. Both round conduits and rectangular conduits, , are being utilized in the design. Round conduits range in size from 12 inches to 84 inches in diameter, while rectangular reinforced concrete conduits range from 48 inches x 36 inches to 144 inches x 96 inches, width by height. The round conduits will be constructed of either standard dimension ratio (SDR) 35 polyvinyl chloride, corrugated high density polyethylene, or precast concrete. All rectangular box conduits sizes will be constructed of precast concrete. Rectangular box conduits are necessary in areas where the capacity needs to be increased due to limited slopes, combined with limited cover, where round conduits are not feasible. Round manholes will be utilized for maintenance access at changes in grade and/or direction. Manholes will be constructed of precast concrete and will range in size from 4 foot to 6 foot in diameter. A 12-inch diameter low flow diversion conduit was incorporated on Main Street to direct flood water into the natural channel to

maintain low flow in the existing channel for environmental benefits.

Once the conduit sizes were determined Autodesk Civil 3D, an infrastructure design program, was utilized to layout the proposed flood protection system. The City of Cottonwood's existing flood water infrastructure was also incorporated into the Civil 3D design program to ensure that the new proposed system would integrate into the existing system on King Street and Main Street. The existing sewer and water utilities were also incorporated into the Civil 3D design program so that conflicts with the proposed flood protection system could be identified and mediated. A preliminary set of plans can be found in **Appendix C2**.

## 5.4 Channel Improvement

Based on input from the City of Cottonwood and Cottonwood Highway District staff and site visits it was determined that channel improvements to Cottonwood Creek would be beneficial along East Road. Improvements include the cleaning of excessive vegetation from the channel, shaping of the channel in eroded areas, and placement of riprap in eroded areas. The proposed channel improvement area is identified in **Appendix C1, Figure C1-6**.

Table 6 – Channel Table

| Channel Name (Reach) | Location  | Drain Area (mi <sup>2</sup> ) | Year freq design dischg (cfs) (100 yr) | Water Surface Depth (ft) | Hydraulic Gradient (ft/ft) | Channel Dimensions |                   |                |                         |
|----------------------|-----------|-------------------------------|----------------------------------------|--------------------------|----------------------------|--------------------|-------------------|----------------|-------------------------|
|                      |           |                               |                                        |                          |                            | Gradient (ft/ft)   | Bottom Width (ft) | Elev. (ft/msl) | Side Slope (Left/Right) |
| Cottonwood Creek     | East Road | 9.2                           | 380                                    | 5.33                     | 1.5/100                    | 1.5%               | 3.65              | 3407.4         | 1.77H:1V / 3.34H:1V     |

| Channel Name (Reach) | n Value |          | Velocities |          | Excavation vol (cy) | Type of work                                              | Existing channel type | Present flow cond. |
|----------------------|---------|----------|------------|----------|---------------------|-----------------------------------------------------------|-----------------------|--------------------|
|                      | aged    | as built | aged       | as built |                     |                                                           |                       |                    |
| Cottonwood Creek     | 0.05    | 0.05     | 3.7        | 3.7      | None                | Vegetation removal and riprap placement on eroded slopes. | Natural               | Perennial          |



## 5.5 Existing Flooded Area Metered Outlet

The existing flooded area off Sunset Drive has an existing metered release. The proposed design also will have an improved metered release outflow that is designed to release floodwater into the system over an extended period of time reducing the peak flow entering the system from storm events. To ensure the flooded area in the preferred alternative will not be larger than the existing flooded area an overflow was designed that will allow passage of flows up to the 500-year return period through an overflow weirs without increasing the size of the flooded area.

## 5.6 Construction Sequencing/Phasing

Construction is anticipated to be completed in several phases generally starting at the downstream end of an alignment progressing up stream. Each sequence will involve the excavation, installation and backfilling of flood control structures in approximately 200-foot working area sections. This will mitigate disturbance to businesses and traffic. Shorter work areas also reduce the odds of accidents associated with having large sections of trenches open. Anticipated individual phases are as follow:

- Construction of Main Street conduit alignment.
- Construction of King Street conduit alignment.
- Metered outlet on the existing flooded area. This will generally be constructed after downstream features are installed but can be constructed congruently with conduit.
- Isolated culvert road crossings. They can be completed before, after, or during any sequences prior to the surface repair sequence.
- Surface repair including hydroseeding the disturbed vegetated areas, placing and compacting the gravel running surface of gravel roads, and patching the asphalt road section and concrete sidewalk will occur after all the flood control features are completed.
- The final sequence will include an asphalt overlay from the north tie-in of Highway 95 down King Street to the Main Street intersection, east along Main Street to the Main Street and Highway 95 intersection.

Due to the scope and size of this project, it is anticipated to require up to 3 years to construct. The existing Main Street and King Street systems are not connected to one outlet but both discharge into the existing creek channel separately, allowing the contractor the flexibility to construct one branch of the new system each year.

## 5.7 Permitting, Agreements and Coordination

It is anticipated that a United States Army Corps of Engineering 404 permit will be required for this project. Along with the 404 permit a variety of other permits, agreements, and coordination will be required prior to construction and/or final design.

## 6.0 Economic Analysis

### 6.1 Capital Costs

An engineer's opinion of probable cost was completed for the preferred alternative. Estimated quantities were derived from the preliminary set of project plans that can be seen in **Appendix C2**. Unit costs were determined utilizing historic project bid pricing information obtained from J-U-B and the Idaho Transportation Department as well as contacting local and regional suppliers. Due to the current supply and demand issues facing suppliers, estimated prices are highly variable. This high variability in pricing, as well as possible changes between the draft and final plans, a contingency amount of 15% was utilized. The estimated total cost of the flood

protection system is presented in **Appendix D**.

## 6.2 Operations, Maintenance, and Replacement

Operation costs of the flood protection system will be minimum since the features being installed do not require an operator to function.

Maintenance of the flood protection system will be largely focused on the cleaning and maintaining of the existing flooded area metered release system and overflow weirs as well as the trash rack installed on the entrance of the Cottonwood Creek alignment. Both items should be cleaned and check for serviceability weekly as well as before and after major runoff events. The rest of the system will require periodic inspection to ensure flood control features are free of debris and identify areas that need repaired. Annual maintenance of the rest of the system includes conduit jetting/cleaning, conduit repair, outlet clearing, inlet cleaning, and open channel clearing. Annual maintenance cost of the flood protection system is estimated to be approximately 38 thousand dollars.

The flood protection system is being designed to have a 100-year service life. With proper maintenance this service life is very tangible due to the durability of the materials being selected to construct the majority of the flood protection system with. The cost to replace the flood protection system in a century will be close to 250 million dollars assuming historic inflation data trend of just over 3% annually hold.

## 7.0 Statement of Limitations

The hydrologic/hydraulic model used in this analysis was created based on land use and hydrologic soil group conditions at the time of the study, of which land use is especially prone to change over time. Since the model is based on these parameters, it is critical to update the model over time to reflect up-to-date conditions. The model is considered sufficiently accurate for its intended purpose on the date this report was submitted.

The slopes used for the existing conduits are based on elevations gathered for previous reports and current survey; supplemental information was gathered through the course of this project. Remaining unknown rim and invert elevations were supplemented by ground surface grades and approximated invert of existing channels. Conduit slopes and depths for the proposed alternative conduit alignments are based on digital surface elevation models supplemented by visual field observations and survey data. Flows and conduit capacities for all alternatives are, therefore, approximate and are intended to be used for planning purposes only. Field verification of all data must be performed prior to final design of any system improvements.

It is important to emphasize the intent of the alignments, depths, and invert elevations. The alignments are a planning tool to guide system improvements, but the elevations are not intended to serve as final design elevations. Depths in the model should be considered as minimums only and may be affected by several factors, including the accuracy of base mapping or variations in stormwater alignments, development patterns, utility conflicts, physical features, and other assumptions made throughout this study.

Select model output from this study will be available to the City and is expected to include peak flow, maximum depth over diameter, and reserve capacity for the Master Plan Model scenario. This information is intended for use by City staff for overall system management. The limitations described above apply to the model output as well.

The economic analysis was conducted using sound engineering judgement and information gathered from creditable sources, however prices of materials, labor, and supplies fluctuate on a daily basis making project costs highly variable.

## **8.0 References**

Federal Highway Administration (FHWA) Hydraulic Design Series Number 5 (HDS5) 3rd Edition, Hydraulic Design of Highway Culverts, April 2012

FHWA Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, 2009

Idaho Department of Water Resources and Idaho Code 42-1709 through 42-1721

Idaho Administrative Code 37.03.06

Idaho Transportation Department, Roadway Design Manual, 2013

Technical Memorandum 003—Breach Flood & Inundation Analysis





## TECHNICAL MEMORANDUM 003

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| <b>Date:</b>    | February, 2024                                        |
| <b>To:</b>      | Bruce Sandoval, PE – NRCS State Conservation Engineer |
| <b>Cc:</b>      |                                                       |
| <b>From:</b>    | Garrett Frei, PE – JUB Engineers                      |
| <b>Project:</b> | Cottonwood Creek Flood Prevention Project             |
| <b>Subject:</b> | Breach Flood & Inundation Analysis                    |
| <b>Note:</b>    | Referenced Figures are in <b>Appendix C</b> .         |

### 1.0 Introduction

This technical memorandum is the Breach Flood and Inundation Analysis for the Cottonwood Creek Watershed Plan-EA. The project area is identified in **Appendix C1, Figure C1-1**. The existing flood areas on the north end of the City of Cottonwood were not analyzed for breach due to project only improving the outlet structure and minor grading of the Sunset Drive existing flooded area. No improvements are being made to the existing Lewiston Street flood area.

### 1.1 Purpose and Need

The purpose of Technical Memorandum (TM) No. 003 is to assess existing flood areas on the north end of the City of Cottonwood.

### 1.2 Idaho State Code

The Idaho Department of Water Resources oversees the Dam Safety Program in the state of Idaho. Idaho State Code 41-1711 defines a dam as "...any artificial barrier or embankment, together with appurtenant works, constructed for the purpose of storing water or that stores water, which is ten (10) feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, as determined by the department, or from the lowest elevation of the outside limit of the barrier, if it is not across a stream channel or watercourse, to the maximum water storage elevation, and has or will have an impounding capacity at maximum water storage elevation of fifty (50) acre-feet or more."

### 1.3 Features

#### 1.3.1 Data Sources

The structural information for the existing flood areas are below Tables 1 and 2. Model development elevation data used in the design of the structures were determined from a topography fly over done by Areographics, a J-U-B topographic survey in select areas, and 10-meter square grid digital elevation data from the USGS to fill in gaps and extend surfaces beyond the limits of the specific surveys.

**Table 1: Existing Flood Area Structure Information**

| Existing Flood Area                                             |                         |                             |
|-----------------------------------------------------------------|-------------------------|-----------------------------|
| <b>Existing Flood Area</b>                                      | Sunset Drive            | Lewiston Street             |
| <b>Bottom Elevation (ft)</b>                                    | 3599.50                 | 3602.00                     |
| <b>Top Elevation (ft)</b>                                       | 3605.00                 | 3605.00                     |
| <b>Total Volume (ac-ft)</b>                                     | 4.15                    | 4.65                        |
| <b>Diameter of Low-Level Outlet Pipe (in)</b>                   | Circular Orifice = 1.2' | Rectangular Orifice = 2'x3' |
| <b>Invert Elevation of Low-Level Outlet Pipe (ft)</b>           | 3599.50                 | 3602.00                     |
| <b>Approx. Length of Low-Level Outlet Pipe (ft)</b>             | 47                      | 65                          |
| <b>10-year 24-hour Design Storm Peak Inflow (cfs)</b>           | 17.5                    | 24.9                        |
| <b>10-year 24-hour Design Storm Peak Outflow (cfs)</b>          | 8.1                     | 20.8                        |
| <b>10-year 24-hour Design Storm Peak Stage (ft)</b>             | 3603.3                  | 3604.1                      |
| <b>10-year 24-hour Design Storm Peak Storage Volume (ac-ft)</b> | 1.3                     | 1.0                         |
| <b>Auxiliary Spillway Crest Elevation (ft)</b>                  | N/A                     | N/A                         |
| <b>Approx. Length of Spillway Crest (ft)</b>                    | N/A                     | N/A                         |
| <b>Approx. Width of Spillway Crest (ft)</b>                     | N/A                     | N/A                         |
| <b>Storage Capacity at Spillway Crest (ac-ft)</b>               | 4.15                    | 4.65                        |
| <b>Surface Area at Spillway Crest (ft<sup>2</sup>)</b>          | N/A                     | N/A                         |

### 1.3.2 Existing Flood Areas

Two stormwater existing flood areas currently exist along the King Street branch of the flood control system. The first one is located on the west side of the abandoned railroad embankment off the extension of Sunset Drive and will be referred to as the Sunset Drive Flood Area in this TM. The second is west of Lewiston Street just south of the intersection with Cottonwood Butte Road and will be referred to as the Lewiston Street Flood Area in this TM. See **Appendix C1, Figure C1-7** for the location of the existing Flood Areas.

Both existing flood areas utilize current natural and manmade geographical features and only require minor improvements to the outlet facilities. The Sunset Drive flood area utilizes a natural draw that is crossed by a railroad embankment. The project will not increase the height of the existing embankment but will focus on improving the embankment and the existing metered outlet structure to control the discharge of floodwater into the flood control system. Much like the Sunset Drive Flood Area, the Lewiston Street Flood Area is a naturally occurring draw that is crossed just west of the city limits by a road embankment. The Lewiston Street Flood Area will require no improvements and will utilize the existing culvert that runs under the road embankment.

The impounding capacity of each of the existing flood areas was computed at the maximum water storage elevation. Autodesk Civil3D was utilized to generate a stage storage volume curve. See Table 1 for a summary of the impounding capacities of each existing flood area.

## 2.0 Breach Analysis

Breach analysis was not performed on the Sunset Drive or Lewiston Street existing flood areas. The existing flood areas are both under 10 feet in height and do not impound a volume of 50 acre-feet or more of water and therefore do not meet the Idaho definition of a dam. Furthermore, the existing flood areas are located outside of City Limits near the industrial section of town. Based on their locations and lack of residential building near them, it was determined unnecessary to conduct a breach analysis since loss of life is extremely unlikely and the existing conditions in large are not being changed.

### 3.0 Statement of Limitations

This document represents J-U-B Engineers, Inc.'s professional judgement based on the information available at the time of its completion and as appropriate for the project Scope of Work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the engineering profession currently practicing under similar conditions. No warranty, express or implied, is made. It is recommended that further coordination with Idaho Dam Safety be conducted throughout the design and construction phase of the project.

### 4.0 References

*Computation of Population at Risk (PAR) during Dam Failure*, Steve Durgin, Natural Resources Conservation Service (NRCS), March 2013.

*Dam Safety Guidelines*. Washington State Department of Ecology (Washington Ecology), 2007.

*Dam Safety Dam Statutes are enumerated in Idaho Code §§ 42-1709 through 42-1721.*

*Earth Dams and Reservoirs, Technical Release (TR) 210-60*, Natural Resources Conservation Service (NRCS), March 2019.

HEC-RAS River Analysis System – 2D Modeling User's Manual. Version 6.0. May 2021.

HEC-RAS River Analysis System – Hydraulic Reference Manual. Version 6.0. May 2021.

*Technical Note 1: Dam Break Inundation Analysis and Downstream Hazard Classification*. Dated July 1992, Revised October 2007.

*2022 Final Technical Memorandum No. T001 – Hydrology*, J-U-B Engineers, Inc (J-U-B), 2024.

Appendix E8: BMP and Mitigation List



### Best Management Practices and Conservation Measures List

#### Cottonwood Creek Watershed Plan-EA

The following BMPs will be implemented during and post-construction to avoid and minimize impacts to environmental resources in the project area that could occur because of the Preferred Alternative.

| Best Management Practices                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Relevant Resource Category                                                                                                                      | Section of EA / Resource Report Identified                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Disturbed areas will be restored after construction completion. Stockpiles will be spread. Disturbed areas will be reseeded to encourage the establishment of native vegetation, and native seed mixes appropriate to the surrounding habitat and that are drought resistant will be utilized to re-establish vegetation in all areas with ground disturbance to prevent construction related erosion and sediment delivery and noxious weed establishment.                | Soils & Geology; Wetlands; Noxious Weeds and Invasive Plants; Riparian Areas; Wildlife and Wildlife Habitat; Visual Resources and Scenic Beauty | EA Sections: 5.1.1.2, 5.2.2.2; 5.4.2.2; 5.4.3.2; 5.5.1.2; 5.6.9.2<br>Biological Evaluation |
| An Idaho Pollution Elimination System (IDPES) Permit, Storm Water Pollution Prevention Plan (SWPPP), and Spill Prevention, Countermeasure, and Control (SPCC) Plan will be implemented to protect water quality and to prevent water pollution from runoff, spills, leaks, and leaching. Meet associated permit conditions during construction operations.                                                                                                                 | Soils & Geology; Clean Water Act / Waters of the U.S., including Wetlands; Hazardous Materials                                                  | EA Sections: 5.1.1.2, 5.2.2.2, 5.6.5.2<br>Biological Evaluation                            |
| Comply with all measures in the associated SWPPP or similar document for implementing temporary erosion and sediment controls (TESCs), covering and storing materials, and other erosion prevention measures. Do not perform construction activities during extreme wet weather conditions, whenever practicable. If heavy precipitation is predicted to occur within 24 hours, take appropriate measures to cover up any stockpiles and check that TESCs are functioning. | Soils & Geology; Clean Water Act / Waters of the U.S., including Wetlands; Wildlife and Wildlife Habitat                                        | EA Sections: 5.1.1.2, 5.2.2.2, 5.5.1.2<br>Biological Evaluation                            |
| Protect native site vegetation and plant communities, including wetland vegetation and milkweed, when practicable. Clearly mark, flag, or fence areas where vegetation is to be protected.                                                                                                                                                                                                                                                                                 | Plants; Wildlife and Wildlife Habitat; Visual Resources and Scenic Beauty                                                                       | EA Sections: 5.4.1.2; 5.5.1.2; 5.6.9.2<br>Biological Evaluation                            |
| Contain all work activities, including those within staging areas, to upland areas to minimize potential impacts to surface water quality,                                                                                                                                                                                                                                                                                                                                 | Soils & Geology; Plants; Wildlife and Wildlife Habitat; Clean                                                                                   | EA Sections: 5.1.1.2; 5.4.1.2; 5.5.1.2; 5.2.2.2                                            |

| Best Management Practices                                                                                                                                                                                                                                                                                                   | Relevant Resource Category                                                                               | Section of EA / Resource Report Identified                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| whenever feasible. Work within wetland areas will be avoided or minimized to the extent practical.                                                                                                                                                                                                                          | Water Act / Waters of the U.S., including Wetlands                                                       | Biological Evaluation                                           |
| Locate borrow areas outside the 100-year floodplain or greater than 200 feet from any identified waters within the Survey Area, whichever is greater.                                                                                                                                                                       | Clean Water Act / Waters of the U.S., including Wetlands; Wildlife and Wildlife Habitat                  | EA Sections: 5.2.2.2; 5.5.1.2<br>Biological Evaluation          |
| Dispose of excavated sediment and debris at a pre-approved area more than 200 feet from any surface water feature.                                                                                                                                                                                                          | Soils & Geology; Clean Water Act / Waters of the U.S., including Wetlands; Wildlife and Wildlife Habitat | EA Sections: 5.5.1.2; 5.2.2.2; 5.5.1.2<br>Biological Evaluation |
| Construction activities will be timed to occur outside of the irrigation season (early May through end of September).                                                                                                                                                                                                       | Clean Water Act / Waters of the U.S., including Wetlands; Migratory Birds / Bald and Golden Eagles       | EA Sections: 5.2.2.2; 5.5.3.2<br>Biological Evaluation          |
| Construction activities will occur during established daytime working hours and construction equipment will use properly functioning equipment mufflers, to minimize temporary noise impacts. All work will be completed within the designated project area during established working hours.                               | Noise                                                                                                    | EA Sections: 5.6.12.2<br>Biological Evaluation                  |
| The project shall secure a Section 402 permit from IDEQ.                                                                                                                                                                                                                                                                    | Clean Water Act / Waters of the U.S., including Wetlands                                                 | EA Sections: 5.2.2.2<br>Biological Evaluation                   |
| When feasible, construction equipment and vehicles will be fueled offsite. If offsite fueling is impractical, fueling will occur in designated fueling areas. Adequate spill response equipment (i.e., spill kits and cleanup materials) shall be always maintained and present. All spills will be cleaned up immediately. | Hazardous Materials; Wildlife and Wildlife Habitat; Special Status Species                               | EA Sections: 5.6.5.2; 5.5.1.2; 5.5.2.2<br>Biological Evaluation |
| The contractor shall follow proper storage, handling, use, and disposal of petroleum products and other hazardous materials.                                                                                                                                                                                                | Hazardous Materials; Water Resources; Special Status Species                                             | EA Sections: 5.6.5.2; 5.2; 5.5.2.2<br>Biological Evaluation     |

| Best Management Practices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Relevant Resource Category                                                                              | Section of EA / Resource Report Identified                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <p>Rehabilitate all areas of ground disturbance. Spread or grade stockpiled materials and use a native seed mix (99.9% noxious weed-free seed) approved by the NRCS to reseed all areas where ground disturbance has occurred. Ensure the seed mix and plants are appropriate to the region and include milkweed species (<i>Asclepias</i> sp.) when appropriate to the site.</p> <p>If appropriate for the area, apply seed by hydroseeding, using a temporary erosion control mulch tackifier to provide stabilization, eliminate erosion concerns, and create vegetation recruitment opportunities.</p>                                                                                            | Clean Water Act / Waters of the U.S., including Wetlands; Wildlife and Wildlife Habitat                 | EA Sections: 5.5.2.2; 5.5.1.2<br><br>Biological Evaluation                   |
| Fugitive dust control measures will be in place. Water trucks or other dust abatement measures will be used during construction to minimize dust impacts. Vehicle speeds will be restricted in the project area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Air Quality; Wildlife and Wildlife Habitat                                                              | EA Sections: 5.3.1.2, 5.5.1.2                                                |
| Construction activities will be confined to the project footprint to preserve and to minimize impacts to existing and native vegetation and wildlife habitat. The construction activity footprint will be limited to the smallest extent practicable within the project area.                                                                                                                                                                                                                                                                                                                                                                                                                         | Clean Water Act / Waters of the U.S., including Wetlands; Riparian Areas; Wildlife and Wildlife Habitat | EA Sections: 5.2.2.2; 5.4.3.2, 5.5.1.2<br><br>Biological Evaluation          |
| Undisturbed areas will be maximized within project area boundaries wherever possible to retain vegetation for erosion control purposes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Soils & Geology; Plants; Wildlife and Wildlife Habitat                                                  | EA Sections: 5.1.1.2; 5.4.1.2; 5.5.1.2<br><br>Biological Evaluation          |
| <p>Clean equipment of mud and other debris to avoid noxious weed or seed dispersal within or near the Project Area. Use pressure washing where appropriate to remove soil, plant parts, or other materials that may carry invasive and noxious weed seeds before arriving at the Project Area. Ensure this cleaning occurs each time equipment is brought into the Survey Area from a different location.</p> <p>Ensure the contractor provides the site inspector with the opportunity to inspect the equipment before unloading at the construction site. If upon inspection, dirt, debris, and seeds are visible, ensure the contractor immediately removes the equipment from the Survey Area</p> | Wetlands; Noxious Weeds and Invasive Plants; Riparian Areas; Wildlife and Wildlife Habitat              | EA Sections: 5.2.2.2, 5.4.2.2; 5.4.3.2, 5.5.1.2<br><br>Biological Evaluation |

| Best Management Practices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Relevant Resource Category                               | Section of EA / Resource Report Identified                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------|
| and rewashes it. Ensure the equipment is clean by having the site inspector re-inspect the equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                          |                                                            |
| <p>Noxious weed and invasive plant transport will be avoided by minimizing the amount of exposed soil without cover; applying herbicide prior to ground disturbance; and identifying and protecting areas where existing vegetation will not be disturbed by construction activities.</p> <p>Continue implementing The City of Cottonwood's existing noxious weed control plan, including periodic mowing and the use of broadleaf spray to manage thistles and other noxious weeds.</p>                                                                                                                                                                                                                                                                                                                       | Noxious Weeds and Invasive Plants                        | EA Sections: 5.4.2.2                                       |
| <p>Perform pre-construction surveys for migratory birds and raptors in all areas where vegetation removal will occur. These surveys should occur no more than 7 days before vegetation removal and disturbance, when construction activities or vegetation removal would occur during the breeding and nesting season of migratory birds (March–September) or eagles (December–August). Repeat surveys if construction and vegetation removal are paused and resumed. If an active nest is discovered within the Survey Area, halt construction and/or vegetation removal and contact the appropriate regulatory agency for guidance. The raptor survey should adhere to the <i>USFWS Wyoming Ecological Services Field Office Raptor Guidelines (2022)</i> for appropriate nesting windows and protocols.</p> | Wildlife & Wildlife Habitat; Migratory Birds/Bald Eagles | EA Sections: 5.5.1.2, 5.5.3.2<br><br>Biological Evaluation |
| <p>An inadvertent discovery plan shall be prepared for the construction phase of the project. If construction activities uncover any materials of cultural or historic significance (i.e., bone fragments, pottery, stone tools, burial features, etc.) construction will halt and coordination with the SHPO, THPO, and Idaho County Sheriff will occur.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Cultural, Historic, & Paleontological Resources          | EA Sections: 5.6.3.2                                       |
| <p>Flaggers will be utilized, where necessary, to control traffic along roadways.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Transportation & Infrastructure                          | EA Sections: 5.6.11.2                                      |