Utah Division of Wildlife Resources
Utah Natural Heritage Program
1594 W. North Temple
PO Box 146301
Salt Lake City, UT 84116

Report Number: 11904
January 15, 2021

Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name

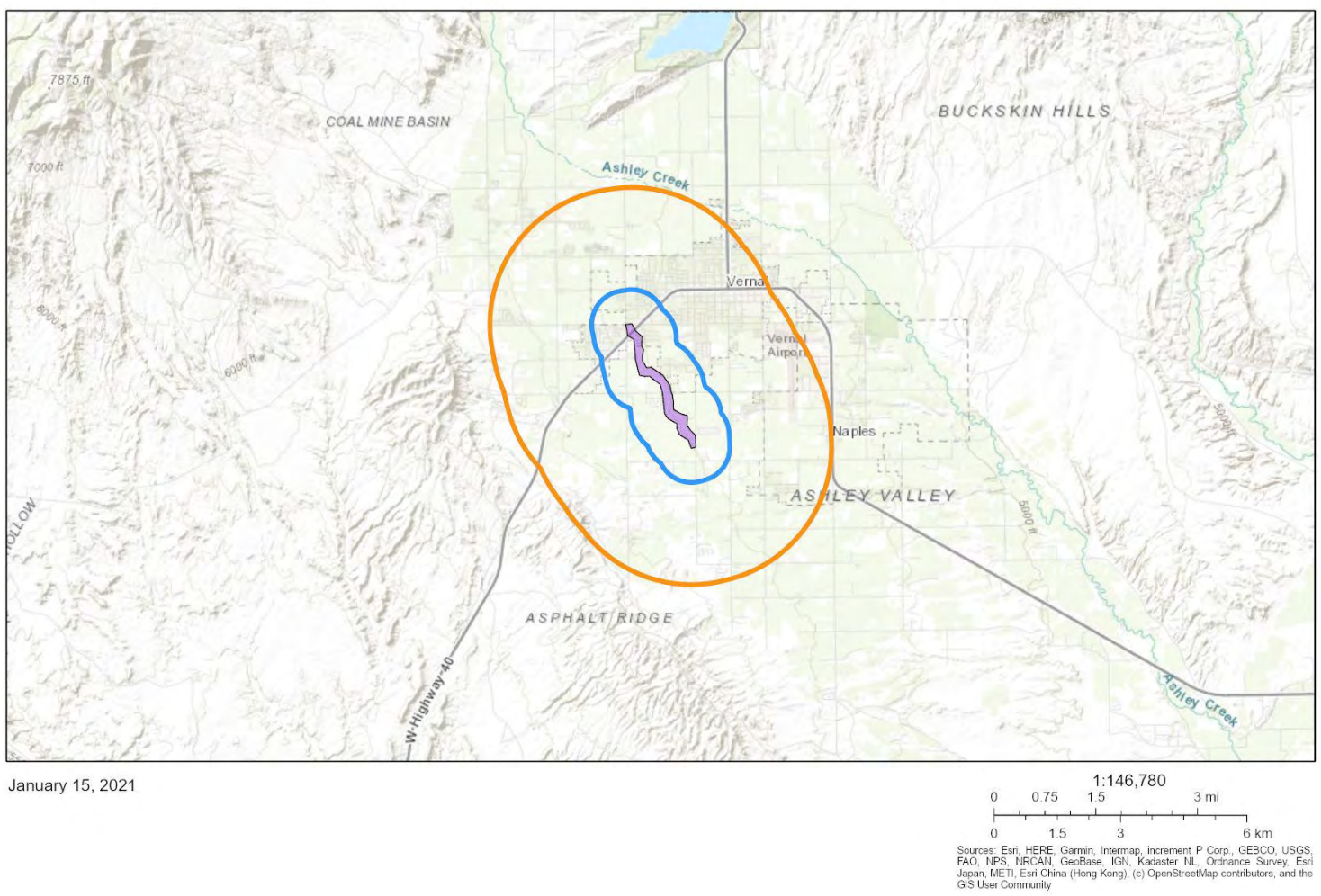
Ashley Valley Watershed Flood & Irrigation Project (middle piping)

Project Description

The Proposed Project would construct two large debris basins to serve as flood control in the Coal Mine and Yellow Hills sub-basins located northeast of Vernal City. Additionally, the Proposed Project would pipe and pressurize approximately 9.6 miles of the Ashley Central Canal with 26-inch to 36-inch High-Density Polyethylene (HDPE) pipe and fittings, install turnout meters, and two screening and overflow structures. The canal would be backfilled to cover the irrigation pipe and then left open to be utilized by the County to convey floodwater. Additional elements of the Proposed Project would include the installation of approximately 3 miles of pedestrian and recreation trails, which would provide biking and walking access to educational, recreational, and commercial facilities.

Location Description

Vernal, Utah - Ashley Central Canal



Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002
Black-footed Ferret	Mustela nigripes	SGCN	LE; XN	1988

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002
Black-footed Ferret	Mustela nigripes	SGCN	LE; XN	1988
Greater Sage-grouse	Centrocercus urophasianus	SGCN		1984
Utah Milksnake	Lampropeltis triangulum	SGCN		1955
Northern Leopard Frog	Lithobates pipiens	SGCN		1951
Wolverine	Gulo gulo	SGCN		1919

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Definitions

State Status

SGCN	Species of greatest conservation need listed in the Utah Wildlife Action Plan

U.S. Endangered Species Act

LE	A taxon that is listed by the U.S. Fish and Wildlife Service as "endangered" with the probability of worldwide extinction
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LE;XN	An "endangered" taxon that is considered by the U.S. Fish and Wildlife Service to be "experimental and nonessential" in its designated use areas in Utah
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Contact the U.S. Fish and Wildlife Service at (801) 975-3330 for the purpose of consultation under the Endangered Species Act.

Please contact our office at (801) 538-4759 or habitat@utah.gov if you require further assistance.

Your project is located in the following UDWR region(s): Northeastern region

---

Report generated for:
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Utah Natural Heritage Program
1594 W. North Temple
PO Box 146301
Salt Lake City, UT 84116

Report Number: 11903
January 15, 2021

Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name

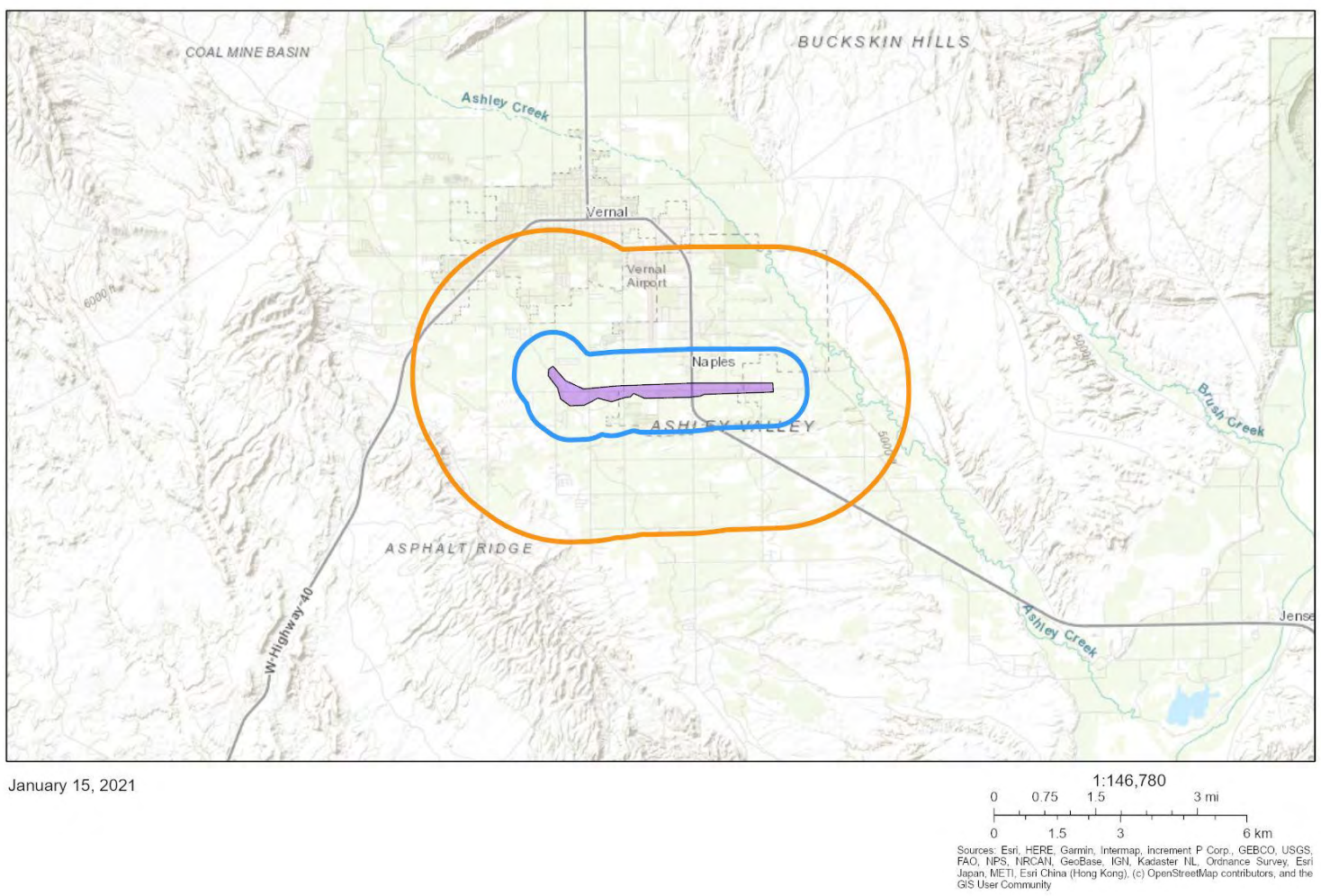
Ashley Valley Watershed Flood & Irrigation Project (southern)

Project Description

The Proposed Project would construct two large debris basins to serve as flood control in the Coal Mine and Yellow Hills sub-basins located northeast of Vernal City. Additionally, the Proposed Project would pipe and pressurize approximately 9.6 miles of the Ashley Central Canal with 26-inch to 36-inch High-Density Polyethylene (HDPE) pipe and fittings, install turnout meters, and two screening and overflow structures. The canal would be backfilled to cover the irrigation pipe and then left open to be utilized by the County to convey floodwater. Additional elements of the Proposed Project would include the installation of approximately 3 miles of pedestrian and recreation trails, which would provide biking and walking access to educational, recreational, and commercial facilities.

Location Description

Vernal, Utah - Ashley Central Canal



Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002
Peregrine Falcon	Falco peregrinus	SGCN		1997
Black-footed Ferret	Mustela nigripes	SGCN	LE; XN	1988

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2008
Peregrine Falcon	Falco peregrinus	SGCN		2007
Black-footed Ferret	Mustela nigripes	SGCN	LE; XN	1988
Utah Milksnake	Lampropeltis triangulum	SGCN		1955
Wolverine	Gulo gulo	SGCN		1919

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Definitions

State Status

SGCN	Species of greatest conservation need listed in the Utah Wildlife Action Plan

U.S. Endangered Species Act

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Your project is located in the following UDWR region(s): Northeastern region

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Utah Natural Heritage Program
1594 W. North Temple
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Report Number: 11905
January 15, 2021

Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name

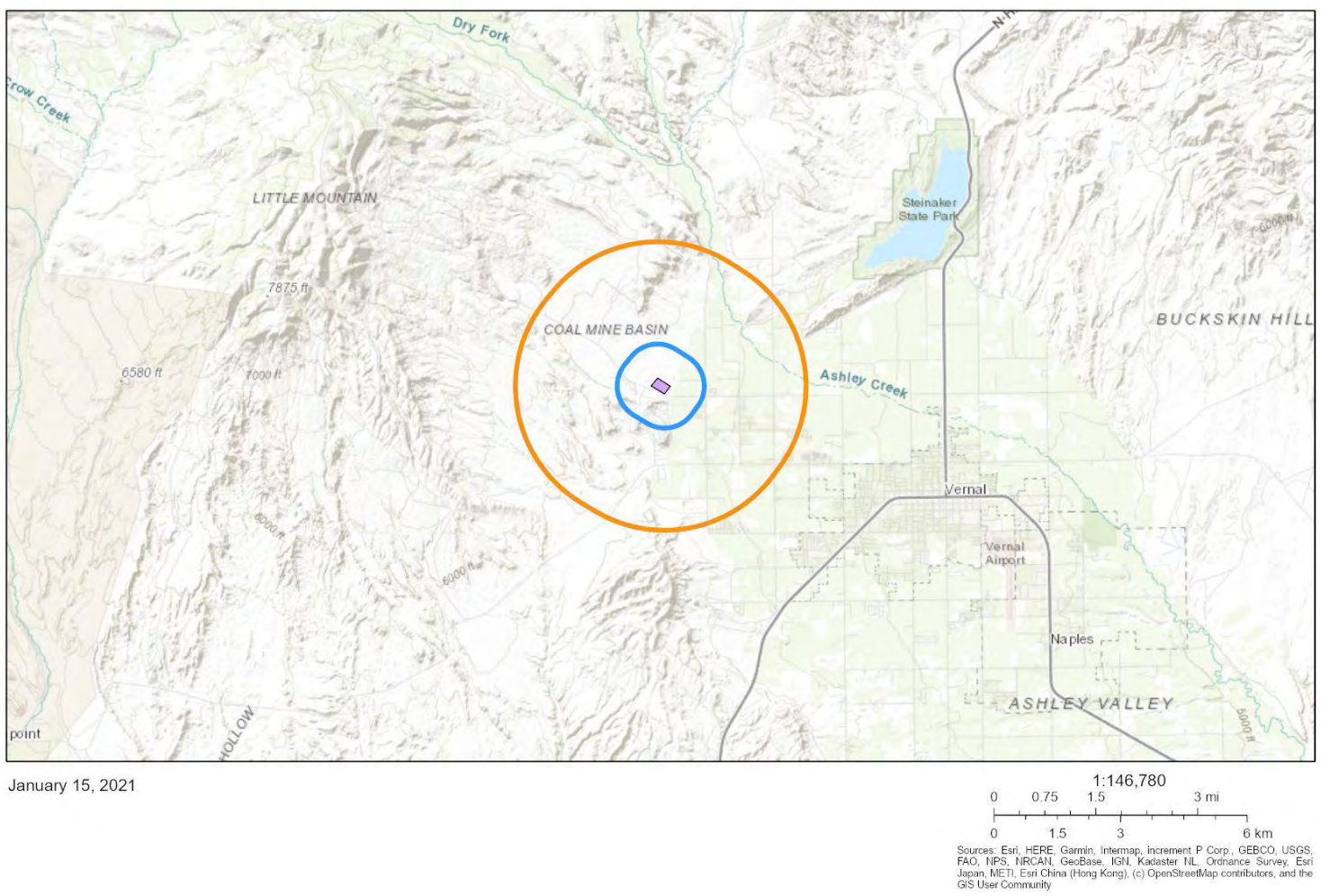
Ashley Valley Watershed Flood & Irrigation Project (Coal Mine Debris Basin)

Project Description

The Proposed Project would construct two large debris basins to serve as flood control in the Coal Mine and Yellow Hills sub-basins located northeast of Vernal City. Additionally, the Proposed Project would pipe and pressurize approximately 9.6 miles of the Ashley Central Canal with 26-inch to 36-inch High-Density Polyethylene (HDPE) pipe and fittings, install turnout meters, and two screening and overflow structures. The canal would be backfilled to cover the irrigation pipe and then left open to be utilized by the County to convey floodwater. Additional elements of the Proposed Project would include the installation of approximately 3 miles of pedestrian and recreation trails, which would provide biking and walking access to educational, recreational, and commercial facilities.

Location Description

Vernal, Utah - Coal Mine Debris Basin



Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002
Wolverine	Gulo gulo	SGCN		1919

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
Ute Ladies' Tresses	Spiranthes diluvialis		LT	2002

Definitions

State Status

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Utah Natural Heritage Program
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Report Number: 11906
January 15, 2021

Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name

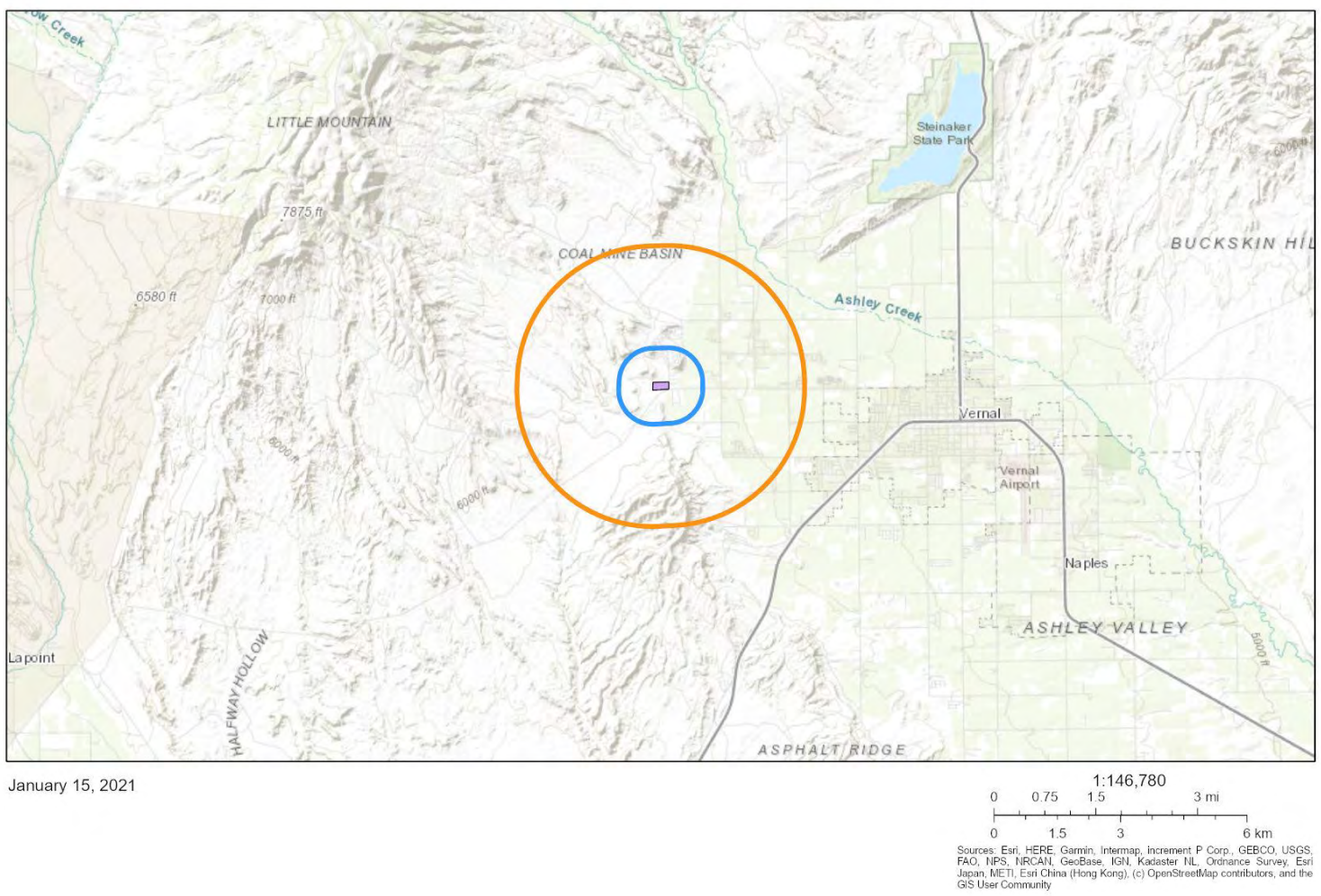
Ashley Valley Watershed Flood & Irrigation Project (Yellow Hills Debris Basin)

Project Description

The Proposed Project would construct two large debris basins to serve as flood control in the Coal Mine and Yellow Hills sub-basins located northeast of Vernal City. Additionally, the Proposed Project would pipe and pressurize approximately 9.6 miles of the Ashley Central Canal with 26-inch to 36-inch High-Density Polyethylene (HDPE) pipe and fittings, install turnout meters, and two screening and overflow structures. The canal would be backfilled to cover the irrigation pipe and then left open to be utilized by the County to convey floodwater. Additional elements of the Proposed Project would include the installation of approximately 3 miles of pedestrian and recreation trails, which would provide biking and walking access to educational, recreational, and commercial facilities.

Location Description

Vernal, Utah - Yellow Hills Debris Basin



Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Definitions

State Status

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Utah Division of Wildlife Resources
Utah Natural Heritage Program
1594 W. North Temple
PO Box 146301
Salt Lake City, UT 84116

Report Number: 11907
January 15, 2021

Utah Natural Heritage Program Online Species Search Report

Project Information

Project Name

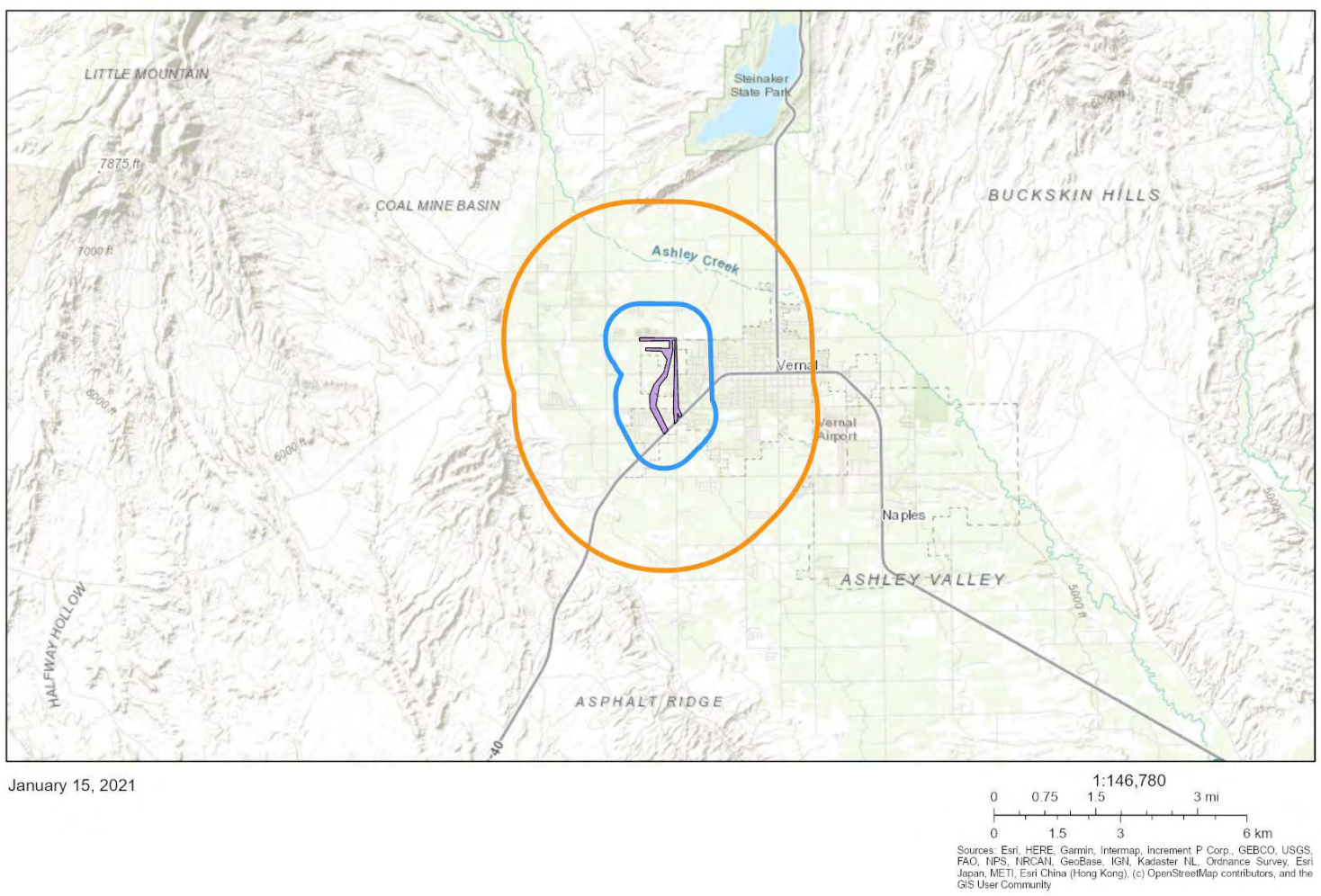
Ashley Valley Watershed Flood & Irrigation Project (recreation trail)

Project Description

The Proposed Project would construct two large debris basins to serve as flood control in the Coal Mine and Yellow Hills sub-basins located northeast of Vernal City. Additionally, the Proposed Project would pipe and pressurize approximately 9.6 miles of the Ashley Central Canal with 26-inch to 36-inch High-Density Polyethylene (HDPE) pipe and fittings, install turnout meters, and two screening and overflow structures. The canal would be backfilled to cover the irrigation pipe and then left open to be utilized by the County to convey floodwater. Additional elements of the Proposed Project would include the installation of approximately 3 miles of pedestrian and recreation trails, which would provide biking and walking access to educational, recreational, and commercial facilities.

Location Description

Vernal, Utah - Ashley Central Canal



Animals within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002

Plants within a ½ mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
No Species Found				

Animals within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
Peregrine Falcon	Falco peregrinus	SGCN		2006
White-tailed Prairie Dog	Cynomys leucurus	SGCN		2002
Black-footed Ferret	Mustela nigripes	SGCN	LE; XN	1988
Greater Sage-grouse	Centrocercus urophasianus	SGCN		1984
Utah Milksnake	Lampropeltis triangulum	SGCN		1955
Northern Leopard Frog	Lithobates pipiens	SGCN		1951
Wolverine	Gulo gulo	SGCN		1919

Plants within a 2 mile radius

Common Name	Scientific Name	State Status	U.S. ESA Status	Last Observation Year
Ute Ladies' Tresses	Spiranthes diluvialis		LT	2020

Definitions

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Appendix 4 – Photo Inventory

Photo Inventory

The following photos were taken during a during a rare plant survey conducted in August 2018 for a separate project, and a site visit conducted on August 27 and 28, 2019 for the Ashley Valley Watershed Flood & Irrigation Project.

Photo 1: Looking downstream along Ashley Creek. Ashley Creek flows beside the Ashley Central Canal pipe alignment. Two clusters of Ute ladies'-tresses (*Spiranthes diluvialis*) were observed along the Ashley Creek bank. Vegetation along Ashley Creek consisted of a variety of large cottonwoods and willows, as well as scouring rush (*Equisetum hyemale*), field horsetail (*Equisetum arvense*), yellow sweet clover (*Melilotus officianalis*), white sweet clover (*Melilotus albus*), and curlycup gumweed (*Grindelia squarrosa*). The Proposed Project would not affect Ashley Creek.

Photo 2: Vegetation along the Ashley Central Canal was primarily dominated by reed canarygrass (*Phalaris arundinacea*) and a combination of large trees, saplings, shrubs, grasses and forbs.

Photo 3: Ashley Central Canal flows through agricultural, residential and undeveloped properties, as well as along city roads. This photograph was taken in August 2018 as part of a rare plant survey for a separate Reclamation project.

Photo 4: Canal vegetation along the middle portion of Ashley Central Canal was dominated by reed canarygrass, Johnsongrass (*Sorghum halepense*), orchardgrass (*Dactylis glomerata*), Russian olive (*Elaegnus angustifolia*), and boxelder maple (*Acer negundo*). This photograph was taken in August 2018 as part of a rare plant survey for a separate project.

Photo 5: A trail would be constructed along the Steinaker Service Canal as part of the Proposed Project. Vegetation along the alignment of Steinaker Service Canal included: reed canarygrass, Canada thistle (*Cirsium arvense*), smooth brome (*Bromus inermis*), sunflower (*Helianthus* sp.), alfalfa (*Medicago sativa*), crested wheatgrass (*Agropyron cristatum*), scouring rush, perennial ryegrass (*Lolium perenne*), prickly lettuce (*Lactuca serriola*), Indian ricegrass (*Achnatherum hymenoides*), milkweed (*Asclepias speciosa*), groundsel (*Senecio vulgaris*), and curlycup gumweed.

Photo 6: Looking northwest at the proposed location of the Coal Mine Detention Basin. The detention basins would be situated in undeveloped areas that are dominated by a desert-scrub landscape. Vegetation in the Coal Mine and Yellow Hills Detention Basin included: big sagebrush (*Artemisia tridentata*), cheatgrass (*Bromus tectorum*), greasewood (*Sarcobatus vermiculatus*), crested wheatgrass, common sunflower (*Helianthus annuus*), pepperweed (*Lepidium latifolium*), and Russian thistle (*Salsola tragus*). Other species observed were plains prickly pear (*Opuntia polycantha*), four-wing saltbush (*Atriplex canescens*), shadescale (*Atriplex confertifolia*) and Utah juniper (*Juniperus osteosperma*).

Photo 7: Looking west at the proposed location of the Yellow Hills Detention Basin.

Photo 8: This photo depicts staging area 1 at the northern portion of the Ashley Central Canal. In general, the Proposed Project staging areas would be situated in an upland position and within a disturbed setting (i.e., residential property, agricultural fields, paved or gravel parking lots). Staging areas are dominated by weedy, upland and agricultural species such as: alfalfa, cheatgrass, field thistle (*Cirsium discolor*), halogeton, field bindweed (*Convolvulus arvensis*), prickly lettuce, prairie sunflower (*Helianthus petiolaris*), perennial ryegrass, rubber rabbitbrush (*Ericameria nauseosa*), and ornamental grasses.

Photo 9: All Proposed Project staging areas would be located in an upland position within a disturbed setting. This photo illustrates a typical staging area for the Proposed Project, specifically staging area 15.

Photo 10: This photo illustrates staging area 13. Staging areas were dominated by weedy, upland and agricultural species.

Appendix 5 – ULT Survey Memos

MEMORANDUM

DATE: January 18, 2021
TO: Amy Defreese, Ecologist, U.S. Fish and Wildlife Service (Utah Field Office); Christine Cimiluca, BLM (Vernal, UT Office); Rita Reisor, Botanist, U.S. Fish and Wildlife Service (Utah Field Office)
CC: Derek Hamilton, NEPA Biologist (NRCS); Marti Hoge, Environmental Lead (J-U-B Engineers, Inc.)
FROM: Autumn Foushee, Senior Biologist (J-U-B Engineers, Inc.)
SUBJECT: Uintah County PL566 Watershed Plan Project: Ute ladies'-tresses Survey Findings

An Ute ladies'-tresses (ULT) (*Spiranthes diluvialis*) protocol-level plant survey was completed for an approximate 9.6-mile survey area of the Ashley Central Canal located in Vernal, Utah. The survey area comprised a 100-foot buffer from the centerline of the canal for the entire 9.6 miles, which encompassed the Action Area for the proposed Uintah County PL566 Watershed Project. The ULT survey was completed to evaluate suitable habitat conditions within the Action Area and locate any previously unidentified ULT populations, if present. Funding for the Proposed Project has been awarded from the Natural Resources Conservation Service (NRCS) PL566 Program, therefore this ULT survey has been compiled to meet the environmental compliance requirements for the Proposed Project, and to provide documentation of survey results in accordance with the *USFWS Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed and Candidate Plants (2011)* and the *USFWS Interim Survey Requirements for Ute Ladies'-tresses Orchid (1992).* The USFWS guidelines were implemented for the survey efforts. Autumn Foushee, Senior Biologist (J-U-B Engineers, Inc.) conducted the field investigation on August 27-28, 2019, during the confirmed flowering period. A separate ULT plant survey was completed for a portion of the canal that was previously slated for Reclamation funding but was subsequently funded by NRCS.

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

The ULT is a member of the orchid family that was first described in 1984. The plant was federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) in January 1992 (USFWS, 1995). Populations have been found in Utah, Colorado, Wyoming, Montana, Nevada, Idaho, and Washington. The elevation ranges in which populations have been found vary from 750 to 7,000 feet, with most populations located above 4,000 feet. ULTs are found in wetlands and riparian areas, including spring habitats, mesic meadows, river meanders and floodplains. They require open habitats, and populations decline if trees and shrubs invade the habitat. They are not tolerant of

permanent standing water, and do not compete well with aggressive species such as reed canarygrass (*Phalaris arundinacea*). The recommended survey time for the species coincides with its flowering period, as identified by the USFWS (1995), and is typically mid-August through mid-September, depending on geographic position and seasonal trends.

1. Photo of 2019 Reference Plant from BLM

Notice of the open survey window was received from Christine Cimiluca in the Bureau of Land Management (BLM) Vernal Field Office on August 14, 2019. The adjacent photo of a flowering, reference population individual was provided by BLM. The Brush Creek reference site was also visited, and a singular ULT was identified, but had reached senescence. A photo from the Maeser reference site was provided by BLM and given the Maeser site's proximity to the Proposed Project Action Area, the reference photo was utilized for the survey.

The Ashley Central Canal were surveyed for suitable habitat and ULT presence on August 27-28, 2019. A 100-foot wide corridor (from the centerline of the canal, 50 feet on both sides of the canal) was surveyed along the Ashley Central Canal from the diversion location on Ashley Creek at the north end of the canal to US-40 in Vernal at approximately 650 South and from the culvert located at 500 West and approximately 2250 South to the terminus of the canal in Naples, Utah. The survey area was approximately 9.6-miles long.

Two groupings of 9 total individual ULTs were identified adjacent to the upper portion of the Proposed Project Action Area. These individuals were identified at the following points:

ULT 1 (6 individuals)
2241168.44 m North, 662309.91 m East

ULT 2 (3 individuals)
2241153.70 m North, 662314.06 m East

These individuals were located at the edge of the survey buffer; however, no work would take place in Ashley Creek, nor on the banks of Ashley Creek where these individuals were located. The populations are, however, within 300 feet of the Proposed Project alignment and thus may likely require informal consultation with USFWS.

Existing conditions along the canal segments were dominated by reed canarygrass, Johnsongrass (*Sorghum halepense*), orchardgrass (*Dactylis glomerata*), Russian olive (*Elaeagnus angustifolia*), and Boxelder maple (*Acer negundo*). The banks of the Ashley Canal within the survey area were thickly

vegetated by invasive species with some sparse, native wetland species; however, open, undisturbed riparian habitat did not exist along the majority of the canal, with the exception of the habitat adjacent to the alignment at the northern end. The banks were generally steep and heavily eroded in a many locations due to cattle and horse access to the canal. Given the vigorous competition for light and resources posed by the invasive species assemblage along the canal segments, and the lack of ULT observation in the remaining alignment segments, it would appear that the current condition of the canal banks is not suitable habitat for ULT.

The attached ULT Survey Exhibit illustrates the locations of the ULT survey area and the location of the ULT individuals identified. The attached Photo Inventory captures the pertinent habitat conditions encountered during the survey.

Conclusion

Approximately 9.6-miles of the Ashley Central Canal was surveyed for suitable habitat and the presence of ULTs. The field investigations identified two populations adjacent to a northern portion of survey area. This northern segment along Ashley Creek does provide suitable habitat for the species, however the Proposed Project would not include instream work or disturbance to the banks of Ashley Creek, where these individuals are located. The identified individuals are located within 300 feet of the Proposed Project Action Area, therefore it is likely that informal consultation with USFWS may be necessary. The banks of the canal throughout the majority of the Proposed Project alignment would not be suitable habitat for ULT given heavy vegetative coverage and competition from invasive species, as well as disturbance from livestock and horse grazing.

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

Attachments

1. Ute ladies'-tresses Survey Exhibit
2. Photo Inventory

References

Final Rule to List the Plant Spiranthes diluvialis, Ute Ladies'-tresses as a Threatened Species. 57 FR 2048 205. (1992)

USFWS. 1992. Interim Survey Requirements for Ute Ladies'-tresses Orchid (*Spiranthes diluvialis*).

USFWS. 2011. USFWS *Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed, and Candidate Plants*.

Ashley Valley Canal Piping Project
ULT Survey Area

ULTs
Ashley Creek
Action Area
Reclamation Project
Staging Areas

0 1,550 3,100 Feet

See ULT Suitable Habitat Map

Ashley Creek

Maeser

Vernal

Naples

Sports Park

Utah Field House of Natural History State Park

Fairgrounds Park

Dinaland Golf Course

Vernal Regional Airport

Air Village Strip

Vernal Ave

500 N

1500 E

Main St

Sunshine Bench Rd

E-459

Ashley Valley Canal Piping Project
ULT Suitable Habitat Map

ULTs
Ashley Creek
Pipe Slip
Pipe Alignment
ULT Suitable Habitat
Action Area

0 50 100 Feet

40° 29' 23.832" N 109° 35' 7.094" W

40° 29' 23.344" N 109° 35' 6.915" W

Ashley Creek

E-4560

Ashley Valley Canal Piping Project
ULT Survey Area

Comment

- ULTs
- Action Area
- Staging Areas

0 1,500 3,000 Feet

Maeser
Uintah Basin Atc
Utah State University Uintah Basin Vernal Campus
Sports Park
Vernal
Main St
Utah Field House of Natural History State Park
Fairgrounds Park
Vernal Regional Airport
1500 E
Air Village Strip
Dinaland Golf Course
Ashley Creek
Naples
Diamond
500 N
Sunshine Bench

E-461

Ashley Valley Canal Piping Project
Reference ULT Survey Area

Reference ULTs

Action Area

Feet
0 4,500 9,000

Red Fleet State Park

Steinaker State Park

Maeser

Vernal

Naples

E-462

Ashley Canal 2019 ULT Survey - Photo Inventory

Reference population individual photo provided by Bureau of Land Management.

1

Disturbed banks and dominance of weedy, invasive species.

2

Representative conditions in more heavily wooded areas of canal segment.

3

4

Representative conditions along Ashley Canal segment surveyed. 5

Reed canarygrass, orchardgrass, and Johnsongrass dominate the canal banks. 6

Representative conditions along Ashley Canal segment surveyed. 7

Canal near 2500 S and 500 W 8

ULT 2 population adjacent to Ashley Creek 9

Individuals in ULT 1 population 10

Diversion structure at northern end of canal 11

Existing conditions in residential areas 12

MEMORANDUM

DATE: September 30, 2019
TO: Amy Defreese, Ecologist, U.S. Fish and Wildlife Service (Utah Field Office); Christine Cimiluca, BLM (Vernal, UT Office); Rita Reisor, Botanist, U.S. Fish and Wildlife Service (Utah Field Office)
CC: Marti Hoge, Environmental Lead (J-U-B Engineers, Inc.)
FROM: Autumn Foushee, Senior Biologist (J-U-B Engineers, Inc.)
SUBJECT: Ashley Central Canal WaterSMART Project: Ute ladies'-tresses Survey Findings

An Ute ladies'-tresses (ULT) (*Spiranthes diluvialis*) protocol-level plant survey was completed for an approximate 2.5-mile segment of the Ashley Central Canal located in Vernal, Utah. The field survey was completed to fulfill the third year of ULT survey requirements for the Ashley Central Irrigation Company's funding through the Bureau of Reclamation's WaterSMART Program for the proposed piping of the 2.5-mile segment of the Ashley Central Canal. Funding for the proposed project has been awarded from the Bureau of Reclamation, therefore this ULT survey has been compiled to meet the environmental compliance requirements for the project, and to provide documentation of survey results in accordance with The *USFWS Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed and Candidate Plants (2011) and The USFWS Interim Survey Requirements for Ute Ladies'-tresses Orchid (1992).* The USFWS guidelines were implemented for the survey efforts. Autumn Foushee, Senior Biologist (J-U-B Engineers, Inc.) conducted the field investigation on August 27-28, 2019, during the confirmed flowering period.

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

The ULT is a member of the orchid family that was first described in 1984. The plant was federally listed as threatened by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) in January 1992 (USFWS, 1995). Populations have been found in Utah, Colorado, Wyoming, Montana, Nevada, Idaho, and Washington. The elevation ranges in which populations have been found vary from 750 to 7,000 feet, with most populations located above 4,000 feet. ULTs are found in wetlands and riparian areas, including spring habitats, mesic meadows, river

meanders and floodplains. They require open habitats, and populations decline if trees and shrubs invade the habitat. They are not tolerant of permanent standing water, and do not compete well with aggressive species such as reed canarygrass (*Phalaris arundinacea*). The recommended survey time for the species coincides with its flowering period, as identified by the USFWS (1995), and is typically mid-August through mid-September, depending on geographic position and seasonal trends.

Notice of the open survey window was received from Christine Cimiluca in the Bureau of Land Management (BLM) Vernal Field Office on August 14, 2019. The adjacent photo of a flowering, reference population individual was provided by BLM. The Brush Creek reference site was also visited, and a singular ULT was identified, but had reached senescence. A photo from the Maeser reference site was provided by BLM and given the Maeser site's proximity to the proposed project area, the reference photo was utilized for the survey.

1. Photo of 2019 Reference Plant from BLM

Two segments of the Ashley Central Canal were surveyed for suitable habitat and ULT presence on August 27-28, 2019 (see attached Project Exhibit). A 50-foot wide corridor (from the centerline of the canal) was surveyed along the Ashley Central Canal from the culvert located just north of US-40 at approximately 650 South and 1425 West to the culvert located at 500 West and approximately 2250 South in Vernal, Utah. The survey area is approximately 2.5-miles long. No ULTs were observed during the field survey. Existing conditions along the canal segments were dominated by reed canarygrass, Johnsongrass (*Sorghum halepense*), orchardgrass (*Dactylis glomerata*), Russian olive (*Elaeagnus angustifolia*), and Boxelder maple (*Acer negundo*). The banks of the Ashley Canal within the survey area were thickly vegetated by invasive species with some sparse, native wetland species; however, open, undisturbed riparian habitat did not exist. The banks were generally steep and heavily eroded in a few small locations due to cattle and horse access to the canal. Given the vigorous competition for light and resources posed by the invasive species assemblage along the canal segments, and the lack of ULT observation, it would appear that the current condition of the banks is not suitable habitat for ULT.

The attached ULT Survey Exhibit illustrates the locations of the ULT survey area. The attached Photo Inventory captures the pertinent habitat conditions encountered during the survey.

Conclusion

An approximate 2.5-mile segment of the Ashley Central Canal was surveyed for suitable habitat and the presence of ULTs. The field investigations did not locate any ULTs within the survey area. Conditions noted during the 2019 survey were unchanged from those identified during the 2017 and 2018 surveys. No changes to land use and disturbance from those conditions noted in the 2017 and 2018 surveys were noted during the 2019 survey. The banks of the canal do not appear to be suitable habitat for ULT given heavy vegetative coverage and competition from invasive species, as well as disturbance from livestock grazing.

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

Attachments

1. Ute ladies'-tresses Survey Exhibit
2. Photo Inventory

References

Final Rule to List the Plant Spiranthes diluvialis, Ute Ladies'-tresses as a Threatened Species. 57 FR 2048 205. (1992)

USFWS. 1992. Interim Survey Requirements for Ute Ladies'-tresses Orchid (*Spiranthes diluvialis*).

USFWS. 2011. USFWS *Utah Field Office Guidelines for Conducting and Reporting Botanical Inventories and Monitoring of Federally Listed, Proposed, and Candidate Plants*.

2019 ULT Survey

- Pipe Alignment
- Action Area
- Reclamation_Staging

0 487.5 975 Feet

N

ESCALANTE DR
Vernal
HWY 40
AGGIE BLVD
Uintah Basin Christian Academy
Ball Park
Vernal Memorial Park/Cemetery
VERNAL AVE
E-470

Ashley Canal 2019 ULT Survey - Photo Inventory

Reference population individual photo provided by Bureau of Land Management. 1

Disturbed banks and dominance of weedy, invasive species. 2

Representative conditions in more heavily wooded areas of canal segment. 3

4

Representative conditions along Ashley Canal segment surveyed. 5

Reed canarygrass, orchardgrass, and Johnsongrass dominate the canal banks. 6

Representative conditions along Ashley Canal segment surveyed. 7

Canal near 2500 S and 500 W 8

J·U·B ENGINEERS, INC.

TECHNICAL MEMORANDUM 001

Date:	November 10, 2021
To:	NRCS - Utah
Cc:	Brian Deeter, PE J-U-B ENGINEERS, Inc.
From:	Nathan Smith, PE J-U-B ENGINEERS, Inc.
Project:	Ashley Valley Watershed Plan-EA
Subject:	Ashley Central Canal Agricultural Water Hydraulics and Hydrology

1.0 Introduction

The Uintah County (County) and Ashley Central Irrigation Company (ACIC) contracted with J-U-B ENGINEERS, Inc. (J-U-B) to complete a Watershed Plan-Environmental Assessment (Plan-EA) of the Ashley Valley Watershed Flood and Irrigation Project (Proposed Project). Part of the Scope of Work included modeling of the agricultural water delivery and irrigation system to determine pipe sizes and capacities required to provide the required irrigation water. After the irrigation water is flowing in a pipe, the canal will become part of the flood control system for Uintah County, Vernal City, Naples City and the Utah Department of Transportation. Another part of the Scope of Work included modeling storm flows in the open channel.

1.1 Purpose

The purpose of Technical Memorandum (TM) No. 001 is to present the methodology and results of the Agricultural Water Hydraulics and Hydrology analysis conducted for the Proposed Project in support of the Plan-EA. The information presented in the TM will be used to determine agricultural water needs for the project.

2.0 Agricultural Water Analysis

J-U-B analyzed the Ashley Central Canal to determine the pipe sizes required to transport irrigation water currently flowing in the open canal. Innovyze's water modeling software Infowater was used for the analysis. The Ashley Central Canal receives water from two sources, Ashley Creek and the Steinaker Service Canal (SC).

2.1 Project Phases

The project will be completed in two phases. Phase 1 includes piping from the Thornburg Diversion to the last share holder on the system (Approximately 2550 East 2500 S) with a hydraulic pressure break at the SC turnout 3.7. The pressure break will allow water from the SC to enter the piped system at turnout 3.7. Phase 2 is a future phase and includes piping the Steinaker Service Canal from the Steinaker Reservoir to the SC turnout 3.7. When these two

phases are completed, they will be connected with a pressure reducing valve (PRV) on the phase 1 piping at the SC turnout 3.7 location. The pressure break will be removed and system pressures in Phase 2 will increase by approximately 20 psi. This will impact the pipeline pressure south of SC 3.7. See Figure 1 for map of the canals.

2.2 Piped Sections

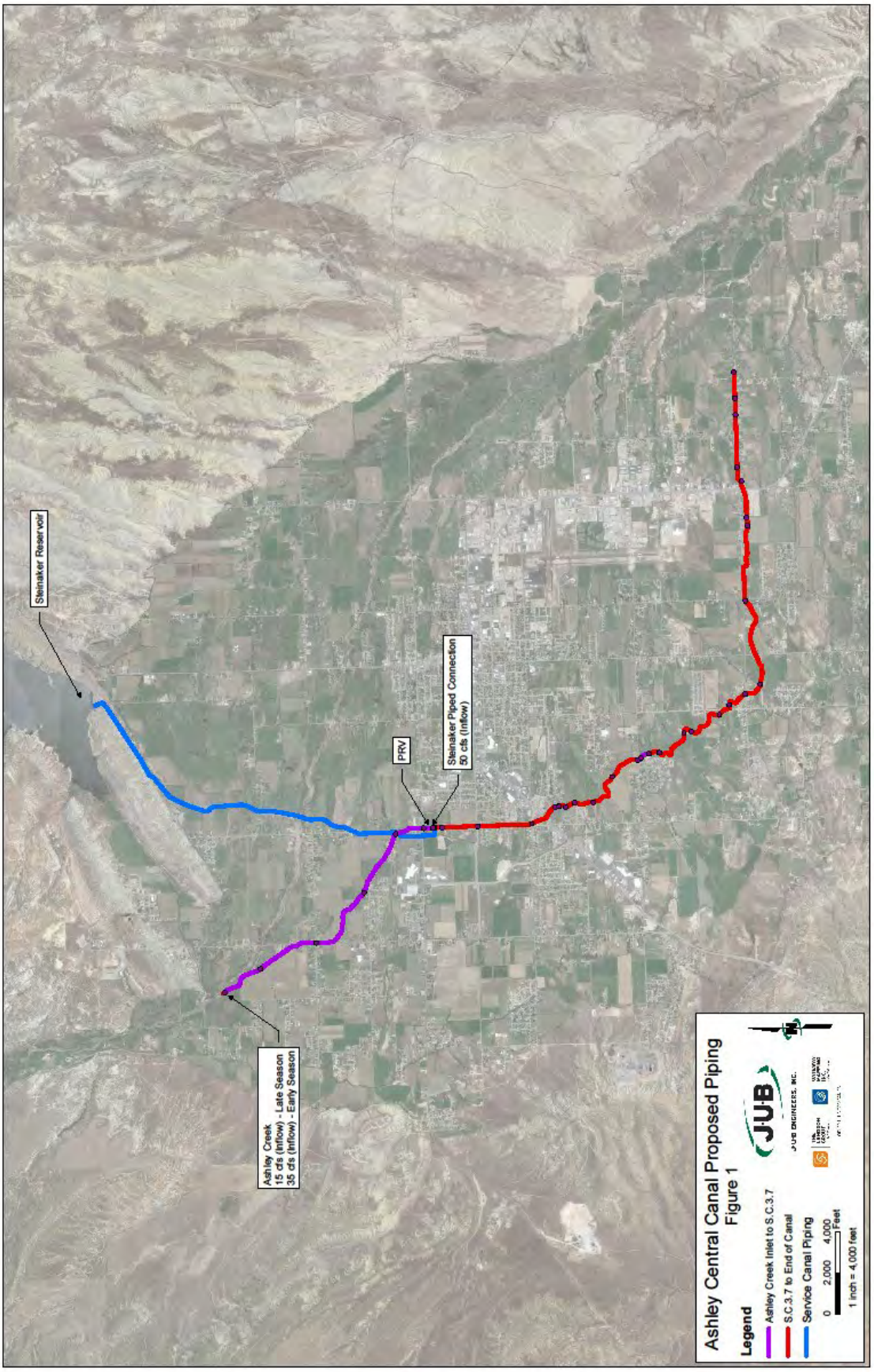
The piped canal system can generally be broken into three sections:

1. **From Sheep Creek Inlet to SC turnout 3.7**
   This section of canal was sized to convey early season high creek flows. It was determined that this section of the pipeline would be sized to convey a peak flow of 35 cfs. A maximum velocity of 5 ft/s was used to size the pipeline.

2. **From SC 3.7 to end of canal**
   This section of canal was sized to convey 65 cfs. Turnout flows are discussed in Table 1 below. A maximum velocity of 5 ft/s was used to size the pipeline.

3. **From the Steinaker Reservoir to the SC turnout 3.7**
   This section of the canal was not modeled as part of this project as it is being completed as a separate project. It was assumed that 50 cfs would enter the Sheep Creek pipeline from the piped SC.

These sections of the canal can be seen in Figure 1.


Steinaker Reservoir
PRV
Steinaker Piped Connection
30 cfs (Inflow)
Ashley Creek
15 cfs (Inflow) - Late Season
35 cfs (Inflow) - Early Season
Ashley Central Canal Proposed Piping
Figure 1
Legend
Ashley Creek Inlet to S.C.3.7
S.C.3.7 to End of Canal
Service Canal Piping
0 2,000 4,000 Feet
1 inch = 4,000 feet
JUB
J-U-B ENGINEERS, INC.

2.3 Demand Calculations

The demands and irrigated acreage at each turnout location used in the model were provided by the ACIC. The irrigated acreage at each turnout location was provided. A demand of 7 gpm/irrigated acres was used to convert the irrigated acres to the demand for each turnout. Table 1 below shows the turnout names, number of irrigated acres, and calculated demand.

Table 1. Turnout Demands Used in the Model

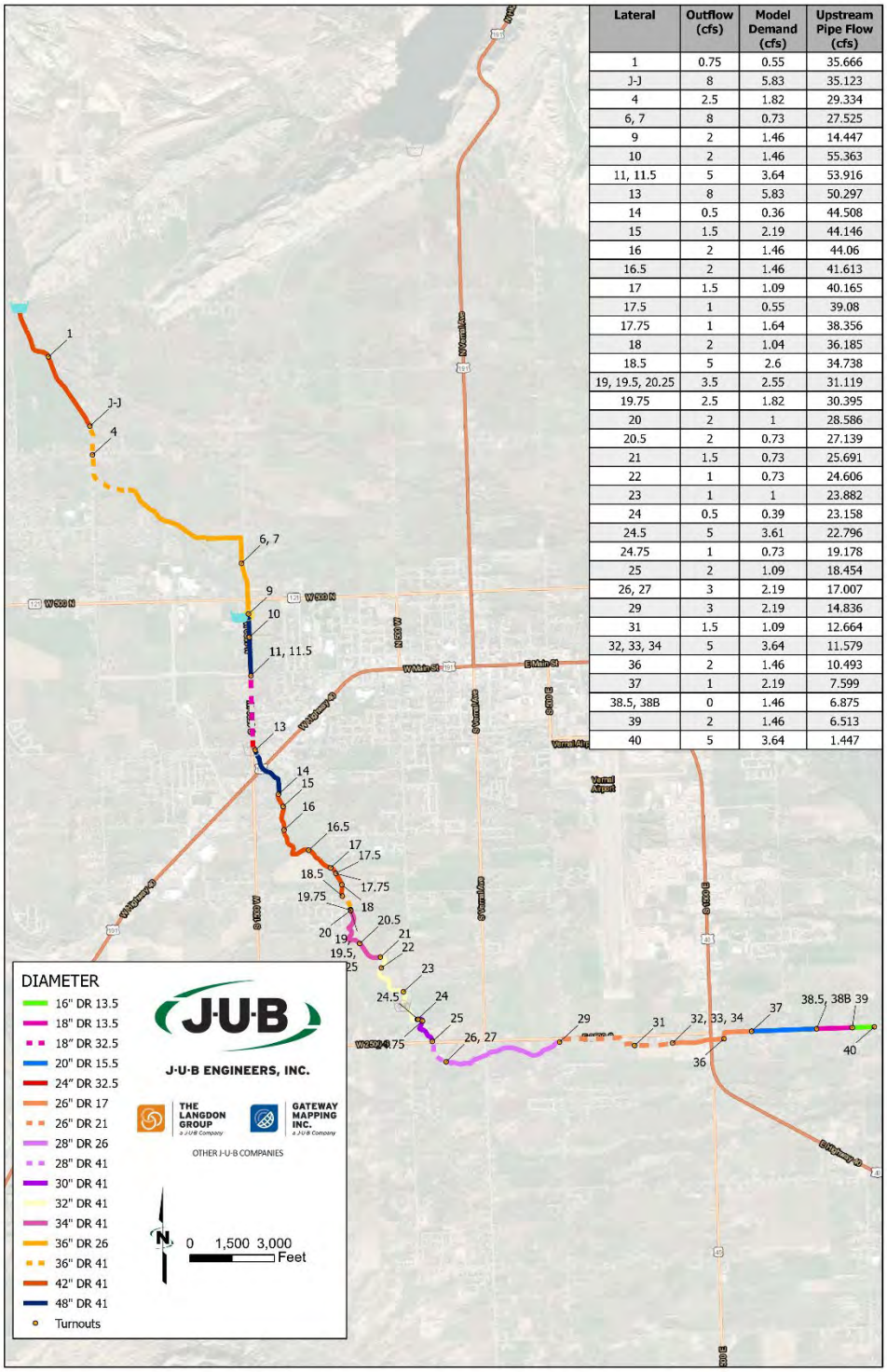
Turnout Name	Irrigated Acre	Total Demand (cfs)[1]	Turnout Name	Irrigated Acre	Total Demand (cfs)[1]	Turnout Name	Irrigated Acre	Total Demand (cfs)[1]
1	35.3	0.55	16.5	93.6	1.46	24.75	46.8	0.73
JJ	373.2	5.82	17	69.9	1.09	25	69.9	1.09
4	116.7	1.82	17.5	105.2	1.64	26, 27	140.4	2.19
6, 7	46.8	0.73	17.75	224.4	3.5	29	140.4	2.19
9	93.0	1.45	18	66.7	1.04	31	69.9	1.09
10	93.0	1.45	18.5	166.7	2.6	32, 33, 34	233.4	3.64
11, 11.5	233.4	3.64	19, 19.5, 20.25	162.9	2.54	36	93.0	1.45
13	373.8	5.83	19.75	116.7	1.82	37	140.4	2.19
14	23.1	0.36	20	64.1	1	38.5, 38B	93.6	1.46
15	140.4	2.19	20.5	46.8	0.73	39	93.6	1.46
16	93.6	1.46	21	46.8	0.73	40	233.4	3.64

[1]*Note: Used demand factor of 7 gpm/irrigated acre*

2.4 Pipe Sizes and DR Selection

The model was used to determine the pipe sizes required to provide the calculated demands in the system and maintain a peak velocity less than 5 ft/s. High density polyethylene (HDPE) pipe sizes were used. HDPE pipe is broken into “DR” ratings based on maximum service pressure in the pipe. The static pressure for each node in the model was identified and the pipe DR ratings were determined to ensure safe operation of the system.

When the Steinaker Service Canal is piped and the PRV is installed at the SC 3.7 turnout location, the pressures in the system will increase by approximately 20 psi. The DR value for each pipe below SC turnout 3.7 was calculated taking into account the increased pressure when the Steinaker Service Canal is piped. Once connected, pressure between the two systems are tied together with a PRV. Figure 2 is included below to show the pipe sizes, DR values, and pressure output of the system.



Lateral	Outflow (cfs)	Model Demand (cfs)	Upstream Pipe Flow (cfs)
1	0.75	0.55	35.666
J-J	8	5.83	35.123
4	2.5	1.82	29.334
6, 7	8	0.73	27.525
9	2	1.46	14.447
10	2	1.46	55.363
11, 11.5	5	3.64	53.916
13	8	5.83	50.297
14	0.5	0.36	44.508
15	1.5	2.19	44.146
16	2	1.46	44.06
16.5	2	1.46	41.613
17	1.5	1.09	40.165
17.5	1	0.55	39.08
17.75	1	1.64	38.356
18	2	1.04	36.185
18.5	5	2.6	34.738
19, 19.5, 20.25	3.5	2.55	31.119
19.75	2.5	1.82	30.395
20	2	1	28.586
20.5	2	0.73	27.139
21	1.5	0.73	25.691
22	1	0.73	24.606
23	1	1	23.882
24	0.5	0.39	23.158
24.5	5	3.61	22.796
24.75	1	0.73	19.178
25	2	1.09	18.454
26, 27	3	2.19	17.007
29	3	2.19	14.836
31	1.5	1.09	12.664
32, 33, 34	5	3.64	11.579
36	2	1.46	10.493
37	1	2.19	7.599
38.5, 38B	0	1.46	6.875
39	2	1.46	6.513
40	5	3.64	1.447

Figure 1. Pipe sizes, DR values, and pressure output of the Ashley Central Canal system

The purpose of this report is to present the methodology and results of the agricultural water hydraulic and hydrology analysis conducted for Proposed Project as part of the Plan-EA. Key results of the agricultural water analyses include the following:

Agricultural Results:

- System to be piped with HDPE pipe
- Maintain peak velocities less than 5 ft/s.
- Irrigation Demand of 7 gpm/irrigated acres
- After Phase 2 is complete, approximately 20 psi will be added to the system
- DR Values account for 20 psi increase after phase 2 completion

3.0 Flood Mitigation Analysis

After the irrigation canal is piped, the canal will remain as a flood control feature for Uintah County, Vernal City, and Naples City. J-U-B analyzed the runoff that currently enters the Ashley Central Canal to determine if any flooding would occur in the existing canal once the piping project is completed. Innovyze's water modeling software Infoswmm was used for the analysis. The Ashley Central Canal receives runoff from various areas. Drainage basins were delineated by Sunrise Engineering in a report they prepared for Uintah County. Shapefiles of the delineated basins were provided to J-U-B to be used in this study.

3.1 Hydrologic Model Assumptions

The NRCS curve number methodology was used in the model to determine the runoff from each of the drainage basins. Land use and soil types were calculated for each drainage basin and curve numbers were assigned for each land use and soil type combination. Table 2 below shows the curve numbers assigned.

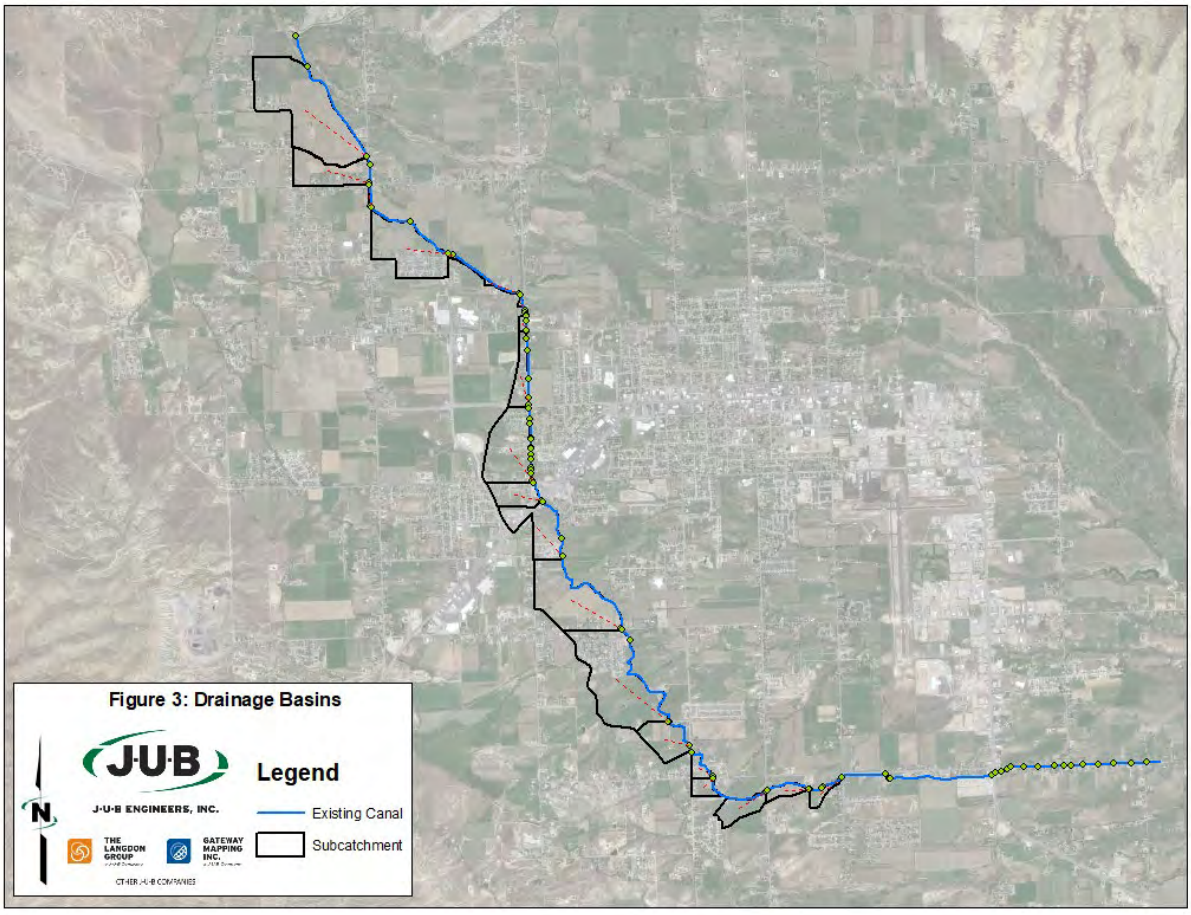
Table 2. Curve numbers used in the model

Landuse. Hydrologic Soil Classification	Curve Number	Landuse. Hydrologic Soil Classification	Curve Number
Residential 1/4 acre, A	70	Residential 1/2 acre, D	85
Residential 1/4 acre, B	82	Residential townhomes, C	92
Residential 1/4 acre, C	88	Residential 1 acre, C	83
Residential 1/4 acre, D	92	Paved with curb	98
Residential 1/8 acre, A	88	Paved NO curb	92
Residential 1/8 acre, B	90	Undeveloped Fair, A	49
Residential 1/8 acre, C	93	Undeveloped Fair, B	69
Residential 1/8 acre, D	95	Undeveloped Fair, C	79
Residential 1/2 acre, A	54	Undeveloped Fair, D	84
Residential 1/2 acre, B	70	Undeveloped Good, C	79
Residential 1/2 acre, C	80		

The drainage basins are shown in Table 3 and Figure 3 below. The canal was broken up into individual cross sections. The cross sections were delineated using survey cross sections of the canal.

Table 3. Curve numbers used in the model

Drainage Basin	Subcatchment Area (acre)	Subcatchment Slope (%)	Length (ft)	TC (Min)	Curve numbers
0	184.08	3.29	5400	133.25	54.8
1	57.56	3.21	3100	59.60	69.3
2	0.96	24.83	800	2.53	98.0
3	94.91	4.15	3500	50.22	74.4
4	2.32	10.08	2000	23.26	70.0
5	0.97	6.13	600	11.38	70.0
6	3.11	3.83	550	11.69	75.0
7	27.19	4.24	2700	34.17	80.0
8	30.96	5.36	2100	33.15	70.0
9	89.32	4.51	2900	37.18	78.1
10	55.37	4.17	3500	57.19	69.6
11	112.10	3.42	4000	61.86	74.2
12	156.12	4.93	5000	53.84	78.8
13	9.75	7.08	1000	12.89	77.5
14	39.02	4.94	2000	27.26	77.0
15	11.58	5.01	1200	22.34	69.3
16	26.57	5.37	2000	54.59	49.0
17	8.39	7.04	1500	22.38	69.6
18	11.67	7.03	1700	20.97	75.5



Rainfall depths used in the model were taken from the NOAA atlas 14 interactive map. The results are show in Table 4.

Table 4. Precipitation Amounts

Storm Drain Interval	Precipitation (Inches)
2-yr 24-hr	1.03
25-yr 24-hr	1.80
100-yr 24-hr	2.30

Canal cross sections were calculated for each segment of the canal using survey data. The culvert cross sections were input into the model and the survey data was used to identify upstream and downstream invert elevations. There are several culverts that will be slip lined when the piping of the canal is completed. The culverts that will be slip lined were modeled with a reduced width to accommodate the reduction in flow area.

3.2 Hydrologic Model Results

The open canal was analyzed to determine the capacity of each canal section from the sheet flow of the 100-year storm and there were no sections of the open canal sections that exceeded 23% of the capacity. The culverts were analyzed and are presented in table 5. Three of the culverts are at 70% or above with one culvert exceeding its capacity.

Table 5. Model Output Results for Culvert Capacities

Culvert Location	Culvert Type[1]	Dimensions (ft)	Culvert Capacity (cfs)	Modeled Max Flow (cfs)	Percent Full (%)
1500 East 2536 South	Box Culvert	3x3.8	180.6	54.4	30%
1500 N 2499 West	Box Culvert	4x5	102.2	7.0	7%
1500 South 915 West	Box Culvert	4x5.8	54.6	63.1	115%
1500 West 620 North	Box Culvert	3.5x12	426.5	18.3	4%
2000 East 2500 South	Pipe	3	71.9	50.0	70%
210 South 1500 West	Pipe	4	49.7	21.6	43%
250 South 1500 West	Pipe	5	313.5	20.3	7%
M,2500 South 1572 East	Box Culvert	3x4	124.4	50.0	40%
2500 South 450 West	Box Culvert	6x2.2	224.0	66.1	30%
2500 West 1653 North	Pipe	5.5	12.6	0.8	6%
200 East 2600 South	Pipe	3	61.0	49.6	81%
400 South 1500 West	Ellipse	4.6x6.7	82.0	49.6	60%
500 North 1500 West	Box Culvert	2.6x13.3	317.1	18.4	6%
500 South 1500 West	Box Culvert	3x8	298.8	46.4	16%
500 West 2350 South	Box Culvert	4x5	112.5	70.4	63%
1450 West HWY-40	Box Culvert	4x10.5	334.4	51.0	15%
1500 West Main Street	Ellipse	3x4.3	175.5	21.2	12%
2600 South Vernal Ave	Box Culvert	6x2.3	299.6	62.1	21%

Note 1: All box culverts are shown at reduced size to allow for slip lined canal pipe.

Naples City intends to pipe the lower portion of the canal from the crossing at 1572 East and 2500 South to the end of the canal. This pipe was sized to convey 35 cfs at 1% slope and 1 foot of freeboard in the pipe. The pipe size was calculated to be 36” RCP. The 1 foot of freeboard would only allow about 10 cfs of additional flow in the bottom piped section.

3.3 Flood Mitigation Conclusions

The purpose of this report is to present the methodology and results of the agricultural water hydraulic and hydrology analysis conducted for the Proposed Project as part of the Plan-EA. Key results of the agricultural water analyses include the following:

Hydrology Results:

- Peak flow in the canal = 51 cfs
- Pipe size required from 1572 East and 2500 South to the end of the canal = 36” RCP at 1.0% slope
- All open canal sections were below 23% capacity of the canal section analyzed
- For culvert capacity and flows see table 5 above

4.0 Floodwater Analysis

The floodwater system was analyzed as part of the Plan-EA for the Ashley Valley Watershed Project. Flood control in the valley is discussed in the 2017 Ashley Valley Flood Control Study and Cost Benefit Analysis completed by Sunrise Engineering (Appendix E). Sunrise Engineering completed the floodwater modeling and analysis that was used for this Proposed Project.

4.1 Ashley Valley Watershed Overview

The Ashley Valley watershed has two main watersheds, the Coal Mine and Yellow Hill watersheds. The floodwaters are collected west of Maeser, Utah and transferred and combine through drainage channels to Highline and Ashley Upper Canals. When storm intensities exceed the capacity of Highline Canal, the canal overtops, and floodwaters are intercepted by the Ashley Upper Canal. If floodwaters exceed the capacity of the Ashley Upper Canal, waters will continue in their historic drainages towards their outlet to the southeast. The Highline and Ashley Upper Canals do not connect to Ashley Central Canal nor Ashley Creek. Highline and Ashley Upper Canal have a diffuse outlet in the Ashley Valley, near the base of Asphalt Ridge, approximately 3 miles south of the Ashley Central Canal terminus. For storm events that exceed the capacity of the basins and Highline and Ashley Upper Canals, floodwaters may spread diffusely over the floodplain below Coal Mine and Yellow Hills drainages. In that scenario, floodwaters could reach Ashley Creek. Tailwater from these canals is conveyed through a web of natural channels that drain toward the Green River. Currently, the watersheds outfall is uncontrolled.

4.2 Ashley Valley Watershed Detention Basins

Coal Mine and Yellow Hill flood control basins modeling and sizing was done by Sunrise Engineering as part of the Investigation and Analyses Report for the Plan-EA. The NRCS curve number methodology was used in the model to determine the runoff from each of the drainage basins. Land use and soil types were calculated for each drainage basin and curve numbers were assigned for each land use and soil type combination. The average point rainfall depths in

the project watershed were obtained from the NOAA Precipitation-Frequency Atlas 14. A list of the input parameters and flow outputs can be found in the Appendix D.

4.2.1 Flood Model

The 500-, 200-, 100-, 50-, 25-, 10-, 5-, and 2-year storm events runoff flow and storage was provided, that incorporates the canal improvements from a separate funded project that will being constructed prior to the construction of the detention basins.

4.2.2 Watershed Model Analysis

The proposed detention basins for Coal Mine and Yellow Hills were sized to detain the 10-year storm event because of budget and placement constraints. The proposed flood control detention basins have a storage capacity of 72.3 ac-ft and 68.4 ac-ft for the Yellow Hills and Coal Mine detention basins, respectively. The modeling input parameters and results were provided by Sunrise Engineering. The watershed boundaries in *Figure* 4 were delineated using 2018 Lidar.

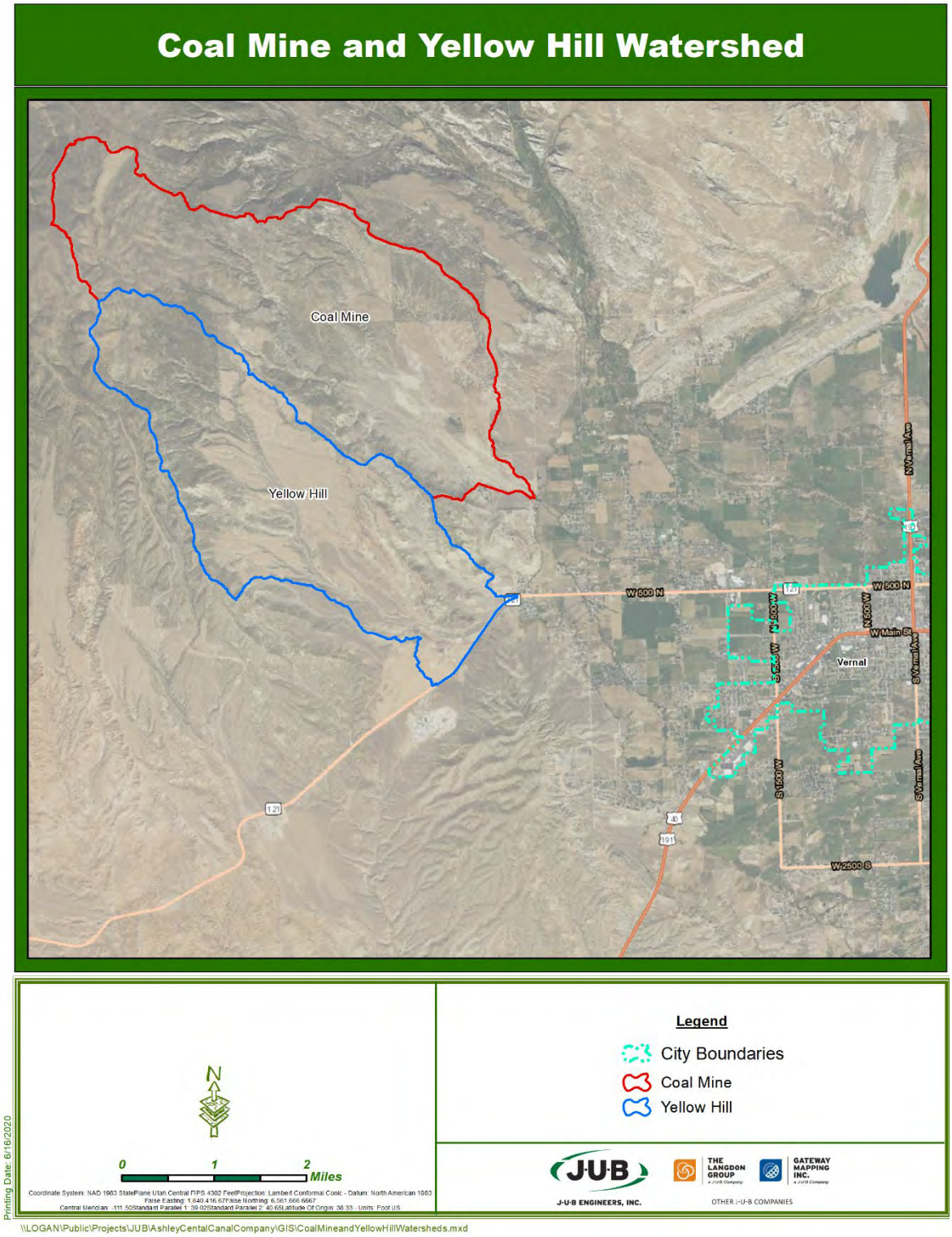


Figure 4: Coal Mine and Yellow Hill Watershed Boundaries

Table 6 and Table 7 below show the totalized flooding flows and volumes for each of the storm events. Flooding was identified as any runoff. The flood flows were then loaded into HEC-RAS 2D model.

Table 6: Coal Mine Totalized Flooding for Existing Scenario

Storm Event	Sum Peak Flooding (cfs)	Flooding Volume (ac ft)	Peak Time (hrs)	Flooding Duration (hrs)
2-Year	0	0	0	0
5-Year	28	4.8	3.5	7.1
10-Year	108	30.3	4.1	16.6
25-Year	273	86.5	3.3	21.2
50-Year	449	143.3	3.3	22.4
100-Year	665	210.3	3.3	22.8
500-Year	1370	419.5	2.2	23.4

Table 7: Yellow Hill Totalized Flooding for Existing Scenario

Storm Event	Sum Peak Flooding (cfs)	Flooding Volume (ac ft)	Peak Time (hrs)	Flooding Duration (hrs)
2-Year	0	0	0	0
5-Year	67	11.5	3.4	7.7
10-Year	202	41.5	3.1	13.3
25-Year	448	102.1	3.1	19.9
50-Year	700	163.7	3.2	21.2
100-Year	996	234.8	3.5	21.5
500-Year	1926	450.3	5.9	22.8

The 2D hydraulics were performed by Sunrise Engineering and HEC-RAS 2D model was used to model the surface flows from the hydrologic model. HEC-RAS 2D is a 2-dimensional surface water model that calculates where water will travel in all directions via overland flow. The upstream boundary conditions are the outflow hydrographs from the hydrologic HEC-HMS model and the downstream boundary conditions were assumed to be normal depth with an assumed slope that was calculated based on the LiDAR terrain. See Figure 5 for inflow hydrographs and boundary condition locations. Culvert sizes and location were not surveyed, so they were not modeled in the existing or proposed hydraulic HEC-RAS modeling.

The Urban Floodplain Maps (Map 6) in Appendix C of the Plan-EA show the results from the HEC-RAS model. The HEC-RAS model was used to identify the number of structures and

agricultural land that would be flooded during each storm event. Table 8 identifies the total number of homes, commercial buildings, and acres of agriculture land that would be flooded without detention ponds.

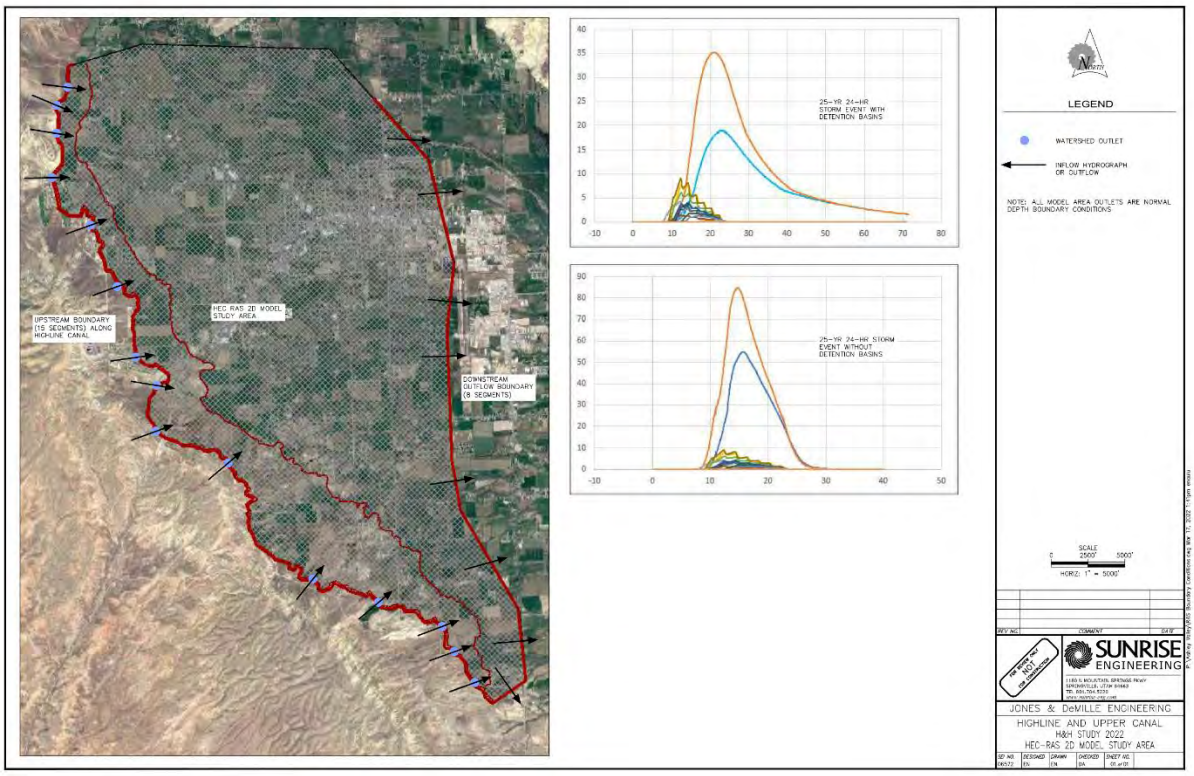


Figure 5: Hydraulic Model 2D Domain and Boundary Conditions

Table 8: Summary of Flooding Impacts of Existing Scenario

Flooded Structures/Land	Depth (ft)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Number of Residential Homes	<1	3	91	188	298	390	488	535
	1-3	-	8	13	22	27	34	40
	>3	-	2	2	4	6	8	8
Number of Mobile Homes	<1	-	-	-	1	1	1	1
	1-3	-	-	-	-	-	-	-
	>3	-	-	-	-	-	-	-
Number of Commercial Structures	<1	-	7	29	45	69	117	136
	1-3	-	1	1	3	6	12	13
	>3	-	-	-	-	-	-	-
Number of Other Structures	<1	-	-	-	-	-	2	4
	1-3	-	-	-	-	-	-	-
	>3	-	-	-	-	-	-	-
Number of Roadways	<1	2	49	82	111	127	140	148
	1-3	1	2	5	8	17	21	24
	>3	-	1	1	1	1	1	1
Agricultural (Acres)	<1	3.0	138.9	307.6	458.4	548.3	632.1	662.4
	1-3	0.6	10.1	24.1	42.4	61.8	82.8	87.8
	>3	-	0.9	2.4	7.6	9.8	11.9	13.1

4.2.3 Proposed System Model Analysis

The capacity of the Coal Mine and Yellow Hill proposed detention pond were determined to be 68.4 ac-ft and 72.3 ac-ft, respectively. The Yellow Hill basin will outfall to the Highline Canal and the Coal Mine basin will outfall to the Ashley Upper Canal. The Highline and Ashley Upper Canals were sized to handle the minimum 10-year storm event. When storm intensities exceed the capacity of Highline Canal, the canal overtops, and floodwaters are intercepted by the Ashley Upper Canal. If floodwaters exceed the capacity of the Ashley Upper Canal, waters will continue in their historic drainages towards their outlet to the southeast. The Highline and Ashley Upper Canals do not connect to Ashley Central Canal nor Ashley Creek. Highline and Ashley Upper Canal have a diffuse outlet in the Ashley Valley, near the base of Asphalt Ridge, approximately 3 miles south of the Ashley Central Canal terminus. For storm events that exceed the capacity of the basins and Highline and Ashley Upper Canals, floodwaters may spread diffusely over the floodplain below Coal Mine and Yellow Hills drainages. In that scenario, floodwaters could reach Ashley Creek. Tailwater from these canals is conveyed through a web

of natural channels that drain toward the Green River. The storm events listed above were routed through the proposed detention ponds and the flooding totals were calculated. Table 9 and Table 10 shows the totalized flood flows and volumes for this scenario.

Table 9: Coal Mine Totalized Flooding for Proposed Scenario

Storm Event	Sum Peak Flooding (cfs)	Peak Basin Storage (ac ft)	Flooding Volume (ac ft)	Peak Time (hrs)	Flooding Duration (hrs)
2-Year	0	10	0	0	0
5-Year	0	26	0	0	0
10-Year	0	42	0	0	0
25-Year	54	69	32.4	6.7	32.7
50-Year	221	74	143.3	5.2	31.1
100-Year	443	80	153.6	3.9	32.4
500-Year	1261	92	362.2	2.5	33.4

Table 10: Yellow Hill Totalized Flooding for Proposed Scenario

Storm Event	Sum Peak Flooding (cfs)	Peak Basin Storage (ac ft)	Flooding Volume (ac ft)	Peak Time (hrs)	Flooding Duration (hrs)
2-Year	0	16	0	0	0
5-Year	0	32	0	0	0
10-Year	0	53	0	0	0
25-Year	127	75	40.9	5.5	43.5
50-Year	368	81	100.3	3.8	26.5
100-Year	706	87	170.7	3.3	27.6
500-Year	1753	99	386.6	3.2	29.0

The flows from Table 9 and Table 10 were loaded into the HEC-RAS 2D model to determine the flooding extents for each of the storm events. Table 11 shows the totalized impacts of the storm event scenarios in the HEC-RAS 2D model. It was determined in the Ashely Valley Flood Control Analysis that the Highline and Ashley Upper Canals have the capacity to convey up to the 10-year storm event. Storm events from the 10-year and lower do not cause any flooding because the Highline and Upper Canals have capacity to convey the runoff flow without causing flooding.

Table 11: Summary of Flooding Impacts of Proposed Scenario

Flooded Structures/Land	Depth (ft)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Number of Residential Homes	<1	-	1	5	43	197	256	471
	1-3	-	-	-	1	13	20	34
	>3	-	-	-	1	2	3	8
Number of Mobile Homes	<1	-	-	-	-	-	1	1
	1-3	-	-	-	-	-	-	-
	>3	-	-	-	-	-	-	-
Number of Commercial Structures	<1	-	-	-	1	30	39	106
	1-3	-	-	-	-	2	3	10
	>3	-	-	-	-	-	-	-
Number of Other Structures	<1	-	-	-	-	-	-	-
	1-3	-	-	-	-	-	-	-
	>3	-	-	-	-	-	-	-
Number of Roadways	<1	-	1	7	30	84	111	138
	1-3	-	-	1	2	5	9	19
	>3	-	-	-	-	1	1	1
Agricultural (Acres)	<1	1.1	2.8	27.1	106.9	323.4	387.2	585.1
	1-3	0.1	0.6	3.6	12.8	28.9	38.9	77.6
	>3	-	-	0.1	1.5	3.2	4.6	11.8

4.3 Flood Control Requirements

Based on the Ashely Valley Flood Control Analysis, the Coal Mine and Yellow Hill watersheds flood control basins will provide additional flood protection to downstream home and landowners. Base on the budget these have been sized for to fully control up to the 10-year storm event. These ponds will restrict outflows into the natural open channel streams to reduce the risk of downstream flooding.

5.0 Conclusions

This report presents a summary of the methodology and results of the floodwater and hydraulic and hydrology analysis conducted for Coal Mine and Yellow Hill watershed as part of the Plan-EA. Key results of the analyses include the following:

- Total floodwater detention capacity is 68.4 and 72.3 acre-feet for the Coal Mine and Yellow Hill detention basins, respectively.

6.0 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.

7.0 References

ESRI ArcMAP Version 10.6.1

UINTAH RECREATION BOARD MEETING
AUGUST 10, 2022
MINUTES

BOARD ATTENDING:
Kam Pope (Chair)
Dennis Stevens (Vice Chair)
Allen Huber
Bart Haslem
Brett Prevedel
Gordon Kitchen
Nicholas Porter
Cheryl Meier (Alternate 1)
Jamey Smuin (Alternate 2)

EXCUSED:

ABSENT:

STAFF ATTENDING:
Kris Abegglen
Sue Slaugh
Shawna Weaver

GUESTS ATTENDING:
See sign-in sheet

Meeting held at 610 South Vernal Ave., Vernal, Utah.

PLEDGE OF ALLIEGIANCE/ PRAYER OR INSPIRATIONAL THOUGHT
Brett led the pledge and Cheryl said the prayer/inspirational thought.

APPROVAL OF PREVIOUS MINUTES
Nick made the motion to approve the July 2022 Board minutes as presented, seconded by Gordon. Nicholas, Gordon, Bart, Allen, Brett, Kam, and Dennis were all in favor, resulting in the motion passing.

ULGT – WENDY HARRIS AWARD
Mike Stagg with Utah local Government's Trust introduced himself to the Board and explained the parameters of the Aquatics Safety Award. ULGT awarded Wendy Harris with the 2021 Aquatic Safety Award for outstanding service and safety at the Uintah Recreation Aquatics department.

OPERATIONAL REPORT
None.

ACTION LOG
Bryan Meier addressed the Board regarding the Pickleball courts to be built at Independence Park, stating they engineering company is looking for new bids on the project in hopes of lowering the cost of the project.

PUBLIC INPUT (7:30 pm) (Revisited due to public confusion)
Several members of the public addressed the Board regarding the Master Plan. Cheryl explained the process of the Master Plan and stated the plan was and will continue to change due to time, money, and community needs.

MASTER PLAN UPDATE
Bart Jensen with Jones and DeMille addressed the Board on the status of the Master Plan Update stating that all comments from the open house had been complied. He stated they are completing a report of all suggestions and input.

KIDS CANAL – BART HASLEM
Bart addressed the Board regarding a section of the Kids Canal that is currently owned by the Recreation District. He stated Uintah County is anticipating PILT money that could be allocated towards the canal parkway to help with improvements, keeping an open water area and the piping of the lateral from the canal.

Bart made the motion to commit to continue maintaining the Kids Canal Parkway, and that we look for water that we can run down the canal up to $150,000 that will be funded by PILT money from the County, and NRCS money. Seconded by Dennis. Roll call: Nicholas; yes, Gordon; yes, Bart; yes, Allen; yes, Brett; yes, Kam; yes, and Dennis; yes.

ASHLEY BACK STOPS
Jerry Slaugh informed the Board of the safety concerns and pricing for back stops at the Ashley Park ball diamonds. He stated bids for materials have been acquired and bids for installation are anticipated.

POLICY 530 – USE OF DISTRICT EQUIPMENT – 2ND READING
Bart made the motion to approve Policy 530 – Use of District Equipment on second reading, seconded by Nicholas. Nicholas, Gordon, Bart, Allen, Brett, Kam, and Dennis were all in favor, resulting in the motion passing.

POLICY 400 – LEAVE- 2ND READING
Gordon made the motion to approve Policy 400 – Leave on second reading, seconded by Brett. Nicholas, Gordon, Bart, Allen, Brett, Kam, and Dennis were all in favor, resulting in the motion passing.

REVIEW TIER 2 ELIGIBILTY STATEMENT FOR APPOINTED AND ELECTED OFFICIALS
Shawna addressed the Board on the status of the Utah Retirement Service compliance audit. It is noted that the URS recommends the Recreation District creates a statement that says," Tier 2 appointed and elected officials for the Uintah Recreation Special Service District are all part time and ineligible to receive Utah State Retirement benefits".

UPDATE ON SPECIAL SERVICE DISTRICT #1/CONTINUATION OF PRESENT BOARD
Kam stated that Kris and himself had met with the Uintah County attorney and were anticipating to have the payables and payroll all switched over by October of 2022. He also stated that things were moving along and Impact Mitigation will soon be absorbed and then the Recreation District.

COMMITTEE REPORTS
None.

FINANCE REPORT
Included in Board packet.

CLOSED MEETING
None.

ACTION TAKEN AS NECESSARY PURSUANT TO CLOSED MEETING
None.

Nicholas made the motion to adjourn, seconded by Kam. Nicholas, Gordon, Bart, Allen, Brett, Kam, and Dennis were all in favor, resulting in the motion passing.

The meeting adjourned at 8:02 pm.

The above Board minutes were finalized and approved on September 14, 2022.

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Kam Pope, Chair

UINTAH RECREATION BOARD MEETING
September 14, 2022
MINUTES

BOARD ATTENDING:
Kam Pope (Chair)
Dennis Stevens (Vice Chair)
Bart Haslem
Brett Prevedel
Nicholas Porter
Cheryl Meier (Alternate 1)
Jamey Smuin (Alternate 2)

EXCUSED:
Allen Huber
Gordon Kitchen

ABSENT:
Bart Haslem

STAFF ATTENDING:
Kris Abegglen
Shawna Weaver
Jaben Carter
Joe Barton

GUESTS ATTENDING:
See sign-in sheet

Meeting held at 610 South Vernal Ave., Vernal, Utah.

PLEDGE OF ALLIEGIANCE/ PRAYER OR INSPIRATIONAL THOUGHT
Brett led the pledge and Jamey said the prayer/inspirational thought.

APPROVAL OF PREVIOUS MINUTES
Brett Prevedel suggested clarification on August meeting minutes prior to approving minutes. Line 38 should be clarified to say Uintah Recreation District will use PILT funds from the County to purchase water shares. Brett made the motion to approve the August 2022 Board minutes with clarification, seconded by Nicholas, Jamey, Kam, and Dennis were all in favor, resulting in the motion passing.

PUBLIC INPUT
Monica – Jensen Pumpkin Festival – Asked for waiver of park fee for the Jensen Pumpkin Festival in Jensen on 10/29. Cheryl made a motion to approve. Dennis seconded. Roll call: Jamey: yes; Nicholas: yes; Brett: yes; Kam: yes; Dennis: yes. Motion passed.

OPERATIONAL REPORT
The Lapoint park piping project will be completed by Backhoe Supremo at the end of this month, and take 7-10 days to complete. This project will assist in preserving water shares, and it meets the criteria that we agreed to with Lapoint Park. The deadline to put our water shares to use is 2024. We have a total of 7 shares.

ACTION LOG

INTRODUCTION – GOLF PRO AND PAYROLL/AP COORDINATOR

Kris Abegglen made introductions of new employees Joe Barton, Golf Professional, and Jaben Carter, Payroll/AP Coordinator.

MASTER PLAN UPDATE

Kam Pope stated that a masterplan is something we have to complete every so many years. If plans do move forward sooner than later, steps will be taken to protect personal property. There are many steps, including funding, prior to finalizing a plan and breaking ground.

Jones and DeMille Engineering distributed a master plan with comments from the open comment meeting. The document is available via pdf document. Post it notes are intact in their office if anyone would like to review.

Majority of comments are positive and many people had good suggestions. Should project go forth, after funding, the comments shape what will actually move forward. Brett Prevedel asked if the project would be done in phases, and what would be done first. The Board would decide and prioritize. Kam requested that we're mindful of what is built, and thoughtful of the build process if it ever moves forward.

PUBLIC

Shayla Erickson asked how and when people should deliver suggestions moving forward. She asked when suggestions would be considered.

Public notices for future changes to the Masterplan will be announced via newspaper, radio, social media, agenda, which can be found on Utah Public Notice website (UPN.gov). Cheryl explained how to sign up for email alerts on UPN.gov. UPN.gov / Special Service District / Uintah Recreation District / enter name and email to receive alerts.

Kris Abegglen added that master plans must be done in order to receive funding.

ASHLEY VALLEY BACKSTOPS

Kris Abegglen received a quote from Sports Field Specialties. Quote is $188,000.00 for everything but the cement work and the foundation work around the 4 backstops.

We should be able to fund this with a portion of the $270,000.00 County PILT money as long as we have help with demolition and pouring of foundations.

Kris recommended to bid cement and foundation work around the 4 backstops. Timing of this project is late fall or early spring. As you remember, we previously budgeted capital money of $25,000.00 that had been budgeted for repairs that has not been used. Kris will handle bids.

Soil samples have been completed in 6 different locations. All done for future work. Have not received test results back yet.

KIDS CANAL / WATER SHARES

Kris stated Uintah Recreation District is involved from a minimal maintenance standpoint. Most are aware of the meetings and concerns with the Kids Canal. We are trying to get enough water to enhance, keep open, maintain historic significance of canal, but we're also responsible for the water. Waiting for Engineer to let us know how much water is in canal. Would like to error on having too many shares. PILT money from County has been received and a portion of that will be used to purchase water shares. Kris stated we should buy as many water shares as possible.

Nicholas stated that the water in question runs from 500 North to Main. Brett stated that the water moves to the golf course. We are purchasing water to compensate for the loss of water that is not reaching the golf course.

Kris stated they would fund upwards to $150,000 to purchase water. Kris would like to purchase 6 or 7 primary shares plus 30-40 fall water shares. Dennis Stevens asked how we find the water shares. He stated it will be difficult to find a party willing to part with water shares. The Water District will let us know over the next few months what is available to purchase. We'll purchase as we find them.

Kris stated that we have access to Red Fleet water ($1400) – Kris requested the water be released to the golf course because parks have had to use some of the golf course water this year.

Jamey asked if a meter has been installed to see what the school uses. Cheryl thought it was installed. Kris stated the School District owns 5 out of the 7 primary shares. Cheryl made a motion to purchase water shares as they come available, up to $100,000.00; Nicholas Porter seconded. Roll call: Jamey: yes; Cheryl: yes; Brett: yes; Kam: yes; Dennis: yes. Motion passed.

UINTAH COMMUNITY CENTER DAYCARE LOGISTICS

Kris Abegglen explained how busy the daycare is. One solution may be adding a morning fitness class. The large Conference Room is 782 sq ft. The current daycare room is 532 sq ft. The outdoor daycare grass section needs paved, rubber mats need to be added to cement area.

UPDATE ON SPECIAL SERVICE DISTRICT #1/CONTINUATION OF PRESENT BOARD

Dan Dilsaver stated that the County Commission docket for next Monday includes a vote regarding the Mitigation District.

Kris Abegglen stated that he has learned that URS and PEHP have a process to complete to ensure coverage.

COMMITTEE REPORTS

None.

FINANCE REPORT
Included in dropbox.

CLOSED MEETING
None.

ACTION TAKEN AS NECESSARY PURSUANT TO CLOSED MEETING
None.

Nicholas made the motion to adjourn, seconded by Dennis. Nicholas, Brett, Jamey, Cheryl, Kam, and Dennis were all in favor, resulting in the motion passing.

The meeting adjourned at 8:02 pm.

The above Board minutes were finalized and approved on October 11, 2022.

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Kam Pope, Chair

ASHLEY CENTRAL IRRIGATION COMPANY
44 WEST 100 NORTH
VERNAL, UT 84078

October 12, 2022

RE: Central Canal Pipeline Rehabilitation Project
Kids Canal Parkway

To Whom It May Concern,

The Directors of the Central Canal are currently in negotiations to purchase the 2 Shares of Central Capital Stock requested for this project. If needed to meet deadlines, the shares could be issued from Treasury Stock.

Also, there are 15 shares of Central "S" Stock earmarked and already set aside for this project.

Once the shares have been secured, they can then be purchased and added to the existing account under the name of Uintah Recreation District or titled differently at their request.

Sincerely,

Wayne Simper, President
Ashley Central Irrigation Company

435-789-3212 ashleywater@stratanet.com Fax: 435-781-0515

J·U·B ENGINEERS, INC.

EXPLANATORY MEMO

Date:	August 11, 2021
To:	NRCS - Utah
Cc:	
From:	Brian Deeter, PE J-U-B ENGINEERS, Inc.
Project:	Ashley Valley Watershed Plan-EA
Subject:	Flood Control Projects

1.0 Introduction

Uintah County (County) contracted with J-U-B ENGINEERS, Inc. (J-U-B) in 2019 to complete a Watershed Plan-Environmental Assessment (Plan-EA) for the Ashley Valley Watershed Flood and Irrigation Project (Ashley Valley). Part of the Scope of Work included two detention basins, one located in the Coal Mine Basin Drainage and one in the Yellow Hills Drainage west of Vernal City. In addition, the Ashley Valley Plan-EA included reshaping and converting the Ashley Central Canal to a flood control facility, post installation of irrigation water piping.

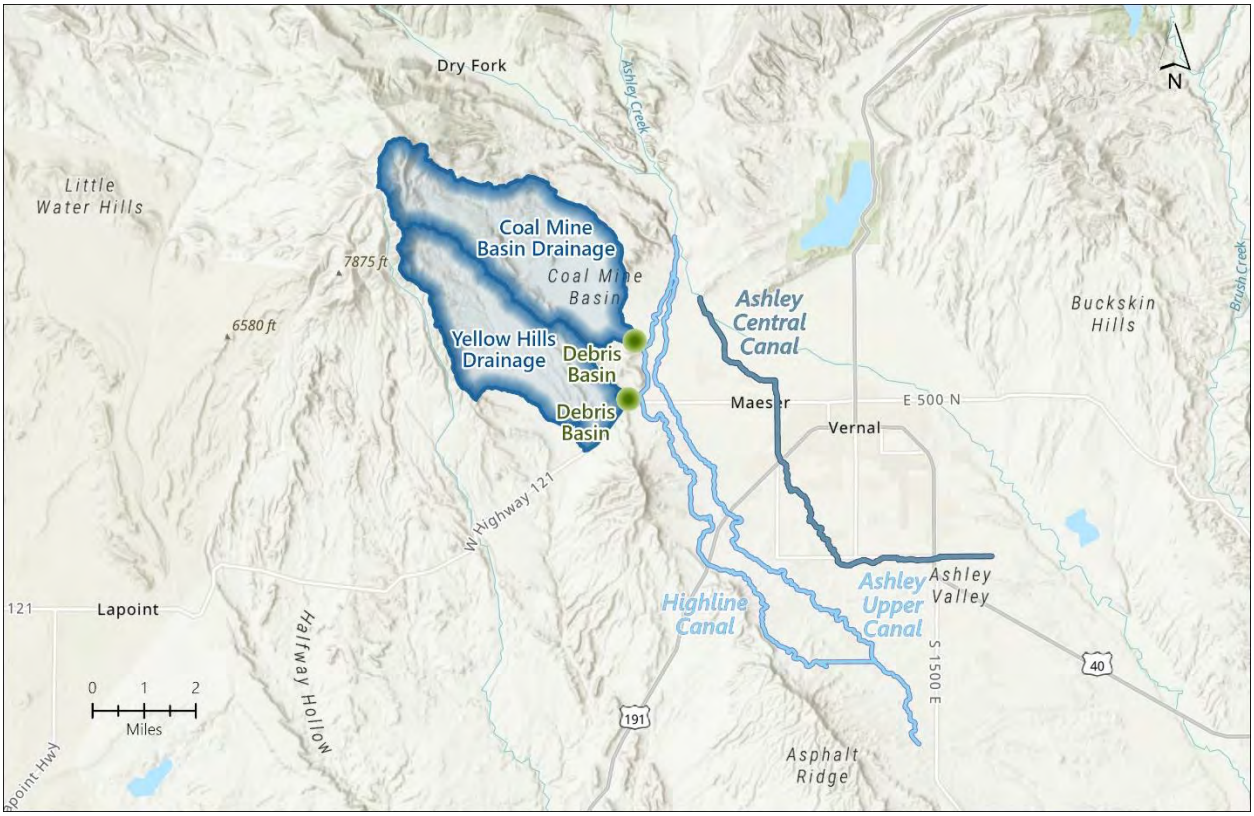
In 2017, the Uintah County Water Conservancy District received funding through the Natural Resources Conservation Service (NRCS) Regional Conservation Partnership Program (RCPP) and contracted with Sunrise Engineering to complete the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project. The purpose of this memo is to describe the following:

- The status of the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project.
- The interaction between the Ashley Valley Watershed Flood and Irrigation Project and the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project.

Figure 1 shows the following elements:

- The Ashley Central Canal
- The Highline and Ashley Upper Canals
- The Yellow Hills and Coal Mine Basin drainages
- The Yellow Hills and Coal Mine Basin detention basins

Figure 1. Highline, Ashley Upper and Ashley Central Canals & Detention Basins



2.0 Highline and Ashley Upper Canals Historic Role in Flood Control

The Highline Canal was completed in 1916 and the Ashley Upper Canal was constructed in 1880. Both canals are oriented perpendicular to the Yellow Hills and Coal Mine Basin drainages. From the date of their construction, both canals have intercepted floodwaters from these drainages. The Highline and Ashley Upper Canals were sized to handle the 10-year storm event. When storm intensities exceed the capacity of Highline Canal, the canal overtops, and floodwaters are intercepted by the Ashley Upper Canal. If floodwaters exceed the capacity of the Ashley Upper Canal, waters will continue in their historic drainages towards their outlet to the southeast. The Highline and Ashley Upper Canals do not connect to Ashley Central Canal nor Ashley Creek. Highline and Ashley Upper Canal have a diffuse outlet in the Ashley Valley, near the base of Asphalt Ridge, approximately 3 miles south of the Ashley Central Canal terminus. For storm events that exceed the capacity of the basins and Highline and Ashley Upper Canals, floodwaters may spread diffusely over the floodplain below Coal Mine and Yellow Hills drainages. In that scenario, floodwaters could reach Ashley Creek. Tailwater from these canals is conveyed through a web of natural channels that drain toward the Green River.

3.0 Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project

The Uintah County RCPP Project will reshape and improve approximately 63,400 feet of the Ashley Upper Canal and 66,000 feet of the Highline Canal as flood control facilities. The improvements also include a diversion to send higher flows from the Highline Canal to the Ashley Upper Canal before some of the structure restrictions on the Highline Canal. In particular, these restrictions include a tunnel cut through the rock just above Highway 40 and also the Highway 40 crossing itself. The canal improvements are designed to contain, and route runoff flows and controlled flows from the west side of Ashley Valley, including flows from the Coal Mine and Yellow Hills Basins, as well as other smaller basins too. The canals are designed and modeled to handle the minimum 10-year 24-hour storm.

- The project will not divert any floodwaters out of the natural drainages beyond what has already been occurring for the past 130 years.
- The canal improvements were sized to handle at minimum the 10- year 24-hour storm.
- Hydrologic modeling was completed for the 10- to the 100-year storm events. The hydraulic modeling was done to determine the existing and proposed canals' capabilities to handle the proposed minimum 10-year storm event.
- More detail can be found in the Uintah Water Efficiency Project Plan-EA.

3.1 Project Status

The NEPA documentation and design are complete and construction is currently underway for the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project. To date, construction is complete on the Highline Canal and construction of the Ashley Upper Canal is scheduled to be complete by April 2022. Given that the project will be completed prior to the construction of the Ashley Valley Watershed Flood and Irrigation Project, the implementation of the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project is considered to be an existing condition for the analysis included in the Ashley Valley Plan-EA.

3.2 Economics

Economic benefits concerning the Highline and Ashley Upper Canals Flood Channel Reshaping Project can be found in the Uintah Water Efficiency Project Plan-EA. The economic costs and benefits of this project have been calculated separate from any other current or future projects in the area, i.e. the Ashley Valley Watershed Plan- EA which only includes improvements to Ashley Central Canal and construction of the Coal Mine and Yellow Hills Detention Basins.

4.0 Ashley Valley Flood and Irrigation Project

4.1 Yellow Hills and Coal Mine Basin Detention Basins

The Ashley Valley Watershed Flood and Irrigation Project, which is being evaluated in the Ashley Valley Watershed Plan-EA, includes the Yellow Hills and Coal Mine Detention Basins. These basins are independent from the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project, as that project will be constructed prior to the commencement

of the Ashley Valley Watershed Project. These detention basins do not divert floodwaters out of their respective historical drainages but rather reduce peak flood flows from Yellow Hills and Coal Mine drainages.

The Ashley Valley Watershed Plan-EA includes the hydrologic and hydraulic modeling as well as the design of the Yellow Hills and Coal Mine Basin Detention Basins. The basins both would receive and detain runoff from their respective drainages. The modeling includes storm return periods of 2 through 500 years. The modeling includes flood inundation mapping below the two drainages both with and without the basins in place. The modeling includes the channel reshaping from the Highline and Ashley Upper Canals Flood Channel Reshaping and Modeling Project as an existing condition. The following information is included in the design and modeling of the Yellow Hills and Coal Mine Detention Basins:

- The basins are sized to detain a 10-year 24-hour storm event.
- Hydrologic and hydraulic modeling were performed routing the 2- through 500-year storms through the basins and through the downstream floodplain which included a significant area of residential and commercial development.
- Appendix D of the Plan-EA and Technical Memorandum 001 (TM 001) contain a more detailed description of the design hydrology (TM 001 is in Appendix E).

4.1.1 Economics

Hydrologic modeling and hydraulic routing from the Coal Mine Basin and the Yellow Hills drainages performed both without the proposed detention basins and with the basins yielded inundation mapping that identified impacted structures. The details about those economic impacts are included in the Ashley Valley Watershed Plan-EA.

4.2 Ashley Central Canal Flood Control Channel

The Ashley Valley Watershed Plan-EA is also evaluating the piping of the Ashley Central Canal. The canal will be piped and the open canal prism will be reshaped and converted to a flood control channel. The channel will collect flows from existing adjacent drainage areas that currently confluence into the channel. Through modeling, the channel was shown to have capacity to convey up to a 100-year 24-hour storm without any flooding. The Ashley Central Canal is not hydraulically connected to the Yellow Hills or Coal Mine Basin drainages.

4.2.1 Economics

The channel was shown to handle the 100-year 24-hour storm. No economic benefits were assumed.

5.0 Project Interaction

As discussed in previous sections, the Ashley Valley Watershed Flood and Irrigation Project and the Highline and Ashley Upper Canals Flood Channel Project are independent projects. The Upper and Ashley Highline Canals have always intercepted water from the Yellow Hills and Coal Mine Basin drainages. The Highline and Ashley Upper Canals Flood Channel Project improves the capacity of those canals for floodwater conveyance. Construction of the Highline and Ashley Upper Canal improvements will be completed in April 2022.

The Ashley Valley Watershed Flood and Irrigation Project includes construction of the Yellow Hills and Coal Mine Basin Detention Basins. These detention basins would attenuate peak flood flows from their drainages prior to those flows entering the Upper and Ashley Highline Canals. The detention basins are part of the Ashley Valley Watershed Flood and Irrigation Project and are hydraulically connected to the Ashley Upper and Highline Canals but are not hydraulically connected to the Ashley Central Canal. These detention basins do not divert floodwaters out of their respective historical drainages.

MEMORANDUM

DATE: September 1, 2021

TO: Norm Evenstad, Assistant State Conservationist, U.S. Department of Agriculture Natural Resources Conservation Service

CC:

FROM: Brian Deeter, P.E. (Vice President, J-U-B ENGINEERS, Inc.)

SUBJECT: Ashley Central Canal – Water Loss Study - 2017

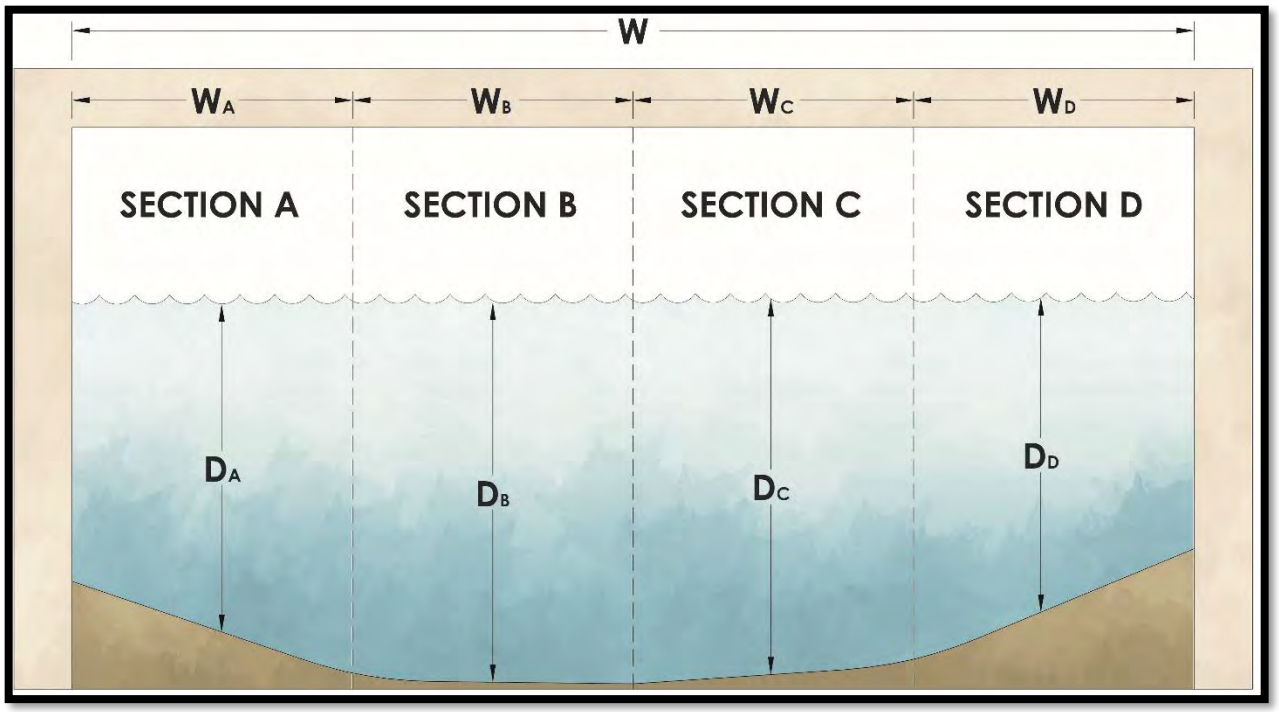
On August 22, 2017, a seepage and evaporation loss study was conducted on the Ashley Central Canal. Flow measurements were taken at three locations within the canal when water was flowing but not being withdrawn by water users. Figure 1 shows the three water loss measurement locations: the canal intake structure, and two rectangular concrete box culverts located at US Highway 40 and at 500 West. Flow at the canal intake structure was recorded via the existing flow measurement device. The box culverts were selected as locations for flow measurement because they provided fixed geometry with measurable dimensions.

Flow at each of the box culvert locations was calculated using the following formula.

$$Flow = WxDxVelocity$$

The average depth of water at each box culvert was measured and recorded. The box culvert width was divided uniformly into sections and velocities were measured at the center of each section (see Figure 2 below); water velocity was measured using a hand-held velocity probe.

Figure 2 Cross Section Areas



The flow rate for each section was calculated by multiplying the cross-section area (width x flow depth) by the velocity. The overall flow rate was calculated by adding the flow of each small section. Table 1 summarizes the flow rate at each location and the flow loss between the locations.

Table 1 – Summary of Flow Rate at each Measurement Location and Flow Loss between Locations

Location	Description	Flow (cfs)	Loss (cfs)	Loss (%)	Distance (ft)	Distance (mi)	Loss (%/mi)
#1	Inlet	48*	-	-	-	-	-
#2	US 40	41.65	6.348	13.2%	22600	4.28	3.1%
#3	500 West	27	14.7	35.2%	13200	2.5	14.1%
***Note: Flow was recorded at the existing flow measurement device.**							

The percent loss per mile for each segment in Table 1 was used to calculate a flow loss in each pipe segment between turnouts. The final segment from 500 West and the end of the system was assumed to have the same loss per mile as the segment between US 40 and 500 West. The waste flow out the end of the ditch was not accounted for in this study.

Figure 1 Measurement Locations for Water Loss Study

The Ashley Creek Distribution System Annual Report for 2017 shows an annual volume of 13,261.5 acre-feet and a 175-day irrigation season for that year. The average daily flow rate at the head of the canal was 38.2 cfs. Table 2 below summarizes the annual flow loss for the canal.

Figure 2- Seasonal Water Loss

Length (ft)	From Turnout	To Turnout	Average Flow (cfs)	Loss Per Mile (%)	Flow Loss (%)	Flow Loss (AF)
2233.016	Inlet	1	38.2	3.1%	1.31%	173.3
2899.11	1	J-J	37.890385	3.1%	1.70%	223.2
1050.635	J-J	4	34.586126	3.1%	0.62%	73.8
7758.821	4	6, 7	33.55351	3.1%	4.54%	529.0
1846.216	6, 7	9	33.14069	3.1%	1.08%	124.3
825.982	9	10	32.314484	3.1%	0.48%	54.2
1374.399	10	11, 11.5	31.488277	3.1%	0.80%	87.9
2651.653	11, 11.5	13	29.423045	3.1%	1.55%	158.5
1951.524	13	14	26.118786	3.1%	1.14%	103.6
479.363	14	15	25.912376	14.1%	1.28%	115.1
863.569	15	16	24.67335	14.1%	2.31%	197.5
1624.837	16	16.5	23.847143	14.1%	4.34%	359.2
1032.466	16.5	17	23.020937	14.1%	2.76%	220.3
275.29	17	17.5	22.40114	14.1%	0.74%	57.2
9.092	17.5	17.75	22.091525	14.1%	0.02%	1.9
456.839	17.75	18	21.162114	14.1%	1.22%	89.6
406.906	18	18.5	20.573506	14.1%	1.09%	77.6
584.985	18.5	19, 19.5, 20.	19.099149	14.1%	1.56%	103.6
16.622	19, 19.5, 20.	19.75	17.653713	14.1%	0.04%	2.7
15.795	19.75	20	16.621097	14.1%	0.04%	2.4
1640.941	20	20.5	16.054037	14.1%	4.38%	244.2
971.666	20.5	21	15.641217	14.1%	2.59%	140.9
539.71	21	22	15.228398	14.1%	1.44%	76.2
1478.961	22	23	14.815578	14.1%	3.95%	203.1
1324.929	23	24	14.248518	14.1%	3.54%	175.0
32.174	24	24.5	14.026797	14.1%	0.09%	4.2
202.91	24.5	24.75	11.977442	14.1%	0.54%	22.5
990.251	24.75	25	11.564623	14.1%	2.64%	106.2
994.946	25	26, 27	10.944826	14.1%	2.66%	100.9
4465.72	26, 27	29	9.7057997	14.1%	11.93%	401.8
2966.133	29	31	8.4667735	14.1%	7.92%	232.8
952.202	31	32, 33, 34	7.848111	14.1%	2.54%	69.3
1814.363	32, 33, 34	36	5.7828783	14.1%	4.85%	97.3
1188.513	36	37	4.9566719	14.1%	3.17%	54.6
2313.199	37	38.5, 38B	3.7176457	14.1%	6.18%	79.7
1269.634	38.5, 38B	39	2.8914392	14.1%	3.39%	34.0
785.937	39	40	2.0652327	14.1%	2.10%	15.0
TOTAL SEASONAL WATER LOSS						**4812.7**

The 4,812.7 acre-feet of water loss represents 36.3% of the annual diversion of 13,261.5 acre-feet in 2017. It can be assumed that once the open and unlined canal is piped, these losses will be eliminated. The pipe will completely separate the flow from the underlying soils, which is the cause of the seepage. The pipe will also completely cut off the water from the solar radiation that causes evaporation.

J-U-B ENGINEERS, INC.

J-U-B COMPANIES | THE LANGDON GROUP | GATEWAY MAPPING INC.

MEMORANDUM

DATE: August 5, 2022

TO: Wayne Simper

CC: Brian Deeter

FROM: Jonathan Frazier

SUBJECT: Ashley Central Canal Flow Measurement: Steinaker Service Canal Inlet to Main Street

On Thursday, August 4, 2022, J-U-B Engineers, Inc. performed discharge measurements on the Ashley Central Canal from the Steinaker Service Canal Inlet to Main Street. The intent of the discharge measurements was to determine the approximate amount of water loss from seepage through this reach of the canal.

Initially the intent was to temporarily stop discharge from Ashley Creek, minimize discharge from the Steinaker Service Canal Inlet, and measure the discharge from the Service Canal Inlet using a V-notch weir. Upon arrival it was determined that the headgate at the Service Canal would not seal when closed. An attempt was made to measure the leakage from the headgate using a V-notch weir. We attempted to dam off the water with plywood and tarps at the entrance of the concrete siphon under 1500 West, see Figure 1. We were unable to successfully block the flow of water due to the rocky nature of the bottom of the canal. The discharge also appeared to be more than 1.5 cfs and may not have been suitable for measurement using the V-notch weir. Additionally, there was flow Ashley Creek being combined with the flow from the Service Canal. This method of measurement was abandoned.

Figure 1 - Attempt to measure discharge using a V-notch weir

We then decided to measure discharge in the Ashley Central Canal below the combination of the Ashley Creek water and the Service Canal water. We chose three location measurements: below the Service Canal Inlet, at a culvert at approximately 226 North 1500 West, and upstream of Main Street. The water depth was measured at intervals across the canal section using an aluminum straight edge ruler. A water velocity was measured at each interval using a Global Water Digital Water Velocity Probe. The interval and depth were used to calculate an approximate interval area. Each interval area was multiplied by the velocity measurement to determine the discharge for the interval. The interval flows were then combined to determine an approximate discharge for the canal at a given location. Table 1 shows the results of the discharge measurements.

Table 1 - Discharge Summary

Measurement Number	Location	Discharge (Q)
1	Downstream of Service Canal Inlet	3.70 cfs
2	Downstream of culvert for driveway at 226 North 1500 West	3.24 cfs
3	Upstream of Main Street	2.95 cfs

Attachment A shows the location of each discharge measurement. Attachment B contains the description, field measurements, and results for each measurement location.

ATTACHMENT A

Discharge Measurement Locations


Ashley Creek Water
Service Canal Gate
Service Canal Water
Measurement Location #1
STA 0+00
Service Canal
Measurement Attempt
Measurement Location #2
STA 7+50
N
1500 West
Steinaker Service Canal
Ashley Central Canal
Measurement Location #3
STA 19+50
Main Street

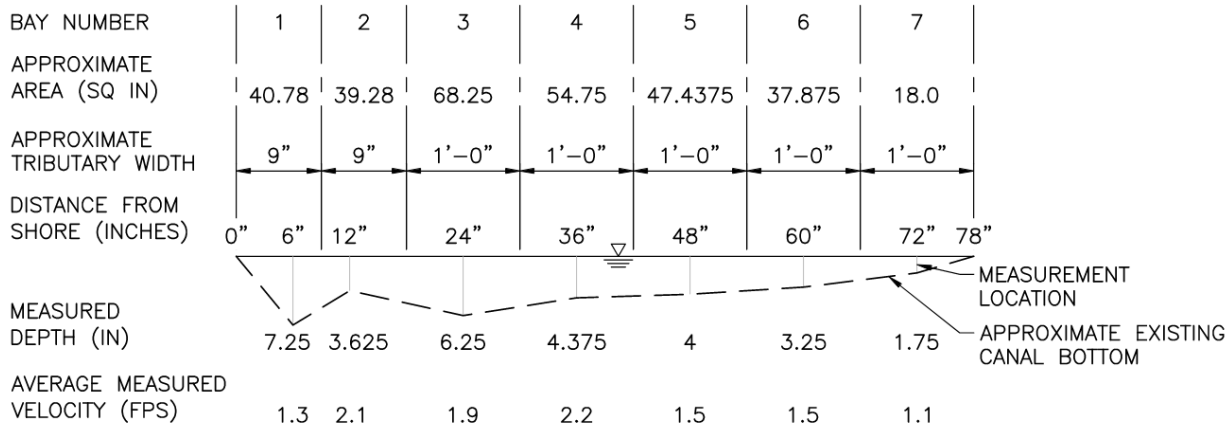
ATTACHMENT B
Measurements

Measurement Location #1

Description:

Measurement taken immediately downstream of the Steinaker Service Canal inlet to the Ashley Central Canal. Time of measurement was approximately 2:50 pm.

Field Measurements:



Results:

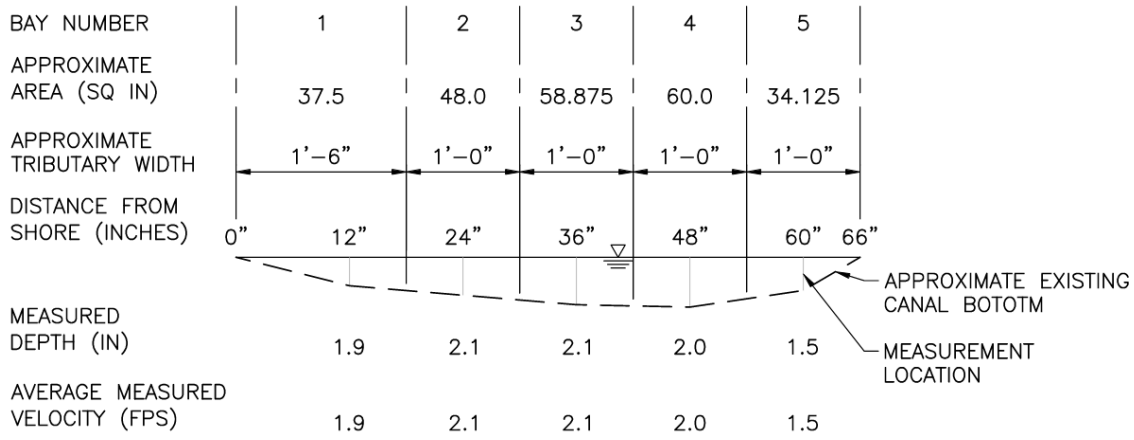
Bay Number	Area		Velocity	Flow
	in²	*ft²*	*ft/s*	*ft³/s*
1	40.78	0.28	1.3	0.37
2	39.28	0.27	2.1	0.57
3	68.25	0.47	1.9	0.90
4	54.75	0.38	2.2	0.84
5	47.44	0.33	1.5	0.49
6	37.88	0.26	1.5	0.39
7	18.00	0.13	1.1	0.14
Total		**2.13**		**3.70**

Measurement Location #2

Description:

Measurement taken immediately downstream of the driveway culvert for 226 North 1500 West.
Time of measurement was approximately 3:15 pm.

Field Measurements:



Results:

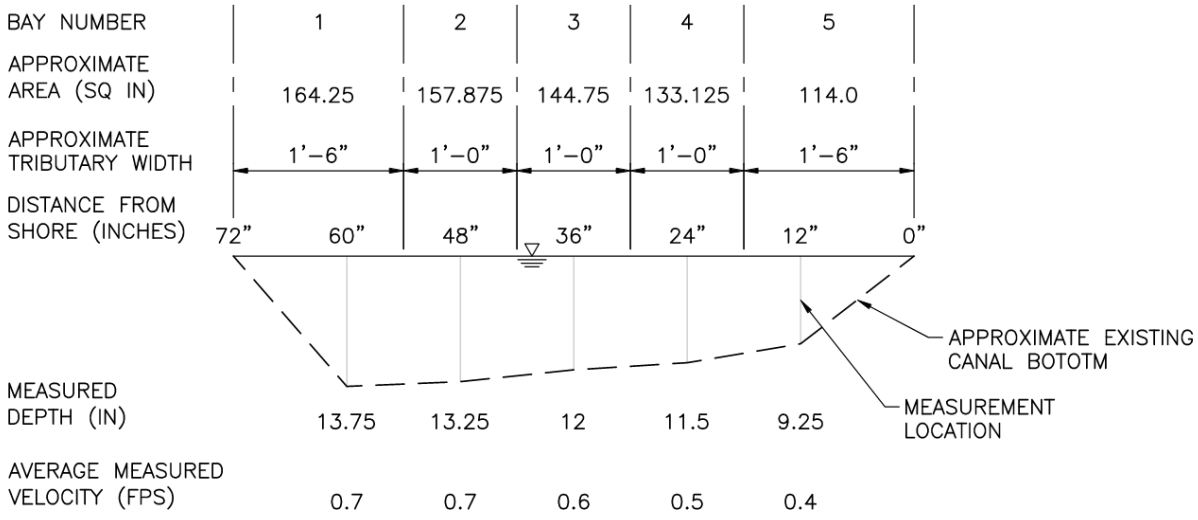
Bay Number	Area		Velocity	Flow
	in^2	ft^2	ft/s	ft^3/s
1	37.50	0.26	1.9	0.49
2	48.00	0.33	2.1	0.70
3	58.88	0.41	2.1	0.86
4	60.00	0.42	2.0	0.83
5	34.13	0.24	1.5	0.36
Total		**1.66**		**3.24**

Measurement Location #3

Description:

Measurement taken immediately upstream of the Ashley Central Canal culvert crossing Main Street.
Time of measurement was approximately 3:30 pm.

Field Measurements:



Results:

Bay Number	Area		Velocity	Flow
	in^2	ft^2	ft/s	ft^3/s
1	164.25	1.14	0.7	0.80
2	157.88	1.10	0.7	0.77
3	144.75	1.01	0.6	0.60
4	133.13	0.92	0.5	0.46
5	114.00	0.79	0.4	0.32
Total		**4.96**		**2.95**

UINTAH COUNTY

ASHLEY VALLEY FLOOD CONTROL STUDY & COST BENEFIT ANALYSIS

March 1, 2017 • 1608-290

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