PLAN OF DEVELOPMENT
WASHINGTON COUNTY WATER CONSERVANCY DISTRICT
ASH CREEK PIPELINE AND ANDERSON JUNCTION RESERVOIR

Submitted to:
Bureau of Land Management
St. George Field Office
345 East Riverside Drive
St. George, Utah 84790

Submitted by:
Washington County Water Conservancy District
533 East Waterworks Drive
St. George, Utah 84770

April 19, 2011
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This is a working document, plans and specifications are subject to change as issues and concerns are identified during the NEPA process.

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1.0 INTRODUCTION AND BACKGROUND

The Washington County Water Conservancy District (WCWCD) is proposing to install a new pipeline, associated facilities, and a reservoir on lands administered mainly by the Bureau of Land Management (BLM), St. George Field Office, with additional areas of state and private land also included. The project would involve the Ash Creek drainage and the Anderson Junction area, Washington County, Utah (**Figure 1**). The pipeline would consist of 5 segments totaling 16.88 miles. One segment would start at the current outflow of the Ash Creek Reservoir and would extend to the proposed Anderson Junction Reservoir (**Figure 2**). The second and third pipeline segments on Leap Creek and South Ash Creek, tributaries of Ash Creek, would capture runoff and spring flows from these tributaries and connect to a regulating pond (**Figure 2C**). The fourth pipeline segment would connect the regulating pond to the Ash Creek pipeline (**Figure 2C).** The fifth pipeline segment would connect the proposed reservoir to the existing Toquerville Secondary Water System (TSWS; **Figure 2A**). The project would also interconnect with an existing pipeline constructed at Wet Sandy to serve residents at Anderson Junction. At full capacity, the surface area of the proposed reservoir surface at 3,725 feet above mean sea level (amsl) would be approximately 115 acres and would hold 3,638 acre feet of water. In order to build the proposed dam, borrow sources on WCWCD property will be utilized. The project would also include construction and access roads, spillway, recreation area, and recovery wells (**Figure 2A**). Water not delivered to existing water rights holders in the various tributaries and to TSWS would be used for irrigation purposes in the cities of La Verkin and Hurricane or diverted into the existing Quail Creek pipeline serving the Quail Creek/Sand Hollow Reservoir system.

The WCWCD was organized by the Fifth Judicial District Court in St. George on November 28, 1962 under the Utah Water Conservancy District Act (Utah Code Ann. §§ 17B-2a-1001 *et seq*.). The WCWCD is a political subdivision of the State of Utah and is responsible for conserving, developing, managing and stabilizing water supplies within the county. The WCWCD service area encompasses all of Washington County. The WCWCD currently provides water to municipal customers serving approximately 95% of the residents in the county. The WCWCD has contractual obligations to develop water resources necessary to meet the future demands of its municipal customers. The WCWCD holds water rights in the Ash Creek drainage which it seeks to develop.

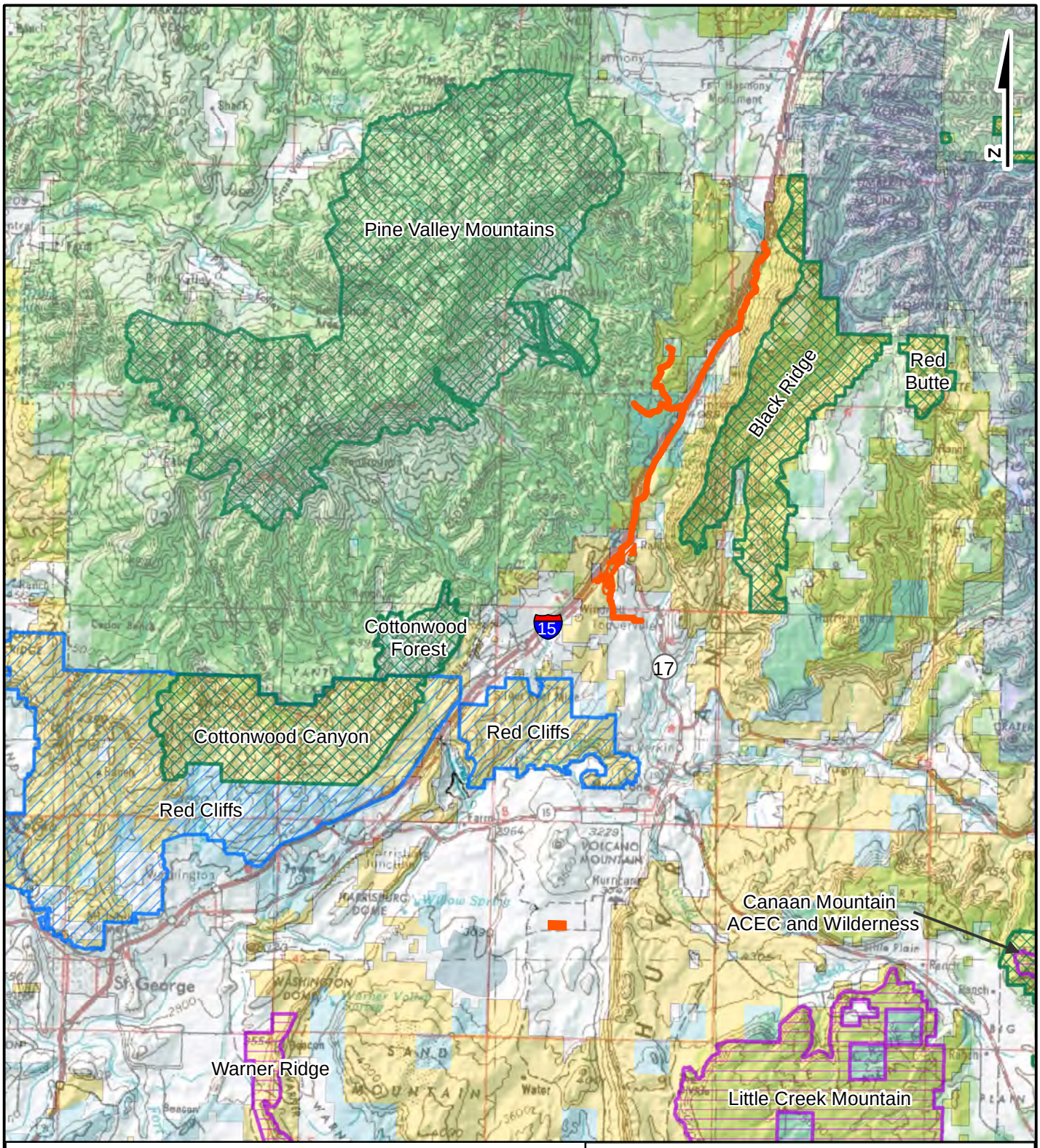
The WCWCD and the cities of Toquerville, Hurricane, and La Verkin are the shareholders of the Ash Creek Irrigation Company. The Irrigation Company's main source of water is Ash Creek and the associated Ash Creek Reservoir. Since its construction, Ash Creek Reservoir has not been able to hold water for an extended period of time. Sink holes along with fissures found within the adjoining lava rock allow the water to seep out of the reservoir and be lost. The main pipeline segment would deliver this water to Anderson Junction to achieve functional storage including groundwater recharge into the Navajo sandstone aquifer. In order to recover this water wells would be installed into the aquifer which would pump culinary grade water out for distribution into culinary water systems. The pumped water comes out of the wells purified and clean, as demonstrated at Sand Hollow Reservoir, which has successfully used this system since 2002.

A number of small tributaries flow in an easterly direction out of the Pine Valley Mountains toward the Hurricane Fault and into Ash Creek below the Ash Creek Reservoir, including Leap Creek, South Ash Creek, and Wet Sandy Creek. Each of these streams currently has a diversion dam. Leap Creek was recently partially piped and Wet Sandy Creek was recently

piped to Anderson Junction. South Ash Creek flows through an open ditch system that provides irrigation. Substantial channel losses from open ditches due to the alluvial stream bed material have been identified in past studies. These streams rarely contribute to surface flow downstream of Toquerville except during high runoff. The high water from these creeks flows into Ash Creek and eventually ends up in the Virgin River.

Toquerville Springs, located in the city of Toquerville, flows at an average rate of 10 cubic feet per second, producing potable water of a very high quality. Due to the high water quality, no treatment is required other than the addition of chlorine in order to comply with State of Utah standards. The cities of Toquerville, La Verkin, and Hurricane use this spring water for culinary purposes. However, a large portion of the water is also used in the TSWS for irrigation purposes. Water delivered into the irrigation system as a result of the Ash Creek Pipeline and Anderson Junction Reservoir Project would allow the spring water to be devoted to culinary use.

This Plan of Development (POD) includes descriptions of and guidelines for the design, construction, operation, maintenance, and reclamation of the Ash Creek Pipeline and Anderson Junction Reservoir Project. The WCWCD would construct and operate the project in conformity with the approved POD.



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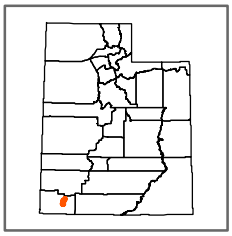

Project Location
Wilderness Area
Area of Critical Environmental Concern
National Conservation Area
Bureau of Land Management
National Park Service
Private
State
US Forest Service
State Park

5 2.5 0 5 Miles

Washington County Water Conservancy District

Anderson Junction Reservoir and Ash Creek Pipeline Project

FIGURE 1
PROJECT LOCATION AND LAND STATUS

JBR

DRAWN BY	DATE DRAWN
S Topham	03-12-12
SCALE	
1 in = 4 miles	

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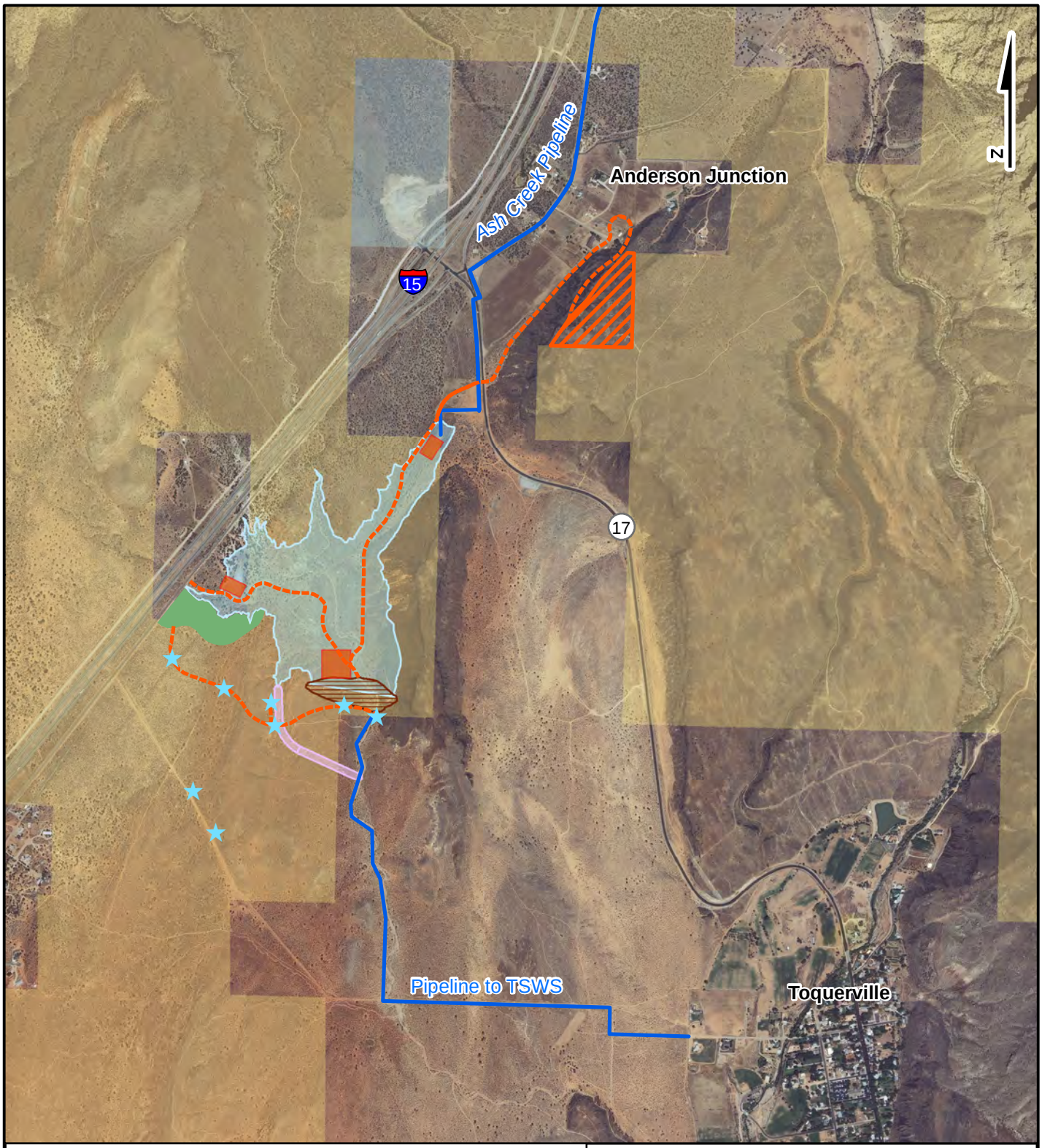
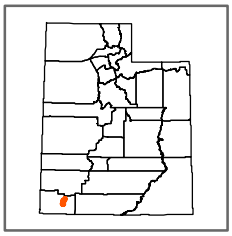


BASE MAP:NAIP (USDA 2009)



- Wells
- Pipeline
- Construction Roads
- Possible Recreation Area
- Dam
- Spillway
- Borrow Pit
- Reservoir
- Staging Area
- Bureau of Land Management
- Private
- State

1,100 550 0 1,100 Feet

Washington County Water Conservancy District

Anderson Junction Reservoir and
Ash Creek Pipeline Project

FIGURE 2A
PROJECT COMPONENTS

JBR

DRAWN BY	DATE DRAWN
S Topham	03-12-12
SCALE	
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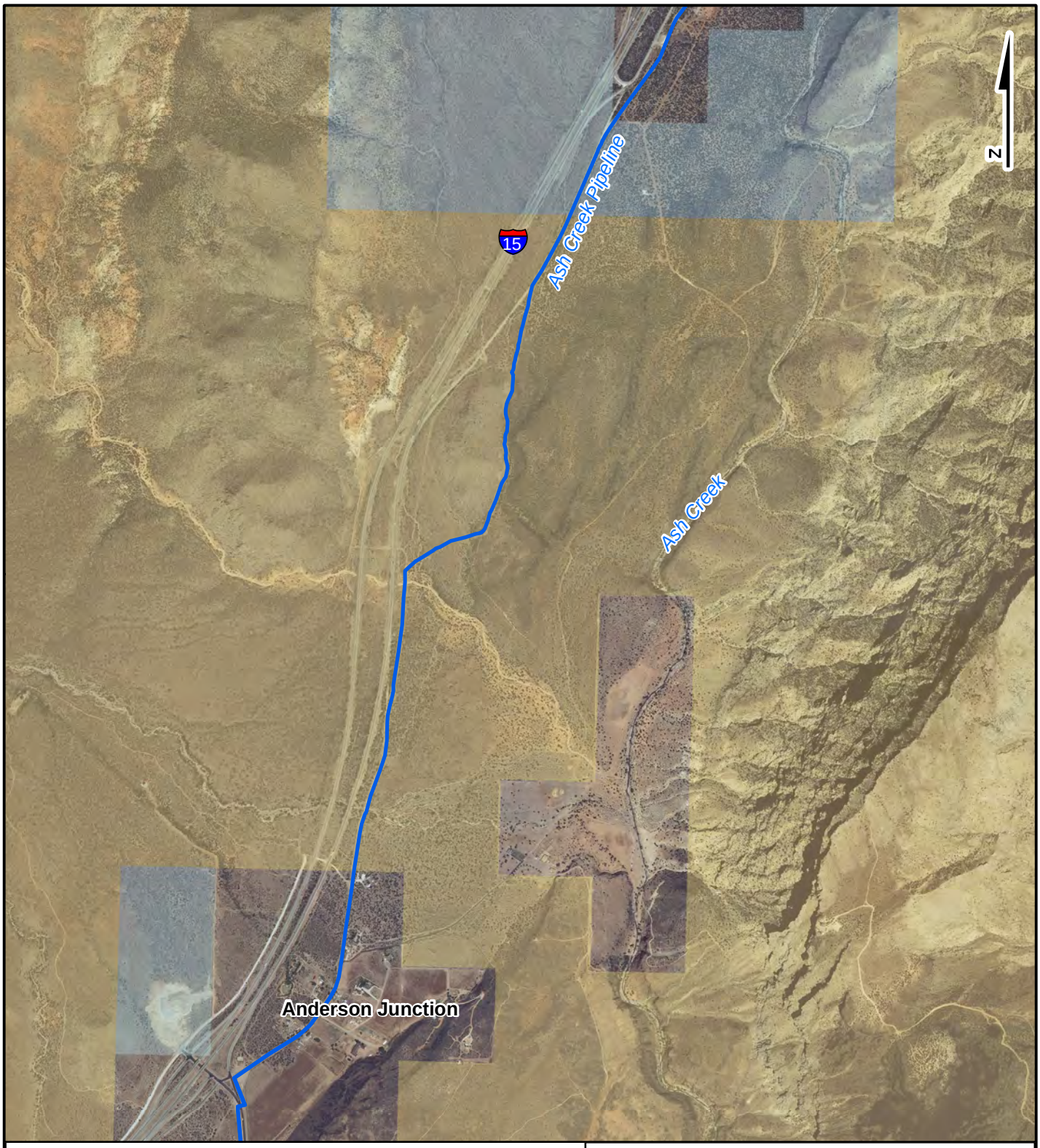

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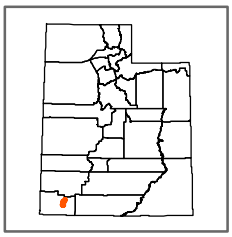

Pipeline

Bureau of Land Management

Private

State

1,100 550 0 1,100 Feet

Washington County Water Conservancy District

Anderson Junction Reservoir and Ash Creek Pipeline Project

FIGURE 2B
PROJECT COMPONENTS

JBR

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S Topham	03-12-12
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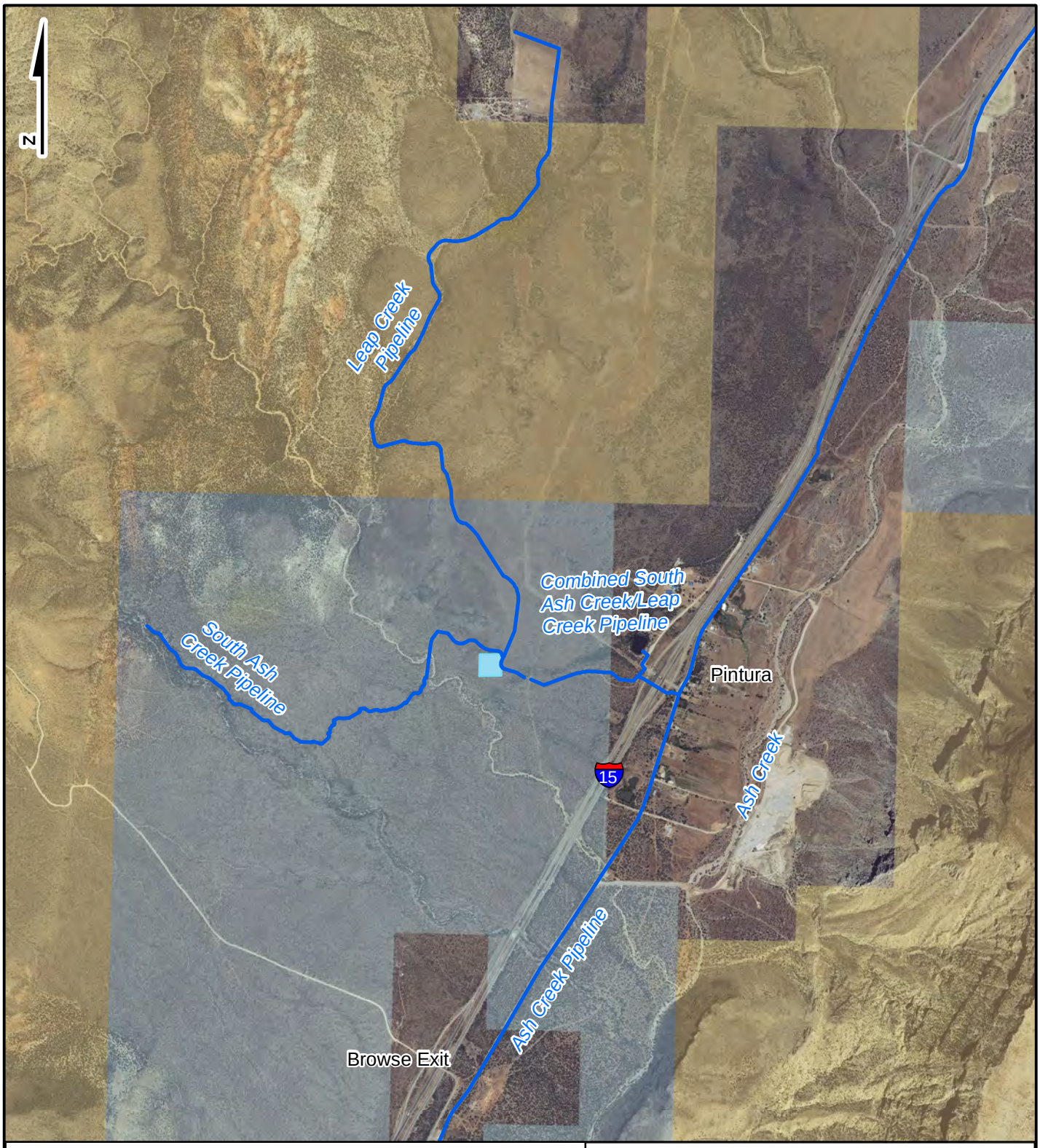

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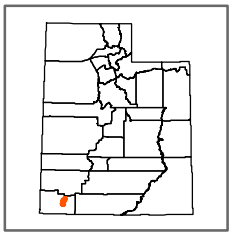

Pipeline
Regulating Pond
Bureau of Land Management
Private
State

1,000 500 0 1,000 Feet

Washington County Water Conservancy District

Anderson Junction Reservoir and Ash Creek Pipeline Project

FIGURE 2C
PROJECT COMPONENTS

JBR

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S Topham	03-12-12
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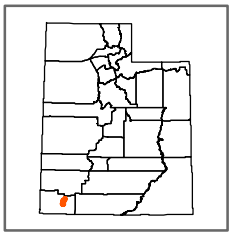

Pipeline
Staging Area
Bureau of Land Management
Private

1,000 500 0 1,000 Feet

Washington County Water Conservancy District

Anderson Junction Reservoir and Ash Creek Pipeline Project

FIGURE 2D
PROJECT COMPONENTS

JBR

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2.0 PURPOSE AND NEED FOR THE FACILITY

2.1 Need

The annual population in Washington County has increased each year from 1964 through 2008 (average annual growth rate of 6.1 percent, range 1.0 - 10.6 percent). The estimated population for Washington County in 2008 was 144,710 (GOPB 2008). This number is expected to increase to 860,378 by 2060 (average annual growth rate = 3.8 percent).

Based on WCWCD data, the current reliable, potable water supply for Washington County is 72,588 acre feet. Demand in 2008 was 54,800 acre feet. Based on predicted annual population growth rates, WCWCD estimates that demand for potable water would surpass supply in about 2017. Thus, the WCWCD must develop additional potable water to serve a growing customer base in Washington County.

2.2 Purpose

The purpose of the project is to increase water availability in Washington County and to provide for enhanced conservation and beneficial use of water. This purpose would be achieved by:

1. Increasing water availability by approximately 5,000 acre feet annually through collecting and storing water, including aquifer recharge.
2. Storing water that is currently lost through canal and reservoir seepage and runoff to be used for irrigation and other municipal purposes.
3. Allowing for the high quality water from Toquerville Springs to be transferred from irrigation to culinary use.

3.0 RIGHT-OF-WAY LOCATION

The facility components would be located on lands administered by the BLM, Utah School and Institutional Trust Lands Administration (SITLA), and private landowners (see **Figures 1 and 2**). The reservoir area would be located in Sections 27, 28, 33, and 34, Township 40 South, Range 13 West. The pipelines north of the proposed reservoir would be located in Sections 7, 8, 18, 19, and 30, Township 39 South, Range 12 West; Sections 25, 26, 35, and 36, Township 39 South, Range 13 West; and Sections 1, 2, 3, 11, 14, 15, 22, and 27, Township 40 South, Range 13 West. The pipeline south of the reservoir would be located in Section 34, Township 40 South, Range 13 West and Section 3, Township 41 South, Range 13 West, while the spillway would be located in Section 33, Township 40 South, Range 13 West and Sections 3 and 4, Township 41 South, Range 13 West.

4.0 FACILITY DESIGN AND CONSTRUCTION

The Ash Creek pipeline would begin at the base of the dam of the existing Ash Creek Reservoir and continue in a southerly direction to the proposed Anderson Junction Reservoir. The Leap Creek pipeline would tie into an existing pipeline that is owned by the WCWCD and convey this water to the Ash Creek pipeline (see **Figure 1**). The existing diversion structure on Leap Creek would be used, with no additional construction required. The South Ash Creek pipeline would collect water from a replacement concrete diversion dam built to replace the existing diversion and convey it along the existing ditch alignment to a proposed regulating pond and then split to deliver to existing water right holders in the town of Pintura and into an overflow pipe tied into the Ash Creek pipeline.

The pipelines would typically require a 50-foot wide permanent ROW and a 100-foot wide temporary construction ROW. The permanent ROW may expand to 75 feet in steep areas to account for cut and fill. A 14-foot wide permanent access road would be constructed within the 50-foot ROW and on top of the buried pipeline and is needed for future maintenance. During pipeline construction, approximately 50 feet on either side of the centerline of the ROW would be needed for vehicle passage and pipe assemblage. The diversion structure on South Ash Creek would require a 200 x 200 foot permanent ROW and the regulating pond would require a 350 x 350 foot permanent ROW. Preliminary engineering drawings are provided in **Appendix A** and **Table 1** provides length, ROW, and disturbance acreages for the various project components.

Water would be transferred from the proposed Anderson Junction Reservoir via a pipeline south of the reservoir connecting to the existing TSWS (**Figure 2A**). A 175-acre area would be required for the reservoir, dam, recreation area, and spillway. The spillway would consist of a concrete weir and splash pad and a 1,972 foot-long excavated channel (1,602 feet on BLM land and 370 feet on private land). The height of the dam would be 103 feet. The resulting surface area of the reservoir would measure 115 acres with storage capacity of 3,638 acre feet at 3,725 feet amsl. A 20-acre borrows area for the dams' construction material would be located on land owned by the WCWCD just northeast of the reservoir site (**Figure 2A**). Other dam construction materials, specifically clay, would be obtained from WCWCD property in Hurricane and transported to the reservoir site (**Figure 3 of 3, Appendix A**). Implementation of the project would temporarily disturb up to 232 acres and permanently disturb 175 acres.

Table 1. Summary of Surface Disturbance.

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
Ash Creek Pipeline (Ash Creek Reservoir to Anderson Junction Reservoir); 100-foot temporary and 50-foot permanent ROW, 14-foot road within the 50-foot ROW				
BLM	27,433	63.0	8.8	31.5
SITLA	4,139	9.5	1.3	4.8
Private	25,502	58.5	8.2	29.3
TOTAL	57,074	131.0	18.3	65.6
South Ash Creek Pipeline (Diversion to combined South Ash Creek/Leap Creek Pipeline); 100-foot temporary and 50-foot permanent ROW, 14-foot road within the 50-foot ROW				
BLM	0	0	0	0
SITLA	6,966	16.0	2.2	8.0
Private	0	0	0	0
TOTAL	6,966	16.0	2.2	8.0

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
Leap Creek Pipeline (End of existing pipe to combined South Ash Creek/Leap Creek Pipeline); 100-foot temporary and 50-foot permanent ROW, 14-foot road within the 50-foot ROW				
BLM	7,509	17.2	2.4	8.6
SITLA	2,542	5.8	0.8	2.9
Private	1,712	3.9	0.6	2.0
TOTAL	11,763	26.9	3.8	13.5
Combined South Ash Creek/Leap Creek Pipeline (Regulating Pond to Ash Creek Pipeline); 100-foot temporary and 50-foot permanent ROW, 14-foot road within the 50-foot ROW				
BLM	0	0	0	0
SITLA	1,804	4.1	0.6	2.1
Private	1,574	3.6	0.5	1.8
TOTAL	3,378	7.7	1.1	3.9
Irrigation Pipeline (Anderson Junction Reservoir to TSWS); 100-foot temporary and 50-foot permanent ROW, 14-foot road within the 50-foot ROW				
BLM	60	0.2	0.02	0.1
SITLA	0	0	0	0.0
Private	8,928	20.5	2.9	10.2
TOTAL	8,988	20.7	2.9	10.3
Spillway; 100-foot ROW				
BLM	1,602	0	3.7	3.7
SITLA	0	0	0	0
Private	370	0	0.8	0.8
TOTAL	1,972	0	4.5	4.5
Reservoir (at high water mark of 3,725 amsl)				
BLM	-	0	105	105
SITLA	-	0	0	0

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
Private	-	0	10	10
TOTAL	-	0	115	115
Dam (construction areas are within the reservoir footprint)				
BLM	-	0	9	9
SITLA	-	0	0	0
Private	-	0	0	0
TOTAL	-	0	9	9
Potential Recreation Area				
BLM	-	0	7	7
SITLA	-	0	0	0
Private	-	0	5	5
TOTAL	-	0	12	12
Pump Station Staging Area (within reservoir footprint)				
BLM	-	1	0	0
SITLA	-	0	0	0
Private	-	0	0	0
TOTAL	-	1	0	0
West Staging Area (within reservoir footprint)				
BLM	-	0	0	0
SITLA	-	0	0	0
Private	-	1	0	0
TOTAL	-	1	0	0

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
Dam Staging Area (within reservoir footprint)				
BLM	-	4	0	0
SITLA	-	0	0	0
Private	-	0	0	0
TOTAL	-	4	0	0
Snowfield Staging Area				
BLM	-	0	0	0
SITLA	-	0	0	0
Private	-	1	0	0
TOTAL	-	1	0	0
Private Borrow Pit (0.42 acres within reservoir footprint are not included)				
BLM	-	0	0	0
SITLA	-	0	0	0
Private	-	20	0	0
TOTAL	-	20	0	0
Construction Roads; 14-foot wide roads (7,048 feet within reservoir footprint are not included)				
BLM	0	0	0	0
SITLA	0	0	0	0
Private	5,887	1.9	0	0
TOTAL	5,887	1.9	0	0
Recreational Roads ROW (permanent disturbance acres are included in Recreation Area)				
BLM	2,926	0	0	0
SITLA	0	0	0	0
Private	3,605	0	0	0

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
TOTAL	6,531	0	0	0
Pintura Regulating Pond (350 x 350 feet)				
BLM	-	0	0	0
SITLA	-	0	2.8	2.8
Private	-	0	0	0
TOTAL	-	0	2.8	2.8
South Ash Creek Diversion Structure (200 x 200 feet)				
BLM	-	0	0	0
SITLA	-	0	0.9	0.9
Private	-	0	0	0
TOTAL	-	0	0.9	0.9
Recovery Wells (80 x 100 feet each); 9 identified but likely only 4 needed, not yet determined				
BLM	-	0	1	1
SITLA	-	0	0	0
Private	-	0	0	0
TOTAL	-	0	1	1
Well Access Roads; 14-foot wide roads (not yet determined, estimated)				
BLM	4,000	0	1.3	1.3
SITLA	0	0	0	0
Private	0	0	0	0
TOTAL	4,000	0	1.3	1.3
Total by Land Administrator				
BLM	43,530	85.4	138.2	167.2

Land Ownership	Linear Feet of ROW	Acres Temporary Surface Disturbance	Acres Permanent Surface Disturbance	Acres Permanent ROW
SITLA	15,451	35.4	8.6	21.5
Private	47,578	110.4	28	59.1
GRAND TOTAL	**106,559**	**231.2**	**174.8**	**247.8**

4.1 Government Agencies Involved

The government agencies potentially involved are:

- BLM
- Utah Division of Wildlife Resources
- Utah School and Institutional Trust Lands Administration
- Washington County
- Toquerville City – To date, the City has signed a Resolution of Support for the Project (**Appendix D**).
- US Army Corps of Engineers
- Utah State Division of Water Rights, Dam Safety

4.2 Construction of the Facilities

Construction would commence as soon as necessary permits are obtained and all plans are finalized. Construction of the pipelines and reservoir is estimated to take up to 15 months to complete. Construction of the pipelines and reservoir would occur simultaneously. The recovery wells and recreation site would be constructed within 3-4 years of completing the pipelines and reservoir. The estimated sequence of construction activities is presented in **Table 2**.

Table 2. Sequence of Construction Activities.

Pipelines	Reservoir
Develop Staging Area	Clear Vegetation
Install Ash Creek Pipeline	Develop Staging Areas
Install South Ash and Leap Creek Pipelines	Construct Haul Roads
Construct Regulating Pond	Construct Dam Trench
Construct South Ash Creek Diversion Structure	Pour Concrete Apron
Construct Reservoir Outlet Pipeline	Haul Clay and Rock; Build Dam

4.2.1 Pipelines

The proposed pipelines would measure 14-inch to 36-inch in outside diameter (OD). The Ash Creek, Leap Creek, South Ash Creek, and TSWS feed pipeline's OD would measure 26-36 inches, 14 inches, 20 and 24 inches, and 30 inches, respectively. A parallel conduit would be

buried with the pipeline for installation of a fiber optic line. Appropriate air valves (above ground and below ground) would be installed along the pipelines – valves would be placed approximately every 0.5 mile and at major grade changes. In-line valves would be required at all pipeline intersections. Drain line or blow-off valves would also be located periodically along the pipeline, at low points in the pipeline not to exceed approximately 1.0 mile intervals, and would drain to existing channels. The pipeline would also be provided with tracer wire for locating the underground piping, meter vaults, and other control vaults with above ground Supervisory Control and Data Acquisition (SCADA) equipment including solar panels for power supply and antennas for sending signals of control status. Above ground filter stations would be required at periodic locations, in particular where water service is provided. Above ground fiberglass markers would also be placed at strategic locations to provide public notice of the underground piping to avoid conflicts with future construction.

Pipeline installation activities would include staking, clearing and grubbing, trenching, hauling equipment and materials, pipeline assembly, backfill and access road construction, in this order. The number of workers and type of equipment expected to be used are provided in **Table 3**. Prior to construction, the exact centerline of the pipeline ROW would be staked. The ROW boundaries would also be flagged in some areas (e.g., thick vegetation). Following staking, vegetation within the ROW would be cleared and grubbed to the extent necessary to provide for equipment clearance, construction, and maintenance operations.

The trench for the pipelines would be excavated using CAT D10 (or smaller) bulldozers and/or CAT 345 (or smaller) track hoes. Blasting may be required in areas that are solid rock. The pipelines would be bedded and buried to a minimum depth of 3 feet to the top of pipe and deeper under streambed crossings. The trench width and depth would vary depending upon the size of the pipe being installed. The trench would generally be 2 feet wider than the pipe.

For example, a 24-inch OD pipe would require a 4-foot wide by 5-foot deep trench. Where the pipeline parallels existing utilities care would be taken to protect existing infrastructure and communication would take place among affected entities. Where the pipeline would be installed under existing asphalt or where it would cross paved roads, asphalt would be replaced according to the governing agency's recommended specifications and requirements.

Following pipeline installation, a 14-foot wide gravel access road would be established directly on top of the buried pipelines. New access roads would be constructed to WCWCD standards on compacted subgrade and overlaid with gravel as needed to ensure adequate access for future operation and maintenance activities. The road would be crowned to allow a minimum 2 percent cross slope up to a maximum 8 percent cross slope. Any excavated boulders would be strategically placed adjacent to the road to discourage off-road travel. In areas where the pipelines would parallel or be within existing roads, the surface would be brought back to an as-good-as or better condition or replaced according to the governing agency's recommended specifications and requirements. Where there would be air valves or other pipeline appurtenances, construction would follow standard safety guidelines, including the distance from the road or installation of barriers.

Table 3. Estimated Personnel And Equipment Required For Pipeline Installation

Task	Number of People	Equipment
Survey and staking	2	1 pickup truck
Trenching	1	1 track hoe (CAT 345 track hoe)
Pipe and materials hauling	2	1 semi-truck and flatbed trailer
Pipeline assembly and burying	4	1 bulldozer (CAT D10) 3 track hoe (CAT 345) 1 dump truck for hauling fill 1 loader 2 pickup trucks
Diversion removal and reconstruction	4	1 track hoe (CAT 345 track hoe) 1 concrete truck 1 pickup truck
New road construction	1	1 D-10 CAT
Regulating Pond Construction	3	1 D-10 Cat 1 track hoe (CAT 345) 1 Dump Truck to haul clay liner 1 loader 2 pickup trucks

4.2.2 South Ash Creek Diversion Structure

The diversion structure construction area ROW would be staked, cleared of vegetation, and grubbed. The existing sandbag and plastic diversion would be removed. Water would be diverted around the construction area and continue down the existing South Ash Creek streambed by the installation of a temporary coffer dam, piping, or temporary diversion.

The foundation for the diversion dam would be excavated with a CAT 345 track hoe(s) or similar to an approximate depth of 10 to 20 feet to provide for a cutoff trench. Approximately 20 to 30 cubic yards of concrete would be placed to provide for a diversion dam. The foundation and cut-off trench would be poured initially with the remaining walls being poured after the foundation is cured (approximately 2 to 3 weeks later). The diversion structure would measure approximately 40 x 20 feet and would require a 200 x 200 foot permanent ROW to construct and maintain.

A 404 or stream alteration permit would be required for the construction of the diversion structure. The diversion dam is located on lands administered by SITLA and the WCWCD would obtain all necessary ROWs or easements.

4.2.3 Regulating Pond

The South Ash Creek Pipeline and the Leap Creek Pipeline would flow into a regulating pond to the west of the town of Pintura. This regulating reservoir would measure approximately 250 by 250 feet and would require a 350 x 350 foot permanent ROW to construct and maintain. The WCWCD would deliver water to the water right holders in Pintura through a new pressurized irrigation system that would be regulated from this pond.

The pond ROW would be staked and cleared of all vegetation. The pond would be constructed using a track hoe(s) (CAT 345 equivalent or smaller) and/or a bulldozer(s) (CAT D10 or smaller). Earth would be pushed up to form a dike around an oval or round pond. The pond would then be lined with an impervious material, either clay or a manmade lining, covered with sand and gravel and with riprap protection on the side slopes to protect the lining. The pond

would have an overflow to an existing ditch or streambed. Chain link fencing would be installed around the pond.

4.2.4 Reservoir and Dam

The Anderson Junction Reservoir would be created by the construction of an earth and rockfill dam having a central clay core transitioning to basalt rock fill. The reservoir would store about 3,638-acre feet with a maximum dam height of 103 feet. The construction of the dam would require large earth moving machinery, a portable gravel pit operation, water, and multiple personnel. **Table 4** summarizes the construction needs.

Table 4. Estimated Personnel And Equipment Required For Reservoir Construction

Task	Number of People	Equipment
Construction Engineering	4	3 Pickup trucks, 1 Four-wheeler
Foundation Preparation	9	1 Dozer, 1 Track hoe, 2 Scrapers 2 Pickup trucks
Dam Embankment	6	1 Dozer, 1 Compactor, 1 Grader, 1 Water truck
Embankment Borrow	6	1 Dozer, 1 Track hoe, 4 Scrapers
Filter and Drain	3	2 Dump Trucks, 1 Compactor
Outlet Works and Spillway	4	1 Concrete Truck

Borrow Areas - Borrow sources would include (1) a piece of private property owned by the WCWCD near Toquerville and (2) clay from an existing, disturbed pit on WCWCD property located at Bench Lake, Hurricane, Utah. The approximate quantities for the two alternative types of dams being considered (either rockfill or earthfill) for this project using a multiplier of 1.2 to account for shrinkage and processing loss are provided in **Table 5**.

Table 5. Approximate Quantities Of Borrow Type For Each Potential Dam Type

Type	Rockfill Dam (Cubic Yards)	Earthfill Dam (Cubic Yards)
Clay	174,000	174,000
Rockfill	673,200	276,600
Earthfill	0	612,240
Sand Filter	49,200	40,200
Gravel Drain	21,360	41,760
Total	917,760	1,144,800

Staging Areas – Four staging areas have been identified. Three of these would occur within the reservoir footprint and would eventually be covered with water. The fourth would be located on private property currently disturbed as a result of an active gravel operation.

Recovery Wells - Nine potential recovery well locations have been identified to date in faults/fractures based on geologic mapping. The purpose of these recovery wells would be to supply additional culinary water supply to areas within the WCWCD service area by recovering groundwater recharged from reservoir storage. It is currently not known how many wells would be needed over time to adequately recover the recharged groundwater, although it is currently estimated that 4 wells will be necessary. After construction of the reservoir, further study will clarify the recharge hydrogeology in order to ascertain the final number and locations of recovery wells. Associated access and pipeline routes cannot be determined until well sites are specified.

4.2.5 Recreation Area

Initial discussions have identified the area as a day-use only area equipped with picnic tables, restrooms, and small-engine (trolling motors) boat access. A detailed recreation plan would be prepared by a committee that involves all stakeholders. The WCWCD would anticipate contracting with a separate state or local governmental entity to manage the recreation area.

4.3 Resource Values and Environmental Concerns

The WCWCD has contracted the services of JBR Environmental Consultants, Inc. (JBR) to complete biological resource surveys and to prepare an Environmental Assessment (EA) and other National Environmental Policy Act (NEPA) related documents. Biological surveys were conducted in 2009 and 2010 and the reports of their findings are included as **Appendix B**. WCWCD has contracted the services of Bighorn Archaeological Consultants, LLC (Bighorn) to complete the cultural surveys. Cultural surveys were completed in 2009 and 2010 and the reports of their findings have been submitted to the BLM.

Cultural resources that would be directly or indirectly impacted would be subject to evaluation and determination through Section 106 consultation (under the National Historic Properties Act). Project engineers would work with BLM archaeologists to avoid or minimize impacts to any identified cultural resources. As necessary, specific mitigation measures for biological resources would also be developed as part of the EA and if necessary, additional surveys and Section 7 consultation (under the Endangered Species Act) would be conducted.

Implementation of the project would comply with all applicable federal and state laws and any local zoning and building ordinances during all phases of the Project. Potential impacts to the environment are expected to be minimal as standard Best Management Practices (BMPs) would be followed (**Appendix C**) and the Environmental Protection Measures (EPMs) listed below would be implemented. EPMs would also apply to operation and maintenance of the completed facility. The BLM is expected to inspect the Project both during and after Project completion to ensure compliance with EPMs and other requirements.

<u>Air Resources</u>: The generation of fugitive dust from surface activities, including earth moving and hauling and handling of materials, would be controlled by implementing BLM BMPs. When needed, water would be applied during construction to control fugitive dust levels on access roads and construction sites.

<u>Water Resources</u>: BMPs would be used as needed to control storm water discharges. These practices would include material handling and temporary storage procedures that minimize the exposure of potential pollutants to storm water, spill prevention and response, sediment and erosion controls, and physical storm water controls. Site runoff would be controlled and managed in accordance with regulation. A Storm Water Pollution Prevention Plan would be prepared prior to construction and followed during construction.

<u>Hazardous Materials and Wastes</u>: Construction sites, staging areas, and access roads would be kept in an orderly condition throughout construction. Refuse and trash, including stakes and flags, would be removed and disposed. Covered dumpsters located in the Project Area would contain all refuse. Refuse would be removed on a regular basis to an approved disposal facility. No open burning of construction trash would occur. Portable toilets would be used on site, and would be maintained on a regular schedule.

No construction equipment oil or fuel would be drained on the ground. Oils or chemicals would be hauled to an approved site for disposal. The only significant sources of potential petroleum

or other hazardous material spills are from mobile equipment. If a fuel/oil or other hazardous material spill were to occur, the BLM and other required regulatory agencies would be contacted as soon as possible, and actions would be taken to minimize the amount and spread of the spill material. Such measures may include straw bale plugs, earthen berms, or use of other absorbent materials. If necessary, soil remediation would be conducted and would include the removal of contaminated soils to an approved facility and a soil sample(s) would be taken to verify the success of the site remediation. In addition, the WCWCD would follow any other local, state, or Federal regulations related to the use, handling, storing, transporting, and disposing of hazardous materials.

Fire Prevention and Protection: All construction personnel would have fire tools and extinguishers available at all times for use if the occasion arises. Construction staff would adhere to any BLM fire prevention and suppression requirements.

Cultural Resources: If, during any Project activities, cultural, historical, or prehistoric resources, including any of Native American religious interest, are inadvertently discovered, the BLM Authorized Officer would be notified, and all work in the area would cease. A professionally trained archeologist would work with the SHPO and affiliated or interested Tribes to determine eligibility for the National Register of Historic Places. If needed, a mitigation plan would be developed in consultation with the SHPO, WCWCD, construction crews, and interested Tribes. Construction personnel would be instructed to watch for cultural artifacts while working on the Project. In the event significant vertebrate paleontological resources are discovered, including human remains, the BLM authorized officer would be notified.

Human Health and Safety: The contractor performing blasting would comply with applicable regulations and standards established by the regulatory agencies, codes, and professional societies, including the rules and regulations for storage, transportation, delivery, and use of explosives. Whenever blasting operations are in progress, explosives would be stored, handled, and used as provided by law, including safety and health regulations for construction. No explosives would be stored on the Project Area.

Construction sites would be managed to prevent harm to any person and property. During construction, all employees, project managers, supervisors, inspectors, contractors, and subcontractors would be required to conform to contractor safety procedures. All personnel would be adequately trained to perform their tasks. Heavy equipment would be outfitted with Occupational Safety and Health Administration (OSHA) required safety devices such as backup warnings and seat belts. Hard hats, safety boots, ear and eye protection, and other personal safety equipment would be available to any personnel requesting it. All accidents and injuries would be reported to the appropriate contractor safety officer.

Noxious Weeds/Invasive Species: All equipment, including pickup trucks and passenger vehicles, would be cleaned of soils, seeds, vegetative matter, or other debris or matter that could contain or hold noxious seeds prior to entering the Project Area. The cleaning of equipment would also be done any time thereafter if the equipment leaves the Project Area, is used on another Project, and reenters the Project Area. The WCWCD would follow any regulations pertaining to control of noxious weeds on BLM-administered land. Vegetation in the Project Area would be monitored periodically for the establishment of noxious weeds or undesirable plant species. The WCWCD would be responsible for any future weed control work, if needed, as a result of the implementation of this Project. Any use of herbicides would comply with BLM requirements.

Stabilization and Rehabilitation: All areas subject to temporary ground disturbance would be restored to original contours to the extent determined by the BLM. Temporarily disturbed areas would be seeded using a certified weed-free seed mix approved by the BLM. Seed would be hand broadcasted and lightly covered with soil by hand using a rake or by pulling a chain-link fence with an all terrain vehicle. All soil removed during construction would be reused. Vegetation removal would be kept to that necessary to install the line. Any brush removed during construction would be used as mulch after reclamation activities. Any trees felled would either be left on site as down woody debris or removed if preferred by the BLM. The reservoir area would be smoothed and cleaned up prior to filling the reservoir with water. The borrow areas would be cleaned up of all debris and smoothed out.

Livestock Grazing: The WCWCD would ensure that any livestock grazing facility improvements and pipelines would remain in a serviceable condition. If damage occurs to any pipelines, fences, or other improvements, the WCWCD would be responsible for any needed repair/replacements.

Raptors and Migratory Birds: In order to avoid or reduce impacts on nesting success of raptors, activities would not occur within recommended spatial and seasonal buffers, and would follow Utah BLM BMPs for Raptors and Their Associated Habitats in Utah (August 2006). If existing topography limits actual line-of-sight of between an active nest (i.e., the nest has eggs or young) and construction activities, the spatial and seasonal buffer may be reduced.

To avoid or minimize potential short-term and long-term impacts to migratory birds, construction activities would be either limited during the migratory bird nesting period (generally defined as 15 May – July 15 [BLM 2008], but could start as early as March/April depending on elevation and latitude), or a migratory bird nesting survey would be completed in areas proposed for disturbance during this time period. If an active nest were discovered, the appropriate agency biologist would be notified and an appropriate buffer area around the nest would be established to prevent nest abandonment until after the migratory bird nesting period is over and/or young have fledged.

Wildlife: No firearms, air guns, or archery equipment would be allowed on the project sites. No pets would be permitted on project sites. To prevent entrapment of wildlife during construction, any open pits or trenches would be monitored throughout the construction day. Excavated pits and trenches more than 2 feet deep would be covered at the close of each day. Alternatively, fencing may be erected around open pits or trenches. At the beginning of the construction day and before pits or trenches are filled, they would be inspected for trapped animals. If any animals are found, they would be moved out of harm's way. No rodenticides would be used on project sites. Encounters with a protected species (e.g., raptors, migratory birds, or listed or sensitive species) would be reported to the BLM and/or the appropriate oversight agency (e.g., USFWS). Any contractor or employee who inadvertently kills or injures a protected species would immediately report the incident to the BLM and/or the appropriate oversight agencies.

Waters of the US: A Waters of the US Delineation Report is included as **Appendix E**.

4.4 Operation and Maintenance

It is anticipated that routine maintenance would include the following, and as summarized in **Table 6**:

- The diversion dam sluice gate would need to be opened and flushed monthly.

- The pipeline air valves would need to be inspected at least annually to ensure that they are functioning properly.
- The pipeline would likely need to be cleaned with a poly pig on an annual basis.
- A grader would be used to grade the pipeline roadway as necessary to ensure that access is maintained.
- The pipeline system is estimated to have a 50-year life before major pipeline repair would be required.
- The reservoir dam would require periodic inspection and maintenance.
- The reservoir requires water management practices of maintaining water levels and release flows.

Table 6. Typical pipeline and reservoir operation and maintenance and estimated personnel and equipment required

Task	Number of People	Equipment
Flushing diversion structure	1 person	1 Pickup truck
Flushing pipeline	2 people	1 Pickup truck
Pipeline maintenance	2 people	1 Pickup truck
Road maintenance	1 person	1 Grader 1 Pickup truck
Reservoir Maintenance	1 person	1 Pickup truck

4.5 Termination and Restoration

If the project is to be terminated or abandoned, a joint inspection would be held with the authorized officer(s) of the BLM prior to termination. This would be held to agree upon an acceptable rehabilitation plan for the area.

5.0 REFERENCES

Bureau of Land Management (BLM). 2006. Best management practices for raptors and their associated habitats in Utah. Recommendations for implementing the U.S. Fish and Wildlife Service, Utah Field Office's Guidelines for Raptor Protection from Human and Land Use Disturbances [Romin and Muck 2002]. BLM Utah State Office, Salt Lake City. August 2006.

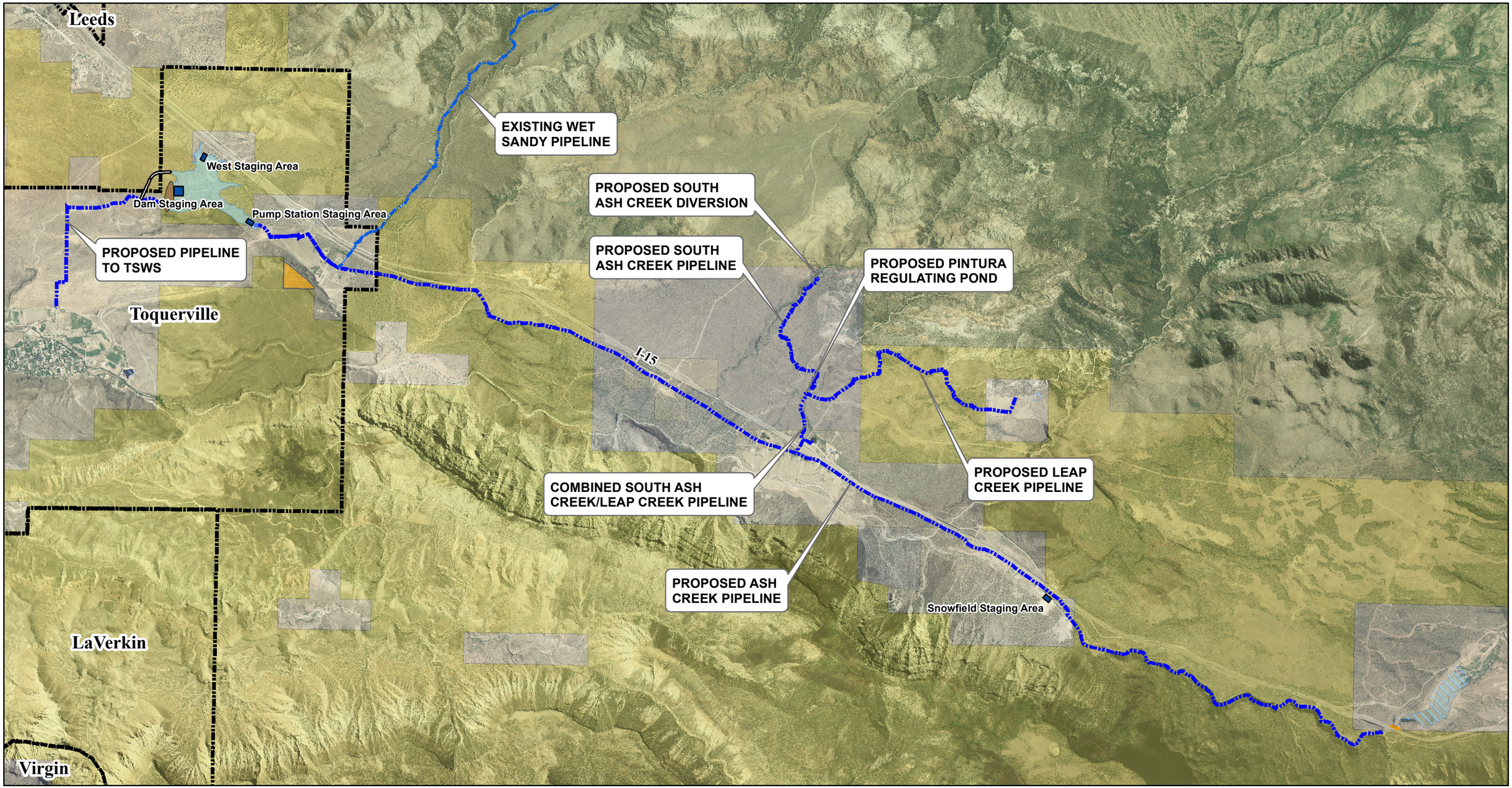
Bureau of Land Management. 2008. Instruction Memorandum No. 2008-050: Migratory Bird Treaty Act – Interim Management Guidance. Expires 30 September 2009.

Governor's Office of Planning and Budget (GOPB). 2008a. Demographic, population estimates. http://www.governor.utah.gov/DEA/popestimates.html. File downloaded: AllUPECData081120.xls. Utah Population Estimates Committee.

Governor's Office of Planning and Budget (GOPB). 2008b. Demographic and economic projections. http://www.governor.utah.gov/DEA/popestimates.html. File downloaded: ProjectSummary.xls. Utah Population Estimates Committee.

APPENDIX A

PRELIMINARY ENGINEERING DRAWINGS AND DESIGN



S:\sdskproj\019-90\GIS (019-90)\019-90 ASH CREEK PIPELINE.mxd

0 2,000 4,000 8,000 Feet

ALPHA ENGINEERING COMPANY

Legend

- Proposed Ash Creek Pipeline
- Anderson Junction Reservoir Staging Area
- Proposed Dam
- Borrow Site
- Proposed Anderson Junction Reservoir
- Existing Reservoir
- BLM
- State
- Private
- Tribal
- National Park
- USFW
- State Parks
- BLM Wilderness
- State Wildlife Reserve
- Water
- State
- SITLA
- USFS
- USFS Wilderness

N

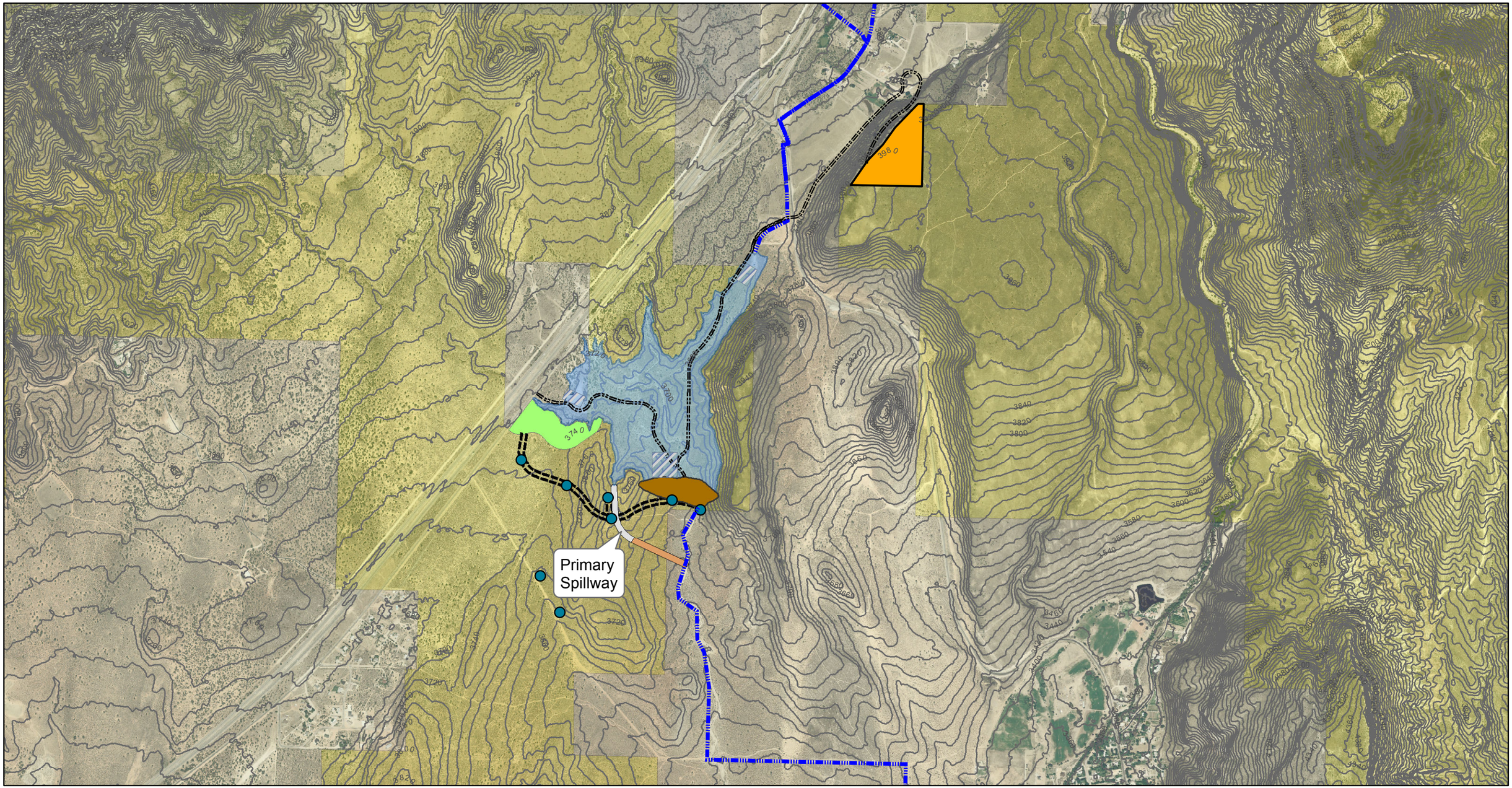
1 of 3

ASH CREEK PIPELINE

WASHINGTON COUNTY WATER CONSERVANCY DISTRICT

Spatial Reference:	Utah State Plane NAD 83, feet
Drawn By:	JTM
Scale:	1 inch = 4,000 feet
Date:	MARCH 8, 2012

S:\sdskproj\019-90\GIS (019-90)\019-90 ANDERSON JUNCTION RESERVOIR.mxd



0 750 1,500 3,000 Feet

ALPHA ENGINEERING COMPANY

Legend

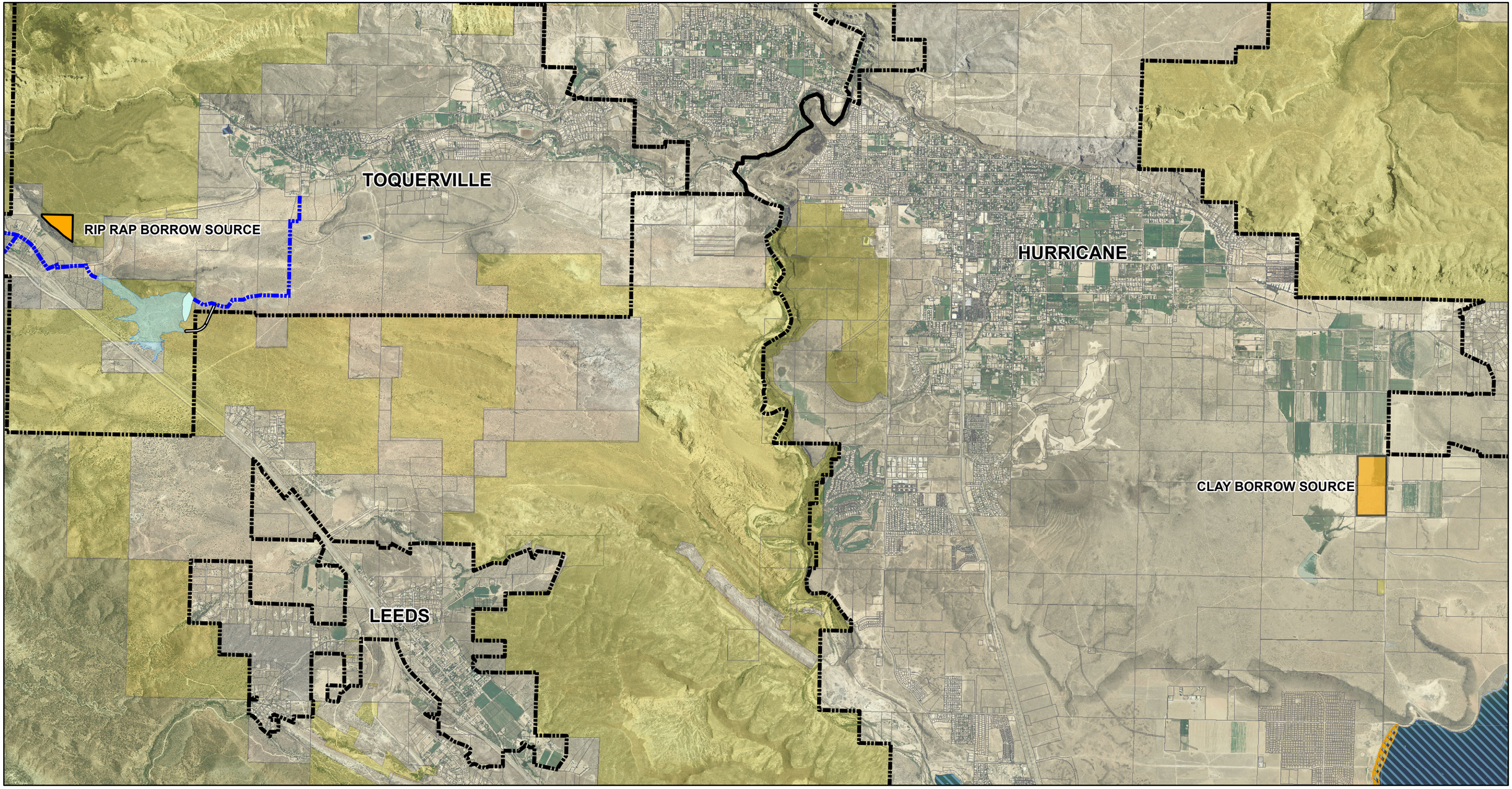
- Anderson Junction Reservoir Staging Area
- Borrow Area
- Anderson Junction Wells
- Construction Access
- Proposed Spillway - Natural
- Proposed Spillway - Disturbed
- Well & Pipeline Access Road
- Anderson Junction Reservoir Potential Recreation Area
- BLM
- State
- Private
- Tribal
- National Park
- USFW
- State Parks
- BLM Wilderness
- State Wildlife Reserve
- Water
- State
- SITLA
- USFS
- USFS Wilderness

N

2 of 3

ANDERSON JUNCTION RESERVOIR
TOQUERVILLE, UTAH

Spatial Reference:	Utah State Plane NAD 83, feet
Drawn By:	JTM
Scale:	1 inch = 1,500 feet
Date:	MARCH 8, 2012



S:\sdskproj\019-90\GIS (019-90)\019-90 AJ BORROW SOURCES.mxd

0 2,000 4,000 8,000 Feet

ALPHA ENGINEERING COMPANY

Legend

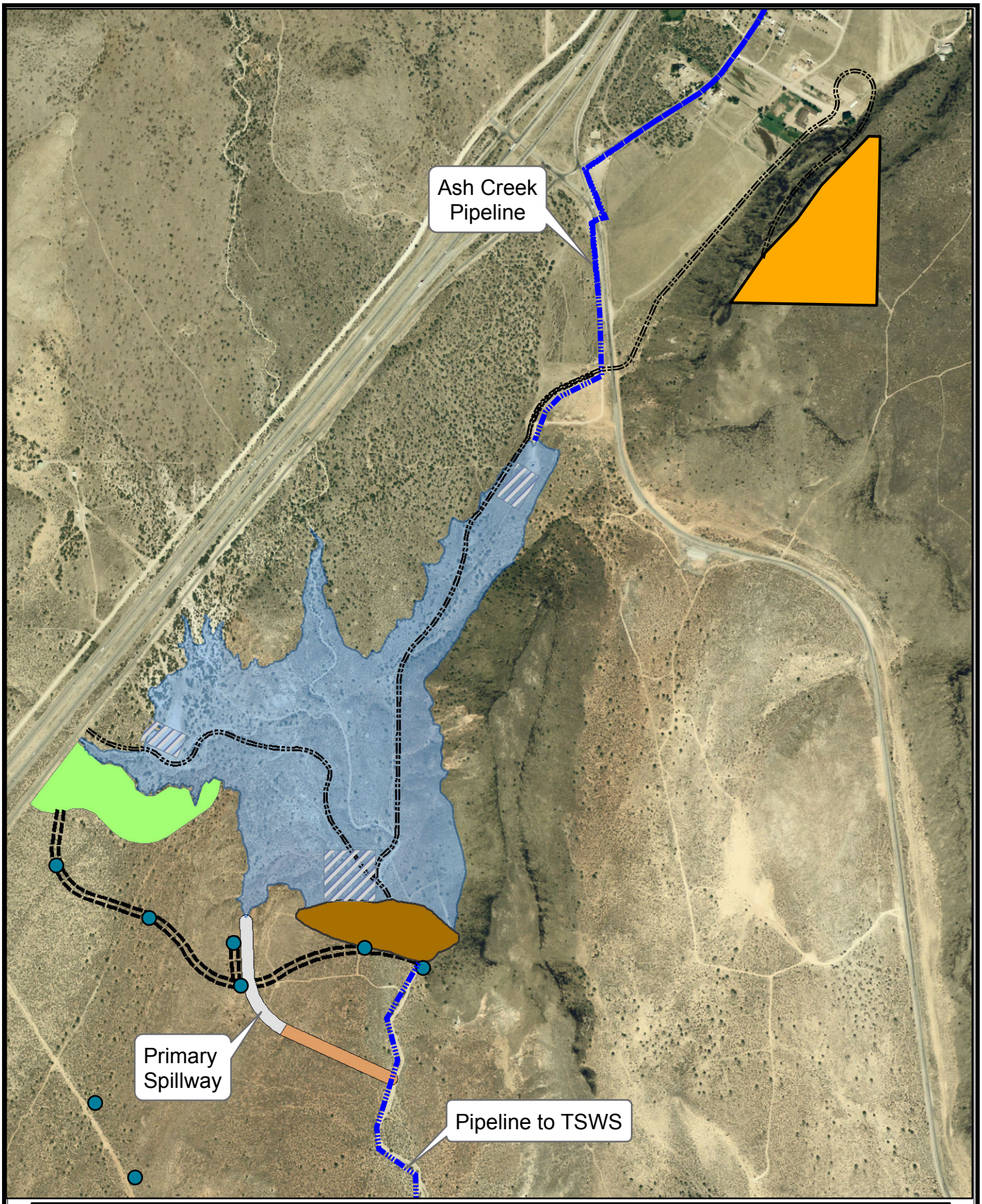
- Municipalities
- Anderson Junction Reservoir Borrow Pits
- BLM
- State
- Private
- Tribal
- National Park
- USFW
- State Parks
- BLM Wilderness
- State Wildlife Reserve
- Water
- State
- SITLA
- USFS
- USFS Wilderness

3 of 3

BORROW SOURCES

ANDERSON JUNCTION RESERVOIR

Spatial Reference:	Utah State Plane NAD 83, feet
Drawn By:	JTM
Scale:	1 inch = 4,000 feet
Date:	MARCH 8, 2012



N

0 250 500 1,000 Feet

ALPHA ENGINEERING COMPANY

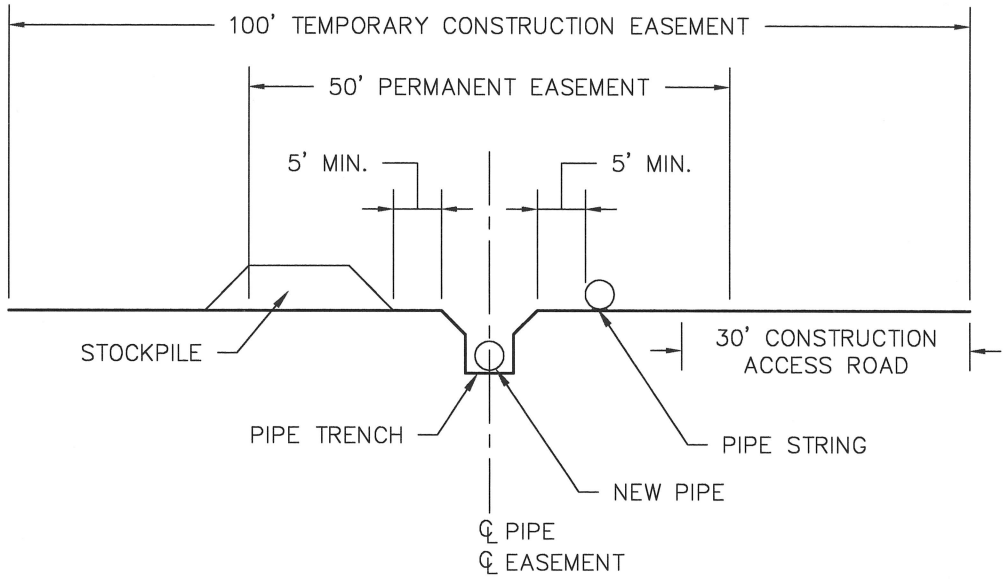
DATE: MARCH 8, 2012

INITIALS: JTM

SCALE: 1 in = 1,000 ft

FIGURE 2A
PROJECT COMPONENTS

- Construction Access
- Anderson Junction Wells
- Anderson Junction Reservoir Staging Area
- Borrow Area
- Anderson Junction Reservoir Potential Recreation Area
- Dam Footprint



TYPICAL SECTION - PIPELINE

SCALE: 1" = 20'

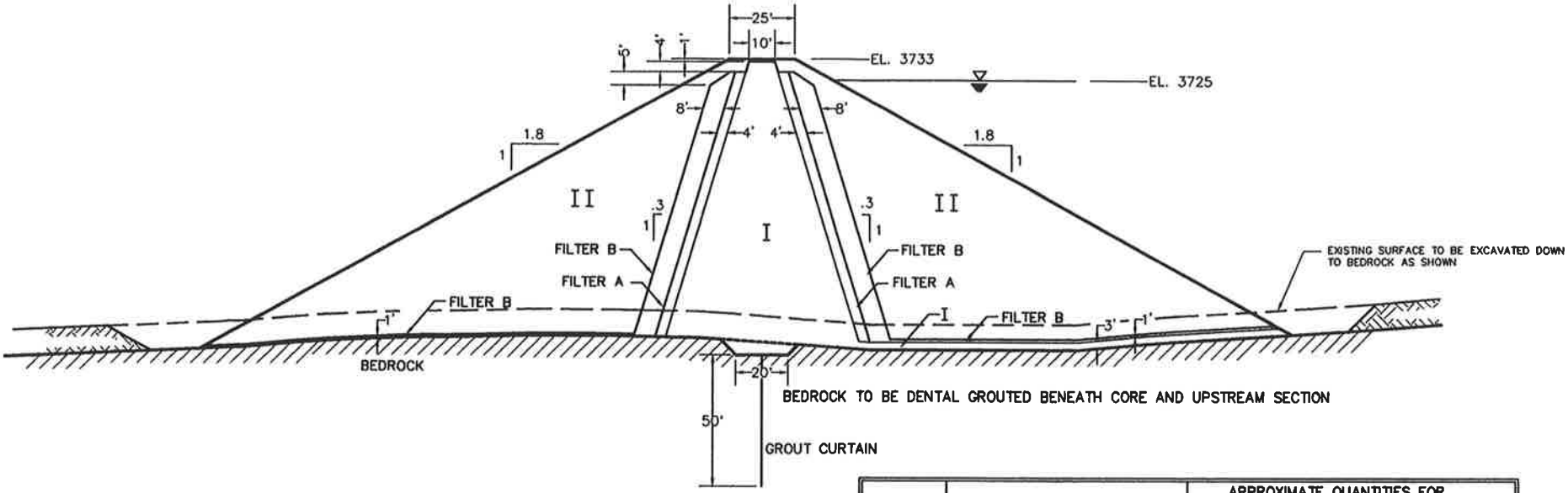
ASH CREEK PIPING PROJECT
WASHINGTON COUNTY WATER CONSERVANCY DISTRICT

DECEMBER 13, 2010

ALPHA ENGINEERING COMPANY
43 SOUTH 100 EAST, ST. GEORGE, UT 84770
TEL: 435-628-6500 FAX: 435-628-6553

S:\sdskproj\019-90\CIVIL3D\019-90 DET-PIPELINE SECTION.dwg, Layout1, 12/13/2010 4:04:36 PM, dhinton

SCALE: 1'= 40'



ZONE	MATERIAL	APPROXIMATE QUANTITIES FOR EMBANKMENT TO ELEVATION 3733 (cu yd)	
		DAM	%
I	CLAY	136,000	22.3%
II	ROCKFILL – 2' MAXIMUM SIZE	393,000	64.4%
FILTER A	SAND	24,000	3.9%
FILTER B	GRAVEL	57,000	9.3%
TOTAL		610,000	100%

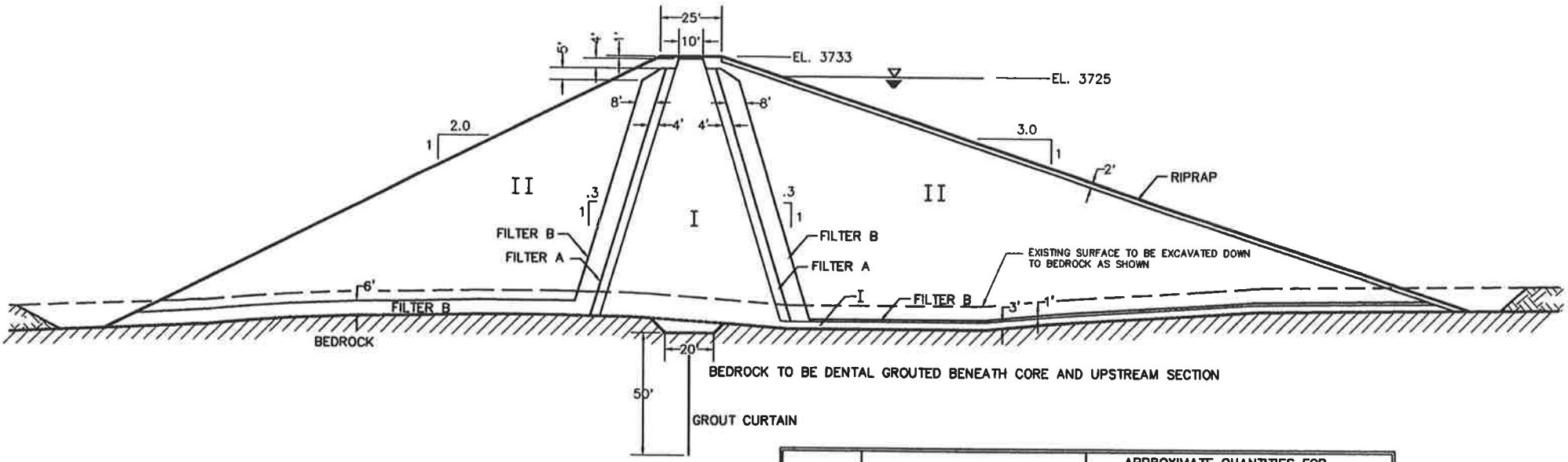
FIGURE 9

RB&G ENGINEERING INC. Provo, Utah

SANDSTONE MOUNTAIN RESERVOIR

EARTH & ROCKFILL EMBANKMENT SECTION

SCALE: 1'= 40'



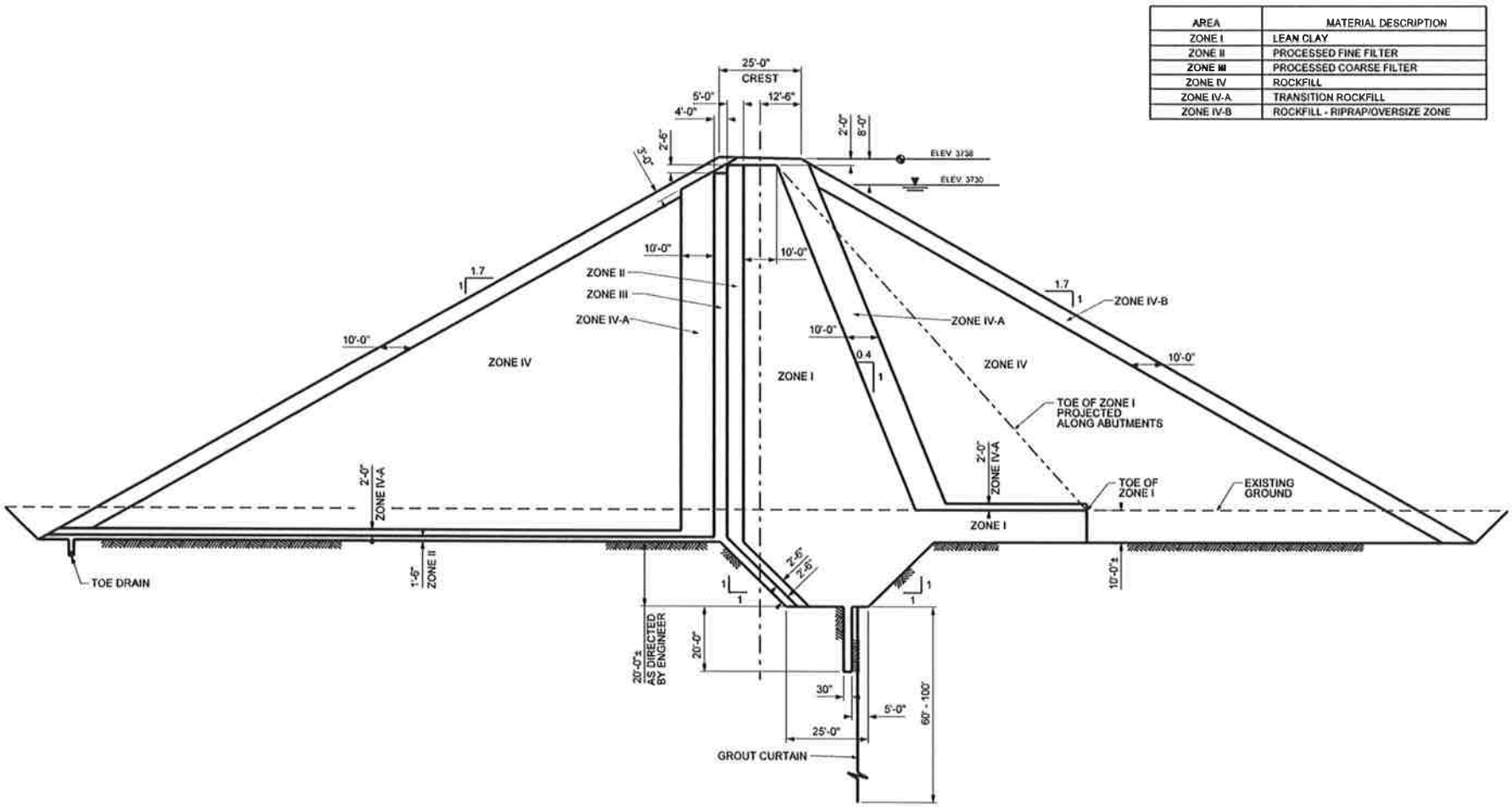
ZONE	MATERIAL	APPROXIMATE QUANTITIES FOR EMBANKMENT TO ELEVATION 3733 (cu yd)	
		DAM	%
I	CLAY	146,000	18.2%
II	SANDY GRAVEL AND COBBLES	520,000	64.7%
FILTER A	SAND	24,000	3.0%
FILTER B	GRAVEL	95,000	11.8%
RIPRAP	BASALT ROCK	19,000	2.4%
TOTAL		804,000	100%

RB&G ENGINEERING INC. Provo, Utah

SANDSTONE MOUNTAIN RESERVOIR

EARTHFILL EMBANKMENT SECTION

FIGURE 10



AREA	MATERIAL DESCRIPTION
ZONE I	LEAN CLAY
ZONE II	PROCESSED FINE FILTER
ZONE III	PROCESSED COARSE FILTER
ZONE IV	ROCKFILL
ZONE IV-A	TRANSITION ROCKFILL
ZONE IV-B	ROCKFILL - RIPRAP/OVERSIZE ZONE

RB&G
ENGINEERING, INC.

Figure 7- ALTERNATE EMBANKMENT SECTION

Anderson Junction Reservoir

APPENDIX B

BIOLOGICAL SURVEY REPORT

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3.0 Mojave Desert Tortoise 7
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5.0 Other Listed and Sensitive Animal Species 7
6.0 Special Status Fish Species 7
7.0 Raptor Nests 8
8.0 Migratory Birds 8
9.0 General Wildlife 8
10.0 Summary 9

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Figure 2c. Study Area and Results - South. 5

Appendices

Appendix A – Protocol Desert Tortoise Data Sheets
Appendix B – Plant Species List and Pictures
Appendix C – Raptor Nest Data Sheets and Pictures
Appendix D – Bird Species List

BIOLOGICAL SURVEY REPORT
Washington County Water Conservancy District
Anderson Junction Reservoir and Ash Creek Pipeline Project

The Washington County Water Conservancy District (WCWCD) is initiating planning and conducting baseline natural resource studies for a proposed surface water reservoir located south of Anderson Junction, near Toquerville, Utah, as well as a pipeline originating near Ash Creek Reservoir and continuing approximately 10 miles south-southwest to the Anderson Reservoir site (Figure 1). During the period May 5 to June 5, 2009, JBR Environmental Consultants, Inc (JBR) conducted biological surveys in support of the Anderson Junction Reservoir Project (including the Ash Creek Pipeline). In 2010, WCWCD identified four borrow sources for this project and during the periods April 27-29, 2010, May 5-28, 2010, and September 7, 2010, JBR conducted biological surveys on these areas. Two of the potential borrow areas are located adjacent to the reservoir area, one is located north of Toquerville, and the fourth is located on a mesa administered by the Bureau of Land Management (BLM) north of Highway 17 (Figure 1). Further information on this proposal is available in the applicable Plan of Development. The sections below describe the methodologies used and results of the surveys.

1.0 Methods

Prior to conducting surveys, JBR reviewed the US Fish and Wildlife Service's Threatened, Endangered, and Candidate Species (TEC species) list (http://www.fws.gov/mountain-prairie/endspp/CountyLists/Utah.pdf), State of Utah Sensitive Species list (http://dwrcdc.nr.utah.gov/ucdc/ViewReports/sscounty.htm), and the BLM Sensitive Species list (http://www.blm.gov/ut/st/en/fo/st__george/more/biological_resources/special_status_species.html). 12 TEC and 55 Utah State Sensitive plant and animal species are known or expected to occur in Washington County.

The Mojave desert tortoise (*Gopherus agassizii*) is listed as threatened under the Endangered Species Act and the extreme southern portion of the Study Area is located in the Upper Virgin River Recovery Unit for the species. For this reason and because it is known that at least one tortoise has been seen in the area, JBR biologists conducted protocol (USFWS 1992, 2009, and 2010) desert tortoise surveys in the portions of the Study Area south of Anderson Junction - essentially the reservoir area and borrow pits.

As the Study Area is large and in being consistent with the survey protocol (USFWS 2010), three additional transects encircling the study area (formerly called Zone of Influence Surveys) were not completed. As required by protocol, JBR biologists walked parallel transects spaced 30 feet apart to achieve 100% coverage of the area. During the surveys, special attention was given to the identification of desert tortoises and their sign (e.g., burrows, scat, carcasses, etc.). Survey information was recorded on established data sheets (Appendix A). Temperatures during the surveys never exceeded 90 degrees Fahrenheit.

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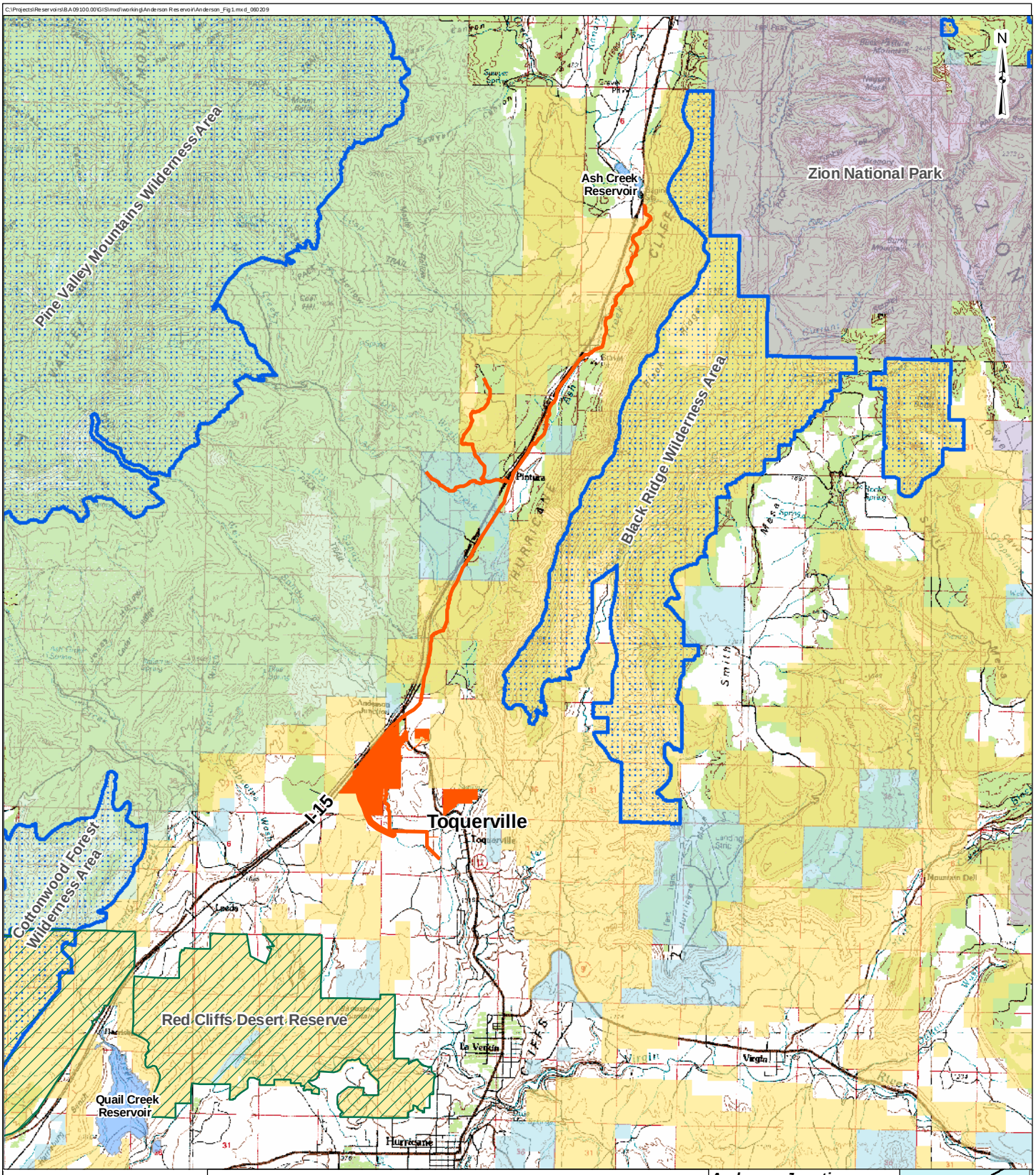


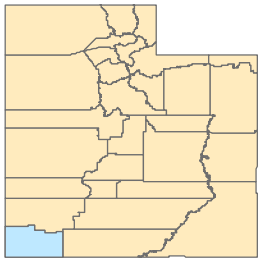


Figure 1. Project Vicinity and Land Owner

- Anderson Study Area
- Wilderness Area
- Reserve
- National Park Service
- Bureau of Land Management
- Private
- State
- US Forest Service

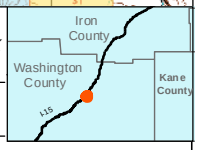
1:146,000

0 1 2 3 4 Miles

Anderson Junction Reservoir and Ash Creek Pipeline Study Area

Washington County Water Conservancy District

Washington, Utah

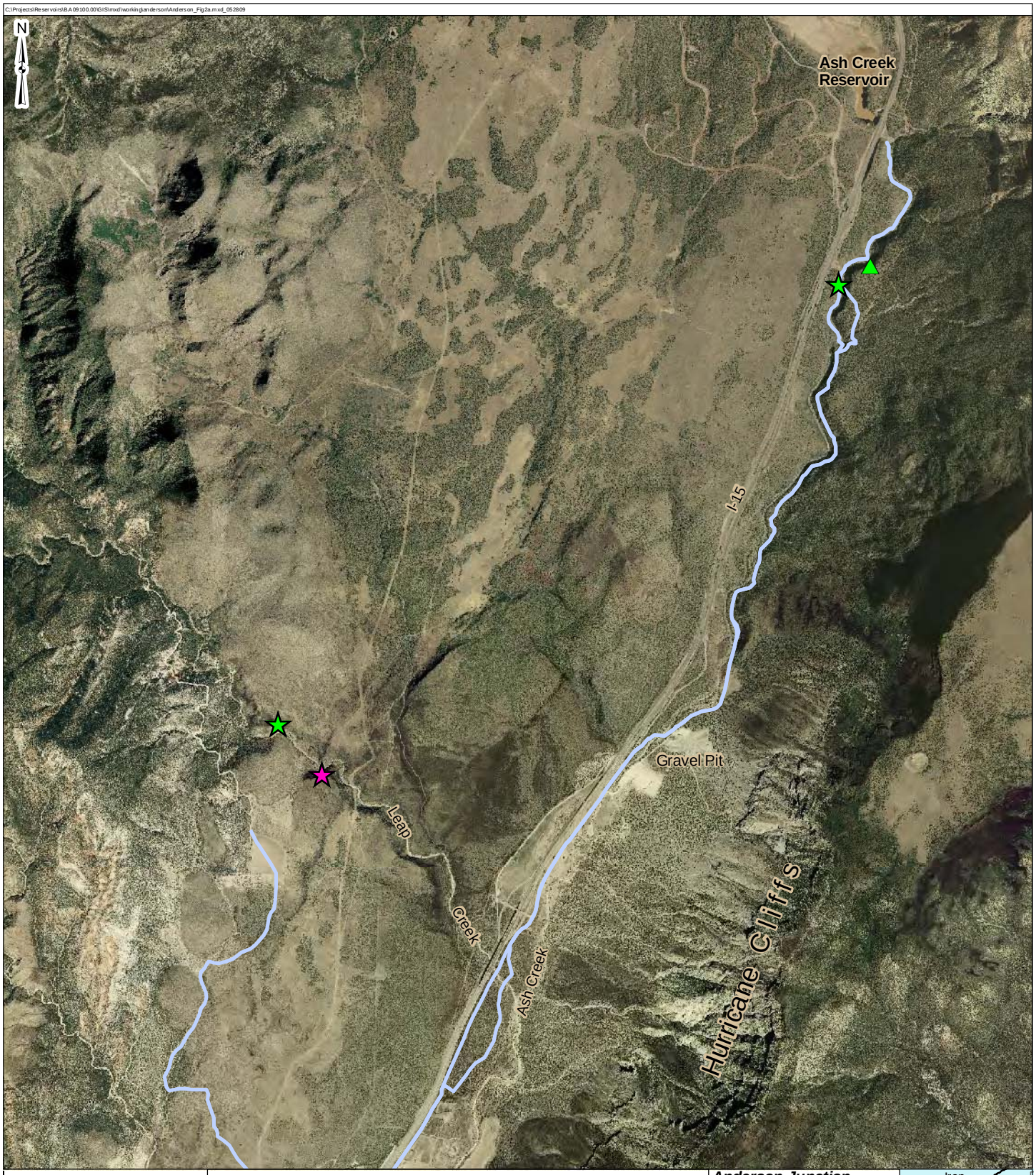


Disclaimer:
This document is for references purposes only and should not be used as a legal document. JBR make no guarantees to the accuracy of the data contained herein or any loss resulting there from.

Data Source:

JBR Map Index	WCWCD-Study Area
SGU BLM-ACEC, SRMA, RCDR	AGRC-Land Ownership
USGS-1:100,000 St. George	

C:\Projects\Reservoirs\BA09100.00\GIS\mxd\workingjanderson\Anderson_Fig2a.mxd_052809



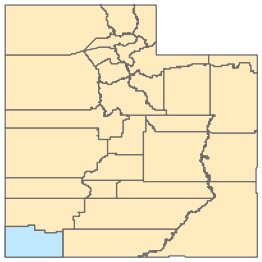


Figure 2a. Study Area and Results - North

Anderson Study Area

Raven Nest

Red-Tailed Hawk Nest

Stick Nest

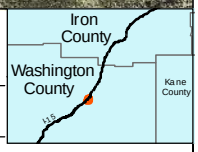
1:37,000

0 0.3 0.6 0.9 1.2 Miles

Anderson Junction Reservoir and Ash Creek Pipeline Study Area

Washington County Water Conservancy District

Anderson Junction, Utah



Disclaimer:
This document is for references purposes only and should not be used as a legal document. JBR make no guarantees to the accuracy of the data contained herein or any loss resulting there from.

Data Source:
JBR Map Index
2006 NAIP Aerial Imagery
JBR-Trimble

WCWCD-Study Area

C:\Projects\Reservoirs\BA09100.00\GIS\mxd\workingjanderson\Anderson_Fig2b.mxd_052809

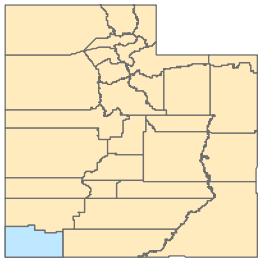


Figure 2b. Study Area and Results - Middle

Anderson Study Area

Cooper's Hawk Nest

Red-Tailed Hawk Nest

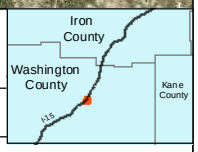
1:37,000

0 0.25 0.5 0.75 1 Miles

Anderson Junction Reservoir and Ash Creek Pipeline Study Area

Washington County Water Conservancy District

Anderson Junction, Utah



Disclaimer:
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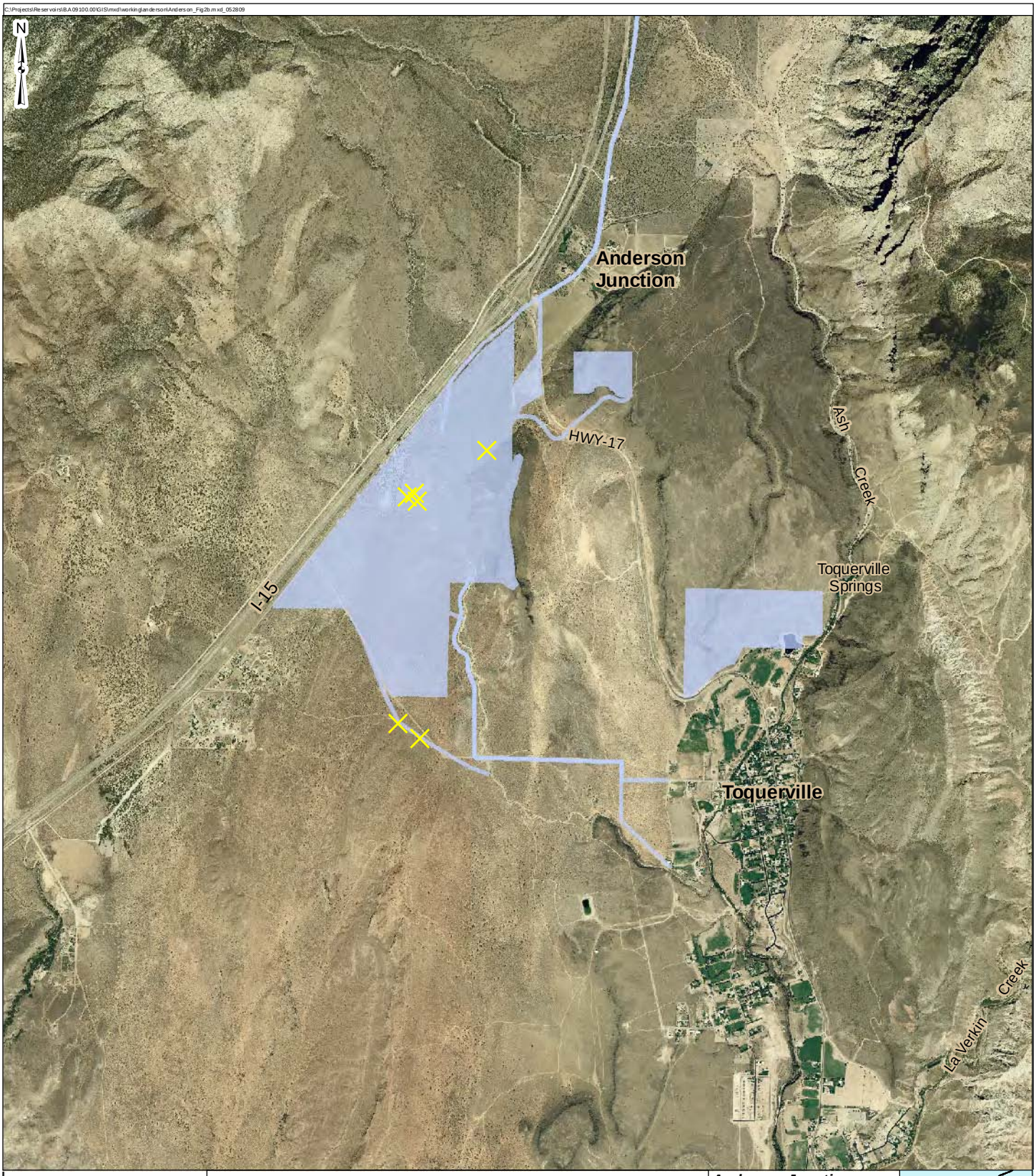
Data Source:
JBR Map Index
2006 NAIP Aerial Imagery
JBR-Trimble

WCWCD-Study Area

C:\Projects\Reservoirs\BA09100.00\GIS\mxd\workingjanderson\Anderson_Fig2b.mxd_052809



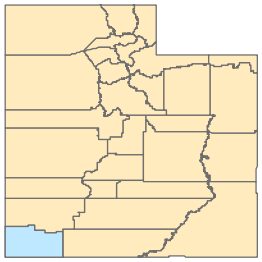


Figure 2c. Study Area and Results - South

Anderson Study Area

Predator Burrow

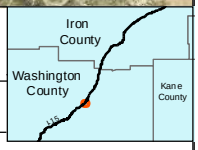
1:37,000

0 0.25 0.5 0.75 1 Miles

Anderson Junction Reservoir and Ash Creek Pipeline Study Area

Washington County Water Conservancy District

Anderson Junction, Utah



Disclaimer:
This document is for references purposes only and should not be used as a legal document. JBR make no guarantees to the accuracy of the data contained herein or any loss resulting there from.

Data Source:
JBR Map Index
2006 NAIP Aerial Imagery
JBR-Trimble

WCWCD-Study Area

In conjunction with the protocol tortoise and other biological surveys, JBR biologists also conducted special status (e.g., Sensitive, TEC) plant and wildlife species surveys. For the areas north of Anderson Junction, this was accomplished by walking meandering transect through the Study Area. All burrows were examined for tortoises and the sensitive burrowing owl (*Athene Cunicularia*) and their sign, sandy areas were examined for tracks of the sensitive Gila monster (*Heloderma suspect*) and sidewinder (*Crotalus cerastes*), rocky areas for Gila monsters and the sensitive chuckwalla (*Sauromalus ater*), unique geologic formations and soils for rare plants, and riparian areas for nesting birds, including the sensitive bobolink (*Dolichonyx oryzivorus*) and long-billed curlew (*Numenius americanus*). All unique, biological observations were mapped using a Trimble GPS. In addition to biological surveys of the Study Area, JBR biologists also surveyed all areas within 0.5 mile for raptor nests (Figure 2a, 2b, and 2c). Raptor nest surveys were conducted by scanning cliff faces, trees, rock outcrops, etc. with binoculars and spotting scopes from vantage points providing coverage of the area.

2.0 General Vegetation

The reservoir area is located in a transition zone from a black brush (*Coleogyne ramosissima*) community to a pinyon/juniper forest. Roughly, the western third of the area is dominated with Utah juniper (*Juniperus osteosperma*) and black brush, while the other two thirds is dominated with black brush, wolfberry (*Lycium andersonii*), green ephedra (*Ephedra viridis*), Indigo bush (*Psorothamnus fremontii*), and sand sage (*Artemisia filifolia*).

Vegetation communities in the two potential borrow areas adjacent to the reservoir area are the same as described for the reservoir area above. The borrow area located on the mesa north of Highway 17 exit was dominated with dense black brush, but contained sparse juniper and wolfberry. Desert Almond (*Prunus fasciculata*) and green brittlebush (*Encelia frutescens*) were the dominant species in the borrow area located north of Toquerville.

Vegetation communities along the pipeline area varies with changes in elevation, presence of surface water, and impacts from past fires. Vegetation from Anderson Junction north to Ash Creek Reservoir can be characterized as pinion/juniper forest. Vegetation communities south of Anderson Junction are lower in elevation and dominated by sand sage, and desert almond. Within the pinion/juniper vegetation communities north of Anderson Junction, there are two distinctly different plant communities. The first is dominated by cottonwood (*Populus fremontii*) and single leaf ash (*Fraxinus anomala*), and was found in association with several streams and an earthen water diversion ditch within the Study Area. The second plant community, dominated by yerba santa (*Eriodictyon angustifolium*) and Dixie live oak (*Quercus turbinella*), was found in burned areas within the Study Area.

While neither cheat grass (*Bromus tectorum*) nor foxtail brome (*Bromus rubens*) are listed on the Utah Noxious Weed List, they are exotic and invasive plant species that occur in great density in the burned areas and throughout the Study Area. Salt cedar (*Tamarix ramosissima*), perennial pepperweed (*Lepidium latifolium*), and scotch thistle (*Onopordum acanthium*) are listed as a noxious weed species and are found in the Pipeline Study Area along several streams and diversion ditch. A complete vegetation list and pictures showing the general vegetation types can be found in (Appendix B).

3.0 Mojave Desert Tortoise

The Study Area is located at or north of the northern extent of the range of the desert tortoise, does not contain Designated Critical Habitat for the species, and no tortoises or tortoise sign (e.g., burrows, scat, carcasses, etc.) were observed.

4.0 Rare Plants

No rare plants are known to occur in Study Area. Soils in the Study Area are alluvium/colluvium or derived from basalt, igneous rock, quartz monzonite, or the Navajo Sandstone and Claron Formations. Rare plant species in Washington County are not known to occur on these soils or formations and none were observed during surveys.

5.0 Other Listed and Sensitive Animal Species

No individuals or sign of any TEC or sensitive animals or plant species were observed in the Study Area. All predator burrows were examined for burrowing owls and no burrowing owls or their sign was observed.

6.0 Special Status Fish Species

There are six fish species native to the Virgin River system that could occur in the three creeks in the Study Area. These fishes include two endangered species, the Virgin River chub (*Gila seminude*) and woundfin (*Plagopterus argentissimus*), as well as three Utah State Sensitive Species, the Virgin spinedace (*Lepidomeda mollispinis*), flannelmouth sucker (*Catostomus latipinnis*), and desert sucker (*Catostomus clarki*). The Virgin spinedace and flannelmouth sucker are protected by multiple agency conservation agreements (UDWR 1995 and 2006, respectively) designed to expedite conservation measures needed for the continued existence and recovery of these species. The speckled dace (*Rhinichthys osculus*) can also be found but is a common species in Utah streams. In addition to these species native to the Virgin River system, creeks in the Study Area also provide habitat for salmonids (trout), including the sensitive Bonneville cutthroat trout (*Oncorhynchus clarkii utah*). The three streams located within the Study Area and the fish species associated with them are listed below.

Ash Creek: Desert sucker and speckled dace are known to occur throughout the length of Ash Creek. In addition, connectivity between Ash Creek and the Virgin River was reestablished following the large floods that occurred throughout the

Virgin River system in 2005. As a result, Virgin spinedace, Virgin River chub, woundfin, and flannelmouth sucker have been found in the lower reaches of Ash Creek (from Toquerville downstream) and may be found further upstream depending upon the time of year and stream flow.

Leap Creek: Within Leap Creek, the best habitat for Bonneville cutthroat trout is located upstream of the Dixie National Forest boundary where the largest populations of this species are expected to occur. However, UDWR records indicate that Bonneville cutthroat trout are also found below the boundary. Although occupancy data is not known, it is expected that desert sucker and speckled dace also occupy Leap Creek.

South Ash Creek: Desert sucker, speckled dace, and Bonneville cutthroat trout. Similar to Leap Creek, the best habitat and primary populations of Bonneville cutthroat trout in "South" Ash Creek are found above the Dixie National Forest boundary. However, UDWR records indicate that Bonneville cutthroat trout are also found below the boundary. Although occupancy data is not known, it is expected that desert sucker and speckled dace also occupy South Ash Creek.

7.0 Raptor Nests

During the raptor survey, JBR biologists located 1 inactive and 4 active nest sites (Figures 2a, 2b, and 2c) in the Study Area. The active nest sites included 3 red-tailed hawks (*Buteo jamaicensis*) and 1 Cooper's hawk (*Accipiter cooperii*). No raptor nests were located in or around the Reservoir Study Area. Raptor data sheets and pictures are provided in Appendix C. Portions of the Study Area are densely forested and other raptor nests could exist within the 0.5-mile buffer that were not observed.

8.0 Migratory Birds

The Study Areas provides nesting habitat for many migratory bird species. In total, 63 different bird species (including raptor, non-migratory, and non-native species) were observed (Appendix D). The highest density and species richness of birds occurred within riparian habitats.

9.0 General Wildlife

Several general wildlife species, or their sign, were encountered in or near the Study Area. Species found in the Reservoir Study Area include side-blotch lizard (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), Great Basin collared lizard (*Crotaphytus bicinctores*), tiger whiptail (*Aspidoscelis tigris*), Great Basin rattlesnake (*Crotalus oreganus lutosus*), desert horned lizard (*Phrynosoma platyrhinos*), white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), rock squirrel (*Spermophilus variegates*), desert cottontail (*Sylvilagus audubonii*), black-tailed jack rabbit (*Lepus californicus*), desert woodrat (*Neotoma lepida*), mule deer (O*docoileus hemionus*), and kangaroo rat (D*ipodomys spp*).

Species found in the Pipeline Study Area include canyon treefrog (*Hyla arenicolor*), Woodhouse's toad (*Bufo woodhousii*), coachwhip (*Masticophis flagellum*), side-blotch lizard, common sagebrush lizard (*Sceloporus graciosus*), long-nosed leopard lizard (*Gambelia wislizenii*), desert horned lizard, white-tailed antelope ground squirrel, rock squirrel, desert cottontail, black-tailed jack rabbit, and least chipmunk (*Neotamias minimus*).

10.0 Summary

No TEC or sensitive wildlife or plants were observed in the Study Area. Several special status species are known to occur in creeks intersecting the Study Area, including the sensitive Bonneville cutthroat trout. The rocky cliffs and riparian areas found adjacent to and in the Study Area offer nesting habitat for raptors and other migratory birds.

References

US Fish and Wildlife Service (USFWS). 1992. Field survey protocol for any federal action that may occur within the range of the desert tortoise. Ventura Office. Ventura, California.

US Fish and Wildlife Service (USFWS). 2009. Preparing for any action that may occur within the range of the Mojave desert tortoise (Gopherus agassizii). 2009 field season. Ventura Office. Ventura, California.

US Fish and Wildlife Service (USFWS). 2010. Preparing for any action that may occur within the range of the Mojave desert tortoise (Gopherus agassizii). 2010 field season. Ventura Office. Ventura, California.

Utah Department of Natural Resources. Division of Wildlife Resources (UDWR). 1995. Virgin spinedace conservation agreement and strategy. Publication # 95-13. June.

Utah Department of Natural Resources. Division of Wildlife Resources (UDWR). 2006. Range-wide conservation agreement and strategy for roundtail chub (*Gila robusta*), bluehead sucker (*Catostomus discobolus*), and flannelmouth sucker (*Catostomus latipinnis*). Prepared for the Colorado River Fish and Wildlife Council. Prepared by the Utah Department of Natural Resources, Salt Lake City, UT. Publication # 06-18.

APPENDIX A
PROTOCOL DESERT TORTOISE DATA SHEETS

5 PEOPLE

Desert Tortoise Survey Form
Presence or Absence / Clearance

Date 5-5-09 Transect No 1 - 5 State UTAH
County WASHINGTON City ~~EAS~~ ANDERSON JT. Recorder: S TOPHAM
Project Name ANDERSON JT RESERVOIR Parcel _____ No. _____

==========

INFORMATION ON SHELTER SITES
(Please indicate why you believe a shelter site is active or inactive)

Sign No.	Type	Location	Width	Estimated Length	Other Sign
	NONE				

Condition of Shelter Site(1)/Comments:

==========

Condition of Scat(2)/Comments:

==========

Condition of Shell Remains(3)/Comments:

Signs of Human Disturbance/Comments:

==========

INFORMATION INDEX FOR DESERT TORTOISE SIGN
Burrows and Dens, Scats, and Shell Remains

Desert Tortoise Summary Form
Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 6-5-09 (M/D/Y) Transect/No. 1 – 5 State UTAH
County WASHINGTON City ST. GEORGE Recorder
Address Project Name ANDERSON JCT. TORT SURVEY
Type of Project proposed DESERVOIR. Quad Name Pintura/Hurricane
Scale 1:24,000 Site Name ANDERSON RES. T 40S R13 Sec 23,27,33,34 1/4
Sec 1/4 1/4 Sec UTM Zone 12 Northing ~~295112.13~~ 4127651.096 m
Easting 295112.13 Parcel No.

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS
Project Site / Zone of Influence ___ft from Project Site

Transect Length: 0.3-1.2 mi Width: 30 ft Other — ft Time 9:00
Weather: Airtemp at : 5 cm 65 °C Surface 65 °C Cloud cover -0- %
Rainfall -0- in Wind speed 3-5 Rainfall in last 30 days TRACE in
Land Form (e.g., mesa, bajada, wash) WASHES + MESA
% Slope: high 35 low -0- Aspect S Elevation 8,432 ft
Vegetation: dominant perennials DIXIE LIVE OAK, JUN. PER, DESERT ALMOND

dominant annuals DESERT MARIGOLD, PRIMROSE, BROMUS

Adjacent Land Use: up to 1 mi AGRACULTURE, HOUSING, FREEWAY, VIRGIN DESERT
Soils SAND SOILS WITH SOME SMALL ~~DEE~~ VEGETATED DUNE AREAS
Vegetation SEE ATTACHED VEG LIST

= =

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A=Ø J=Ø M=Ø F=Ø Unk=Ø	A=Ø I=Ø	Ø	A=Ø J=Ø M=Ø F=Ø Unk=Ø

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
Ø	Ø	Ø	Ø	Ø	w/ sign= Ø w/o sign= 4

= =

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens
	2 SETS	NONE	MUCH Dumping	MANY	Ø	ONE LARGE BLADED AREA	1

Comments/Drawings:

Desert Tortoise Survey Form
Presence or Absence / Clearance

Date 5-6-09 Transect No 6 - 10 State UTAH
County WASHINGTON City _____ Recorder: _____
Project Name ANDERSON JCT TORT SURVEY Parcel _____ No. _____

==========

INFORMATION ON SHELTER SITES
(Please indicate why you believe a shelter site is active or inactive)

Sign No.	Type	Location	Width	Estimated Length	Other Sign

Condition of Shelter Site(1)/Comments:

==========

Condition of Scat(2)/Comments:

==========

Condition of Shell Remains(3)/Comments:

==========

Signs of Human Disturbance/Comments:

==========

INFORMATION INDEX FOR DESERT TORTOISE SIGN
Burrows and Dens, Scats, and Shell Remains

Desert Tortoise Summary Form

Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 5-6-09 (M/D/Y) Transect/No. 6 State UTAH
County WASHINGTON City ANDERSON JT. Recorder STOPHAN
Address I-15 TOQUERVILLE EXIT Project Name ANDERSON JT. TORTOISE SURVEY
Type of Project PROPOSED RESERVOIR Quad Name PINTURA/HURRICANE
Scale 1:24,000 Site Name ANDERSON RES. T 40 S R 13 Sec 28,27,33,34 1/4
Sec ____ 1/4 1/4 Sec ____ UTM Zone 12 Northing 4127651.016 m
Easting 295112.13 Parcel No. ____

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS

Project Site / Zone of Influence ___ft from Project Site

Transect Length: ∞ ft Width: 30 ft Other — ft Time 7:35
Weather: Airtemp at : 5 cm 61 °C Surface 61 °C Cloud cover -0- %
Rainfall -0- in Wind speed 5-8 mph Rainfall in last 30 days TRACE in
Land Form (e.g., mesa, bajada, wash) BRAIDED WASHES.
% Slope: high 35 low 0 Aspect SOUTH Elevation 8,432 ft
Vegetation: dominant perennials DIXIE LIVE OAK, JUNIPER, DESERT ALMOND
dominant annuals DESERT MARIGOLD, PRIMROSE,
Adjacent Land Use: up to 1 mi AGRICULTURE, HOMES, FREEWAY,
Soils SAND SOILS, BASALT MESA,
Vegetation SEE MASTER VEG LIST.

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A=0 J=0 M=0 F=0 Unk=0	A=0 I=0	0	A=0 J=0 M=0 F=0 Unk=0

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
0	0	0	0	0	w/ sign=0 w/o sign=5

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens
YES	NO	0	~~0~~ YES	much Dumping	0	ONE AREA	2.

Comments/Drawings:

Desert Tortoise Survey Form
Presence or Absence / Clearance

Date 5-7-09 Transect No 11 - 13 State UTAH
County WASH City ANDERSON JCT. Recorder: S TAPHAM
Project Name ANDERSON DES. Parcel _____ No. _____

==========

INFORMATION ON SHELTER SITES
(Please indicate why you believe a shelter site is active or inactive)

Sign No.	Type	Location	Width	Estimated Length	Other Sign

Condition of Shelter Site(1)/Comments:

==========

Condition of Scat(2)/Comments:

==========

Condition of Shell Remains(3)/Comments:

==========

Signs of Human Disturbance/Comments:

==========

INFORMATION INDEX FOR DESERT TORTOISE SIGN
Burrows and Dens, Scats, and Shell Remains

Desert Tortoise Summary Form
Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 5-7-09 (M/D/Y) Transect/No.____ State UTAH
County WASHINGTON City ANDERSON JCT Recorder S TOPHAM
Address ____ Project Name ANDERSON RES
Type of Project PROPOSED RES. Quad Name PINTURA/HURRICANE
Scale 1:24,000 Site Name ANDERSON RES T 40S R 13 Sec 24,27,33,34 1/4
Sec____ 1/4 1/4 Sec____ UTM Zone 12 Northing 4127651.096m
Easting 295112.13 Parcel No.____

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS

Project Site / Zone of Influence ___ft from Project Site

Transect Length: 0.8-1.2 mi Width: 30 ft Other — ft Time 9:00
Weather: Airtemp at : 5 cm 67 °C Surface 67 °C Cloud cover 0 %
Rainfall 0 in Wind speed 3-5 Rainfall in last 30 days TRACE in
Land Form (e.g., mesa, bajada, wash) WASHES
% Slope: high 0 low 45 Aspect S Elevation 8,432 ft
Vegetation: dominant perennials DWARF WHITE OAK, JUNIPER

dominant annuals PRIMROSE

Adjacent Land Use: up to 1 mi AGRICULTURE, HOUSES, FREEWAY,
Soils SAND
Vegetation____

= =

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A=0 J=0	A=0	0	A=0 J=0
	M=0 F=0	I=0		M=0 F=0
	Unk=0			Unk=0

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
0	0	0	0	0	w/ sign=0 w/o sign= 4

= =

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens
YES	NO	NO	YES	YES	NO	YES	1

Comments/Drawings:

Desert Tortoise Survey Form
Presence or Absence / Clearance

Date 05-13-09 Transect No SPILLWAY/PIPELINE State UTAH
County WASHINGTON City ANDERSON JCT. Recorder: J TOPHAM
Project Name ANDERSON JCT RES. Parcel _____ No. _____

==========

INFORMATION ON SHELTER SITES
(Please indicate why you believe a shelter site is active or inactive)

Sign No.	Type	Location	Width	Estimated Length	Other Sign

Condition of Shelter Site(1)/Comments:

==========

Condition of Scat(2)/Comments:

==========

Condition of Shell Remains(3)/Comments:

==========

Signs of Human Disturbance/Comments:

==========

INFORMATION INDEX FOR DESERT TORTOISE SIGN
Burrows and Dens, Scats, and Shell Remains

Desert Tortoise Summary Form
Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 05-13-09 (M/D/Y) Transect/No. SPILLWAY / PIPELINE State UTAH
County WASHINGTON City ANDERSON JCT Recorder J TOPHAM
Address _____ Project Name ANDERSON JCT 12FS.
Type of Project RESERVOIR / PIPELINE / SPILLWAY Quad Name PINTURA / HURRICANE
Scale 1:24,000 Site Name ANDERSON JCT T 40S R 13 Sec 20, 27, 33, 34 1/4
Sec ____ 1/4 1/4 Sec ____ UTM Zone 12 N Northing 4127651.096m
Easting 295117.13 Parcel No. _____

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS
Project Site / Zone of Influence ___ft from Project Site

Transect Length: _____ft Width: 30 ft Other _____ft Time 7:10
Weather: Airtemp at : 5 cm 55 °C Surface 55 °C Cloud cover 0 %
Rainfall 0 in Wind speed 25 Rainfall in last 30 days TRACE in
Land Form (e.g., mesa, bajada, wash) WASH
% Slope: high 30 low 0 Aspect S Elevation 4,432 ft
Vegetation: dominant perennials SAGEBRUSH, INDIGO BUSH, BLACK BRUSH

dominant annuals _____

Adjacent Land Use: up to 1 mi AGRICULTURE, HOUSING, FREEWAY,
Soils SAND
Vegetation _____

= =

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A=0 J=0	A=0	0	A=0 J=0
	M=0 F=0	I=0		M=0 F=0
	Unk=0			Unk=0

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
0	0	0	0	0	w/ sign= 0
					w/o sign= 6

= =

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens
NONE	NONE	NONE	NONE	NONE	NONE	1 ROAD	1

Comments/Drawings:

Desert Tortoise Survey Form
Presence or Absence / Clearance

Date 05-14-09 Transect No 14-16 State UTAH
County IRON City ANDERSON JCT Recorder: S TOPHAM
Project Name ANDERSON JCT RES. Parcel _____ No. _____

==========

INFORMATION ON SHELTER SITES
(Please indicate why you believe a shelter site is active or inactive)

Sign No.	Type	Location	Width	Estimated Length	Other Sign

Condition of Shelter Site(1)/Comments:

==========

Condition of Scat(2)/Comments:

==========

Condition of Shell Remains(3)/Comments:

==========

Signs of Human Disturbance/Comments:

==========

INFORMATION INDEX FOR DESERT TORTOISE SIGN
Burrows and Dens, Scats, and Shell Remains

= =

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A=0 J=0	A=0	0	A=0 J=0
	M=0 F=0	I=0		M=0 F=0
	Unk=0			Unk=0

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
0	0	0	0	0	w/ sign= 0
					w/o sign= 5

= =

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens
yes	no	no	no	no	no	no	2

Comments/Drawings:

Desert Tortoise Summary Form
Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 05-14-09 (M/D/Y) Transect/No. 14 – 16 State UTAH
County IRON City ANDERSON JCT Recorder S TOPHAM
Address _____ Project Name ANDERSON JCT RES.
Type of Project RESERVOIR Quad Name _____
Scale 1:24,000 Site Name ANDERSON JT T 40S R 13 Sec 22, 27, 33, 34 1/4
Sec ____ 1/4 1/4 Sec ____ UTM Zone 12N Northing 4127651.096m
Easting 295112.13 Parcel No. _____

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS
Project Site / Zone of Influence ___ft from Project Site

Transect Length: _____ft Width: 30 ft Other _____ft Time 10:00 AM
Weather: Airtemp at : 5 cm 20 °C Surface 20 °C Cloud cover 0 %
Rainfall — in Wind speed 1-3 Rainfall in last 30 days TRACE in
Land Form (e.g., mesa, bajada, wash) WASHES.
% Slope: high 30 low 0 Aspect S Elevation 8,132 ft
Vegetation: dominant perennials SAND SAGE,
dominant annuals PRIMROSE
Adjacent Land Use: up to 1 mi ALFALFA FIELDS, HOUSES, FREEWAY
Soils _____
Vegetation _____

Desert Tortoise Summary Form

Presence or Absence / Clearance

(place a 4 X 6 photograph showing the area where the transect was conducted)

This form should be completed for those transects that contain one or more desert tortoise sign. After the project site and Zone of Influence have been surveyed for tortoise sign, the results from the transect forms should be compiled on a summary form. If no tortoise sign occurs on the project site or Zone of Influence, the summary form should be completed. Please fill in all sections on the top 2/3 of the page of the summary form.

Date 06-15-09 (M/D/Y) Transect/No. 17 – State UTAH
County WASHINGTON City ST. GEORGE Recorder S TOPHAM
Address _____ Project Name ANDERSON RT 1281.
Type of Project RES. Quad Name PINTURA, HURRICANE
Scale 1:24,000 Site Name _____ T _____ R _____ Sec _____ 1/4
Sec ____ 1/4 1/4 Sec ____ UTM Zone _____ Northing _____
Easting _____ Parcel No. _____

DESERT TORTOISE HANDBOOK 1992: FORM FOR PRESENCE-OR-ABSENCE AND CLEARANCE SURVEYS

Project Site / Zone of Influence ___ft from Project Site

Transect Length: _____ft Width: 30 ft Other _____ft Time _____
Weather: Airtemp at : 5 cm_____°C Surface_____°C Cloud cover_____%
Rainfall____in Wind speed_____ Rainfall in last 30 days_____in
Land Form (e.g., mesa, bajada, wash)_____
% Slope: high_____ low_____ Aspect_____ Elevation_____ft
Vegetation: dominant perennials_____
_____
dominant annuals_____
_____
Adjacent Land Use: up to 1 mi_____
Soils_____
Vegetation_____

= =

TOTAL NUMBER OF

Corrected Sign	Live Tortoises Adult/Juv.	Shelter Sites Pallet/Burrow/Den Active/Inactive(1)	Scats(2)	Shell Remains(3)
	A= J=	A=		A= J=
	M= F=	I=		M= F=
	Unk=			Unk=

Tracks	Eggshell Fragments	Drinking Sites	Courtship Rings	Other	Neotoma Middens
					w/ sign=
					w/o sign=

= =

SIGNS OF HUMAN DISTURBANCE - NUMBER AND TYPES SEEN

Tire Tracks	Human Footprints	Dog Sign	Trash	Dump Sites	Gun Shells	Blading	Ravens

Comments/Drawings:

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 27/04/10 (day, month, year) Survey biologist(s): S. DOPHAM, L. SHARP, J. SAGE (name, email, and phone number)

Site description: ~~BATT~~, Rock Quarry Pit (project name and size; general location)

County: WASHINGTON Quad: TOQUERVILLE 1:24,000 Location: 4126478.51mN 296761.57mE (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: ____ Transect length: 2,744FT

GPS Start-point: 4126108.95mE 296759.76mE (easting, northing, elevation in meters) Start time: 8:35 am/pm

GPS End-point: 4126732.93mE 296718.35mE (easting, northing, elevation in meters) End time: 5:00 am/pm

Start Temp: 14 °C End Temp: 27 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: 1 of _____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 28-04-10 (day, month, year) Survey biologist(s): S DRUM, B SHARP, K SHARP, J SAGE. (name, email, and phone number)

Site description: ANDERSON JCT RESERVOIR (project name and size; general location)

County: WASHINGTON Quad: _____ Location: 4127230.26 mN 294309.97 mE (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: 1 Transect length: 4,202

GPS Start-point: 4127230.26 mN 294309.97 mE (easting, northing, elevation in meters) Start time: 1:56 am/pm

GPS End-point: _____ (easting, northing, elevation in meters) End time: 4:40 am/pm

Start Temp: 22 °C End Temp: 24 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 28/04/10 (day, month, year) Survey biologist(s): S TOPHAM, G SHARP, K SHARP, T SAGE. (name, email, and phone number)

Site description: Rock Quarry Pit. (project name and size; general location)

County: WASHINGTON Quad: TOWNSHIPE 1:24,000 Location: (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: ____ Transect length: _____

GPS Start-point: 4126732.93mE 8675 976mE (easting, northing, elevation in meters) Start time: 8.02 am/pm

GPS End-point: _____ (easting, northing, elevation in meters) End time: 10:30 am/pm

Start Temp: 14 °C End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: ____ of ____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 28-04-10 (day, month, year) Survey biologist(s): S DRAM, B SHAP, K SHAP, J SAGE. (name, email, and phone number)

Site description: MESA QUARY (project name and size; general location)

County: WASHINGTON Quad: _____ Location: 4128463.35 m N 296367.00 m E (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: ____ Transect length: 1,301.87

GPS Start-point: 4128463.35 m N 296367.00 m E (easting, northing, elevation in meters) Start time: 11:17 am/pm

GPS End-point: 4128151.32 m N 296363.22 m E (easting, northing, elevation in meters) End time: 1:32 am/pm

Start Temp: 20 °C End Temp: 21 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____of_____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 29 - 04 - 10 (day, month, year) Survey biologist(s): S DYHAM, D SHARP, K SHARP, J SAGE (name, email, and phone number)

Site description: ANDERSON JCT RESERVOIR (project name and size; general location)

County: WASHINGTON Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: ____ Transect length: 4,202

GPS Start-point: 412603 M. 47 ME 2949M. 72m E (easting, northing, elevation in meters) Start time: 7:39 am/pm

GPS End-point: _____ (easting, northing, elevation in meters) End time: 11:15 am/pm

Start Temp: 4 °C End Temp: 8 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____of_____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 5/12/10 (day, month, year) Survey biologist(s): G. Sharp, K. Sharp (name, email, and phone number)

Site description: partially disturbed sage / juniper (Borrow area access rd) (project name and size; general location)

County: Washington Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: ____ Transect length: 2,500 ft

GPS Start-point: _____ (easting, northing, elevation in meters) Start time: 0930 am/pm

GPS End-point: _____ (easting, northing, elevation in meters) End time: 1330 am/pm

Start Temp: 50°F °C End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 25 / 05 / 10 (day, month, year) Survey biologist(s): S Dolan, G Sharp, K Sharp, J Sage (name, email, and phone number)

Site description: PROPOSED RESERVOIR ANDERSON JUNCTION. (project name and size; general location)

County: WASHINGTON Quad: _____ Location: 4127 038.74 mN 294152.16mE (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: _____ Transect #: 1 Transect length: 4,105 OR LESS.

GPS Start-point: _____ (easting, northing, elevation in meters) Start time: 8:00 am/pm

GPS End-point: _____ (easting, northing, elevation in meters) End time: 2:30 am/pm

Start Temp: 11 °C End Temp: 25 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5	NONE					
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5		NONE		
6				
7				
8				

Page: _____ of _____

Transect number: _____

USFWS 2010 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit a completed copy to the action agency and local USFWS office within 30-days of survey completion

Date of survey: 9-7-10 (day, month, year) Survey biologist(s): G. Sharp (name, email, and phone number)

Site description: Anderson jet RES. 20ace parcel next to I15 & Toquerville exit. (project name and size; general location)

County: Washington Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: 20 acres Transect #: ____ Transect length: _____

GPS Start-point: 4128699N 295570E 1,138m (easting, northing, elevation in meters) Start time: 0930 am/pm

GPS End-point: 4128247N 295550E 1130m (easting, northing, elevation in meters) End time: 1600 am/pm

Start Temp: 22.2 °C End Temp: 24.8 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Transect number: _____

APPENDIX B
PLANT SPECIES LIST AND PICTURES

Plant Species List
Reservoir Study Area

Common Name	Genus	Species
snowball sand verbena	*Abronia*	*fragrans*
desert needle grass	*Achnatherum*	*speciosum*
Indian rice grass	*Achnatherum*	*hymenoides*
devils lettuce	*Amsinckia*	*tessellata*
big sage	*Artemisia*	*tridentata*
sand sagebrush	*Artemisia*	*filifolia*
4 wing salt brush	*Atriplex*	*canescens*
desert marigold	*Baileya*	*multiradiata*
red brome	*Bromus*	*rubens*
red brome	*Bromus*	*madritensis*
rattlesnake weed	*Chamaesyce*	*albomarginata*
alderleaf mountain-mahogany	*Cercocarpus*	*montanus*
yellow rabbitbrush	*Chrysothamnus*	*viscidiflorus*
black brush	*Coleogyne*	*ramosissima*
croton	*Croton*	*californicus*
forget me not	*Cryptantha*	*spp*
wingnut cryptantha	*Cryptantha*	*pterocarya*
bulbous springparsley	*Cymopterus*	*bulbosus*
larkspur	*Delphinium*	*spp*
hedge-hog cactus	*Echinocereus*	*engelmannii*
Virgin river brittlebush	*Encelia*	*virginensis*
green ephedra	*Ephedra*	*viridis*
Mormon tea	*Ephedra*	*nevadensis*
rabbitbrush	*Ericameria*	*spp*
filaree	*Erodium*	*cicutarium*
Apache plume	*Fallugia*	*paradoxa*
broom snakeweed	*Gutierrezia*	*sarothrae*
sticky snakeweed	*Gutierrezia*	*microcephala*
cheese bush	*Hymenoclea*	*salsola*
Utah juniper	*Juniperus*	*osteosperma*
winter fat	*Krascheninnikovia*	*lanata*
pepper weed	*Lepidium*	*latifolium*
Anderson boxthorn	*Lycium*	*andersonii*
smooth desert dandelion	*Malacothrix*	*glabrata*
horehound	*Marrubium*	*vulgare*
giant four o'clock	*Mirabilis*	*multiflora*
Porters muhly	*Muhlenbergia*	*porteri*
lion in a cage	*Oenothera*	*deltoides*
pale evening primrose	*Oenothera*	*pallida*
Mojave prickly-pear	*Opuntia*	*erinacea*
galleta grass	*Pleuraphis*	*rigida*
desert almond	*Prunus*	*fasciculata*
indigo bush	*Psorothamnus*	*arborescens*
stansbury cliffrose	*Purshia*	*stansburiana*

skunkbush	*Rhus*	*trilobata*
curly doc	*Rumex*	*crispus*
desert sage	*Salvia*	*funerea*
ragwort	*Senecio*	*spp*
globemallow	*Sphaeralcea*	*ambigua*
cottonthorn	*Tetradymia*	*axillaris*
banana yucca	*Yucca*	*baccata*
narrowleaf yucca	*Yucca*	*angustissima*

Plant Species List
Pipeline Study Area

Common Name	Genus	Species
snowball sand verbena	*Abronia*	*fragrans*
Indian rice grass	*Achnatherum*	*hymenoides*
crested wheatgrass	*Agropyron*	*cristatum*
Hookers onion	*Allium*	*acuminatum*
Utah serviceberry	*Amelanchier*	*utahensis*
manzanita	*Arctostaphylos*	*pungens*
prickly poppy	*Argemone*	*munita*
big sage	*Artemisia*	*tridentata*
sand sagebrush	*Artemisia*	*filifolia*
white sagebrush	*Artemisia*	*ludoviciana*
Milk vetch	*Astragalus*	*spp.*
desertbroom	*Baccharis*	*sarothroides*
cheat grass	*Bromus*	*tectorum*
alderleaf mountain-mahogany	*Cercocarpus*	*montanus*
littleleaf mountain mohogany	*Cercocarpus*	*intricatus*
mountain-mahogany	*Cercocarpus*	*ledifolius*
purple mustard	*Chorispora*	*tenella*
prairie clover	*Dalea*	*searlsiae*
flixweed	*Descurainia*	*sophia*
bluedicks	*Dichelostemma*	*capitatum*
saltgrass	*Distichlis*	*spicata*
green ephedra	*Ephedra*	*viridis*
basin daisy	*Erigeron*	*pulcherrimus*
yerba santa	*Eriodictyon*	*trichocalyx*
Apache plume	*Fallugia*	*paradoxa*
single leaf ash	*Fraxinus*	*anomala*
velvet ash	*Fraxinus*	*velytina*
broom snakeweed	*Gutierrezia*	*sarothrae*
angelita daisy	*Hymenoxys*	*acaulis*
Utah juniper	*Juniperus*	*osteosperma*
range ratany	*Krameria*	*erecta*
pepper weed	*Lepidium*	*latifolium*
horehound	*Marrubium*	*vulgare*
yellow sweetclover	*Melilotus*	*officinalis*
lion in a cage	*Oenothera*	*deltoides*
pale evening primrose	*Oenothera*	*pallida*
scotch thistle	*Onopordum*	*canthium*

brown spined pp	*Opuntia*	*phaeacantha*
Palmer's penstemon	*Penstemon*	*palmeri*
firecracker penstemon	*Penstemon*	*eatonii*
desert phlox	*Phlox*	*austromontana*
curly grass	*Pleuraphis*	*jamesii*
muttongrass	*Poa*	*fendleriana*
cotton wood	*Populus*	*fremontii*
chokecherry	*Prunus*	*virginiana*
bitter brush	*Purshia*	*tridentata*
stansbury cliffrose	*Purshia*	*stansburiana*
Dixie live oak	*Quercus*	*turbinella*
gambels oak	*Quercus*	*gambelii*
wild rose	*Rosa*	*woodsii*
curly doc	*Rumex*	*crispus*
sandbar willow	*Salix*	*exigua*
globemallow	*Sphaeralcea*	*coccinea*
gooseberryleaf globemallow	*Sphaeralcea*	*grossulariifolia*
twistflower	*Streptanthus*	*cordatus*
Salt cedar	*Tamarix*	*ramosissima*
vetch	*Vicia*	*americana*
canyon grape	*Vitis*	*arizonica*

Vegetation in the southern portion of the Pipeline Study Area.

Vegetation in the burned portion of the Pipeline Study Area.

Ash Creek vegetation in the Pipeline Study Area.

Diversion stream vegetation in the Pipeline Study Area.

Vegetation on the east side of the Reservoir Study Area.

Vegetation on the west side of the Reservoir Study Area.

Vegetation community in the north side borrow area.

Vegetation community in the BLM-administered borrow area.

Vegetation community in the Toquerville borrow area.

BIOLOGICAL SURVEY REPORT

Washington County Water Conservancy District
Anderson Junction Reservoir and Ash Creek Pipeline Project

Prepared For
Washington County Water Conservancy District
533 E Waterworks Drive
St. George UT 84770

Contact: Doug Wilson
435-673-3617

Prepared By
JBR Environmental Consultants, Inc.
321 N. Mall Drive #I-202
St. George, Utah 84790

Contact: Eric Holt
435-652-8301

September 21, 2010

APPENDIX C
RAPTOR NEST DATA SHEETS AND PICTURES

Raptor Observation Record Card

Observer Name and Address:	Map Name:
DW & ST	
	Map # - Nest Terr # - Site # - Year
Specific Area (describe): _____ Creek west of Printed.	Other No. (e.g. Agency No.)
	UTM. N - 4138670.54 E - 298006.80

Species (Com Name or AOU Abbrev.): Red-tailed Hawk

Date	Time	Sur. Met	No. Ads	No. Sub	No. Eggs	No. Nest	Age Nest	No. Flg
5/20/09	11:15 AM	1	2	4				
Summary	Total:							

Survey Method:	Activity / Behavior (may be more than one)		
1. Foot	1. Perched	7. Body Care	13. Copulating
2. Vehicle	2. Flying	8. Courtship	14. Other:
3. Boat	3. Hunting / Foraging	9. Nest Building	
4. Plane	4. Feeding Adult	10. Incubating	
5. Helicopter	5. Terr. Defense	11. Brooding	
6. Incidental Obs.	6. Vocalizing	12. Feeding Young	
Official Nest Status	Notes, Map, or Photo Attached?	1. Yes	2. No

N – 4138670.54
E – 298006.80
5/20/09 Nest Elevation 1494.3 m
Red-tailed Hawk – both adults sighted

Raptor Nest / Eyrie Record Card

Tree Nest-Species:		**Ground Nest - Situation:**	
1. Live Tree	4. Artificial	1. Ledge on Cliff	4. Open Hillside
2. Snag	5. Cavity In Tree	2. Sticknest on Cliff	5. Level Ground
3. Nest Box / Platform	6. Other	3. Cavity (pothole on cliff)	6. Other
Tree Height (ft):		Cliff Rock Type: 1. Sed 2. Ign 3.Met.	
Tree Diameter (in):		Spec. Formation:	
Height of Nest (ft):		Cliff Height (ft): 70'	
Dominant Habitat Types		Cliff Length (ft): 200 m	
(up to three within .5 mile of nest)		Height of Nest (ft): 30'	
1. Cliff		Elevation of Nest Above Sea Level (ft): 1,494.3m	
2. Unvegetated Ground		Aspect of Slope: S	
3. Wet Meadow		Aspect of Nest: S	
4. Dwarf Shrub Meadow (tundra dominated by grasses or sedges)		Nest Condition: 1. Good 2. Poor 3. Remnant Only	
5. Grass Meadow		Nest Accessibility (to ground predators):	1. Easy
6. Dwarf Shrub Mat (dwarf shrubs < 1.5 ft high)			2. Mod. Difficult
7. Low Shrub Thicket (shrubs 1.5 - 3.5 ft high)			3. Very Difficult
8. Med. Shrub Thicket (shrubs 3.5 - 7.5 ft high)		Distance to Human Activity (mile) 0.75	
9. Tall Shrub Thicket (shrubs 7.5 - 16.5 ft high)		Human Activity Visible From Nest	1. Yes
10. Decidous Forest			2. No
11. Coniferious Forest		Type(s) Of Human Activity:	
12. Mixed Deciduous-Conifer Forest			
13. Scattered Woodland and Dwarf Forest		1. Trail	10. Oil / Gas
14. Artificial Habitat	oat – P/J	2. Road	11. Logging
15. Other		3. Boating	12. Other:
16. Marine (dist. mile)		4. Aircraft	
17. Riparian (dist. mile)		5. Buildings	
18. Lacustrine (lake) (dist. mile)		6. Agriculture	
19. River / Stream (dist. mile)		7. Construction	
20. For Cliff Nests - Above Cliff:		8. Research	
(habitat types) - Below Cliff:		9. Mining	

Nest in triangular cavity on rock.

4 juveniles in nest, still very large, too far flight feathers

Trail about 1/4 mile from nest, but may not be visible from nest.

Circle Any That Apply:

1. Photo of Cliff Taken	4. Prey Remains Coll	7. Whitewash at Eyrie → only at very edge of nest ledge, nothing below.
2. Photo of Eyrie Taken	5. Egg(s) Coll.	8. Other Whitewash on Cliff
3. Eyrie Descrip. Att.	6. Egg Shell Coll	9. Over Hang at Eyrie

Banding and Band Recovery Information

Age	Sex	Avise No. Color / Leg	Band Code - Color / Leg

Raptor Observation Record Card

Observer Name and Address: DW & ST	Map Name:
	Map # - Nest Terr # - Site # - Year
Specific Area (describe): Creek SE of Ash Creek Reservoir	Other No. (e.g. Agency No.)
	UTM. N- 4141685.17 E- 301850.13
Species (Com Name or AOU Abbrev.): Red-tailed Hawk	

Date	Time	Sur. Met	No. Ads	No. Sub	No. Eggs	No. Nest	Age Nest	No. Flg
5/21/09	9:25 AM	1.	1			1		
Summary	Total:							

Survey Method:	Activity / Behavior (may be more than one)		
1. Foot	1. Perched	7. Body Care	13. Copulating
2. Vehicle	2. Flying	8. Courtship	14. Other:
3. Boat	3. Hunting / Foraging	9. Nest Building	
4. Plane	4. Feeding Adult	10. Incubating	
5. Helicopter	5. Terr. Defense	11. Brooding	
6. Incidental Obs.	6. Vocalizing	12. Feeding Young	
Official Nest Status	Notes, Map, or Photo Attached?	1. Yes	2. No

Red-tailed Hawk 5/21/09

N- 4141685.17
E- 301850.13

Raptor Nest / Eyrie Record Card

Tree Nest-Species:	**Ground Nest - Situation:**
1. Live Tree 4. Artificial 2. Snag 5. Cavity In Tree 3. Nest Box / Platform 6. Other	1. Ledge on Cliff 4. Open Hillside (2.) Sticknest on Cliff 5. Level Ground 3. Cavity (pothole on cliff) 6. Other
Tree Height (ft):	Cliff Rock Type: 1. Sed (2. Ign) 3.Met.
Tree Diameter (in):	Spec. Formation: CLIFF
Height of Nest (ft):	Cliff Height (ft): 80'
Dominant Habitat Types	Cliff Length (ft): 200'
(up to three within .5 mile of nest)	Height of Nest (ft): 65'
(1.) Cliff	Elevation of Nest Above Sea Level (ft): 4700
2. Unvegetated Ground	Aspect of Slope: E
3. Wet Meadow	Aspect of Nest: E
4. Dwarf Shrub Meadow (tundra dominated by grasses or sedges)	Nest Condition: (1.) Good 2. Poor 3. Remnant Only
5. Grass Meadow	Nest Accessibility (to ground predators): 1. Easy (2.) Mod. Difficult 3. Very Difficult
6. Dwarf Shrub Mat (dwarf shrubs < 1.5 ft high)	
7. Low Shrub Thicket (shrubs 1.5 - 3.5 ft high)	
8. Med. Shrub Thicket (shrubs 3.5 - 7.5 ft high)	Distance to Human Activity (mile) 0.3
9. Tall Shrub Thicket (shrubs 7.5 - 16.5 ft high)	Human Activity Visible From Nest 1. Yes (2.) No
10. Decidous Forest	
11. Coniferious Forest	Type(s) Of Human Activity:
12. Mixed Deciduous-Conifer Forest	
13. Scattered Woodland and Dwarf Forest	1. Trail 10. Oil / Gas
14. Artificial Habitat	(2.) Road; I-15 11. Logging
15. Other	3. Boating 12. Other:
16. Marine (dist. mile)	4. Aircraft
(17.) Riparian (dist. mile) 0.10	5. Buildings
18. Lacustrine (lake) (dist. mile)	6. Agriculture
19. River / Stream (dist. mile) 0.10	7. Construction
20. For Cliff Nests - Above Cliff: 13	8. Research
(habitat types) - Below Cliff: 17	9. Mining

Circle Any That Apply:

(1.) Photo of Cliff Taken	4. Prey Remains Coll	7. Whitewash at Eyrie
(2.) Photo of Eyrie Taken	5. Egg(s) Coll.	(8.) Other Whitewash on Cliff
3. Eyrie Descrip. Att.	6. Egg Shell Coll	9. Over Hang at Eyrie

Banding and Band Recovery Information

Age	Sex	Avise No. Color / Leg	Band Code - Color / Leg

Raptor Observation Record Card 5/21/09

Observer Name and Address:	Map Name:
ST & DW	
	Map # - Nest Terr # - Site # - Year
Specific Area (describe): Ash Cr	Other No. (e.g. Agency No.)
	UTM. N 4132630.64 E 298355.93

Species (Com Name or AOU Abbrev.): Cooper's Hawk

Date	Time	Sur. Met	No. Ads	No. Sub	No. Eggs	No. Nest	Age Nest	No. Flg
5/21/09	2:20 PM	2	1			1		
Summary	Total:							

Survey Method:	Activity / Behavior (may be more than one)		
1. Foot	1. Perched	7. Body Care	13. Copulating
2. Vehicle	(2.) Flying	8. Courtship	14. Other:
3. Boat	3. Hunting / Foraging	9. Nest Building	
4. Plane	4. Feeding Adult	(10.) Incubating	
5. Helicopter	5. Terr. Defense	(11.) Brooding	
6. Incidental Obs.	(6.) Vocalizing	12. Feeding Young	
Official Nest Status	Notes, Map, or Photo Attached?	(1.) Yes	2. No

Cooper's Hawk

N 413 2630.64
E 29825.93

Raptor Nest / Eyrie Record Card 5/21/09

Tree Nest-Species:	**Ground Nest - Situation:**
1. Live Tree (cottonwood stranded) 4. Artificial 2. Snag 5. Cavity In Tree 3. Nest Box / Platform 6. Other	1. Ledge on Cliff 4. Open Hillside 2. Sticknest on Cliff 5. Level Ground 3. Cavity (pothole on cliff) 6. Other
Tree Height (ft): 35'	Cliff Rock Type: 1. Sed 2. Ign 3.Met.
Tree Diameter (in):	Spec. Formation:
Height of Nest (ft): 17'	Cliff Height (ft):
Dominant Habitat Types	Cliff Length (ft):
(up to three within .5 mile of nest)	Height of Nest (ft):
1. Cliff	Elevation of Nest Above Sea Level (ft):
2. Unvegetated Ground	Aspect of Slope:
3. Wet Meadow	Aspect of Nest:
4. Dwarf Shrub Meadow (tundra dominated by grasses or sedges)	Nest Condition: 1. Good 2. Poor 3. Remnant Only
5. Grass Meadow	Nest Accessibility (to ground predators): 1. Easy 2. Mod. Difficult 3. Very Difficult
6. Dwarf Shrub Mat (dwarf shrubs < 1.5 ft high)	
7. Low Shrub Thicket (shrubs 1.5 - 3.5 ft high)	
8. Med. Shrub Thicket (shrubs 3.5 - 7.5 ft high)	Distance to Human Activity (mile) 0.25
9. Tall Shrub Thicket (shrubs 7.5 - 16.5 ft high)	Human Activity Visible From Nest 1. Yes 2. No
10. Decidous Forest	
11. Coniferious Forest	Type(s) Of Human Activity:
12. Mixed Deciduous-Conifer Forest	
13. Scattered Woodland and Dwarf Forest	1. Trail 10. Oil / Gas
14. Artificial Habitat	2. Road 11. Logging
15. Other	3. Boating 12. Other:
16. Marine (dist. mile)	4. Aircraft
17. Riparian (dist. mile) — 20m	5. Buildings
18. Lacustrine (lake) (dist. mile)	6. Agriculture
19. River / Stream (dist. mile) 25m	7. Construction
20. For Cliff Nests - Above Cliff:	8. Research
(habitat types) - Below Cliff:	9. Mining

Circle Any That Apply:

1. Photo of Cliff Taken	4. Prey Remains Coll	7. Whitewash at Eyrie
2. Photo of Eyrie Taken	5. Egg(s) Coll.	8. Other Whitewash on Cliff
3. Eyrie Descrip. Att.	6. Egg Shell Coll	9. Over Hang at Eyrie

Banding and Band Recovery Information

Age	Sex	Avise No. Color / Leg	Band Code - Color / Leg

Raptor Observation Record Card

Observer Name and Address:	Map Name:
DW & ST	
	Map # - Nest Terr # - Site # - Year
Specific Area (describe): Ash Creek east of I-15, near Bronco exit.	Other No. (e.g. Agency No.)
	UTM. N-4132984.02 E-298105.25

Species (Com Name or AOU Abbrev.): Red-tailed Hawk

Date	Time	Sur. Met	No. Ads	No. Sub	No. Eggs	No. Nest	Age Nest	No. Flg
5/21/09	1:20PM	1.	2			1		
Summary	Total:							

Survey Method:	Activity / Behavior (may be more than one)		
1. Foot	(1) Perched	7. Body Care	13. Copulating
2. Vehicle	(2) Flying	8. Courtship	14. Other:
3. Boat	3. Hunting / Foraging	9. Nest Building	
4. Plane	4. Feeding Adult	10. Incubating	
5. Helicopter	5. Terr. Defense	11. Brooding	
6. Incidental Obs.	(6) Vocalizing	(12) Feeding Young	
Official Nest Status	Notes, Map, or Photo Attached?	(1) Yes	2. No

Red-tailed Hawk

N – 4132984.02
E – 298105.25

5/21/09

Raptor Nest / Eyrie Record Card

Tree Nest-Species:		**Ground Nest - Situation:**	
1. Live Tree	4. Artificial	(1.) Ledge on Cliff	4. Open Hillside
2. Snag	5. Cavity In Tree	(2.) Sticknest on Cliff	5. Level Ground
3. Nest Box / Platform	6. Other	3. Cavity (pothole on cliff)	6. Other
Tree Height (ft):		Cliff Rock Type: 1. Sed (2. Ign) 3.Met.	
Tree Diameter (in):		Spec. Formation:	
Height of Nest (ft):		Cliff Height (ft): 150'	
Dominant Habitat Types		Cliff Length (ft): 350 m	
(up to three within .5 mile of nest)		Height of Nest (ft): 95'	
(1.) Cliff		Elevation of Nest Above Sea Level (ft): 4,374	
2. Unvegetated Ground		Aspect of Slope: W	
3. Wet Meadow		Aspect of Nest: W	
4. Dwarf Shrub Meadow (tundra dominated by grasses or sedges)		Nest Condition: (1.) Good 2. Poor 3. Remnant Only	
5. Grass Meadow		Nest Accessibility (to ground predators):	1. Easy
6. Dwarf Shrub Mat (dwarf shrubs < 1.5 ft high)			2. Mod. Difficult
7. Low Shrub Thicket (shrubs 1.5 - 3.5 ft high)			(3.) Very Difficult
8. Med. Shrub Thicket (shrubs 3.5 - 7.5 ft high)		Distance to Human Activity (mile)	
9. Tall Shrub Thicket (shrubs 7.5 - 16.5 ft high)		Human Activity Visible From Nest	(1. Yes) 2. No
10. Decidous Forest			
11. Coniferious Forest		Type(s) Of Human Activity:	
12. Mixed Deciduous-Conifer Forest			
(13.) Scattered Woodland and Dwarf Forest		1. Trail	10. Oil / Gas
14. Artificial Habitat		(2.) Road: I-15	11. Logging
15. Other		3. Boating	12. Other:
16. Marine (dist. mile)		4. Aircraft	
(17.) Riparian (dist. mile)		5. Buildings	
18. Lacustrine (lake) (dist. mile)		6. Agriculture	
19. River / Stream (dist. mile)		7. Construction	
20. For Cliff Nests - Above Cliff: 13		8. Research	
(habitat types) - Below Cliff: 17		9. Mining	

Circle Any That Apply:

(1.) Photo of Cliff Taken	4. Prey Remains Coll	7. Whitewash at Eyrie
(2.) Photo of Eyrie Taken	5. Egg(s) Coll.	(8.) Other Whitewash on Cliff – almost none
3. Eyrie Descrip. Att.	6. Egg Shell Coll	9. Over Hang at Eyrie

Banding and Band Recovery Information

Age	Sex	Avise No. Color / Leg	Band Code - Color / Leg

Red-tailed hawk in nest in basalt cliffs near the Pipeline Study Area.

Nesting Cooper's hawk in tree along Pipeline Study Area.

APPENDIX D
BIRD SPECIES LIST

Bird Species List
Pipeline Study Area

Common Name	Scientific Name
American Goldfinch	*Carduelis tristis*
American Robin	*Turdus migratorius*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Black Phoebe	*Sayornis nigricans*
Black-and-white Warbler	*Mniotilta varia*
Black-chinned Hummingbird	*Archilochus alexandri*
Black-chinned Sparrow	*Spizella atrogularis*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Black-throated Gray Warbler	*Dendroica nigrescens*
Black-throated Sparrow	*Amphispiza bilineata*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
Common Raven	*Corvus corax*
Cooper's Hawk	*Accipiter cooperii*
Dark-eyed Junco	*Junco hyemalis*
Eurasian Collared-Dove	*Streptopelia decaocto*
Golden Eagle	*Aquila chrysaetos*
Gray Flycatcher	*Empidonax wrightii*
Gray Vireo	*Vireo vicinior*
Greater Roadrunner	*Geococcyx californianus*
House Finch	*Carpodacus mexicanus*
Juniper Titmouse	*Baeolophus ridgwayi*
Lark Sparrow	*Chondestes grammacus*
Lazuli Bunting	*Passerina amoena*
Mallard	*Anas platyrhynchos*
Mourning Dove	*Zenaida macroura*
Northern Mockingbird	*Mimus polyglottos*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Say's Phoebe	*Sayornis saya*
Sharp-shinned Hawk	*Accipiter striatus*
Spotted Towhee	*Pipilo maculatus*
Steller's Jay	*Cyanocitta stelleri*
Turkey Vulture	*Cathartes aura*
Violet-green Swallow	*Tachycineta thalassina*
Western Bluebird	*Sialia mexicana*
Western Kingbird	*Tyrannus verticalis*
Western Scrub-Jay	*Aphelocoma californica*
Western Tanager	*Piranga ludoviciana*
Wild Turkey	*Meleagris gallopavo*
Yellow Warbler	*Dendroica petechia*

Bird Species List
Reservoir Study Area

Common Name	**Scientific Name**
Black-chinned Hummingbird	*Archilochus alexandri*
Black-throated Sparrow	*Amphispiza bilineata*
Bushtit	*Psaltriparus minimus*
Canyon Wren	*Catherpes mexicanus*
Chipping Sparrow	*Spizella passerina*
Gambel's Quail	*Callipepla gambelii*
Greater Roadrunner	*Geococcyx californianus*
Great-tailed Grackle	*Quiscalus mexicanus*
Green-tailed Towhee	*Pipilo chlorurus*
House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*
Juniper Titmouse	*Baeolophus ridgwayi*
Lesser Goldfinch	*Carduelis psaltria*
Mourning Dove	*Zenaida macroura*
Northern Mockingbird	*Mimus polyglottos*
Red-tailed Hawk	*Buteo jamaicensis*
Say's Phoebe	*Sayornis saya*
Western Meadowlark	*Sturnella neglecta*
Western Tanager	*Piranga ludoviciana*
White-crowned Sparrow	*Zonotrichia leucophrys*
Yellow-rumped Warbler	*Dendroica coronata*

APPENDIX C

BEST MANAGEMENT PRACTICES

Best Management Practices

As part of standard operating procedures, standard BMPs would be implemented throughout the project in order to reduce potential adverse environmental impacts. Most of the impacts are short term and generally occur during the construction period. Project design and implementation of site-specific or selectively recommended BMPs would minimize the effect of the project where the potential for long-term, adverse impacts may occur.

STANDARD BMPs
1. All construction vehicle movement outside of the right-of-way would be restricted to pre-designated access, contractor acquired access, or public roads.
2. The limits of construction activities would be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate survey or construction activity limits. The right-of-way boundary would be flagged in environmentally sensitive areas described in the plan of development to alert construction personnel that those areas would be avoided.
3. In construction areas where re-contouring is not required, vegetation would be left in place wherever possible to avoid excessive root damage and allow for re-sprouting.
4. In construction areas where ground disturbance is significant or where re-contouring is required, surface restoration would occur as required by the landowner or land management agency. The method of restoration typically would consist of returning disturbed areas to their natural contour (to the extent practical) and reseeding or re-vegetating with native plants. Seed viability would be tested and seed mixes would be certified to contain no noxious weeds.
5. Prior to construction, all construction personnel would be instructed on the protection of cultural, paleontological, and ecological resources. To assist in this effort, the construction contract would address (a) federal and state laws regarding antiquities, fossils, and plants and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them.
6. An initial intensive cultural resource inventory survey would be conducted prior to construction. Impact avoidance and mitigation measures developed in consultation with appropriate land management and regulatory agencies and other interested parties would be implemented subsequent to the completion of the NEPA compliance document.
7. Any cultural and/or paleontological resource discovered during construction by the WCWCD or any person working on their behalf on public or federal land would be reported immediately to the authorized officer. The WCWCD would suspend operations in the area until an evaluation is completed to prevent the loss of cultural or scientific values.
8. All construction and maintenance activities would be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and intermittent and perennial stream banks. In addition, dust-control measures would be utilized as necessary during construction in sensitive areas. Any used existing roads would be left in a condition equal to or better than their condition prior to construction.
9. All requirements of those entities having jurisdiction over air quality matters would be adhered to and any necessary permits for construction activities would be obtained. Open burning of construction trash (cleared trees, etc.) would not be allowed on BLM- or USFS-administered lands.
10. Fences and gates, if damaged or destroyed by construction activities, would be repaired or replaced to their original pre-disturbed condition as required by the landowner or the land management agency. Temporary gates would be installed only with the permission of the landowner or the land management agency.

STANDARD BMPs
11. Totally enclosed containment would be provided for all hazardous materials (if needed) and trash. All construction waste including trash, litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.
12. Third-party environmental contractors would be used throughout the construction effort, from clearing through rehabilitation.
13. The WCWCD would trim trees in preference to cutting trees, and would cut trees in preference to bulldozing them.
14. Construction holes left open overnight would be covered to prevent livestock or wildlife from harm.
15. The contractor would clean off-road equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts prior to moving equipment onto public land.

ADDITIONAL STIPULATIONS

The following additional stipulations would be implemented throughout the construction and operation of the project and would be included as part of the standard operating procedures.

STIPULATIONS – STANDARD OPERATING PROCEDURES
1. WCWCD would construct, operate, and maintain the facilities, improvements, and structures within this ROW in strict conformity with the plan of development as it is approved. Any relocation, additional construction, or use that is not in accord with the approved plan of development would not be initiated without the prior written approval of the authorized officer. A copy of the complete ROW grant or acknowledgment, including all stipulations and approved plan of development, would be made available on the ROW area during construction, operation, and maintenance to the authorized officer. Noncompliance with the above shall be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or a material threat to the environment.
2. This plan of development describes in detail the construction, operation, maintenance of the ROW and its associated improvements and/or facilities. An approved plan of development may be referred to for interpretation of the right-of-way grant.
3. WCWCD would contact the authorized officer at least 10 days prior to the anticipated start of construction and/or any surface-disturbing activities. The authorized officer may require and schedule a preconstruction conference with the WCWCD prior to commencement of construction and/or surface-disturbing activities on the ROW. The WCWCD, its contractor(s), or agents involved with the construction and/or surface-disturbing activities on the ROW should attend this conference to review the stipulations of the grant and the plan(s) of development.
4. WCWCD would designate a representative(s) who would have the authority to act upon and implement instructions from the authorized officer within a reasonable time when construction or other surface-disturbing activities are underway.
5. The holder would protect all survey monuments found within the right-of-way. Survey monuments include but are not limited to General Land Office and BLM Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the WCWCD would immediately report the incident, in writing, to the authorized officer and the respective installing authority, if known. Where General Land Office or BLM ROW monuments or references are obliterated during operations, WCWCD shall secure the services of a registered land surveyor or a BLM cadastral surveyor to

STIPULATIONS – STANDARD OPERATING PROCEDURES
restore the disturbed monuments and references using surveying procedures found in the *Manual of Surveying Instructions for the Survey of the Public Lands of the United States*, latest edition. WCWCD shall record such survey in the appropriate county and send a copy to the authorized officer. If the BLM cadastral surveyors or other federal surveyors are used to restore the disturbed survey monument, WCWCD would be responsible for the survey cost.
6. The holder of the ROW grant or the holder's successor in interest shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et. seq.) and the regulations of the Secretary of Interior issued pursuant hereto.
7. WCWCD would mark the exterior boundaries of the ROW with a stake and/or lath. The intervals may be varied at the time of staking at the discretion of the authorized officer. The tops of the stakes and/or laths would be painted and the laths flagged in a distinctive color as determined by the holder. The survey station numbers would be marked on the boundary stakes and/or laths at the entrance to and exit from public land. Holder would maintain all boundary stakes and/or laths in place until final cleanup and restoration are completed and approved by the authorized officer. The stakes and/or laths would then be removed at the direction of the authorized officer.
8. The holder would conduct all activities associated with the construction, operation, and maintenance of the right-of-way within the authorized limits of the ROW and approved plan of development.
9. The holder would survey and clearly mark the centerline and/or exterior limits of the ROW, as determined by the authorized officer.
10. All design, material, and construction, operation, maintenance, and termination practices would be in accordance with safe and proven engineering practices.
11. The holder would inform the authorized officer within 48 hours of any accidents on federal lands that require reporting to the Department of Transportation as required by 49 CFR Part 195.
12. During conditions of extreme fire danger, operations may be suspended or limited in certain areas.
13. The holder would be liable for damage or injury to the United States to the extent provided by 43 CFR Sec. 2803.1-4. The holder would be held to a standard of strict liability for damage or injury to the United States resulting from fire or soil movement (including landslides and slumps as well as wind and water-caused movement of particles) caused or substantially aggravated by any of the following within the ROW or permit area: ■ Activities of the holder including but not limited to construction, operation and maintenance of the facility. ■ Activities of other parties acting under color of authority from the WCWCD, including but not limited to: - land clearing - earth-disturbing and earth-moving work - blasting
14. Within 30 days of completion, the holder would submit to the authorized officer, as-built drawings and a certification of construction verifying that the facility has been constructed (and tested) in accordance with the design, plans, specifications, and applicable laws and regulations.
15. Construction sites would be maintained in a sanitary condition at all times; waste materials at those sites would be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including but not limited to human waste, debris, garbage, refuse, oil drums, petroleum products, ashes, and equipment.
16. Prior to preconstruction activities on the subject parcel, the lessee would identify all noxious weeds present. A list of the weeds would be provided to the authorized officer. A determination would be

STIPULATIONS – STANDARD OPERATING PROCEDURES
made by the authorized officer of any noxious weeds that may require flagging for treatment. The lessee shall treat the noxious weeds as required by the authorized officer.
17. The lessee would clean off-road equipment (power or high-pressure cleaning) of all mud, dirt, and plant parts prior to moving equipment onto public land authorized under this lease.
18. Gravel and/or fill material to be placed in relatively weed-free areas must come from weed-free sources. Prior to obtaining gravel and/or fill material, the authorized officer would inspect the source for weeds and determine adequacy of site.
19. The lessee would identify a road maintenance program, which would include monitoring for noxious weeds. If lessee identifies any noxious weeds, the lessee would notify the authorized officer immediately. A treatment program would be identified and the lessee would be responsible for weed abatement.

APPENDIX D

TOQUERVILLE CITY'S RESOLUTION OF SUPPORT

RESOLUTION OF SUPPORT
#RES.2010.01, January 14th, 2010

WASHINGTON COUNTY WATER DISTRICT, ASHCREEK PROJECT

PURPOSE

A RESOLUTION OF THE TOQUERVILLE CITY COUNCIL IN SUPPORT OF THE ASH CREEK PROJECT WITHIN THE CITY BOUNDARIES OF TOQUERVILLE, TO BE CONSTRUCTED BY THE WASHINGTON COUNTY WATER CONSERVANCY DISTRICT.

WHEREAS, the Washington County Water Conservancy District (the "District") is developing a water supply to serve municipalities in the county, including Toquerville City (the "City"); and

WHEREAS, the District is developing a water project that will require construction of a pipeline from Ash Creek Reservoir to a new reservoir to be constructed within Toquerville City boundaries in the Anderson Junction area that will provide benefits including water supply to the District's municipal customers; and

WHEREAS, Toquerville City desires to support the construction of the ASHCREEK PROJECT with the Washington County Water Conservancy District and with compliance to all requirements of City Ordinances, Regulations and Standards under current Codes; and with compliance to Washington County and Utah State Code Regulations and Standards during all phases of the proposed project.

NOW, THEREFORE BE IT RESOLVED, the City of Toquerville does hereby express its support of the project to construct a pipeline from Ash Creek Reservoir, including the replacement of the Wet Sandy ditch with a pipeline, other tributary pipeline systems and a delivery pipeline system at Anderson Junction; including the construction of a reservoir near Anderson Junction; and subject to the condition that the District provide the City with copies of all construction drawings and plans, and that said plans be approved by the City for compliance to current Codes; and City does hereby declare the following vote for this Resolution of Support by City Council:

Council Members:			
	Lynn Olds	AYE X	NAE___
	Paul Heideman	AYE X	NAE___
	Mark Fahrenkamp	AYE X	NAE___
	Daren Cottam	AYE EXCUSED	NAE___
	Brad Langston	AYE X	NAE___

By: M. Darrin LeFevre
M. Darrin LeFevre, Mayor

Dated: 1-15, 2010

Toquerville City, Washington County
Corporate SEAL
* UTAH *

ATTEST:

By: Carol Pogue
Carol Pogue, City Recorder

APPENDIX E

WATERS OF THE U.S. DELINEATION REPORT

ANDERSON RESERVOIR AND ASH CREEK PIPELINE
WATERS OF THE U.S. DELINEATION REPORT
WASHINGTON COUNTY, UTAH

Prepared for:

Washington County Water Conservancy District
533 East Waterworks Drive
St. George, Utah 84770
435-673-3617

Prepared by:

JBR Environmental Consultants, Inc.
8160 South Highland Drive
Sandy, Utah 84093
Contact: Ryan Clerico
801-943-4144

June 2009

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ANDERSON RESERVOIR AND ASH CREEK PIPELINE
WATERS OF THE U.S. DELINEATION REPORT
WASHINGTON COUNTY, UTAH

EXECUTIVE SUMMARY

Washington County Water Conservancy District is initiating planning and conducting baseline natural resource studies for a proposed surface water reservoir located near Anderson Junction, as well as a pipeline extending from Ash Creek Reservoir south to the proposed Anderson Reservoir. Washington County Water Conservancy District asked JBR Environmental Consultants, Inc. to perform a wetlands and Waters of the United States delineation on the project site. In May 2009, wetland scientists from JBR Environmental Consultants, Inc. visited the project site and conducted a wetlands and Waters of the U.S. delineation for the study area. This report details the findings of that investigation.

1.0 INTRODUCTION

Washington County Water Conservancy District (WCWCD) is initiating planning and conducting baseline natural resource studies for a proposed surface water reservoir located south of Anderson Junction (known as Anderson Reservoir), near Toquerville, Utah, as well as a pipeline originating near Ash Creek Reservoir and continuing approximately 10 miles south-southwest to the Anderson Reservoir site (**Figure 1**). Two branches of the pipeline are also located west of the town of Pintura, across Interstate 15 (I-15), roughly mid-way between Ash Creek and the proposed Anderson Reservoirs, and approximately 1.2 miles of spillway and 2 miles of pipeline extend south from the proposed Anderson Reservoir site. The study area consisted of a 50-foot buffer of the pipeline and spillway centerlines (100-foot wide corridor), as well as a predetermined 286-acre boundary provided by WCWCD for the Anderson Reservoir site (**Figure 2**). The 286-acre reservoir study area is located in Sections 27, 28, 33, and 34, Township 40 South, Range 13 West. The pipeline study area from Ash Creek Reservoir to Anderson Reservoir is located in Sections 7, 8, 18, 19, and 30, Township 39 South, Range 12 West; Sections 25, 26, 35 and 36, Township 39 South, Range 13 West; Sections 1, 2, 3, 11, 14, 14, 22, and 25, Township 40 South, Range 13 West. The pipeline south of Anderson Reservoir is located in Section 34, Township 40 South, Range 13 West and Section 3, Township 41 South, Range 13 West, while the spillway is located in Section 33, Township 40 South, Range 13 West and Sections 3 and 4, Township 41 South, Range 13 West.

WCWCD requires a formal determination of jurisdictional waters of the United States, including wetlands, in order to evaluate potential impacts to areas regulated under Section 404 of the Clean Water Act. JBR Environmental Consultants, Inc. (JBR) conducted the jurisdictional delineation in May 2009.

2.0 DEFINITIONS

2.1 WATERS OF THE U.S.

Waters of the U.S. are defined by 40 CFR 230.3 and 33 CFR 328.3 as:

> All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce…;
>
> All interstate waters including wetlands;
>
> All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce…;
>
> All impoundments of waters otherwise defined as waters of the U.S. under this definition.

The limits of jurisdiction in non-tidal waters, according to 33 CFR 328.4, are:

1. In the absence of adjacent wetlands, the jurisdiction extends to the ordinary high water mark (OHWM), or

2. When adjacent wetlands are present, the jurisdiction extends beyond the OHWM to the limit of the adjacent wetlands.

3. When the water of the U.S. consists only of wetlands, the jurisdiction extends to the limit of the wetland.

Criteria used to determine whether a drainage constitutes a water of the U.S. include:

> Presence of a defined bed – a linear bed in topographic depression which would transport surface water from a watershed.
>
> Presence of defined banks – near vertical or steep-sided banks formed by erosion from flowing water.
>
> Evidence of an OHWM – some indicator(s) that the drainage is subject to surface water flows on an average annual basis. Such indicators include a scoured bed, shelving, an absence of terrestrial vegetation (particularly perennials), and recent alluvial or litter deposition.
>
> The presence of a defined bed and banks, along with some evidence that the drainage experiences surface water flows on an average annual basis, are considered to be indicative of waters of the U.S.

The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are "adjacent wetlands." In the absence of adjacent wetlands, the limits of the United States Army Corps of Engineers (USACE or the Corps) jurisdiction extend to the OHWM.

2.2 WETLANDS

Wetlands are defined by the USACE and the Environmental Protection Agency (EPA) in 40 CFR 230.3 and 33 CFR 328.3 as follows:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

As noted under the waters of the U.S. discussion, if adjacent wetlands are present, Corps jurisdiction extends beyond the OHWM to the limit of the adjacent wetlands.

2.3 JURISDICTION

2.3.1 SWANCC DECISION

The Corps regulates dredge and fill activities in waters of the U.S. (including wetlands) under Section 404 of the Clean Water Act (CWA). Waters of the U.S. include navigable waters and their tributaries, including adjacent wetlands; interstate waters and their tributaries, including

adjacent wetlands; and all other waters of the U.S. such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable waters of the U.S., the degradation or destruction of which could affect interstate commerce (Federal Register 1982). In January 2001, the U.S. Supreme Court ruled in the Solid Waste Agency of Northern Cook County (SWANCC) case that the Corps cannot invoke migratory bird use as the sole basis under which the Corps may assume jurisdiction over certain isolated waters of the U.S., including isolated wetlands. Prior to this Supreme Court ruling, the Corps considered migratory bird use of isolated wetlands to be a tie to interstate or foreign commerce. As a result of the SWANCC decision, the rationale for Corps jurisdictional determinations has changed. The Corps may require the presence of a defined channel/bed and bank connection to known interstate waters or to waters with a clear tie to interstate or foreign commerce before taking jurisdiction.

The SWANCC determination found that wetlands that share no physical connection to interstate waters or waters otherwise involved in interstate commerce, and which were formerly considered jurisdictional solely due to migratory bird use, are now considered isolated, and not subject to jurisdiction by the Corps. Following the SWANCC decision, drainages that included a defined bed and bank and showed evidence of an OHWM, but that lacked a physical connection to interstate waters, or other waters clearly involved in interstate commerce, were identified as isolated, non-jurisdictional features.

2.3.2 RAPANOS GUIDANCE REGARDING TRIBUTARY STREAMS

On June 5, 2007, the U.S. EPA and the Department of the Army issued a joint legal guidance memorandum regarding CWA jurisdiction of tributary streams based on the U.S. Supreme Court's decision in *Rapanos v. United States* and *Carabell v. United States*. The guidance memo stated that the agencies will assert jurisdiction over the following categories of water bodies:

- Traditional Navigable Waters (TNWs);
- All wetlands adjacent to TNWs;
- Non-navigable tributaries of TNWs that are relatively permanent waters (RPW) (i.e., tributaries that typically flow year-round or have continuous flow at least seasonally); and
- Wetlands that directly abut such tributaries.

The Rapanos guidance memo further stated:

> In addition, the agencies will assert jurisdiction over every water body that is not an RPW if that water body is determined (on the basis of a fact-specific analysis) to have a significant nexus with a TNW. The classes of water body that are subject to CWA jurisdiction only if such a significant nexus is demonstrated are: non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally; wetlands adjacent to such tributaries; and wetlands adjacent to but that do not directly abut a relatively permanent, non-navigable tributary. A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a TNW.

> Principal considerations when evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to a TNW, plus the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands.

Since issuance of the Rapanos guidance, jurisdictional determinations must include a written assessment of the relative permanence of flow in each tributary. For any stream and/or stream reach that does not have relatively permanent flow, the flow and ecological characteristics must be evaluated to determine if the tributary has a significant nexus to a traditionally navigable water body.

3.0 METHODOLOGY

JBR performed a field investigation of the project study area on May 6 (Anderson Reservoir, spillway, and southern pipeline routes), 7 (Ash Creek pipeline), and 20 (western pipeline spur routes), 2009, in order to identify potentially jurisdictional waters of the U.S., including wetlands, as described in **Section 2**. The project study area consisted of the 286 acres associated with the Anderson Reservoir site and a 100-foot wide corridor associated with the pipeline and spillway alignments, as described in **Section 1** and collectively referred to as the "study area" throughout the remainder of this document (except where noted otherwise).

Potentially jurisdictional areas along were recorded in the field by a Trimble Geo XT global position system (GPS) capable of sub-meter accurate positions. For Ash Creek and other linear stream systems (both perennial and intermittent/ephemeral), the width from OHWM to OHWM was measured at representative locations within the study area to provide dimensions of the feature, paying particular attention to the proposed crossing locations of potentially jurisdictional systems. Within the Anderson Reservoir site, the centerline of a jurisdictional drainage was also recorded with the GPS system in addition to width measurements.

3.1 WATERS OF THE U.S.

Drainages with defined beds, banks, and an OHWM, including evidence of erosion or deposition (indicating the evidence of regular surface water flows) are considered to be indicative of a water of the U.S. Drainages within the study area were assessed for defined channel connections to the Ash Creek, which is tributary to the Virgin River, a TNW. A lack of such connections would indicate the drainages are probably isolated, and therefore not subject to jurisdiction by the Corps under the Clean Water Act.

Regulatory Guidance Letter No. 05-05, *Ordinary High Water Mark Identification* (USACE 2005), Technical Report ERDC/EL TR-04-1, *Review of Ordinary High Water Mark Indicators for Delineating Arid Streams in the Southwestern United States* (USACE 2004), and Technical Report ERDC/CRREL TR-08-12, *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008) were consulted for guidance in determining the extent of jurisdiction along Ash Creek and other tributaries where adjacent wetlands were not present.

3.2 WETLANDS

In addition to those areas identified as possessing defined bed, bank, and OHWM indicators, the study area was examined for wetland characteristics in accordance with the criteria contained in Technical Report Y-87-1, *Corps of Engineers Wetland Delineation Manual, January 1987*, referred to as the 1987 Manual (USACE 1987), and Technical Report ERDC/EL TR-08-28, *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*, referred to as the Arid West Supplement (USACE 2007).

4.0 FINDINGS

The pipeline portion of the study area begins at the Ash Creek Reservoir discharge outlet underneath I-15 and runs adjacent to Ash Creek along the northern one-third of the alignment, beginning on the west side of the drainage, crossing briefly to the east side (at one of two alternative locations), then back to the west side near an existing gravel pit. South of the gravel pit, the pipeline departs from Ash Creek and crosses the generally west-to-east flowing Leap Creek (at one of two alternative locations), Dry Wash, South Ash Creek, Dry Sandy Creek, and Wet Sandy Creek, all of which discharge to the main Ash Creek east of the study area.

The Anderson Reservoir portion of the study area contained a length of unnamed ephemeral drainage tributary to the main Ash Creek, which was also crossed once by the portion of pipeline south of the Anderson Reservoir site. The spillway did not contain any potentially jurisdictional areas.

Ash Creek and the other drainages are discussed in detail in separate sections below.

Small areas exhibiting wetland characteristics were observed adjacent to Ash Creek near the northern terminus of the study area, although all were found to be within the OHWM and were therefore considered part of the active channel. The majority of Ash Creek (and all other drainage crossings) was limited to its active channel with no adjacent wetland. No other wetlands were observed anywhere in the study area.

The study area is located in the United States Department of Agriculture's (USDA) Land Resource Region D. A review of NRCS soil maps and descriptions for the area showed seven different soil types present in the Anderson Reservoir study area, and a number of others throughout the pipeline study area (**Figure 3**). None of the soils are listed on Utah's hydric soil list and are therefore not discussed in detail here.

4.1 WATERS OF THE UNITED STATES

The lower reach of Ash Creek is tributary to the Virgin River, discharging to the river approximately 4 miles south of the Anderson Reservoir site. The Virgin River is a TNW, while Ash Creek is a RPW. The upper reach of Ash Creek, although not perennial to the point of its confluence with the Virgin River, does have a permanent surface water connection to Ash Creek Reservoir (as well as a continuous channel south to the Virgin River). This connection to Ash Creek Reservoir could represent a tie to interstate commerce, since the reservoir is used for recreation and agricultural use. Since all of the drainages observed in the study area have a surface water connection, either perennially or seasonally, to one of the two Ash Creek reaches, all were considered potentially jurisdictional if they met the criteria described in **Section 2.1**.

Seven potentially jurisdictional waters of the United States, including Ash Creek itself, were identified during the delineation process.

4.1.1 UPPER ASH CREEK PIPELINE

At the northern end of the study area, Ash Creek flows under I-15 from Ash Creek Reservoir, joining with several intermittent drainages flowing in from the east that form Deadman Hollow (**Figure 4**). At the northern terminus of the study area, the proposed pipeline is located on the west side of Ash Creek, with the creek itself approximately 50 feet east of the edge of the 100-foot wide study area. At this location, the active channel of Ash Creek is approximately 13 feet wide. Ash Creek meanders south at, or just beyond, the eastern edge of the study area for approximately 4,200 linear feet to the first crossing location, ranging in width from 10 to 30 feet (from OHWM to OHWM). One unnamed, ephemeral drainage enters Ash Creek from the east in this section, although due to the steepness of the side slope no defined channel was present and this channel was not considered jurisdictional (this drainage was not flowing at the time of inspection).

Two alternative crossing locations occur, where the pipeline would cross from the west side of Ash Creek to the east side of Ash Creek (**Figure 4**). The northernmost crossing location (*Crossing 1*, **Figure 4**; **Photo 1**) had an active channel width of approximately 8 feet (flow width of 2 feet) and featured sparse Fremont's cottonwood (*Populus fremontii* – FACW) and occasional sandbar and Pacific willow (*Salix exigua* – OBL and *S. lasiandra* – OBL, respectively) along the banks, rapidly transitioning to evergreens in the adjacent upland areas.

Photo 1. *Crossing Alternative 1* (**Figure 4**), facing downstream.

Channel substrate consisted of sand and silt, interspersed with large-diameter boulders. Rafted debris, a shift to coarser-diameter sand, and an adjacent bench were observed at the OHWM. No wetlands were present at this crossing location.

The southernmost crossing location (*Crossing Alternative 2*, **Figure 4**; **Photo 2**) occurred approximately 80 feet upstream of the distal end of observed surface flow. At this location, the active channel broadened and flattened to approximately 15 feet in width. Significant reduction in flow was visibly noted beginning approximately 200 feet upstream. Substrate at the crossing location was sand and silt, with minimal rock material. OHWM indicators in the form of rafted debris, mud cracks, and shelving were noted at the crossing location. Just beyond this broad, flat, sandy area, the channel bed became very rocky and dropped significantly in elevation, across which all surface water infiltrated. Two unnamed, ephemeral drainages entered the study area from the east, although due to the steepness of the side slope no defined channel was present and these were not considered jurisdictional.

Photo 2. *Crossing Alternative 2* (**Figure 4**), facing downstream. Crossing location is at the furthest downstream area visible in the photo.

No wetlands were observed within this southern crossing area. Although mud cracks were observed adjacent to the surface water, they were concluded to be within the active channel based on other OHWM indicators. Hydrophytic vegetation was not present in this area, and an impenetrable cobble layer was encountered approximately 3 inches below ground surface that prevented an analysis of the soil conditions. This mud flat area is considered within the jurisdictional portion of the channel.

Approximately 135 linear feet of Ash Creek is present within the study area at *Crossing Alternative 1*, while approximately 100 linear feet is present at *Crossing Alternative 2*.

The alternative crossing alignments converged back to a single corridor approximately 150 feet downstream of the end of observed surface flow, with the study area continuing south on the east side of Ash Creek. As with the study area upstream and on the west side, Ash Creek was outside or at the western margin of the study area for much of the distance south to an existing gravel pit (**Figure 4**). Within this section, Ash Creek presented as a large, dry, ephemeral wash, ranging in active channel width from 8 to 15 feet and containing a substrate mix of sand and boulders. **Photo 3** is representative of this section of upper Ash Creek. Three other unnamed, ephemeral drainages entered the study area from the east, although all were less than 3 feet in width and did not possess defined beds, banks, and/or OHWMs and were not considered jurisdictional. No wetlands were observed in this section.

Photo 3. Typical section of Ash Creek from end of surface flow to existing gravel pit (**Figure 4**).

At the southern end of the upper Ash Creek reach, the study area again crossed from the east side to the west side of Ash Creek within an ephemeral section (**Photo 4**; *Crossing 3*, **Figures 4** and **5**). This crossing occurs at the location of a historic bridge structure, where the concrete abutments are still visible adjacent to the channel. The active channel was measured as 8 feet wide at the centerline of the crossing location. Substrate was a mix of sand and cobble material, and OHWM indicators occurred in the form of bank nick points. The bed and banks of this reach of Ash Creek were poorly defined, although rafted material and the absence of

Photo 4. View downstream of *Crossing 3* (**Figure 4**). Note existing concrete bridge abutment immediately downstream of the proposed crossing location.

terrestrial vegetation in the channel indicate that this section does receive at least seasonal/intermittent flow. Approximately 160 linear feet of Ash Creek is present within the study area at *Crossing 3*.

4.1.2 MIDDLE ASH CREEK PIPELINE AND PIPELINE SPUR ROUTES

From *Crossing 3* (**Figures 4** and **5**), the proposed pipeline corridor remains west of the Ash Creek channel, following an existing frontage road along I-15. Approximately 660 feet southwest of *Crossing 3*, an unnamed, ephemeral drainage crosses the study area from west to east, originating from a 4-foot by 6-foot box culvert underneath I-15 (*Crossing 4*, **Figure 5**). The drainage continues steeply downstream to the east and discharges to the Ash Creek channel, although no defined bed was observed. Cut banks were the only evidence of an OHWM, and mature terrestrial vegetation in the form of rubber rabbitbrush (*Ericameria nauseosa* - UPL) and Wyoming sagebrush (*Artemisia tridentata* - UPL) had become established amidst the boulders present in the channel bed. This channel was determined not meet the criteria for jurisdiction as a water of the U.S. **Photo 5** exhibits the channel characteristics at the proposed crossing location.

Photo 5. *Crossing 4* (**Figure 5**), a non-jurisdictional ephemeral channel crossed by the pipeline study area.

4.1.2.1 LEAP CREEK

Approximately 1,500 feet south of Exit 33 off I-15, the second alternative crossing location occurs, with two different options for crossing Leap Creek. The western option (*Crossing Alternative 5*, **Figure 5**) follows an existing overhead transmission line corridor adjacent to I-15, while the eastern option (*Crossing Alternative 6*, **Figure 5**; **Photo 6**) is located approximately 300 feet to the southeast and downstream. Both crossing locations featured a deeply incised, flowing drainage with a 15-foot wide active channel, as determined by the presence of water staining on boulders and rafted debris, as well as occasional bank nicks where exposed sand was present. Channel substrate consisted of large-diameter boulders and sand (little to no silt was observed). The full channel width was approximately 20-30 feet from top of bank to top of bank, with either side flanked by pinyon pine (*Pinus edulis* - UPL) and Utah juniper (*Juniperus osteosperma* - UPL). Occasional Fremont's cottonwood trees were observed adjacent to the channel, particularly along the north bank, although no hydrophytic herbaceous vegetation was noted. Stream flow and channel morphology indicate that Leap Creek is likely a perennial stream, although United States Geologic Survey (USGS) mapping data identifies it as intermittent/ephemeral (**Figure 5**). No wetlands were observed at either crossing location. Approximately 116 linear feet of Leap Creek is present within the study area at *Crossing Alternative 5*, while approximately 102 linear feet is present at *Crossing Alternative 6*.

Photo 6. Leap Creek, *Crossing Alternative 6* location, view upstream.

4.1.2.2 DRY WASH

South of the town of Pintura, the study area crosses Dry Wash (*Crossing 7*, **Figure 5**; **Photo 7**). Dry Wash flows under the frontage road via an aging 10-foot by 5-foot box culvert. At the time of inspection (May 7, 2009), Dry Wash contained a small amount of surface flow (approximately 3 feet wide), although the active channel was measured as 8.5 feet in width from OHWM to OHWM. The active channel elevation was estimated as the top elevation of several point bars observed immediately downstream of the culvert, as well as bank nicks at a similar elevation. Channel substrate was primarily small-diameter gravel, with minimal sand and/or silt. The channel was flanked by skunkbush (*Rhus trilobata* - NI) and cheatgrass (*Bromus tectorum* - UPL) at its margins, with no adjacent wetland. The relatively small flow and channel morphology indicate that this channel may only experience intermittent flow, during spring snowmelt and/or immediately following precipitation events, and USGS identifies the channel as intermittent/ephemeral (**Figure 5**). Approximately 100 linear feet of Dry Wash is present within the study area at this location, where the proposed pipeline would cross perpendicular to the wash channel. Dry Wash discharges to Ash Creek approximately 1,950 feet southeast of the crossing location.

Photo 7. Dry Wash, *Crossing 7* (**Figure 5**), view upstream.

4.1.2.3 SOUTH ASH CREEK

Approximately 1,350 feet southwest of the Dry Wash crossing, the study area crosses South Ash Creek (*Crossing 8*, **Figure 5**; **Photo 8**). South Ash Creek flows under the frontage road via a single-span concrete bridge approximately 50 feet wide and 20 feet above the stream channel. At the crossing location, the active channel is approximately 25 feet wide and appears to be perennial, although USGS identifies it as intermittent/ephemeral.

Photo 8. *Crossing 8* (**Figure 5**), South Ash Creek, view upstream and under bridge structure.

Significant flows were observed at the time of inspection. Similar to Dry Wash, approximately 100 linear feet of South Ash Creek is present within the study area at this location, where the proposed pipeline would cross perpendicular to the wash channel. South Ash Creek discharges to

Ash Creek approximately 2,100 feet southeast of the crossing location. No wetlands were observed adjacent to the stream channel, and the surrounding landscape slopes upward steeply out of the channel floodplain.

4.1.2.4 PIPELINE SPUR ROUTES

To the west of the town of Pintura and west of I-15, two pipeline spur route study areas were investigated, including a northern and southern branch. Several small (i.e., less than 3 feet in width), unnamed, ephemeral wash crossings were observed along the northern branch, although no potentially jurisdictional drainages were encountered in this segment.

The southern branch crossed Dry Wash approximately 4,100 feet upstream of the main Dry Wash crossing (see **Section 4.1.2.2** above), although at the time of inspection of this segment (May 20, 2009) no flow was observed. At this location (*Crossing 9*, **Figure 5**), Dry Wash was approximately 4 feet wide with poorly defined banks and no apparent OHWM indicators (**Photo 9**). An agricultural diversion ditch was also observed (and is shown on the USGS topographic map) running from west to east toward several stock ponds in the vicinity if Pintura and originating from South East Creek (see below). It is possible that overflow water from this ditch was being directed into Dry Wash during the investigation on May 7. Neither Dry Wash nor the agricultural ditch was determined to be jurisdictional at this location, due to a lack of OHWM indicators and defined bed and banks.

Photo 9. *Crossing 9*, Dry Wash within the western pipeline spur route, view upstream from the crossing location.

The southern branch of the pipeline spur route originates at South Ash Creek, described in **Section 4.1.2.3** above, and follows the path of an existing agricultural irrigation ditch. At the origin of the southern branch, South Ash Creek is similar in morphology to the main crossing location. Historic agricultural improvements have been made to the stream channel at this location, in order to direct water into the ditch. As with the main South Ash Creek crossing, this reach is considered jurisdictional by virtue of a continuous surface water connection with Ash Creek.

4.1.3 LOWER ASH CREEK PIPELINE

From approximately Exit 30 on I-15 southwest to Anderson Junction and the location of the proposed Anderson Reservoir, the lower reach of the Ash Creek pipeline route crosses several small, unnamed, ephemeral washes. These washes are all less than 3 feet in width and were not considered jurisdictional. In addition to these drainages, the study area also crosses Dry Sandy Creek and Wet Sandy Creek.

4.1.3.1 DRY SANDY CREEK

The study area crosses Dry Sandy Creek approximately 1.5 miles northeast of Anderson Junction (*Crossing 10*, **Figure 6**; **Photo 10**). At this location, Dry Sandy Creek is a broad ephemeral wash that runs underneath I-15 via a 12-foot by 12-foot box culvert and continues 4,200 feet southeast to a discharge point into Ash Creek. The measured active channel of Dry Sandy Creek at the crossing location was 5 feet wide, with a mixed bed substrate of sand, cobble, and large boulders. An existing two-track road crosses Dry Sandy Creek at the proposed pipeline crossing location. Although the channel bed and banks are somewhat poorly defined, Dry Sandy Creek does possess a continuous surface water connection with Ash Creek, and OHWM indicators in the form of rafted debris and a shift in substrate particle size, as well as an absence of terrestrial vegetation in the channel, indicate that it should be jurisdictional. Approximately 100 linear feet of Dry Sandy Creek occurs within the study area, crossing perpendicular to the pipeline alignment.

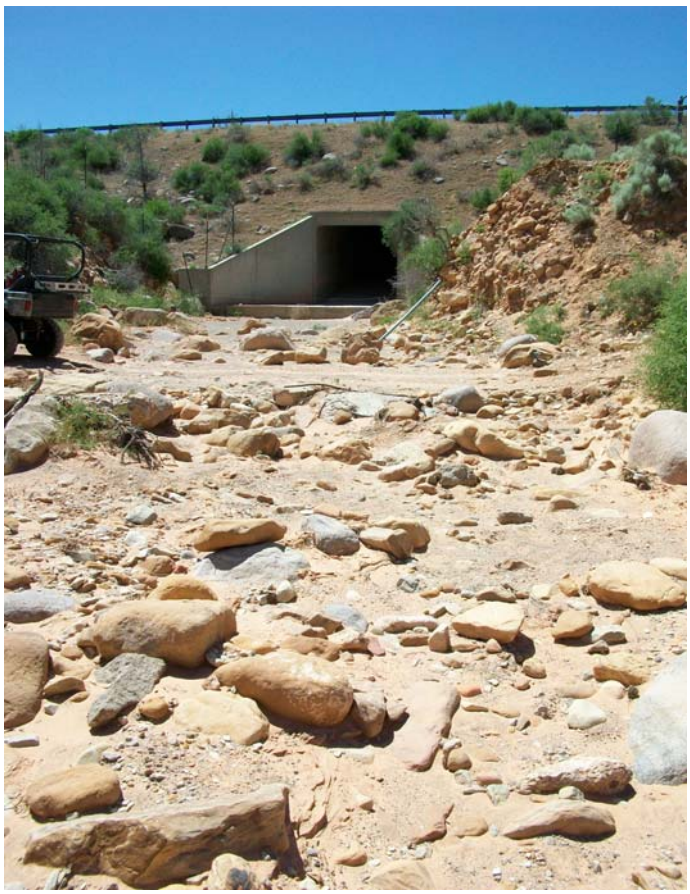

Photo 10. *Crossing 10* (**Figure 6**), Dry Sandy Creek, view upstream of existing two-track road and channel issuing from box culvert.

4.1.3.2 WET SANDY CREEK

The study area crosses Wet Sandy Creek approximately 0.9 mile northeast of Anderson Junction (*Crossing 11*, **Figure 6**; **Photo 11**). At this location, Wet Sandy Creek is a broad intermittent drainage that runs underneath the paved frontage road via a single-span concrete bridge approximately 50 feet wide and continues 4,000 feet east to a discharge point into Ash Creek. The measured active channel of Wet Sandy Creek at the crossing location was 24 feet wide, with a mixed bed substrate of sand, cobble, and large boulders. Dark, moist sand with erosional patterns was observed at the crossing location, indicating recent surface flow. It is possible that Wet Sandy Creek is diverted for agricultural purposes further to the west, although the channel is still considered jurisdictional by virtue of defined bed and banks and OHWM indicators and a continuous surface water connection with Ash Creek. Approximately 100 linear feet of Wet Sandy Creek occurs within the study area, crossing perpendicular to the pipeline alignment. No wetlands were observed at this crossing location.

Photo 11. *Crossing 11* (**Figure 6**), Wet Sandy Creek, view downstream of frontage road bridge and crossing location.

4.1.4 ANDERSON RESERVOIR, SPILLWAY, AND SOUTHERN PIPELINE ROUTE

The Anderson Reservoir study area is located approximately 0.5 mile south of Anderson Junction. Within the proposed reservoir, one main, unnamed, ephemeral drainage runs generally from north to south across the study area, with a smaller, secondary branch joining the main channel from the west (**Figure 7**).

The main drainage enters the site via a 96-inch corrugated metal pipe culvert under the frontage road, with the start of the channel approximately 4 feet in width from OHWM to OHWM and poorly defined. OHWM indicators occurred in the form of rafted debris, bank nicks, and changes in substrate material, from a sand/cobble bed to sandy shelves. Measurements of channel width were recorded approximately 200-400 linear feet apart along the stream channel (total of 16 width measurements), and the centerline of the main channel was mapped to determine a total area within the Anderson Reservoir study area. The channel varied in width from 4 feet to 11 feet, with an average width of 6.5 feet. It generally constricts to narrow channel during significant elevation drops, followed by a widening over flatter sections. Exposed sandstone was noted within (or immediately adjacent to) the channel at several locations. A total of 8,150 linear feet of the main drainage occurs in the reservoir study area. The smaller secondary branch was 4 feet wide at its junction with the main drainage, reducing to less than 3 feet wide after 960 linear feet, at which time it was found to not longer exhibit jurisdictional characteristics. The total area of waters of the U.S. within the Anderson Reservoir study area was 1.30 acres. **Photo 12** shows a typical section of the unnamed main drainage crossing the study area, while **Photo 13** shows a typical section of the unnamed secondary channel.

Photo 12. Typical section of main drainage in reservoir study area.

Photo 13. Typical section of secondary drainage in reservoir study area.

The main channel continues south of the reservoir study area and is crossed once from west to east by the southern pipeline route (*Crossing 12*, **Figure 7**). The channel at this location is similar in character to the reach located within the reservoir study area, with a total of 100 linear feet of channel within the pipeline study area. The drainage discharges to Ash Creek immediately west of Toquerville and approximately 1.1 miles southeast of *Crossing 12* and was therefore considered jurisdictional.

There were no drainage crossings identified in the spillway study area, and no wetlands were observed in the reservoir, spillway, or southern pipeline route study areas. The majority of this portion of the study area consists of pinyon-juniper woodlands, and no hydric soils are present in the area.

4.1.5 WATERS OF THE UNITED STATES SUMMARY

The total length of observed surface water in Ash Creek, from the northern extent to the end of surface flow, was approximately 5,460 linear feet of stream system, although only small portions and two potential crossing locations actually occur within the 100-foot wide pipeline study area. This entire length of the Ash Creek system has been mapped by USGS as intermittent/ephemeral, although channel morphology and OHWM indicators appear to indicate that surface flow occurs year-round in the upper reach, with the distance reached varying depending on the amount of water discharged from the Ash Creek Reservoir. The pipeline study corridor crosses Leap Creek (at two potential locations), Dry Wash, South Ash Creek, and Dry and Wet Sandy Creeks, all of which are considered jurisdictional. Crossing distances range from 8 to 25 feet in channel width. Approximately 1.5 miles of an unnamed ephemeral drainage occurs within the Anderson Reservoir site, also considered jurisdictional. Several small, unnamed ephemeral drainages were encountered in the study area, although due to their bed width of less than 3 feet and/or undefined beds, banks, and OHWM, they were not considered jurisdictional.

4.2 WETLANDS

Areas meeting the three criteria for wetlands – hydrophytic vegetation, hydric soil indicators, and indicators of hydrology – were not observed anywhere in the study area. Some locations adjacent to Ash Creek within its upper reach contained some wetland characteristics, although each of

these areas was determined to be waterward of the OHWM and therefore contained within the water of the U.S. limits.

4.3 NON-JURISDICTIONAL AREAS

Several non-jurisdictional drainages were observed in the study area, primarily in the form of pipeline corridor crossings, as noted in the sections above. The majority of these drainages were small, ephemeral features with poorly defined banks and less than 3 feet in bed width. **Photo 14** depicts a typical non-jurisdictional drainage within the study area. These small ephemeral features were also present on the Anderson Reservoir site.

Other non-jurisdictional drainages issued from the eastern-bounding Hurricane Cliffs along the northern end of the pipeline corridor, where the terrain was too steep to establish a defined bed and bank.

Photo 14. Typical non-jurisdictional ephemeral drainage within the study area.

5.0 SUMMARY AND U.S. ARMY CORPS OF ENGINEERS JURISDICTION

Washington County Water Conservancy District is initiating planning and conducting baseline natural resource studies for a proposed surface water reservoir located south of Anderson Junction, near Toquerville, Utah, as well as a pipeline originating near Ash Creek Reservoir and continuing approximately 10 miles south-southwest to the Anderson Reservoir site. Two branches of the pipeline are also located west Pintura, roughly mid-way between Ash Creek and the proposed Anderson Reservoirs, and approximately 1.2 miles of spillway and 2 miles of pipeline extend south from the proposed Anderson Reservoir site. Waters of the United States were delineated in the project area in May 2009. Ash Creek, a tributary of the Virgin River and a water of the U.S., is crossed twice by the study area in its upper reach, while Leap Creek, Dry Wash, South Ash Creek, Dry Sandy Creek, and Wet Sandy Creek are also crossed by the pipeline route. Each of these drainages is tributary to Ash Creek, possessed define beds, banks, and OHWMs, and were therefore considered jurisdictional. Additionally, approximately 1.5 miles of an unnamed ephemeral tributary of Ash Creek was also present on the Anderson Reservoir site. Several unnamed ephemeral washes less than 3 feet in width were also encountered, although none were determined to be jurisdictional. No wetlands were encountered anywhere within the project study area.

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FIGURES

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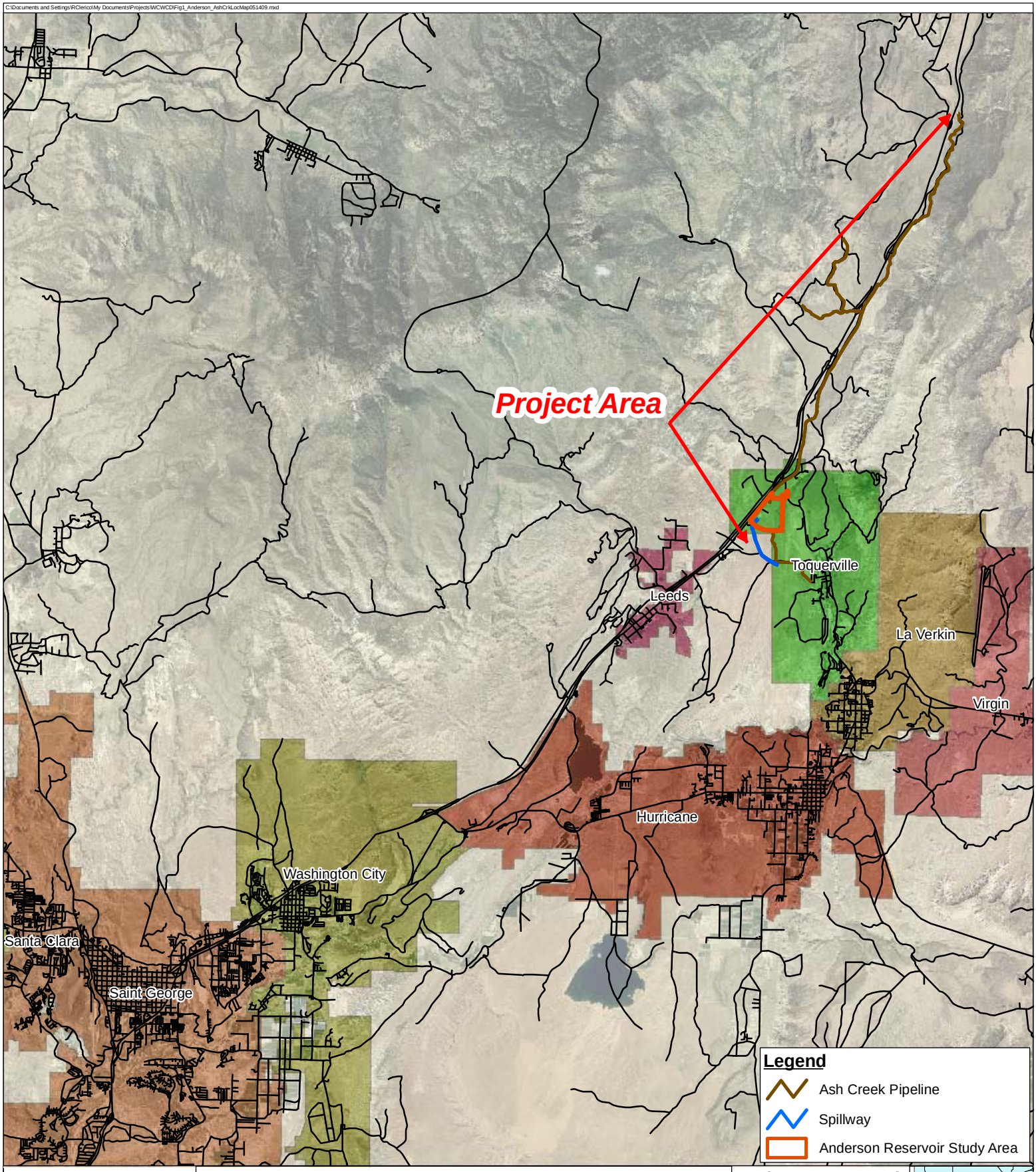

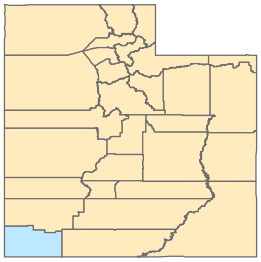

Figure 1. General Location

N
W E
S

1 inch = 3 miles

Miles
0 2 4 6 8

Anderson Reservoir
Ash Creek Pipeline
WCWCD

Washington County, UT

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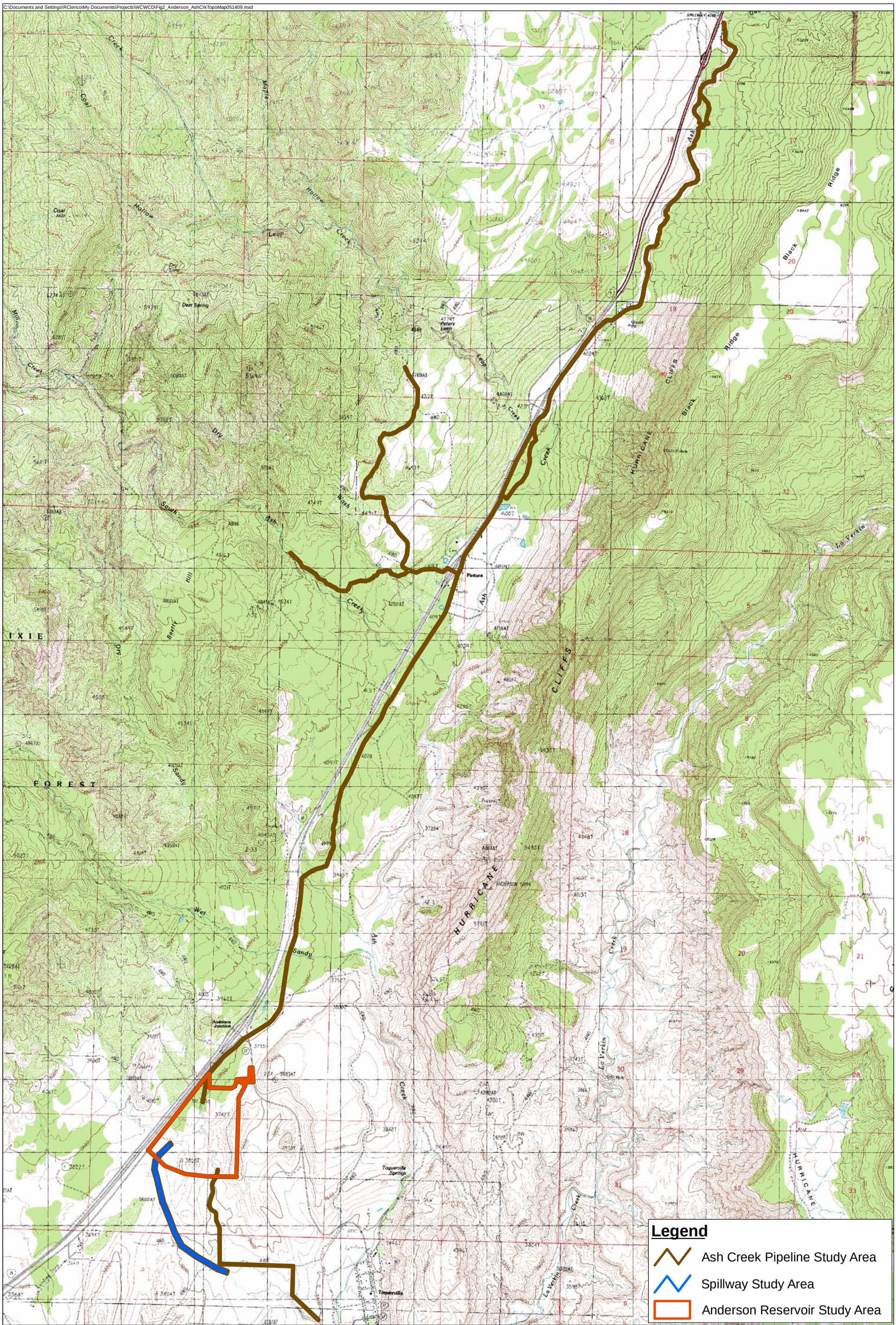

Figure 1. USGS Topographic Map

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Washington County, UT

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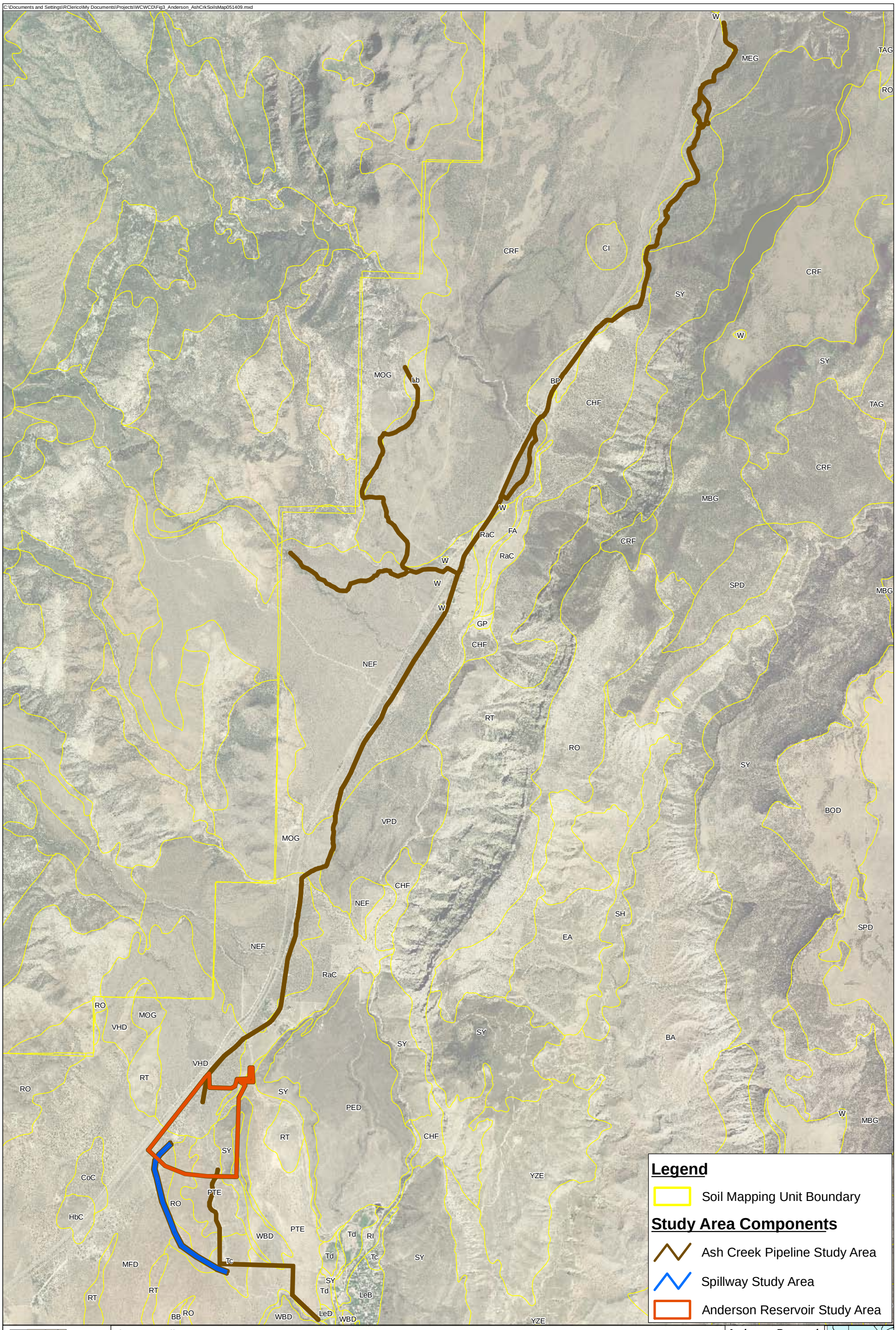

Figure 3. Soils

1 inch = 4,000 feet

0 4,000 8,000 12,000 16,000 Feet

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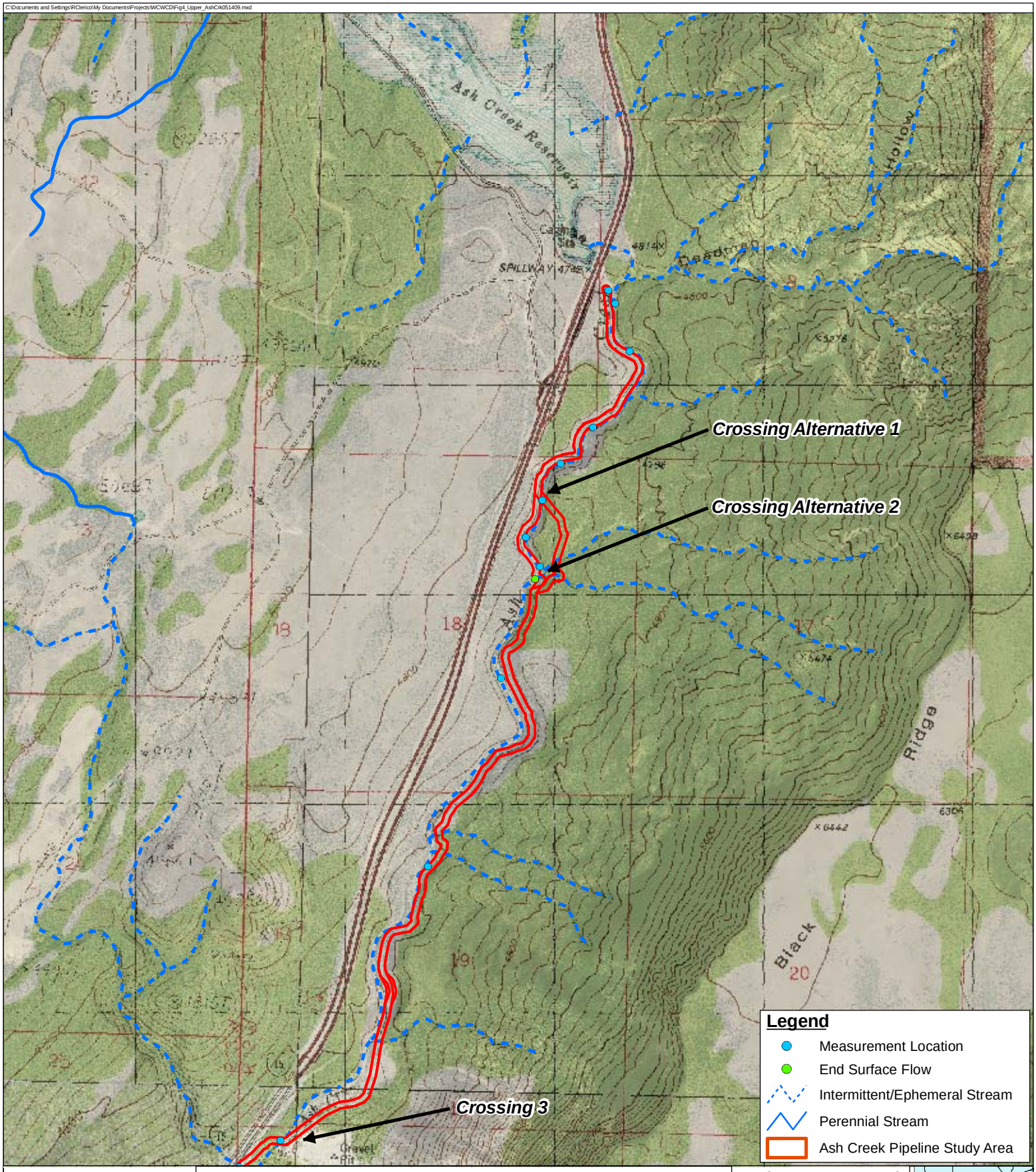

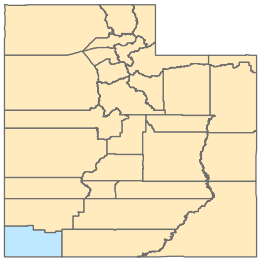

Figure 4. Upper Ash Creek Pipeline

N
W E
S

1 inch = 2,000 feet

Feet
0 1,000 2,000 3,000 4,000

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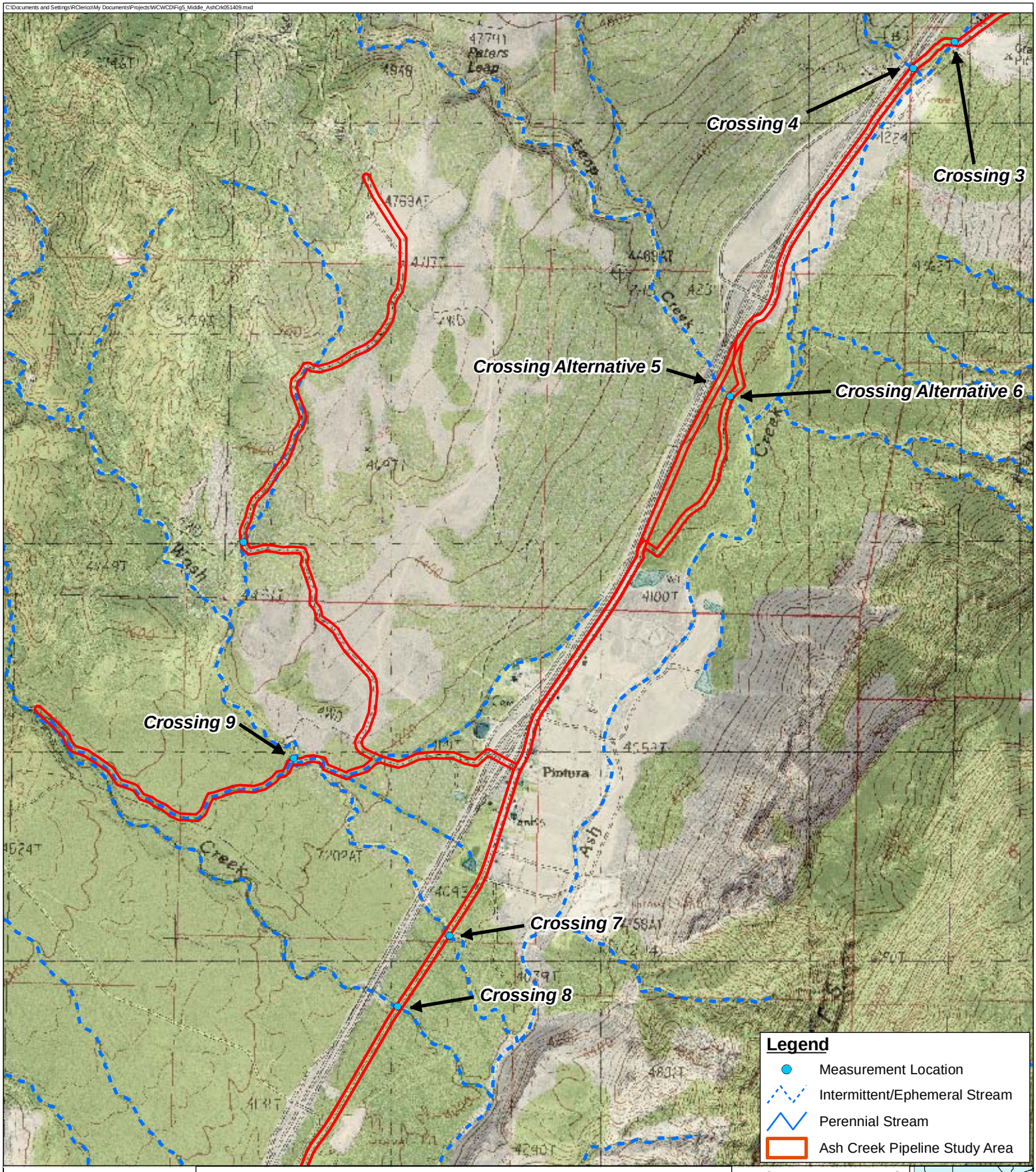

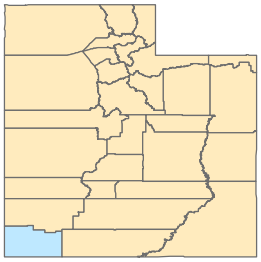

Figure 5. Middle Ash Creek Pipeline and Pipeline Spur Routes

N W E S

1 inch = 2,000 feet

Feet
0 1,000 2,000 3,000 4,000

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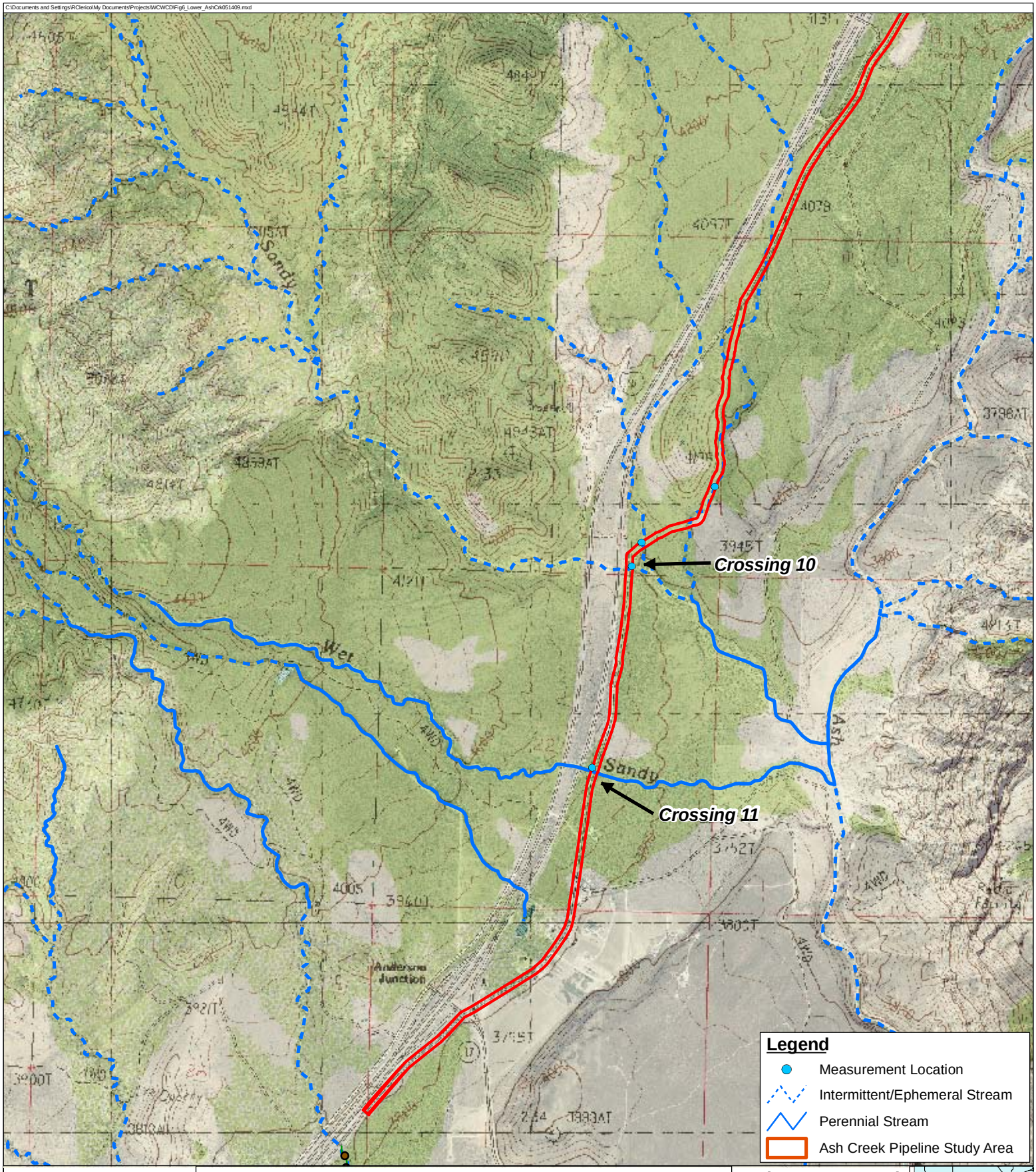

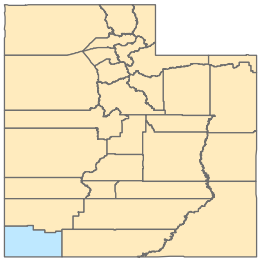

Figure 6. Lower Ash Creek Pipeline

N
W E
S

1 inch = 2,000 feet

Feet
0 1,000 2,000 3,000 4,000

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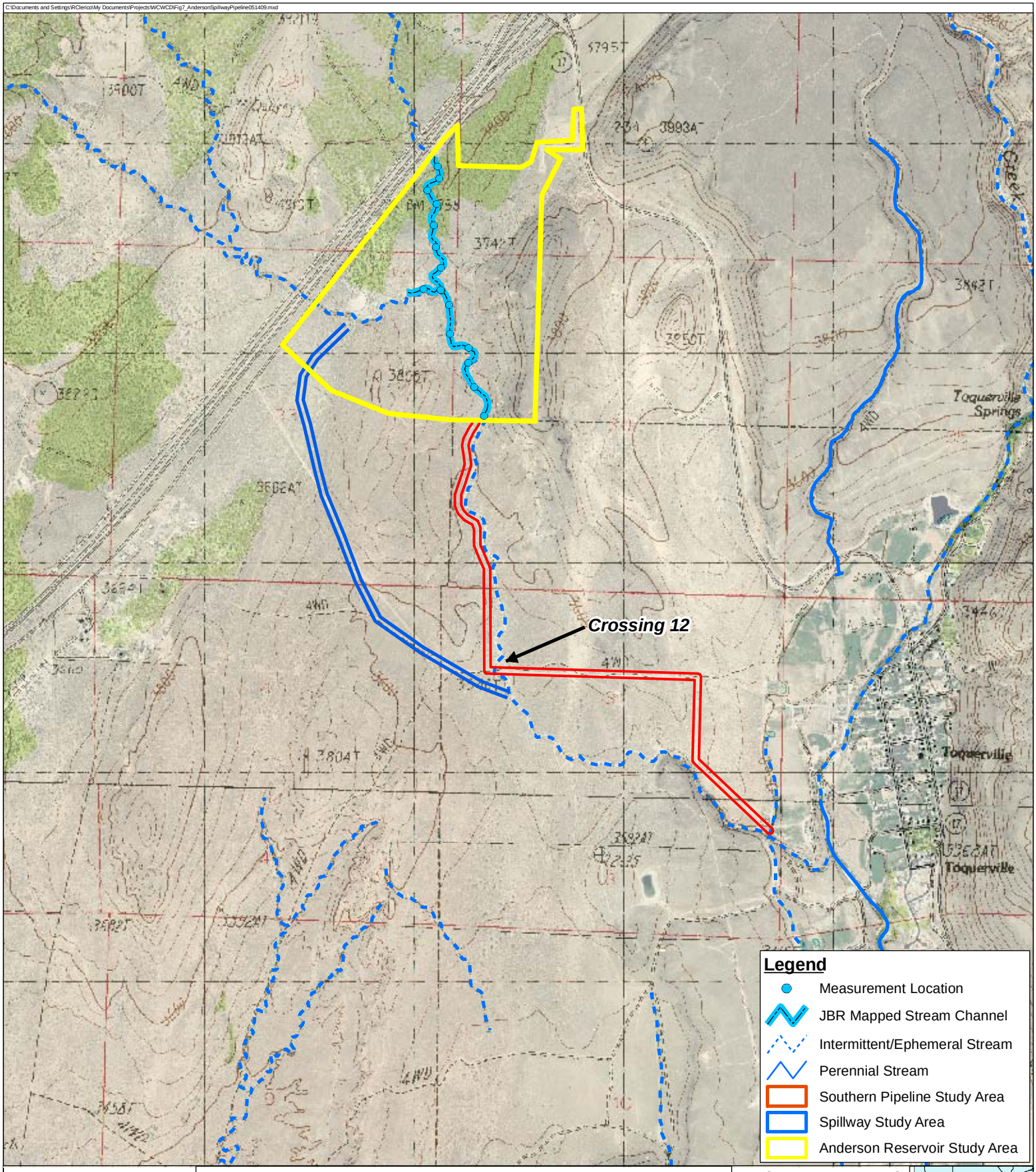

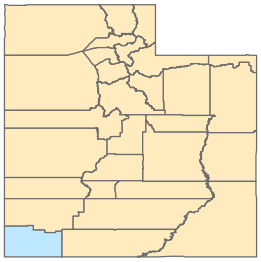

Figure 7. Anderson Reservoir, Spillway, and Southern Pipeline Route

N
W E
S

1 inch = 2,000 feet

Feet
0 1,000 2,000 3,000 4,000

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