CULTURAL RESOURCES INVENTORY REPORT

Kane County Water Conservancy District's Cove Reservoir Project
Kane County, Utah

Prepared for:

Kane County Water Conservancy District
725 East Kaneplex Drive
Kanab, Utah 84741
435-644-3997

For submittal to:

United States Department of Agriculture, Natural Resources Conservation Service, Utah State Office
United States Department of the Interior, Bureau of Land Management Kanab Field Office
State of Utah School and Institutional Trust Lands Administration
Utah Division of State History

Prepared by:

Lindsey M. Evenson, Archaeologist
Jennifer Bannick, Archaeologist

Submitted by:

Lindsey M. Evenson, Principal Investigator
Transcon Environmental, Inc.
579 West Galena Park Place, Unit 102
Draper, Utah 84020
801-649-5141

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TRANSCON environmental

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ABSTRACT

Project Title: U18TN0544 Kane County Water Conservancy District's Cove Reservoir Project

Report Title and Date: Cultural Resources Inventory Report, U18TN0544 Kane County Water Conservancy District's Cove Reservoir Project, Kane County, Utah December 2019

Cooperating Agencies: United States Department of Agriculture, Natural Resources Conservation Service (NRCS), Utah State Office
Bureau of Land Management (BLM) Kanab Field Office
State of Utah School and Institutional Trust Lands Administration (SITLA)

Project Numbers: Transcon Environmental, Inc. (Transcon) Project Number: D38-02
Utah Division of State History Project Number: U18TN0544

Permit Numbers: BLM Permit: 18UT81313
Public Lands Policy Coordination Office: Lindsey M. Evenson PLCPO No. 177

Project Description: The NRCS and Kane County Water Conservancy District (KCWCD) are proposing to construct the new Cove Reservoir within the existing Glendale, Mt. Carmel, and Orderville irrigation systems. This proposed reservoir would be located immediately southwest of Orderville, Utah, off Cove Road. Additional improvements would include the construction of approximately 1.5 miles of new pipeline, the Glendale hydroelectric power plant, and 0.2 mile of new power line, and 0.7 acre of utility corridor along U.S. Highway 89 (US-89) and Cove Road; these improvements would be located west of US-89 and the East Fork of the Virgin River in Glendale, Utah. The Project also proposes the potential use of six previously disturbed borrow pits—Lambs Pit, County Pit, Tait Pit, Bald Knolls Community Pit, Bald Knolls Community Pit Expansion, and Black Knoll Rip-Rap Pit—for Project-related construction needs; no disturbance outside the previously disturbed areas is proposed at these borrow pit locations with the exception of new pits being developed at Bald Knolls Community Pit Expansion and Black Knoll Rip-Rap Pit.

The proposed Project will include a block survey of the proposed reservoir and hydroelectric power plant locations and four borrow pits, a linear survey of the new pipeline, power line, and utility corridor locations, and a spot check/survey of two borrow pit locations. KCWCD retained Transcon to conduct this analysis; the cultural resources survey and resulting report were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

Location: The Project area is generally located west of US-89 in Glendale and southwest of Orderville, Utah. The survey area measures approximately 791.68 acres and is located within Township 40 South, Range 5 West, Section 28; Township 40 South, Range 6 West, Sections 25, 26, 27, and 34; Township 40 South, Range 7 West, Sections 23, 26, and 27; and Township 41 South, Range 7 West,

Sections 5, 6, 17, 19, 30, and 31 of the Salt Lake Baseline and Meridian. The Project crosses the Bald Knoll, Orderville, Glendale, and Mount Carmel, Utah 7.5-minute U.S. Geological Survey topographic quadrangles.

Acreage and Jurisdiction:

The Project area of potential effect (APE) measures approximately 791.68 acres and crosses BLM Kanab Field Office-managed lands (152.18 acres), SITLA-managed lands (70.33 acres), and privately-owned lands (569.17 acres). The survey was conducted in 15-meter-wide transects throughout the Project area (including both block and linear survey areas), with the exception of the Lambs Pit, which is located on private property and was "spot" checked for any potential areas that may be previously undisturbed and may contain significant cultural resources; the County Pit and Tait Pit, also located on private property, were surveyed in 15-meter transects at the request of the NRCS and BLM Kanab Field Office. No portion of the Project area was left unsurveyed, due to prior survey efforts.

Personnel and Dates of Fieldwork:

A total of 32 person-days of field effort were spent on the Project. Original surveys between October 1 through 8 and October 10 through 13, 2018; supplemental surveys on the project occurred between June 12 through 14, July 10, and September 19, 2019. The survey was conducted by Transcon archaeologists Brent Larsen, Jennifer Bannick, and Nicole Jacobson.

Register-eligible Properties:

42KA6331, 42KA8785, 42KA8904, and 42KA8974

Register-ineligible Properties:

42KA8900, 42KA8901, 42KA8902, 42KA8903, 42KA8972, and 42KA8973

Comments:

A total of 9 new cultural resource sites (42KA8785, 42KA8900, 42KA8901, 42KA8902, 42KA8903, 42KA8904, 42KA8972, 42KA8973, and 42KA8974), 1 previous cultural resource sites (42KA6331), and 15 isolated occurrences (IOs) were identified and recorded within the Project APE. Of the 10 total sites located within the project APE, 4 sites (42KA6331, 42KA8785, 42KA8904, and 42KA8974) are recommended Eligible for listing on the National Register of Historic Places (NRHP) under Criterion D for their information potential; the remaining 6 sites and all 15 IOs are recommended Not Eligible for listing on the NRHP under any Criteria.

It is recommended that implementation of the Project would result in *No Adverse Effect to Historic Properties*, if certain protective measures are followed (see *Survey and Summary Results* for details). If any previously undetected or unreported cultural features or deposits are encountered during future Project-related activities, these activities must be discontinued in the immediate area of the feature(s), and an NRCS archaeologist, BLM archaeologist, or SITLA archaeologist, where appropriate, must be consulted to evaluate their nature and significance.

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INTRODUCTION

Transcon Environmental, Inc. (Transcon) conducted a Class III (intensive pedestrian) cultural resources survey of approximately 791.68 acres adjacent to U.S. Highway 89 (US-89) and Glendale Bench Road in the vicinity of Glendale and southwest of Orderville, in Kane County, Utah. Fieldwork was conducted between October 1 through 8 and October 10 through 13, 2018 with supplemental fieldwork being conducted between June 12 through 14, July 10, and September 19, 2019. The survey was requested by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), Utah State Office and Kane County Water Conservancy District (KCWCD) to determine if any significant cultural resources, which could be affected by the proposed Kane County Water Conservancy District's Cove Reservoir Project (Project), are present within the Project area. Important cultural resources may include historic or prehistoric archaeological sites or objects; historically or architecturally significant structures, buildings, or landscapes; and traditional cultural places that are or could be considered Eligible for inclusion in the National Register of Historic Places (NRHP).

Project Description

The NRCS and KCWCD are proposing to construct the Project within the existing Glendale, Mt. Carmel, and Orderville irrigation systems. This proposed reservoir would be located immediately southwest of Orderville, Utah, off Cove Road. Additional improvements would include the construction of approximately 1.5 miles of new pipeline, the Glendale hydroelectric power plant (hydroplant), 0.2 mile of new power line, 0.7 acre of utility corridor along US-89 and Cove Road; these improvements are located west of US-89 and the East Fork of the Virgin River in Glendale, Utah. The Project also proposes the use of six borrow pits—Lambs Pit, County Pit, Bald Knolls Community Pit, Bald Knolls Community Pit Expansion, Black Knoll Rip-Rap Pit, and Tait Pit—for Project-related construction needs; no disturbance outside the previously disturbed areas is proposed at these borrow pit locations with the exception of the Bald Knoll Community Pit Expansion and Black Knoll Rip Rap Pit, which will have new disturbance. An additional borrow pit location—Lava Pit—was evaluated for the proposed project by the NRCS and will not be further discussed in this report. The proposed Project includes a block survey of the proposed reservoir, proposed new hydroplant, and borrow pit locations with new development proposed; a linear survey of the new pipeline, new power line, and road improvement locations; and a spot check/survey of the borrow pit locations with no new disturbance proposed. In addition, the Bureau of Land Management (BLM) Kanab Field Office requested a full block survey of the County Pit borrow pit location (on BLM-managed lands). The previously constructed Orderville hydroplant and the existing pipeline locations were not reevaluated as part of this Project.

The proposed Project area is located primarily along US-89, with one borrow pit (Bald Knolls) located along Glendale Bench Road in Kane County, Utah. The proposed new pipeline parallels US-89 between milepost (MP) 89.4 and MP 87.9, the proposed hydroplant is located west of US-89 by MP 87.9, access to the proposed Cove Reservoir is along Cove Road between MP 84.9 and MP 85, the County Pit can be accessed east of US-89 on a dirt road from MP 84.3, Lamb's Pit is accessed east of US-89 from a dirt road at MP 81.4, and Bald Knolls Community Pit is accessed from a dirt road off Glendale Bench Road, which is east of US-89 at MP 90.

The Project area of potential effect (APE) measures approximately 791.68 acres and crosses BLM Kanab Field Office-managed lands (152.18 acres), State of Utah School and Institutional Trust Lands Administration (SITLA)-managed lands (70.33 acres), and privately-owned lands (569.17 acres). The survey was conducted in 15-meter-wide transects throughout the Project area (including both block and linear areas), with the exception of the Lambs Pit, which was spot checked for any potential areas that may have been previously undisturbed. The County Pit and Tait Pit were completely surveyed under a block

survey, as requested by the NCRS and BLM Kanab Field Office. No portion of the Project area was left unsurveyed, due to prior survey efforts.

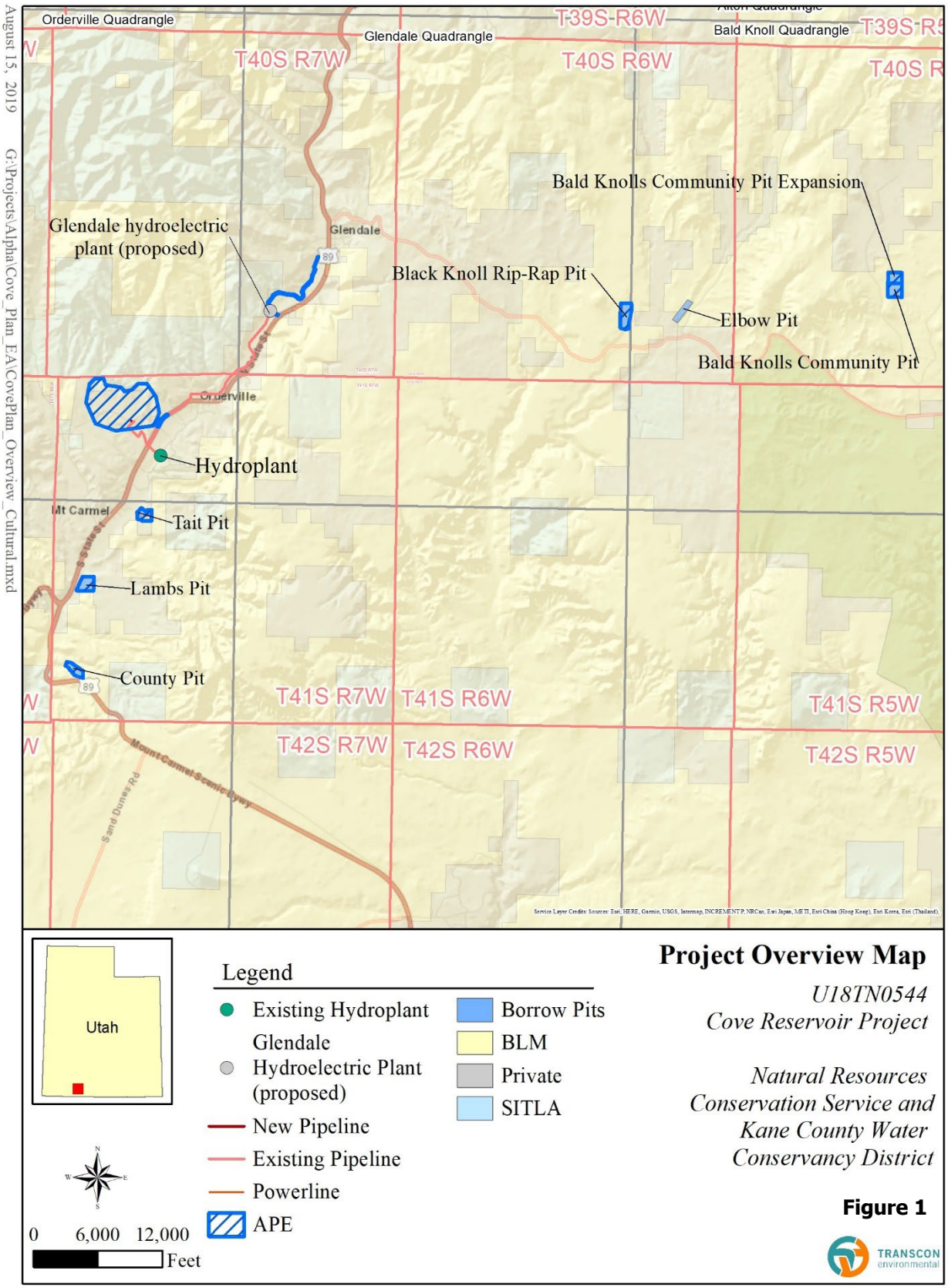
KCWCD retained Transcon to conduct a cultural resources analysis. The cultural resources survey and this resulting report have been completed as part of that analysis and were conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The NRCS Utah State Office served as the lead federal agency for the Project. The survey was conducted under a BLM fieldwork authorization dated September 28, 2018 and a SITLA fieldwork authorization dated September 28, 2018; additionally, a supplemental BLM fieldwork authorization was signed May 23, 2019 for additional project areas (borrow pits) on BLM-manged lands outside the original project APE (**Appendix A**). The cultural resources survey was conducted between October 1–8 and 10–13, 2018 with supplemental fieldwork being conducted between June 12 through14, 2019, July 10, and September 19, 2019 for a total of 32 person-days of fieldwork. Lindsey M. Evenson served as Principal Investigator, Brent Larsen served as the Field Director, and Jennifer Bannick and Nicole Jacobson served as the Project Archaeologists.

Project Location

The Project area is generally located west of US-89 in Glendale and southwest of Orderville, in Kane County, Utah. The survey area measures approximately 791.68 acres and is located within Township 40 South, Range 5 West, Section 28; Township 40 South, Range 6 West, Sections 25, 26, 27, and 34; Township 40 South, Range 7 West, Sections 23, 26, and 27; and Township 41 South, Range 7 West, Sections 5, 6, 17, 19, 30, and 31 of the Salt Lake Baseline and Meridian. The Project crosses the Bald Knoll, Orderville, Glendale, and Mount Carmel, Utah 7.5-minute U.S. Geological Survey topographic quadrangles.

The Project area is generally located along US-89 near Orderville and Mt. Caramel, with three borrow pits (Bald Knolls, Bald Knolls Expansion, and Black Knoll) located along Glendale Bench Road in Kane County, Utah. The proposed new pipeline parallels US-89 south from MP 89.4–MP 87.9 and the proposed hydroplant is located west of US-89 at MP 87.9. Access to the proposed Cove Reservoir is along Cove Road between US-89 MP 84.9–MP 85 and the County Borrow Pit can be accessed east of US-89 from a dirt road at MP 84.3. Lamb's Pit is accessed east of US-89 from a dirt road at MP 81.4 and Tait Pit can be accessed east of US-89 from a dirt road near MP 83, while Bald Knolls Community Pit, Bald Knolls Community Pit Expansion, and Black Knoll Rip-Rap Pit can be accessed from a dirt road off of Glendale Bench Road located east of US-89 at MP 90.

The Project area is located on land under the jurisdiction of the BLM Kanab Field Office, SITLA, and private ownership. **Figure 1** shows the proposed Project development features, APE, and land jurisdictions.


August 15, 2019
G:\Projects\Alpha\Cove_Plan_EA\CovePlan_Overview_Cultural.mxd
Orderville Quadrangle
Glendale Quadrangle
Bald Knoll Quadrangle
T39S-R6W
T40S R7W
T40S R6W
Bald Knolls Community Pit Expansion
Glendale hydroelectric plant (proposed)
Glendale
Black Knoll Rip-Rap Pit
Elbow Pit
Bald Knolls Community Pit
Orderville
Hydroplant
Mt Carmel
Tait Pit
Lambs Pit
County Pit
T41S R7W
T41S R6W
T41S R5W
T42S R7W
T42S R6W
T42S R5W
Mount Carmel Scenic Hwy
Sand Dunes Rd
Utah
Legend
Existing Hydroplant
Glendale Hydroelectric Plant (proposed)
New Pipeline
Existing Pipeline
Powerline
APE
Borrow Pits
BLM
Private
SITLA
0 6,000 12,000
Feet
Project Overview Map
U18TN0544
Cove Reservoir Project
Natural Resources Conservation Service and Kane County Water Conservancy District
Figure 1
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ENVIRONMENTAL SETTING

The proposed Project area is located within the Grand Staircase subdivision of the Colorado Plateau physiographic region of southwestern Utah, immediately south of the Basin and Range–Colorado Plateau Transition Zone (Stokes 1977). The Grand Staircase subdivision is characterized by a series of slopes, cliffs and terraces that extend from the Grand Canyon in Arizona culminating in the High Plateaus of southern Utah. This region is further characterized by many unique linear cliffs that are distinctly colored and display several different geologic ages (Stokes 1977). Major drainage systems in the Project area include the East Fork of the Virgin River and Muddy Creek, as well as unnamed washes, springs, and dry washes.

The Project area begins south of Mt. Carmel at the County Borrow Pit, encompasses a large area west of Orderville at the proposed reservoir site (**Figure 2**), extends along the East Fork of the Virgin River at the area of the proposed new pipeline, and terminates northeast of Glendale by the Bald Knolls Community Pit. The topography of the region is characterized by steep slopes, cliff faces, and various rock formations and is situated in a distinctive geological area surrounded by the Coral Pink Sand Dunes State Park to the south, Zion National Park to the west, Cedar Breaks National Monument to the northwest, the Grand Staircase-Escalante National Monument (GSENM) to the east, and Bryce Canyon National Park to the northeast. Most of the Project extends along the Sevier Fault; Triassic and Jurassic rock formations are exposed in the region across the anticline, including the Glen Canyon Group of Moenave Formation, Kayenta Formation, and Navajo Sandstone. There are also Cretaceous rock formations west of the Sevier Fault in the Project area, including the Wahweap and Straight Cliffs formations, Dakota Sandstone and Cedar Mountain Formation, and the Jurassic Carmel Formation (Williams et al. 2014).



Figure 2. Project overview looking southeast within the proposed Cove Reservoir basin.

The proposed new pipeline section of the Project area is located within Long Valley along the Mt. Carmel Scenic Byway, which lies west of Glendale Bench and the White Cliffs. The proposed reservoir section of the Project area is located west of the town of Orderville adjacent to Cove Canyon and Deer Hollow, and

Bald Knolls community Pitt is located just above the Skutumpah Terrace. Elevations in the Project area range from 5230 feet above sea level (asl) near Lamb's Pitt to 6542 feet asl in the vicinity of Bald Knolls Community Pit. Elevations in the proposed new pipeline area range from 5600 to 5721 asl.

Vegetation found in the Project area consists of greasewood-salt scrub and transitions into sagebrush-perennial grassland habitat and, eventually, into pinyon-juniper woodlands in the higher elevations. The area of the proposed new pipeline meanders along the East Fork of the Virgin River, and portions of this section of the Project cross though agricultural fields and along a riparian environment with tamarisk, Russian olive, and cottonwood trees found in abundance.

CULTURAL HISTORY

Professional investigations of the Project area were initiated in the 1940s. Since that time, the cultural history of Utah and of the Project vicinity has been reviewed by a number of authors, including general and more area-specific overviews (Steward 1938; Wormington 1957; Marwitt 1970; Jennings 1978; Aikens and Madsen 1989; Copeland and Fike 1988; Cordell 1997; Madsen and Simms 1998). Studies have included extensive excavations of prehistoric sites and, since the 1970s, cultural resource management surveys.

Prehistory

The first period of significant human occupation within southeastern Utah occurred around approximately 13,000 BP, towards the end of the Pleistocene, when the climate was cooler and moister than at present (Jennings 1989). During this Paleoindian period, the region was characterized by extensive marshlands and shallow lakes, as well as woodlands at lower elevations; these conditions supported the presence of large game mammals such as giant bison, mammoth, camel, and ground sloth (Grayson 1993). Artifacts associated with this period are dominated by lanceolate and fluted lanceolate projectile points, such as Clovis, Folsom, and Lake Mojave (Cordell 1997).

In the Southwest, the subsequent Archaic period is loosely used to define the period of time between the end of the Pleistocene and the widespread adoption of agriculture (Cordell 1997). The Archaic period is characterized by populations infilling the landscape and becoming more reliant on plant foods. The following Archaic occupation began in this region sometime around 6500 BC with the extinction of the megafauna and lasted until the beginning of the first millennium AD. In Utah this occupation is often subdivided into the Early (6500 to 3500 BC), Middle (3500 to 1500 BC), and Late (1500 BC to AD 1) Archaic periods; these last two are characterized by a gradual occupation of wooded upland environments and the abandonment of many lower, lacustrian locations.

Archaic peoples followed a seasonal round of hunting and gathering, utilizing a wide range of plants and smaller animals as well as processed seeds and tubers. Archaeological sites representing Archaic occupations can often be differentiated from later sites by an absence of cultigens, pottery, and small arrow points. Important new technologies during this period included nets, traps, atlatls, and milling stones. Obsidian from sources west of the Project area was used and widely traded. Numerous Archaic sites have been identified in the region; these site locations are often associated with good viewpoints, the availability of raw material suitable for stone tool manufacture, and pinyon groves.

By the first millennium AD, Formative cultures were present in south-central Utah. The Formative period (1500 BC to AD 500) is identified by maize agriculture, ceramics, and greater sedentism, often involving permanent or semi-permanent housing. Formative period sites in the vicinity of the Project area tend to be associated with the Fremont culture to the west on the fringes of the Great Basin and east in the Escalante area; sites associated with the Anasazi culture are present south and southeast.

Most Formative village sites are associated with well-watered areas of good soil at low-to-moderate elevations. None of these are represented within the Project area. However, the agriculturally oriented Fremont culture also used higher altitude areas for hunting and resource collection. The remnants of the Fremont culture are often limited and can be confused with non-Formative uses of the area. Between AD 1200 and 1500 there was a gradual abandonment of the region by Formative groups, possibly due to drought or warfare.

Beginning around AD 1300 throughout the Colorado Plateau, small triangular arrow points (Desert Side-notched and Cottonwood Triangular) became more common, as did a distinctive brown ware pottery ("Intermountain Brown ware" or "Shoshonean Ware"). The appearance of these ceramics and projectile

point types, the abandonment of horticulture, and other aspects of material culture indicate an expansion of Numic-speaking peoples into the region from the Mojave Desert area to the west (Bettinger and Baumhoff 1982; Madsen 1975; Rhode and Madsen 1994). The model is premised on the fact that Numic-speaking groups were present in the area at the time of contact. Furthermore, glotto-chronological evidence suggests that the languages spoken by these groups (primarily Shoshone, Paiute, and Ute) shared a common origin and began to diverge approximately 1000 years ago (Rhode and Madsen 1994).

By 1300, Numic-speaking Shoshonean peoples entered the Project area from the west. These groups followed a lifeway more similar to the Archaic than the immediately preceding Formative groups. They were highly mobile, relied on seasonal hunting and gathering, and lived in temporary structures called wickiups. Numic sites can be identified by Desert Side-notched projectile points and Numic ceramics, and often include hearths and roasting pits. Subsistence options for these groups included plant collecting, small and large game hunting, fishing, and some limited agriculture. The descendants of these groups lived in southern Utah at the time of Western contact and included the Shivwit, Koosharem, Kanosh, Indian Peaks, and Cedar City bands of the Southern Paiute. Protohistoric and historic Southern Paiute sites are not commonly found but have been identified in the vicinity of the Project.

Ethnography

Paiute Indians are a group of native peoples who generally inhabit the Great Basin region of the southwestern United States. Generally, Paiutes are divided into three groups: Northern Paiute, Southern Paiute, and Mono people. The Northern Paiute have historically inhabited regions of California, Oregon, Nevada, and Idaho; the Mono People inhabit regions of California; and Southern Paiute territory includes regions in southern Nevada, northern Arizona, and southern Utah (Poll et al. 1989).

Southern Paiute people speak a Shoshonean language, a dialect in the Numic family of languages, which in turn is a branch of the Uto-Aztecan language family, a broad family of Native American languages found throughout the western United States and Northern Mexico (Simms 2008). The language of the Southern Paiute people is closely related to that of the Northern and Southern Utes, and scholars generally agree that speakers of Numic languages began to spread across the Great Basin from California sometime around AD 1000. (Bettinger and Baumhoff 1982). Fluency in Paiute languages has decreased in recent years and there are currently projects aimed at reviving and preserving the different Paiute dialects (Paiute Indian Tribe of Utah 2018).

Bands of Southern Paiute traditionally lived in locations in the territory of the Project area. Historically, Southern Paiute subsistence was based on hunting, fishing, and gathering wild foods; bands augmented hunting and gathering activities with small gardens. Paiute people used bows and arrows for hunting and were skilled in the art of basketmaking; the cultivation of willow and other raw materials; and the preparation of fiber, cordage, and fabric (Simms 2008). Southern Paiute Tribes depended on seasonally available foods such as agave, cacti, juniper berries, roots and tubers, various seeds, pine nuts, yucca, rabbits, antelope, and deer. Each Paiute group subsisted on various foods depending on the geographical location and cultural traditions of their individual bands. These people lived primarily in independent, small bands of three to ten households and placed primary importance on their camp groups (Holt et al. 2006).

The first recorded European contact with the Southern Paiute occurred during the Domingo-Escalante expedition to find an overland route from New Mexico to Monterey, California. In 1776, a party of Spanish explorers, led by Fray Silvestre Vélez de Escalante and Fray Francisco Dominguez, encountered a band of women gathering seeds near what is modernday Cedar City, Utah (Holt et al. 2006). The Paiute people have been described as peaceful seminomadic foragers who practiced limited horticultural activities and skillfully utilized the available resources of their homelands (Holt et al. 2006). The peaceful Paiute people

were sometimes subjected to raids, taken as captives, and sold as slaves by neighboring Tribes to the Spanish (Poll et al. 1989).

Trappers and slave traders followed the Spanish Trail through Utah, yet the Paiutes managed to stay in control of their territory until the 1850s when settlers from the Church of Jesus Christ of Latter-Day Saints (Mormons/LDS) began to move into the Southern Paiute territory (Holt et al. 2006). Although the Mormons had, in general, a friendly view of the Native Americans, domesticated livestock and crop lands soon took over the grazing lands of the animals that the Natives hunted and drove away game. The Mormons occupied many Paiute water sources, and the streams that had once provided water for gathered foods were now utilized for irrigation; this made it difficult for the Southern Paiute to continue their traditional way of life (Poll et al. 1989).

Despite disagreements as to band affiliation among scholars, it is clear that the Southern Paiute traditionally defined themselves by food names and geographical locations of groups (Steward 1938; Hafen and Hafen 1954). These groups were highly flexible and consisted for the most part of households bound together by kinship, marriage ties, and specialization. During the nineteenth century as populations dwindled, the groups consolidated in order to adapt to their changing environment, and chieftainships came about in many cases as a response to these consolidations (Euler 1966). The Southern Paiute resisted the government's efforts to relocate them to the Ute reservations. The Kaibab Band of Paiute Indians was formed after the Indian Reorganization Act of 1934, and in 1950 an organized Tribal government was formed (Arizona State University 2018). Paiute populations were heavily affected by European diseases and food shortages after an influx of European settlers in the 1860s, and by 1869 Paiutes were faced with the option of moving out of their traditional homelands and relocating into marginal desert areas or living on the fringes of Mormon settlements.

Present-day Paiute communities are located in Pahrump, Moapa, and Las Vegas, Nevada; in Willow Springs, Arizona; and in the towns of Cedar City, Koosharem, Kanosh, Indian Peaks, Shivits, and Kaibab, Utah. The Kaibab Paiute reservation is not far from the Project area; it is located by the Utah–Arizona border near Kanab, Utah and approximately 50 miles north of the Grand Canyon. This reservation consists of five tribal villages and approximately 200 tribal members, most of whom live on the reservation near Kanab Creek, which is considered a sacred site. Present-day Southern Paiute are known for skillful basket weaving in the tradition of their ancestors (Grand Canyon Trust 2018).

History

The first Europeans in Utah were Spanish explorers, missionaries, and traders. The route they followed looped up from the pueblos of the Four Corners region, ran north of the Project area, and then south-southwest to the west of the Project area. An alternative route ran south of the Project area across the Arizona Strip. This Old Spanish Trail likely followed routes previously used by Native Americans. It was later used by fur trappers, traders, and soldiers. Goods from Santa Fe, New Mexico, including Native American slaves, were transported along this route to Los Angeles, California. A variety of other goods, including horses and mules, were traded back. The Spanish also traded with the Utes along this route for Southern Paiutes captured as slaves. The route was used as early as 1829, but the first wagons on the trail were likely those of the Mormon Battalion traveling from San Diego, California to Salt Lake City, Utah in 1849 (Hafen and Hafen 1954).

In 1862, Mormon ranchers first came to Long Valley, the land east of Zion National Park, to graze cattle along the East Fork of the Virgin River. Robert and Isabella Berry named this location Berryville but were later killed by Native Americans in 1866 and the region was abandoned. In 1871, Mormons from the Muddy River settlement in Nevada resettled the area, naming the town Glendale. By the 1880s, the Mormon population in the area had grown and the nearby towns of Orderville and Mount Carmel Junction had been

established. Glendale became part of the United Order, a program of economic and moral reform that began in 1874; together, the towns of Mt. Carmel, Orderville, and Glendale have become known as Long Valley (Bradley 1999). Homestead entries within the Project area were patented in 1892, 1897, 1900, 1902, and 1937 (BLM 2018). In 1900, the Denver and Rio Grande Western Railroad opened a branch from its main line, south to Marysvale, well to the north in the Sevier River Valley; no rail line ever reached farther south, and so residents of Long Valley had to travel north to the railhead at Marysvale (Athearn 1962).

The southern part of the current US-89 route, running north from Kanab, mostly followed a succession of linear valleys. The original 19th-century road was poorly constructed, with steep grades and a rough surface. The Utah State Road Commission designated the highway from Nephi south to Kanab as a state road around 1910. However, this route initially went through Alton and Johnson Canyon to the east, bypassing the Project area. The more direct route via Long Valley and Glendale required difficult construction over a sandy mesa near Kanab. This sand-clay road was constructed in 1916; in the early-1920s, the State Road Commission designated it State Route 11. By 1926, it was designated part of US-89, although at the time US-89 only went as far north as Spanish Fork. The portion of US-89 that runs through the Project area has been realigned, paved, and widened numerous times since then (Knowlton 1965; Bradley 1999).

Settlers first arrived into the area surrounding Bryce Canyon in 1864. Exploration in 1852 by Mormon pathfinders had resulted in the determination that Panguitch Valley and the Sevier Valley to the south was a suitable area for 50 to 100 families to settle (Chidester and Bruhn 1949). The construction of the 10-mile-long Tropic Canal, which runs from the East Fork of the Sevier River across the Paunsaugnut Plateau to the Paria Valley, began in 1889. Within the next two years, anticipating the benefits of this irrigation system, several families moved into the area. In 1892, the canal was completed and the following year, the Tropic and East Fork Irrigation Company was established to administer this and another canal.

The publicizing of Bryce Canyon and its inclusion in the National Parks System contributed to the success of the region, bringing better roads and a steady stream of tourists and allowing locals to invest in the creation of hotels and restaurants. Bryce Canyon National Park was named after one of its first settlers, Ebenezer Bryce, a Scottish emigrant. Tourism increased when the Union Pacific Railroad built a rail line to Cedar City. Here, tourists could secure a bus tour starting in Cedar Breaks and continue on to Bryce Canyon, Zion National Park, and the north rim of the Grand Canyon (Caywood and Grant 1994; Chidester and Bruhn 1949; Newell and Talbot 1998).

The area that is now Zion National Park was originally inhabited by Southern Paiute Indians and subsequently explored and settled by Mormon pioneers expanding out of Cedar City to the settlement of Springdale. The name “Zion” is credited to an early settler named Isaac Behunin; it is a Biblical name that symbolizes a place of utopia (Zion Nation Park 2017). Increased access to Southern Utah created new tourism enterprises, and by the start of the 20th century Utahans were beginning to recognize the need to preserve the unique landscapes of their state while profiting from the scenic magnificence of Utah’s geological wonders. Twelve national parks and monuments were created in Utah by 1970, and all but three of these are in Southern Utah (Poll et al. 1989). Under the national Antiquities Act of 1906, a national monument was created at Zion Canyon by President Howard Taft in 1909; originally named “Mukuntuweap National Monument” (Paiute for “straight canyon), it was changed to “Zion National Monument” in 1918 and then “Zion National Park” in 1910 (Zion National Park 2017).

Cedar Breaks National Monument was created in 1933 by President Franklin D. Roosevelt; it is a natural amphitheater of eroded sedimentary rock from the Claron Formation sitting at over 10,000 feet in elevation (NPS 2018). Coral Pink Sand Dunes State Park was created in 1963. This popular recreational area encompasses nearly 3370 acres and was formed by the Venturi effect on the area’s Navajo sandstone, resulting in the unusually colored dunes found in the park (Zion National Park 2018). In addition to the

majestic geology of these parks, they are home to distinctive plants and wildlife, such as the bristlecone pine in Cedar Breaks National Monument and the Coral Pink Sand Dunes tiger beetle (NPS 2018).

Tourism to the national parks and monuments in the region continues to be an important economic factor in the Project area, as the unique and beautiful scenery of the region continues to attract tourists from all over the world and filmmakers for the western setting.

CLASS I AND ARCHIVAL RESEARCH

Prior to the commencement of fieldwork, records on file with the Utah Division of State History were checked to determine whether previously identified cultural resources were present or if any previously reported archaeological investigations had been conducted within 0.5 mile of the proposed Project area. It was determined that 38 previous cultural resource surveys, 7 previously identified historic structures, and 34 previously recorded cultural resource sites are located within 0.5 mile of the Project area (UDSH 2018b).

Cultural Resource Definitions

Identified cultural resources and potential sites were defined according to criteria established by the BLM Manual 8110 "Cultural Resources Manual" (BLM 2004; UDSH 2018a). An archaeological site (prehistoric or historic) contains the physical remains of past human activity that is at least 50 years old and consists of at least one of the following:

- At least 10 artifacts of a single class within a 10-meter-diameter area, except when all artifacts are from a single source (e.g., single pot or bottle)
- At least 15 artifacts of at least 2 classes within a 10-meter area
- One or more archaeological features in temporal association with any number of artifacts
- Two or more temporally associated archaeological features without artifacts

Artifact or feature occurrences that do not meet any of these criteria are considered isolated occurrences (IOs). IOs are recorded and described, but they do not qualify as sites and are often Not Eligible for inclusion on the NRHP. However, the NRHP does have an "object" property type where IOs can be categorized when recommended Eligible. Roadside memorials are commonly found while surveying within road rights-of-way (ROWs). Roadside memorials generally indicate the location of a roadside fatality and the markers or shrines tend to be maintained by relatives. Although roadside memorials are not NRHP-Eligible, they are significant to members of the local communities and cultures and are recorded to ensure their avoidance during Project implementation.

Previously Conducted Cultural Resource Surveys

Background research identified 38 previously conducted cultural resource surveys within 0.5 mile of the Project area (**Table 1**). Of these, seven previous cultural surveys cross into or overlap some portion of the Project area, two of which were conducted within the past ten years (blue highlighted blue text in **Table 1**). These surveys mapped within or adjacent to the Project area are shown in **Appendix B**. These recent surveys consist of watershed and waste water surveys. No portion of the Project area was left unsurveyed due to prior survey efforts.

TABLE 1
PREVIOUS CULTURAL SURVEYS WITHIN 0.5 MILE OF THE PROJECT AREA

Survey No.	Survey Name	Organization	Date	Within APE*
U75AF0049	Long Valley Improvement Project	Archaeological Environmental Research Corporation (AERC)	1975	In
U77AF0068	Cultural Resource Evaluation in South Central Utah	AERC	1977	Out
U78AF0322	Long Valley/Mount Carmel Junction Locality	AERC	1978	Out
U79BL0092	K. S. Anderson Agricultural Trespass	BLM	1979	In

TABLE 1 PREVIOUS CULTURAL SURVEYS WITHIN 0.5 MILE OF THE PROJECT AREA				
Survey No.	**Survey Name**	**Organization**	**Date**	**Within APE***
U79BL0093	L. D. Anderson Agricultural Trespass	BLM	1979	Out
U80BL0116	Mount Bell ROW	BLM	1980	Out
U80BL0181	Garkane Power Line Upgrade	BLM	1980	Out
U81BL0226	Orderville ROW Water Well	BLM	1981	Out
U82BL0166	Black Rock Chaining	BLM	1982	Out
U82BL0172	Glendale Town Sale	BLM	1982	Out
U83NH0165	Alton—Kolob Class II	Nickens and Associates	1983	Out
U84BL0697	Black Knoll Rip Rap Pit	BLM	1984	In
U85BL0906	Keith Walber Land Sale	BLM	1985	Out
U85BL0910	Glendale Baseball Park R&PP	BLM	1985	Out
U86NI0487	Alton Coal Project Survey	Museum of Northern Arizona	1986	Out
U88BL0539	Glendale Dump Sale	BLM	1988	Out
U89BL0240	Glendale Dump Access ROW	BLM	1988	Out
U91BL0018	East Fork Access Road ROW	BLM	1991	Out
U92IG0094	South Central Utah Telephone, Arizona to Mount Carmel Junction	Intersearch	1992	Out
U92UJ0622	SCS Muddy Creek-Orderville Chaining	Utah State University	1992	In
U94IG0133	South Central Utah Telephone, Mount Carmel Junction to Zion National Park	Intersearch	1994	Out
U98ST0307	Muddy Wash Bridge Replacement (Utah Department of Transportation)	SWCA	1998	Out
U01MQ0510	Garkane Power's Mt. Carmel to Zion	Montgomery Archaeological Consultants	2001	Out
U03BL0632	Xpressweb Services Orderville	BLM	2003	Out
U03BL0894	Glendale Landfill Expansion	BLM	2003	Out
U04BL0680	Glendale Bench Watershed Project	BLM	2004	Out
U06HO0544	Glendale Waterline Project	Bighorn Archaeological Consultants	2006	Out
U06HO1371	Orderville Water System Improvements	Bighorn Archaeological Consultants	2006	In
U07BL0560	Bald Knoll Community Pit	BLM	2007	In
U07HO1381	Cultural Resources Inventory of the Orderville Water System Improvements Alternative near Mount Carmel Junction	Bighorn Archaeological Consultants	2007	Out
U11SH0605	Cultural Resources Inventory of a Proposed Range	NRCS	2011	Out

TABLE 1 PREVIOUS CULTURAL SURVEYS WITHIN 0.5 MILE OF THE PROJECT AREA				
Survey No.	**Survey Name**	**Organization**	**Date**	**Within APE***
	Improvement Project West of Glendale Kane County Utah			
U11UM0953	The East Fork and Yellow Jacket Canyon Re-seeding Project, Kane County, Utah	SITLA	2011	Out
U12SH0189	Cultural Resources Inventory of Kane County Emergency Watershed Protection (EWP)	NRCS	2012	In
U13IG0529	Caruso-SITLA Emerald Green Mine Survey in Kane County	Intersearch	2013	Out
U13SH0294	A Supplemental Cultural Resources Inventory of EWP Locations Along the East Fork of the Virgin River, Kane County, Utah	NRCS	2013	Out
U14HO0043	A Cultural Resource Inventory for the Long Valley Sewer Improvement District Waste Water System Upgrade Project, Kane County, Utah	Bighorn Archaeological Consultants	2014	In
U16SH0722	Cultural Resources Inventory in Support of an EWP Project Along Johnson Canyon, Kane County, Utah	NRCS	2016	Out
U17SH0395	Cultural Resources Inventory for FY2016 NRCS Riparian Restoration Project No. 748D431608E, Kane County, Utah	NRCS	2017	Out
***Note:** "In" indicates the survey is overlapped or crossed by some portion of the current Project APE (also in blue text); "Out" indicates the survey is not overlapped by any portion of the current Project; blue highlighting represents "In" surveys conducted within the past 10 years.				

Previously Recorded Cultural Resource Sites

Background research identified 41 previously recorded cultural resources within 0.5 mile of the Project area (**Table 2**). Of these, four sites (indicated by blue text in **Table 2**) were mapped within or adjacent to the Project APE. These cultural resources consist of four prehistoric lithic scatters in the vicinity of the Bald Knolls Community Pit and Black Knoll Rip-Rap Pit.

TABLE 2 PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN 0.5 MILE OF THE PROJECT AREA			
Site No.	**Description**	**Eligibility**	**In/Out***
42KA0625	Prehistoric campsite	Unevaluated	Out
42KA1156	Prehistoric open habitation (possibly destroyed)	Determined unevaluated	Out
42KA1158	Prehistoric campsite	Unevaluated	Out

TABLE 2 PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN 0.5 MILE OF THE PROJECT AREA			
Site No.	**Description**	**Eligibility**	**In/Out***
42KA1159	Prehistoric campsite	Unevaluated	Out
42KA1160	Prehistoric campsite	Unevaluated	Out
42KA1161	Prehistoric campsite (possibly destroyed)	Unevaluated	Out
42KA1162	Prehistoric campsite	Unevaluated	Out
42KA1163	Prehistoric campsite	Unevaluated	Out
42KA1836	Historic coal mine (Mackelprang Coal Mine)	Determined Not Eligible	Out
42KA1956	Multi-component: prehistoric open camp; historic isolate	Recommended Eligible	Out
42KA1960	Prehistoric campsite	Unevaluated	Out
42KA1986	Prehistoric open habitation	Unevaluated	Out
42KA2121	Prehistoric campsite	Rcommended Not Eligible	Out
42KA2416	Prehistoric open habitation	Recommended Eligible	Out
42KA2676	Prehistoric artifact scatter	Determined Not Eligible	Out
42KA2677	Prehistoric lithic scatter	Recommended Not Eligible	In
42KA2678	Prehistoric lithic scatter	Recommended Not Eligible	In
42KA2417	Prehistoric campsite	Recommended Eligible	Out
42KA2712	Prehistoric lithic scatter	Recommended Eligible	Out
42KA2713	Prehistoric artifact scatter	Recommended Eligible	Out
42KA3279	Prehistoric room block	Recommended Eligible	Out
42KA3280	Prehistoric campsite	Unevaluated	Out
42KA3281	Prehistoric ground stone scatter	Recommended Not Eligible	Out
42KA3899	Prehistoric ground stone and fire-cracked rock (FCR) scatter	Recommended Eligible	Out
42KA3920	Prehistoric artifact scatter	Recommended Eligible	Out
42KA3921	Prehistoric village with artifact scatter	Recommended Eligible	Out
42KA3922	Prehistoric open habitation with artifact scatter	Recommended Eligible	Out
42KA3929	Prehistoric artifact scatter	Recommended Eligible	Out
42KA3930	Prehistoric open habitation with artifact scatter	Recommended Eligible	Out
42KA3931	Prehistoric ceramic scatter	Recommended Not Eligible	Out
42KA3932	Prehistoric lithic scatter	Recommended Not Eligible	Out
42KA5680	Prehistoric lithic scatter	Recommended Eligible	Out
42KA6178	Historic ditch	Determined Eligible	Out
42KA6243	Prehistoric campsite with artifact scatter	Determined Eligible	Out
42KA6244	Prehistoric campsite with artifact scatter	Determined Eligible	Out
42KA6245	Historic flood control ditch	Determined Eligible	Out

TABLE 2 PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN 0.5 MILE OF THE PROJECT AREA			
Site No.	**Description**	**Eligibility**	**In/Out***
42KA6331	Prehistoric lithic scatter	Recommended Eligible	In
42KA6332	Prehistoric lithic scatter	Recommended Eligible	In
42KA6460	Prehistoric artifact scatter	Determined Eligiible	Out
42KA7261	Prehistoric campsite	Recommended Eligible	Out
42KA7725	Historic check dams	Recommended Eligible	Out
***Note:** "In" indicates the site is located within the project APE (also in blue text); "Out" indicates the site is located outside the project APE			

Previously Recorded Historic Structures

Background research identified 7 historic structures within 0.5 mile of the Project area, none of which are located within or crossed by any portion of the Project APE. These historic structures are described below (**Table 3)**.

TABLE 3 PREVIOUSLY IDENTIFIED HISTORIC STRUCTURES WITHIN 0.5 MILE OF THE PROJECT AREA*						
Property ID	**Property Name**	**Date Constructed**	**Construction Type**	**Original Use**	**Eligibility**	**NRHP Status**
31067	Orderville LDS Chapel	Unknown	Church/ meetinghouse	Religious facility	Undetermined	Not Listed
32819	Orderville Rock School	1890		School	Eligible/ Contributing	Not Listed
33219	Virgin River Bridge (OD 689)	1932	Bridge	Road transportation related	Eligible/ Contributing	Not Listed
33220	Orderville Co-Op Buildings	1878	Mining—other (misc.)	Industrial (general)	Demolished	Not Listed
50442	Valley School	1935	Horizontal school	School	Eligible/ Significant	Listed
50442	Valley School	1936	Horizontal school	School	Eligible/ Significant	Listed
59437	N/A	1920	Central block with project bays	Single dwelling	Undetermined	Not Listed
***Note:** Data derived from the Utah Division of State History's Preservation Pro online database.						

General Land Office Maps

Historic General Land Office (GLO) maps and plats were also reviewed for the Project area and accessed through the BLM website on September 28, 2018. Original cadastral surveys for Township 40 South, Range 5 West (1877, 1914, and 1961); Township 40 South, Range 6 West (1877, 1936, and 1961); Township 40 South, Range 7 West (1877, 1896, 1937, 1944, 1961, and 1965); and Township 41 South, Range 7 West (1877, 1926, 1945, and 1965) were perused (BLM 2018). These surveys indicate few historic improvements near the Project area (**Table 4**), including historic roads, trails, ditches, telephone lines, homesteads, and coal mines.

The historic US-89 highway is located adjacent to the Project area, is greater than 50 years old, and has an alignment visible on the historic GLO maps. This historic road has been repaved, recontoured, and relocated since its original designation and, therefore, was not recorded as part of this Project.

TABLE 4
HISTORIC GENERAL LAND OFFICE MAPS

Date	Township	Range	Historic Features
1877	40 South	5 West	Road (*To Johnsonville and Kanab*)
1877	40 South	6 West	Road (*From Long Valley to Skum Pak*), trail
1896	40 South	7 West	Road (*Old Wood Road*)
1877	40 South	7 West	Townsite (*Glendale*), structures (*School House, Jannet Knight, Wm Johnson, Thds Smith*), roads (*Mill Race, County Road*), ditch
1937	40 South	7 West	Road (*State highway To Glendale*), ditch
1944	40 South	7 West	Road (*U. S. Highway No. 89 - To Orderville - To Glendale*), mines (*Foot Coal Mine, Coal Mine*), cultivated fields, fences, ditch, transmisiosn lines
1965	40 South	7 West	Highway ROW (*West R/W Line U.S. Highway 89*)
1877	41 South	7 West	Roads (*County Road*, unnamed), mines (*Coal, Coal, Coal*), townsite (*Mt. Carmel*), structures (*G.A. Hicks,* unnamed), ditch
1926	41 South	7 West	Townsite (*Mt. Carmel*), roads (*To Clear Cr. & Zion Canon, Mt. Carmel, Kanab, State Road Mt. Carmel to Kanab*), fence
1965	41 South	7 West	Roads (US-89), Structures (*Water Tank, Pump House,* unnamed), power line, canal, townsite (*Mt. Carmel*)

Paleontology

A paleontological review of the Project area was conducted by the Utah Geological Survey (UGS) on October 3, 2018. UGS determined that there are no paleontological localities recorded for the Project area and that Quaternary and recent alluvial deposits that are exposed in the borrow pit sites and over parts of the hydroplant and reservoir Project areas have a low potential for yielding significant fossil localities (PFYC 5).

In the Cove Reservoir, Orderville hydroplant, and Glendale hydroplant portions of the Project area there are also exposures of the Cretaceous Tropic Shale, Dakota and Straight Cliffs Formations that have a moderate to high potential for yielding significant fossil localities (PFYC 3 to 4). The UGS recommends awareness of potential impacts to paleontological resources if these Cretaceous deposits are disturbed. Otherwise, unless fossils are discovered as a result of construction activities, this Project should have no impact on paleontological resources. See **Appendix A** for the paleontological consultation letter and details.

SURVEY METHODS

The APE for the Project totals approximately 791.68 acres. Construction equipment will vary depending on what Project feature is being developed and will most likely consist of bulldozers, compactors, graders, loaders, track hoes, trailers, dump trucks, semi-trucks, concrete mixers, water trucks, pickup trucks, flatbed trailers, and other large construction equipment. Construction of the dam will require large earth-moving machinery, a portable gravel pit operation, and multiple personnel. Continued excavation and import of material to build the dam incrementally to its full height will require large machinery that will make continual trips between the reservoir and borrow sites as the dam is constructed.

The survey was conducted in 15-meter-wide transects throughout the Project area (**Figure 3**) for a total of approximately 791.68 acres surveyed. The survey was conducted in block surveys for the proposed reservoir, Glendale hydroplant, and five borrow pit locations (County Pit, Bald Knolls Community Pit, Bald Knolls Community Pit Expansion, Black Knoll Rip-Rap Pit, and Tait Pit); the survey was conducted in 15-meter-wide linear surveys for the proposed new pipeline and power line locations and the proposed road maintenance locations; and the survey was conducted in cursory "spot survey" for the remaining borrow pit (Lambs Pit). This resulted in approximately 791.68 acres surveyed.

No portion of the Project area was left unsurveyed due to prior survey efforts or difficult terrain; however, portions of the Project area in developed areas of Glendale along the proposed new pipeline were excluded from survey due to prior urban and/or agricultural disturbance (**Figure 4**). Additionally, sections of the proposed Cove Reservoir were excluded due to steep slopes (greater than 30 percent; **Figure 5**). However, these unsurveyed portions were spot checked for visible cultural resources.

IO locations were documented during the survey. New cultural resource sites identified during the survey were noted and then recorded after the survey was conducted for a more thorough review as necessary. These IOs and sites are discussed in the following *Survey Results* section. The Utah BLM's Digital Data Standards—May 2012 (BLM 2012) were adhered to at all times.



Figure 3. Project overview looking across proposed dam site from the southwest end of dam. View to the northeast.



Figure 4. Project overview showing area excluded from new survey. View to the south.



Figure 5. Overview of proposed Cove Reservoir with area excluded due to steep slopes. View to the southwest

SURVEY RESULTS

As a result of the survey, a total of 1 previously recorded site, 9 new sites, and 15 IOs were identified and recorded. Of the 41 previously recorded sites mapped within 0.5 mile of the Project area, 4 sites were determined to be either adjacent to or crossed by the Project APE and were searched for during field efforts. Additionally, modern bottles and cans, wire, plastic, fragments of milled lumber, and fences of undetermined age within the Project area were not recorded.

Survey conditions varied during the survey; several days had overcast skies, rain, and poor access road conditions due to muddy, clay soils that complicated the Class III survey. There were also a few days of sunny skies and comfortable fall temperatures. For most of the survey, ground visibility was excellent (averaging between 60–80 percent). No portion of the Project area was left unsurveyed due to severe terrain or other hazardous conditions.

Archaeological Sites

A total of 41 previously recorded sites have been mapped within 0.5 mile of the Project area. Of these sites, only four were determined to be either adjacent to or crossed by the Project APE: 42KA2677, 42KA2678, 42KA6331, and 42KA6332 (**Table 5**). Two of these sites (42KA2677 and 42KA2678) were last revisited in 2018 and were not relocated, and no attmpt was made to relocate these sites in 2019 and they are not further discussed in this report; the remaining two sites were searched for during field investigations (42KA6331, and 42KA6332) with one site being relocated in 2019 (42KA6331) and the other not relocated (42KA6332) and not further discussed in this report. The remaining 39 previously identified sites that were determined to be located outside the Project APE are not discussed further in this report.

As a result of the survey, a total of one previous site and nine new sites were identified and recorded within the Project APE (**Table 5**). Each of these new sites are discussed below, mapped in **Appendix C**, and further discussed in their respective Utah Archaeological Site Forms in **Appendix D**.

TABLE 5
CULTURAL RESOURCES IDENTIFIED WITHIN THE PROJECT APE

Site No.	Temp No.	Description	Eligibility Recommendation
42KA6331	FS-01	Prehistoric lithic scatter	Eligible – D
42KA8900	B-FS-01	Historic artifact scatter	Not Eligible
42KA8901	B-FS-02	Multicomponent: prehistoric lithic scatter; historic artifact scatters	Not Eligible
42KA8902	B-FS-03	Historic artifact scatter	Not Eligible
42KA8903	B-FS-04	Historic artifact scatter	Not Eligible
42KA8904	B-FS-05	Prehistoric artifact scatter	Eligible – D
42KA8972	FS-03	Prehistoric lithic scatter	Not Eligible
42KA8973	FS-02	Prehistoric artifact scatter	Not Eligible
42KA8974	FS-04	Prehistoric artifact scatter	Eligible – D

Previous Cultural Resource Sites

During the Class III survey, one previously reocrded cultural resource site was relocated and recorded within the project APE: 42KA6331. This site is described here and in **Appendix D**.

42KA6331

Site **42KA6331** is a previously recorded prehistoric lithic scatter on BLM-managed lands. The site was originally recorded in 2007 by the BLM GSENM and was determined Eligible for listing on the NRHP under Criterion D for information potential due to the unusual depositional context of the site's location; the site was evaluated under a Programmatic Agreement (Storm 2007). [REDACTED]

Based on the 2019 recording, Transcon concurs with the previous site evaluation and recommends that site 42KA6331 is Eligible for listing on the NRHP under Criterion D for information potential. Site 42KA6331 is located inside of the Project APE on BLM-managed lands; however, the project design team will ensure the proposed project disturbance will not impact the area around the site. Therefore, Transcon recommends the proposed Project will result in *No Adverse Effect to Historic Properties*. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

New Cultural Resource Sites

During the Class III survey, nine new cultural resource sites were identified and recorded: 42KA8785 (NFS-01), 42KA8900 (B-FS-01), 42KA8901 (B-FS-02), 42KA8902 (B-FS-03), 42KA8903 (B-FS-04), 42KA8904 (B-FS-05), 42KA8972 (FS-02), 42KA8973 (FS-03), and 42KA8974 (FS-04). These new sites are described below and in **Appendix D**.

42KA8785

Site 42KA8785 (temporary site NFS-01) is a newly recorded expansive surface scatter of prehistoric artifacts. [REDACTED]

This site was recorded for the first time by Transcon archaeologists in 2019. [REDACTED]

Based on the 2019 recording, Transcon recommends site 42KA8785 is Eligible for listing on the NRHP under Criterion D for information potential. Site 42KA8785 is located inside the Project APE on privately-owned lands; however, the project design team will ensure the proposed project disturbance will avoid the site by at least 15 meters, utilizing the southern portion of the existing pit. Therefore, Transcon recommends the proposed Project will result in *No Adverse Effect to Historic Properties*. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

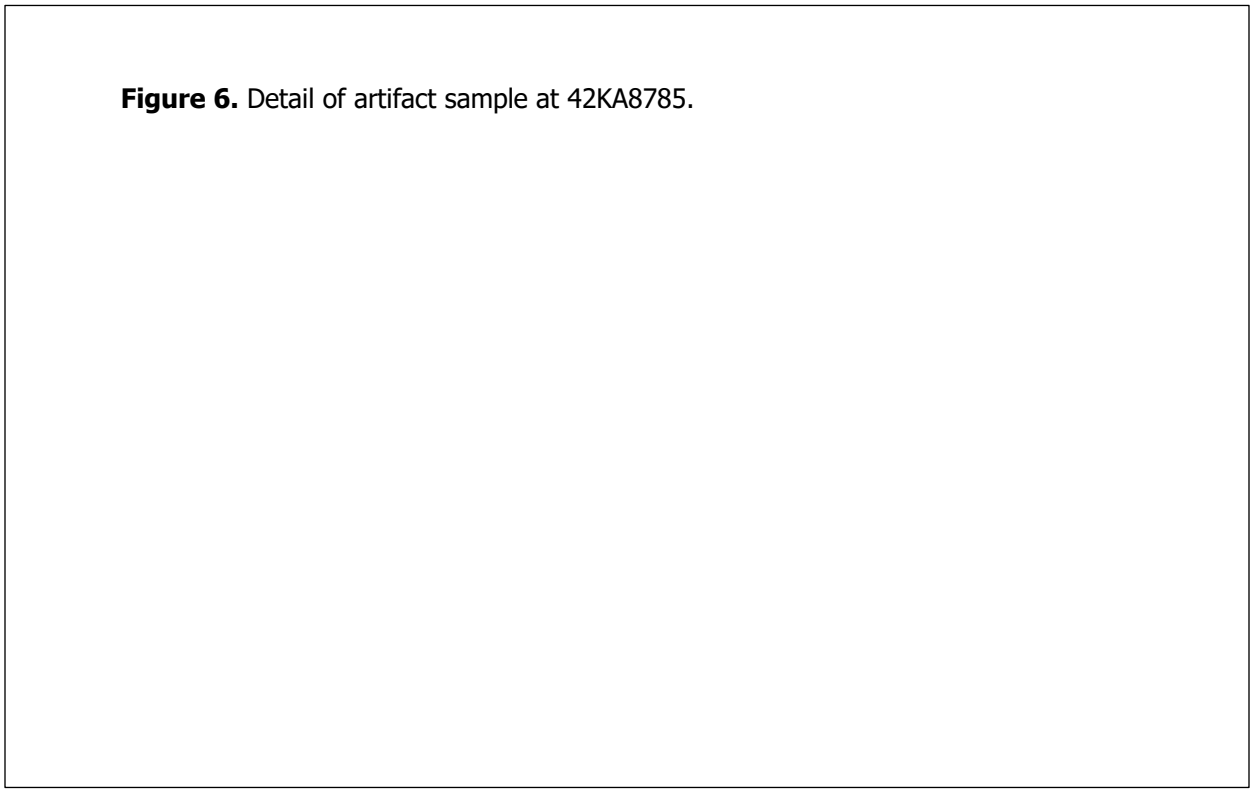


Figure 6. Detail of artifact sample at 42KA8785.

42KA8900

Site 42KA8900 (temporary number B-FS-01) is a relatively small, previously unrecorded historic artifact scatter. This site was identified and recorded for the first time by Transcon archaeologists in 2018. [REDACTED]

Based on the 2018 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. As such, Transcon recommends that the proposed project would result in no historic properties affected.

42KA8901

Site 42KA8901 (temporary number B-FS-02) is a previously unrecorded multicomponent site located on privately-owned lands. This site was identified and recorded for the first time by Transcon archaeologists in 2018. [REDACTED]

Based on the 2018 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. Transcon recommends the proposed project will result in no effect to historic properties.

Figure 7. Overview north of 42KA8901 showing artifacts actively being buried by the gravel pit.

42KA8902

Site 42KA8902 (temporary number B-FS-03) is a previously unrecorded historic artifact scatter. This site was identified and recorded for the first time by Transcon archaeologists in 2018. [REDACTED]

Based on the 2018 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. Transcon recommends the proposed project will result in no effect to historic properties.

42KA8903

Site 42KA8903 (temporary number B-FS-04) is a previously unrecorded, large historic artifact scatter. This site was identified and recorded for the first time by Transcon archaeologists in 2018. [REDACTED]

Based on the 2018 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. Transcon recommends the proposed project will result in no effect to historic properties.

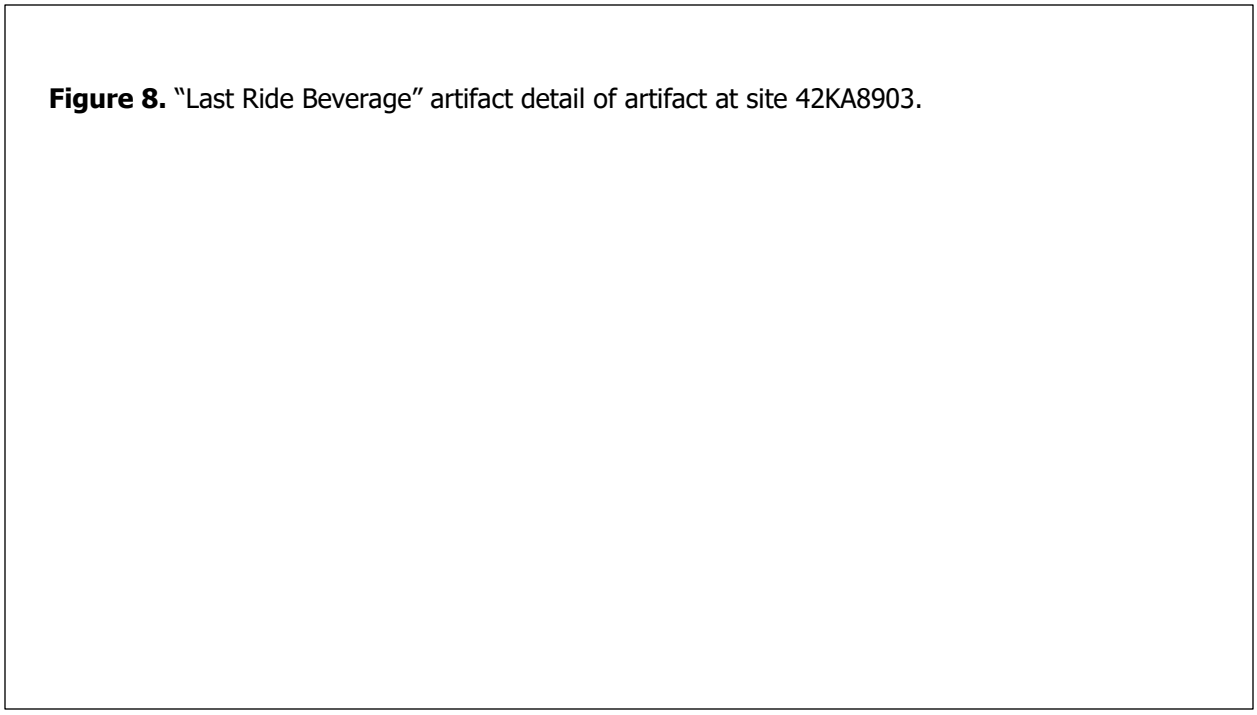


Figure 8. "Last Ride Beverage" artifact detail of artifact at site 42KA8903.

42KA8904

Site 42KA8904 (temporary number B-FS-05) is a previously unrecorded large prehistoric artifact scatter located on privately-owned lands (**Figure 9**). This site was identified and recorded for the first time by Transcon archaeologists in 2018. [REDACTED]

Based on the 2018 recording, Transcon recommends this site as Eligible for listing on the NRHP under Criterion D as there is a high potential for cultural depth at this site, due to the aeolian nature of the soil deposition; therefore, this site could possibly yield important information pertaining to the history or prehistory of the region. Site 42KA8904 is located outside of the Project APE on privately owned property that will not be purchased by KCWCD for the Project and thus will not be disturbed by construction of the reservoir or access roads. Therefore, Transcon recommends the proposed Project will result in *No Adverse Effect to Historic Properties*. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

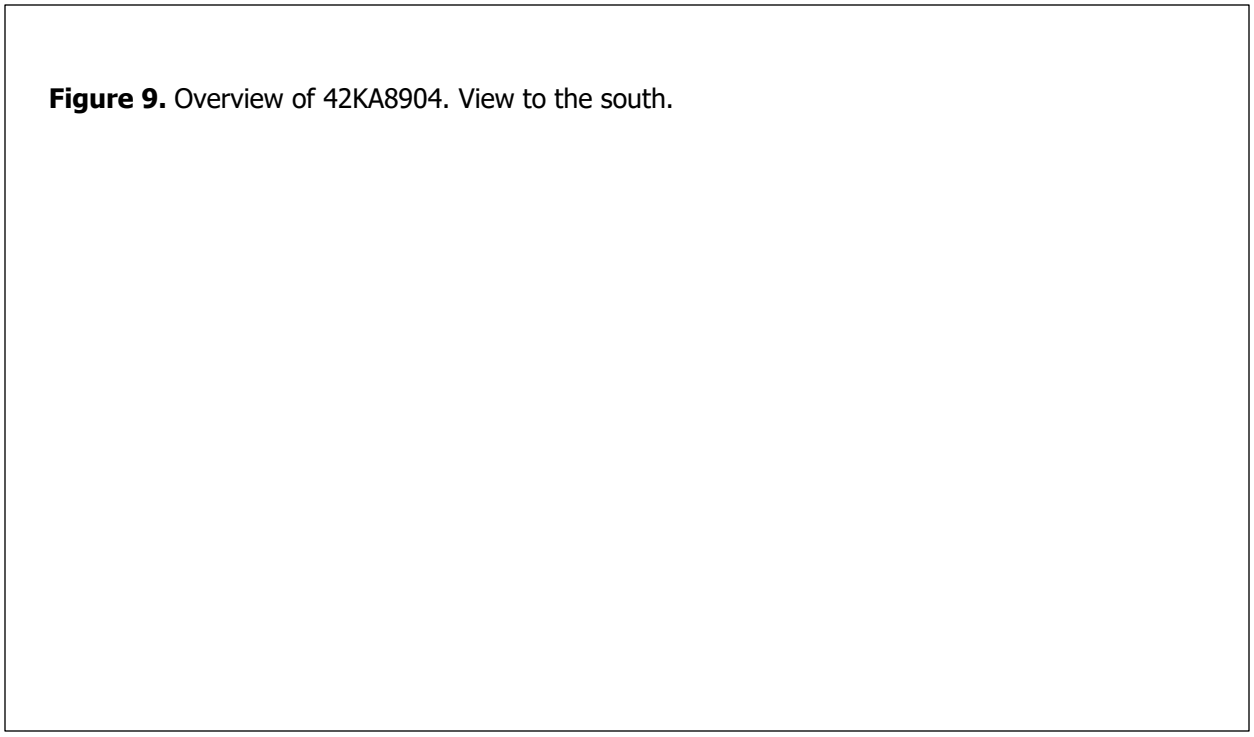


Figure 9. Overview of 42KA8904. View to the south.

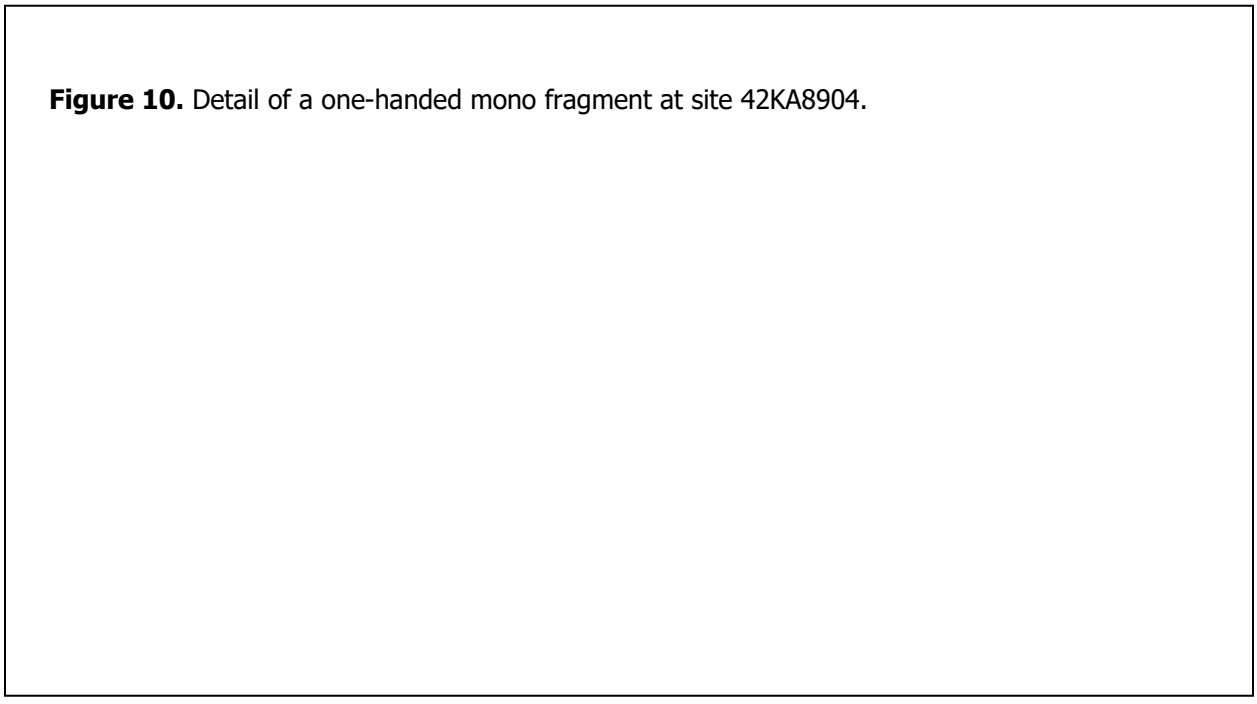


Figure 10. Detail of a one-handed mono fragment at site 42KA8904.

42KA8972

Site 42KA8972 (temporary number FS-03) is a newly recorded, small prehistoric artifact scatter located on BLM-managed lands. This site was identified and recorded for the first time by Transcon archaeologists in 2019. [REDACTED]

Based on the 2019 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. Transcon recommends the proposed project will result in no effect to historic properties.

42KA8973

Site 42KA8973 (temporary number FS-02) is a newly recorded, small prehistoric artifact scatter located on BLM-managed lands. This site was identified and recorded for the first time by Transcon archaeologists in 2019. [REDACTED]

Based on the 2019 recording, Transcon recommends this site as Not Eligible for listing on the NRHP under any Criteria. Transcon recommends the proposed project will result in no effect to historic properties.

42KA8974

Site 42KA8974 (temporary site FS-04) is a newly recorded extensive prehistoric artifact scatter located on privately-owned lands. [REDACTED]

This site was recorded for the first time by Transcon archaeologists in 2019. [REDACTED]

Based on the 2019 recording, Transcon recommends this site as Eligible for listing on the NRHP under Criterion D for information potential. Site 42KA8974 is located inside of the Project APE on privately-owned lands; however, the project design team will ensure the proposed project disturbance will avoid the site by at least 15 meters, utilizing the southern portion of the existing pit. Therefore, Transcon recommends the proposed Project will result in *No Adverse Effect to Historic Properties*. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

Figure 11. Overview of 42KA8974. View to the northeast overlooking Tait Pit.

Isolated Occurrences

During the Class III survey, a total of 15 IOs were identified and recorded (**Table 6**). Transcon recommends all 15 of these IOs are Not Eligible for listing on the NRHP under any Criteria. It should be noted that IO-05, five obsidian shatter pieces, was possibly previously illegally collected and dumped at its present locations, and may not be prehistoric occupation of the area. This IO was identified on the ground surface and very near site 42KA8903, which also contained evidence of modern dumping activities.

TABLE 6
NEWLY IDENTIFIED ISOLATED OCCURRENCES WITHIN THE PROJECT APE*

IO No.	Temporal Affiliation	Description	UTM - E	UTM - N
IO-01	Historic	Two historic coal/wood-burning stoves		
IO-02	Prehistoric	Two prehistoric whiteware ceramic sherds		
IO-03	Historic	One historic Chevy vehicle trunk lid (1966 Florida license plate)		
IO-04	Prehistoric	One prehistoric white ware sherd		
IO-05	Prehistoric	Five prehistoric obsidian shatter pieces (three snowflake obsidian, one mahogany, and one black)		
IO-06	Prehistoric	One white chert tertiary flake		
IO-07	Prehistoric	Three white chert tertiary flakes and one brown quartzite flake		
IO-08	Prehistoric	Prehistoric ceramic fragment; grayware with wite slip		
IO-09	Prehistoric	Prehistoric ceramic fragment; grayware with wite slip		

TABLE 6 NEWLY IDENTIFIED ISOLATED OCCURRENCES WITHIN THE PROJECT APE*				
IO No.	**Temporal Affiliation**	**Description**	**UTM - E**	**UTM - N**
IO-10	Prehistoric	Prehistoric ceramic fragment; grayware with wite slip		
IO-11	Historic	Historic farming equipment (plow)		
IO-12	Prehistoric	Prehistoric ceramic fragment; grayware		
IO-13	Prehistoric	Prehistoric ceramic fragment; grayware with wite slip		
IO-14	Prehistoric	One prehistoric chert core, one brown chert ertiary flake, one gray quartzite flake, one hammerstone (10cm long by 7.7cm wide by 4.8cm thick), one piece of FCR, and four grayware ceramic fragments (one with wite slip)		
IO-15	Prehistoric	Four chert tertiary flakes (gray and brown) and four ceramic fragments (two grayware and one brownware)		
***Note:** UTM coordinates provided in NAD'83 Zone 12; "E" represents Easting and "N" represents Northing.				

SURVEY SUMMARY AND RESULTS

Transcon archaeologists conducted a Class III cultural resources survey of approximately 791.68 acres of BLM, SITLA, and privately-owned lands near Glendale and Orderville, in Kane County, Utah. The Project area generally parallels US-89 to the west, with the exception of Bald Knolls Community Pit, Bald Knolls Community Pit Expansion, and Black Knoll Rip-Rap Pit, which is accessed from Glendale Bench Road in Glendale. This investigation was requested by the NRCS and the KCWCD to determine if any significant cultural resources, which could be affected by the proposed undertaking, were present within the Project area. Important cultural resources may include historic or prehistoric archaeological sites or objects; historically or architecturally significant structures, buildings, or landscapes; and Traditional Cultural Properties which are NRHP-Eligible.

The cultural resources survey was completed between October 1–8 and October 10–15, 2018, and between June 12 through14, July 10, and September 19, 2019, for a total of 32 person-days of survey. As a result of the survey, 1 previously recorded cultural resource site, 9 new cultural resource sites, and 15 IOs are located within the Project APE (**Table 7**). There were no previously identified historic structures or historic developments located within the Project APE.

TABLE 7
CONCLUSIONS AND RECOMMENDATIONS

Site Number	Site Description	Eligibility	Effects
42KA6331	Prehistoric lithic scatter	Eligible—D	*No Adverse Effect to Historic Properties* if the site is avoided. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA8785	Prehistoric artifact scatter	Eligible – D	*No Adverse Effect to Historic Properties* if the site is avoided. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA8900	Historic artifact scatter	Not Eligible	No Effects
42KA8901	Multicomponent: prehistoric lithic scatter, historic artifact scatters	Not Eligible	No Effects
42KA8902	Historic artifact scatter	Not Eligible	No Effects
42KA8093	Historic artifact scatter	Not Eligible	No Effects
42KA8904	Prehistoric ceramic, lithic, and FCR scatter	Eligible—D	*No Adverse Effect to Historic Properties* if the site is avoided. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.
42KA8972	Prehistoric lithic scatter	Not Eligible	No Effects
42KA8973	Prehistoric artifact scatter	Not Eligible	No Effects
42KA8974	Prehistoric artifact scatter	Eligible—D	*No Adverse Effect to Historic Properties* if the site is avoided. Should any future project-related activities occur within 15 meters of the site, a cultural resources monitor must be present.

Of the 10 sites identified within the Project APE, 4 are recommended Eligible for listing on the NRHP under Criterion D for their information potential: 42KA6331, 42KA8785, 42KA8904, and 42KA8974. The remaining 6 sites and all 15 IOs are recommended Not Eligible for listing under any Criteria (**Table 7**).

If the site avoidance recommendations are followed, implementation of the Project would result in *No Adverse Effect to Historic Properties*. If any previously undetected or unreported cultural features or deposits are encountered during future Project-related activities, these activities must be discontinued in the immediate area of the feature(s) and an NRCS archaeologist, BLM archaeologist, or SITLA archaeologist, where appropriate, must be consulted to evaluate their nature and significance.

This cultural resource survey and resulting report were completed as part of those studies and were conducted in compliance with Section 106 of the NHPA of 1966, as amended. The NRCS Utah State Office served as the lead federal agency.

REFERENCES

Aikens, C. M., and David B. Madsen. 1986. Prehistory of the Eastern Area. In *Great Basin*, edited by Warren L. D'Azevedo, pp. 149–160. Handbook of North American Indians, Vol 11, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Athern, Robert G. 1962. *Rebel of the Rockies: A History of the Denver and Rio Grande Western Railroad.* Yale University Press, New Haven, Connecticut.

Arizona State University. Kaibab Paiute Reservation. 2018. URL: http://www.grcahistory.org/sites_adjacentlands_kaibabpaiutereservation.html, accessed October 23, 2018.

Bettinger, Robert and M. A. Baumhoff. 1982. The Numic Spread: Great Basin Cultures in Competition. *American Antiquity* 46(3):485–503.

Bradley, Martha Sonntag. 1999. *A History of Kane County (Utah Centennial County History Series).* Utah State Historical Society, Salt Lake City, Utah.

Bureau of Land Management (BLM). 2004. 8110—Identifying and Evaluating Cultural Resources. https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.23101.File.dat/8110.pdf, accessed February 28, 2017.

_____. 2012. Utah BLM Digital Data Standards—May 2012. http://www.blm.gov/style/medialib/blm/ut/natural_resources/cultural/archaeology/arch_documents0.Par.53469.File.dat/BLM%20Data%20Standards%20May%202012.pdf, accessed February 28, 2017.

_____. 2018. General Land Office Patent Records. http://www.glorecords.blm.gov/PatentSearch/, accessed September 2018.

Caywood, Janene, and Frank Grant. 1994. *Inventory and Evaluation of Historical Resources within Bryce Canyon National Park.* Historical Research Associates, Inc.

Chidester, Ida, and Eleanor Bruhn. 1949. Golden Nuggets of Pioneer Days; a History of Garfield County. Garfield County News, Panguitch, Utah.

Copeland, James M. and Richard E. Fike. 1988. Fluted Points in Utah. *Utah Archaeology 1988*, 1 (1) pp. 5–28.

Cordell, Linda. 1997. *Archaeology of the Southwest*. Second Edition. Academic Press: San Diego.

Davis, William. 1989. The Lime Ridge Clovis Site. *Utah Archaeology* Volume 2(Number 1):66–76.

Euler, Charles. 1966. Southern Paiute Ethnohistory. *Utah Anthropological Papers*, Vol. 78. University of Utah Press, Salt Lake City.

Grand Canyon Trust. 2018. URL: https://www.grandcanyontrust.org/kaibab-band-paiute, accessed October 23, 2018.

Grayson, Donald K. 1993. *The Desert's Past: A Natural Prehistory of the Great Basin*. Smithsonian Institution Press, Washington.

Hafen, LeRoy R., and Ann W. Hafen. 1954. *Old Spanish Trail, Santa Fe to Los Angeles.* A.H. Clark Company: Glendale, California.

Holt, Ronald L., Floyd O'Neil, and Lora Tom. 2006. *Beneath these Red Cliffs: An Ethnohistory of the Utah Paiutes*. Utah State University Press, Logan Utah.

Jennings, J. 1978. *Prehistory of Utah and the Eastern Great Basin.* University of Utah Anthropological Papers #98. Salt Lake City, Utah.

_____. 1989. *Prehistory of North America*. Third Edition. ed. Mayfield Publishing, Mountain View.

Knowlton, Ezra. 1965. *History of Highway Development in Utah.* Utah Department of Transportation, Salt Lake City, Utah.

Madsen, David B. 1975. Dating Paiute-Shoshoni Expansion in the Great Basin. *American Antiquity* 40:82–86.

_____. 1989. *Exploring the Fremont*. University of Utah Occasional Publication No.8. University of Utah and the Utah Museum of Natural History, Salt Lake City.

Madsen, D. B., and S. R. Simms. 1998. The Fremont Complex: A Behavioral Perspective. In *Journal of World Prehistory* 12(3) 255–326.

Marwitt, J. P. 1970. Median Village and Fremont Culture Regional Variation. *University of Utah Anthropological Papers #95*. University of Utah Press, Salt Lake City.

National Park Service (NPS). 2018. Cedar Breaks National Monument Utah. URL: https://www.nps.gov/cebr/learn/historyculture/index.htm; https://www.nationalparks.org/explore-parks/cedar-breaks-national-monument. Accessed October 24, 2018.

Newell, Linda King, and Vivian Linford Talbot. 1998. *A History of Garfield County*. Utah State Historical Society: Garfield County Commission.

Paiute Indian Tribe of Utah. 2018. URL: http://www.utahpaiutes.org/about/culture/paiutelanguage.aspx, accessed October 23, 2018.

Poll, Richard D., Thomas G. Alexander, Eugene E. Campbell, and David E. Miller. 1989. *Utah's History*. Utah State University Press, Logan, Utah.

Rhode, D., and David B. Madsen. 1994. Where Are We? In *Across the West: Human Population Movement and the Expansion of the Numa*, edited by David B. Madsen and D. Rhode, pp. 213–221. University of Utah Press, Salt Lake City.

Simms, Steven R. 2008. *Ancient Peoples of the Great Basin & Colorado Plateau.* Left Coast Press, Inc. Walnut Creek, California.

Steward, Julian. 1938. *Basin-Plateau Aboriginal Sociopolitical Groups*. BAE Bulletin 120. Smithsonian Institution, Washington, DC.

Stokes, W. L. 1977. Physiographic Subdivisions of Utah. *Utah Geology* Vol. 4(1). Utah Geological and Mineral Survey, Salt Lake City.

Storm, Brian P. 2007. 42KA6331 Site Form. Prepared by the Bureau of Land Management, Grand Staircase-Escalante National Monument. On file at Utah Division of State History.

Williams, Felicie, Lucy Chronic, and Halka Chronic. 2014. *Roadside Geology of Utah, Second Edition.* Mountain Press Publishing Company, Missoula Montana.

Wormington, H. M. 1957. *Ancient Man in North America*. Popular Series No. 4. Denver Museum of Natural History, Denver

Utah Department of State History (UDSH). 2018a. *Archaeological Compliance Guidance.* Utah State Historic Preservation Office & Antiquities Section. URL: https://heritage.utah.gov/wp-content/uploads/Arch_Compliance_Guide_March2016.pdf?x15791, accessed September 28, 2018.

_____. 2018b. Preservation Pro. Utah Department of Heritage & Arts, Utah Division of State History. URL: https://preservationpro.utah.gov/, accessed September 2018.

Zion National Park. 2017. A Brief History of Zion National Park. URL: https://www.zionnationalpark.com/zion-national-park/zion-national-park-history/, accessed October 24, 2018.

_____. 2018. Coral Pink Sand Dunes Geology. URL: http://www.zionnational-park.com/sdgeology.htm, accessed October 24, 2018.

APPENDIX A

PROJECT CORRESPONDENCE

APPENDIX B

PROJECT BACKGROUND RESEARCH MAPS

APPENDIX C

PROJECT RESULTS MAPS

APPENDIX D

UTAH ARCHAEOLOGICAL SITE FORMS

(November 2015) **BUREAU OF LAND MANAGEMENT**

Summary Report of Cultural Resources Inspection

PROJECT NUMBER: U21TN0840

Report Title: ***Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah—Addendum to Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove Reservoir Project (U18TN0544), Kane County, Utah***

1. Report Date: April 2021
2. Date(s) of Survey: November 15 to 19, 2021 and March 20, 2022
3. Development Company: Alpha Engineering, for the Natural Resources Conservancy District and Kane County Water Conservancy District
4. Responsible Institution: Transcon Environmental, Inc.
5. Principal Investigator: Jennifer Bannick
6. BLM Field Office: Kanab Field Office
7. County(ies): Kane County, Utah
8. NEPA Number: *TBD*
9. Fieldwork Location:
   USGS Map: Mount Carmel and Orderville, Utah
   Township 41 South Range 7 West Sections 8, 9, 17, 18, and 19

10. Description of the Undertaking (including the Area of Potential Effects):
The Natural Resources Conservation Service (NRCS) and Kane County Water Conservancy District (KCWCD) are proposing the addition of a pipeline to their *Cove Reservoir Project* (U18TN0544), which originally consisted of a reservoir and associated facilities. The original U18TN0544 Class III inventory was conducted in October of 2018. The additional pipeline is being completed as *Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement (EIS), Kane County, Utah—Addendum to Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove Reservoir Project (U18TN0544), Kane County, Utah* (Addendum Project; Utah Antiquities Project Number U21TN0840). This addendum and supplemental inventory area are the result of a change in project complexity, changing from an Environmental Assessment to an EIS.

The supplemental inventory area is generally located within an existing Utah Department of Transportation (UDOT) highway right-of-way (ROW) on the eastern side of US-89 (State Street), along portions of Center Street and Cottonwood Lane to the east of US-89, and within agricultural fields and unnamed dirt roads that cross sections of Tait Lane, West 2500 South (Lambs Lane), Stevens Lane, and Muddy Creek Road on the western side of US-89 (State Street) within the town of Mount Carmel in Long Valley, Kane County, Utah. The Addendum Project crosses 0.02 mile (0.11 acre) of Bureau of Land Management (BML) Kanab Field Office-managed lands, 0.01 mile (0.01 acre) of School and Institutional Trust Land Administration (SITLA)-managed lands, and 11.47 miles (68.71 acres) of privately owned lands (survey) for a total Project area that is 9.06 miles (68.83 acres) in length. The inventory was linear and conducted in 15-meter-wide transects throughout the Project area. No portion of the Project was left unsurveyed due to prior survey efforts.

The proposed Addendum Project alignment totals approximately 9.06 miles in length and is located within portions of Township 41 South, Range 7 West, Sections 8, 9, 17, 18, and 19 of the Salt Lake Baseline and Meridian. The Project crosses the Mount Carmel and Orderville, Utah 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle maps (**Appendix A***, Project Results Maps*).

The Addendum Project *Area of Potential Effects* (APE) totals 9.06 miles (68.83 acres) in length in Kane County, Utah. Throughout the addendum Project area, for a total of 9.06 miles (47,836 feet), a new pipeline will be placed as part of

improvements associated with the proposed Cove Reservoir which would be located immediately southwest of the town of Orderville, Utah. A 25-foot temporary ROW will be required on established roads to accommodate equipment during construction. To account for flexibility in design, a survey corridor of 15 meters (approximately 50 feet) was evaluated. This results in a horizontal APE of 15 meters (50 feet) and a linear APE of 47,836 feet (9.06 miles), resulting in a total of 68.83 acres evaluated for cultural resources.

In support of the NRCS and KCWCD, Alpha Engineering retained Transcon Environmental, Inc. (Transcon) to conduct a cultural resources evaluation. The cultural resources inventory and this resulting report have been completed as part of that evaluation and were conducted in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. The NRCS served as the lead agency on both the original and Addendum Project. The Class III inventory was conducted under a BLM Kanab Field Office fieldwork authorization (FWA) dated November 08, 2021, a SITLA FWA dated November 04, 2021, and a UDOT FWA dated November 04, 2021. A desktop literature review was conducted for the proposed Project area on October 18, 2021, and a Class III (intensive pedestrian) and Class II (reconnaissance) cultural resources inventory was conducted between November 15 to 19, 2021 and on March 20, 2022, for a total of 11 person-days of fieldwork. Jennifer Bannick and Lindsey M. Evenson served as Principal Investigators and Jennifer L. Bannick served as Field Director and report author.

11. Location(s) and Date(s) of Literature Review:

1. Field Office: N/A
2. Utah Division of State History/Sego: October 18, 2021
3. Historic Records and Maps: October 18, 2021
4. Satellite imagery: October 18, 2021

12. Results of Literature Review (½ mile buffer):

On October 18, 2021, records on file with the Utah Division of State History (UDSH) were checked prior to the commencement of fieldwork to determine whether previously identified cultural resources were present or if any previously reported archaeological investigations had been conducted within 0.5 mile of the proposed Project alignment (UDSH 2021a). The results of this background research are presented in **Appendix B**, *Results of Literature Review*. The results of this literature review indicate there are a total of 16 previously conducted cultural resource surveys (**Table B-1**, *Previous Cultural Surveys Within 0.5 Mile of the Project Area*) and 15 previously recorded cultural resource sites (**Table B-2**, *Previously Identified Cultural Resource Sites Within 0.5 Mile of the Project Area*) within 0.5 mile of the Project area. Of these, 6 previous surveys and 4 previously identified sites were mapped as overlapping, being immediately adjacent, or being crossed by some portion of the current Project APE.

Previously Conducted Cultural Resource Surveys

Background research identified 16 previously conducted cultural resource surveys within 0.5 mile of the Project area (**Appendix B**, *Results of Literature Review*). Of these, 6 previous cultural surveys cross into or overlap some portion of the Project APE, and 2 of these surveys were conducted within the past 10 years. These recent surveys (U14HO0043 and U17HO0675) were conducted for a wastewater system upgrade and a highway improvement project. The remaining surveys consist of surveys for sewer improvement, agricultural trespass, seeding, gravel, bridge replacement, watershed, and wildlife habitat improvement surveys. The surveys mapped within or adjacent to the Project APE are detailed in **Table B-1**, *Previous Cultural Surveys within 0.5 Mile of the Project Area*. No portion of the current Project was left unsurveyed due to prior survey efforts.

Previously Recorded Cultural Resource Sites

Background research identified 15 previously recorded cultural resources within 0.5 mile of the Project area; these previously recorded sites are detailed in **Table B-2**, *Previously Recorded Cultural Resource Sites within 0.5 Mile of the Project Area.* Of these, four sites were mapped within or adjacent to the Project APE during the literature review. These cultural resources consist of a two prehistoric artifact scatters (42KA1157 and 42KA1965), a historic bridge abutment (42KA4538), and a historic ditch (42KA4539). During the literature review, it was noted that previous sites 42KA1157, 42KA1958, and 42KA1965 were found to be the same site. Additionally, during the Class III inventory, previous sites 42KA4538 and 42KA4539 were relocated outside of the current Project APE.

Historic Document Review

In addition to the Sego literature review (described above), Transcon consulted a number of historic documents and records, including BLM land records (e.g., historic General Land Office [GLO] records, land patents, mining records, grazing records, Master Title Plat records, etc.), the Utah State Historic Preservation Office's historic contexts, individual BLM field office predictive models (if available) and Class I documents (if available), water rights, Sanborn maps, and Utah Division of Water Rights (UDWR) records (BLM 2021a, 2021b, 2021c, 2021d, 2021e; LOC 2021; UDSH 2021a, 2021b; UDWR

2021). The GLO records, land patents, grazing records, and water rights records yielded historic resources in or very near to the Project area (see General Land Office Maps, Land Patent Records, Grazing Allotment Records, and Water Rights Records sections below).

General Land Office Maps

Historic GLO maps and plats were reviewed for the Project area and accessed through the BLM website on October 18, 2021. Original cadastral surveys for Township 41 South, Range 7 West (1877, 1926, 1945, and 1965) were perused (BLM 2021a). These surveys indicate a few historic improvements near the Project area including historic roads, ditches, transmission lines, ditches, fences, structures, agricultural fields, and a coal mine (see **Table 1**, *Historic General Land Office Maps*, below).

TABLE 1
HISTORIC GENERAL LAND OFFICE MAPS

Date	Township	Range	Historic Features near the Project Area
1877	41 South	7 West	Roads (*County Road*, unnamed), structures (*Sawmill, JW Reed, Ruf Jolly, Wm Jolly,G.A. Hicks*, unnamed residences), unnamed ditches, fence lines, cultivated fields (*Fiddlers Green*, unnamed), town (*Mount. Carmel*)
1926	41 South	7 West	Roads (Old Road, Mount. *Carmel to Kanab*, unnamed), town (Mount *Carmel*), ditch (*Irrigation Ditch*) structures (*Diversion Dam,* unnamed residences), transmission lines (*Telephone Line Orderville to Mount Carmel,* unnamed)
1945	41 South	7 West	Road (*To Mount Carmel, Utah*), structure (*Coal Mine*), transmission line
1965	41 South	7 West	Roads (*US-89*, unnamed), transmission lines (*Power Line, Telephone Line*), structures (*Pump House, Water Tank, Flume, Coal, Barn,* unnamed residences), town (*Mount. Carmel*), canal

Additional historic maps were accessed from both the USGS TopoView topographic map viewer created by the National Geologic Map Database Project and the Utah Geological Survey Aerial Imagery Collection (DNR 2021; USGS 2021a, 2021b). Historic aerial imagery in the vicinity of the Project indicates a few visible historic developments, including established roads/highways, ditches, and cultivated fields. Portions of the historic County Road system may be the same as (or adjacent to) the present alignment of US-89 (DNR 2021).

Land Patent Records

Historic land patent records within the Project area were also reviewed and accessed through the BLM website on October 18, 2021. These historic resources indicate 22 land patents near the Project area, with dates ranging from 1880 to 1980. These include Thomas W. Blackburn (4/5/1928; 6/5/1928), Henry W. Esplin (5/10/1884), William J. Jolley (11/15/1881), Francis L. Porter (5/10/1884), Kirsten Sorensen (2/13/1899), Christena Heaton (3/9/1927), William A. Bringhurst (5/15/1880), Rasmus M. Engelstad (8/1/1883), Silas Hoyt (10/1/1880), Lorene C. and Sharon C. Lamb (7/30/1980), Utah State (6/16/1924; 4/13/1965), Henry B.M. Jolley (10/1/1880), Edward T. Lamb (6/16/1931) Robert Moncur (7/18/1898), Earl J. Sorensen (2/5/1931), David W.P. Stevens (11/10/1930; 2/12/1931), Ezra W. Stevens (8/12/1918), Alfred Misner (3/28/1905), and Hans C. Sorensen (9/21/1916) (BLM 2021b).

Grazing Allotment Records

Historic grazing allotment records within the Project area were also reviewed and accessed through the BLM website on October 18, 2021. This resource indicated seven active grazing allotments surrounding the Project area; however, none cross into or overlap any portion of the Project APE: the Gardner Hollow Allotment (UT24049) is located to the north of the APE; the Spring Hollow Allotment (UT04151) and Glendale Bench Allotment (UT24051) are to northeast of the APE; the Red Hollow Allotment (UT 14097) and the Sugar Knoll Allotment (UT 04117) are to the east and southeast of the APE; the Carmel Junction Allotment (UT 24021) is south of the APE, and the Zion Allotment (UT 04138) encompasses a large area west of the APE and the town of Mount Carmel. There are no dates associated with this data to indicate if these are historic allotments (BLM 2021e).

Water Rights Records

Historic water rights records within the Project area were reviewed and accessed through the UDWR records website on October 18, 2021. These historic resources indicate that there are 10 historic water rights within 0.5 mile of the Project APE consisting of underground water sources (underground water wells), and surface water rights with sources from springs (Fiddlers Green Spring No. 1, Fiddlers Green Spring No. 2, Fiddlers Green Spring No. 3, Mount Carmel Springs, Spring

Hollow Spring, and Hard Pan Spring), and the East Fork Virgin River. Historic water rights that may be within the Project APE include 81-4346 (Diversion/Return from East Fork Virgin River, Kane County Water Conservancy District, 2000), 81-1133 (Mount Carmel Springs, Town of Orderville, 1870) and 81-1141 (Surface, East Fork Virgin River [Long Valley], Mount. Carmel Irrigation Company, 1865) (UDWR 2021).

Summary and Expectations
Based on the results of the record search, it was anticipated that three previous sites may be located within or immediately adjacent to the project APE in the new survey area; however, it was understood that the sites' previous recordings were old/outdated and had poor location information and, as a result, might not be relocated in the project APE.

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13. Description of Field Methods:
The survey was conducted in 15-meter-wide transects throughout the entire Project APE. This resulted in a total of approximately 68.83 acres evaluated for cultural resources. No portion of the current Project was left unsurveyed due to prior survey efforts. A total of 48.66 acres were surveyed to Class III standards; some fenced off and inaccessible areas on private property with posted no trespassing signs within the APE (20.17 acres) were surveyed to Class II standards due to safety and trespassing concerns (**Table 2**, *Total Survey Area*).

Isolated occurrence (IO) locations were documented during the survey. Previously identified cultural resource sites identified during the survey had locations noted, revisited, and recorded/updated after the survey was conducted for a more thorough review and to update site documentation, as necessary. These sites and IOs are discussed below in **Table 3**, *Total Sites Recorded*, **Appendix C***, Cultural Resource Sites Within the Project APE*, and **Appendix D**, *Newly Identified Isolated Occurrences within the Project APE*. The Cultural Resource Fieldwork Guidelines and Standards BLM Supplement H-8110—Utah—February 2021 and the Utah SHPO & Antiquities Section Archaeological Compliance Guidance—June 2020 were adhered to at all times during fieldwork (BLM 2021f; UDSH 2021c).

14. Area Surveyed:
Table 2, *Total Survey Area,* below, indicates the total acreage per landowner surveyed to Class I and III standards within the entire Project area.

TABLE 2
TOTAL SURVEY AREA

	BLM	SITLA	Private	UDOT	TOTAL
Project Mileage	0.02	0.00	9.04	0.00	**9.06**
Class II Survey Mileage*	0.00	0.01	3.37	0.00	**3.38**
Class III Survey Mileage*	0.02	0.00	8.10	0.00	**8.12**
Class II Acreage	0.00	0.01	20.16	0.00	**20.17**
Class III Acreage	0.11	0.00	48.55	0.00	**48.66**
Total Survey Mileage	**0.02**	**0.01**	**11.47**	**0.00**	**11.50**
Total Project Acreage	**0.11**	**0.01**	**68.71**	**0.00**	**68.83**

* Survey mileage based on 15m wide transects (Acres * 0.167).

15. Sites Recorded:
Of the four previously recorded sites mapped within the Project APE, previous sites 42KA1157 and 42KA1965 were found to be the same site during the literature review (and also found to include site 42KA1958 which was not plotted in Sego but listed on previous site maps and reports). Additionally, during the Class III inventory sites 42KA4538 and 42KA4539 were relocated outside of the current Project APE (**Table 3**, *Total Sites Recorded*). The two remaining previously recorded sites (42KA4538 and 42KA4539) mapped within the APE were relocated outside of the current Project APE during the Class III inventory. Although these sites were not relocated in the current Project APE, updated Utah Archaeology Site Forms (UASF) were prepared, however GIS data was not updated. Additionally, four new sites (42KA9490, 42KA9491, 42KA9492, and 42KA9493) were identified and documented during survey. Updated and new UASFs have been prepared for sites 42KA1157 (also 42KA1965/42KA1958), 42KA4538, 42KA4539, 42KA9490, 42KA9491, 42KA9492, and 42KA9493.

TABLE 3 TOTAL SITES RECORDED*										
		BLM		State		Private		Tribal		Total
		#	Site No.	#	Site No.	#	Site No.	#	Site No.	
Revisits *Updated*	Eligible	0		0		1	42KA1157*	0		1
	Not Eligible	0		0		2	42KA4538* 42KA4539*	0		2
Revisits *Not Updated*	Eligible	0		0		0		0		0
	Not Eligible	0		0		0		0		0
Newly Recorded	Eligible	1	42KA9491*	0		1	42KA9490	0		2
	Not Eligible	0		0		2	42KA9492 42KA9493	0		2
TOTAL		**1**		**0**		**6**		**0**		**7**
*Note: Site 42KA9491 is located mostly on privately owned land with a small portion of the site alignment on BLM land; site 42KA1157 is also sites 42KA1965 and 42KA1958; sites 42KA4538 and 42KA4539 were relocated outside of the current Project APE.										

16. Individual Site Descriptions and Determinations of Eligibility and Effect:
There is one previously recorded site, 42KA1157 (also 42KA1965 and 42KA1958), and four newly recorded sites (42KA9490, 42KA9491, 42KA9492, 42KA9493) within the Project APE; additionally, two previously recorded sites (42KA4538 and 42KA4539) were mapped within but relocated outside of the current Project APE. These sites are described in detail in **Appendix C***, Cultural Resource Sites Within the Project APE*. Of these sites, one is recommended Eligible for listing on the National Register of Historic Places (NRHP) under Criterion D (42KA1157), one site is recommended Eligible for the NRHP under Criteria A and D (42KA9491), one site is recommended Eligible for the NRHP under Criteria A, C, and D (42KA9490), and four sites are recommended Not Eligible for the NRHP under any Criteria (42KA4538, 42KA4539, 42KA9492, and 42KA9493).

17. Isolated Occurrences:
Three IOs were identified and recorded within the Project APE during the Class III inventory. These IOs are individually described and photographed below, and mapped in **Appendix A**, *Project Results Maps*. All three IOs are recommended Not Eligible for listing on the NRHP under any Criteria.

IO-01
IO-01 is a historic monument erected in 1995 to commemorate the settlement of Long Valley and Orderville, and the early pioneers. The monument is an obelisk constructed from concrete with river cobbles pressed into the surface measuring 7.5-feet-high, by 52-inches-square, and located on top of a 20-foot square concrete pad (**Figure 1**).

IO-02
IO-02 is an unnamed historic road segment that appears on the 1879 GLO maps. The road segment dates from 1879 or earlier and consists of a barren path that is between 15 to 18 feet wide, covered in natural cobbles. It is not modified from its historic format, has no prepared foundation or ditches, but does have a natural drainage to the east that flows parallel to the road (**Figure 2**).

IO-03
IO-03 is a wagon yoke measuring about 42 inches long by 7 inches at the widest. The tongue is a narrow juniper post tapering from 3 inches in diameter down to 2 inches in diameter and 28 inches long. The wagon yoke ends in a loop of commercially formed sheet metal riveted through the post and is bound to a 4-inch steel ring, which is connected to two large eye bolts with oval split-rings. The eye bolts are set into two rusted steel plates, which likely reinforced a piece of wood. One eye bolt is a modern style made from formed steel rod and the other is an older forged or cast design. **Figure 3**).

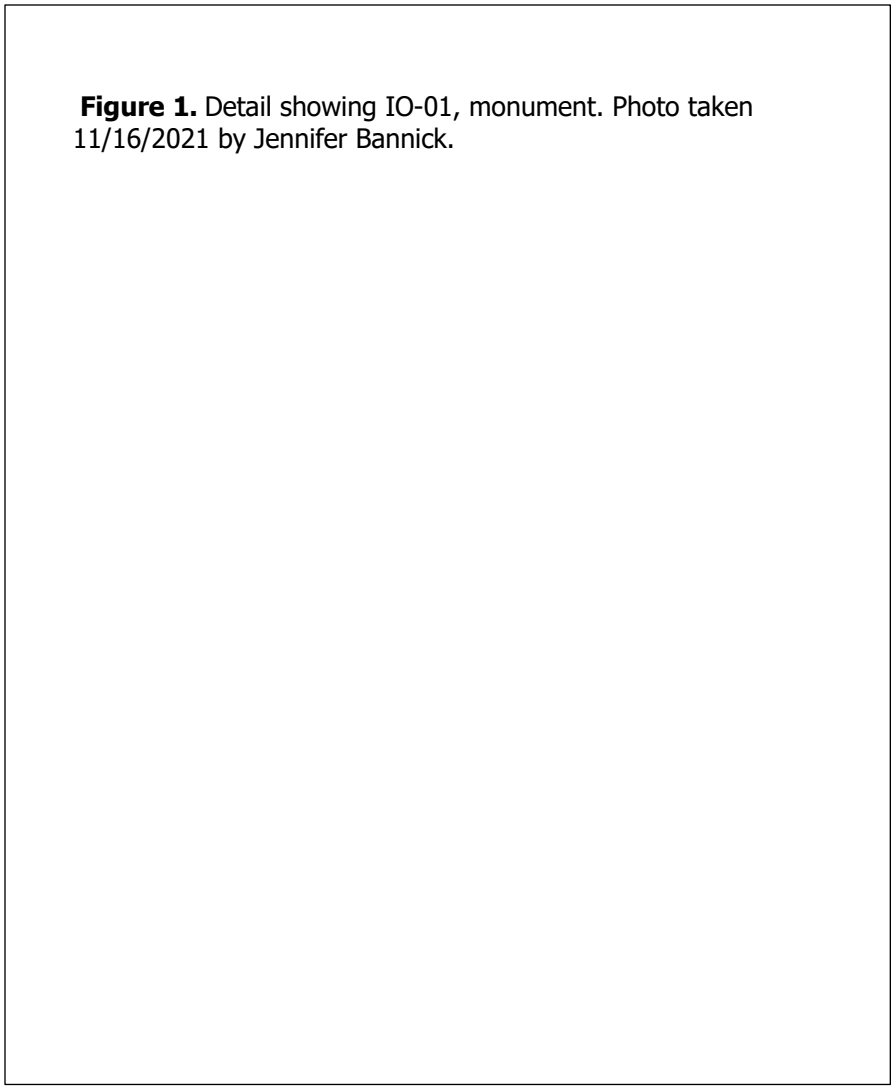


Figure 1. Detail showing IO-01, monument. Photo taken 11/16/2021 by Jennifer Bannick.

Figure 2. Overview showing IO-02, historic road. View to the north. Photo taken 11/18/2021 by Aaron Larsen.

Figure 3. Detail showing IO-03 wagon yoke. Photo taken 11/18/2021 by Aaron Larsen.

18. Summary of Findings:

As a result of the Class III inventory, it was determined that a total of five cultural resource sites (one previously identified and four newly recorded) are located within or crossed by the Project APE (42KA1157, 42KA9490, 42KA9491, 42KA9492 42KA9493). Updated UASFs have been prepared for the previously recorded site identified within the Project APE during

new survey (42KA1157 [also 42KA1965/42KA1958]) and for two previously recorded site that were mapped within the current Project APE but relocated outside of the APE (42KA4538 and 42KA4539); additionally, Transcon identified four new cultural resource sites as a result of this survey (42KA9490, 42KA9491, 42KA9492, and 42KA9493). Three IOs (IO-01to IO-03) were also identified and recorded within the Project APE as a result of new survey. Modern debris was also noted but not recorded at various places within the Project area, as it appears to have originated from modern transportation and recreational activities.

Survey conditions were good, consisting of sunny to clouded or partially clouded skies and cool temperatures. For most of the survey, ground visibility was fair to excellent, ranging between 40 to 80 percent or greater (**Figures 4**, **5**, **6** and **7**). Of the five cultural resource sites identified within the Project APE during new survey, one previously recorded site (42KA1157 [also 42KA1965/42KA1958]) is recommended Eligible for listing on the NRHP under Criterion D; one site is recommended Eligible for the NRHP under Criteria A and D (42KA9491), one site is recommended Eligible for the NRHP under Criteria A, C, and D (42KA9490), and two sites (42KA9492 and 42KA9493) are recommended Not Eligible for the NRHP under any Criteria. Additionally, two previously recorded mapped in but located outside of the current Project APE (42KA4538 and 42KA4539) and three IOs are recommended Not Eligible for the NRHP under any Criteria.

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19. Collection Yes___ No _X_

(If Yes) Curation Facility: N/A Accession Number(s): N/A

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20. Conclusion/Recommendation of Effect:
Transcon archaeologists conducted a Class II/III cultural resources inventory of 0.02 mile on BLM-managed lands, 0.01 mile on SITLA-managed land, and 11.47 miles on privately owned lands (survey) in a total Project area that is 9.06 miles in length within the town of Mount Carmel in Long Valley, Kane County, Utah. The Class II/III cultural resources survey was completed between November 15 and 19, 2021, and on March 20, 2022. This investigation was requested by Alpha Engineering, in support of the NRCS and KCWCD, to determine if any significant cultural resources which could be affected by the proposed undertaking were present within the Project area.

As a result of the survey, it was determined that a total of five cultural resource sites are located within the Project APE (see **Appendix C***, Cultural Resource Sites Within the Project APE*, for details). Of the five sites identified within the Project APE, one previously recorded site (42KA1157 [also 42KA1965/42KA1958]) is recommended Eligible for listing on the NRHP under Criterion D for information potential; two sites are recommended Eligible for the NRHP under Criteria A and D (42KA9490 and 42KA9491) for their association with significant regional events and for information potential; site 42KA9490 is also recommended to be Eligible for listing on the NRHP under Criterion C as it embodies the distinctive characteristics of a type, period, and method of construction in the region; the remaining sites (42KA9492 and 42KA9493) are recommended Not Eligible for the NRHP under any Criteria. Additionally, two sites that were previously determined Not Eligible for the NRHP were mapped within but relocated outside of the current Project APE (42KA4538 and 42KA4539).

Transcon recommends that the Project will result in *No Adverse Effects to Historic Properties*. At one Eligible site location within the Project APE, (42KA1157 [also 42KA1965/42KA1958]) the site area has been bisected and heavily disturbed by the construction and maintenance of US-89. It is partially located in an agricultural field with evidence of livestock trampling and past plowing within the field. There is an existing pipeline cutting through the site area, and the site area on the eastern side of US-89 has been previously tested (see 2021 UASF) and all elements of the site are non-contributing to the overall eligibility of the site within the current Project APE.

For the two additional Eligible sites within the Project area (42KA9490 and 42KA9491), an inadvertent discovery plan should be prepared, and a Historic Properties Treatment Plan (HPTP) should be developed to mitigate adverse effects to the sites (**Table 4**, *Project Summary and Conclusions*).

If any previously undetected or unreported cultural features or deposits are encountered during future project-related activities, these activities must be discontinued in the immediate area of the feature(s), and a BLM archaeologist (or UDOT archaeologist, where appropriate) must be consulted to evaluate their nature and significance.

TABLE 4 PROJECT SUMMARY AND CONCLUSIONS					
Site No.	**Temporal Affiliation**	**Site Description**	**Eligibility**	**Effects**	**Site Protective or Avoidance Measures**
42KA1157	Prehistoric	Prehistoric artifact scatter	Eligible—D	*No Adverse Effect*	None; the portion of the site within the Project APE is heavily disturbed by previous road construction/maintenance, plowing, livestock and a sewer line, it has also been previously tested and is non-contributing to the overall eligibility of the site.
42KA4538	Historic	Historic bridge abutment	Not Eligible	No effect	N/A; also, outside of the current Project APE.
42KA4539	Historic	Historic ditch/ flume	Not Eligible	No effect	N/A; also, outside of the current Project APE.
42KA9490 (FS-01)	Historic	Historic ditch (*Mount Carmel Irrigation Ditch–West Ditch*)	Eligible—A, C, D	*No Adverse Effect*	An inadvertent discovery plan should be prepared, and a HPTP should be developed to mitigate adverse effects to the site.
42KA9491 (FS-02)	Historic	Historic ditch (*Mount Carmel Irrigation Ditch–East Ditch*)	Eligible—A, D	*No Adverse Effect*	An inadvertent discovery plan should be prepared, and a HPTP should be developed to mitigate adverse effects to the site.
42KA9492 (FS-03)	Historic	Historic road (*Lamb's Lane*)	Not Eligible	No effect	N/A
42KA9493 (FS-04)	Historic	Historic road (*Tait Lane*)	Not Eligible	No effect	N/A

REFERENCES:

Bureau of Land Management (BLM). 2021a. "Cadastral Surveys and Plats" Land Records, Bureau of Land Management, Utah. Accessed October 18, 2021, at https://www.ut.blm.gov/LandRecords/search_plats.cfm.

_____. 2021b. "Land Patent Records" Land Records, Bureau of Land Management, Utah. Accessed October 18, 2021, at https://glorecords.blm.gov/search/default.aspx.

_____. 2021c. "Mineral Survey Records" Land Records, Bureau of Land Management, Utah. Accessed October 18, 2021, at https://www.ut.blm.gov/LandRecords/special_surveys.cfm#special_results.

_____. 2021d. "Master Title Plat Maps" Land Records, Bureau of Land Management, Utah. Accessed October 18, 2021, at https://glorecords.blm.gov/search/default.aspx.

_____. 2021e. "Grazing Allotments" National Data, Bureau of Land Management, Utah. Accessed October 18, 2021, at https://blm-egis.maps.arcgis.com/apps/webappviewer/index.html?id=6f0da4c7931440a8a80bfe20eddd7550.

_____. 2021f. Cultural Resource Fieldwork Guidelines and Standards BLM Supplement H-8110—Utah. Accessed October 18, 2021, at https://www.blm.gov/sites/blm.gov/files/docs/2021-02/H8110_Fieldwork%20Guidelines%20and%20Standards508.pdf.

Library of Congress (LOC). 2021. "Sanborn Fire Insurance Maps" Sanborn Maps Collection, Library of Congress. Accessed October 18, 2021, at https://www.loc.gov/collections/sanborn-maps/index/location/?q=Utah.

United States Geological Survey (USGS). 2021a. Orderville 7.5-Minute topographic map. Accessed October 18, 2021, at https://ngmdb.usgs.gov/topoview/viewer/#10/37.3751/-112.7508.

_____. 2021b. Mount Carmel 7.5-Minute topographic map. Accessed October 18, 2021, at https://ngmdb.usgs.gov/topoview/viewer/#9/37.3274/-112.6151.

Utah Division of Natural Resources (DNR). 2021. UGS Aerial Imagery Collection. Accessed on October 18, 2021, at https://geodata.geology.utah.gov/imagery/.

Utah Division of State History (UDSH). 2021a. Sego. Utah Department of Heritage and Arts, Utah Division of State History. Accessed October 18, 2021, at https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8d1c8337d050431080f7dce538f7677c.

_____. 2021b. Historic Contexts. Utah Department of Heritage and Arts, Utah Division of State History. Accessed October 18, 2021, at https://drive.google.com/drive/u/0/folders/1f29mMHZF5NZuuz8ar8WkHEMu0oKDiW6R.

_____. 2021c. Archaeological Compliance Guidance. Utah State Historic Preservation Office & Antiquities Section. Accessed August 18, 2021, at https://drive.google.com/file/d/1_e2QLxR2pLUBns2l2GyDbomzJeWTH_Wu/view.

Utah Division of Water Resources (UDWR). 2021. "Water Right Areas" Utah Division of Water Rights Database. Accessed October 18, 2021, at https://maps.waterrights.utah.gov/EsriMap/map.asp.

*Include the appropriate amount of 1:24,000 scale topographic maps, which clearly identify the APE, area of Class II or III survey, sites, and isolated finds.
**Include at least one landscape photograph of the area surveyed.
8100-3 Form

Figure 4. Overview showing site 42KA9490 *Mount Carmel Irrigation Ditch—East Ditch* (Segment 3) in a private yard in Mount Carmel. View to the southwest. Photo taken 11/17/21 by Aaron Larsen.

Figure 5. Overview showing a portion of site 42KA9490 *Mount Carmel Irrigation Ditch—East Ditch* Segment 5 visible in the foreground in the outskirts of Mount Carmel. View to the northeast. Photo taken 11/17/2021 by Jennifer Bannick.

Figure 6. Overview showing site 42KA9491 *Mount Carmel Irrigation Ditch—West Ditch* (Segment 1) with F-02 retention pond and headgate in the foreground. View to the east. Photo taken 11/18/21 by Jennifer Bannick.

Figure 7. Overview showing a portion of site 42KA9491 *Mount Carmel Irrigation Ditch—West Ditch* with Segment 2 visible in the foreground below the berm. View to the east/southeast. Photo taken 11/18/2021 by Jennifer Bannick.

APPENDIX A

PROJECT RESULTS MAPS

APPENDIX B

RESULTS OF LITERATURE REVIEW

APPENDIX C

CULTURAL RESOURCE SITES WITHIN THE PROJECT APE

Utah Division of State History

Short Cultural Resources Inventory Report Form

State Project Number: U23TN0682

Report Title: *Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah: Esplin Pit Evaluation*

Report Date: February 2024

Report Author(s): Aaron D. Larsen and Jennifer Bannick

Principal Investigator: Jennifer Bannick/Lindsey M. Evenson

Person-Days for Survey: A total of two person-days of survey for Jennifer Bannick on October 10 and 11, 2023.

Acreage: APE: 13.72
Intensive: 8.47
Recon/Intuitive: 5.25

Project Background:

The Natural Resources Conservation Service (NRCS) and Kane County Water Conservancy District (KCWCD) are proposing the use of the Bald Knolls Community Pit to provide riprap for their *Cove Reservoir Project* (U18TN0544), which originally consisted of a reservoir and associated facilities. The original U18TN0544 Class III inventory was conducted in October, 2018. The additional borrow pit is being completed as *Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah: Esplin Pit Evaluation* in Kane County, Utah (Project) (Utah Antiquities Project Number U23TN0682). This supplemental inventory area is the result of a change in project complexity, changing from an Environmental Assessment to an Environmental Impact Statement, and a later assessment of the original project requirements and determination of preferred material sources.

As part of the proposed Project, NRCS and KCWCD have requested a cultural resources evaluation of the Project area in Kane County, Utah. The NRCS and KCWCD retained Transcon Environmental, Inc. (Transcon) to conduct the cultural resources evaluation and resulting report in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

The proposed Project *Area of Potential Effects* (APE) measures 2.29 miles (13.72 acres) in length entirely on private property along County Road 2095 between County Roads 2895 and 2912 east of the town of Glendale, in Kane County, Utah. The Project is located within portions of Township 40 South, Range 6 West, Section 35 of the Salt Lake Baseline and Meridian and crosses the Bald Knoll, Utah 7.5-minute U.S. Geological Survey topographic quadrangle map (U.S. Geological Survey [USGS] 2023) (Appendix A, *Project Results Map*).

Area of Potential Effect Definition:

The Project APE totals 2.29 miles (13.72 acres) in length. The Project APE is the site of a former borrow pit (*Esplin Glendale Bench Pit* or *Esplin Pit*) where basalt bedrock has previously been quarried for use as riprap. The Project proposes to reopen the borrow pit to procure riprap for construction and armoring of the planned *Cove Dam*. Observed basalt exposures in the Project area measure 10 to 20 feet thick, and procurement activities to fulfill the dam construction needs (approximately 29,000 cubic yards of riprap) would require quarrying 1.8 acres of basalt to a thickness of 10 feet. The Class III (intensive pedestrian) cultural resources inventory was conducted following Utah State Historic Preservation Office (USHPO) guidelines in 15-meter transects in a modified block survey within the Project area, resulting in a total of 2.29 miles or 13.72 acres of survey. No portion of the Project was left unsurveyed due to prior survey efforts; however, some areas of difficult or hazardous terrain encountered within the Class III inventory area were subject to Class II (reconnaissance) inventory due

to safety concerns. This resulted in a total Project APE of 2.29 miles (13.72 acres), a total Class II (reconnaissance) inventory of 5.25 acres, and a total Class III Inventory of 8.47 acres (Table 1).

TABLE 1
TOTAL PROJECT AREA

	BLM	SITLA	UDOT	USFS	Private	Other	Total
Class II Inventory Acreage	0.00	0.00	0.00	0.00	5.25	0.00	5.25
Class III Inventory Acreage	0.00	0.00	0.00	0.00	8.47	0.00	8.47
Total Project Mileage	0.00	0.00	0.00	0.00	2.29	0.00	2.29
Total Project Acreage	0.00	0.00	0.00	0.00	13.72	0.00	13.72

* Survey mileage based on 15-meter-wide transects (Acres * 0.167).

Identification Strategies (*archaeological, historical, and ethnographic*):

The desktop background research review, Class III cultural resources inventory, and this resulting report have been completed by Transcon and conducted in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. The survey was conducted in coordination with the NRCS, and as the Project is located entirely on private property, no formal field work authorization was required. The desktop review was conducted on September 13, 2023, and the cultural resources survey was conducted on October 10 and 11, 2023, for a total of two person-days of fieldwork. Jennifer Bannick and Lindsey M. Evenson served as co-principal investigators, Jennifer Bannick served as field director, and Jennifer Bannick and Aaron D. Larsen served as report co-authors. All Transcon staff meet the Secretary of the Interior's professional qualification standards for the state of Utah; additionally, Lindsey M. Evenson holds PLPCO Permit #177; Lindsey M. Evenson and Jennifer Bannick are permitted as Principal Investigators (Statewide, Historic) and Aaron D. Larsen is permitted as a Field Director (Great Basin, San Juan, Historic) under the United States Department of the Interior Permit for Archaeological Investigations/Utah BLM Cultural Resource Use Permit (CRUP) permit number 24UT81313, valid 1/12/2024 – 1/11/2027.

Location(s) and Date(s) of Pre-Field Records Search:

1. Utah Division of State History: September 13, 2023
2. Federal/State Office: N/A
3. Historic Records/Maps: September 13, 2023
4. Other: N/A

Results of Pre-Field Records Search (*sites and projects within agency-defined APE buffer and/or site leads from research*):

A background research review was conducted on the USHPO's Sego and Utah Digital Asset Manager online cultural resources databases on September 13, 2023 (USHPO 2023). The results of this literature review indicate there are a total of 11 previously conducted cultural resource surveys (Table B-1, *Previous Cultural Surveys Within 0.5 Mile of the Project Area*) and 16 previously recorded cultural resource sites (Table B-2, *Previously Identified Cultural Resource Sites Within 0.5 Mile of the Project Area*) within 0.5 mile of the Project area. Of these, five previously conducted surveys and one previously recorded site (42KA7537) are mapped as overlapping, being immediately adjacent to, or being crossed by some portion of the current Project APE.

Records on file with USHPO's Historic Utah Buildings database were perused on September 14, 2023. This resource identified no recorded historic structures within 0.5 mile of the current Project APE (HUB 2023).

Historic General Land Office (GLO) maps for Township 40 South, Range 6 West (1877, 1979) were perused on the BLM Land Records website (BLM 2023). These surveys indicate the potential presence of various resources, including historic roads/trails and a historic structure (*Cabin*) near the Project area (Table B-3, *Historic General Land Office Maps*).

Additional historic maps were accessed from both the USGS TopoView topographic map viewer created by the National Geologic Map Database project and the Utah Geological Survey Aerial Imagery Collection (Department of Natural Resources [DNR] 2023; USGS 2023). Historic topographic maps in the vicinity of the proposed Project indicate several historic developments, including:

- Unnamed roads (1966 Bald Knoll, Utah 1:24,000 scale topographic maps)
- Unnamed roads (1968 Bald Knoll, Utah 1:24,000 scale topographic maps)

Date(s) of Survey: October 10 and 11, 2023

Description of Findings:

The Class III inventory area was characterized by a moderately disturbed rural landscape at the base of and along a basalt ridge. Survey conditions consisted of partly cloudy to clear skies and warm temperatures. For most of the survey, ground surface visibility was poor to moderate and averaged 20 to 60 percent depending on vegetation (Figures 1 to 6). Some areas contained dense cheatgrass and other opportunistic ground-cover vegetation obstructing the view of the ground. Undisturbed areas were typified by juniper-pinyon woodland vegetation, including juniper, pinyon, big sagebrush, rabbitbrush, and various forbs and grasses. Some modern debris was also noted but not recorded at various places within the Project area, as it appears to have originated from modern transportation and recreational activities.

As a result of the new Class III inventory, two cultural resource sites (42KA7537 [*Kanab Creek Cave*] and 42KA9789 [FS-01]) were identified and documented. Both site 42KA7537 and 42KA9789 are recommended Eligible for the National Register of Historic Places (NRHP) under Criterion D for information potential. One isolated occurrence (IO), IO-01, was identified during the survey. These identified resources are further described below.

Archaeological Sites

42KA7537

Site 42KA7537 is a previously recorded prehistoric cave and artifact scatter (*Kanab Creek Cave*) located on an outcrop of a basalt terrace east of the town of Glendale in Kane County, Utah. The site was originally recorded by the NRCS in 2013 and determined Eligible for listing on the NRHP under Criterion D for information potential (Hoffmann and Williamson 2013).

The site was previously described as a prehistoric cave (F01) and associated artifact scatter that includes lithic debris, ceramic fragments, stone tools, and a diffuse scatter of fire-cracked rock (FCR) (Hoffmann and Williamson 2013). The roof and rear of the cave are stained with possible smoke residue and covered with a pack rat midden, and one obsidian tertiary flake and four ceramic fragments were observed on the cave floor which did not appear to have been looted. Four lithic tools and three ceramic sherds were identified and formally recorded: P01 translucent marbled chert possible Nawthis Side-Notched projectile point; P02 white chert Elko Corner-notched projectile point; P03 late-stage biface with concave base; P04 possible chert drill; P05 North Creek Gray rim sherd; P06 North Creek Gray rim sherd; and P07 indeterminate Black-on-White sherd (Hoffmann and Williamson 2013). Additionally, two discrete artifact concentration areas consisting of an estimated 100 to 500 flakes of lithic debitage and 416 ceramic fragments were observed on the

slope in front of and below the cave, and a diffuse scatter of FCR and a modern fire ring were observed in an area near the mouth of the cave. Approximately 25 percent of the site was estimated to have been negatively impacted by a roadcut for nearby mining/rock quarrying activities (Hoffmann and Williamson 2013).

In 2023, Transcon recorded the cave/rockshelter (F-01) and three collector's piles (AC-01, AC-02, and AC-03) and observed a moderately dense artifact scatter with a composition generally matching the original 2013 recording. Comparing the photos taken during the original recording with the present condition reveals movement of large cobbles and small boulders and a significant loss of sediment inside the shelter. In combination with the three collector's piles, the evidence strongly suggests the rockshelter has been looted. The previously noted distinct artifact concentrations were not observed, possibly due to revegetation or looting. The previously noted area of FCR near the mouth of F-01 was relocated, accompanied by faint, ashy soil stains. No diagnostic artifacts that appeared on the original recording were relocated, and no diagnostic artifacts were recorded in 2023. Despite looting, undisturbed subsurface cultural deposits may still be preserved inside the rockshelter and on the surrounding terrace.

Transcon recommends site 42KA7537 is Eligible for listing on the NRHP under Criterion D for information potential and recommends the proposed Project will have *No Adverse Effects* to Historic Properties present and no impact, assuming certain protective measures are carried out.

42KA9789 (FS-01)

Site 42KA9789 is a newly recorded prehistoric campsite that was identified and recorded for the first time by Transcon archaeologists in 2023. The site is located at the base of a basalt terrace east of the town of Glendale in Kane County, Utah.

Transcon recorded a chert scraper (A-01), a chert biface (A-02), and a moderately dense, well-defined artifact scatter, some scattered quartzite FCR, and areas of possible ashy soil staining. No concentrations or other organization was observed, and the sediments in the area generally consist of light and dark patches further confusing the difference between natural sediment and potential culturally modified sediments. The site occupies an exposed crescent defined by basalt boulders upslope and a cheatgrass field downslope, and subsurface cultural deposit is likely preserved beneath eolian sediments trapped by vegetation.

Transcon recommends site 42KA9789 is Eligible for listing on the NRHP under Criterion D for information potential and recommends the proposed Project will have *No Adverse Effects* to Historic Properties present and no impact, assuming certain protective measures are carried out.

Isolated Occurrences

Additionally, one IO was identified within the Project area (Figures 7 and 8). IO-01 consists of a single white prehistoric chert tertiary flake of indeterminate age. IO-01 is recommended Not Eligible for listing on the NRHP under any Criteria.

<u>Conclusion and Management Recommendations:</u>

A Transcon archaeologist conducted a Class III (intensive pedestrian) and Class II (reconnaissance) cultural resources survey on October 10 and 11, 2023, of approximately 13.72 acres (2.29 miles) located on private property along County Road 2095 between County Roads 2895 and 2912 east of the Town of Glendale, in Kane County, Utah. Of the 2.29 miles (13.72 acres), approximately 5.25 acres of difficult and hazardous terrain and was evaluated to Class II (reconnaissance) survey standards. The remaining 8.47 acres were evaluated to Class III (intensive pedestrian) cultural resources inventory (survey) standards and surveyed in 15-meter-wide transects throughout the proposed Project APE. This investigation was requested by the

NRCS and KCWCD to determine if any significant cultural resources which could be affected by the proposed undertaking were present within the Project area.

As a result of the Class III/II inventory, it was determined that two cultural resource sites and one IO are located within the Project APE. Both sites (42KA7537 [*Kanab Creek Cave*] and 42KA9789) are recommended Eligible for the NRHP under Criterion D for information potential. Additionally, one isolated occurrence was identified within the Project APE (IO-01) and is recommended as Not Eligible for the NRHP under any Criteria (Table 2, *Project Summary and Conclusions*).

Transcon recommends that the Project will result in *No Adverse Effects* to Historic Properties if all ground disturbance is avoided within 15 meters of each eligible site boundary (42KA7537 and 42KA9789). If this is unavoidable, a cultural monitor should be present for all ground-disturbing activities within 15 meters of the site boundary.

TABLE 2
PROJECT SUMMARY AND CONCLUSIONS

Site Number	Site Description	Eligibility	Protective Measures
42KA7537	Prehistoric cave and artifact scatter (*Kanab Creek Cave*)	Eligible—D	Avoid all ground disturbing activities within 15 meters of the site boundary; a cultural monitor must be present during all ground disturbance within 15 meters of the site boundary, and avoidance flagging must be placed 15 meters from the site boundary prior to any construction activities near the site area.
42KA9789	Prehistoric artifact scatter	Eligible—D	Avoid all ground disturbing activities within 15 meters of the site boundary; a cultural monitor must be present during all ground disturbance within 15 meters of the site boundary, and avoidance flagging must be placed 15 meters from the site boundary prior to any construction activities near the site area.

If any previously undetected or unreported cultural features or deposits are encountered during future Project-related activities, these activities must be discontinued in the immediate area of the feature(s) and an NRCS archaeologist must be consulted to evaluate their nature and significance.

References:

Bureau of Land Management (BLM). 2023. "Cadastral Surveys and Plats" Land Records, Bureau of Land Management, Utah. Accessed August 22, 2023, at https://www.ut.blm.gov/LandRecords/search_plats.cfm.

Hoffmann, Tara S., and Andrew M. Williamson. 2013. 42KA7537 Site Form. Prepared by NRCS. On file at the Utah Division of State History.

U.S. Geological Survey (USGS). 2023. Bald Knoll, UT 7.5-Minute topographic map. Accessed September 13, 2023, at https://ngmdb.usgs.gov/topoview/viewer/#12/37.3126/-112.4379.

Utah Division of Natural Resources (DNR). 2023. UGS Aerial Imagery Collection. Accessed on September 13, 2023, at https://geodata.geology.utah.gov/imagery/.

Utah State Historic Preservation Office (USHPO). 2023. Sego. Utah Department of Heritage and Arts, Utah Division of State History. Accessed September 13, 2023, at https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8d1c8337d050431080f7dce538f7677c.

Utah State Historic Preservation Office, Historic Utah Buildings (HUB). 2023. Utah Division of State History. Accessed September 14, 2023, at: https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8e218e18c2b74477b5f520e5617bebaf.

Required Materials:

☒7.5' Quadrangle Base map(s) for Project Area (*Project Results Map*)

☐7.5' Quadrangle Base map (s) for Surveyed Area (if different than #1)



Figure 1. Project overview showing the top of a basalt ridge in the survey area above site 42KA7537. View to the east-northeast. Photo taken 10/11/2023.



Figure 2. Project overview showing the survey APE on top of the basalt ridge and slope excluded areas of the ridge. View to the southwest. Photo taken 10/11/2023.



Figure 3. Project overview showing the survey APE in the foreground. View to the southeast. Photo taken 10/11/2023.

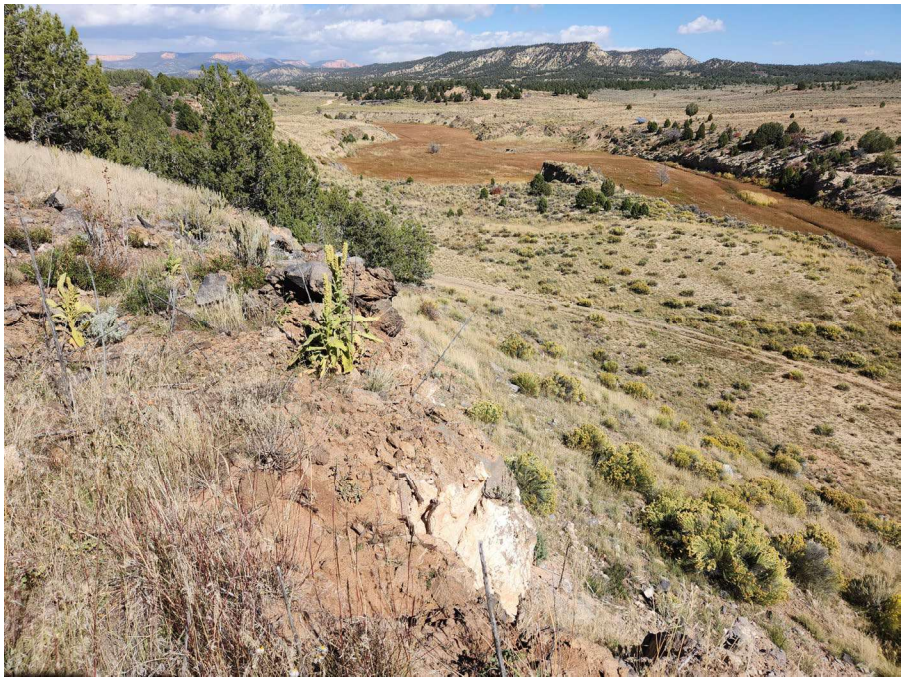


Figure 4. Project overview in the survey APE showing slope excluded Class II area in the survey area from the basalt ridge top. View to the northeast. Photo taken 10/11/2023.



Figure 5. Project overview showing a slope excluded area in the central survey area from the ridge top. View to the south. Photo taken 10/11/2023.



Figure 6. Project overview showing a large slope excluded area from the ridge top in the central survey area. View to the north. Photo taken 10/11/2023.

Figure 7. Overview showing IO-01, prehistoric chert flake. View to the northwest. Photo taken 10/10/2023.

Figure 8. Detail showing IO-01, prehistoric chert flake. Photo taken 10/10/2023.

APPENDIX A

PROJECT RESULTS MAP

APPENDIX B

RESULTS OF LITERATURE REVIEW

September 3, 2026

Tara S. Hoffmann
Water and Cultural Resources Specialist
Natural Resources Conservation Service
Wallace F. Bennett Federal Building
125 State Street #6416
Salt Lake City, Utah 84138

RE: Kane County Water Conservancy District's Cove Reservoir Project—Cultural Resources Review Memo, Indirect Breach Inundation/Visual Areas of Potential Effect (APEs)

Dear Ms. Hoffmann:

Pursuant to your request, Eocene Environmental Group, Inc. (Eocene, formerly Transcon Environmental, Inc.) is pleased to present this Cultural Resources Review Memo as part of the desktop *Breach Inundation/Visual Areas of Potential Effect analysis for the Kane County Water Conservancy District's Cove Reservoir Project* (Project) in Kane County, Utah. The purpose of this desktop review is to, prior to construction design finalization, identify cultural resources within the Indirect Breach Inundation/Visual Project Areas of Potential Effect (APE) that may be impacted by the proposed Project.

The Natural Resources Conservation Service (NRCS) and Kane County Water Conservancy District (KCWCD) are proposing to construct the new Cove Reservoir within the existing Glendale, Mt. Carmel, and Orderville irrigation systems. This proposed reservoir would be located immediately southwest of Orderville, Utah, off Cove Road. Additional improvements would include the construction of approximately 1.5 miles of new pipeline, the Glendale hydroelectric power plant, and 0.2 miles of new power line and 0.7 acres of utility corridor along United States Highway 89 (US-89) and Cove Road; these improvements would be located west of US-89 and the East Fork of the Virgin River in Glendale, Utah. The Project also proposes the potential use of three previously disturbed borrow pits—Lambs Pit, Tait Pit, and Esplin Pit—for Project-related construction needs. Use of the three existing borrow pits for construction of the earthen-fill dam is expected to result in the disturbance of an estimated 5.7 acres. Lambs Pit and Tait Pit would require permanent disturbance of approximately 0.5 acres or 0.7 acres, respectively. Only one of these pits would be selected for the project, and along with approximately 5.0 acres of permanent disturbance from the Esplin Pit, no disturbance outside the previously disturbed areas is proposed at these borrow pit locations.

The NRCS has identified four distinct APEs for the entire proposed Project, including the Direct APE, the Visual APE, and two Indirect Breach Inundation APEs (Sunny Day APE/ Rainy Day APE), all of which partially overlap each other (see **Appendix A**). Cultural resources within the Direct APE have previously been inventoried and evaluated and are not considered as part of this review. The two Indirect Breach Inundation APEs (Sunny Day APE/ Rainy Day APE) consist of unbuffered breach inundation zones which include the proposed Cove Reservoir area and the

individual downstream inundation zones, and the Visual APE consists of a 1-mile buffer around the proposed Cove Reservoir, which does not include the borrow pits or pipeline areas as only the proposed Cove Reservoir and the inundation zone will require a visual analysis (**Appendix A**).

Alpha Engineering retained Eocene to conduct a Class I cultural resources evaluation of the proposed Project Indirect Breach Inundation APEs/Visual APE (see below). A background research literature review was conducted on July 15, 2026, through the Utah State Historic Preservation Office's (SHPO) Sego and Utah Digital Asset Manager online cultural resources databases. The results of this literature review indicate there are a total of 158 previously conducted cultural resource surveys that cover 100 percent of the Direct APE, approximately 40 percent of the Visual APE, approximately 32.3 percent of the Sunny Day APE, and approximately 31.4 percent of the Rainy Day APE. Additionally, the APEs encompass 97 previously recorded cultural resource sites and 20 historic structures.

A review of these previously recorded sites and structures within the various Project APEs indicates that none of them would require a formal Visual Effects Analysis as they would not be subject to adverse visual or indirect impacts from the implementation of the Project. Therefore, the recommended determination of effect for both the Visual and Indirect Breach Inundation APEs is *No Adverse Effect*.

If you have any questions regarding this this desktop review, please contact me directly at (801) 649-5141, extension 310, or levenson@eocene.com.

Sincerely,



Lindsey M. Evenson
Regional Manager, Region 20
Cultural Resources Program Manager | Senior Archaeologist
Eocene Environmental Group, Inc.

PROJECT DESCRIPTION

The NRCS and KCWCD are proposing to construct the new Cove Reservoir within the existing Glendale, Mt. Carmel, and Orderville irrigation systems. This proposed reservoir would be located immediately southwest of Orderville, Utah, off Cove Road. Additional improvements would include the construction of approximately 1.5 miles of new pipeline, the Glendale hydroelectric power plant, and 0.2 miles of new power line and 0.7 acres of utility corridor along US-89 and Cove Road; these improvements would be located west of US-89 and the East Fork of the Virgin River in Glendale, Utah. The Project also proposes the potential use of three previously disturbed borrow pits—Lambs Pit, Tait Pit, and Esplin Pit—for Project-related construction needs; no disturbance outside the previously disturbed areas is proposed at these borrow pit locations.

The NRCS has identified four distinct APEs for the entire proposed Project, including the **Direct APE**, the **Visual APE,** and two Indirect Breach Inundation APEs (**Sunny Day APE/ Rainy Day APE**), which partially overlap each other. The NRCS also determined that no other visual or atmospheric impacts would occur from Project implementation. There may be temporary auditory effects caused by rock quarrying activities at the Esplin Pit, as raised by the Moapa Band of Paiute Indians, which have been consulted on and accounted for by the NRCS (see **Appendix A**). The Direct APE consists of the proposed Cove Reservoir (buffered), pipelines, and three borrow pits (Esplin, Lambs, and Tait). The two Indirect Breach Inundation APEs (Sunny Day APE/ Rainy Day APE) consist of unbuffered breach inundation zones which include the proposed Cove Reservoir area and the individual downstream inundation zones, and the Visual APE consists of a 1-mile buffer around the proposed Cove Reservoir, which does not include the borrow pits or pipeline areas as only the proposed Cove Reservoir and the inundation zone will require a visual analysis.

Alpha Engineering retained Eocene to conduct a cultural resources evaluation (desktop literature review) of the proposed Project Indirect APE/Visual APE. The evaluation was requested by Alpha Engineering to determine if any significant cultural resources that could be affected by the proposed Project are present within the Indirect APE/Visual APE. Important cultural resources may include historic or prehistoric archaeological sites or objects; historically or architecturally significant structures, buildings, or landscapes; and traditional cultural places (TCPs) that are or could be considered eligible for inclusion in the National Register of Historic Places (NRHP).

PROJECT AREA OF POTENTIAL EFFECT LOCATIONS AND DIMENSIONS

The entire Project APE is generally located southwest of Orderville, south and east of Glendale, and within and south of Mount Carmel in Kane County, Utah (**Appendix A**). The proposed Project consists of the Direct, Indirect Breach Inundation (Sunny Day APE/ Rainy Day APE), and Visual APEs, which overlap in some areas.

The Direct APE totals approximately 712.46 acres, including 0.23 acres of Bureau of Land Management (BLM) Kanab Field Office (KFO)–managed lands, 70.33 acres of Utah Trust Lands Administration (TLA)–managed lands, and 641.90 acres of privately owned lands. The Direct APE is located within portions of Township 40 South, Range 6 West, Section 35; Township 40 South, Range 7 West, Sections 23, 26, and 27; and Township 41 South, Range 7 West, Sections 5, 6, 8, 9, 17, 18, and 19 of the Salt Lake Baseline and Meridian and crosses the Bald Knoll, Glendale, Orderville, and Mount Carmel, Utah, United States Geological Survey (USGS) 7.5-minute topographic quadrangle maps (USGS 2026).

The Sunny Day Indirect Breach Inundation APE totals approximately 3,122.63 acres, including 1,147.18 acres of BLM-managed lands, 181.85 acres of TLA-managed lands, 77.27 acres of National Park Service (NPS)–managed lands, 0.92 acres of Utah State Parks–managed land, and 1,715.41 acres of privately owned lands. The Sunny Day APE is located within portions of Township 41 South, Range 7 West, Sections 4, 5, 6, 8, 9, 17, 18, 19, and 30; Township 41 South, Range 8 West, Sections 24, 25, 34, 35, and 36; Township 41 South, Range 9.5 West, Sections 31 and 32; Township 41 South, Range 10 West, Section 36; Township 41 South, Range 11 West, Sections 30, 31, 32, 33, and 34; Township 41 South, Range 12 West, Sections 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, and 30; Township 41 South, Range 13 West, Sections 20, 21, 22, 23, 25, 26, 27, 28, 29, and 30; Township 41 South, Range 14 West, Sections 25, 35, and 36; Township 42 South, Range 8 West, Sections 2, 3, 4, 5, 6, 7, 8, 9, and 10; Township 42 South, Range 9 West, Sections 3, 4, 5, 6, 8, 9, 10, 11, 12, and 14; Township 42 South, Range 10 West, Sections 1, 2, 3, 3, 4, 5, 6, 9, and 10; Township 42 South, Range 11 West, Sections 1, 2, 3, 4, and 5; and Township 42 South, Range 14 West, Sections 1, 2, 10, and 11 of the Salt Lake Baseline and Meridian and crosses the Springdale East, Springdale West, Virgin, Hurricane, Harrisburg Junction, Mount Carmel, Orderville, and The Barracks, Utah, USGS 7.5-minute topographic quadrangle maps (USGS 2026).

The Rainy Day Indirect Breach Inundation APE totals approximately 3,892.76 acres, including 1,403.92 acres of BLM-managed lands, 192.38 acres of TLA-managed lands, 77.34 acres of NPS-managed lands, 0.92 acres of Utah State Parks–managed land, and 2,218.20 acres of privately owned lands. The Rainy Day APE is located within portions of Township 41 South, Range 7 West, Sections 4, 5, 6, 8, 9, 17, 18, 19, and 30; Township 41 South, Range 8 West, Sections 24, 25, 34, 35, and 36; Township 41 South, Range 9.5 West, Sections 31 and 32; Township 41 South, Range 10 West, Section 36; Township 41 South, Range 11 West, Sections 30, 31, 32, 33, and 34; Township 41 South, Range 12 West, Sections 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, and 30; Township 41 South, Range 13 West, Sections 20, 21, 22, 23, 25, 26, 27, 28, 29, and 30; Township 41 South, Range 14 West, Sections 25, 35, and 36; Township 42 South, Range 8 West, Sections 2, 3, 4, 5, 6, 7, 8, 9, and 10; Township 42 South, Range 9 West, Sections 3, 4, 5, 6, 8, 9, 10, 11, 12, and 14; Township 42 South, Range 10 West, Sections 1, 2, 3, 3, 4, 5, 6, 9, and 10; Township 42 South, Range 11 West, Sections 1, 2, 3, 4, and 5; Township 42 South, Range 14 West, Sections 1, 2, 10, 11, 15, 16, 19, 20, and 21; Township 42 South, Range 15 West, Sections 22, 23, 24, 26, 27, 28, 31, 32, and 33; Township 43 South, Range 15 West, Section 6; Township 43 South, Range 16 West, Sections 1, 12, 13, 14, 15, 20, 21, 22, 28, 29, and 30; and Township 43 South, Range 17 West, Sections 25 and 36 of the Salt Lake Baseline and Meridian and crosses the Springdale East, Springdale West, Virgin, Hurricane, Harrisburg Junction, Mount Carmel, Orderville, The Barracks, Washington Dome, St George, White Hills, and Washington, Utah, USGS 7.5-minute topographic quadrangle maps (USGS 2026).

The Visual APE totals approximately 4,952.29 acres, including 245.00 acres of BLM–managed lands, 1,698.01 acres of TLA-managed lands, and 3,009.28 acres of privately owned lands. The Visual APE is located within portions of Township 40 South, Range 7 West, Sections 31, 32, and 33; Township 40 South, Range 8 West, Section 36; Township 41 South, Range 7 West, Sections 4, 5, 6, 7, 8, and 9; and Township 41 South, Range 8 West, Sections 1 and 2 of the Salt Lake Baseline and Meridian and crosses the Orderville, Utah, USGS 7.5-minute topographic quadrangle map (USGS 2026).

TABLE 1. TOTAL PROJECT AREAS						
Area of Potential Effect	**BLM**	**NPS**	**State**	**USP**	**Private**	**Total**
Sunny Day APE Acreage (Indirect Breach Inundation Areas)	1,147.18	77.27	181.85	0.92	1,715.41	**3,122.63**
Rainy Day APE Acreage (Indirect Breach Inundation Areas)	1,403.92	77.34	192.38	0.92	2,218.20	**3,892.76**
Visual APE Acreage (1 Mile Buffer of Cove Reservoir and Facilities)	245.00	0.00	1,698.01	0.00	3,009.28	**4,952.29**
Direct APE Acreage (Cove Reservoir, Pipes, Canals, Esplin Pit, Tait Pit, Lamb's Pit)	0.23	0.00	70.33	0.00	641.9	**712.46**

INDIRECT AREAS OF POTENTIAL EFFECT AND VISUAL AREA OF POTENTIAL EFFECT ASSESSMENT

The NRCS has identified four distinct APEs for the entire proposed Project, including the **Direct APE**, the **Visual APE**, and two **Indirect Breach Inundation APEs** (**Sunny Day APE/ Rainy Day APE**), which partially overlap each other (**Appendix A**). The Direct APE consists of the proposed Cove Reservoir (buffered), pipelines, and three borrow pits (Esplin, Lambs, and Tait); these areas were inventoried and documented in **U18TN0544** Cultural Resources Inventory Report (CRIR), KCWCD's Cove Reservoir Project; **U21TN0840** CRIR, KCWCD's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah—Addendum to CRIR; KCWCD's Cove Reservoir Project (U18TN0544), Kane County, Utah; and **U23TN0682** CRIR, KCWCD's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah: Esplin Pit Evaluation. Effects to resources within the Direct APE are considered in these reports and impacts from indirect (Breach Inundation Zones: Sunny Day and Rainy Day APEs) and visual effects are considered for this review (**Appendix A**).

Section 106 of the National Historic Preservation Act requires federal agencies to consider the impacts, including visual impacts, of their undertakings on the ability of certain historic properties to convey their historic significance. Under the National Environmental Policy Act of 1969, federal agencies must consider visual impacts of proposed projects, including potential effects on historic properties, scenic resources, and the scenic experiences of people who view the landscape.

Auditory impact-causing elements for the Direct Project APE may include the use of heavy machinery and construction of Project components. Auditory effects may also result from vibrations that could cause damage to prehistoric or historic structures, such as cracks in prehistoric or historic foundations, wall fall within prehistoric or historic structures, or damage to prehistoric rock art or historic inscriptions. Atmospheric impact-causing elements may include coarse particles, such as dust, from road use, digging, grading, drilling, construction activities, or construction lighting, which interfere with the view of the sky. Environmental degradation due to certain construction activities, excavating, and vegetation clearing may also change the land surface, which can contribute to increased atmospheric pollution. Visual effects can result from

the development of relatively permanent, aboveground infrastructure, which can require a Visual Effect Assessment (VEA).

Atmospheric and auditory effects resulting from the implementation of this Project would be temporary during construction and will not be considered for this review. There may be some additional auditory effects from recreation at the reservoir, which were considered by the NRCS during tribal consultations and no concerns were raised. There may be temporary auditory effects caused by rock quarrying activities at the Esplin Pit, as raised by the Moapa Band of Paiute Indians, which have been consulted on and accounted for by the NRCS (see **Appendix A**). Potential hydrologic effects from Project implementation would likely be minimal as water output flows would remain the same; however, these effects may also be considered in a separate review.

Due to the varied geography surrounding the reservoir, a Visual APE of 1 mile around the periphery of the proposed Cove Reservoir was evaluated for potential visual resources that could be impacted by the current undertaking; however, it was only applicable to certain site types and sites that are unevaluated, considered Eligible for listing on the NRHP, and/or tribally sensitive sites that would be both visible to the undertaking and possess setting as a contributing aspect of their NRHP eligibility (**Table 2**). Additionally, site types that typically do not include viewshed as a component contributing to NRHP eligibility include prehistoric quarries, earthen dams or reservoirs, irrigation canals, historic mines or mine openings without associated structures, historic roads, railroads without associated structures, and telegraph lines because visual setting is not considered a critical attribute of their general historical setting and because some of these structures are often integrated into developed landscapes. As such, these site types do not generally include visual setting as an aspect of integrity for NRHP consideration since they are not experienced in association with any particular past landscape (Sullivan et al. 2018).

The inundation zones for the Sunny Day and Rainy Day scenarios were calculated using Hydrologic Engineering Center's River Analysis System (HEC-RAS), developed by the United States Army Corps of Engineers. HEC-RAS is designed to perform one- and two-dimensional hydraulic calculations for a full network of natural and constructed channels. A reservoir breach could impact various cultural resources, including prehistoric and historic sites, structures, landscapes, and artifacts within the Indirect Breach Inundation APEs (Sunny Day APE/ Rainy Day APE). These resources could be directly impacted by the breach due to inundation or damage from debris or indirectly by changes to the surrounding environment.

TABLE 2.
SITE TYPE CRITERIA FOR INCLUSION IN VISUAL IMPACT ASSESSMENT*

Prehistoric	Historic
Petroglyphs	Historic Inscriptions
Pictographs	Historic Scenic Overlooks
Prehistoric Dendroglyphs	Historic Dendroglyphs
Prehistoric Cairns	Historic Cairns
Prehistoric Architectural Sites	Historic Architectural Sites
Prehistoric Scenic Roads/Trails	Historic Scenic Roads/Trails
Prehistoric rockshelters	Architectural Districts on a case-by-case basis

TABLE 2. SITE TYPE CRITERIA FOR INCLUSION IN VISUAL IMPACT ASSESSMENT*	
Prehistoric	**Historic**
Prehistoric, Historic, Ethnohistoric, or Multi-Component	
National Historic Trails – Contributing Segments and High Potential Sites	
National Historic Landmarks	
Historic properties of traditional religious or cultural importance to Indian Tribes	
Traditional Cultural Properties	
Cultural resources identified by consulting parties as requiring a visual impact assessment	
Previously recorded cultural resources that have insufficient information and have a high likelihood of having character-defining features susceptible to visual effects	
Unrecorded cultural resources that have a high likelihood of having character-defining features susceptible to visual effects (e.g., sites that are identified through historic research)	
Unrecorded Utah Rock Art Research Association (URARA) cultural resource locations as displayed in the Utah SHPO Sego Application	
*Note: Site types which may be included in a visual impact assessment include sites that are Unevaluated, Eligible, or Listed sites on the NRHP.	

LITERATURE REVIEW

Eocene archaeologists conducted a desktop background research literature review for the Project APEs on July 15, 2026. Records on file with the Utah SHPO's Sego and Utah Digital Asset Manager (UDAM) online cultural resources databases were checked to determine if previously identified cultural resources are present within the various APEs (USHPO 2026a, 2026b). The results of this review indicate there are a total of 158 previously conducted cultural resource surveys crossing portions of these APEs (**Table 3**), there are 96 previously recorded cultural resource sites within all four overlapping Project APEs (**Table 4**), and there are 20 previously identified historic structures within the Indirect Breach Inundation APEs (Sunny Day APE/ Rainy Day APE) and Visual APEs (**Table 5**).

CULTURAL RESOURCE SURVEYS

Background research identified 158 previously conducted cultural resource surveys that overlap the various APEs within the proposed Project APE (**Table 3**). These previous surveys completely cover the Direct APE, cover approximately 40 percent of the Visual APE, approximately 32.3 percent of the Sunny Day APE, and approximately 31.4 percent of the Rainy Day APE (USHPO 2026a, 2026b).

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U70UA0003	An Archaeological Survey of The Dixie Reclamation Project	University of Utah, Archaeological Center (U of U)	1970	Sunny/ Rainy Day APEs
U73UA0008	LaVerkin Springs Disposal Facilities	U of U	1973	Sunny/ Rainy Day APEs

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U75AF0049	Long Valley Improvement Project	Archaeological-Environmental Research Corporation (AERC)	1975	Direct/ Visual/ Sunny/ Rainy Day APEs
U77AF0068	Cultural Resource Evaluation in South Central Utah	AERC	1977	Sunny/ Rainy Day APEs
U77IG0076	LaVerkin Springs Project	Intersearch, Inc.	1977	Sunny/ Rainy Day APEs
U78AF0322	Long Valley/Mt. Carmel Junction Locality	AERC	1978	Sunny/ Rainy Day APEs
U78AF0429	Mt Carmel Habitation 42 Ka 1958	AERC	1978	Sunny/ Rainy Day APEs
U79BL0092	K. S. Anderson Ag. Trespass	BLM	1979	Direct APE
U79SE0334	St. George Industrial Park	International Learning and Research , Inc .	1979	Rainy Day APE
U79BL0101	Sharon Lamb Ag. Trespass	BLM	1979	Sunny/ Rainy Day APEs
U80BL0116	Mtn. Bell R/W	BLM	1980	Sunny/ Rainy Day APEs
U80BL0126	Dixie Project Revocation EAR	BLM	1980	Sunny/ Rainy Day APEs
U80BL0524	Marsing Fence	BLM	1980	Sunny/ Rainy Day APEs
U81BL0166	Hurricane American Legion R&PP	BLM	1981	Sunny/ Rainy Day APEs
U82IG0163	Quail Creek Project	Intersearch, Inc.	1982	Sunny/ Rainy Day APEs
U83BL0553	Little Man Archaeological Sites: Excavations	BLM	1983	Sunny/ Rainy Day APEs
U83NH0165	Alton - Kolob Class II	Nickens and Associates	1983	Visual APE
U84BC0931	39.5 kv Diversion Dam Control Power Line	Brigham Young University (BYU), Office of Public Archaeology	1984	Sunny Day APE
U84BC0924	Three Powerline Routes in Iron & Washington Co.	BYU	1984	Sunny/ Rainy Day APEs
U84BL0669	Mt. Carmel Junction Land Sale	BLM	1984	Sunny/ Rainy Day APEs
U85IG0288	Survey Along SR-9 Virgin to Coalpits Wash	Intersearch, Inc.	1985	Sunny/ Rainy Day APEs
U86BC0015	An Archaeological Survey Of A Proposed 245kV Powerline Corridor In Southwest Washington County, Utah	BYU	1986	Rainy Day APE
U86IG0377	Nichols Peak Road	Intersearch, Inc.	1986	Rainy Day APE

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U86IG0794	St. George Culinary Line/Site Testing (2 repts.)	Intersearch, Inc.	1986	Rainy Day APE
U86IG0884	Excavations at Quail Creek	Intersearch, Inc.	1986	Sunny/ Rainy Day APEs
U86NA0882	Archaeological Investigations at Zion Nat. Park	NPS	1986	Sunny/ Rainy Day APEs
U86SE0347	Tree's Ranch Survey	Southern Utah University	1986	Sunny/ Rainy Day APEs
U86UC0142	State Lands Chaining - Muddy Creek	Antiquities Section, Utah Division of State History	1986	Visual APE
U87BC0136	St. George Water Treatment Facility	BYU	1987	Rainy Day APE
U88NP0024	Mtn. Fuel Cedar City to Ivins Pipeline	Nielson Consulting, Inc.	1988	Sunny/ Rainy Day APEs
U88PD0524	I-15 to Virgin River	P-III Associates	1988	Sunny/ Rainy Day APEs
U89BL0514	Falls Right-of-Way Realignment	BLM	1989	Direct APE
U89SJ0551	BioWest Bridge Across Virgin River	Sagebrush Archaeological Consultants	1989	Rainy Day APE
U89BL0015	Foote Ranch Wilderness Trespass	BLM	1989	Sunny/ Rainy Day APEs
U89BL0796	Hurricane Golf Course Exchange	BLM	1989	Sunny/ Rainy Day APEs
U90NP0344	UAMPS Middleton to Riverbottom 138KV	Nielson Consulting, Inc.	1990	Rainy Day APE
U90A10345	Data Recovery at Sites 42Ws54 & 42Ws1226--SR9	Alpine Archaeological Consultants (Alpine)	1990	Sunny/ Rainy Day APEs
U91IG0669	Dixie-Escalante Powerline	Intersearch, Inc.	1991	Rainy Day APE
U91NP0224	UAMPS Alt Lines vic. St. George & Middleton	Nielson Consulting, Inc.	1991	Rainy Day APE
U91A10794	Zion National Park Assessment	Alpine	1991	Sunny/ Rainy Day APEs
U91BL0018	East Fork Access Road Right-of-Way	BLM	1991	Sunny/ Rainy Day APEs
U91BL0507	North Steep Trails Fence	BLM	1991	Sunny/ Rainy Day APEs
U91NP0788	Quail Crk/Virgin R Bridge Borrow & Stag Areas	Nielson Consulting, Inc.	1991	Sunny/ Rainy Day APEs
U92UJ0622	SCS Muddy Creek-Orderville Chaining	Utah State University	1992	Direct/ Visual/ Sunny/ Rainy Day APEs
U92IG0094	S Central Utah Tel/AZ-Mt Carmel Jct	Intersearch, Inc.	1992	Sunny/ Rainy Day APEs

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U92IG0604	Wal-Mart Utilities, Harrisburg Junction	Intersearch, Inc.	1992	Sunny/ Rainy Day APEs
U93IG0624	Springdale Sewer Pipeline and Lagoons	Intersearch, Inc.	1993	Sunny/ Rainy Day APEs
U94AS0012	UDOT SR 9 & SR 17 vic. Hurricane and LaVerkin	Abajo Archaeology	1994	Sunny/ Rainy Day APEs
U94IG0133	S Centr Utah Telephone, Mt. Carmel Jct to Zion NP	Intersearch, Inc.	1994	Sunny/ Rainy Day APEs
U94NA0123	Parunaweap 1994 Historical Survey	NPS (Rocky Mountain Region)	1994	Sunny/ Rainy Day APEs
U94NP0152	UAMPS Quail Creek 69KV Line	Nielson Consulting, Inc.	1994	Sunny/ Rainy Day APEs
U95BL0792	Desert Tortoise Exchange Tract DTX-33	BLM	1995	Sunny/ Rainy Day APEs
U95US0020	Springdale Wastewater	Division of Water Quality	1995	Sunny/ Rainy Day APEs
U96BL0132	Parunweap Canyon Community Trail Rides	BLM	1996	Rainy Day APE
U98ST0307	Muddy Wash Bridge Replacement (UDOT)	SWCA Environmental Consultants	1998	Direct/ Sunny/ Rainy Day APEs
U98BL0735	Webb Hill Fish Barrier	BLM	1998	Rainy Day APE
U98BL0311	Virgin Falls Park	BLM	1998	Sunny/ Rainy Day APEs
U98BL0813	Virgin River/Ash-La Verkin Creeks Confluence-Evaluation	BLM	1998	Sunny/ Rainy Day APEs
U99CH0014	Southgate Ridge 120 Acres	Complete Archaeological Service Associates	1999	Rainy Day APE
U99JB0398	Two Trails across the Virgin River	JBR Environmental Consultants Inc.	1999	Rainy Day APE
U99MQ0200	UDOT St. George Southern Corridor	Montgomery Archaeological Consultants (MOAC)	1999	Rainy Day APE
U99MQ0322	St. George River Road	MOAC	1999	Rainy Day APE
U99IG0156	Alpha Sheep Bridge Road	Intersearch, Inc.	1999	Sunny/ Rainy Day APEs
U00BL0749	East Fork Of The Virgin River Inventory	BLM	2000	Sunny/ Rainy Day APEs
U00IG0317	Sunroc-Gravel Storage and Production Area Survey	Intersearch, Inc.	2000	Sunny/ Rainy Day APEs
U02BC0775	Quail Creek to Snow Canyon Waterline	BYU	2002	Rainy Day APE
U02IG0267	Landmark-Virgin River Trail Phase III	Intersearch, Inc.	2002	Rainy Day APE
U03ES1130	Materials Pit Expansion East of ST George for ADOT	EnviroSystems Management, Inc.	2003	Rainy Day APE

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U04BS1097	Hurricane City/Sand Hollow R&PP Lease Project	Baseline Data Inc.	2004	Rainy Day APE
U04HQ0847	Data Recovery on 42Ws2556	HRA, Inc. Conservation Archaeology	2004	Rainy Day APE
U04BL0873	Virgin Falls Fuel Reduction	BLM	2004	Sunny/ Rainy Day APEs
U05BS0397	Virgin River Trail	Baseline Data Inc.	2005	Rainy Day APE
U05MQ0662	UDOT's Arizona Stateline to Middleton	MOAC	2005	Rainy Day APE
U06HO1371	Orderville Water System Improvements	Bighorn Archaeological Consultants (Bighorn)	2006	Direct/ Visual/ Sunny/ Rainy Day APEs
U06HO0789	Virgin River Trail PII	Bighorn	2006	Rainy Day APE
U07HO0245	DEREA Black Roct To Beaver Dam Powerline Corridor	Bighorn	2007	Rainy Day APE
U07MX0929	South Bloomington/Sun River Trail	McFadden Archaeological Consulting	2007	Rainy Day APE
U07BL0025	Foot Ranche Powerline ROW	BLM	2007	Sunny/ Rainy Day APEs
U07HO1381	CRI Of The Orderville Water System Improvements Alternative Near Mt. Caramel Junction	Bighorn	2007	Sunny/ Rainy Day APEs
U08BL0450	Shinob Kibe Riparian Treatment	BLM	2008	Rainy Day APE
U08HO0032	CRI of the Warner Valley Reservoir	Bighorn	2008	Rainy Day APE
U08HO0783	Mall Drive Bridge Projects	Bighorn	2008	Rainy Day APE
U08UI1219	Washington Fields Roads	URS Corporation	2008	Rainy Day APE
U08BL1278	Parunuweap Canyon Inventory	BLM	2008	Sunny/ Rainy Day APEs
U08MX0948	Parunuweap Survey	Cultural Site Management and Research	2008	Sunny/ Rainy Day APEs
U08SH1091	Three Emergency Watershed Protection (EWP) Locations	NRCS	2008	Sunny/ Rainy Day APEs
U09SJ0115	Lake Powell Pipeline Project	Commonwealth Heritage Group, Inc. (formerly known as Sagebrush Consultants)	2009	Sunny/ Rainy Day APEs
U10LI0939	St. George Travel Management Plan	Logan Simpson Design Inc.	2010	Rainy Day APE
U10UQ0013	Virgin River Riparian Restoration Project #1656	Utah Division of Wildlife Resources	2010	Rainy Day APE

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U10BL0068	An Archaeological Inventory Of The P.U.B. (Morby) Virgin River Exchange, Washington County, Utah	BLM	2010	Sunny/ Rainy Day APEs
U10HO0027	UDOT Bridges Project	Bighorn	2010	Sunny/ Rainy Day APEs
U11HO0853	A Cultural Resource Inventory Of The City Of St. George 2011 Trails Restoration Project, Washington County, Utah	Bighorn	2011	Rainy Day APE
U11HO1029	A Cultural Resource Inventory Of The I-15 Milepost 0-16 Highway Improvements, Washington County, Utah	Bighorn	2011	Rainy Day APE
U11HO1116	A Cultural Resource Inventory Of The Questar Gas Company Virgin River Pipeline Replacement, Washington County, Utah	Bighorn	2011	Rainy Day APE
U11LI0017	St. George Virgin River Trail Segment C	Logan Simpson Design Inc.	2011	Rainy Day APE
U11SH0004	CRI For The Upper Virgin River Emergency Watershed Protection Project	NRCS	2011	Sunny/ Rainy Day APEs
U11UM0953	The East Fork And Yellow Jacket Canyon Re-seeding Project, Kane County, Utah	State of Utah School and Institutional Trust Lands Administration (SITLA)	2011	Sunny/ Rainy Day APEs
U12SH0189	CRI Of Kane County Emergency Watershed Protection	NRCS	2012	Direct/ Sunny/ Rainy Day APEs
U12HO1100	A Cultural Resource Inventory Of The Virgin River Trail, Phase III Corridor, Washington County, Utah	Bighorn	2012	Rainy Day APE
U12SH0272	Cultural Resources Inventory For Washington County 2012 Emergency Watershed Protection Project	NRCS	2012	Sunny/ Rainy Day APEs
U13SH0294	A Supplemental Cultural Resources Inventory Of Emergency Watershed Protection (EWP) Locations Along The East Fork Of The Virgin River, Kane County, Utah	NRCS	2013	Visual/ Sunny/ Rainy Day APEs
U13SH0167	Cultural Resources Inventory Of The Kane County Emergency Watershed Protection (EWP) Project Rock Quarry Location On Kanab Creek, Kane County, Utah	NRCS	2013	Direct APE
U13UT0901	Mall Drive Bridge Cultural Resources Inventory II	Utah Department of Transportation (UDOT; Region 4)	2013	Rainy Day APE

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U13BL0579	2013 Grand To Grand Stage Race Inventory	BLM	2013	Sunny/ Rainy Day APEs
U13SH0047	Cultural Resources Inventory Of The Grafton Heritage Partnership Wildlife Habitat Improvement Program (WHIP) Project, Washington County, Utah	NRCS	2013	Sunny/ Rainy Day APEs
U13SH1057	Cultural Resources Inventory Of The Esplin Wildlife Habitat Improvement Project, Kane County, Utah	NRCS	2013	Sunny/ Rainy Day APEs
U13SH1071	Cultural Resources Inventory Of The Fasselin Wildlife Habitat Improvement Project, Washington County, Utah	NRCS	2013	Sunny/ Rainy Day APEs
U13IG0529	Caruso-SITLA Emerald Green Mine Survey In Kane County	Intersearch, Inc.	2013	Visual APE
U14SH0315	Cultural Resources Inventory Of The Tait Land And Livestock, LLC Wildlife Habitat Improvement Project, Kane County, Utah	NRCS	2014	Visual/ Sunny/ Rainy Day APEs
U14SH0327	Supplemental Site Documentation And Archaeological Monitoring Summary For The Kane County Emergency Watershed Protection (EWP) Project Rock Quarry, Kane County, Utah	NRCS	2014	Direct APE
U14HO0043	A Cultural Resource Inventory For The Long Valley Sewer Improvement District Waste Water System Upgrade Project, Kane County, Utah	Bighorn	2014	Direct/ Visual/ Sunny/ Rainy Day APEs
U14HO0647	A Cultural Resource Inventory Of The Virgin River Stream Restoration Project, Washington County, Utah	Bighorn	2014	Rainy Day APE
U14HO1019	A Cultural Resource Inventory Of The Dixie Center Erosion Protection Project, Washington County, Utah	Bighorn	2014	Rainy Day APE
U14SH0668	Cultural Resources Inventory Of The Great Western Investments Environmental Quality Improvement Project, Washington County, Utah	NRCS	2014	Sunny/ Rainy Day APEs
U15LI0488	A Class III Cultural Resources Inventory Of 3,686 Acres For The Cottonwood Springs Vegetation Project, Kane County, Utah	Logan Simpson Design Inc.	2015	Direct APE
U15HO0924	A Cultural Resource Inventory Of The Virgin River South Trail - Phase I, Washington County, Utah	Bighorn	2015	Rainy Day APE

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U15LI0528	A Class III Cultural Resources Inventory of 275 Miles of the Western Transmission System, from the Navajo Generating Station in Page, Coconino County, Arizona, to the McCullough Substation near Henderson, Clark County, Nevada	UDOT (Region 4)	2015	Rainy Day APE
U15TD0791	A CRI Of 4 Acres For Questar's FL121 Pipeline Construction Project, Washington, Utah	Tetra Tech	2015	Rainy Day APE
U15EZ0146	An Archaeological Inventory Of The Proposed First Digital Telecom Fiber Optic Project, Along Highway SR-9 In Springdale, Washington County, Utah	EnviroWest LLC	2015	Sunny/ Rainy Day APEs
U16HO0559	A Cultural Resource Inventory Of The Lizzy Lane Sewer Replacement, Virgin River And Fort Pearce Wash Crossings, Washington County, Utah	Bighorn	2016	Rainy Day APE
U16HX0170	An Archaeological Investigation For The Purgatory Road Environmental Assessment, Washington, Utah	Horrocks Engineers	2016	Rainy Day APE
U16HY0406	A CRA For The Virgin River Coridor In St. George, Washington County, Utah	Certus Environmental Solutions, LLC (Certus)	2016	Rainy Day APE
U17HO0675	A Cultural Resource Inventory Of The US-89 Milepost 82-83 Highway Improvements Project, Kane County, Utah	Bighorn	2017	Direct/ Sunny/ Rainy Day APEs
U17BE1154	2017 Annual Report for the Programmatic Agreement between the Bureau of Reclamation and the Utah SHPO Regarding NHPA Responsibilities for Minor Agency Projects	United States Department of the Interior, Bureau of Reclamation	2017	Sunny/ Rainy Day APEs
U17HQ0992	Class III Cultural Resource Survey Of Off-highway Vehicle Routes In The Kanab Field Office: Trail Canyon Travel Management Area	HRA, Inc. Conservation Archaeology	2017	Sunny/ Rainy Day APEs
U17HY0265	An Archaeological Assessment For The Rockville Bridge Structure Rehabilitation, Washington County, Utah	Certus	2017	Sunny/ Rainy Day APEs
U17TN0772	Cultural Resources Inventory Report, UDOT's SR-9 Midway To Rockville Passing Lanes Project, Washington County, Utah	Transcon Environmental (Transcon)	2017	Sunny/ Rainy Day APEs

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U17TN0987	Cultural Resources Inventory Report, Sunroc SR-9 Rockville To Springdale Project, Washington County, Utah	Transcon	2017	Sunny/ Rainy Day APEs
U18TN0544	Cove Reservoir Project	Transcon	2018	Direct/ Visual/ Sunny/ Rainy Day APEs
U17HQ0452	An Archaeological Survey of 40 Acres West of Rockville, in Washington County, Utah	HRA, Inc. Conservation Archaeology	2018	Sunny/ Rainy Day APEs
U18BL0617	Barracks Ranch Buried Irrigation Pipeline ROW -UTU-93149	BLM	2018	Sunny/ Rainy Day APEs
U19TN0063	UDOT's SR-9; I-15 to Southern Parkway Improvements	Transcon	2019	Sunny/ Rainy Day APEs
U20TN0874	UDOT's US-89; Mt. Carmel to Orderville Passing Lane Project	Transcon	2020	Direct/ Visual/ Sunny/ Rainy Day APEs
U20HO0949	A Cultural Resource Inventory of the Sullivan Park Erosion Protection Project, Washington County, Utah	Bighorn	2020	Rainy Day APE
U20HO0308	A Cultural Resource Inventory of the Confluence Park Pedestrian Bridge Project, Washington County, Utah	Bighorn	2020	Sunny/ Rainy Day APEs
U21TN0298	Cultural Resources Inventory Report, South Central Communications' Orderville/Glendale Fiber-to-the-Home (FTTH) Project, Kane County, Utah	Transcon	2021	Direct APE
U21TN0840	Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah-Addendum to Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove Reservoir Project (U18TN0544), Kane County, Utah	Transcon	2021	Direct/ Visual/ Sunny/ Rainy Day APEs
U21HY0380	A Cultural Resource Assessment for the St. George Emergency Watershed Protection Projects – Virgin River Parcel, Washington County, Utah	Certus	2021	Rainy Day APE
U21A10307	A Class III Cultural Resource Inventory of Six Natural Resources Conservation Service Project Parcels in Garfield and Kane Counties, Utah	Alpine	2021	Sunny/ Rainy Day APEs
U21IG0716	Rockville FFSL Vegetation Treatment Inventory in Washington County	Intersearch, Inc.	2021	Sunny/ Rainy Day APEs

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U22UX0033	A Cultural Resources Survey for the Arcadian Fiber Optic Orderville to Bear Valley Project, Kane and Garfield Counties, Utah	Westland Engineering and Environmental Services (Westland)	2022	Direct/ Visual APEs
U22UX0032	Cultural Resources Survey for the Arcadian Fiber Optic Paria to Orderville Project, Kane County, Utah	Westland	2022	Direct/ Visual/ Sunny/ Rainy Day APEs
U22IG0055	The St. George City Archaeological Site Recording Project	Intersearch, Inc.	2022	Rainy Day APE
U22TN0348	Cultural Resources Inventory Report, South Central Communications' Mt. Carmel US-89 Fiber to the Home (FTTH) Project, Kane County, Utah	Transcon	2022	Sunny/ Rainy Day APEs
U22UT0316	US-89; Mt. Carmel Junction Station Shoulder Widening and Belly of the Dragon Trailhead Turn Lane MP 80.36-80.8, Kane County	UDOT (Region 4)	2022	Sunny/ Rainy Day APEs
U23SH0941	A Pedestrian Survey for a Proposed Irrigation Pipeline and Pump on Private Land in Kane County, Utah	NRCS	2023	Visual/ Sunny/ Rainy Day APEs
U23TN0682	Cultural Resources Inventory Report, Kane County Water Conservancy District's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah: Esplin Pit Evaluation	Transcon	2023	Direct APE
U23HO0459	A Cultural Resource Inventory of the George Washington Boulevard Bridge, Washington County, Utah	Bighorn	2023	Rainy Day APE
U24HO0158	A Cultural Resource Inventory of the SunRiver Trespass Remediation Project, Washington County, Utah	Bighorn	2024	Rainy Day APE
U24HX0317	An Archaeological Survey of the George Washington Boulevard Project	Horrocks Engineers	2024	Rainy Day APE
U24HO0577	A Cultural Resource Inventory of the La Verkin to Virgin Sewer Line, Washington County, Utah	Bighorn	2024	Sunny/ Rainy Day APEs
U24HO0855	A Cultural Resource Inventory of the Sheep Bridge Road Improvements Project, Washington County, Utah	Bighorn	2024	Sunny/ Rainy Day APEs
U24HO1104	A Cultural Resource Inventory of the Orderville Culinary Water Loop, Kane County, Utah	Bighorn	2024	Sunny/ Rainy Day APEs
U24UT0706	US-89; Mt. Carmel JCT to Muddy Canyon Passing Lane	UDOT (Region 4)	2024	Sunny/ Rainy Day APEs

TABLE 3. PREVIOUS CULTURAL SURVEYS WITHIN EACH AREA OF POTENTIAL EFFECT				
Survey No.	**Survey Name**	**Organization**	**Date**	**Location**
U25SH0035	Cultural Resources Inventory in Support of Sorensen Livestock Company's Irrigation Pipeline Project Near Orderville, Kane County, Utah	NRCS	2025	Direct/ Visual APEs
U25IG0179	The Washington County Confluence Park Archaeological Site Recording Project	Intersearch, Inc.	2025	Sunny/ Rainy Day APEs
U25UT0456	UDOT Region 4 Surplus 2025	UDOT (Region 4)	2025	Sunny/ Rainy Day APEs
U25HX0285	UDOT Zion NP Fiber Optic, Rockville to Mount Carmel Junction.	Horrocks Engineers		Sunny/ Rainy Day APEs
*Note: Location indicates which APE (Direct, Visual, Sunny Day, or Rainy Day) overlaps each project.				

CULTURAL RESOURCE SITES

Background research identified 96 previously identified cultural resource sites within the various proposed Project APEs consisting of prehistoric campsites, prehistoric petroglyphs and pictographs, prehistoric habitations, prehistoric artifact scatters, prehistoric lithic scatters, prehistoric rockshelters/caves, historic canals/ditches, historic check dams, historic roads, historic bridges, historic inscriptions, a historic borrow pit, historic flumes, historic foundations, a historic irrigation pond, a historic townsite, and a historic rock retention wall complex (**Table 4**). Some of these sites are overlapped by more than one APE; three sites are overlapped by only the Direct APE; 10 sites are overlapped by only the Visual APE; 14 sites are overlapped by only the Rainy Day APE; four sites are overlapped by both the Direct APE and Visual APEs; two sites are overlapped by the Visual, Sunny Day, and Rainy Day APEs; three sites are overlapped by the Direct, Visual, Sunny Day, and Rainy Day APEs; and 60 sites are overlapped by the Rainy Day and Sunny Day APEs (USHPO 2026a, 2026b).

None of the sites except for 42KA7537 (prehistoric cave and artifact scatter) meet the site type criteria for inclusion in the visual impact assessment and therefore do not require a formal visual effects assessment. Site 42KA7537 is only in the Direct APE and will be avoided (see **U23TN0682** CRIR, KCWCD's Cove East Fork Virgin River Plan-Environmental Impact Statement, Kane County, Utah).

TABLE 4. PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN EACH AREA OF POTENTIAL EFFECT			
Site No.	**Description**	**Eligibility**	**Location**
42KA1156	Prehistoric artifact scatter	*Unevaluated*	Sunny/ Rainy Day APEs
42KA1157	Prehistoric artifact scatter (same site as 42KA1958 and 42KA1965)	Determined Eligible	Sunny/ Rainy Day APEs
42KA1158	Prehistoric campsite	*Unevaluated*	Direct/ Visual APEs

TABLE 4. PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN EACH AREA OF POTENTIAL EFFECT			
Site No.	**Description**	**Eligibility**	**Location**
42KA1505	Prehistoric rock writing	Determined Eligible	Sunny/ Rainy Day APEs
42KA1958	Prehistoric artifact scatter (same site as 42KA1157 and 42KA1965)	Determined Eligible	Sunny/ Rainy Day APEs
42KA1960	Prehistoric artifact scatter	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA1965	Prehistoric artifact scatter (same site as 42KA1157 and 42KA1958)	Determined Eligible	Rainy Day APE
42KA2192	Historic inscription	Recommended Not Eligible	Sunny/ Rainy Day APEs
42KA2416	Prehistoric artifact scatter	Recommended Not Eligible	Visual APE
42KA2417	Prehistoric lithic scatter	Determined Eligible	Visual APE
42KA3899	Prehistoric campsite	Determined Eligible	Visual APE
42KA3922	Prehistoric habitation	Determined Eligible	Visual APE
42KA3928	Prehistoric lithic scatter	Determined Not Eligible	Visual APE
42KA3929	Prehistoric artifact scatter	Determined Eligible	Visual APE
42KA3930	Prehistoric habitation	Determined Eligible	Visual APE
42KA3931	Prehistoric ceramic scatter	Determined Not Eligible	Visual APE
42KA3932	Prehistoric lithic scatter	Determined Not Eligible	Visual APE
42KA3933	Prehistoric artifact scatter	Determined Not Eligible	Visual APE
42KA4226	Historic road (*Old U.S. Highway 89/ State Route 89*)	Determined Eligible	Sunny/ Rainy Day APEs
42KA4293	Prehistoric rockshelter	Determined Eligible	Sunny/ Rainy Day APEs
42KA4527	Prehistoric rock art	Recommended Eligible	Sunny/ Rainy Day APEs
42KA4538	Historic bridge abutment	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA4539	Historic ditch/flume	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA5574	Prehistoric artifact scatter and depressions	Determined Eligible	Sunny/ Rainy Day APEs
42KA5577	Prehistoric petroglyph panel	Determined Eligible	Sunny/ Rainy Day APEs
42KA5583	Prehistoric campsite	Determined Eligible	Sunny/ Rainy Day APEs
42KA5584	Historic signature panel	Determined Eligible	Sunny/ Rainy Day APEs
42KA5585	Multi-component: prehistoric petroglyphs; historic inscriptions	Determined Eligible	Sunny/ Rainy Day APEs
42KA5586	Prehistoric petroglyphs	Determined Eligible	Sunny/ Rainy Day APEs

TABLE 4. PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN EACH AREA OF POTENTIAL EFFECT			
Site No.	**Description**	**Eligibility**	**Location**
42KA5904	Multi-component: prehistoric rockshelter; historic inscriptions	Recommended Eligible	Sunny/ Rainy Day APEs
42KA6243	Prehistoric campsite	Determined Eligible	Sunny/ Rainy Day APEs
42KA6245	Historic flood control ditch	Determined Eligible	Sunny/ Rainy Day APEs
42KA6765	Prehistoric rock art	Recommended Eligible	Sunny/ Rainy Day APEs
42KA6890	Muti-component: prehistoric habitation; historic borrow pit and debris scatter	Recommended Eligible	Sunny/ Rainy Day APEs
42KA7186	Historic irrigation pond	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA7537	Prehistoric cave and artifact scatter	Determined Eligible	Direct APE
42KA7712	Historic flume	Determined Eligible	Sunny/ Rainy Day APEs
42KA7716	Historic foundation	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA7717	Prehistoric campsite	Determined Eligible	Sunny/ Rainy Day APEs
42KA7725	Historic check dams	Determined Eligible	Sunny/ Rainy Day APEs
42KA8601	Prehistoric artifact scatter	Determined Eligible	Sunny/ Rainy Day APEs
42KA8602	Prehistoric artifact scatter	Determined Eligible	Sunny/ Rainy Day APEs
42KA8840	Prehistoric rock writing (*Parunuweap Rock Art Panel*)	In Progress—TBD	Sunny/ Rainy Day APEs
42KA8900	Historic artifact scatter	Determined Not Eligible	Direct/ Visual/ Sunny/ Rainy Day APEs
42KA8902	Historic artifact scatter	Determined Not Eligible	Direct/ Visual/ Sunny/ Rainy Day APEs
42KA8903	Historic artifact scatter	Determined Not Eligible	Direct / Visual APEs
42KA8904	Prehistoric artifact scatter	Determined Eligible	Direct / Visual APEs
42KA8974	Prehistoric artifact scatter	Determined Eligible	Direct APE
42KA9490	Historic ditch (*Mount Carmel Irrigation Ditch [West Ditch]*)	Determined Eligible	Direct/ Visual/ Sunny/ Rainy Day APEs
42KA9491	Historic ditch (*Mount.Carmel Irrigation Ditch [East Ditch]*)	Determined Eligible	Visual/ Sunny/ Rainy Day APEs
42KA9492	Historic road *(Lamb's Lane)*	Determined Not Eligible	Sunny/ Rainy Day APEs

TABLE 4. PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN EACH AREA OF POTENTIAL EFFECT			
Site No.	**Description**	**Eligibility**	**Location**
42KA9493	Historic road (Tait Lane)	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA9589	Historic rock retention rock wall complex	Determined Not Eligible	Sunny/ Rainy Day APEs
42KA9789	Prehistoric campsite	Determined Eligible	Direct APE
42KA9790	Historic lateral ditch	Determined Not Eligible	Visual/ Sunny/ Rainy Day APEs
42WS0064	Prehistoric rockshelter with pictographs	*Unevaluated*	Sunny/ Rainy Day APEs
42WS0144	Prehistoric habitation	*Unevaluated*	Sunny/ Rainy Day APEs
42WS0305	Prehistoric rockshelter and artifact scatter	Recommended Eligible	Sunny/ Rainy Day APEs
42WS0337	Historic townsite (*Duncan's Retreat*)	Determined Not Eligible	Sunny/ Rainy Day APEs
42WS0395	Prehistoric rockshelter, petroglyphs, and artifact scatter	Recommended Eligible	Sunny/ Rainy Day APEs
42WS0396	Prehistoric rockshelter and artifact scatter	*Unevaluated*	Sunny/ Rainy Day APEs
42WS0404	Prehistoric artifact scatter	Recommended Eligible	Sunny/ Rainy Day APEs
42WS0486	Prehistoric habitation	*Unevaluated*	Rainy Day APE
42WS0795	Prehistoric lithic scatter	Determined Eligible	Rainy Day APE
42WS0796	Prehistoric artifact scatter	*Unevaluated*	Rainy Day APE
42WS0807	Prehistoric artifact scatter	Determined Not Eligible	Sunny/ Rainy Day APEs
42WS1158	Prehistoric village: petroglyph, pit structure; 3 room blocks; 5 habitation rooms, 12 storage rooms	Listed; Contributing	Sunny/ Rainy Day APEs
42WS1160	Prehistoric petroglyph panel and artifact scatter	Listed; Contributing	Sunny/ Rainy Day APEs
42WS1170	Prehistoric habitation	*Unevaluated*	Sunny/ Rainy Day APEs
42WS1175	Prehistoric rockshelter with slab lines cists	*Unevaluated*	Sunny/ Rainy Day APEs
42WS1176	Prehistoric habitation	*Unevaluated*	Sunny/ Rainy Day APEs
42WS1352	Prehistoric artifact scatter	*Unevaluated*	Sunny/ Rainy Day APEs
42WS1650	Prehistoric artifact scatter	Recommended Not Eligible	Rainy Day APE
42WS1659	Prehistoric habitation	Recommended Eligible	Rainy Day APE
42WS1665	Prehistoric artifact scatter and possible structure	Recommended Eligible	Rainy Day APE
42WS1681	Prehistoric habitation	Recommended Eligible	Rainy Day APE

TABLE 4. PREVIOUSLY IDENTIFIED CULTURAL RESOURCE SITES WITHIN EACH AREA OF POTENTIAL EFFECT			
Site No.	**Description**	**Eligibility**	**Location**
42WS1682	Prehistoric habitation	Recommended Eligible	Rainy Day APE
42WS1728	Prehistoric petroglyphs	Recommended Eligible	Sunny/ Rainy Day APEs
42WS1781	Prehistoric rockshelter and lithic scatter	Recommended Not Eligible	Sunny/ Rainy Day APEs
42WS1793	Prehistoric habitation and artifact scatter (two structures)	Listed; Contributing	Sunny/ Rainy Day APEs
42WS2114	Prehistoric rockshelter and dry laid masonry wall	Determined Not Eligible	Rainy Day APE
42WS2226	Prehistoric artifact scatter	Recommended Eligible	Rainy Day APE
42WS2273	Historic canal/syphon system	*Unevaluated*	Sunny/ Rainy Day APEs
42WS2356	Historic bridge (*Harrisburg Bridge, Berry Springs Bridge or Virgin River Bridge*)	Determined Not Eligible	Sunny/ Rainy Day APEs
42WS2556	Prehistoric artifact scatter	Determined Not Eligible	Rainy Day APE
42WS2795	Historic canal	Recommended Eligible	Sunny/ Rainy Day APEs
42WS2796	Historic canal	Recommended Eligible	Sunny/ Rainy Day APEs
42WS2799	Historic sawmill and artifact scatter	Recommended Eligible	Sunny/ Rainy Day APEs
42WS2809	Historic canal	Recommended Eligible	Sunny/ Rainy Day APEs
42WS3344	Historic ditch (*Springdale Irrigation Ditch*)	Determined Eligible	Sunny/ Rainy Day APEs
42WS3673	Prehistoric bedrock mortars	Determined Eligible	Sunny/ Rainy Day APEs
42WS4397	Historic road (*Road to Virgin City*)	Determined Eligible	Sunny/ Rainy Day APEs
42WS5515	Historic road	Determined Not Eligible	Rainy Day APE
42WS6113	Historic townsite (*Grafton Townsite*)	Listed	Sunny/ Rainy Day APEs
42WS6242	Historic site (indeterminate)	In Progress—TBD	Sunny/ Rainy Day APEs
42WS6789	Prehistoric petroglyph panel	Determined Eligible	Rainy Day APE
*Note: Location indicates which APE (Direct, Sunny Day, Rainy Day, or Visual) overlaps each site.			

UTAH ROCK ART RESEARCH ASSOCIATION ROCK IMAGERY

Background research conducted July 15, 2026, indicates that there is one URARA rock imagery location within an overlapping portion of the Sunny Day and Rainy Day APEs (also in-progress site 42KA8840) (USHPO 2026a).

UTAH REVISED STATUTE 2477 ROADS

The Utah Revised Statute (RS) 2477 Right-of-Way roads layer was reviewed on Utah SHPO's Sego website on July 15, 2025 (USHPO 2026a). This review identified one RS2477 road that crosses only the Visual APE; one RS2477 road that crosses both the Visual APE and Sunny Day/Rainy Day APEs; and five RS2477 roads that cross both the Sunny Day and Rainy Day APEs (**Table 5**). These roads do not meet the site criteria for a formal VEA, and Muddy Canyon Road, is a type "B" road, which is typically a county road located outside of incorporated municipalities, not designated as a state highway, which serves as rural route for farming, ranching, and recreation, connecting communities and providing access to public lands. Although a reservoir breach could cause damage or changes to the roads, the significance of the roads has already been compromised from continuous use and maintenance; therefore, they would not experience any additional significant impacts from the Indirect Breach Inundation (Sunny and Rainy Day) APEs that would further damage their historic significance.

TABLE 5.
RS2477 ROADS WITHIN THE PROJECT APE

Road ID	County No.	Class	Steet Name	Length (Miles)	Location*
RD130173	K2110	D	*Twin Hollow Road*	5.97	Visual APE
RD130181	K2150	B	*Muddy Canyon Road*	3.05	Visual APE, Sunny Day/ Rainy Day APEs
RD130274	K2735	D	*State Barn Ridge Road*	2.97	Sunny Day/ Rainy Day APEs
RD130073	K1300	B	*Elephant Cove Road (two segments)*	2.67, 17.15	Sunny Day/ Rainy Day APEs
RD130071	K1297	D	*Steep Trail Road*	2.41	Sunny Day/ Rainy Day APEs
RD130131	K1615	D	*K1615 Kane County*	1.88	Sunny Day/ Rainy Day APEs
RD270397	0397	B	*Sheep Bridge Road*	6.02	Sunny Day/ Rainy Day APEs

*Note: Location indicates which APE (Direct, Sunny Day, Rainy Day, or Visual) overlaps each site.

UTAH NRHP DISTRICTS

Two NRHP districts (Grafton Historic District and Parunuweap Canyon Archaeological District) overlap both the Sunny Day and Rainy Day APEs (USHPO 2026c). The Grafton Historic District encompasses the historic townsite of Grafton, Utah, which was a Mormon agricultural settlement that was established in 1861 and subsequently abandoned in 1945 (Lufkin 2010). The district is located along the Virgin River approximately 2 miles west of Rockville and adjacent to Zion National Park; it can be accessed via Bridge Road across the historic Rockville Bridge and remains one of Utah's best-preserved ghost towns which displays the settlement patterns, architecture, and agricultural practices of early Mormon colonization in southern Utah (Lufkin 2010). The district is listed on the NRHP under Criterion A for its association with events that have made a significant contribution to the broad patterns of our history, and it preserves a rare and largely intact example of a 19-century rural community with contributing resources including four historic residences, a church/schoolhouse, five agricultural outbuildings, five building foundations, the footings of a historic bridge, and associated roads, irrigation ditches, orchards, fields, fences, and other landscape features (Lufkin 2010). The Grafton Historic District retains its historic grid

layout, rural setting, and agricultural character, reflecting the community's reliance on irrigation and farming within the arid Virgin River Valley (Lufkin 2010). Although a reservoir breach could cause damage or changes to the outer perimeter of the district boundary, the contributing historic structures within the district would not experience significant impacts from the Indirect Breach Inundation (Sunny and Rainy Day) APEs that would damage their historic significance (**Figure 1**).



Figure 1. Overview showing the Sunny Day and Rainy Day APEs (overlapping) in purple and the Grafton Historic District in yellow (USHPO 2026c).

The Parunuweap Canyon Archaeological District is located inside of Zion National Park within an extremely steep-sided canyon that was formed by the East Fork of the Virgin River cutting through sedimentary rock of Jurassic and Triassic age consisting of Navajo sandstone, Kayenta formation, Moenave formation (including the Springdale sandstone member), as well as the upper layer of the Petrified Forest member of the Chinle formation (Stokes 1986; Horn 1996). Parunuweap Canyon's favorable climate and abundant natural resources supported human populations during the Ancestral Puebloan period and possibly the Southern Paiute occupation. Its near-pristine vegetation shows that the canyon remains largely unaltered, unlike heavily developed and accessible Zion Canyon (Horn 1996). Parunuweap Canyon is unique because most agricultural and historic activities did not significantly disturb its terraces or archaeological sites, unlike nearby canyons; however, natural erosion has likely damaged or removed some sites. Archaeological research began in 1933 under Ben Wetherill, who documented 14 sites and excavated at least five, representing several Anasazi cultural periods. Much of his later report and field notes were lost in a fire, though some information and artifacts survived for later study (Horn 1996). Russell K. Grater, Park Naturalist for Zion National Park, documented 57 sites between 1941 and 1946 in the park, including revisits to several of the sites recorded and excavated by Wetherill in

Parunuweap Canyon, and assigned Zion Archaeological Survey (ZAS) numbers to them (Horn 1996). In 1982, National Park Service researchers Cindy Beaudett and Deborah Armstrong attempted to relocate the sites previously recorded by Wetherill and Grater in Parunuweap Canyon. Although field notes from their work exist, no formal report or site records appear to have been produced (Horn 1996). In 1984, crews from the Midwest Archeological Center in Lincoln, Nebraska, returned to Zion National Park under the direction of Susan Vetter to survey areas of the park, including Parunuweap Canyon, that could be affected by visitor use (Horn 1996). During the survey, numerous previously undocumented sites were briefly recorded, and several previously known sites were relocated (Horn 1996). The National Park Service contracted with Alpine Archaeological Consultants, Inc., in 1991 to conduct an archaeological assessment of prehistoric structural remains in Zion National Park which resulted in the documentation of 16 previously recorded sites in Parunuweap Canyon (Horn 1996).

The archaeological sites within Parunuweap Canyon are significant under Criteria C and D because they represent the distinctive Virgin Anasazi culture and have contributed greatly to understanding the region's prehistoric peoples. Ben Wetherill's 1934 excavations recovered important artifacts and architectural evidence that helped establish the Virgin Anasazi as a distinct cultural variant. The sites also have the potential to provide further information about both the Virgin Anasazi and later Southern Paiute cultures. While some of Wetherill's excavated sites still contain intact cultural deposits, many other sites in the canyon remain unexcavated and may preserve valuable archaeological information (Horn 1996). Parunuweap Canyon's archaeological sites represent a small community that used the canyon's resources in diverse ways over a long period, from permanent settlements and field houses to short-term resource-gathering locations. These sites may reveal how population, settlement patterns, and resource use changed over time, offering broader insights into Virgin Anasazi culture and possibly later Southern Paiute use of the canyon. The canyon's unique transition between Sonoran life zones also provides opportunities to study human adaptation to an arid environment (Horn 1996).

The archaeological sites within Parunuweap Canyon would likely experience minimal to no direct impacts from indirect breach inundation because many are situated on elevated terraces, benches, or other areas above the canyon floor and outside the primary flood pathway. The canyon's topography and steep, confined terrain would further limit the lateral spread of floodwaters. Although localized erosion or sediment deposition could potentially affect sites near drainage channels, the anticipated inundation would not be expected to substantially damage or disturb intact archaeological deposits. Therefore, based on the elevated site locations and the anticipated extent of inundation, impacts from the Indirect Breach Inundation (Sunny and Rainy Day) APEs is unlikely to result in significant adverse effects to the district's archaeological resources, which include only contributing sites 42WS1158 (also recorded as 42WS219 and ZNP-5), 42WS1160 (also recorded as 42WS217 and ZNP-14), and 42WS1793 within the Indirect Breach Inundation (Sunny and Rainy Day) APEs. Site 42WS1158 is located on the north side of the East Fork Virgin River approximately 731 meters east of the Zion Park boundary on the second terrace above the river; site 42WS1160 is located near the edge of the highest East Fork Virgin River terrace; and site 42WS1793 is located at the base of a talus slope and trail on an old river terrace remnant (Naylor II 1992; Naylor II and Frank 1994; Frank 1994).

HISTORIC BUILDINGS/STRUCTURES

Background research conducted on July 15, 2026, for records on file with the Historic Utah Buildings (HUB) online database indicates that there are no previously recorded historic buildings/structures within the Direct APE, 14 historic buildings/structures overlapped by both the Sunny Day and Rainy Day APEs, and six historic buildings/structures within the Visual APE (**Table 6**; USHPO 2026c). Historic buildings/structures within the Visual APE consist of a religious facility (Orderville Latter-day Saints [LDS] Chapel), two schools (Orderville Rock School and Valley School), a bridge (Virgin River Bridge), a residential dwelling (100 South, Orderville), and industrial buildings (Orderville Co-op Buildings). The overlapping Sunny Day and Rainy Day APEs contain a religious facility (Mt. Carmel School and Church), a barn (Steven's Barn), a single swelling (the Dixon, Maynard, House and Studio); three residential buildings associated with the Esplin Ranch, a World War II-Era cottage (the Margaret Tait Home), and seven bridges including the Virgin River Bridge (OD 689), the Muddy Wash Bridge (OD 728), the 105951 Bridge, the Virgin River/ Harrisburg Bridge (OD 350), the East Fork Virgin River Bridge (OC 337), the Rockville Bridge (053019C), and the Hurricane/ LaVerkin Bridge).

Of the six historic buildings/structures within the Visual APE, one has been demolished (Property ID No. [PI No.] 33220 - Orderville Co-op Buildings), and one single dwelling is considered Ineligible/Non-contributing (PI No. 135092 - 100 South, Orderville). The four remaining buildings/structures located within the Visual APE (PI Nos. 31067, 32819, 50442, and 33219) are in Orderville, and the proposed Cove Reservoir would be obstructed from view by means of several ridges southwest of Gardner Hollow; additionally, these structures are located in a small-town environment surrounded by modern developments.

Of the 14 historic buildings/structures within the overlapping Sunny Day/Rainy Day APEs, one has been demolished (PI# 50974 - Muddy Wash Bridge [OD 728]), and a Google Earth review indicates that Steven's Barn (Property ID NO. 31786) has also likely been demolished as it does not appear to be in the location plotted in the HUB. Additionally, one building (PI No. 300560, an Esplin Ranch Building) is considered out-of-period as it dates to 2008, and five historic buildings/structures are considered Ineligible/Non-contributing (PI Nos. 105951, 130748, 300558, 300559, 3005610. The six remaining historic buildings/structures include two historic bridges with undetermined NRHP eligibility statuses: PI No. 7339 - Virgin River Bridge (OC 183), and PI No. 108043 - Virgin River/ Harrisburg Bridge (OD 350); two Eligible/National Register Individually Listed historic bridges: PI No. 115917 - Hurricane/ LaVerkin Bridge and PI No. 17795 - Rockville Bridge (053019C); the Mt. Carmel School and Church (Property ID No. 37252), and the Dixon, Maynard, House and Studio (Property ID No. 40479).

The Dixon, Maynard, House and Studio (Property ID No. 40479) is slightly elevated from the surrounding Long Valley floor and just over 1 mile away from the proposed Cove Reservoir, and the Mt. Carmel School and Church (Property ID No. 37252) is located along US-89 and is approximately 1.60 miles from the edge of the proposed Cove Reservoir; both of these buildings and each of the four bridges (all located within Washington County) are within the overlapping Indirect Breach Inundation Sunny Day/ Rainy Day APEs but are unlikely to be adversely impacted by the failure of the proposed Cove Reservoir due to distance, elevation, and the proposed reservoir safety features.

TABLE 6. PREVIOUSLY IDENTIFIED HISTORIC STRUCTURES WITHIN THE PROJECT AREA OF POTENTIAL EFFECTS									
Property ID No.	**Property Name**	**Street Address**	**Construction Year**	**Plan Type**	**Style**	**Original Use**	**Eligibility**	**NRHP Status**	**Location**
7339	Virgin River Bridge (OC 183)	Zion National Park, Washington County	1929	Bridge	Steel	Road Trans. Related	Undetermined	Not Listed	Sunny/ Rainy Day APEs
17795	Rockville Bridge (053019C)	150 South Bridge Road, Washington County	1924	Bridge	Steel	Road Trans. Related	Eligible/Contributing	NRHP Individually Listed Property	Sunny/ Rainy Day APEs
31067	Orderville LDS Chapel	Orderville, Kane County	Undetermined	Church/ Meetinghouse	Undetermined	Religious Facility	Undetermined	Not Listed	Visual APE
31786	Stevens Barn	Stevens Lane, Mt. Carmel, Kane County	1867	Barn-Other	Undefined	Agricultural (Gen.)	Undetermined	Not Listed	Sunny/ Rainy Day APEs
32819	Orderville Rock School	Orderville, Kane County	1890	Undetermined	Undetermined	School	Eligible/Contributing	Not Listed	Visual APE
33219	Virgin River Bridge (OD 689)	Off Highway 89, Orderville, Kane County	1932	Bridge	Concrete/Other	Road Trans. Related	Eligible/Contributing	Not Listed	Visual APE
33220	Orderville Co-op Buildings	Orderville, Kane County	1878	Mining—Other/Misc.	Plank Siding	Industrial (Gen.)	Demolished	Not Listed	Visual APE
37252	Mt. Carmel School and Church	Off Highway 89, Mt. Carmel, Kane County	1890	Crosswing	Stone: Other/Undefined	Religious Facility	Eligible/Contributing	NRHP Individually Listed Property	Sunny/ Rainy Day APEs
40479	Dixon, Maynard, House and Studio	Off Highway 89, Mt. Carmel, Kane County	1939	Other Residential Type	Round Logs	Single Dwelling	Eligible/Contributing	NRHP Individually Listed Property	Sunny/ Rainy Day APEs
50442	Valley School	Off Highway 89, Orderville, Kane County	1935	Horizontal School	Brick:Other/ Undefined	School	Eligible/Contributing	NRHP Individually Listed Property	Visual APE
50974	Muddy Wash Bridge (OD 728)	US-89, Orderville, Kane County	1932	Bridge	Concrete/Other	Road Trans. Related	Demolished	Not Listed	Sunny/ Rainy Day APEs
105951	Bridge	Virgin, Washington County	1940	Bridge	Steel	Road Trans. Related	Ineligible/ Non-contributing	Not Listed	Sunny/ Rainy Day APEs
108043	Virgin River/ Harrisburg Bridge (OD 350)	SR-9, Hurricane, Washington County	1934	Bridge	Concrete/Other	Road Trans. Related	Undetermined	Not Listed	Sunny/ Rainy Day APEs
115917	Hurricane/ LaVerkin Bridge	SR-9, Hurricane, Washington County	1908	Bridge	Other	Road Trans. Related	Eligible/Contributing	NRHP Individually Listed Property	Sunny/ Rainy Day APEs
130748	East Fork Virgin River Bridge OC 337	US-89, Orderville, Kane County	1961	Bridge	Steel	Road Trans. Related	Ineligible/ Non-contributing	Not Listed	Sunny/ Rainy Day APEs
135092	N/A	100 South, Orderville, Kane County	1932	Other Residential Type	Vinyl Siding	Single Dwelling	Ineligible/ Non-contributing	Not Listed	Visual APE
300558	Margaret Tait Home	2660 S State St, Orderville, Kane County	1950	WWII-Era Cottage	Wood/Other/Undefined	Single Dwelling	Ineligible/ Non-contributing	Not Listed	Sunny/ Rainy Day APEs
300559	Esplin Ranch	2710 S State St, Orderville, Kane County	1977	Manufactured Home	Aluminum Siding	Resedential (Gen.)	Ineligible/ Non-contributing	Not Listed	Sunny/ Rainy Day APEs
300560	Esplin Ranch	2720 S State St, Orderville, Kane County	2008	Ranch with Garage	Concrete/Other	Resedential (Gen.)	Out-of-Period	Not Listed	Sunny/ Rainy Day APEs
300561	Esplin Ranch	2910 S State St, Orderville, Kane County	1941	Period Cottage	Concrete/Other	Resedential (Gen.)	Ineligible/ Non-contributing	Not Listed	Sunny/ Rainy Day APEs

*Note: No historic structures are located within the Direct APE. Historic buildings/structures within the Visual APE are highlighted blue.

SUMMARY AND RESULTS

On July 15, 2026, Eocene archaeologists conducted a desktop literature review of the Direct APE, Indirect Breach Inundation (Sunny Day and Rainy Day) APEs, and Visual APE for the proposed Cove Reservoir Project located southwest of Orderville and north of Mount Carmel in Kane County, Utah. This review was requested by Alpha Engineering, per the NRCS, prior to construction concept design finalization to identify cultural resources within the Indirect Breach Inundation (Sunny Day and Rainy Day) APEs and Visual Project APEs that may be impacted by the proposed Project. Important cultural resources may include historic or prehistoric archaeological sites or objects; historically or architecturally significant structures, buildings, or landscapes; and TCPs that are NRHP eligible.

The results of this literature review indicate that there are a total of 158 previously conducted cultural resource surveys that cover 100 percent of the Direct APE, approximately 40 percent of the Visual APE, approximately 32.3 percent of the Sunny Day APE, and approximately 31.4 percent of the Rainy Day APE.

Research identified 96 cultural resources and 20 historic structures within the partially overlapping Direct, the Indirect Breach Inundation (Sunny Day and Rainy Day) APEs, and Visual APEs. None of the previously documented cultural resource sites or historic structures within these APEs meet the site type criteria for inclusion in the visual/indirect literature review and therefore do not require a formal visual effects assessment (**Table 7**). Additionally, the implementation of the Project will not impact the character-defining characteristics of the sites that allow them to convey their significance since visual component is not the character-defining feature that makes the sites eligible, and adverse effects to sites within both the Sunny Day and Rainy Day Indirect Breach Inundation zones are unlikely/minimal due to distance and the proposed reservoir safety features. Therefore, the recommended determination of effect for the Visual APE and the Indirect Breach Inundation (Sunny Day and Rainy Day) APEs is *No Adverse Effect*.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
7339	Virgin River Bridge (OC 183)	Undetermined	Unknown	NPS	Historic Structure	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
17795	Rockville Bridge (053019C)	Eligible/Contributing	Unknown	Town of Rockville (public-local)	Historic Structure	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
31067	Orderville LDS Chapel	Undetermined	Unknown	Private	Historic Structure	N/A	Visual APE	The proposed Cove Reservoir would be obstructed from view by means of several ridges southwest of Gardner Hollow. The visual component of the structure is not a character-defining feature for eligibility, which is based on its design and historic association, and the structure is already surrounded by modern developments within the town of Orderville.
31786	Stevens Barn	Undetermined	Unknown	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; the structure appears to have been demolished.
32819	Orderville Rock School	Eligible/Contributing	1983	Private	Historic Structure	N/A	Visual APE	The proposed Cove Reservoir would be obstructed from view by means of several ridges southwest of Gardner Hollow. The visual component of the structure is not a character-defining feature for eligibility, which is based on its design and historic association, and the structure is already surrounded by modern developments within the town of Orderville.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
33219	Virgin River Bridge (OD 689)	Eligible/Contributing	1991	Private	Historic Structure	N/A	Visual APE	The proposed Cove Reservoir would be obstructed from view by means of several ridges southwest of Gardner Hollow. The visual component of the structure is not a character-defining feature for eligibility, which is based on its design and historic association, and the structure is already surrounded by modern developments within the town of Orderville.
33220	Orderville Co-op Buildings	Demolished	1986	Private	Historic Structure	N/A	Visual APE	Does not meet site type criteria; the structure appears to have been demolished.
37252	Mt. Carmel School and Church	Eligible/Contributing	1987	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
40479	Dixon, Maynard, House and Studio	Eligible/Contributing	2002	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
50442	Valley School	Eligible/Contributing	1985	Private	Historic Structure	N/A	Visual APE	The proposed Cove Reservoir would be obstructed from view by means of several ridges southwest of Gardner Hollow. The visual component of the structure is not a character-defining feature for eligibility, which is based on its design and historic association, and the structure is already surrounded by modern developments within the town of Orderville.
50974	Muddy Wash Bridge (OD 728)	Demolished	Unknown	UDOT	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; the structure appears to have been demolished.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
105951	Bridge	Ineligible/Non-contributing	Unknown	UDOT	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
108043	Virgin River/ Harrisburg Bridge (OD 350)	Demolished	1991	UDOT	Historic Structure	N/A	Sunny/Rainy Day APEs	Demolished in 1991 after sustaining severe damage during the 1990 Virgin River flood. It was replaced by a new bridge on the same route.
115917	Hurricane/ LaVerkin Bridge	Eligible/Contributing	1995	Public-local	Historic Structure	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
130748	East Fork Virgin River Bridge OC 337	Ineligible/Non-contributing	Unknown	UDOT	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
135092	100 South Orderville	Ineligible/Non-contributing	Unknown	Private	Historic Structure	N/A	Visual APE	Does not meet site type criteria
300558	Margaret Tait Home	Ineligible/Non-contributing	2025	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
300559	Esplin Ranch	Ineligible/Non-contributing	2025	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
300560	Esplin Ranch	Out-of-Period	2025	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
300561	Esplin Ranch	Ineligible/Non-contributing	2025	Private	Historic Structure	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42KA1156	Prehistoric artifact scatter	Unevaluated	2014	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; also not relocated in 2014.
42KA1157	Prehistoric artifact scatter (previously combined with 42KA1958 and 42KA1965)	Determined Eligible—D	2021	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA1158	Prehistoric campsite	Unevaluated	2022	Private	N/A	N/A	Direct/Visual APEs	Does not meet site type criteria; also misplotted.
42KA1505	Prehistoric rock writing	Determined Eligible—D	1969	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features. The site is situated on a ledge above the floodplain.
42KA1958	Prehistoric artifact scatter (previously combined with 42KA1157 and 42KA1965)	Determined Eligible—D	2021	Private	N/A	N/A	Sunny/ Rainy Day APEs	Does not meet site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA1960	Prehistoric artifact scatter	Determined Not Eligible	2014	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA1965	Prehistoric artifact scatter (previously combined with 42KA1157 and 42KA1965)	Determined Eligible—D	2021	Private	N/A	N/A	Rainy Day APE	Does not meet the site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA2192	Historic inscription	Recommended Not Eligible	1976	BLM	N/A	N/A	Sunny/Rainy Day APEs	Does not meet the site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA2416	Prehistoric artifact scatter	Recommended Not Eligible	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria.
42KA2417	Prehistoric lithic scatter	Determined Eligible—D	2006	BLM	N/A	N/A	Visual APE	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility, which is based on data potential. The site is also located in an area of pinyon-juniper with a blocked or partially blocked view.
42KA3899	Prehistoric campsite	Determined Eligible—D	1993	TLA	N/A	N/A	Visual APE	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility, which is based on data potential. The site is also located in an area of pinyon-juniper with a blocked or partially blocked view.
42KA3922	Prehistoric habitation	Determined Eligible—D	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility, which is based on data potential. The site is also located in an area of pinyon-juniper with a blocked or partially blocked view.
42KA3928	Prehistoric lithic scatter	Determined Not Eligible	1993	TLA	N/A	N/A	Visual APE	Does not meet site type criteria.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA3929	Prehistoric artifact scatter	Determined Eligible—D	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility, which is based on data potential. The site is also located in an area of pinyon-juniper with a blocked or partially blocked view.
42KA3930	Prehistoric habitation	Determined Eligible—D	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility, which is based on data potential. The site is also located in an area of pinyon-juniper with a blocked or partially blocked view.
42KA3931	Prehistoric ceramic scatter	Determined Not Eligible	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria.
42KA3932	Prehistoric lithic scatter	Determined Not Eligible	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria.
42KA3933	Prehistoric artifact scatter	Determined Not Eligible	1993	Private	N/A	N/A	Visual APE	Does not meet site type criteria.
42KA4226	Historic road (*Old U.S. Highway 89/ State Route 89*)	Determined Eligible—A	2022	BLM, Private, SITLA, UDOT, USFS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA4293	Prehistoric rockshelter	Determined Eligible—D	1995	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA4527	Prehistoric rock art	Recommended Eligible—D	2008	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA4538	Historic bridge abutment	Determined Not Eligible	2021	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA4539	Historid ditch/flume	Determined Not Eligible	2021	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA5574	Prehistoric artifact scatter and depressions	Determined Eligible—D	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA5577	Prehistoric petroglyph panel	Determined Eligible—D	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA5583	Prehistoric campsite	Determined Eligible—D	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA5584	Historic signature panel	Determined Eligible—A	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Additionally, the panel is just above a detached boulder that allowed the signatures to be 15 to 20 feet above the floor of the canyon.
42KA5585	Multi-component: prehistoric petroglyphs; historic inscriptions	Determined Eligible—D	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Additionally, the panel is located at the base of a trail that is elevated over the surrounding terrain.
42KA5586	Prehistoric petroglyphs	Determined Eligible—D	2000	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Additionally, the panel is located in short narrow cleft in a cliff wall that is elevated over the surrounding terrain.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA5904	Multi-component: prehistoric rockshelter; historic inscriptions	Recommended Eligible—D	2002	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA6243	Prehistoric campsite	Determined Eligible—D	2006	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA6245	Historic flood control ditch	Determined Eligible—A/C	2006	Private	N/A	N/A	Sunny/Rainy Day APEs	The visual component of the site is not a character-defining feature to site eligibility, which is based on its design and association with Civilian Conservation Corps activities; the potential for additional waterflow would not impact the site.
42KA6765	Prehistoric rock art	Recommended Eligible—D	2008	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Additionally, the panel is located on the east wall of a slot canyon that is elevated over the surrounding terrain.
42KA6890	Muti-component: prehistoric habitation; historic borrow pit and debris scatter	Recommended Eligible—D	2010	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42KA7186	Historic irrigation pond	Determined Not Eligible	2011	TLA	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA7537	**Prehistoric cave and artifact scatter**	**Determined Eligible—D**	**2023**	**Private**	**Prehistoric cave/ rockshelter**	**N/A**	**Direct APE**	**The site is located in the Direct APE near Esplin Pit outside of the Indirect Breach Inundation APEs, and the Visual APE will not be impacted.**
42KA7712	Historic flume	Determined Eligible—A	2013	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; the potential for additional waterflow would not impact the site.
42KA7716	Historic foundation	Determined Not Eligible	2013	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA7717	Prehistoric campsite	Determined Eligible—D	2014	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; also, adverse effects are unlikely/minimal due to distance, elevation, and the proposed reservoir safety features.
42KA7725	Historic check dams	Determined Eligible—A	2013	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria; the potential for additional waterflow would not impact the site.
42KA8601	Prehistoric artifact scatter	Determined Eligible—D	2017	BLM	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA8602	Prehistoric artifact scatter	Determined Eligible—D	2017	BLM	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA8840	Prehistoric rock writing (Parunuweap Rock Art Panel	*In Progress*	*In Progress*	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42KA8900	Historic artifact scatter	Determined Not Eligible	2018	Private	N/A	N/A	Direct/Visual/ Sunny/Rainy Day APEs	Does not meet site type criteria.
42KA8902	Historic artifact scatter	Determined Not Eligible	2018	Private	N/A	N/A	Direct/Visual/ Sunny/Rainy Day APEs	Does not meet site type criteria.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA8903	Historic artifact scatter	Determined Not Eligible	2018	Private	N/A	N/A	Direct/Visual APEs	Does not meet site type criteria.
42KA8904	Prehistoric artifact scatter	Determined Eligible—D	2018	Private	N/A	N/A	Direct/Visual APEs	Does not meet site type criteria. The site is adjacent to the future reservoir high-water line; however, the NRCS previously conducted a tribal visit, and this site was not a concern.
42KA8974	Prehistoric artifact scatter	Determined Eligible—D	2018	Private	N/A	N/A	Direct APE	Does not meet site type criteria; the site is actively eroding and being lost to an expanding gravel pit and will be avoided during dam construction.
42KA9490	Historic ditch (*Mount Carmel Irrigation Ditch [West Ditch]*)	Determined Eligible—A	2022	Private	N/A	N/A	Direct/Visual/ Sunny/Rainy Day APEs	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility. The site will be impacted by pipe construction and mitigated per Memorandum of Agreement (MOA).
42KA9491	Historic ditch (*Mount.Carmel Irrigation Ditch [East Ditch]*)	Determined Eligible—A	2018	Private, BLM	N/A	N/A	Visual/Sunny/ Rainy Day APEs	Does not meet site type criteria; the visual component of the site is not a character-defining feature of site eligibility. The site will be impacted by pipe construction and mitigated per MOA.
42KA9492	Historic road *(Lamb's Lane)*	Determined Not Eligible	2022	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria
42KA9493	Historic road (Tait Lane)	Determined Not Eligible	2022	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria
42KA9589	Historic rock retention rock wall complex	Determined Not Eligible	2022	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria
42KA9789	Prehistoric campsite	Determined Eligible—D	2023	Private	N/A	N/A	Direct APE	Does not meet site type criteria; the site will be avoided by dam construction.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42KA9790	Historic lateral ditch	Determined Not Eligible	2023	Private	N/A	N/A	Visual/Sunny/ Rainy Day APEs	Does not meet site type criteria.
42WS0064	Prehistoric rockshelter with pictographs	Unevaluated	1949	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0144	Prehistoric habitation	Unevaluated	1949/2022	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. The site was revisited as part of the Site Stewardship Program in 2022 but was not evaluated for the NRHP.
42WS0305	Prehistoric rockshelter and artifact scatter	Recommended Eligible—D	1983	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0337	Historic townsite (*Duncan's Retreat*)	Determined Not Eligible	2017	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria.
42WS0395	Prehistoric rockshelter, petroglyphs, and artifact scatter	Recommended Eligible—D	1982	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0396	Prehistoric rockshelter and artifact scatter	*Unevaluated*	1970	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0404	Prehistoric artifact scatter	Recommended Eligible—D	2018	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0486	Prehistoric habitation	*Unevaluated*	1974	BLM	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42WS0795	Prehistoric lithic scatter	Determined Eligible—D	2023	Private	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS0796	Prehistoric artifact scatter	*Unevaluated*	1976	Private	N/A	N/A	Rainy Day APE	Does not meet site type criteria.
42WS0807	Prehistoric artifact scatter	Determined Not Eligible	2025	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1158	Prehistoric village: petroglyph, pit structure; 3 room blocks; 5 habitation rooms, 12 storage rooms	Listed; Contributing	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Additionally, the site has been excavated.
42WS1160	Prehistoric petroglyph panel and artifact scatter	Listed; Contributing	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1170	Prehistoric habitation	Unevaluated	1978	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1175	Prehistoric rockshelter with slab lines cists	Unevaluated	1978	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1176	Prehistoric habitation	Unevaluated	1978	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1352	Prehistoric artifact scatter	Unevaluated	1980	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42WS1650	Prehistoric artifact scatter	Recommended Not Eligible	1983	BLM, Private	N/A	N/A	Rainy Day APE	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1659	Prehistoric habitation	Recommended Eligible—D	1983	BLM	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1665	Prehistoric artifact scatter and possible structure	Recommended Eligible—D	1983	BLM	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1681	Prehistoric habitation	Recommended Eligible—D	1983	BLM	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1682	Prehistoric habitation	Recommended Eligible—D	1983	BLM	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1728	Prehistoric petroglyphs	Recommended Eligible—D	1969	Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS1781	Prehistoric rockshelter and lithic scatter	Recommended Not Eligible	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, there appears to be a limited amount of fill within the shelter, and the associated artifacts suggest that this was a limited use site where core reduction and/or tool production or maintenance activities were occurring.
42WS1793	Prehistoric habitation and artifact scatter (two structures)	Listed; Contributing	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42WS2114	Prehistoric rockshelter and dry laid masonry wall	Determined Not Eligible	1988	BLM, SITLA	N/A	N/A	Rainy Day APE	Does not meet site type criteria. Test excavations determined there is no cultural depth.
42WS2226	Prehistoric artifact scatter	Recommended Eligible—D	1986	Private	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS2273	Historic canal/syphon system	*Unevaluated*	2025	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. Also, the site was not relocated in 2025.
42WS2356	Historic bridge (*Harrisburg Bridge, Berry Springs Bridge or Virgin River Bridge*)	Determined Not Eligible	2025	Private	N/A	N/A	Sunny/Rainy Day APEs	Does not meet site type criteria. Also, the bridge has been removed and replaced with modern components and is no longer considered an archaeological site.
42WS2556	Prehistoric artifact scatter	Determined Not Eligible	1994	Private	N/A	N/A	Rainy Day APE	Does not meet site type criteria. Also, the completion of full-scale excavations at the site have exhausted its information potential.
42WS2795	Historic canal	Recommended Eligible—A	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS2796	Historic canal	Recommended Eligible—A	1994	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS2799	Historic sawmill and artifact scatter	Recommended Eligible—A/D	2021	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

TABLE 7. VISUAL/INDIRECT BREACH INUNDATION (SUNNY DAY AND RAINY DAY) EFFECTS ASSESSMENT LITERATURE REVIEW*								
Site No.	**Description**	**Eligibility**	**Date of Last Recording**	**Land Ownership**	**Site Type Criteria of Concern**	**VEA Required?**	**APE**	**Justification for a VEA or no VEA (ex. Did not meet site type criteria)**
42WS2809	Historic canal	Recommended Eligible—A	1994	NPS, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS3344	Historic ditch (*Springdale Irrigation Ditch*)	Recommended Eligible—A	2021	BLM, NPS, Private, SITLA, UDOT	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features. This site was also recorded as site 42WS3020 and was not relocated in 2021.
42WS3673	Prehistoric bedrock mortars	Determined Eligible—D	1998	BLM	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS4397	Historic road (*Road to Virgin City*)	Determined Eligible—A	2019	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS5515	Historic road	Determined Not Eligible	2010	BLM	N/A	N/A	Rainy Day APE	Does not meet site type criteria. Also, adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS6113	Historic townsite (*Grafton Townsite*)	Listed	2025	BLM, Private	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS6242	Historic site (indeterminate)	*In Progress*	*In Progress*	NPS	N/A	N/A	Sunny/Rainy Day APEs	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.
42WS6789	Prehistoric petroglyph panel	Determined Eligible—C/D	2022	Private	N/A	N/A	Rainy Day APE	Adverse effects are unlikely/minimal due to distance and the proposed reservoir safety features.

*Note: Sites or structures that are either Eligible, Listed, or unevaluated for the NRHP are in bold blue text within the “NRHP Eligibility” column; bold blue highlighted text in the “Site Type Criteria of Concern” column indicates a site type that may require assessment for visual impacts.

REFERENCES

Frank, Barbara. 1994. 42WS1793 Intermountain Antiquities Computer System (IMACS) Form. Prepared by the National Park Service (NPS). On file with the Utah State Historic Preservation Office.

Horn, Jonathon C. 1996. Parunuweap Canyon Archaeological District, Zion National Park, Springdale, Washington County, Utah. United States Department of the Interior National Park Service National Register of Historic Places Nomination Form. Prepared by Alpine Archaeological Consultants, Inc., Montrose, Colorado. On file with the Utah State Historic Preservation Office.

Lufkin, Beatrice. 2010. Grafton Historic District, Rockville, Washington County, Utah. United States Department of the Interior National Park Service National Register of Historic Places Nomination Form. Prepared by Grafton Heritage Partnership, Salt Lake City, Utah. On file with the Utah State Historic Preservation Office.

Naylor II, Laird P. 1992. 42WS1158 Rocky Mountain Region Archaeological Site Status Evaluation. Prepared by the National Park Service (NPS). On file with the Utah State Historic Preservation Office.

Naylor II, Laird P. and Barbara Frank. 1994. 42WS1160 Intermountain Antiquities Computer System (IMACS) Form. Prepared by the National Park Service (NPS). On file with the Utah State Historic Preservation Office.

Stokes, William Lee. 1986. *Geology of Utah*. Utah Museum of Natural History and Utah Geological and Mineral Survey, Salt Lake City, Utah.

Sullivan, Robert G., Mark E. Meyer, and Daniel. J. O'Rourke. 2018. Comparison of Visual Impact Analysis Under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. Accessed on February 2, 2023, at: https://www.fs.usda.gov/nrs/pubs/gtr/gtr-nrs-p-183papers/20-sullivan-VRS-gtr-p-183.pdf.

United States Geological Survey (USGS). 2026. Accessed July 16, 2026, at: https://ngmdb.usgs.gov/topoview/viewer/#16/37.2488/-112.6630.

Utah State Historic Preservation Office (USHPO). 2026a. *Sego*. Utah State Historic Preservation Office. Accessed July 15, 2026, at: https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8d1c8337d050431080f7dce538f7677c.

_____. 2026b. *Utah Digital Asset Manager* (UDAM). Utah State Historic Preservation Office. Accessed July 15, 2026, at: https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8d1c8337d050431080f7d ce538f7677c.

_____. 2026c. *Historic Utah Buildings* (HUB). Utah State Historic Preservation Office. Accessed July 15, 2026, at: https://shpo.utah.gov/portal/apps/webappviewer/index.html?id=8e218e18c2b74477b5f 520e5617bebaf.

APPENDIX A

PROJECT AREA OF POTENTIAL EFFECT OVERVIEW MAP

KANE COUNTY

Supplemental Survey

Black Knoll Pit
(Removed from Final Alternatives)

Bald Knoll Pits
(Removed from Final Alternatives)

Esplin Pit

Cove Reservoir

Mt. Carmel Irrigation Improvements

Tait Pit

Lamb's Pit

County Pit
(Removed from Final Alternatives)

Glendale

Orderville

GLENDALE BENCH

THE SAND HILLS

WHITE CLIFFS

Cultural Resources Visual Effect Analysis Overview

Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Direct APE
- Visual APE
- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- SITLA
- UDOT

Utah

N

0 2 Miles

Eocene Environmental Group

Cultural Resources Visual Effect Analysis Panel Maps

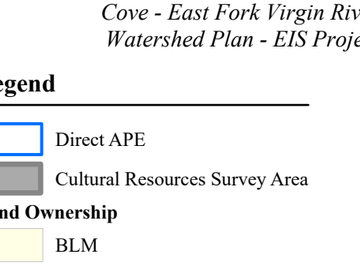
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Direct APE
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- TLA



N

0 3,900 Feet

Eocene Environmental Group

Black Knoll Pit
(Removed from Final Alternatives)

Esplin Pit

KANE COUNTY

T40S R6W
T41S R6W
T40S R5W
T41S R5W

Glendale USGS 7.5 Minute Quadrangle
Bald Knoll USGS 7.5 Minute Quadrangle

Black Knoll
The Falls
Borrow Pit
Kanab Creek
Skutumpah Creek
Hollow
Sink
Valley
Trail
Jeep
Spring
Kanab
Cliffs

Cultural Resources Visual Effect Analysis Panel Maps

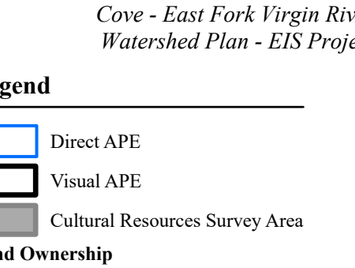
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Direct APE
- Visual APE
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- TLA



Panel 2 of 17

N

0 3,900 Feet

Eocene Environmental Group

Supplemental Survey

Orderville USGS 7.5 Minute Quadrangle
Glendale USGS 7.5 Minute Quadrangle

KANE COUNTY

T40S R7W
T41S R7W
T40S R6W
T41S R6W

Bishop Canyon
Long Valley
Glendale
Calf Pasture
Hollow
Gardner Hollow
East Fork
Virgin River
Spring Hollow
Stewart Creek
Bench
Swain

July 6, 2020
G:\Projects\AlphaCove_Plan_EA_EIS_02_Cove_EFVR_Plan_EIS_Desktop_Files\MAPFOLDER\20250001_Cove_AWR_MCD.aprx

KANE COUNTY

T40S R8W
T41S R8W

T40S R7W
T41S R7W

Cove Reservoir

Orderville

Orderville USGS 7.5 Minute Quadrangle
Glendale USGS 7.5 Minute Quadrangle

Cultural Resources Visual Effect Analysis Panel Maps

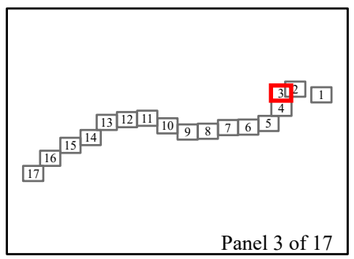
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Direct APE
- Visual APE
- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- TLA



Panel 3 of 17

N

0 3,900 Feet

Eocene Environmental Group

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Cultural Resources Visual Effect Analysis Panel Maps

Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Direct APE
- Visual APE
- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- TLA

KANE COUNTY

Orderville USGS 7.5 Minute Quadrangle
Mount Carmel USGS 7.5 Minute Quadrangle

Orderville USGS 7.5 Minute Quadrangle
Glendale USGS 7.5 Minute Quadrangle

Mount Carmel USGS 7.5 Minute Quadrangle
White Tower USGS 7.5 Minute Quadrangle

Mt. Carmel Irrigation Improvements

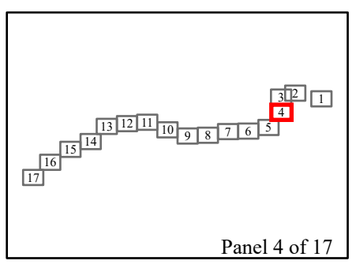
Tait Pit

Lamb's Pit

Mount Carmel Junction

T41S R8W

T41S R7W



Panel 4 of 17

N

0 3,900 Feet

Eocene Environmental Group

KANE COUNTY

The Barracks USGS 7.5 Minute Quadrangle
Mount Carmel USGS 7.5 Minute Quadrangle

T41S R8W
T42S R8W
T41S R7W
T42S R7W

Monument Hollow
East Fork Virgin River
Yellowjacket Canyon
Meeks Cliffs
CLIFFS
Joseph Canyon
Point Canyon
Monroe Spring
State

Cultural Resources Visual Effect Analysis Panel Maps

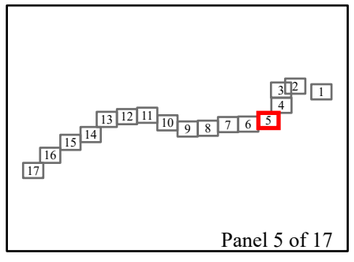
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)
- Cultural Resources Survey Area

Land Ownership

- BLM
- Private
- TLA
- UDOT



N

0 3,900 Feet

Eocene Environmental Group

Cultural Resources Visual Effect Analysis Panel Maps

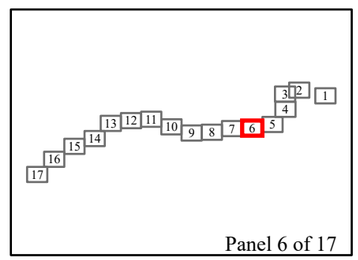
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- TLA



Panel 6 of 17

N

0 3,900 Feet

Eocene Environmental Group

The Barracks USGS 7.5 Minute Quadrangle

July 6, 2026
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Cultural Resources
Visual Effect Analysis
Panel Maps

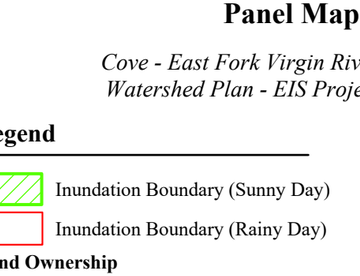
Cove - East Fork Virgin River
Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- NPS
- TLA



N

0 3,900 Feet

Eocene Environmental Group

T41S R9.5W
T41S R9W
T42S R9W
T42S R9.5W
WASHINGTON COUNTY
KANE COUNTY
Springdale East USGS 7.5 Minute Quadrangle
The Barracks USGS 7.5 Minute Quadrangle
ARK
RIVER
CANYON
Dennett Canyon
Parunuweap Can

WASHINGTON COUNTY

N A T I O N A L

The Watchman

Johnson Mountain

T41S R10W
T42S R10W

T41S R10W

T41S R9.5W

T41S R9.5W
T42S R9.5W

VIRGIN

PARUNUWEAP

FORK

EAST

Cem

Shunesburg

Shunesburg Mountain

T42S R10W

T42S R9.5W

Shunes Creek

Springdale East USGS 7.5 Minute Quadrangle

Cultural Resources Visual Effect Analysis Panel Maps

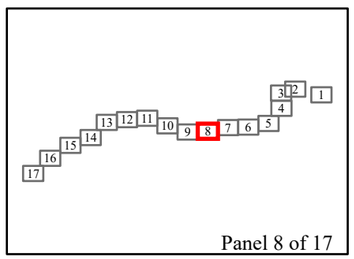
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- NPS
- Private



Panel 8 of 17

N

0 3,900 Feet

Eocene Environmental Group

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Cultural Resources
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Cove - East Fork Virgin River Watershed Plan - EIS Project

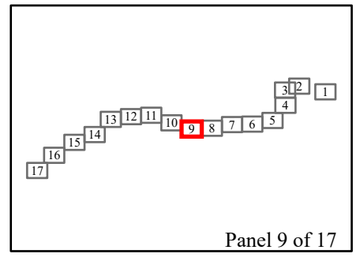
Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- NPS
- Private
- UDOT

Springdale West USGS 7.5 Minute Quadrangle
Springdale East USGS 7.5 Minute Quadrangle



Panel 9 of 17

N

0 3,900 Feet

Eocene Environmental Group

July 6, 2026
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Cultural Resources Visual Effect Analysis Panel Maps

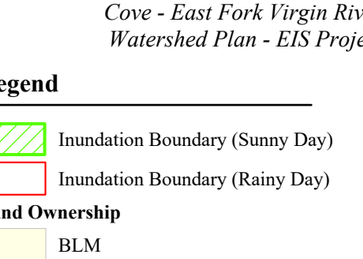
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- NPS
- Private
- TLA



Panel 10 of 17

N

0 3,900 Feet

Eocene Environmental Group

WASHINGTON COUNTY

VIRGIN RIVER

T41S R12W
T42S R12W

T41S R11W
T42S R11W

Virgin USGS 7.5 Minute Quadrangle
Springdale West USGS 7.5 Minute Quadrangle

Gravel Pit

Pasley Ridge

TRAIL

JEEP

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WASHINGTON COUNTY

Observation Tower

Virgin

Water Tank

VIRGIN RIVER

CANAL

T41S R12W

Virgin USGS 7.5 Minute Quadrangle

Cultural Resources Visual Effect Analysis Panel Maps

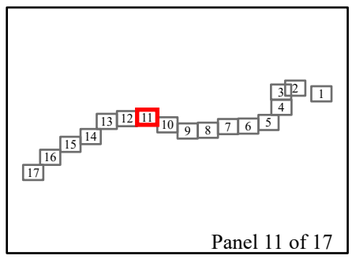
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA



Panel 11 of 17

N

0 3,900 Feet

Eocene Environmental Group

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Cultural Resources Visual Effect Analysis Panel Maps

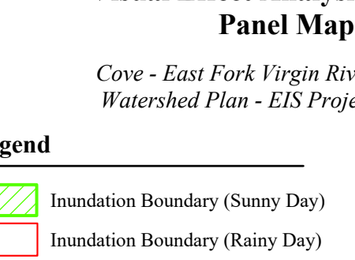
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA
- UDOT



N

0 3,900 Feet

Eocene Environmental Group

Hurricane USGS 7.5 Minute Quadrangle
Virgin USGS 7.5 Minute Quadrangle

Cultural Resources Visual Effect Analysis Panel Maps

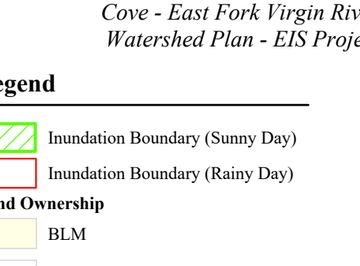
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA
- UDWR
- OTHER



N

0 3,900 Feet

Eocene Environmental Group

Harrisburg Junction USGS 7.5 Minute Quadrangle
Hurricane USGS 7.5 Minute Quadrangle

T41S R14W
T41S R13W
T42S R14W
T42S R13W

WASHINGTON COUNTY
Harrisburg
Mobile Home Park
Little Purgatory
Boat Ramp
QUAIL CREEK STATE PARK
Quail Creek Reservoir
Harrisburg Gap
Gaging Sta
Berry Springs
AQUADUCT
Washington County Regional Fairpark
East Fork
VIRGIN
VOLCANO MTN
Sullivan Knoll

Cultural Resources
Visual Effect Analysis
Panel Maps

Cove - East Fork Virgin River
Watershed Plan - EIS Project

WASHINGTON COUNTY

Harrisburg Junction USGS 7.5 Minute Quadrangle
Washington Dome USGS 7.5 Minute Quadrangle

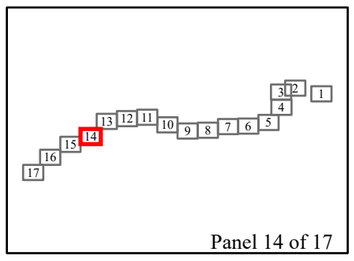
T42S R14W

Legend

- Inundation Boundary (Sunny Day)
- Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA
- OTHER



Panel 14 of 17

N

0 3,900 Feet

Eocene Environmental Group

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Cultural Resources Visual Effect Analysis Panel Maps

Cove - East Fork Virgin River Watershed Plan - EIS Project

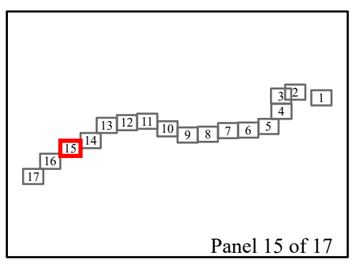
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Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA
- UDOT
- UDWR

Washington USGS 7.5 Minute Quadrangle
St George USGS 7.5 Minute Quadrangle
St George USGS 7.5 Minute Quadrangle
Washington Dome USGS 7.5 Minute Quadrangle



Panel 15 of 17

N

0 3,900 Feet

Eocene Environmental Group

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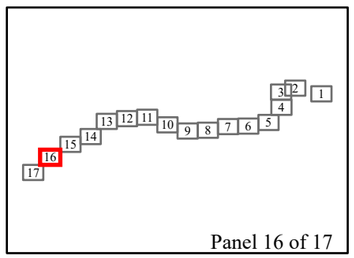
Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

Inundation Boundary (Rainy Day)

Land Ownership

- BLM
- Private
- TLA
- UDOT



Panel 16 of 17

N

0 3,900 Feet

Eocene Environmental Group

Cultural Resources Visual Effect Analysis Panel Maps

Cove - East Fork Virgin River Watershed Plan - EIS Project

Legend

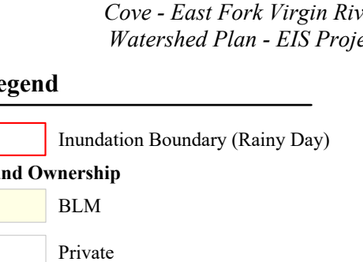
Inundation Boundary (Rainy Day)

Land Ownership

BLM

Private

TLA



N

0 3,900 Feet

Eocene Environmental Group

WASHINGTON COUNTY

T43S R17W

T43S R16W

UTAH

ARIZONA

WASHINGTON CO

MOHAVE CO

Wash

Big Round Valley

Little Round Valley

Atkinville Wash

VIRGIN RIVER

First Narrows

Point

Starvation

POINT OF ROCKS TRAIL

Inspection Station

T 42 N

T 41 N

White Hills USGS 7.5 Minute Quadrangle

St George USGS 7.5 Minute Quadrangle

July 6, 2026 G:\Projects\AlphaCove_Plan_EA_DSI\02_Cove_EFVR_Plan_EIS_DSI\Map_Files\ARCGIS\20250001_Cove_WM_Mxds.aprx

Visual Resources Technical Memorandum
Cove-East Fork Virgin River Plan-EIS – Kane County, Utah

Draft – For Internal Review

Executive Summary - Visual Resources

Visual effects of the proposed Cove-East Fork Virgin River (Cove-EFVR) dam and reservoir were evaluated within a landscape designated entirely as *BLM Visual Resource Management (VRM) Class IV*, (Fig.1) which allows major modification of landscape character where such change is anticipated by land use plans. Although the project would introduce a visible dam and reservoir in localized areas, these changes are consistent with VRM Class IV management intent and are limited by topography and distance. With incorporation of design and mitigation measures, visual impacts would not be significant under NEPA. The proposed measures of this project are not located within BLM-managed areas.

1. Purpose and Scope

This Technical Memorandum documents the assessment of visual resources potentially affected by the Cove Reservoir Project. It supports the NEPA Environmental Impact Statement (EIS) and administrative record by evaluating visual effects, photo-simulation viewpoints, and mitigation commitments.

2. Regulatory Framework

Visual resources were evaluated consistent with NEPA and CEQ regulations at 40 CFR §§1502.15 and 1502.16. The analysis integrates BLM Visual Resource Management (VRM) policy and FHWA Visual Impact Assessment (VIA) guidance.

3. Visual Management Context

Review of BLM Utah VRM spatial data indicates that all lands within the Area of Visual Effect are designated VRM Class IV. Class IV allows major modifications of the existing landscape character provided land use objectives are met.

Visual Resource Management Class IV

All Bureau of Land Management (BLM)–administered lands within the Area of Visual Effect (AVE) are designated *Visual Resource Management (VRM) Class IV.* VRM Class IV areas are managed to provide for management activities that may require *major modification of the existing character of the landscape.* Under Class IV, the degree of visual change **may be high**, and modifications **may attract attention, dominate the view, and become a major focus of viewer attention**. Class IV is typically applied where land use plans anticipate infrastructure development, resource use, or other activities that substantially alter landscape character, while still requiring consideration of visual design measures to support applicable land use objectives.[1]

4. Area of Visual Effect

The Area of Visual Effect (AVE) includes areas from which the dam and reservoir may generally be visible, including portions of U.S. Highway 89, local roads, and downstream canyon viewpoints.

5. Viewer Groups and Key Observation Points (KOP)

Key viewer groups include highway travelers, local road users, nearby landowners, and downstream observers. Three Key Observation Points (KOP-1, KOP-1.1, and KOP-2) were selected for perspective to show most common viewshed for the proposed embankment measures.

6. Visual Effects Summary

The proposed action would introduce a dam and reservoir causing moderate, localized long-term visual change. Effects are consistent with VRM Class IV intent and are not significant under CEQ criteria.

7. Photo-Simulation Captions

KOP-1: Primary Highway 89 corridor view illustrating dam visibility.
KOP-1.1: Secondary Highway 89 view, south of KOP-1 with partial topographic screening.
KOP-2 : View downstream of proposed embankment showing embankment/topography.

8. Mitigation Commitments

Mitigation measures include surface color and texture treatments, contour grading, revegetation of disturbed areas, dust control during construction, and minimization of nighttime lighting.



Figure 1. General location of proposed ~1,900 ft long, 90 feet high earthen embankment *(most visible measure).*

Proposed Earthen Embankment: Slope protection will be required, with rock riprap and bedding planned for the upstream slope and native shallow root seeding planned for the downstream slope.

A 6-inch surface course of untreated road base will be placed to cap the crest of the dam to provide a finished surface. The crest will be sloped at 2 percent downward toward the reservoir to prevent ponding. A crest width of 25 feet, ~1,900 feet long and ~90 feet high has been assumed, with an upstream slope of 3H:1V (Horizontal: Vertical) and downstream slope 2H:1V. The crest of the dam will be 6.5 and 3.0 feet above the crests of the Principal Spillway and Auxiliary Spillway, respectively. Local rock will be used as much as practicable to match the surrounding landscape.

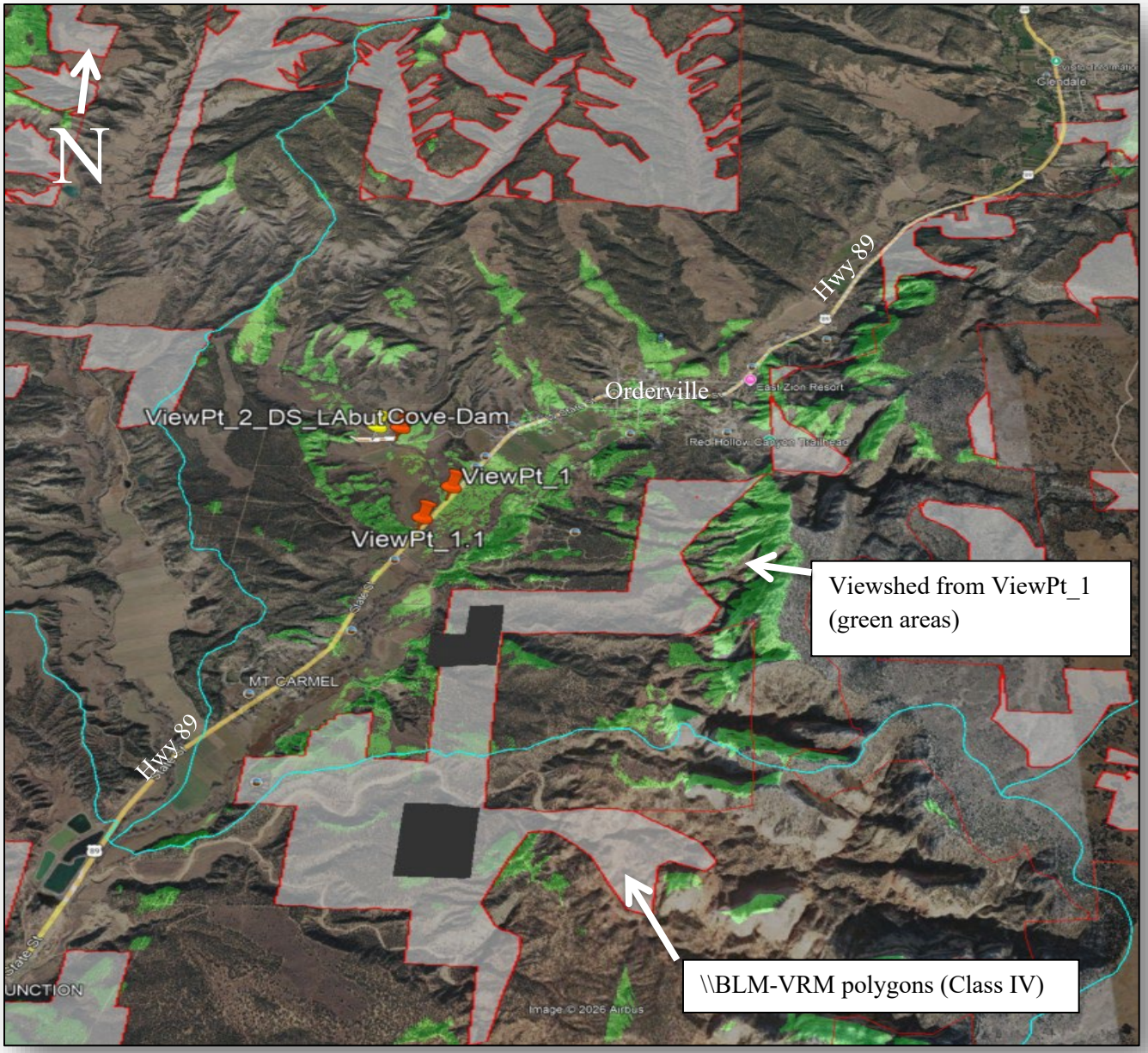


Figure 2. Viewshed from Key Observation Point-1

VRM Class IV: BLM areas that are managed to provide for management activities that may require major modification of the existing character of the landscape. Under Class IV, the degree of visual change may be high, and modifications may attract attention, dominate the view, and become a major focus of viewer attention. Class IV is typically applied where land use plans anticipate infrastructure development, resource use, or other activities that substantially alter landscape character, while still requiring consideration of visual design measures to support applicable land use objectives.



Figure 3. Key Observation Point – 1 -- looking from Hwy 89 toward the proposed earthen embankment dam ~2,800 ft away.



Figure 4. Key Observation Point 1.1 - looking toward proposed earthen embankment ~3,400 ft away



Figure 5. On access road at Key Observation Point-2, downstream of proposed dam near the left abutment - looking upstream.

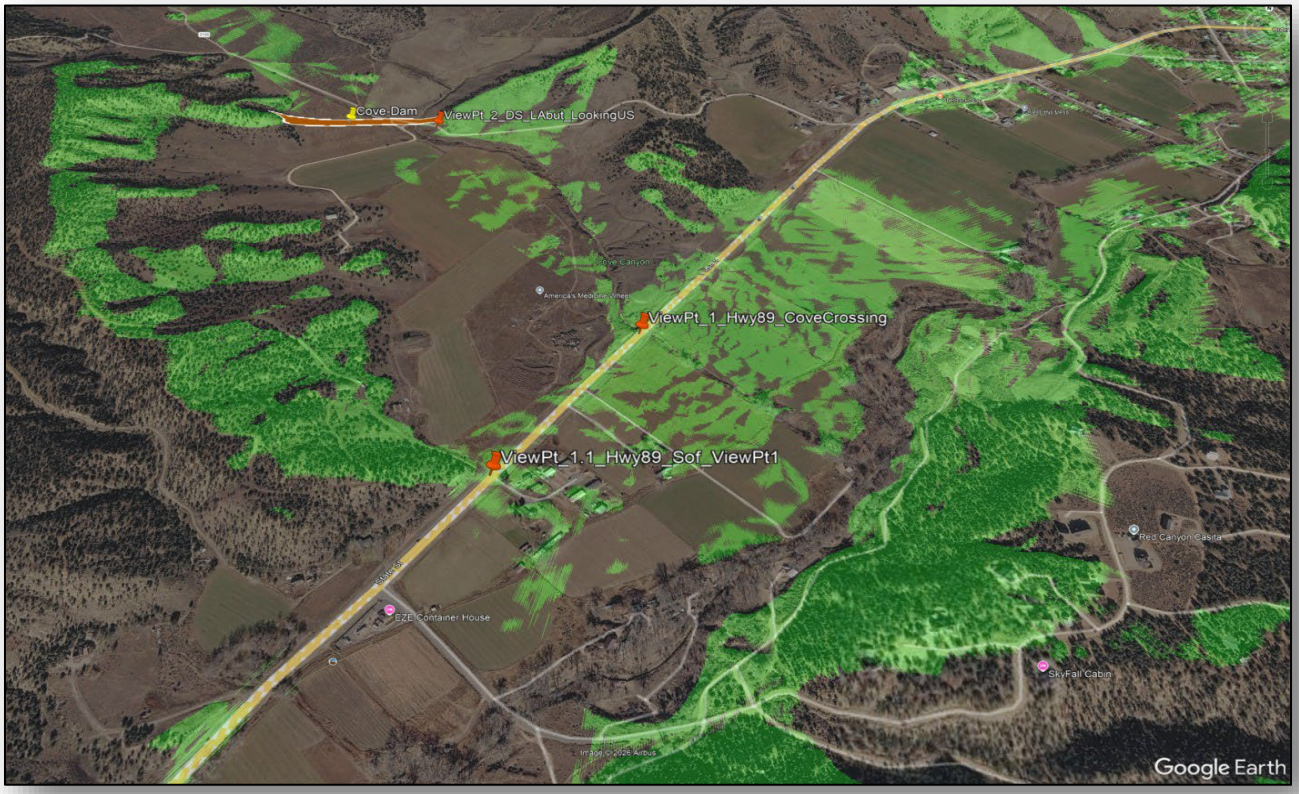


Figure 6. Viewshed from Key Observation Point-1 ***(Google Earth Pro). Green polygons show what is generally visible at View Point 1.1 on Hwy 89.***



Figures 7-8. Simulations at Key Observation Point-2 - looking upstream ~80 ft tall earthen embankment.

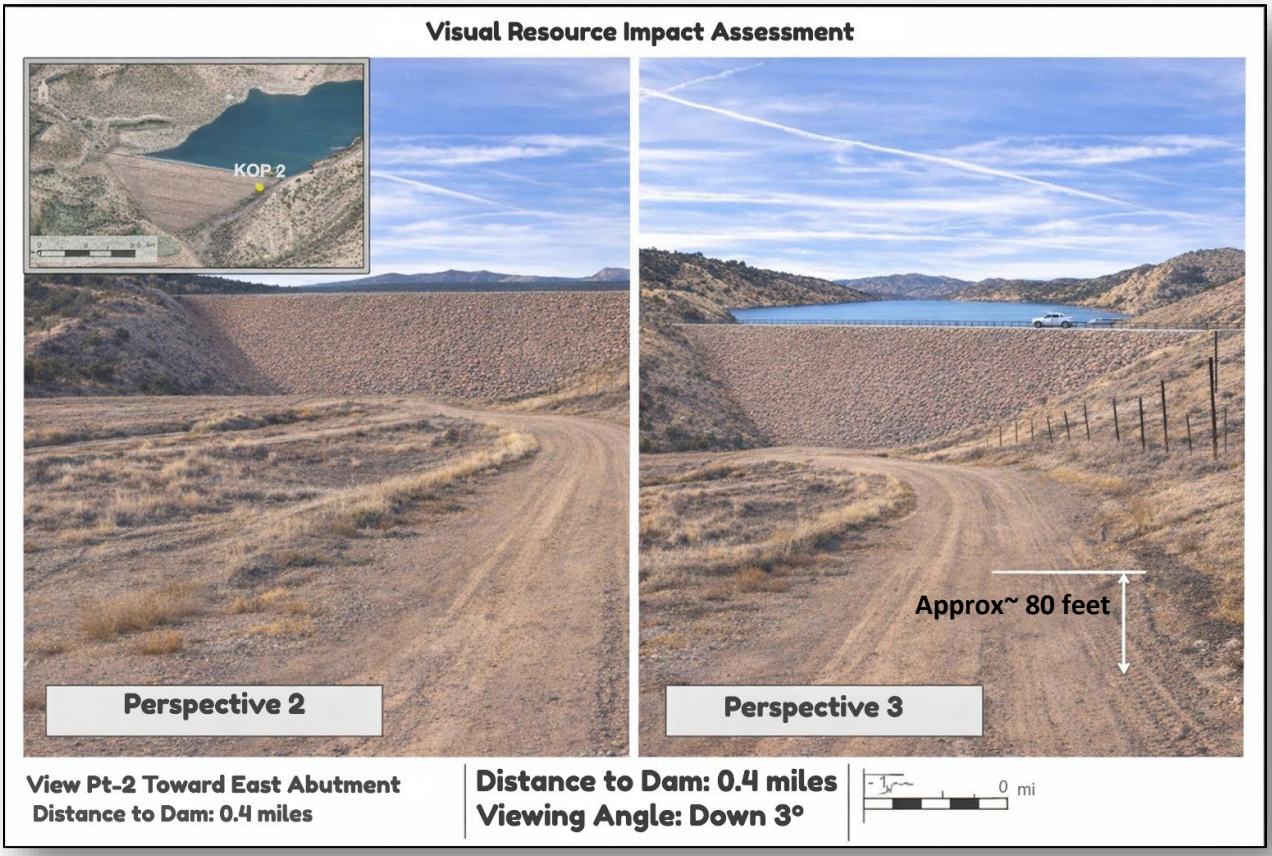




Figure 8. KOP-1 Simulation at 8 ft above Hwy 89 and approximately 2,800 feet to embankment.

From Key Observation Point 1 (KOP-1) located along U.S. Highway 89, approximately 2,800 feet (0.53 mile) at the Cove Canyon crossing, a visual simulation was prepared from an eye-level viewpoint approximately 8 feet above U.S. Highway 89 at an elevation of approximately 5,407 feet to represent typical driver perspectives. From this location, the dam crest at the approximate elevation of 5,560 feet would be viewed at a shallow upward angle and would appear primarily as a thin horizontal line above intervening terrain. The downstream embankment face would be largely obscured by foreground topography, further reducing the apparent scale of the structure. At this distance and viewing angle, the project would not dominate the viewshed and would result in a subtle visual change for most highway travelers.

Visual Impact Conclusion (All Key Observation Points)

Based on evaluation of visual conditions from Key Observation Points representing roadway viewers (KOP-1 along U.S. Highway 89), mid-distance oblique perspectives, and closer localized viewpoints near the project area (KOP 1.1 and KOP-2), the proposed dam would result in localized but limited visual change. From Highway 89, where most of the public viewing would occur, the dam would be viewed from a distance of approximately 2,800 feet at a shallow upward angle, appearing primarily as a thin, horizontal feature partially screened by foreground topography. At these distances, the apparent height and mass of the embankment are substantially reduced, and viewer exposure is brief and transient. Closer KOPs provide clearer views of the embankment face and crest; however, even at these locations the structure blends with surrounding landforms due to the use of earth-toned materials, smooth transitions into abutment slopes, and compatibility with existing landscape character. Visual simulations demonstrate that

the dam would not dominate the viewshed from any evaluated perspective and would not introduce high visual contrast. Considering distance, viewing angle, duration of exposure, and the modified nature of the landscape setting, the project would not result in a significant adverse impact to visual resources under NEPA.

---

[1] Bureau of Land Management (BLM). 1984. *Manual 8400 – Visual Resource Management*. U.S. Department of the Interior, Washington, D.C.

[2] Bureau of Land Management (BLM). 2015. *Visual Resource Management Class Objectives and Guidance*, including *Handbook H-8410-1 – Visual Resource Inventory*. U.S. Department of the Interior.

DRAFT PALEONTOLOGICAL RESOURCES SURVEY REPORT

East Fork Virgin River Watershed Project, Kane County, Utah

Prepared for:
Alpha Engineering
Glen Carnahan, PE
glencarnahan@alphaengineering.com
(435) 628-6500

For Submittal to:
Todd Sieber
todd.sieber@usda.gov
State Geologist
Natural Resources Conservation Service

Prepared by: Stephanie Grossart and Larkin McCormack
Eocene Environmental Group, Inc.
1745 South Alma School Road #220
Mesa, Arizona 85210

May2025

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PROJECT DESCRIPTION AND LOCATION

Project Description and Location

The Natural Resources Conservation Service (NRCS), in association with the Kane County Water Conservancy District (KCWCD) and Washington County Water Conservancy District as project sponsors, has initiated work on a Watershed Plan-Environmental Impact Statement (Plan-EIS) within the Long Valley portion of the East Fork Virgin River Watershed. The NRCS, KCWCD, and Alpha Engineering (Alpha) contracted Eocene Environmental Group, Inc. (Eocene), formerly Transcon Environmental, Inc., to prepare the Plan-EIS and analyze the East Fork Virgin River Watershed Project (Project) for anticipated impacts to natural and human resources. This includes an analysis of potential impacts to paleontological resources. This paleontological resource survey report was prepared to summarize results from the paleontological field survey and evaluate potential impacts from the proposed Project to paleontological resources.

The purpose of this proposed Project is to provide the Glendale, Mt. Carmel, and Orderville irrigation companies additional water storage capacity to meet present and future irrigation water demands during dry summer months, add a new local water-based recreational opportunity, and provide additional water to the WCWCD for agricultural, municipal, and industrial use.

The Project area is located in Kane County near the towns of Mt. Carmel, Orderville, and Glendale and is shown in **Appendix A**, *Project Overview Map*. The Project is entirely on private property.

The construction of the Project would include the following components:

- 6,055-acre-foot capacity reservoir covering approximately 235 surface acres
- Approximately 90-foot by 1,900-foot earthen and rock fill dam
- Primary spillway (870-foot-long, 30-inch-diameter pipeline)
- Auxiliary spillway (1,070-foot-long, 30-foot-wide open channel)
- Approximately 1.7 miles of pipeline comprising the primary portion of the Glendale irrigation system would be replaced with a new 8- to 16-inch pipeline (Cove Reservoir, Plan of Development)
- Approximately 4.55 miles of new pipeline to access agricultural fields near Mt. Carmel
- Approximately 3.2 miles of access road (construction of new roads or improvement of existing roads) to provide access around the reservoir and maintain access to surrounding properties
- An outdoor recreational area and boat ramp at the reservoir site, including picnic facilities, a pavilion, restrooms, overnight and primitive camping sites, and recreation vehicle sites
- Approximately 700 feet (0.13 mile) of a large diameter concrete-encased steel pipeline that would extend from the existing Orderville irrigation pipeline through the dam to the outlet structure of the proposed reservoir
- Use of three borrow sites would be required
    - The Tait and Lamb pits would provide gravel; they are located on private lands near Mt. Carmel and Mt. Carmel Junction
    - The Esplin pit would provide riprap; it is located near the Glendale Bench Road on private land
- Permanent ground disturbance (approximately 259 acres) would occur where the proposed reservoir, dam, primary and auxiliary spillways, access roads, pipelines, and

recreational features (e.g., campsites, boat ramp, etc.) would be constructed; permanent ground disturbance would also occur where the existing three borrow pit sites would be expanded for project-related use

- Temporary ground disturbance (approximately 64 acres) would occur during replacement of the existing pipeline and installation of new pipelines, adjacent to where the permanent spillways would be constructed

Paleontological Survey Area

In support of the Plan-EIS, a paleontological survey was conducted within Potential Fossil Yield Classification (PFYC) 4–5 (high to very high potential) geologic formations that underlay the Project area. The survey area was determined in coordination with the NRCS and Utah Geological Survey (UGS). Areas that were surveyed include the following:

- **Tropic Shale Formation (PFYC 4):** Proposed reservoir and associated features; pipeline replacement to the west of Glendale
- **Naturita Formation (PFYC 5):** Tait Pit and Mt. Carmel irrigation improvement pipeline

PFYC 1–3 and Unknown potential areas were not surveyed.

The paleontological survey was conducted within the below U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps and Public Land Survey System (PLSS) divisions:

TABLE 1
LOCATION OF PALEONTOLOGICAL SURVEY AREA

Prime Meridian	Township	Range	Sections	USGS Topographic Quadrangle
Salt Lake	40 South	7 West	26, 27	Glendale, Orderville
Salt Lake	41 South	7 West	5, 6, 8, 17	Mount Carmel, Orderville

FEDERAL ACTS AND PROFESSIONAL GUIDANCE

This paleontological resource evaluation follows federal regulations governing paleontological resources as well as professional guidance, described below.

Paleontological Resources Preservation, Omnibus Public Lands Management Act, Public Law 111-011, Title VI, Subtitle D 16 United States Code 470aaa (2009)

The Paleontological Resources Preservation Act (PRPA) of 2009 states that paleontological resources on federal lands will be protected and managed using scientific principles and expertise. The act establishes a management framework for paleontological resources and declares that paleontological resources on federal property must be preserved and protected. The PRPA also provides minimum requirements for paleontological resource use permit holders, criminal penalties for illegal collection of fossils on federal lands, and necessary curation protocols of federal fossils at approved repositories.

National Environmental Policy Act of 1969 Public Law 91-190, 83 Stat. 852, 42 United States Code 4321

The National Environmental Policy Act (NEPA) of 1969 was signed into law to "preserve important historic, cultural, and natural aspects of our national heritage." Paleontological resources are evaluated during NEPA analyses when there is potential for adverse impacts.

Federal Land Policy and Management Act of 1976 (Public Law 94-579)

The Federal Land Policy and Management Act of 1976 (FLPMA) provides direction for management, protection, and development of public lands.

Professional Paleontological Guidance

Society of Vertebrate Paleontology Professional Standards

The Society of Vertebrate Paleontology (SVP) Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources details procedures for evaluating potential impacts of proposed actions on paleontological resources and describes ways of mitigating those impacts through surveys, salvage, reporting, and curation (SVP 1995, 2010). The SVP details standard best practice measures for assessing potential impacts to paleontological resources and mitigating these impacts. The professional standards designated by the SVP were used as a guidance document for this project.

Best Practices in Mitigation Paleontology

The "Best Practices in Mitigation Paleontology" paper was also used as a guidance document for this Project (Murphy et al. 2019). This paper is more recent than the SVP guidance and details standard operating procedures in the field of mitigation paleontology. The paper promotes best practices in the field through using rigorous scientific standards to preserve and protect paleontological resources (Murphy et al. 2019).

ANALYSIS OF EXISTING DATA

Potential Fossil Yield Classification

The Bureau of Land Management (BLM) PFYC was developed to assist with paleontological planning. In this system, geologic units are assigned a class based on occurrence of significant paleontological resources (BLM 2022). This system is widely used in the field of mitigation paleontology and by agencies to determine the likelihood of encountering scientifically significant paleontological resources; it was used to guide the need for paleontological resources surveys for this Project. The classification ranks geologic units between 1 and 5, 1 being very low probability and 5 being very high probability of encountering scientifically significant fossils. Areas of Unknown PFYC are poorly studied, and fossil potential has not been assessed yet in those regions. The BLM PFYC guidance provided by BLM PIM 2022-009 can be found in **Appendix B**. The BLM PFYC Utah Statewide GIS data was used for the PFYC values for this project.

Geological and Paleontological Review

The Project area is underlain by the PFYC 5 Dakota (Naturita) Formation; PFYC 4 Tropic Shale Formation; PFYC 3 Carmel Formation (Crystal Creek Member and Co-op Creek Limestone Member); PFYC 4 Straight Cliffs Formation; PFYC 2 Carmel Formation (Winsor Member); PFYC 1 basalt lava flows and cinder cones; and PFYC Unknown alluvial gravel. The geologic formations

that were surveyed are described in detail below and shown on the panel maps in **Appendix A**. Geologic abbreviations are listed after the formation names in the below sections. The geologic map used in this study was from Doelling 2008 and was mapped at a 1:100,000 scale. Since only the PFYC 4–5 geologic formations were designated for paleontological survey, only those formations are described in detail below.

Naturita Formation (formerly Dakota Formation; Kcdm)

The Naturita Formation is a middle Cretaceous sedimentary unit found on the Colorado Plateau. The geologic unit is mainly composed of reddish-brown to tan sandstones, shale, and limestone. The sandstones are fine- to medium-grained with cross-bedding, indicating fluvial deposition. Dark shales are also present, suggesting low-oxygen conditions. The lower portion of the formation contains mudstones and sandstones, representing river channel and floodplain deposits. The upper portion of the formation contains deposits indicative of estuaries, lagoons, and swamps on a coastal plain. Thick coal beds are also present in the formation. Stratigraphically, in Utah the Naturita Formation overlies the Cedar Mountain Formation and underlies the Mancos Shale Formation, representing a shift from terrestrial to marine-influenced deposits as the western interior seaway expanded (Phillips et al. 2021). The Naturita Formation is the lateral equivalent of the Dakota Formation, which is present on the opposite (eastern) side of the Western Interior Seaway in states like Iowa, Kansas, and Nebraska. The Naturita Formation was previously referred to as the Dakota Formation in the west and is still referred to as the Dakota Formation in the geologic map used by this study. The use of the name Naturita Formation for the western deposits has become more popular due to the deposit's spatial separation and different sediment sources from the Dakota Formation (Carpenter et al. 2014).

The Naturita Formation is known to contain microfossil localities that have preserved a diverse mammalian fauna of multituberculates and marsupials (Eaton 1999). Vertebrate fossils are known from the Naturita Formation, including fragmentary remains of dinosaurs such as sauropods, ceratopsians, ankylosaurs, and theropods, as well as turtles and crocodyliformes (Kirkland et al. 2025). Tracks from dinosaurs and other archosaurs are known from the Naturita Formation (Lockley et al. 2018).

Tropic Shale Formation (Kt)

The Tropic Shale Formation, found in southern Utah, is an Upper Cretaceous (Cenomanian to Turonian) geologic unit (Albright et al. 2013). The formation is predominantly composed of dark gray shale, siltstone, and sandstone. Bentonite layers are also present throughout the Tropic Shale Formation. The shales are indicative of low-oxygen depositional conditions and were deposited in a marine environment from the Western Interior Seaway. Septarian nodules are found throughout the lower and middle portions of the formation. Stratigraphically, the Tropic Shale overlies the terrestrial Naturita Formation and is overlain by the Straight Cliffs Formation.

The Tropic Shale Formation was initially known for a diverse record of marine invertebrates that have been used for biostratigraphy (Kirkland 1991). Marine invertebrates known from the Tropic Shale Formation include ammonites, bivalves, oysters, and gastropods. More recently, the Tropic Shale Formation has been found to include a diverse vertebrate assemblage as well, preserving fossils of at least five different shorted necked plesiosaur genera (marine reptiles), marine turtles, many species of chondrichthyans (sharks), and osteichthyians (fish) (Albright et al. 2013). The Museum of Northern Arizona houses an extensive collection of Tropic Shale Formation plesiosaurs, including several holotypes. Occasional dinosaurs are also found within the Tropic Shale Formation, thought to be preserved through a "bloat and float" method in which the

terrestrial animal fills up with air after death and floats out to sea, being deposited and preserved in the marine formation. This was the case with the therizinosaur *Nothronychus graffami* (Zanno et al. 2009) found in the Tropic Shale Formation near Big Water, Utah.

Straight Cliffs Formation (Ksl and Ksu)

The Straight Cliffs Formation, located in southern Utah, is an Upper Cretaceous sedimentary unit spanning the Turonian to early Campanian. It consists of four members listed from youngest to oldest: Tibbet Canyon Member, Smokey Hollow Member, John Henry Member, and Drip Tank Member (Foster et al. 2001). The formation tends to form long bands of cliffs overlying the Tropic Shale Formation and underlying the Wahweap Formation. The Straight Cliffs Formation was deposited in a marginal marine environment on the western side of the Western Interior Seaway and marks a transition from marine to terrestrial deposition. Its lithology consists predominantly of fine- to medium-grained sandstones with lesser components of mudstones, siltstones, and coals. The sandstones show cross-bedding, indicative of fluvial, deltaic, or shallow marine deposition. During the Western Interior Seaway's maximum extent, the unit records a mix of terrestrial and marine environments. The sandstones suggest high-energy environments like river channels and deltas, while the mudstones and limestone reflect lower-energy floodplains, lagoons, or shallow marine embayments.

The Straight Cliffs Formation preserves a diverse invertebrate fauna including ammonites, oysters, ostracods, ammonites, and bivalves such as inoceramids. Many vertebrates are also known from the formation including sharks, fish, mammals, crocodyliforms, amphibians, turtles, lizards, and dinosaurs (Foster et al. 2001).

Paleontology Resource Records Review

A paleontological record search was conducted with the UGS on November 12, 2024. There were no previously known paleontological localities within the Project area, but there were many localities known from the vicinity. Within approximately 2 miles of the Project area, there were 47 previously known localities in UGS's database. There were 23 in the Tropic Shale Formation, one in the Straight Cliffs Formation, 16 in the Carmel Formation, and seven in the Naturita Formation. The Tropic Shale Formation localities were to the west of the proposed reservoir area and included an articulated plesiosaur found in a septarian nodule mine (Gillette et al. 1999), a possible dinosaur limb bone, ammonites, and bivalves. Localities within the Carmel Formation include fossils of bivalves, gastropods, echinoderms, bryozoans, skolithos trace fossils, conifers, and algal stromatolites. Localities within the Naturita Formation include fossils of crocodyliforms, turtles, fish, and possible dinosaur tracks.

METHODS

The paleontological field survey was conducted on November 21 and 22, 2024, by paleontological Principal Investigator Larkin McCormack and Field Technician James Lotts. An additional day of survey was conducted on February 10, 2025, by Larkin McCormack. Prior to beginning the field survey, a literature review, locality search, and geologic review were conducted. The geologic formations that underlay the Project, the PFYC, and previously known paleontology localities were reviewed to determine which areas of the Project have the potential to contain significant fossils and should be surveyed for paleontological resources. The survey area, depicted in **Appendix A** Project Overview Map, was evaluated using aerial imagery to determine likely areas for outcrops of sensitive geologic formations.

The survey area boundaries were identified in the field using ArcGIS Field Maps, and all the areas shown as being within the paleontological survey area were pedestrian surveyed. Areas containing outcrops of exposed bedrock were inspected in detail to document any evidence of vertebrate fossils, invertebrate fossils, trace fossils, and plant fossils. All outcrops were inspected for in situ fossils, which represent fossils observed in place within the bedrock, as well as surface fossils, which have eroded out of the geologic formation and are preserved outside of their original context.

Fossil localities were documented using a Bad Elf GPS unit, photographs, field notes, and locality sheets. Significance was assessed using the criteria of BLM IM 2009-011, “Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value” (BLM 2008).

FIELD SURVEY RESULTS

New Paleontological Localities

Twelve new non-significant paleontological localities were documented during the paleontological survey. Most of the fossils were discovered in the Upper Cretaceous Tropic Shale Formation. A list of the new paleontological localities is below in **Table 2**, and more detailed information is included in the locality forms in **Appendix C**.

TABLE 2. NEW PALEONTOLOGICAL LOCALITIES FROM THE COVE RESERVOIR FIELD SURVEYS						
Eocene Field Number	**Scientific Significance**	**Type**	**Identification**	**Geologic Formation**	**PLSS**	**Description**
11212024-LMC-01	Non-significant	Invertebrate; Possible Vertebrate	Clam and possible fish scale	Tropic Shale Formation	T41S R7W Sec 5	Partial shell in tan sandstone and possible fish scale fragment in gray septarian nodule
11212024-LMC-02	Non-significant	Invertebrate	Oyster	Tropic Shale Formation	T41S R7W Sec 5	Partial shell in tan medium-grained sandstone
11212024-LMC-03	Non-significant	Invertebrate	Gastropods including *Turritella*	Tropic Shale or Straight Cliffs Formations	T41S R7W Sec 5	Fragmented shells in coarse-grained tan sandstone
11212024-LMC-04	Non-significant	Invertebrate	Inoceramid clam	Tropic Shale Formation	T41S R7W Sec 5	Fragmented shell preserved in a septarian nodule
11212024-LMC-05	Non-significant	Invertebrate Trace	Burrows	Tropic Shale Formation	T41S R7W Sec 5	Burrow casts in tan medium-grained sandstone
11222024-LMC-01	Non-significant	Invertebrate	Inoceramid clam	Tropic Shale Formation	T41S R7W Sec 6	Shell cast in mudstone
11222024-JCL-01	Non-significant	Invertebrate	Ammonite impression	Tropic Shale Formation	T41S R7W Sec 5	Shell impression in septarian nodule in popcorn weathered mudstone
11222024-LMC-02	Non-significant	Plant	Petrified wood	Straight Cliffs Formation	T41S R7W Sec 6	Petrified wood fragment observed on mudstone slope with sandstone cobbles and boulders
11222024-JCL-02	Non-significant	Invertebrate	Oyster and inoceramid clam hash	Straight Cliffs Formation	T41S R7W Sec 6	Oyster shells, shell hash, and inoceramid shell impression observed in medium grained sandstone
11222024-LMC-03	Non-significant	Invertebrate	Inoceramid clam cast	Tropic Shale Formation	T41S R7W Sec 5	In situ layer of clam shells in gray to tan mudstone
02102025-LMC-01	Non-significant	Invertebrate	Shell hash	Unknown	T41S R7W Sec 8	Block of tan sandy limestone preserved ex situ
02102025-LMC-02	Non-significant	Invertebrate	Oyster impression	Quaternary alluvial conglomerate	T42S R7W Sec 17	Oyster impression preserved in a cobble in the Tait Pit

Paleontological and Geological Field Results by Formation

Naturita Formation (Kdcm)

The Naturita Formation was mapped as underlying the Project area in a couple of locations, including the northwest corner of the Tait Pit and the Mt. Carmel irrigation improvement to the north of the Tait Pit. The Tait Pit is a gravel mine that is partially mapped as Naturita Formation and partially mapped as Pleistocene to Holocene alluvial gravel (Doelling 2008). Based on our field observations, there were no outcrops of the Naturita Formation exposed within the Tait Pit or adjacent undisturbed slope (**Figures 1–3**). If the adjacent undisturbed slope did belong to the Naturita Formation, the Naturita Formation would be exposed in the excavations above this, and that was not the case.

While known to be fossiliferous, there were not extensive fossil localities in the Naturita Formation within the field survey area because there were not good exposures of the formation. There were two ex situ localities documented in or near areas that were mapped as the Naturita Formation, but both were found ex situ and in areas of variable geology, making it uncertain which formation they originated from. These localities were both invertebrates, one consisting of an isolated oyster impression preserved in a cobble from the Tait Pit and the other shell hash preserved in a small limestone block within the Mt. Carmel irrigation pipeline survey corridor. Both were poorly preserved.



Figure 1. Overview of the Tait Pit looking at the area mapped as the Naturita Formation. The pit appears to be all Quaternary gravel with no Naturita Formation exposed. Larkin McCormack, 2/10/2025.



Figure 2. Closeup on alluvial gravel, cobbles, and sand present within the Tait Pit in an area mapped as the Naturita Formation. Larkin McCormack, 2/10/2025.



Figure 3. Undisturbed northwest corner of the Tait Pit which is mapped as the Naturita Formation. Difficult to discern if the formation is actually present because the surface of the hillside is covered in brown soils and alluvial cobbles. Larkin McCormack, 2/10/2025.

Tropic Shale Formation (Kt)

The Tropic Shale Formation had the best exposures within the Project area near the perimeter of the proposed Cove Reservoir footprint and along the access road grading and recreational features that encircle the outside of the reservoir area. The interior of the proposed Cove

Reservoir was covered in more recent quaternary sediment, soils, and vegetation including sage brush and grasses (**Figure 4**). The Tropic Shale Formation was also mapped as underlying the proposed 16-inch pipeline to the south of Glendale on the west side of State Street; however, outcrops of the formation in this area were very sparse, and some of the area was covered in agricultural fields.

Within the Project area, the Tropic Shale Formation was represented by gray to tan mudstone badlands in a sparse pinyon-juniper forest (**Figure 5**). Septarian nodules were observed throughout the Tropic Shale Formation, and these were checked for fossils when observed (**Figure 6**). Popcorn weathering on the badlands was also observed in some areas (**Figure 7**). The Tropic Shale becomes sandier going upward as it nears its contact with the Straight Cliffs Formation, which was only preserved in the distance on the northern side of the proposed reservoir.



Figure 4. Photo taken from the southern boundary of the Cove Reservoir looking out into the vegetation- and soil-covered interior of the proposed reservoir, with Tropic Shale Formation badlands in the distance. Larkin McCormack, 11/22/2024.



Figure 5. Overview of a typical outcrop of the Tropic Shale Formation within the Project area, taken from the northeastern portion of the proposed Cove Reservoir area. Larkin McCormack, 11/21/2024.



Figure 6. Example of one of the septarian nodules that was found across the Cove Reservoir survey area in the Tropic Shale Formation. Larkin McCormack, 11/22/2024.



Figure 7. Popcorn weathering was observed in some areas of the Tropic Shale Formation. Larkin McCormack, 11/22/2024.

Eight new fossil localities were discovered in the Upper Cretaceous aged Tropic Shale Formation. These included shelled invertebrates (inoceramid clams, ammonites, turritella, oysters, and bivalves; **Figures 8–11**), invertebrate burrow trace fossils (**Figure 12**), and possible fish scales (**Figure 13**). Locality 11222024-LMC-04 was the sole locality found in situ. The locality consisted of two exposed horizons with inoceramid clam shells preserved in gray to tan mudstone layers. This locality was carefully looked over to see if any vertebrate fossil material might be present, but none was found.

All localities documented within the Tropic Shale Formation were from within the proposed Cove Reservoir and associated features, and none were found within the proposed pipeline corridor.



Figure 8. Inoceramid clam within the Tropic Shale Formation from the lower horizon of 11222024-LMC-03. Larkin McCormack, 11/22/2024.

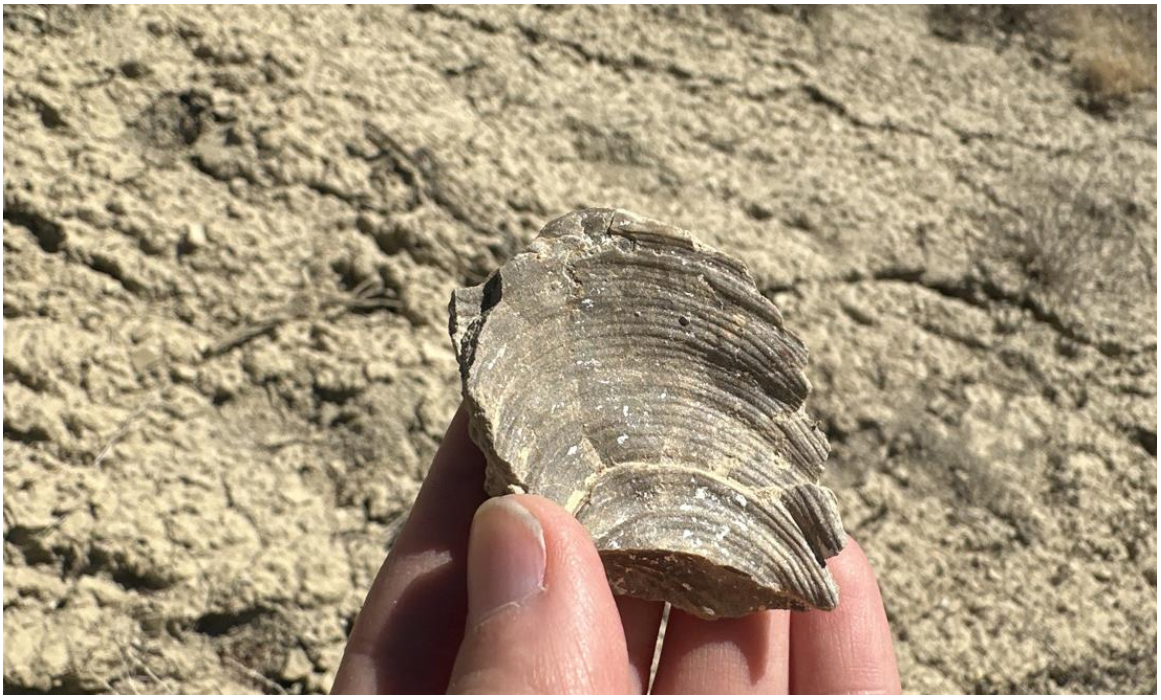


Figure 9. Larger partial inoceramid clam from upper layer at 11222024-LMC-03. Larkin McCormack, 11/22/2024.



Figure 10. Partial oyster within the Tropic Shale Formation at 11212024-LMC-02. Larkin McCormack, 11/21/2024.



Figure 11. *Turritella* and other gastropods preserved in coarse-grained sandstone in the Tropic Shale or Straight Cliffs formations at locality 11212024-LMC-03. Larkin McCormack, 11/21/2024.

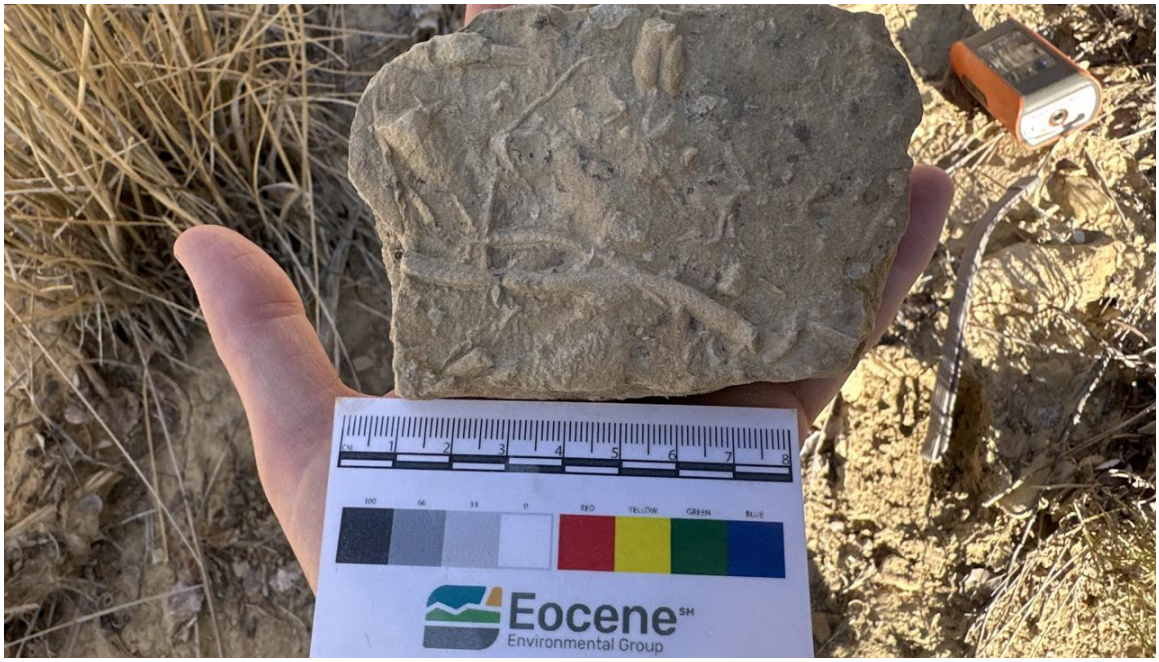


Figure 12. Invertebrate burrows within the Tropic Shale from 11212024-LMC-05. Larkin McCormack, 11/21/2024.



Figure 13. Possible fish scale preserved in a septarian nodule within the Tropic Shale from 11212024-LMC-01. Larkin McCormack, 11/21/2024.

Straight Cliffs Formation (Ksl and Ksu)

While not specifically mapped in the Project area, there were sandstone boulders and cobbles that can likely be attributed to the Straight Cliffs Formation due to erosion of the formation onto the underlying Tropic Shale Formation (**Figure 14**). The geologic contact between the Straight Cliffs Formation and Tropic Shale Formation can be gradational, making it hard to determine an exact point where one stops and the other begins. This combined with the ex situ nature of the cobbles and boulders make the attribution to the Straight Cliffs Formation tentative. The Straight Cliffs Formation lithology observed in the field was a tan medium- to coarse-grained sandstone with crossbedding present in some areas (**Figure 15**).

The Straight Cliffs Formation boulders and cobbles produced two new non-significant paleontological localities, including petrified wood and shells. Petrified wood fragments were found as float on a mudstone slope covered in sandstone cobbles and boulders (**Figure 16**). Oyster shells, shell hash, and inoceramid shell impressions were documented in medium-grained sandstone blocks overlying Tropic Shale Formation mudstone badlands (**Figures 17–18**).



Figure 14. Tan boulders and cobbles likely belonging to the Straight Cliffs Formation overlying the Tropic Shale Formation gray mudstone slopes. Larkin McCormack 11/21/2024.



Figure 15. Closeup on a sandstone boulder overlying the Tropic Shale Formation mudstone, likely belonging to the Straight Cliff Formation. Medium-grained tan sandstone with crossbedding. Larkin McCormack, 11/21/2024.



Figure 16. Petrified wood fragment likely eroded from the Straight Cliffs Formation overlying the Tropic Shale from 11222024-LMC-02. Larkin McCormack, 11/22/2024.



Figure 17. Fragmented bivalve shells, shell hash, and shell impressions eroded from the Straight Cliffs Formation overlying the Tropic Shale from 11222024-JCL-02. James Lotts, 11/22/2024.



Figure 18. Oyster shells and shell hash likely from the Tropic Shale Formation, from 11222024-JCL-02. James Lotts, 11/22/2024.

CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

This paleontological field survey generated 12 new non-significant paleontological localities on privately owned land located in Kane County between the towns of Mt. Carmel and Orderville in southern Utah. The most fossiliferous geologic unit in the survey area was the Tropic Shale Formation. Fossils found in this formation included shelled invertebrates (inoceramid clams, ammonites, turritella, oysters, and bivalves), invertebrate burrows, and possible fish scales. While not represented on the geologic map for the area, the Straight Cliffs Formation overlies the Tropic Shale Formation and was likely observed eroding over mudstone slopes within the Project area. The Straight Cliffs Formation produced two new paleontological localities, including petrified wood and bivalves. Fossils found near the Naturita Formation that were not attributed to a specific formation included shell hash and an oyster. All new localities were determined to be non-significant based on their commonality and poor preservation of the fossils, and none of the fossils were collected. Two horizons found in the Tropic Shale Formation consisting of inoceramid clam layers were of note due to their in situ preservation.

The Naturita Formation is mapped as underlying a portion of the Tait Pit and the and the Mt. Carmel irrigation improvements. The Naturita Formation is known to produce significant paleontological microsites near this area in Orderville. Based on field observations, the Tait Pit was fully Pleistocene to Holocene gravel deposits and the Naturita Formation was not exposed within disturbed areas of the Tait Pit. We recommend that the construction contractors are instructed to only excavate from previously disturbed areas of the pit, and if they notice a lithology change from gravel to finer grained sediments that could be indicative of the Naturita Formation they should not work in that area or should contact a paleontological monitor. The Mt. Carmel irrigation improvements within the Naturita Formation mapped area have experienced previous disturbance. If the improvements stay within these previously disturbed areas paleontological monitoring is not needed. If new disturbance is needed outside of these boundaries, a paleontological monitor should be present.

The Tropic Shale Formation underlies the outer perimeters of the proposed Cove Reservoir and associated features. No significant fossil localities were found during the pre-construction survey, but there are known vertebrate localities including a plesiosaur from the surrounding area. Based on the lack of fossils found during the pre-construction survey, full time paleontological monitoring is not needed but spot check paleontological monitoring during ground disturbance is recommended to observe spoils and disturbed materials, helping to mitigate potential risks to paleontological resources that could be unearthed by construction. Specific attention should be given to the area of locality 11222024-LMC-03 which preserved an in situ clam layer, suggesting that there could be more fossils preserved within this layer.

A pre-construction paleontological training with the construction contractor is recommended. If any fossils are found and a paleontological monitor is not on site, all activities should be stopped within 100 feet of the discovery, and the project paleontologist should be contacted.

REFERENCES

Albright, L. B., Gillette, D. D., and Titus, A. L. 2013. Fossil Vertebrates from the Tropic Shale (Upper Cretaceous), Southern Utah. At the top of the Grand Staircase: the Late Cretaceous of Southern Utah, Indiana University Press, Bloomington and Indianapolis, 536-562.

Bureau of Land Management (BLM). 2008. Instruction Memorandum No. 2009-011; Assessment and Mitigation of Potential Impacts to Paleontological Resources. United States Department of the Interior, Washington, D.C. 20240.

_____. 2022. Permanent Instruction Memorandum (PIM) 2022-009; Implementing the Paleontological Resources Preservation Act of 2009 (PRPA). United States Department of the Interior, Washington, D.C. 20240.

Carpenter, K., 2014. Where the Sea Meets the Land—the Unresolved Dakota Problem in Utah. Utah Geological Association Publication, 43, 357-372.

Doelling, H.H., 2008, Geologic Map of the Kanab 30' x 60' Quadrangle, Kane, Utah, and Coconino and Mohave Counties, Arizona. Utah Geological Survey, Miscellaneous Publication 08-2DM, 1:100,000

Eaton, J. G. 1999. Vertebrate Paleontology of the Paunsaugunt Plateau, Upper Cretaceous, Southwestern Utah. Vertebrate Paleontology in Utah: Utah Geological Survey Miscellaneous Publication, 99(1), 335-338.

Foster, J. R., Titus, A. L., Winterfeld, G. F., Hayden, M. C., & Hamblin, A. H. 2001. Paleontological Survey of the Grand Staircase-Escalante National Monument, Garfield and Kane Counties, Utah. Utah Geological Survey: Special Study 99, 1-98.

Gillette, D. D., Hayden, M. C., & Titus, A. L. (1999). Occurrence and Biostratigraphic Framework of a Plesiosaur from the Upper Cretaceous Tropic Shale of Southwestern Utah. Vertebrate Paleontology in Utah: Miscellaneous Publication 99(1), 269-274.

Kirkland, J. I. 1991. Lithostratigraphic and Biostratigraphic Framework for the Mancos Shale (late Cenomanian to middle Turonian) at Black Mesa, Northeastern Arizona. 85-112 in J.D Nations and J.G. Eaton (eds.) Stratigraphy, Depositional Environments, and Sedimentary Tectonics of the Western Margin, Cretaceous Western Interior Seaway. Geological Society of American Special Paper 260.

Kirkland, J. I., Sertich, J. J., & Titus, A. L. 2025. Dinosaur Biostratigraphy of the Non-Marine Cretaceous of Utah. Geological Society, London, Special Publications, 545(1).

Lockley, M., Burton, R., & Grondel, L. 2018. A large assemblage of tetrapod tracks from the Cretaceous Naturita Formation, Cedar Canyon region, southwestern Utah. Cretaceous Research, 92, 108-121.

Murphy, P.C, Knauss, G.E, Fisk, L.H., Demere, T.A., and Reynolds, R.E. 2019. "Best Practices in Mitigation Paleontology." Proceedings of the San Diego Society of Natural History. 47:1-43.

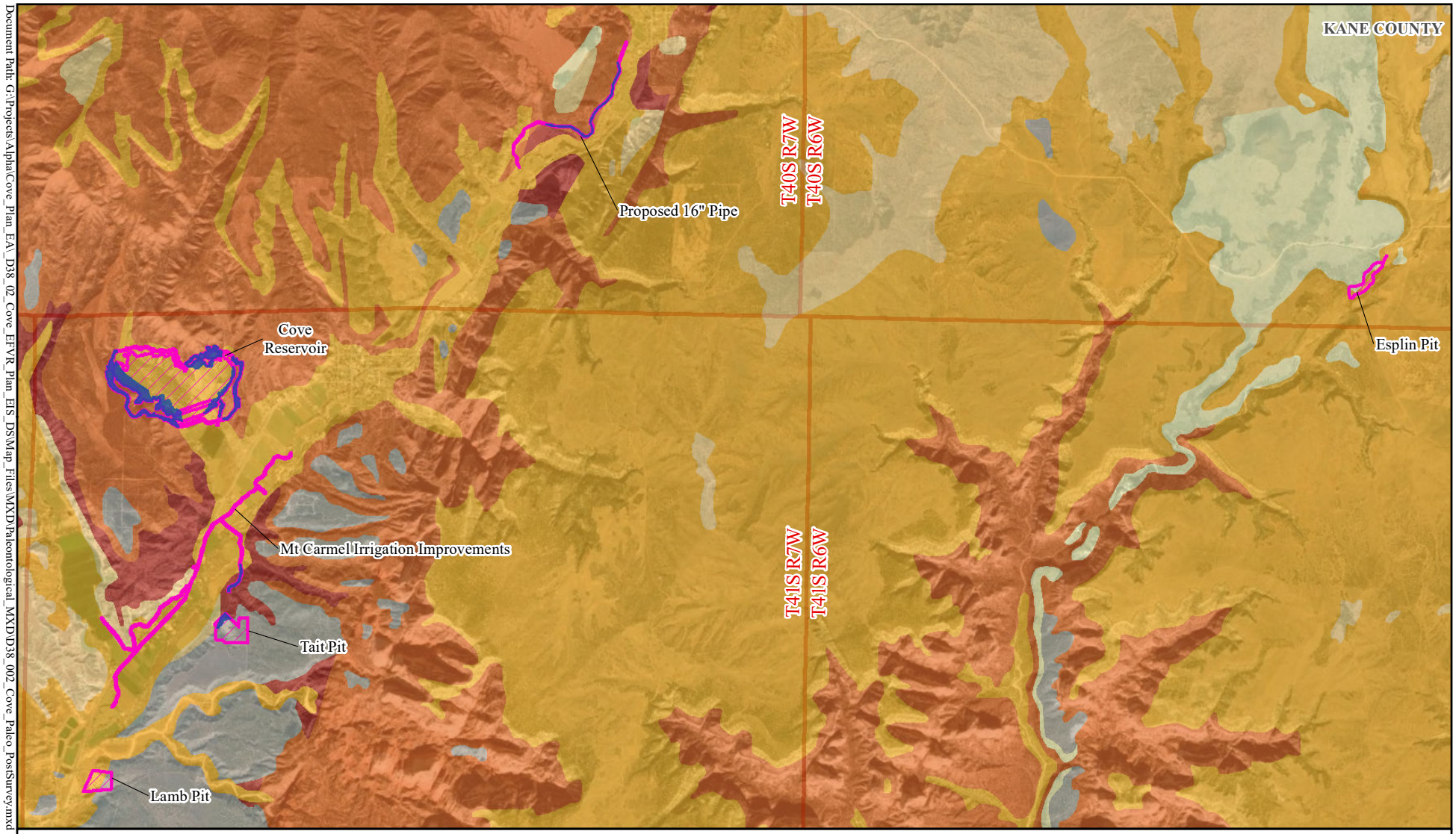
Phillips, S. P., Howell, J. A., Hartley, A. J., Chmielewska, M., & Hudson, S. M. 2021. Evolution of foreland basin fluvial systems in the mid-Cretaceous of Utah, USA (upper Cedar Mountain and Naturita formations). Sedimentology, 68(5), 2097-2124.

Society of Vertebrate Paleontology (SVP). 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontological Resources: Standard Guidelines. Society of Vertebrate Paleontology News Bulletin. 163:22-27

_____. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology, Impact Mitigation Guidelines Revision Committee, 1-11.

Zanno, L. E., Gillette, D. D., Albright, L. B., and Titus, A. L. (2009). A new North American therizinosaurid and the role of herbivory in 'predatory' dinosaur evolution. Proceedings of the Royal Society B: Biological Sciences, 276(1672), 3505-3511.

APPENDIX A
PROJECT MAPS



Document Path: G:\Projects\Alpha\Cove_Plan_EA_D38_02_Cove_EFVR_Plan_EIS_DS\Map_Files\MXD\Paleontological_MXD\D38_002_Cove_Paleo_PostSurvey.mxd

Legend

- Paleontological Survey Area
- Project Area
- PFYC Class 1
- PFYC Class 2
- PFYC Class 3
- PFYC Class 4
- PFYC Class 5
- PFYC Unknown

0 2,000,000

Feet

1:26,836,491

Paleontological Overview

Alpha Engineering
Cove Reservoir Project

Date: 3/3/2025
Projection: NAD_1983_UTM_Zone_12N

Eocene Environmental Group

APPENDIX B

POTENTIAL FOSSIL YIELD CLASSIFICATION

Potential Fossil Yield Classification System

Introduction.
The Potential Fossil Yield Classification (PFYC) system allows Bureau of Land Management (BLM) employees to make initial assessments of paleontological resources in order to plan for multiple uses of public lands, consider disposal or acquisition of lands, analyze potential effects of a proposed action under the National Environmental Policy Act (NEPA) or conduct other BLM resource-related activities. The PFYC system can also highlight areas where paleontological research efforts may be warranted or predict illegal collecting. The system provides a consistent approach to land use planning or to determine if a proposed action may affect paleontological resources on public lands.

The PFYC system provides baseline guidance for assessing paleontological resources. The classification should be considered early in an analysis and should be used to assist in determining the need for further assessment or actions. When considering proposed actions, the PFYC system should be used in conjunction with an analysis of known fossil localities.

Occurrences of paleontological resources are known to be correlated with mapped geologic units (i.e., formations). The PFYC is created from available geologic maps and assigns a class value to each geological unit, representing the potential abundance and scientific importance of paleontological resources that occur in that geological unit. PFYC assignments should be considered as only a first approximation of the potential presence of paleontological resources, subject to change based on ground verification.

In the PFYC system, geologic units are assigned a class based on the known relative abundance of scientifically important paleontological resources and their sensitivity to adverse impacts. This classification is applied to the geologic formation, member, or other mapped unit. The classification is not intended to be applied to specific paleontological localities or small areas within units. Although important localities may occasionally occur in a geologic unit that has been assigned a lower PFYC classification, widely scattered fossils or localities do not necessarily indicate a higher class assignment. Instead, the overall abundance of scientifically important localities is intended to be the major determinant for the assigned classification.

The descriptions for the class assignments below serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual geological units are considered when developing PFYC assignments. These assignments must be developed using scientific expertise with input from a BLM paleontologists, but may include collaboration or peer review from outside researchers who are knowledgeable about both the geology and the nature of paleontological resources that may be found in each geologic unit. Each state has unique geologic maps and so also has unique PFYC assignments. It is possible, and occasionally desirable, to have different assignments for a similar geologic unit across separate states.

Class 1—Very Low. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics:

- Geologic units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units
- Geologic Units are Precambrian in age

1) Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.

2) Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. For example, young fissure-fill deposits often contain fossils but are too limited in extent to be represented on a geological map, a lava flow that preserves evidence of past life, or caves that contain important paleontological resources. Such exceptions are the reason that no geologic unit is assigned a Class 0.

Overall, the probability of impacting significant paleontological resources is very low and further assessment of paleontological resources is usually unnecessary. An assignment of Class 1 normally does not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate an unanticipated discovery.

Class 2—Low. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics:

- Field surveys have verified that significant paleontological resources are not present or are very rare
- Units are generally younger than 10,000 years before present
- Recent aeolian deposits
- Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely

1) Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary except in occasional or isolated circumstances.

2) Paleontological mitigation is only necessary where paleontological resources are known or found to exist.

The probability of impacting significant paleontological resources is low. Localities containing important paleontological resources may exist but are occasional and should be managed on a case-by-case basis. An assignment of Class 2 may not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate unanticipated discoveries.

Class 3—Moderate. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics:

- Marine in origin with sporadic known occurrences of paleontological resources
- Paleontological resources may occur intermittently, but abundance is known to be low
- Units may contain significant paleontological resources, but these occurrences are widely scattered
- The potential for an authorized land use to impact a significant paleontological resource is known to be low to moderate

1) Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting.

2) Paleontological mitigation strategies will be proposed based on the nature of the proposed activity.

This classification includes units of moderate or infrequent occurrence of paleontological resources. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4—High. Geologic units that are known to contain a high occurrence of paleontological resources. Units assigned to Class 4 typically have the following characteristics:

- Significant paleontological resources have been documented but may vary in occurrence and predictability
- Surface-disturbing activities may adversely affect paleontological resources
- Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present
- Illegal collecting activities may impact some areas

1) Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action.

2) Paleontological mitigation strategies will depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions.

The probability for impacting significant paleontological resources is moderate to high and is dependent on the proposed action. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required, and on-site monitoring or spot-checking may be necessary during land-disturbing activities. In some cases, avoidance of known paleontological resources may be necessary.

Class 5—Very High. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics:

- Significant paleontological resources have been documented and occur consistently
- Paleontological resources are highly susceptible to adverse impacts from surface-disturbing activities
- Unit is frequently the focus of illegal collecting activities

1) Management concerns for paleontological resources in Class 5 areas are high to very high.

2) A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface-disturbing activities.

The probability for impacting significant paleontological resources is high. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed, and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

Class U—Unknown Potential. Geologic units that cannot receive an informed PFYC assignment. Characteristics of Class U may include:

- Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known
- Geological units represented on a map are based on lithologic character or basis of origin but have not been studied in detail
- Scientific literature does not exist or does not reveal the nature of paleontological resources
- Reports of paleontological resources are anecdotal or have not been verified
- Area or geologic unit is poorly or under-studied
- BLM staff has not yet been able to assess the nature of the geologic unit

1) Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns.

2) Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

An assignment of “Unknown” may indicate the unit or area is poorly studied, and field surveys are needed to verify the presence or absence of paleontological resources. Literature searches or consultation with professional colleagues may allow an unknown unit to be provisionally assigned to another Class, but the geological unit should be formally assigned to a Class after adequate survey and research is performed to make an informed determination.

Class W—Water.
Includes any surface area that is mapped as water. Bodies of water do not normally contain paleontological resources. However, shorelines should be carefully considered for uncovered or transported paleontological resources. Reservoirs are a special concern because important paleontological resources are often exposed during low water intervals. In areas of karst, sinkholes and cenotes may trap animals and contain paleontological resources. Dredging river systems may result in the disturbance of sediments that contain paleontological resources.

Class I—Ice.
Includes any area that is mapped as ice or snow. Receding glaciers, including exposed lateral and terminal moraines, should be considered for their potential to reveal recentlyexposed paleontological resources. Other considerations include melting snow fields that may contain paleontological resources with possible soft-tissue preservation.

Special Notes.
When developing PFYC assignments, the following should be considered:

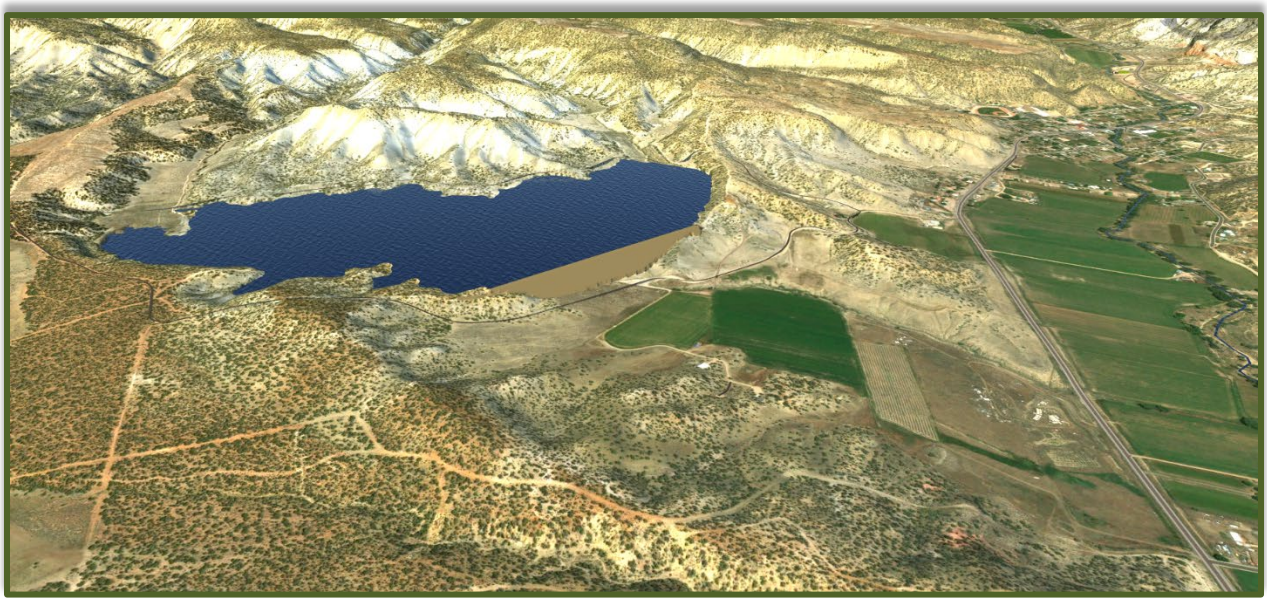
- Standard stipulations should always be put in place prior to authorizing any land use action in order to accommodate an unanticipated discovery.

- Class 1 and 2 and Class 4 and 5 units may be combined for broad applications, such as largescale planning, programmatic assessments, or when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations will need to be addressed when actual land disturbing activities are proposed.
- Where large projects impact multiple geologic units with different PFYC Classes, field survey and monitoring should be applied appropriately. For example, the authorized officer may determine that on-the-ground (pedestrian) surveys are necessary for the Class 4 and 5 formations, but not for Class 2 formations along a specific project.
- Based on information gained by surveys, the BLM may adjust PFYC assignments appropriately. Actual survey and monitoring intensities, as well as the extent of discoveries, should be included in any assessment, mitigation, or permit report so the BLM may reevaluate PFYC assignments.
- Some areas are difficult to evaluate, such as talus, colluvium, tailings, fill, borrow, and other mapped features. A PFYC assignment should be made for each area using available information, or the area should be assigned to Class U as appropriate.
- The BLM-wide PFYC assignments are maintained and periodically updated by the BLM paleontology team and may be obtained by contacting the BLM state or regional paleontologist assigned to an area.

APPENDIX C

LOCALITY FORMS (CONFIDENTIAL)

Kane County
Water Conservancy District



Submitted to
Natural Resources
Conservation Service
125 South State Street, Room 4010
Salt Lake City, Utah 84138

Submitted by
Kane County Water
Conservancy District
725 E Kaneplex Drive
Kanab, Utah 84741

Updated July 2024

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Part I. Introduction

A. Background

The Kane County Water Conservancy District (KCWCD) is proposing to construct a reservoir with associated facilities on property owned by the KCWCD as well as additional private land located near Orderville, Utah. Material borrow areas for construction of the dam are located on Bureau of Land Management (BLM) lands and private land. The dam is situated 0.6 miles from Highway 89 southwest of downtown Orderville (see **Figure 1**). As proposed, the reservoir would be constructed by the KCWCD. The Washington County Water Conservancy District (WCWCD) may participate in funding a portion of the water storage created by the project. The WCWCD participation would provide for: 1) storage of their water rights at higher elevation to reduce evaporation rates; 2) water releases during periods of low stream flows to augment peak summer uses and provide in stream flows for native and threatened and endangered fish species; and 3) more efficient use of the Quail Lake and Sand Hollow pipeline delivery system by releasing water when there is excess capacity in the pipeline system. This site was identified in the mid- to late-1980s during a reconnaissance level inventory of potential dam sites associated with tributaries of the Virgin River. Starting in 1996, the KCWCD and WCWCD have further explored constructing a dam at this location.

A feasibility study of the dam was performed in 2004 by RB&G Engineering. There were five borings along the dam alignment and 13 test pits completed during the investigation. The report concluded that the site is suitable for a dam and reservoir, there are available materials within a five- to 20-mile radius and the reservoir would be cost effective to construct.

The project will serve current water right holders and store water from the East Fork of the Virgin River during months with high river flow and then provide water during months with high demand. The components of the project include (see **Figure 2a** and **Figure 2b**):

- Reservoir
- Dam
- Low Level Outlet
- Principal Spillway
- Auxiliary Spillway
- Pipeline
- Pump Station
- Access Road
- Borrow Areas
- Recreation Area

The dam will be designed to maximize storage capacity with principal/auxiliary spillways to sustain the improvements during storm events. At full capacity, the reservoir would have a surface elevation of approximately 5545.5 feet above mean sea level (amsl) and a capacity of approximately 6,055 acre-feet. Rock, gravel, and clay borrow sources from nearby pits will be utilized to construct the facility. Approximately 3.2 miles of new and existing roads will be constructed and/or improved to provide access around the reservoir and replace access to properties surrounding the reservoir. Approximately 1.2 miles of existing roadway will be graded and improved from its current width of approximately 12 to 16 feet and improved with road base to a width of 28 feet. Approximately 2.0 miles of new roadway will be constructed to a width of 28 feet of road base.

Approximately 700 feet of large diameter pipe is required to extend from the existing irrigation transmission line, near the reservoir, to the outlet works of the reservoir. This extension will allow the use of the existing diversion dam and transmission line to fill the reservoir and allow use of the stored water during the irrigation season. This extension will also serve as the emergency drain for the reservoir. It is also proposed to replace approximately 1.7 miles of existing 4-inch to 8-inch lines in the Glendale irrigation system with a larger transmission line from the current hydro plant location to a new location next to the Orderville Diversion Dam. Excess water from the Glendale Irrigation System will then be combined with water diverted from the Orderville Diversion Dam to provide use of the existing irrigation pipeline system to fill the Cove Reservoir.

The existing Glendale and Orderville irrigation systems have limited capacity to deliver flows from the river and no capacity for storage during non-use and high flow periods. The Orderville Hydro Plant currently uses excess head available from the piping system and will continue to be used after the construction of the Cove Reservoir. Currently the hydro plant generates power during the winter months. With the construction of the Cove Reservoir, water will be stored during the winter and released during the irrigation season as water is needed for irrigation and to generate power during the summer. The construction of the proposed Cove Reservoir with its associated facilities provide a drought buffer, improve water quality, increase and maintain a more consistent reliable flow for the pressurized irrigation system, provide a water-energy nexus, and provide for more efficient irrigation methods. This will allow the KCWCD to take advantage of existing water rights and provide a more stable and sustainable supply of water for the area. Water storage at higher elevations also reduces evaporation losses that occur in lower reservoirs operated by the WCWCD. In addition, water can be released from the reservoir to provide for in-stream flows during periods of low flow in the Virgin River for endangered fish species.

Since the original concept of the Cove Reservoir and piping of a portion of the Glendale Irrigation Company piping the Mt. Carmel Irrigation Company has approached the KCWCD to pressurize the remainder of their irrigation system. There is approximately 24,000 feet of pipeline varying

in size from 8 to 16 inches in diameter and a booster pump station required to provide pressurized irrigation for the irrigation company.

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

B. Diversion & Water Rights

The proposed system will store water from the Glendale Irrigation Company, the Orderville Irrigation Company and the Mt. Carmel Irrigation Company. Water rights held by the respective irrigation companies include points of diversion from the East Fork Virgin River.

A portion of the water rights owned by the three irrigation companies that could be stored in the proposed reservoir are summarized in **Table 1.** Additional water rights will be provided by the WCWCD.

User	Flow	Volume	Acreage
Glendale Irrigation Company	7.23 cfs	2,170 ac-ft	434
Orderville Irrigation Company	4.684 cfs	1,430 ac-ft	286
Mt. Carmel Irrigation Company	6.58 cfs	2,020 ac-ft	404
Total	**18.494 cfs**	**5,620 ac-ft**	**1,124**

Table 1 Water Rights Summary