Lake Powell Pipeline Project

Final Study Report 09
Recreation Resources

April 2016

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Executive Summary

ES-1 Introduction

This study report describes the results and findings of an analysis to evaluate recreation resources along the proposed alternative alignments of the Lake Powell Pipeline (LPP) Project, No Lake Powell Water Alternative, and No Action Alternative. The purpose of the analysis, as defined in the 2008 Recreation Resources Study Plan prepared for the Federal Energy Regulatory Commission (Commission), was to identify potential impacts from construction and operations of the alternatives, and identify and document measures to mitigate impacts from the LPP Project as necessary.

ES-2 Methodology

The analysis of impacts on recreation resources follows the methodology identified and described in the Preliminary Application Document, Scoping Document No. 1 and the revised Recreation Resources Study Plan prepared for the Commission. This methodology involves the review of recreation resources within one mile of the alternative alignments which comprises the study area, and the analysis of impacts from construction and operation on recreation areas, facilities and use. Recreation resources focused on within the study area include tourist use areas, locations of perceived aesthetic value, reservoirs, waterways and surrounding areas, and national recreation areas, parks and monuments.

The recreation resources study methodology commenced with a review of management goals for agencies with jurisdiction over public lands potentially affected by the LPP Project, and with the Kaibab Band of Paiute Indians for the Kaibab-Paiute Indian Reservation. Existing recreation resource data and information was collected and compiled for the study area. A field reconnaissance was performed to inspect existing recreation facilities, travel routes, and use patterns. Field data and information were compiled for use in determining impacts on recreation resources from construction and operation of the LPP Project. Impacts on recreation resources were analyzed and determined relative to the affected environment for established recreation resources in the study area. The amount of change between the affected environment and conditions under the alternatives was documented as impact. Direct, indirect and cumulative impacts were analyzed and documented based on the available information. Mitigation measures were developed to offset potential significant impacts, whenever possible.

ES-3 Affected Environment

The documented recreation resources of the study area include recreation areas, facilities and use on public lands managed by federal, state and local government agencies, Kaibab-Paiute Indian Reservation lands administered by the Kaibab Band of Paiute Indians, and on privately-owned land. Public lands providing recreation resources include national monuments, national recreation areas, national parks, wilderness areas and wilderness study areas, special recreation management areas, recreation management zones, reserves, Bureau of Land Management field office management areas, and state parks. Privately-owned recreation land and facilities include resorts, education sites, campgrounds and recreational vehicle parks, and golf courses. Recreation needs documented in federal land management plans and State Comprehensive Outdoor Recreation Plans (SCORP) for Utah and Arizona are summarized at the end of Chapter 3.

ES-4 Environmental Consequences

Most of the direct construction impacts on recreation resources would involve temporary delay or bypass of access to recreation areas, facilities, trails, sites, overlooks, highway pull-outs and visitor centers during pipeline, penstock and transmission line construction at specific crossings along rights-of-way. Construction of the Hurricane Cliffs afterbay reservoir and transmission lines within the Sand Mountain Special Recreation Management Area (SRMA) under all of the LPP action alternatives would result in permanent loss of 260 acres of designated recreation land, which would be a significant impact on recreation resources in the SRMA. The reservoir could not be used for public recreation because of rapidly fluctuating water levels. Most of the indirect impacts on recreation resources would involve temporary noise, air pollutants, additional LPP Project construction traffic and changes in views during the pipeline, penstock, transmission line, and facility construction along the rights-of-way.

Most of the LPP operations would have no direct impacts on recreation resources. Operation of the Hurricane Cliffs afterbay reservoir within the Sand Mountain SRMA would be a significant impact on recreation resources because the reservoir area could not be used for any recreational activities. Indirect impacts of the LPP operations would involve occasional additional LPP Project construction traffic for recreational vehicles near LPP facilities and changed views could be experienced by recreation users in the vicinity of LPP facilities and reservoirs.

The No Lake Powell Water Alternative would have direct construction and operation impacts on about 290 acres of the Sand Mountain Special Recreation Management Area, which would be a significant impact because the affected area would be closed to recreational activities.

ES-5 Mitigation and Monitoring

General mitigation measures for constructing, operating and maintaining the LPP project to avoid, minimize or reduce impacts on recreation resources are reviewed. Specific mitigation and monitoring measures for the alternatives are described for construction and operation and maintenance periods in Chapter 5.

ES-6 Unavoidable Adverse and Cumulative Impacts

Unavoidable adverse impacts would occur from recreation access temporary delays or interruptions. Permanent loss of recreation resources in the Sand Mountain SRMA would be an unavoidable adverse impact.

Cumulative impacts of the LPP Project action alternatives would occur with the Southern Corridor Highway (operation), Kern River – Hurricane Natural Gas Pipeline (operation), and Warner Valley Reservoir (operation). The cumulative impacts of the LPP Project combined with impacts of these projects would permanently reduce the recreation resource use area within the Sand Mountain SRMA. The long-term, direct cumulative impacts on recreation resources would be significant. The No Lake Powell Water Alternative would have long-term, direct cumulative impacts on recreation resources within the Sand Mountain SRMA with the Southern Corridor Highway and Kern River-Hurricane Natural Gas Pipeline. These cumulative impacts would be significant.

Chapter 1
Introduction

1.1 Introduction

This chapter presents a summary description of the Lake Powell Pipeline (LPP) Project alignment alternatives, the No Lake Powell Water Alternative, and the No Action Alternative. It introduces the area studied for environmental resources. It provides an overview of the proposed LPP Project, including each alignment alternative and locator maps.

The LPP Project would deliver Utah's Colorado River water from Lake Powell to the service areas of Washington County Water Conservancy District (WCWCD) and Kane County Water Conservancy District (KCWCD). The LPP Project action alternatives studied include various pipeline and penstock system configurations. Each action alternative would deliver 86,249 acre-feet of municipal and industrial (M&I) use water to the following southwest Utah water conservancy district service areas:

- WCWCD would receive 82,249 acre-feet annually.
- KCWCD would receive up to 4,000 acre-feet annually.

One of the LPP systems previously studied included a conveyance system for the Central Iron County Water Conservancy District (CICWCD), which would have delivered approximately 13,249 acre-feet annually to the Cedar Valley area. The various alternatives were under study when the CICWCD decided to withdraw from the LPP Project, and this conveyance system is no longer being considered.

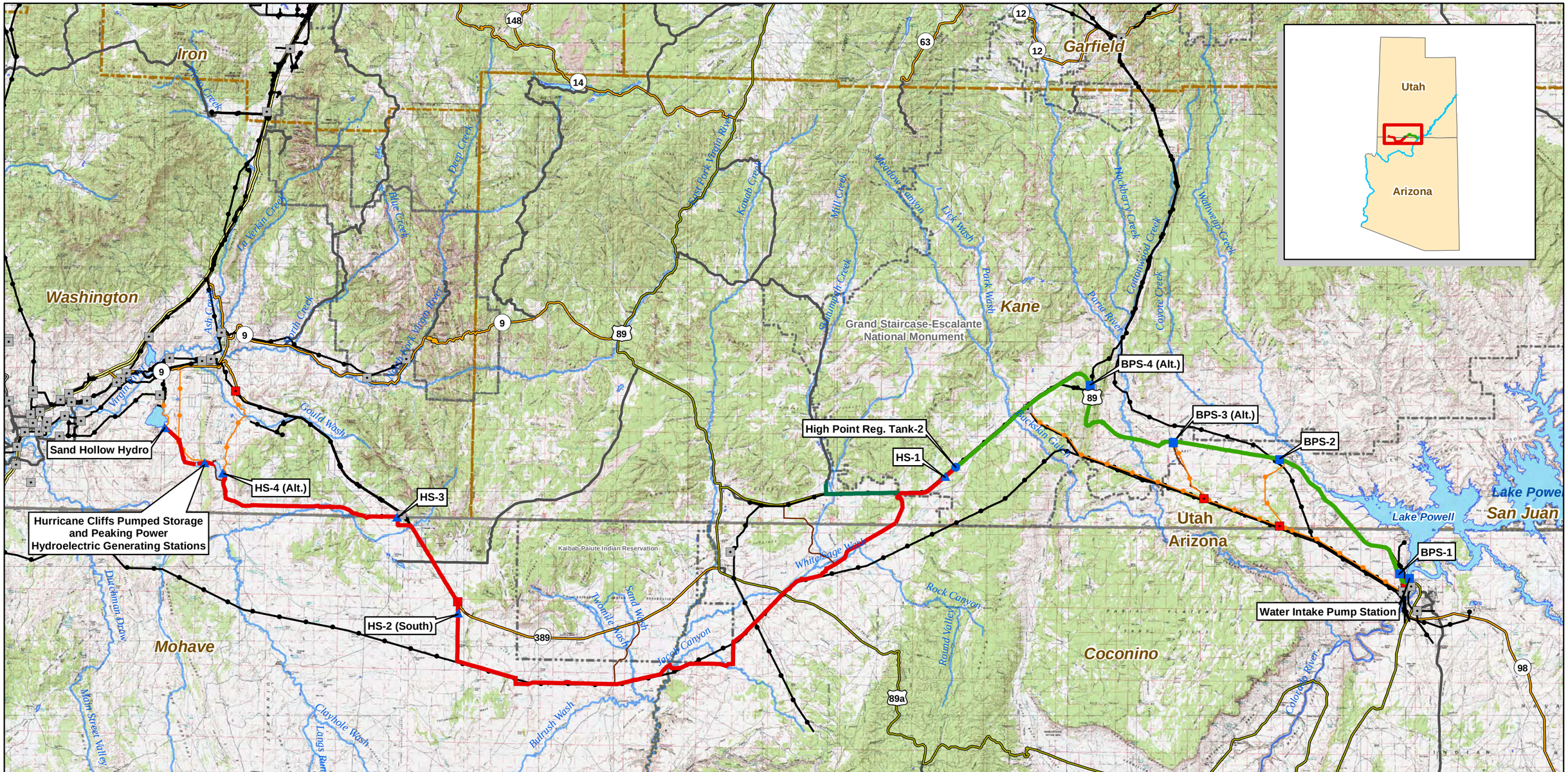
1.2 Summary Description of LPP Project Alignment Alternatives

Three primary pipeline and penstock alignment alternatives are described in this section, along with the electrical power transmission line alignments for providing power to the pump stations and a natural gas supply line alignment alternative. The pipeline and penstock alignment alternatives share common segments between the intake at Lake Powell and delivery at Sand Hollow Reservoir, and they differ spatially in, through and around Kaibab-Paiute Indian Reservation.

The South Alternative (Proposed Action) extends south around Kaibab-Paiute Indian Reservation. The Existing Highway Alternative follows an Arizona state highway through Kaibab-Paiute Indian Reservation. The Southeast Corner Alternative follows the Navajo-McCullough Transmission Line corridor through the southeast corner of Kaibab-Paiute Indian Reservation. The Electric Transmission Line alignments are common to all the pipeline and penstock alignment alternatives. The Natural Gas Supply Line Alignment Alternative is common to all pipeline and penstock alignment alternatives. The natural gas pipeline alignment would be coincident to the buried waterline and would not have a different alignment, as compared to transmission line alignments. Figure 1-1 shows the overall proposed project from Lake Powell near Page, Arizona to Sand Hollow Reservoir, Utah.

1.2.1 South Alternative

The South Alternative consists of four systems: **Water Intake, Water Conveyance, Hydro,** and **KCWCD** (see Figure 1-1).



Project Pump Station
Project Regulating Tank
Project Hydro Station
Substation
Proposed Substation

Water Conveyance System
Hydro System - South Alternative (Penstock Segment)
KCWCD System
Project Transmission Lines
Existing Transmission Lines

Interstate
US Highway
ST Highway
Hwy
Major Road
Access Roads

Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams

National Park/Monument
GSENM-Boundary
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

0 2.5 5 10 15 20 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-1** MWH

Lake Powell Pipeline Proposed Action

The **Water Intake System** would pump Lake Powell water via submerged horizontal tunnels and vertical shafts into the LPP. The intake pump station would be constructed and operated adjacent to the west side of Lake Powell, approximately 2,000 feet northwest of Glen Canyon Dam in Coconino County, Arizona. An enclosed pump station building would house vertical turbine pumps with electric motors, electrical controls, and other equipment at a ground level elevation of 3,745 feet above mean sea level (AMSL).

The **Water Conveyance System** would convey water diverted from Lake Powell at the Intake System through a buried 69-inch diameter pipeline for about 51 miles, parallel with Highway 89 in Coconino County, Arizona and Kane County, Utah, to a buried regulating tank (High Point Regulating Tank-2) along Highway 89 at ground level elevation 5,691 feet AMSL. The pipeline would be a line of connected pipes used for carrying water over a long distance. Figure 1-2 shows the LPP Project Water Intake and Water Conveyance systems. The High Point Regulating Tank-2 would be the LPP Project topographic high point (Figure 1-2). The pipeline would be sited within a utility corridor established by Congress in 1998 that extends 500 feet south and 240 feet north of the Highway 89 centerline on public land administered by Bureau of Land Management (BLM) (U.S. Congress 1998). Figure 1-3 shows the typical 100-foot-wide right-of-way and 20-foot-wide temporary construction easement for the water conveyance system pipeline, adjacent to and away from the highway.

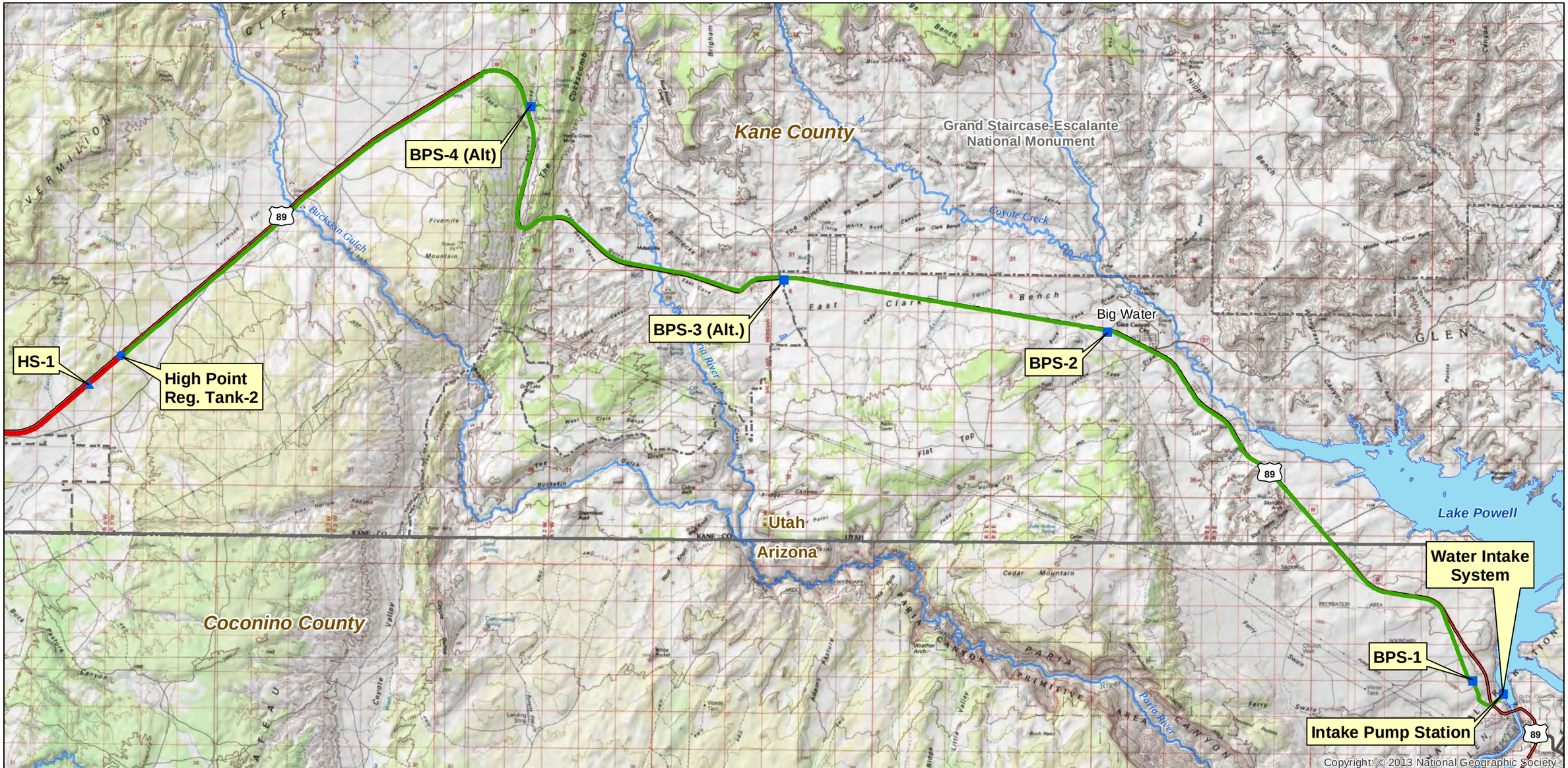
Four booster pump stations (BPS) along the pipeline would pump water to the high point regulating tank. Each BPS would house vertical turbine pumps with electric motors, electrical controls, and other equipment. Additionally, each BPS site would have a buried forebay tank, buried surge tanks, pig retrieval and launching stations, and a surface emergency overflow detention basin. BPS-1 would be located within Glen Canyon National Recreation Area (GCNRA) adjacent to an existing Arizona Department of Transportation maintenance facility, along a segment of abandoned highway, west of Highway 89. The BPS-1 site would cover about six acres and be surrounded by security fencing.

BPS-2 would be on land administered by Utah School and Institutional Trust Lands Administration (SITLA) near Big Water, Utah, on the south side of Highway 89. The BPS-2 site would cover about five acres and be surrounded by security fencing.

BPS-3 (Alt.) would be on land administered by BLM Kanab Field Office, near the east boundary of Grand Staircase-Escalante National Monument (GSENM) on the south side of Highway 89, within the Congressionally-designated utility corridor. The BPS-3 (Alt.) site would cover about five acres and be surrounded by security fencing.

BPS-4 (Alt.) would be located on private land east of Highway 89 and west of the Cockscomb geologic feature (Figure 1-2). The BPS-4 (Alt.) site would cover about six acres and be surrounded by security fencing. The proposed pipeline alignment west of the Cockscomb geologic feature would be situated adjacent to the south boundary of the Congressionally-designated utility corridor.

The proposed pipeline alignment would continue parallel to Highway 89 to the buried High Point Regulating Tank-2 at 5,691 feet AMSL, which would be the topographic high point of the LPP Project (Figure 1-2). The Water Conveyance System would terminate at High Point Regulating Tank-2. The buried High Point Regulating Tank-2 would cover about four acres and be surrounded by security fencing.



- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alternative (Penstock Segment)
- KCWCD System
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- Lakes & Reservoirs
- Major Rivers & Streams
- National Park/Monument
- GSENM Boundary
- State Boundaries

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 0.5 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-2** MWH

Lake Powell Pipeline Intake and Water Conveyance System

Figure 1-3 shows the typical 100-foot-wide right-of-way and 20-foot-wide temporary construction easement for the hydro system penstock adjacent to, and away from, the highway. Four in-line hydro generating stations (HS-1, HS-2 [South], HS-3, and HS-4 [Alt.]), with substations located along the penstock, would generate electricity and help control water pressure in the penstock. Each in-line hydro station would consist of a building housing the generator units, an afterbay reservoir, retention basin, pig retrieval and launching stations, switchyard, and maintenance parking area, all surrounded by perimeter security fencing.

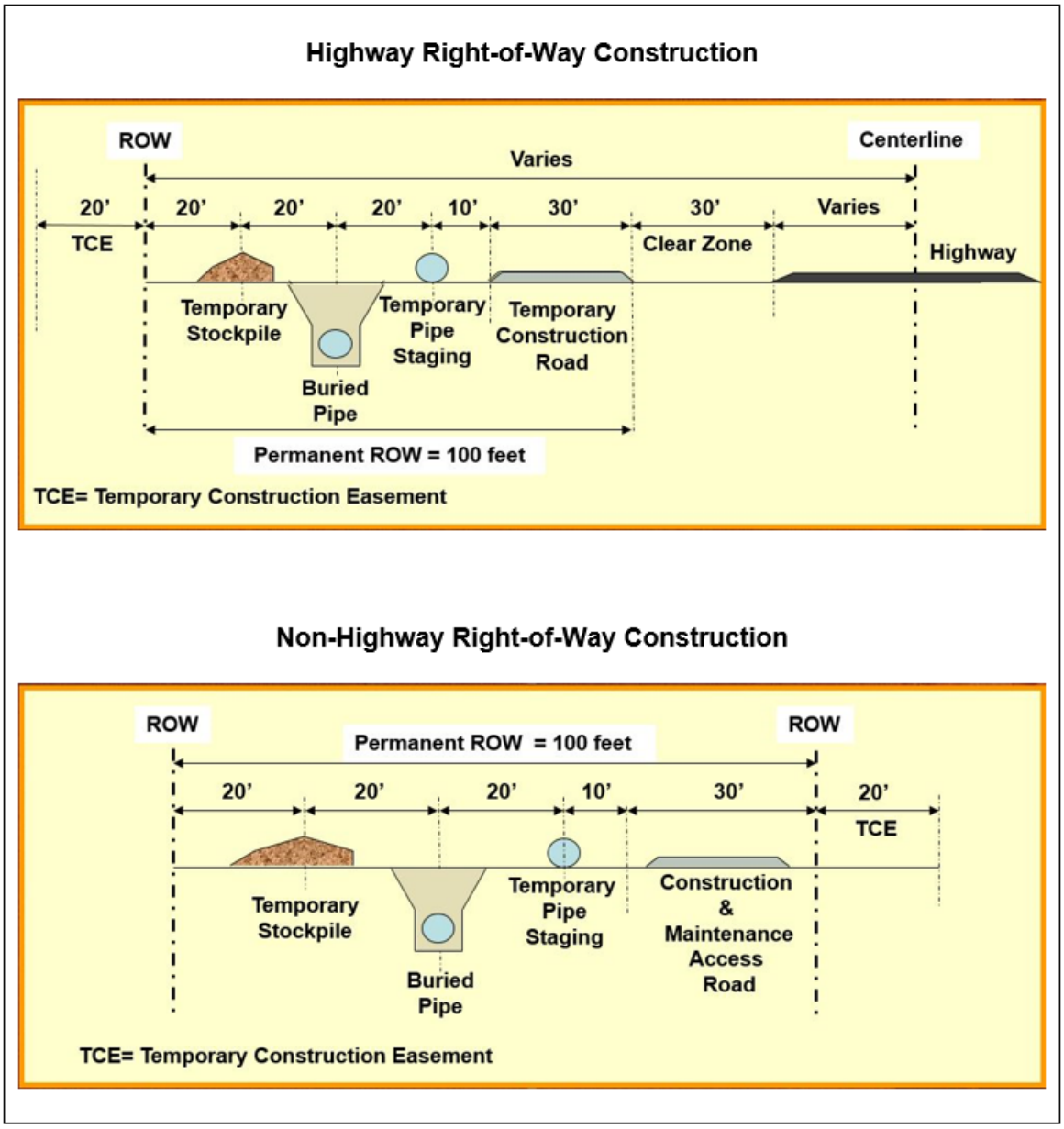


Figure 1-3
Pipeline and Penstock Right-of-Way

The **Hydro System** would convey the water from High Point Regulating Tank-2, at a topographic high point in the LPP Project with ground level elevation 5,691 feet AMSL, for about 87.5 miles through a buried 69-inch diameter penstock in Kane and Washington counties, Utah, and Coconino and Mohave counties, Arizona, to Sand Hollow Reservoir near St. George, Utah (Figure 1-4). A penstock is an enclosed pipe that delivers water to hydroelectric turbines.

A short penstock segment would convey the water to HS-1. This in-line hydro station would generate up to one megawatt (MW) of electricity at a site along Highway 89 within GSENM, and the penstock would continue west along Highway 89 to the GSENM west boundary. The HS-1 site would cover about five acres.

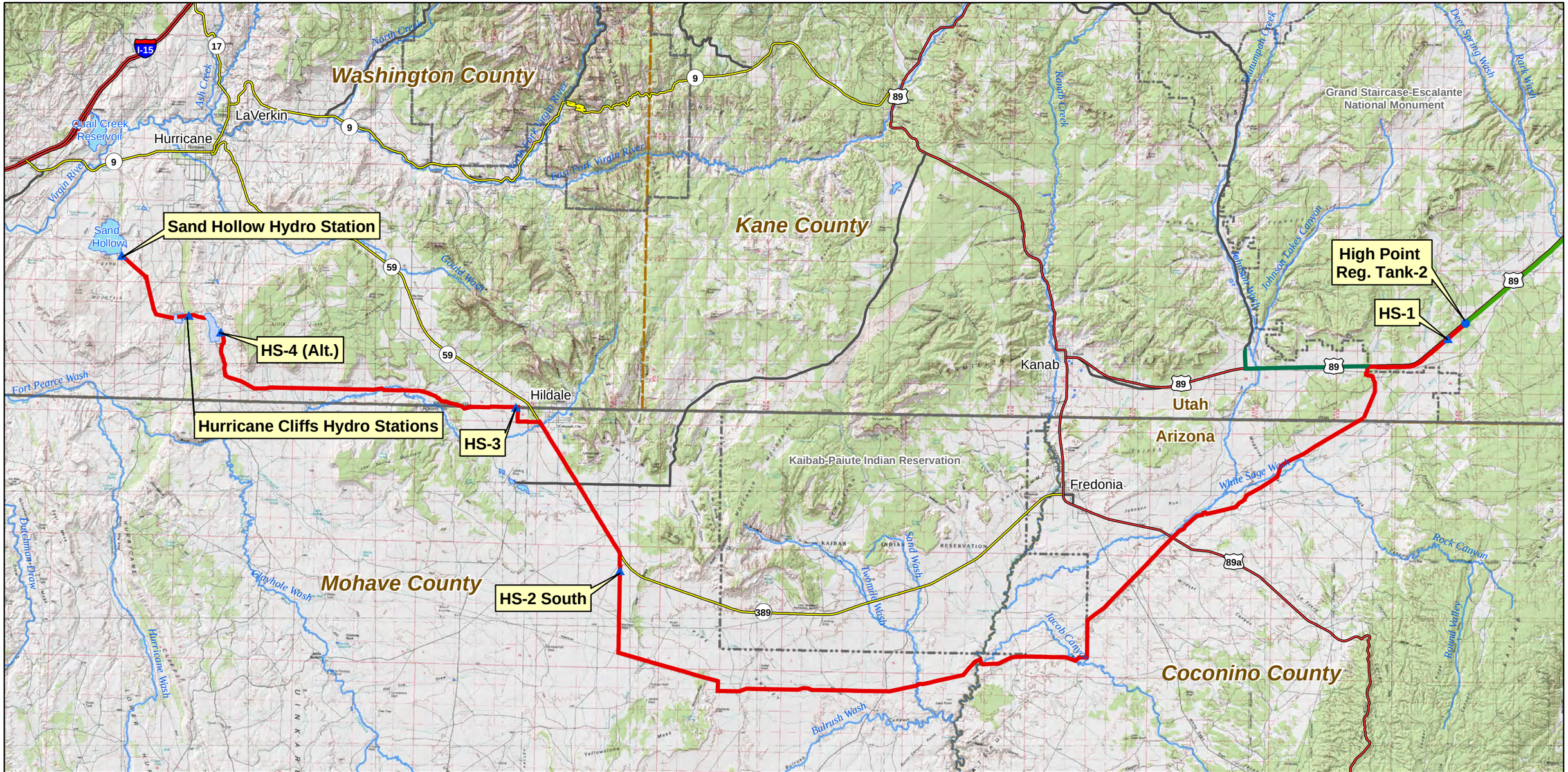
The penstock alignment would turn south from Highway 89 through private land and BLM-administered public lands into White Sage Wash. It would continue across White Sage Wash and then parallel Navajo-McCullough Transmission Line, crossing Highway 89 Alt. and Forest Highway 22 toward the southeast corner of Kaibab-Paiute Indian Reservation. The penstock alignment would run parallel to and south of the Kaibab-Paiute Indian Reservation south boundary, crossing Kanab Creek and Bitter Seeps Wash. It would continue across Moonshine Ridge and Cedar Ridge to Yellowstone Road. At this point, the penstock alignment would run north along Yellowstone Road to Arizona State Route 389 west of Kaibab-Paiute Indian Reservation. HS-2 (South) would be located west of Kaibab-Paiute Indian Reservation on private land east of Yellowstone Road. HS-2 (South) would generate up to one MW of electricity. The HS-2 (South) site would cover about five acres. The penstock alignment would continue northwest along the south side of Arizona State Route 389 past Colorado City to Hildale City, Utah, and HS-3. HS-3 would be located on private land west of Hildale City, Utah, north of and adjacent to Uzona Road. HS-3 would generate up to one MW of electricity. The HS-3 site would cover about five acres. A turnout for future delivery of 13,249 acre-feet of WCWCD's allocation of LPP Project water to Apple Valley would be located immediately west of HS-3.

The penstock alignment would follow Uzona Road west through Canaan Gap and south of Little Creek Mountain, turning north to HS-4 (Alt.) above the proposed Hurricane Cliffs forebay reservoir. HS-4 (Alt.) would be located on about three acres of public land administered by the BLM. HS-4 (Alt.) would generate up to 1.7 MW of electricity and would discharge into the forebay reservoir.

The forebay reservoir would be contained in a valley between two dams (south and north), maintaining active storage of 11,255 acre-feet of water. The forebay reservoir and two dams would cover about 500 acres of public land administered by BLM and would be surrounded by security fencing. A low-pressure tunnel would convey the water to a high-pressure vertical shaft in the bedrock forming the Hurricane Cliffs, connected to a high-pressure tunnel near the bottom of the Hurricane Cliffs. The high-pressure tunnel would connect to a penstock conveying the water to a 35-MW-capacity peaking power hydroelectric generating station and a 300-MW-capacity pumped storage hydroelectric generating station.

The Hurricane Cliffs hydroelectric generating stations and tailrace channel would cover about 50 acres of public land administered by BLM and would be surrounded by security fencing. The tailrace channel would discharge into an afterbay reservoir with 3,551 acre-feet of operating capacity, which is contained by a single dam in the valley below the Hurricane Cliffs. The afterbay reservoir and dam would cover about 200 acres of public land administered by BLM and would be surrounded by security fencing.

Water would be released from the forebay reservoir through the hydro generating system to meet peak power demands. Water would be pumped from the afterbay reservoir into the forebay reservoir during periods of off-peak power demand. The forebay and afterbay reservoirs would not be open to public access because the water levels would fluctuate rapidly during daily operations. A low pressure tunnel would convey the water northwest from the afterbay reservoir to a penstock, continuing to the Sand



Project Pump Station
Project Regulating Tank
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs

Water Conveyance System
Hydro System - South Alternative (Penstock Segment)
KCWCD System
Major Rivers & Streams

Interstate
US Highway
ST Highway
Hwy
Major Road

National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number:
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BLM Serial Numbers:
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UTU-85472

N

0 1 2 4 6 8 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-4** MWH

Lake Powell Pipeline Hydro System South Alternative

Hollow Hydro Station, which would generate up to 4.2 MW of electricity. The Sand Hollow Hydro Station would be located on land owned by WCWCD and cover about five acres adjacent to Sand Hollow Reservoir. The LPP Project water would discharge from the Sand Hollow Hydro Station into the existing Sand Hollow Reservoir.

The **KCWCD System** would convey water diverted from Lake Powell through the LPP at the west GSENM boundary for about eight miles through a buried 24-inch diameter pipeline in Kane County, Utah, near the mouth of Johnson Canyon. The pipeline would parallel the south side of Highway 89 across Johnson Wash and then run north for 5000 feet to the mouth of Johnson Canyon (Figure 1-4).

1.2.2 Existing Highway Alternative

The Existing Highway Alternative consists of four systems: **Water Intake, Water Conveyance, Hydro,** and **KCWCD**. The **Water Intake** and **Water Conveyance** systems would be the same as described for the South Alternative. The **Hydro System** would convey water diverted at Lake Powell from High Point Regulating Tank 2 at the LPP Project topographical high point (5,691 feet AMSL) for about 80.5 miles through a buried 69-inch diameter penstock in Kane and Washington counties, Utah, and Coconino and Mohave counties, Arizona, to Sand Hollow Reservoir near St. George, Utah (Figure 1-5). The alternative alignment parallels Highway 89 to the west and south boundary of GSENM and continues along Highway 89 to Lost Spring Gap. Four in-line hydro generating stations (HS-1, HS-2 [Hwy], HS-3, and HS-4 [Alt.]) located along the penstock would generate electricity and help control water pressure in the penstock. The HS-1, HS-3 and HS-4 (Alt.) hydro stations would be the same as described for the South Alternative.

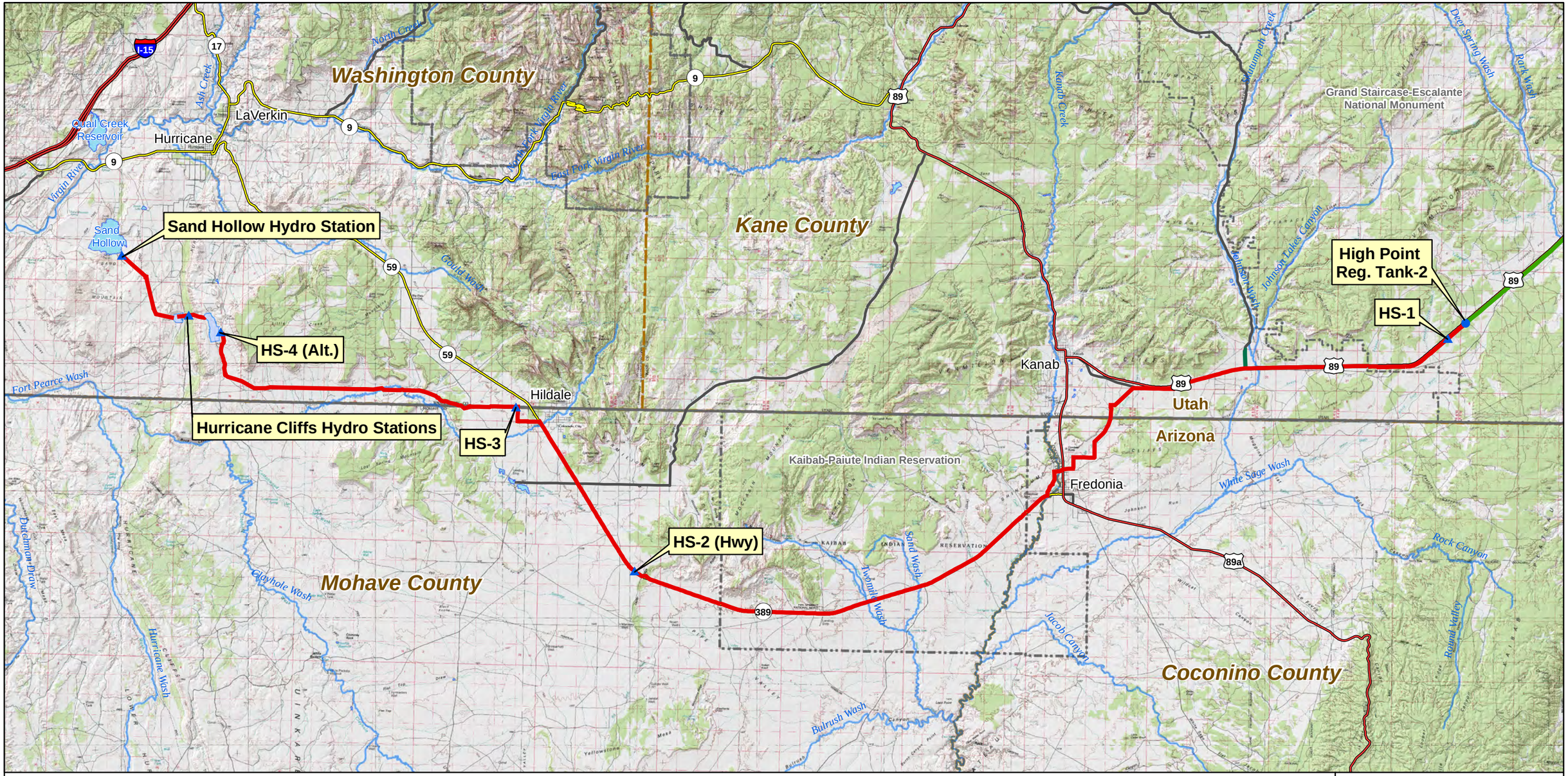
The penstock downstream from the proposed HS-1 would be sited along the south side of Highway 89 within GSENM. The penstock would parallel the south side of Highway 89 west of GSENM, continue past Johnson Wash and follow Lost Spring Gap southwest, crossing Highway 89 Alt. and Kanab Creek in the north end of Fredonia, Arizona. It would continue south, paralleling Kanab Creek to Arizona State Route 389, where it would run west, adjacent to the north side of Route 389 through Kaibab-Paiute Indian Reservation past Pipe Spring National Monument. The penstock would continue along the north side of Arizona State Route 389 through the west half of Kaibab-Paiute Indian Reservation to 1.8 miles west of Cedar Ridge (intersection of Yellowstone Road with Highway 89), where it would then follow the same alignment as the South Alternative to Sand Hollow Reservoir. HS-2 (Hwy) would be sited 0.5 miles west of Cedar Ridge along the north side of Arizona State Route 389. HS-2 (Hwy) would generate approximately 0.8MW of electricity and cover 8.7 acres of private land.

The **KCWCD System** would convey water diverted at Lake Powell from the LPP Project along Highway 89 north along Johnson Canyon Road for 5,000 feet through a buried 24-inch diameter pipeline in Kane County, Utah to the mouth of Johnson Canyon (Figure 1-5).

1.2.3 Southeast Corner Alternative

The Southeast Corner Alternative consists of four systems: **Water Intake, Water Conveyance, Hydro,** and **KCWCD**. The **Water Intake**, **Water Conveyance**, and **KCWCD** systems would be the same as described for the South Alternative.

The **Hydro System** would be the same as described for the South Alternative from High Point Regulating Tank 2 at the LPP Project topographical high point (5,691 feet AMSL) to the east boundary of Kaibab-Paiute Indian Reservation. At the east boundary of Kaibab-Paiute Indian Reservation, the penstock alignment would parallel the north side of the Navajo-McCullough Transmission Line corridor in Coconino County, Arizona, through the southeast corner of the Kaibab-Paiute Indian Reservation for



Project Pump Station
Project Regulating Tank
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs

Water Conveyance System
Hydro System - Existing Highway Alternative (Penstock Segment)
KCWCD System
Major Rivers & Streams

Interstate
US Highway
ST Highway
Hwy
Major Road

National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 1 2 4 6 8 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-5** MWH

Lake Powell Pipeline Hydro System Existing Highway Alternative

about 3.8 miles. The penstock would then follow the South Alternative alignment south of the south boundary of the Kaibab-Paiute Indian Reservation, continuing to Sand Hollow Reservoir (Figure 1-6). The Southeast Corner Alternative would be about 85.7 miles long from High Point Regulating Tank-2 to Sand Hollow Reservoir.

1.2.4 Transmission Line Alignments

Transmission line alignments have been identified to transmit electric power to pump stations in the Water Intake and Water Conveyance systems, and to transmit electric power generated by hydroelectric stations in the Hydro System. The transmission lines that would serve the Water Intake and Water Conveyance systems are located in the east half of the LPP Project. The transmission lines that would serve the Hydro System are located in the west half of the LPP Project.

The proposed new **Water Intake Transmission Line** would begin at Glen Canyon Substation and run parallel to Highway 89 for about 2,500 feet to a new switch station, cross Highway 89 at the Intake access road intersection, and continue northeast to a new electrical substation on the Intake Pump Station site. This 69 kV transmission line would be 0.9 mile long in Coconino County, Arizona (Figure 1-7).

The proposed new **BPS-1 Transmission Line** would begin at the new switch station located on the south side of Highway 89 and parallel the LPP Project Water Conveyance System alignment to a new electrical substation on the BPS-1 site west of Highway 89. The 69 kV transmission line would be about one mile long in Coconino County, Arizona (Figure 1-7).

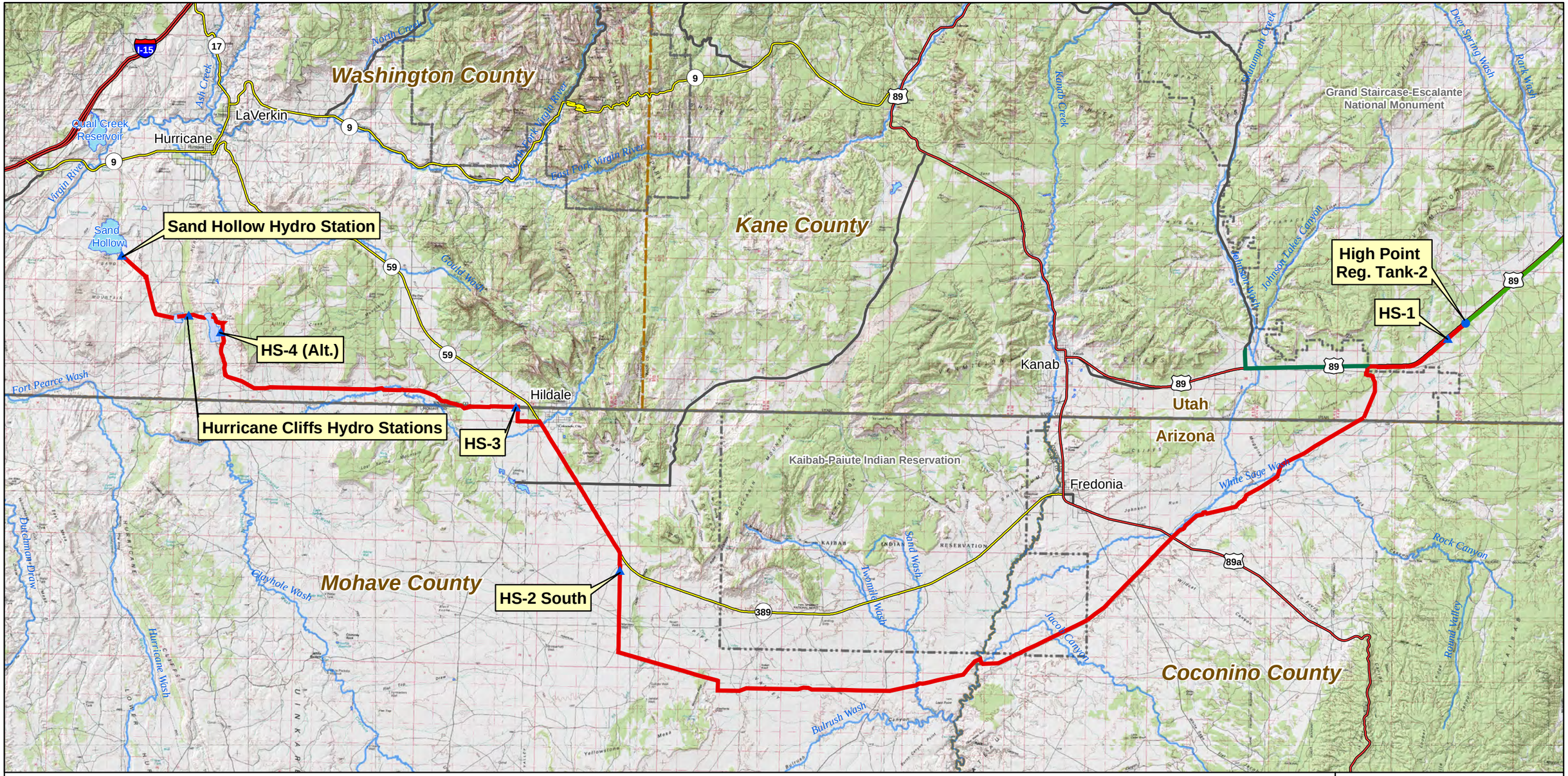
The proposed new **Glen Canyon to Buckskin Transmission Line** would consist of a 230 kV transmission line from the Glen Canyon Substation to the Buckskin Substation, running parallel to the existing 138 kV transmission line. This transmission line upgrade would be about 36 miles long through Coconino County, Arizona, and Kane County, Utah (Figure 1-7).

The existing **Buckskin Substation** would be upgraded as part of the proposed project to accommodate the additional power loads from the new 230 kV Glen Canyon to Buckskin transmission line. The substation upgrade would require an additional five acres of land within GSENM adjacent to the existing substation in Kane County, Utah (Figure 1-7).

The existing **Paria Substation** would be upgraded as part of the proposed project to accommodate the additional power loads to BPS-4 (Alt.). The substation upgrade would require an additional two acres of privately-owned land adjacent to the existing substation in Kane County, Utah (Figure 1-7).

The proposed new **BPS-2 Transmission Line** would consist of a new three-ring switch station along the new 230 kV Glen Canyon to Buckskin Transmission Line, a new transmission line from the switch station to a new substation west of Big Water, and a connection to BPS-2 substation in Kane County, Utah. The new transmission line would parallel an existing distribution line that runs northwest, north, and then northeast to Big Water. This new 138 kV transmission line alignment would be about seven miles long across Utah SITLA-administered land, with a 138 kV connection to a new electrical substation on the BPS-2 site (Figure 1-7).

The proposed new **BPS-3 Alt. Transmission Line South** would consist of a new three-ring switch station along the new 230 kV Glen Canyon to Buckskin Transmission Line, and a new transmission line from the switch station north along an existing BLM road to a new electrical substation on the BPS-3 (Alt.) site near the GSENM east boundary and within the Congressionally-designated utility corridor. This new 138 kV transmission line alignment would be about 5.9 miles long in Kane County, Utah (Figure 1-7).



- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Hurricane Cliffs Forebay/Afterbay
- Lakes & Reservoirs
- Water Conveyance System
- Hydro System - Southeast Corner Alternative (Penstock Segment)
- KCWCD System
- Major Rivers & Streams
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- National Park/Monument
- GSENM Boundary
- Tribal Lands
- State Boundaries
- County Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

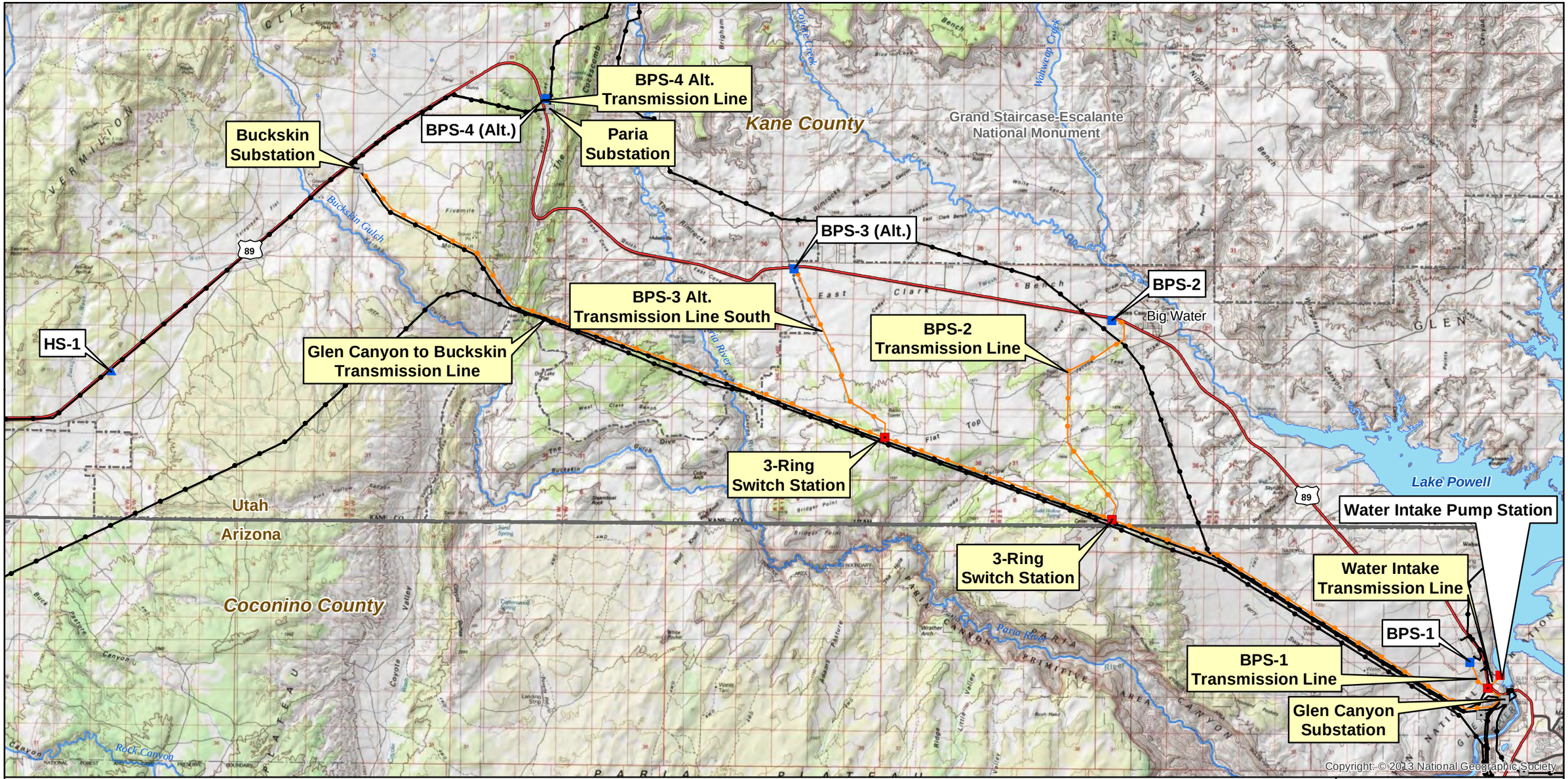
0 1 2 4 6 8 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-6** MWH

Lake Powell Pipeline
Hydro System
Southeast Corner Alternative



Project Intake Pump Station
Project Pump Station
Project Hydro Station
Substation
Proposed Substation
Project Transmission Lines
Existing Transmission Lines
Interstate
US Highway
ST Highway
Hwy
Major Road
Lakes & Reservoirs
Major Rivers & Streams
National Park/Monument
GSENM Boundary
State Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

0 0.5 1 2 3 4 Miles

N

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-7** MWH

Lake Powell Pipeline Proposed Transmission Lines East

The proposed new **BPS-4 Alt. Transmission Line** would begin at the upgraded Paria Substation and run north to a new electrical substation on the BPS-4 Alternative site. This 69 kV transmission line would be about 0.4 mile long in Kane County, Utah (Figure 1-7).

The proposed new **HS-1 Transmission Line** would begin at the new HS-1 and tie into the existing 69 kV transmission line along Highway 89 from the Buckskin Substation to the Johnson Substation. The HS-1 69 kV transmission line would be about 400 feet long in Kane County, Utah (Figure 1-8).

The proposed new **HS-2 (South) Transmission Line** would connect the HS-2 hydroelectric station and substation along the South Alternative to an existing 138 kV transmission line paralleling Arizona State Route 389. This new 34.5 kV transmission line would be about 0.9 mile long in Mohave County, Arizona (Figure 1-8).

The new **HS-2 (Highway) Transmission Line** alternative would directly connect the HS-2 hydroelectric station and substation along the Existing Highway Alternative to an existing 138 kV transmission line paralleling Arizona State Route 389. This new 34.5 kV transmission line would be about 200 feet long in Mohave County, Arizona.

The proposed new **HS-3 Transmission Line** would connect the HS-3 hydroelectric station and substation to the existing Twin Cities Substation in Hildale City, Utah. The new 12.47 kV transmission line would be about 0.6 mile long in Washington County, Utah (Figure 1-8).

The proposed new **HS-4 (Alt.) Transmission Line** would connect the HS-4 (Alt.) hydroelectric station and substation to an existing transmission line parallel to Utah State Route 59. The new 69 kV transmission line would be about 7.5 miles long in Washington County, Utah (Figure 1-8).

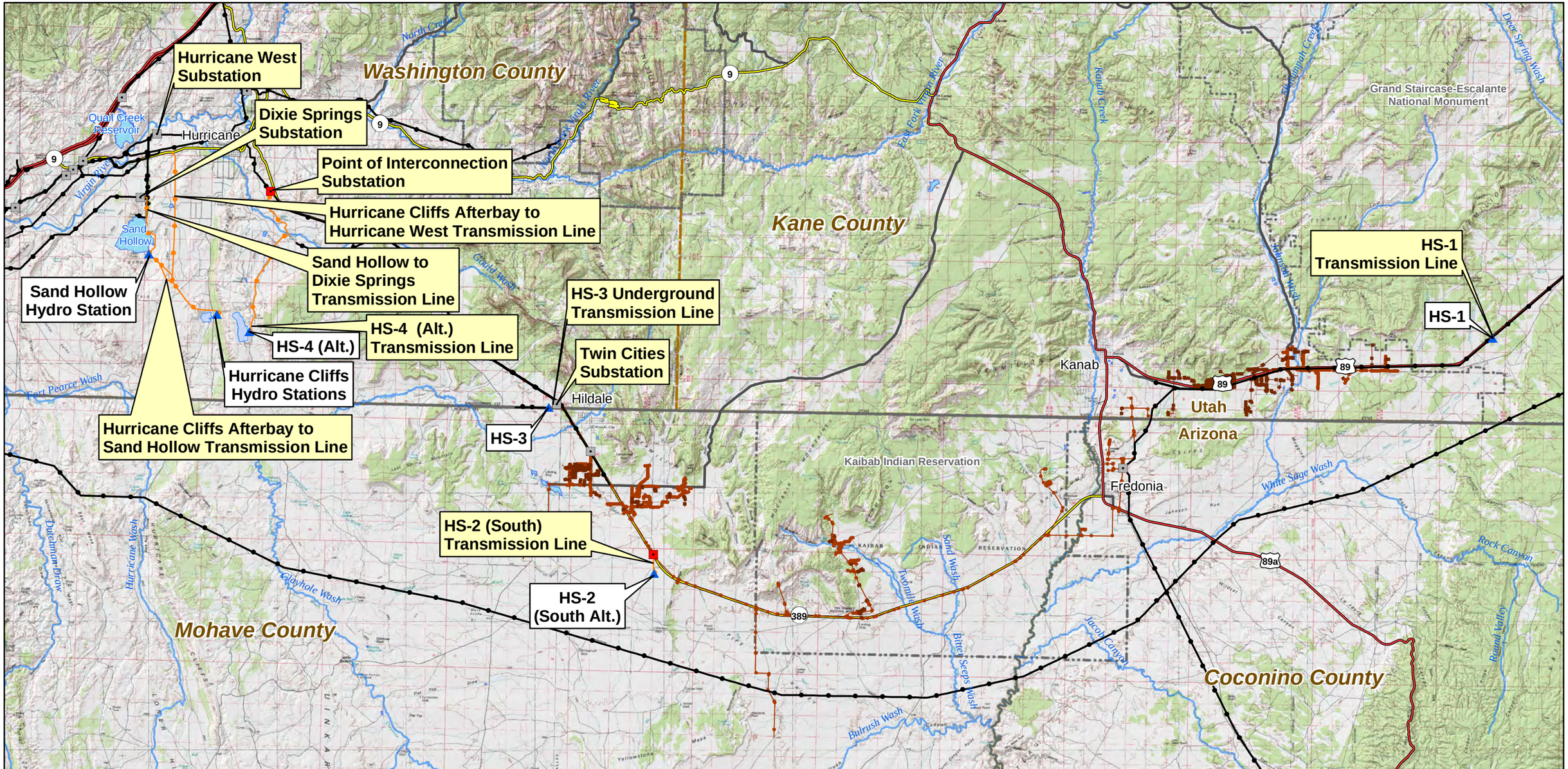
The proposed new **Hurricane Cliffs Afterbay to Sand Hollow Transmission Line** would consist of a new 69 kV transmission line, which would run northwest from the Hurricane Cliffs peaking power plant and substation to the Sand Hollow Hydro substation. This new 69 kV transmission line would be about 4.9 miles long in Washington County, Utah (Figure 1-8).

The proposed new **Hurricane Cliffs Afterbay to Hurricane West Transmission Line** would consist of a new 345 kV transmission line, running from the Hurricane Cliffs pumped storage power plant northwest and then north to the planned Hurricane West 345 kV substation. This new 345 kV transmission line would be about 10.9 miles long in Washington County, Utah (Figure 1-8).

The proposed new **Sand Hollow to Dixie Springs Transmission Line** would consist of a new 69 kV transmission line, running from the Sand Hollow Hydro substation around the east side of Sand Hollow Reservoir and north to the existing Dixie Springs Substation. This new 69 kV transmission line would be about 3.4 miles long in Washington County, Utah (Figure 1-8).

1.2.5 Natural Gas Pipeline and Generators Alternative

Natural gas engine-driven generation systems to power electric pumps would be an alternative to powering the LPP Project pump stations by electricity via transmission lines. Recent discussions with Questar Gas Company (local natural gas supplier) indicated that capacity would be available in the Kern River natural gas pipeline, which is located west of St. George, Utah, to supply natural gas for this alternative. Questar Gas Company indicated the company has future plans to extend a high pressure natural gas pipeline from the Kern River line to Hurricane, Utah. The Questar Gas pipeline would be sized to supply natural gas to the LPP Project if it is determined that a single-purpose, dedicated high pressure gas line would be extended to service the LPP pump stations. Based on the preliminary pump



Project Hydro Station
Substation
Proposed Substation
Project Transmission Lines
Existing Transmission Lines
Existing OH Primary Line
Existing UG Primary Line
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number:
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UTU-85472

N

0 1 2 4 6 8 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-8** MWH

Lake Powell Pipeline Proposed Transmission Lines West

selection and fuel requirements, the natural gas supply pipeline would be 12 inches in diameter to provide natural gas supply for the LPP Project pump stations. The pipeline would likely be successively reduced in size as it delivers gas to each of the pump stations.

1.2.5.1 Natural Gas Transmission Line Connection

The natural gas supply line alternative would connect to the proposed Questar Gas Transmission Line from the existing Kern River line to Hurricane City. The natural gas supply line would connect to the high pressure gas transmission line at a proposed gate station southeast of Sand Hollow Reservoir. The proposed gate station would be located adjacent to the alignment of the extension of the Southern Corridor Highway, which is the existing alignment of Sand Hollow Road east of Sand Hollow Reservoir (Figure 1-9).

1.2.5.2 Natural Gas Supply Line

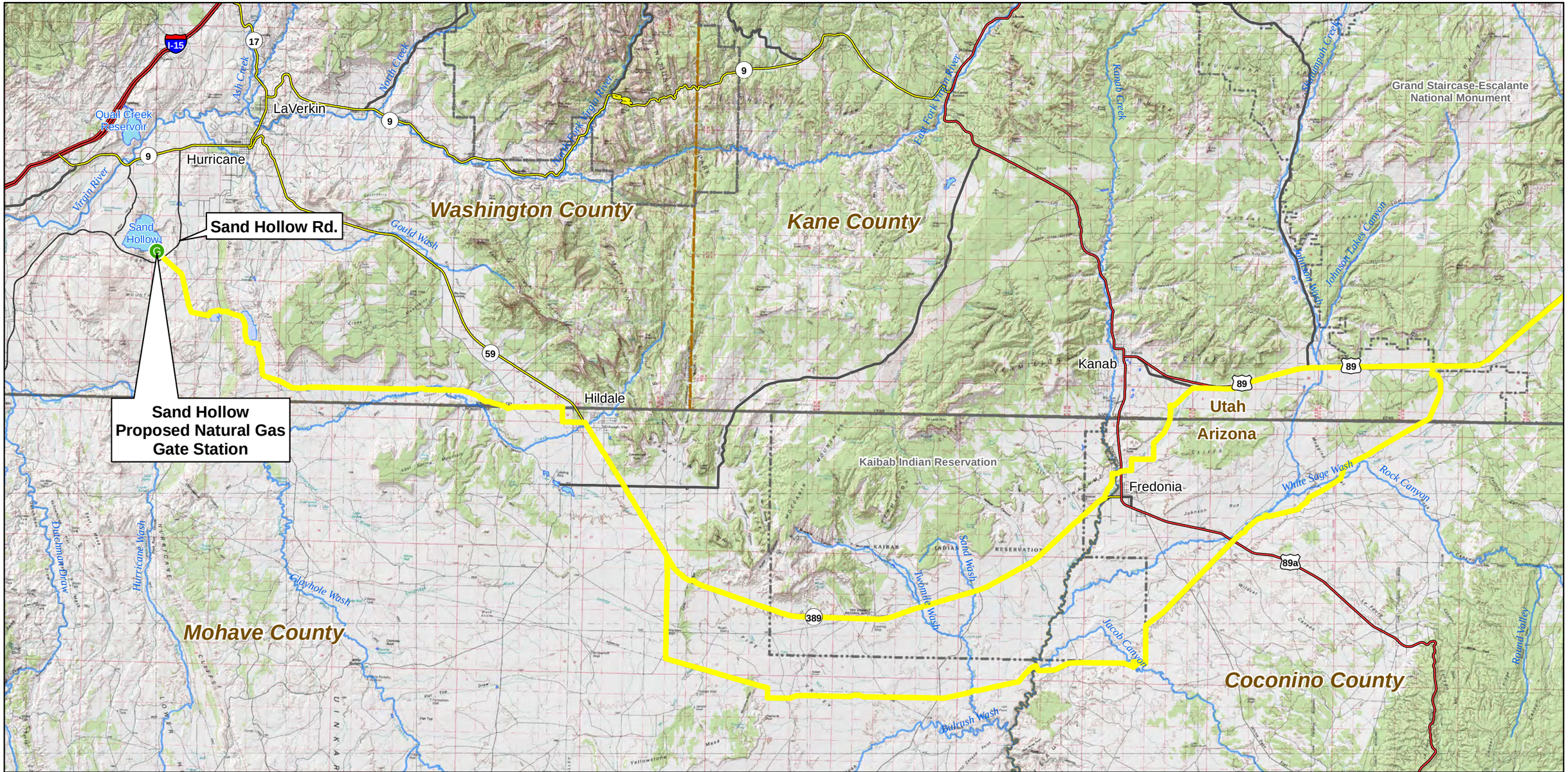
The proposed natural gas supply line would be an intermediate high pressure line and would operate between approximately 250 to 300 psi at the gate station connection. Because of pressure losses in the pipeline it is anticipated that the pressure at each of the LPP pump stations would vary between 50 and 100 psi, which would meet the requirements of the natural gas generators. The pipeline would be constructed of strong carbon steel and have a dielectric coating, such as a fusion bonded epoxy or extruded polyethylene. It would be installed with a minimum four feet of cover and be provided with cathodic protection (a technique that involves inducing an electric current through the pipe to ward off corrosion and rusting). The pipeline would be designed, constructed, tested, and operated at a minimum in accordance with all applicable requirements included in the U.S. DOT regulations in 49 CFR Part 192, "Transportation of Natural Gas and other Gas by Pipeline: Minimum Federal Safety Standards," and other applicable federal and state regulations.

The natural gas supply line would follow the proposed LPP ROW from the Sand Hollow Gate Station to the intake pump station near Page, Arizona. The line would be about 138.5 miles long and installed a minimum of 10 feet from the edge of the proposed water pipeline in a separately excavated trench within the LPP ROW. Figure 1-9 shows the west alignment of the natural gas supply line as proposed and an alternative alignment along Arizona State Route 389 and through Fredonia, Arizona, parallel to the Existing Highway Alternative alignment, both to the west GSENM boundary. Figure 1-10 shows the east alignment of the natural gas supply line as proposed from the west GSENM boundary to the water intake pump station.

Sectionalizing valves would be required along the natural gas supply line alignment. These valves are safety devices used for emergency shut down or maintenance. The natural gas supply line sectionalizing valves would be required at approximately 20-mile intervals because of the gas line's remoteness. The main line valve sites would cover a 40-foot by 40-foot area surrounded by a chain link fence within the confines of the permanent LPP pipeline ROW. The valves would be above ground and connected to the buried natural gas supply line. Additionally, pig launching or receiving equipment would be installed within the fenced areas. Pigs are devices that are placed into a natural gas supply line to clean the inside walls or to monitor its internal and external condition. Launching and receiving equipment is connected to the natural gas supply line to enable pigs to be inserted into or removed from the pipeline.

1.2.5.3 Natural Gas Generators

Natural gas generators would be used to supply power to operate the electric pumps at the LPP pump stations. The size of the electric pumps is approximately 18 feet from center to center when configured.



Natural Gas Gate Station
Natural Gas Supply Line Alignment
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

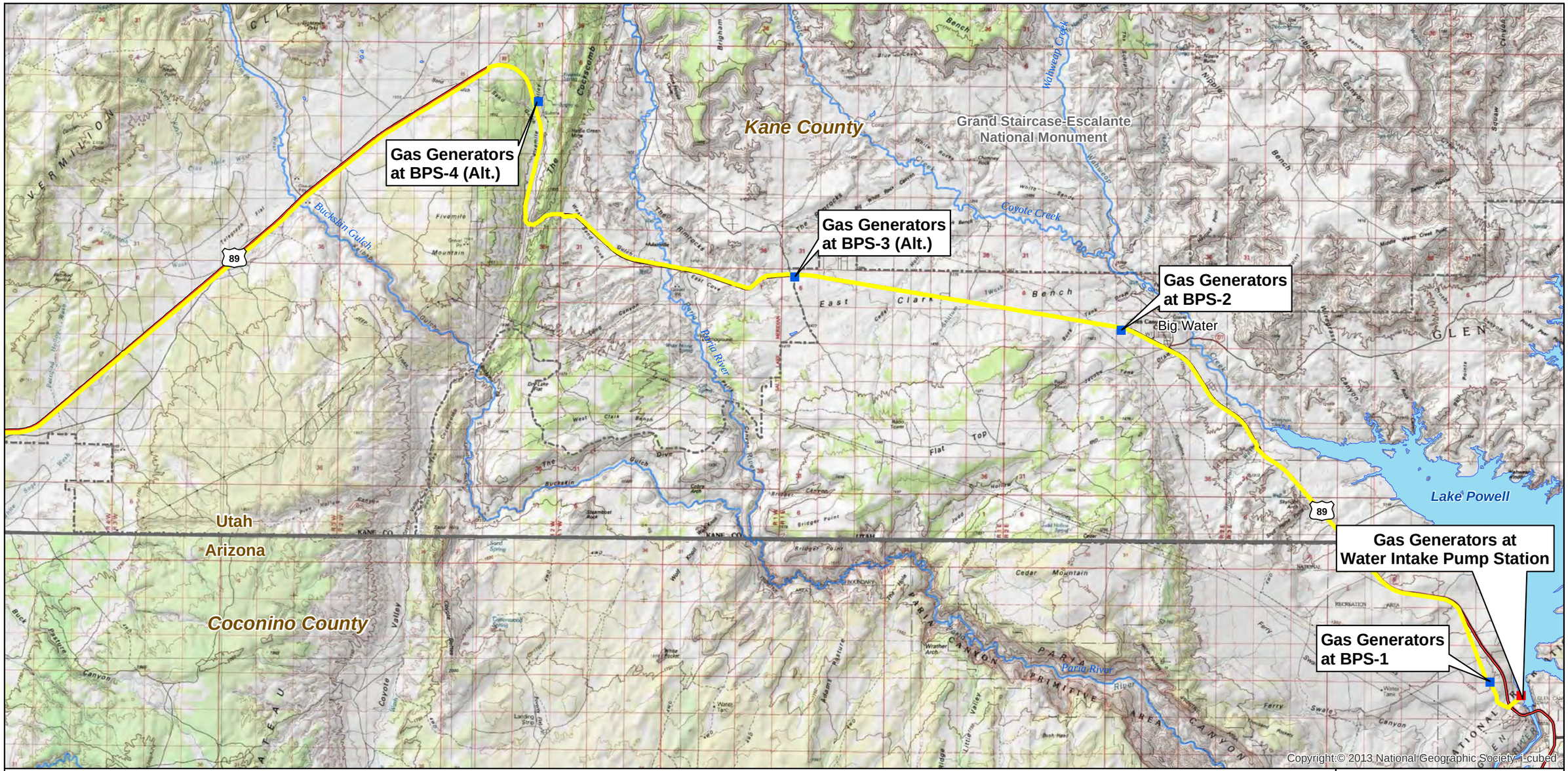
0 2 4 6 8 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-9** MWH

Lake Powell Pipeline
Natural Gas Supply Line and Generators West Alternatives



Project Water Intake Pump Station
Gas Generators at Booster Pump Station
Natural Gas Supply Line Alignment

Interstate
US Highway
ST Highway
Hwy
Major Road

Lakes & Reservoirs
Major Rivers & Streams
National Park/Monument
GSENM Boundary
State Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

0 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-10** MWH

Lake Powell Pipeline Natural Gas Supply Line and Generators East Alternative

The overall pump station building size would be 14 feet wider and 18 feet longer than the pump stations which are powered by electricity from transmission lines.

The natural gas generators would be approximately 35 feet long by eight feet wide by nine feet high. The intake pump station building size for the natural gas generators would be approximately 65 feet wide by 170 feet long by 50 feet high, and located adjacent to the pump station electrical room within the five-acre site designated for each pump station. The booster pump station building size for the natural gas generators would be 65 feet wide and 39 feet high, with lengths ranging from 114 feet to 162 feet long. Each natural gas generator would require a 24-inch diameter stack, with guide wires, extending above the building roof to disperse the exhaust gases. The five stacks (four operating natural gas generators plus one standby natural gas generator) at the intake pump station would extend 20 feet above the top of the 55-foot tall building. The stacks at BPS-1, BPS-2, BPS-3 (Alt.), and BPS-4 (Alt.) would extend 61 feet above the top of the buildings to a total height of 100 feet above the ground surface. The natural gas generators at the intake pump station and BPS-4 (Alt.) would require emission control systems to meet air quality standards.

The natural gas generators alternative at the LPP pump stations would require an annual natural gas supply of 2,855,400 million British thermal units (MMBtu). Table 1-1 shows the annual natural gas consumption at the proposed project intake pump station and booster pump stations 1 through 4.

Table 1-1
Water Conveyance System Natural Gas Generator Annual Fuel Consumption

Pump Station	Site Elevation Feet MSL	Number of Pumps	Motor (HP)	Total Motor (kW)	Natural Gas Generator GE Model	# of Units[1]	Emission Control Required	Generator Total kW[2]	Annual Fuel Consumption (MMbtu)[3]
IPS	3,750	5	3000	11,190	JGS 620 F09	4+1	Yes	12,120	729,000
BPS-1	4,111	5	1500	5,595	JGS 620 F09	2+1	No	5,992	364,500
BPS-2	4,311	5	1750	6,530	JGS 620 F09	3+1	No	8,895	425,400
BPS-3 Alt.	4,657	5	2500	9,325	JGS 620 F09	4+1	No	11,652	607,500
BPS-4 Alt.	5,001	5	3000	11,190	JGS 620 F09	5+1	Yes	14,430	729,000
Total		**25**		**43,830**		**18+5**		**53,089**	**2,855,400**

Notes:
[1] Number of operating units plus standby generator
[2] Total generator capacity without standby generator
[3] The annual fuel consumption is based on all pumps operating at rated motor horsepower, 8400 hours/year operation with generators loaded at 87 percent on the average.

1.3 Summary Description of No Lake Powell Water Alternative

The No Lake Powell Water Alternative would involve a combination of developing remaining available surface water and groundwater supplies, developing reverse osmosis treatment of existing low quality water supplies, and eliminating residential outdoor water use in the WCWCD service area. This alternative could provide a total of 86,249 acre-feet of water annually to WCWCD and KCWCD for M&I use without diverting Utah's water from Lake Powell.

1.3.1 WCWCD No Lake Powell Water Alternative

1.3.1.1 Background

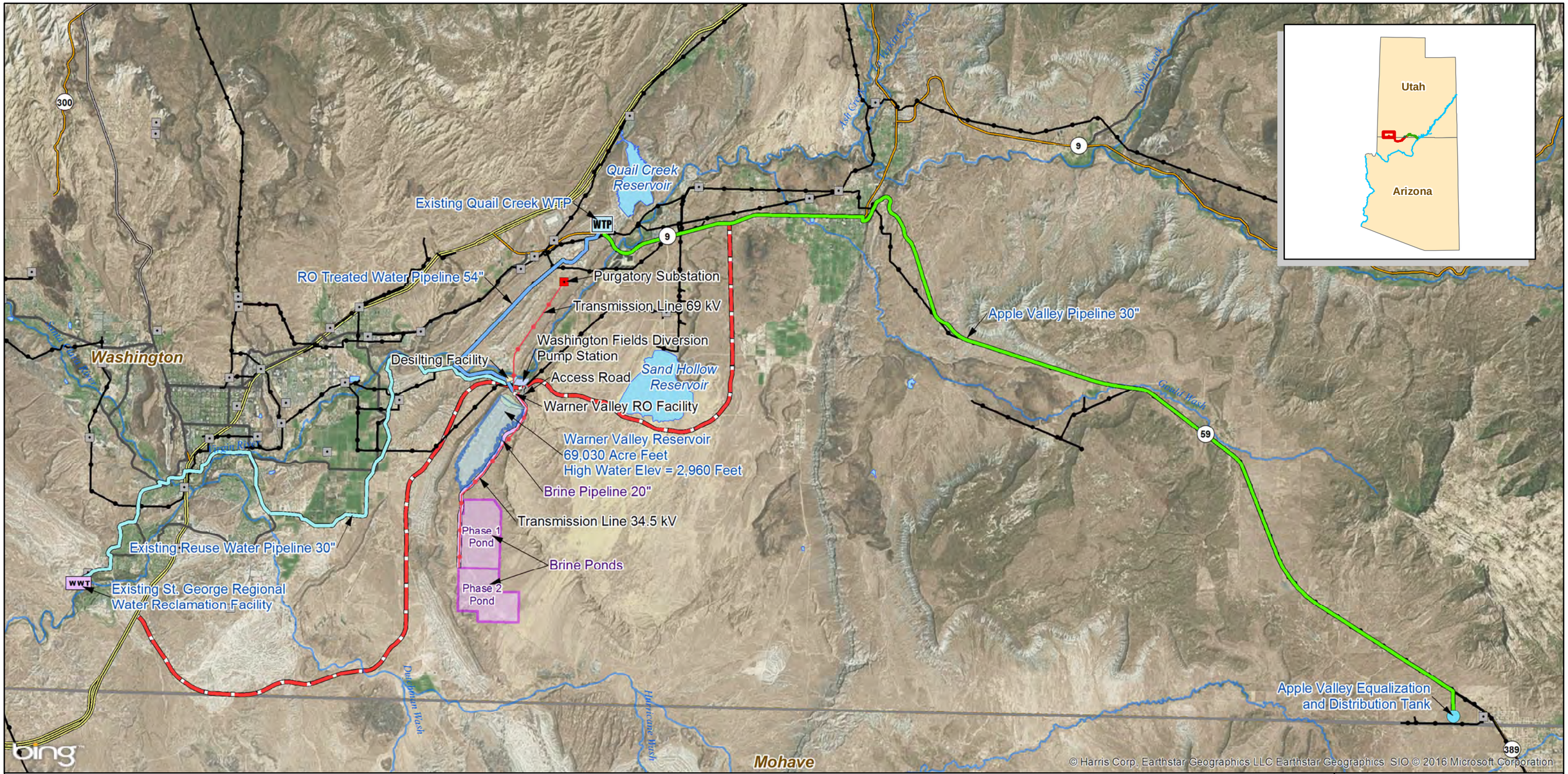
The WCWCD LPP allocation would be 82,249 acre-feet per year, and the WCWCD No Lake Powell Water alternative would need to supply 82,249 acre-feet per year to meet the same future water demands. In addition to the direct supply from Utah's Colorado River water, the water supplied by the LPP Project would provide additional wastewater reuse supply provided that sufficient storage is available.

The No Lake Powell Water Alternative would serve the same population as the LPP Project. WCWCD would implement other future water development projects currently planned by the District, develop additional water reuse/reclamation programs, continue to implement new water conservation measures, and convert additional agricultural water use to M&I use as a result of urban development in agricultural areas through 2028. Remaining planned and future water supply projects include the Ash Creek Pipeline (2,840 acre-feet per year), Sand Hollow recharge/recovery (3,000 acre-feet per year), Westside groundwater wells arsenic treatment (5,000 acre-feet per year), and development/yield increase of existing groundwater wells (2,830 acre-feet per year). Along with existing supplies, these future water supplies would yield an estimated 72,842 acre-feet per year of potable water and 8,505 acre-feet per year secondary water by 2028.

Under the No Lake Powell Water Alternative, actions in addition to the currently planned WCWCD projects would be taken to meet the water demand that would have been supplied by the Lake Powell Pipeline, as described below.

1.3.1.2 WCWCD No Lake Powell Water Alternative Features

Beginning in 2025, Washington County residential outdoor potable water use would be permanently re-purposed to indoor potable water use to help meet increasing indoor potable water demands. The WCWCD would develop a reverse osmosis (RO) advanced water treatment facility near the Washington Fields Diversion in Washington County, Utah, to treat up to 50,000 acre-feet per year of diverted Virgin River water, which has a high total dissolved solids (TDS) concentration, mixed with an additional 19,030 acre-feet per year of reuse water. WCWCD would develop the Warner Valley Reservoir to store the reuse water and diverted Virgin River water prior to RO treatment. A water distribution pump station and pipeline would be constructed to convey 13,249 acre-feet of potable water from Quail Creek Water Treatment Plant to the Apple Valley area of Washington County. Figure 1-11 shows the primary conceptual components of the No Lake Powell Water Alternative. Table 1-2 summarizes available supplies and projected demands under the No Lake Powell Water Alternative and the LPP Project alternatives.



WTP Quail Creek WTP (Existing)
WWT St. George Regional Water Reclamation Facility (Existing)
Substation
Substation (Future)
Warner Valley Transmission Line
Existing Transmission Lines
Desilting Facility
RO WTP
Washington Fields Diversion Pump Station
Lakes & Reservoirs
Brine Evaporation Ponds
Access Road
Apple Valley Pipeline 30"
Brine Pipeline 20"
Existing Reuse Water Pipeline 30"
RO Treated Water Pipeline 54"
Major Rivers & Streams
Interstate
US Highway
ST Highway
Hwy
Major Road
Southern Corridor Highway
State Boundaries
County Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

0 0.75 1.5 3 4.5 6 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 1-11** MWH

No Lake Powell Water Alternative Primary Infrastructure

Table 1-2 Available Supplies and Projected Demands Under the No Lake Powell Water and Lake Powell Pipeline Project Alternatives		
	No Lake Powell Water Alternative	**Lake Powell Pipeline Project Alternative**
Existing Supplies	67,677	67,677
Planned Projects	13,670	13,670
Lake Powell Pipeline Project	0	82,249
RO Treatment of Virgin River and Reuse Water	57,883	0
Agricultural Conversion	0[1]	10,080
Reuse	17,100[2]	36,130
2060 Total Supply	156,330	209,806
2060 Total Demand	133,119[3]	185,285
Surplus in 2060	**23,211**	**24,521**

Notes:
[1]Agricultural conversion water included in RO treatment.
[2]19,030 acre-feet per year additional reuse included in RO treatment.
[3]Demand reduced 52,166 acre-feet per year from elimination of residential outdoor watering.

1.3.1.2.1 Re-Purposing Potable Water Use. The No Lake Powell Water Alternative would permanently eliminate residential outdoor potable water use in Washington County, re-purposing the portion of potable water used for residential outdoor watering to indoor potable use. Projections of future water use through 2060 account for population growth, climate change (projected 6 percent reduction of Virgin River flows by 2050 [Reclamation 2014]), and water conservation (35 percent reduction in per capita water use from 2000 to 2060). Potable water in Washington County is consumed for residential indoor and outdoor uses, commercial uses, institutional uses, and industrial uses. These potable water uses would total 130,245 acre-feet per year by 2052, the year the LPP Project water is anticipated to be fully utilized (UDWRe 2015). Gradually eliminating residential outdoor potable water use starting in 2025 would provide the growing population with potable water for indoor use through 2045; however, re-purposing residential outdoor potable water use to indoor use would not increase the water supply and would have to be accompanied by adding another water supply to meet the growing demand. Re-purposing residential outdoor potable water use to indoor potable use would require converting traditional residential outdoor landscapes and uses to either landscaping requiring no irrigation or desert landscapes compatible with the local climate. Residential water users would be responsible for converting their traditional outdoor landscapes to non-irrigated or desert landscapes. If no additional water supply was added in Washington County after 2025 and potable water use continued to meet residential indoor and outdoor purposes, then the projected population would completely utilize the potable water supply of 72,842 acre-feet per year by 2028.

1.3.1.2.2 Reverse Osmosis Water Treatment. Washington County's additional future water supply under the No Lake Powell Water Alternative would be dependent on two water sources: 1) Virgin River water diverted at the Washington Fields Diversion; and 2) reuse water from an expanded St. George Regional Water Reclamation Facility. WCWCD would develop a RO advanced water treatment facility near Washington Fields Diversion in Washington County, Utah. The RO facility would be designed to treat 50,000 acre-feet of de-silted water per year diverted from the Virgin River at Washington Fields Diversion. St. George Regional Wastewater Reclamation Facility would provide an additional 19,030

acre-feet of water per year to be treated at the RO facility. The RO facility would be necessary to remove the high concentrations of TDS present in both the Virgin River and the effluent from the St. George Regional Wastewater Reclamation Facility. The reuse facility has a current capacity of approximately 7,800 acre-feet per year, with a future design capacity of 11,760 acre-feet per year. An additional 7,830 acre-feet per year of future wastewater reclamation capacity would need to be added to meet the total reuse water requirement of 19,030 acre-feet per year for RO processing inflow. The RO process would separate the TDS from the water, resulting in two products: 1) a treated water product; and 2) a brine product consisting of highly concentrated salts. A two-stage RO process would be applied to the brine solution to recover additional water and reduce the brine volume for enhanced evaporation. The RO-treated water product would be pH-adjusted to neutral pH, dosed with sodium silicate, mixed with conventionally-treated water from the Quail Creek Water Treatment Plant, and disinfected for distribution throughout the WCWCD service area. The RO advanced water treatment facility would process up to 64,313 acre-feet per year and produce up to 57,883 acre-feet per year of water suitable for M&I potable indoor use. The two-stage RO process would remove 90 percent of the TDS. The remaining 10 percent rejection (6,430 acre-feet per year) of brine by-product from the RO treatment process would require evaporation and disposal meeting State of Utah water quality regulations. The RO water treatment plant would process approximately 64,313 acre-feet per year of inflow water from Warner Valley Reservoir storage to meet the 2052 water demand under the No Lake Powell Water Alternative.

The RO water treatment plant processes would consist of pressurized, parallel ultra-filtration units, an influent storage tank with acid added to adjust the pH, pressurized cartridge filtration to remove additional particles from the water, high pressure pumping to pass the water through the parallel RO membrane units, a product water storage tank with saturated lime solution added to adjust the pH of the treated product water prior to disinfection and distribution as potable water, and brine storage tanks in series with the two-stage RO process units for further brine reduction. These water treatment processes would be housed in a water treatment building with electrical, mechanical, chemical storage and metering, heating/air conditioning/ventilation, and SCADA systems. A seven-mile long buried 54-inch diameter pipeline would convey the product water from a pump station at the RO water treatment plant to the Quail Creek Water Treatment Plant. The RO water treatment plant would add RO membrane units in phases as necessary to meet the growing water demand. The RO water treatment plant would be powered by electricity, requiring a 2.8-mile long 69-kV power transmission line from the proposed Purgatory Substation.

The concentrated brine product (6,430 acre-feet per year) would be pumped from the brine tanks through a pipeline to an evaporation apron, spray system and double-lined pond, and then pumped into spray headers over a series of double-lined ponds with leak detection and recovery systems. The enhanced evaporation ponds would be located south of Warner Valley Reservoir and would cover approximately 2,000 acres, developed in two phases. A buried brine conveyance pipeline approximately 4.4 miles long would convey the concentrated brine to the enhanced evaporation ponds. A 4.4-mile long 34.5-kV power transmission line would be extended from the RO water treatment plant to the enhanced evaporation ponds to provide electricity for the pumps spraying the brine solution. The brine solids would be evaporated for approximately 25 years in the Phase 1 ponds, and then dried, collected and disposed in an approved solid waste landfill. The Phase 2 enhanced evaporation ponds would be used during the following 25 years to continue evaporating the brine by-product. Additional infrastructure would be required as part of this alternative, including a de-silting facility, pump stations, pipelines, switch stations and substations, blending and storage tanks, and other associated earthwork.

1.3.1.2.3 Secondary Water Storage in Warner Valley Reservoir. WCWCD would develop the Warner Valley Reservoir to store diverted Virgin River water and reuse water from the St. George Regional Water Reclamation Facility, which would be delivered as inflow to the RO advanced water treatment facility. Warner Valley Reservoir would be located south-southwest of the Washington Fields Diversion.

An earth-fill embankment with a clay core and rock-riprap facing would be constructed across the north entrance to the natural valley. The reservoir would have a maximum active storage volume of 69,030 acre-feet and would cover approximately 1,130 acres, including the earth-fill embankment. A large pump station would be constructed at the Washington Fields Diversion to pump the diverted Virgin River water into the Warner Valley Reservoir. The pump station would be powered by electricity via the 69-kV transmission line from the Purgatory Substation to the RO water treatment plant. The reservoir would store Virgin River water diverted at the Washington Fields Diversion (50,000 acre-feet per year) mixed with St. George Regional Water Reclamation Facility effluent (19,030 acre-feet per year), accounting for annual average evaporation (4,717 acre-feet per year), to produce up to 57,883 acre-feet of RO product water (assuming 90 percent recovery). The brine product from RO treatment would total approximately 6,430 acre-feet per year.

1.3.1.2.4 Water Distribution to Apple Valley. The largest remaining contiguous land area available for development in Washington County would be in Apple Valley. WCWCD would develop a pump station and 28-mile long pipeline to deliver 13,249 acre-feet per year of potable water from the Quail Creek Water Treatment Plant near Hurricane City to the Apple Valley area to meet future residential and commercial water demands.

1.3.2 KCWCD No Lake Powell Water Alternative

The KCWCD No Lake Powell Water Alternative would rely on existing water supplies, water conservation measures resulting in reduced water use, and future water development projects consisting of new groundwater production. Reliable water supplies (projected to be 2,170 acre-feet per year in 2035) for the area served by KCWCD (Kanab City and Johnson Canyon), adjusted for projected stream flow reductions (4.2 percent in 2035) resulting from climate change and a planning reserve (10 percent), would be exceeded by projected M&I water demands by 27 acre-feet per year within the KCWCD service area in 2035. KCWCD projected potable water demand in 2060 would be 3,435 acre-feet per year, with a potable water deficit of 1,334 acre-feet per year. Additional groundwater in the Kanab Creek drainage basin could be developed to provide up to 6,615 acre-feet per year of potable water within the aquifer's estimated safe yield. The quality of this water would likely require advanced water treatment. The developed groundwater from the Kanab Creek drainage basin would be pumped and conveyed through an eight-mile long pipeline to the Johnson Canyon drainage basin. The Johnson Canyon drainage basin comprises the potable water supply service area served by KCWCD in the area that could be served by the LPP Project.

1.4 Summary Description of the No Action Alternative

No new intake, water conveyance or hydroelectric features would be constructed or operated under the No Action Alternative. FERC would not issue a license for the LPP Project. The Utah Board of Water Resources' Colorado River water rights consisting of 86,249 acre-feet per year would not be diverted from Lake Powell and would continue to flow into the lake until the water is used for another State of Utah purpose.

1.4.1 WCWCD No Action Alternative

Under the No Action Alternative, WCWCD would complete the Ash Creek Project, planned groundwater development and continue to implement planned conservation programs. Wastewater reuse would be utilized to the maximum extent storage allows. Existing and future water supplies totaling 72,840 acre-feet per year potable and 8,505 acre-feet per year secondary would meet projected M&I water demand within the WCWCD service area through approximately 2028, exhausting all water planning reserves.

Each supply source would be phased in to meet the M&I potable and secondary water demand associated with the forecasted population.

The No Action Alternative would not provide WCWCD with any reserve water supply (e.g., water to meet annual shortages because of drought, emergencies, and other losses). The No Action Alternative would not provide adequate water supply to meet projected water demands beyond 2028. There would be a projected water shortage of approximately 102,903 acre-feet per year in 2060 within the WCWCD service area under the No Action Alternative.

1.4.2 KCWCD No Action Alternative

KCWCD would use existing water supplies to meet potable water demands through 2035. Reliable water supplies are projected to be 2,101 acre-feet per year in 2060.

The No Action Alternative would not provide KCWCD with any reserve water supply (e.g., water to meet annual shortages because of drought, emergencies, and other losses). The No Action Alternative would not provide adequate water supply to meet projected water demands beyond 2035. There would be a projected water shortage of approximately 1,334 acre-feet per year in 2060 within the KCWCD service area under the No Action Alternative.

1.5 Identified Issues

The following issues were identified for this assessment through the scoping process:

- Impacts in tourist use areas
- Impacts on locations of perceived aesthetic value
- Impacts on reservoirs, waterways and surrounding area (e.g. Lake Powell and Sand Hollow Reservoir)
- Impacts on National recreation areas, parks, and monuments (e.g. GCNRA, Pipe Springs National Monument, and GSENM)

1.6 Impact Topics

The following impact topics are analyzed in this study report:

- Existing and proposed recreation areas, facilities, and use

Information concerning these impact topics was obtained from available literature, management plans, Geographic Information Systems (GIS data layers), field reconnaissance, and meetings with resource agency personnel.

Chapter 2
Methodology

2.1 Introduction

This chapter presents the goals and objectives of the recreation resources study, identifies the recreation resources study area and summarizes the methodology for assessing impacts of the action alternatives and No Action Alternative on recreation resources in the Lake Powell Pipeline project (LPP) study area.

2.2 Goals and Objectives

The goals of the recreation resources study are to identify and determine recreation resource impacts resulting from LPP project construction and operation, as described in the Revised Recreation Resources Study Plan (UBWR 2008). Information regarding potential recreation resource impacts will guide decisions in the LPP project design, construction, operation, and maintenance, so that impacts on recreation resources may be minimized and/or mitigated.

Specific recreation-related objectives include determination of how the LPP project construction, operation, and maintenance would affect local, regional, and statewide recreation resources along the alternative alignments. The primary objectives of the recreation resource study are as follows:

- Identify recreation resources within the study area
- Address recreation resource management goals of the State of Utah, State of Arizona, National Park Service (NPS), Bureau of Land Management (BLM), and other agencies (such as county, city, or tribal entities with jurisdiction over recreation resources)
- Identify potential impacts from Project construction on Utah and Arizona State Comprehensive Outdoor Recreation Plans (SCORPs), NPS plans, and BLM plans within and surrounding the study area
- Evaluate cumulative recreation resource impacts from LPP project construction and operation
- Evaluate whether recreation resource impacts from the LPP project along the alternative alignments can be mitigated by design, construction, or operations and maintenance practices

2.3 Recreation Resources Study Area

The recreation resources study area includes the entire length of the alternative alignments, locations of ancillary facilities, and construction work areas. Particular attention was focused on the following features located within one mile of proposed LPP project facilities:

- Tourist use areas
- Locations of perceived aesthetic value
- Reservoirs, waterways and surrounding areas (e.g. Lake Powell and Sand Hollow Reservoir)
- National recreation areas and monuments (e.g. GCNRA, Pipe Springs National Monument, and GSENM)

The recreation resources study area (Figure 2-1) includes approximately 330,000 acres of public and private land. Approximately 20 percent (65,376 acres) of the study area is privately owned, while the remainder is managed by federal and state agencies.

2.4 Recreation Resources Study Methods

Management goals for the LPP project include avoiding, reducing, and mitigating conflicts with existing recreational resources. Resource management goals for agencies with jurisdiction over lands to be affected by the LPP project are defined in existing management plans. Consultation with federal, state, and local agencies, as well as Tribes and private landowners, further identified resource management goals for lands associated with the LPP project.

Existing recreation resource data and information relevant to the LPP project was reviewed in current published reports, studies, and literature. This literature review included information from established agency sources such as the NPS, BLM, State of Utah, State of Arizona, and other sources.

Field reconnaissance was performed in late August and early September 2009. This work included a physical inspection of existing recreation facilities, travel routes, and use patterns in the LPP project recreation study area.

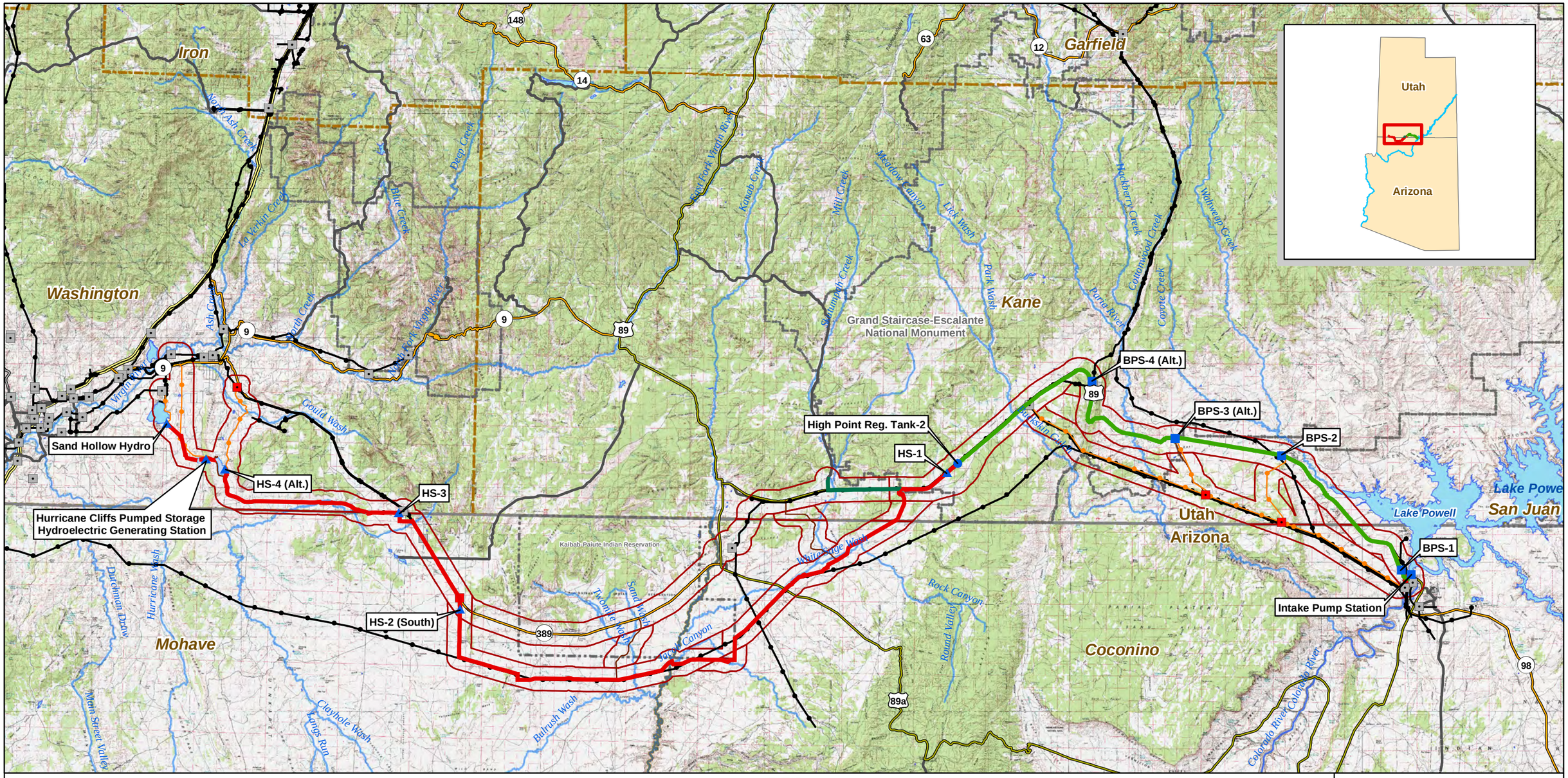
Data collected from the literature review and field reconnaissance were compiled and evaluated. These evaluations were used to determine the recreation resource impacts generated from LPP project construction activities and operations.

Impacts on recreation were analyzed for each of the LPP project alternatives, relative to the affected environment (baseline conditions) for the impact topics listed in Chapter 1 of this study report. The amount of change between the baseline conditions and conditions under the alternatives was documented as impact.

Determination of impacts involved identifying the existing and proposed recreation areas, facilities, and use. Changes in these resources were evaluated using best professional judgment and past experience.

Cumulative impacts are defined as those impacts resulting from the incremental impacts upon a resource from interaction of two or more individual actions. For the purposes of this study report, the cumulative impact analysis was based on the identification of future projects that may occur in and around the study area. These projects were examined to determine if they would impact recreation resources in the study area when combined with impacts of the LPP project.

Mitigation measures were developed to offset potential significant impacts, whenever possible. These measures were based on applicable state and federal statutes and regulations, past experience, and best professional judgment to satisfy a legal and/or public interest requirement.



Project Pump Station
Project Regulating Tank
Project Hydro Station
Substation
Proposed Substation
Water Conveyance System
Hydro System - Proposed Action
KCWCD System
Project Transmission Line
Existing Transmission Lines
Interstate
US Highway
ST Highway
Hwy
Major Road
Access Roads
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Recreation Study Area
National Park/Monument
Tribal Lands
State Boundaries
County Boundaries

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

0 2.5 5 10 15 20 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 2-1** MWH

Recreation Resources Study Area

Chapter 3
Affected Environment

3.1 Introduction

This chapter describes the affected environment of recreation resources for the Lake Powell Pipeline (LPP) project. It identifies recreation areas, facilities and use on lands managed by federal, state and local government agencies and on privately owned land. It reviews identified recreation needs and opportunities documented in federal land management plans and State Comprehensive Outdoor Recreation Plans (SCORP) for Utah and Arizona.

3.2 Recreation Areas, Facilities and Use

Construction and operation activities associated with the LPP project would occur on federal, state, and private lands in Utah's Kane and Washington counties, and in Arizona's Coconino and Mohave counties. The following recreation areas and facilities on public, tribal and private lands are located in the recreation resources study area:

- Glen Canyon National Recreation Area (GCNRA)
- Vermilion Cliffs National Monument (VCNM)
- Paria Canyon – Vermilion Cliffs Wilderness (PCVCW)
- Grand Staircase – Escalante National Monument (GSENM)
- BLM – Kanab Field Office (KFO)
- BLM – Arizona Strip Field Office (ASFO)
- Kaibab-Paiute Indian Reservation
- Pipe Springs National Monument (PSNM)
- BLM – St. George Field Office (SGFO)
- Sand Hollow State Park (Utah)
- Private Recreational Facilities

3.2.1 Glen Canyon National Recreation Area

The GCNRA encompasses more than 1.2 million acres, stretching from Lees Ferry in northern Arizona to the Orange Cliffs in southern Utah (NPS, 2009a). Approximately five percent (16,687 acres) of the recreation resources study area lies within GCNRA.

The National Park Service (NPS) administers, operates and maintains GCNRA, which offers water-based and backcountry recreational opportunities, and includes scenic vistas, unique geologic features, and a vast panorama of human history. The GCNRA includes Glen Canyon Dam and Lake Powell, the second largest manmade lake in North America (see Recreation Study Area Photographs, Appendix A).

The GCNRA was established to provide for the management of public outdoor recreation use and the enjoyment of Lake Powell and adjacent lands in Arizona and Utah. In 2003, there were 1.9 million visitors and more than 1.2 million overnight stays. Recreation uses range from those activities that require solitude and an undisturbed setting to those that require mechanical means, such as power boating and

four-wheel driving. The most popular forms of recreation are water-based activities such as boating, fishing, water skiing, and boat camping. The City of Page, Arizona, provides a significant portion of the infrastructure required to support these recreational activities in the form of lodging, restaurants, and permanent housing for people employed by these businesses and the lake concessionaires.

According to NPS policies, the enjoyment of park resources and values by people is part of the fundamental purpose and all park units (NPS, 2007). The NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks, and will maintain within the parks an atmosphere that is open, inviting, and accessible to every segment of society. Further, the NPS will provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the parks. NPS policies also state that scenic views and visual resources are considered highly valued associated characteristics that the NPS strives to protect.

Tourist traffic to GCNRA is heavier during the summer than during the winter months (NPS, 2007). However, traffic in the vicinity is characterized as light throughout the year, and all roads operate well below their design capacities throughout the year.

GCNRA points of interest in the vicinity of the LPP project are shown on Figure 3-1. Recreation areas and facilities within the recreation resources study area are described in the following subsections.

3.2.1.1 "Dead Dog" and "Ropes" Recreation Areas

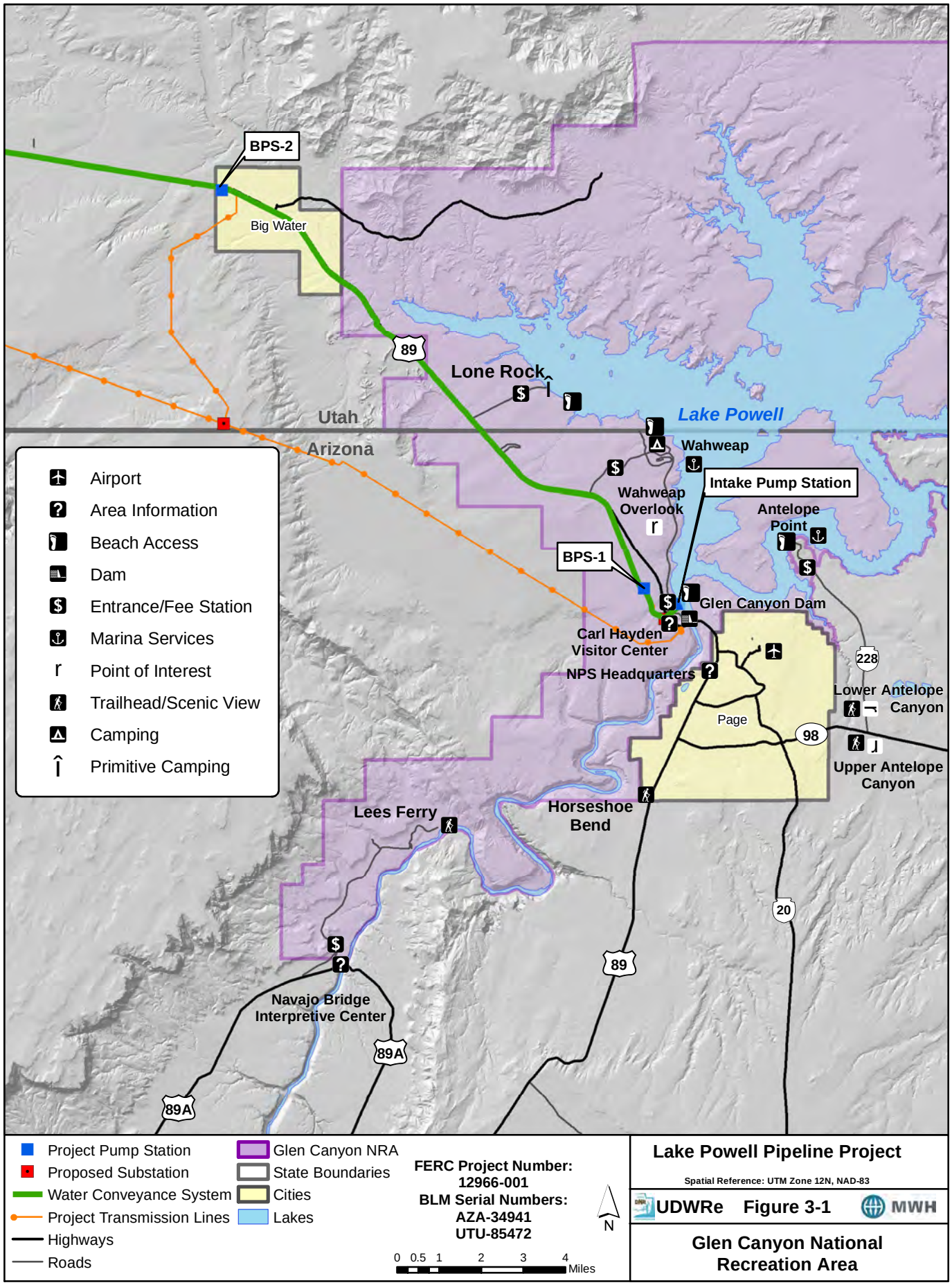
The "Dead Dog" and "Ropes" dispersed recreational areas are located south of Glen Canyon Dam and west of the Colorado River. These areas are accessible from Highway 89 and unpaved roads, just south and west of the dam. These recreational areas are frequented by local OHV enthusiasts (Hughes, 2009). The Ropes area contains a designated, but unmarked camping area.

3.2.1.2 Colorado River Discovery Rafting Tours

Colorado River Discovery offers rafting tours of the Colorado River below Glen Canyon Dam. Half-day float trips are offered annually from March 1 through November 30. Full-day rowing trips are also available (CRD 2009). Rafting trips depart from Page, Arizona, and include a drive through the two-mile-long Glen Canyon Dam access tunnel, a stop to view ancient petroglyphs, and conclude at Lees Ferry. Prices for the trips include a river usage fee.

3.2.1.3 Highway 89

Highway 89 serves as a connector between Interstates 17 and 40 to the south, and Interstate 15 to the north and west. This highway is also the access route from Phoenix and Flagstaff to Wahweap Marina on Lake Powell. The mix of traffic on Highway 89 includes a substantial portion of heavy trucks, which provide both local services and long-haul transportation of goods. Highway 89 connects Kanab, Utah, and Page, Arizona, with 72 paved miles.


BPS-2
Big Water
89
Lone Rock
Utah
Arizona
Lake Powell
Wahweap
Intake Pump Station
Wahweap Overlook
Antelope Point
BPS-1
Glen Canyon Dam
Carl Hayden Visitor Center
NPS Headquarters
228
Lower Antelope Canyon
Page
98
Upper Antelope Canyon
Lees Ferry
Horseshoe Bend
20
89
Navajo Bridge Interpretive Center
89A
89A
Airport
Area Information
Beach Access
Dam
Entrance/Fee Station
Marina Services
Point of Interest
Trailhead/Scenic View
Camping
Primitive Camping
Project Pump Station
Proposed Substation
Water Conveyance System
Project Transmission Lines
Highways
Roads
Glen Canyon NRA
State Boundaries
Cities
Lakes
FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472
N
0 0.5 1 2 3 4 Miles
Lake Powell Pipeline Project
Spatial Reference: UTM Zone 12N, NAD-83
UDWRe
Figure 3-1
MWH
Glen Canyon National Recreation Area

3.2.1.4 Carl Hayden Visitor Center

The Carl Hayden Visitor Center is located on Highway 89, on the west side of Glen Canyon Dam. Attractions at the visitor center include tours of the dam (fee required and security measures in place), exhibits, video shows, and a relief map of the entire Glen Canyon area. The facility is owned and operated by the Bureau of Reclamation, who, in turn, provides space for NPS staff and exhibits (Hughes, 2009). Ranger talks are presented daily on a variety of subjects throughout the year. Ranger programs are presented three times a week from Memorial Day through mid-September, and opportunities for solar telescope viewing are offered outside the visitor center several times a week from April through October. A bookstore and restrooms are located in Carl Hayden Visitor Center. NPS staff reported visitor numbers of 405,031 at Carl Hayden Visitor Center for the 2008 calendar year (Sweatland, 2009).

3.2.1.5 Glen Canyon Dam Overlook

The Glen Canyon Dam Overlook, located on Scenic View Drive off of Highway 89, provides a spectacular view of the dam and Colorado River from just downstream. From the paved (asphalt) parking area a 5 to 10 minute walk leads downhill over uneven, sandy, and rocky terrain. There is a handrail halfway down the trail. NPS staff reported visitor numbers of 63,271 at Glen Canyon Dam Overlook for the 2008 calendar year (Sweatland, 2009). The NPS categorizes this day hike trail as "easy."

3.2.1.6 "Chains" Recreation Area and "Hanging Garden" Trail

East of Glen Canyon Dam and adjacent to the town of Page, Arizona, an unpaved road heading north off of Highway 89 leads to an area known as "The Chains." This area provides scenic views of Lake Powell and the upstream side of the dam. This day-use, publicly accessible area includes a large gravel parking lot, two unisex pit toilets (no water provided), and some signage. No safety fencing currently exists at this location. The Chains area is used by local residents for fishing and swimming (Hughes, 2009). NPS staff reported visitor numbers of 50,597 at the Chains area for the 2008 calendar year (Sweatland, 2009). Lake shore access is possible at the Chains area, depending on the lake elevation. The lake is very deep at this location, and good swimming skills are required. In The Chains area, visitors may partake in a self-guided tour through slick rock sand formations (NPS, 2009a). The NPS categorizes this day hike trail as "easy to moderate."

The Hanging Garden Trail is adjacent to the Chains area. This one mile roundtrip hike leads visitors to the Hanging Gardens area, a "desert oasis on the mesa top high above the Colorado River and Lake Powell." Obscured by Jurassic Navajo sandstone, this seep spring quickly absorbs rainwater, and slowly releases it over time to create a surprisingly lush plant and animal habitat. A free guide is available for the Hanging Garden trail. The trail is poorly signed, and no formal parking area is provided at the trailhead. The NPS categorizes this day hike trail as "easy to moderate" (NPS, 2009a).

3.2.1.7 Wahweap Recreation Area

The Wahweap Recreation Area can be reached from Highway 89 via a south access road (Lakeshore Drive) or via a north access road (Wahweap Drive) (Figure 3-1). These access roads are paved (asphalt). Pay stations are located along both access roads in the vicinity of Highway 89. Lakeshore Drive receives more use than does Wahweap Drive, as it is located closer to the Town of Page and provides easier access to Phoenix (Hughes, 2009). The Wahweap Recreation Area is heavily developed and heavily used. Facilities at this location include:

- Lake Powell Resort (lodge, restaurant, boat tours, gift shop)

- Boat Rentals and Repairs
- Boat Launches and Marina
- Fuel Pumps and Docks
- Stores, Showers, Laundry Facilities
- Picnic Area
- Campground
- Amphitheater
- Ranger Station
- Fishing, Swimming, and Hiking Areas

NPS staff reported visitor numbers of 1,383,000 at the Wahweap Recreation Area for the 2008 calendar year (Sweatland, 2009).

3.2.1.8 Wahweap Overlook

Located between the north and south Wahweap Recreation Area access road intersections with Highway 89 is the Wahweap Overlook access road (Figure 3-1). This graveled roadway, which is in fair condition, leads to a large, graveled parking area and high point that offers a 360-degree panorama of GCNRA. A rustic shelter and bench are provided for visitors, but there is no railing at the viewpoint. Visitors must pack garbage out and keep pets on leashes. NPS staff reported visitor numbers of 36,250 at the Wahweap Overlook for the 2008 calendar year (Sweatland, 2009).

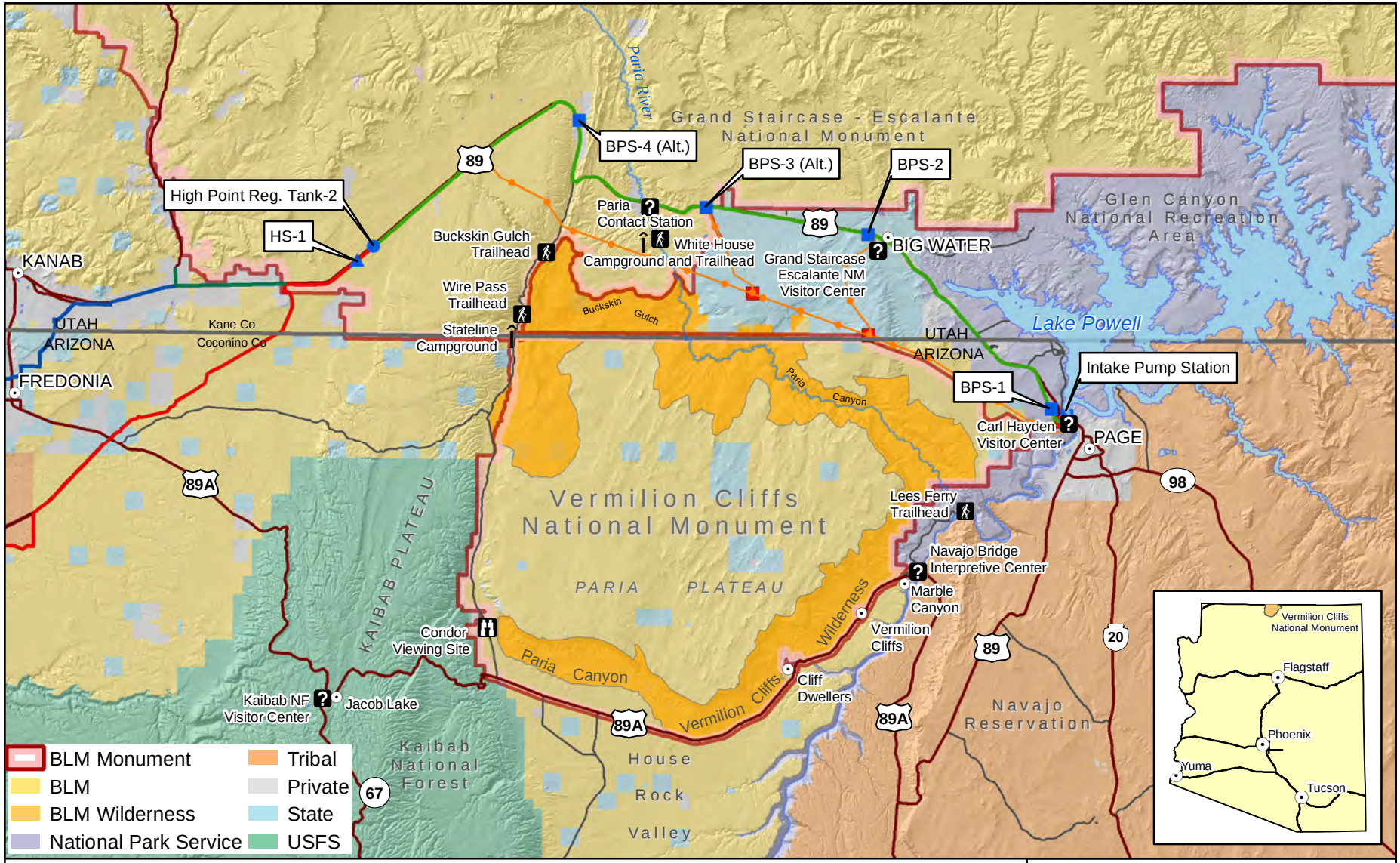
3.2.1.9 Lone Rock Recreation Area

Located along Highway 89, near the western boundary of GCNRA (Figure 3-1), is the Lone Rock access road. This paved (asphalt) access road leads northeast to a fee station and then to Lone Rock Recreation Area. The area consists of an informal boat launch and primitive campsites. Four micro-flush toilets, six vault toilets, one wheelchair accessible comfort station, an outdoor (cold water) shower, OHV use area, dump station, potable water (seasonal), and a day use area are provided. No reservations are required. NPS staff reported visitor numbers of 43,241 at the Lone Rock Recreation Area for the 2008 calendar year (Sweatland, 2009).

3.2.2 Vermilion Cliffs National Monument

The VCNM was established on November 9, 2000, by President Clinton to "protect an array of scientific, biological, geological, hydrological, cultural, and historical objects" (BLM, 2008a). Located in northern Coconino County, Arizona, VCNM contains 279,566 acres of BLM-administered lands, 13,438 acres of Arizona State Trust lands, and 683 acres of private land. Approximately one percent (4,124 acres) of the recreation resources study area lies in VCNM.

The VCNM borders GCNRA, Glen Canyon National Recreation Area, BLM's Kanab (Utah) Field Office, and BLM's Arizona Strip Field Office (Figure 3-2). Located in a remote section of northern Arizona, accessible from Highways 89 and 89A via House Rock Valley Road, this area includes spectacular geologic formations. The scenic beauty of VCNM's Paria Canyon and Coyote Buttes is known internationally. The colorful and winding corridors, narrow constricted gorges, and multilayered displays



Water Conveyance System
Hydro System - South Alternative
Hydro System - Southeast Corner Alternative
KCWCD System
Hydro System - Existing Highway Alternative
Project Pump Station
Project Regulating Tank
Project Hydro Station
Cities
Proposed Substation
Lakes
Major Rivers & Streams
State Boundaries
Project Transmission Lines
Highways
Roads

0 2 4 8 12 Miles

N

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe Figure 3-2 MWH

Vermilion Cliffs National Monument

of vibrantly colored sandstone attract hikers and photographers. There are no designated trails and permits are required. Other recreational opportunities and features in the Paria Canyon/Coyote Buttes include wildlife viewing, geologic viewing, a cultural/historic site, dispersed camping, and an interpretive site.

3.2.3 Paria Canyon – Vermilion Cliffs Wilderness

Located in Arizona and Utah, PCVCW is primarily (90 percent) within VCNM, but also within BLM-KFO (10 percent). This wilderness area is located south of the Grand Staircase-Escalante National Monument. This area is accessible from Highways 89 and 89A via House Rock Valley Road. The BLM's ASFO and KFO jointly manage this designated wilderness for the use and enjoyment of visitors in a manner that leaves the area unimpaired for future use and enjoyment as wilderness (BLM, 2008b). BLM staff reported dispersed visitor use numbers of 40,256 for PCVCW between October 1, 2008, and September 30, 3009 (Kiel, 2009a).

3.2.4 Grand Staircase-Escalante National Monument

GSENM, located in southern Utah, encompasses the spectacular grand staircase of cliffs and terraces, stretches across the rugged Kaiparowits Plateau, and includes the Escalante River Canyons. Managed by BLM, GSENM includes approximately 1,870,000 acres of public lands, with 68 percent of the national monument located in Kane County and 32 percent in Garfield County (BLM, 2000). GSENM is partially bordered on the east by GCNRA and on the south by PCVCW and VCNM (Figure 3-3). Approximately 16 percent (54,000 acres) of the recreation resources study area lies in GSENM.

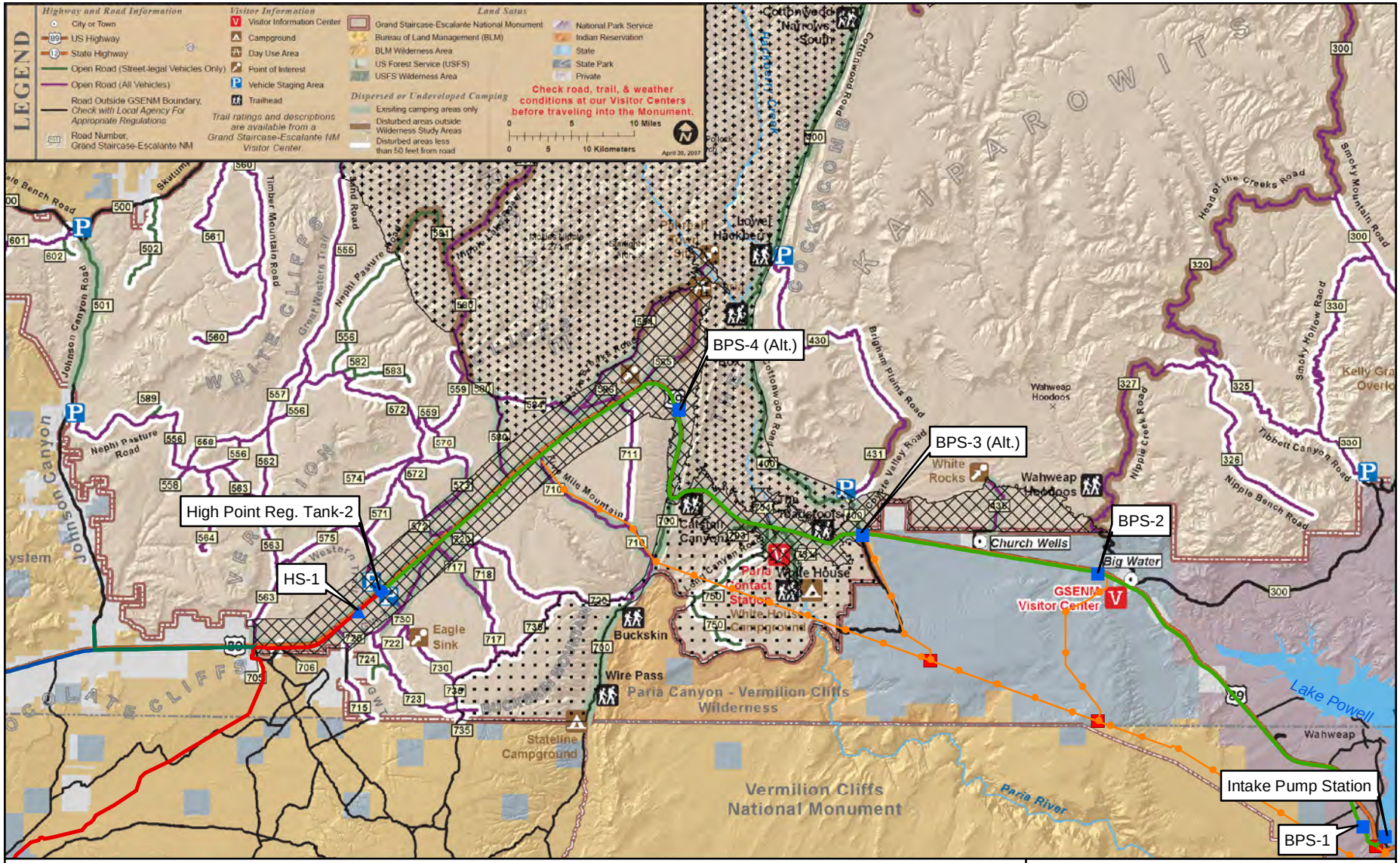
Visitor development in GSENM is limited to minor facilities, such as interpretive kiosks and pullouts located in small areas of the monument's periphery (BLM, 2000). The major BLM visitor centers are located outside of GSENM's borders, in surrounding towns. GSENM does not contain any designated wilderness areas, although about 50 percent of GSENM is wilderness study area (including the Cockscomb and Wahweap wilderness study areas, see below).

3.2.4.1 Guided Trips

For visitors preferring guided trips, GSENM has over 100 operators offering services for: auto tours, hiking, backpacking, bicycling, horseback riding, ranch recreation, hunting, fishing, and therapeutic recreation (KCOTFC, 2010.) Geology and natural history tours, photography classes, environmental education, and pack trips are also available.

3.2.4.2 Cockscomb Wilderness Study Area

The Cockscomb Wilderness Study Area (WSA), located on the north side of Highway 89 between the Cockscomb on the west and the eastern GSENM boundary (Figure 3-4), provides opportunities for primitive recreation. Visitors can explore the Paria River by foot or horseback (BLM, Undated 1). The aesthetic Cockscomb, a jagged sandstone ridge, affords visitors a challenging and scenic trek to the top, which can be accomplished by rock scrambling or by following a side canyon to the summit.



Source:
http://www.blm.gov/ut/st/en/fo/grand_staircase-escalante/visitor_information/travel_brochure__.html

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

Lake Powell Pipeline

UDWRe Figure 3-3 MWH

Grand Staircase- Escalante National Monument

Project Pump Station
Proposed Substation
Water Conveyance System
Project Transmission Lines
Highways
Streams

BLM
BLM Wilderness
State
Private
Township
Section

GSENM Boundary

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

0 0.5 1 1.5 2 Miles

N

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 3-4** MWH

The Cockscomb Wilderness Study Area

Sightseeing, cultural site investigation, photography, nature study, day hiking, outdoor art work, bird watching, and other pursuits are possible recreation endeavors within the Cockscomb WSA.

3.2.4.3 Wahweap Wilderness Study Area

The Wahweap WSA is located north of Highway 89 and east of the Cockscomb WSA (Figure 3-5). This WSA, which includes the White Rocks "Point of Interest", can be reached via Highway 89 at Church Wells (BLM, Undated 2).

3.2.4.4 Highway 89 Corridor Special Recreation Management Area

The Highway 89 corridor is a Special Recreation Management Area (SRMA) where more intense recreation management is needed because it is a focal point for visitation. The Highway 89 Corridor SRMA encompasses the highway corridor within GSENM, and includes features such as the old Pahreah Townsite, BLM Paria Contact Station, White House Campground, and Paria River Canyon (see Section 3.2.4.8). Recreation opportunities along the Highway 89 Corridor SRMA include scenic driving, day-use hiking, camping, road and mountain bicycling, scenic and interpretive viewing.

SRMAs are "well-defined land units that support a combination of natural features that make them attractive and management for interrelated recreation opportunities on a sustained basis" (BLM, 1999). In SMRAs, emphasis is placed on maintaining specific features or recreation opportunities that make the SMRA unique or particularly desirable to recreationalists and other members of the public.

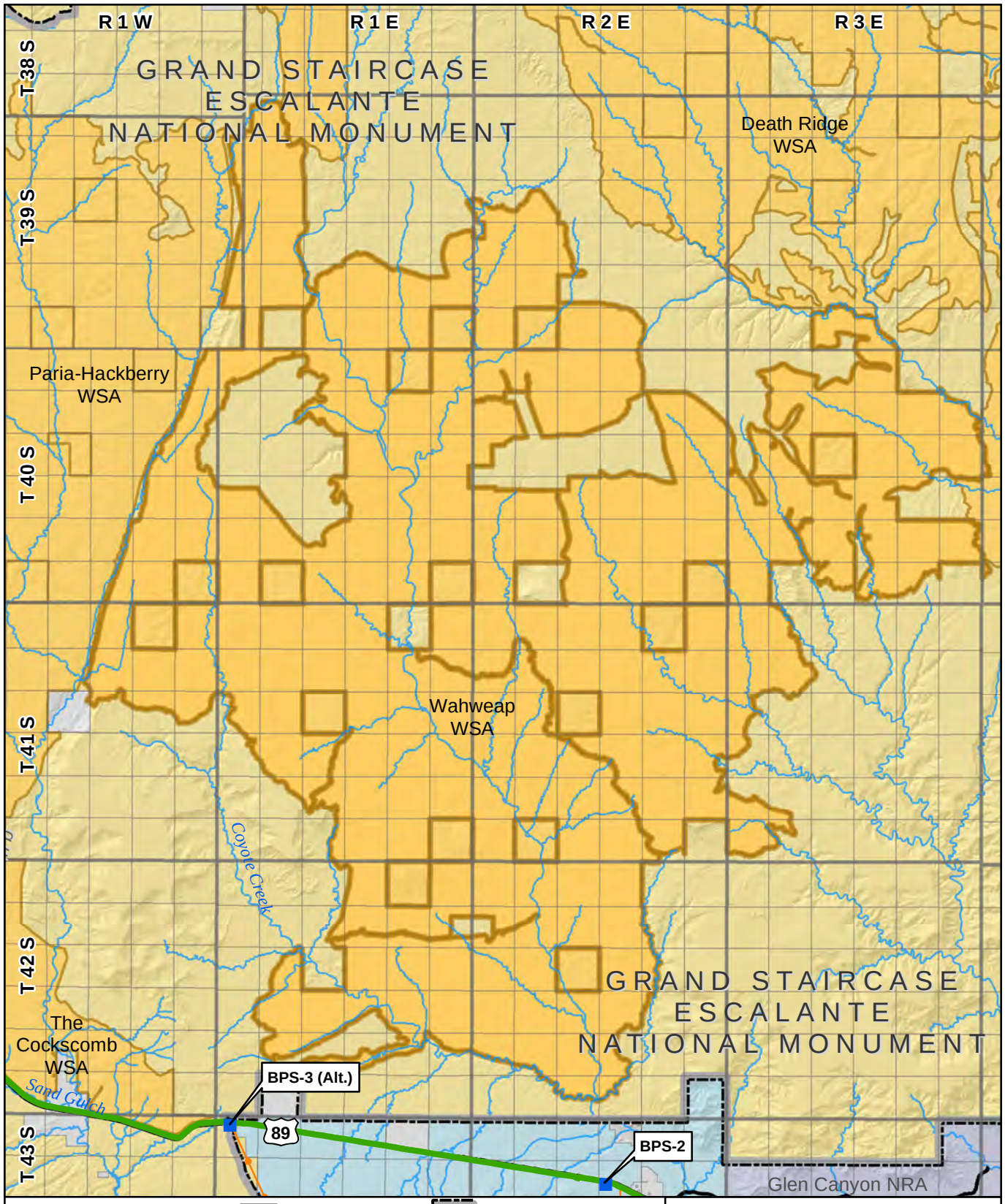
3.2.4.5 Historic Trails

The general alignments of the Old Spanish National Historic Trail and the Dominguez – Escalante Trail are believed to follow the Highway 89 corridor through GSENM.

The Old Spanish National Historic Trail links Santa Fe and Los Angeles, traveling 2,700 miles across six states (BLM, Undated 3). Designated by Congress as a National Historic Trail in 2002, it is jointly administered by BLM and NPS in partnership with other federal, state, and local government entities, as well as private landowners that manage or own lands along the trail route. Only a few remnant traces of the rugged trail remain. Although seldom used for recreational purposes, opportunities along the trail include camping, hiking, landscape photography, and wildlife viewing; many points of historical or cultural interest can be found along the trail as well. Vehicles must remain on existing roads. The trail does not currently have any visitor facilities or services.

Fathers Francisco Dominguez and Silvestre Escalante, Spanish priests, traveled on foot from Santa Fe, New Mexico, through western Colorado, to Spanish Fork, Utah, and then down through northern Arizona and back to Santa Fe in 1776. While the exact route of the Dominguez-Escalante Trail is unknown, the priests may have followed the present day Highway 89 corridor.

Additional information concerning historic trails is contained in the Final Visual Resources Study Report (UBWR 2016).



Project Pump Station
Water Conveyance System
Project Transmission Lines
Highways
Streams
Township
BLM
BLM Wilderness
National Park Service
State
Private
Section
GSENM Boundary

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 3-5** MWH

Wahweap Wilderness Study Area

3.2.4.6 Paria Canyons and Plateaus Special Recreation Management Area

The Paria Canyons and Plateaus SRMA includes lands south of the Highway 89 Corridor SRMA and east of House Rock Valley Road. Recreational activities available in the Paria Canyons and Plateaus SRMA include canyoneering, equestrian use, backpacking, hiking, hunting, and scenic touring (BLM, 2000). Access to this area is available primarily from House Rock Valley Road and the Paria Contact Station turnoff. In the 2000 GSENM Management Plan, BLM stated that this SRMA will be managed to provide continued primitive, uncrowded, and remote recreational experiences. While overall social encounters will remain comparatively low, the Paria Canyons and Plateaus SRMA will be managed to create opportunities for a range of social encounters.

3.2.4.7 GSENM Visitor Center in Big Water

GSENM Visitor Center in Big Water is located east of GSENM, on the south side of Highway 89 in the Town of Big Water (Figure 3-3). Constructed in 2002, this modern structure includes indoor and outdoor paleontology exhibits, interpretive signage, outdoor amphitheater, picnic tables, shade structures, restrooms with running water, water fountains, a bookstore, and a sizable, lighted parking lot that can accommodate RVs and includes two universally accessible parking spaces. The center is open daily. Visitor Center staff members reported receiving over 35,000 visitors in 2008. 2015 annual visitation was 36,792.

3.2.4.8 Paria Contact Station, White House Campground, and Paria River Canyon.

BLM's Paria Contact Station is located along the south side of Highway 89, west of Church Wells and east of the Cockscomb (Figure 3-3). The contact station includes a gravel entrance road and parking lot, modern restrooms, trash and recycling containers, and a water pump. Interpretive signage is also provided near the entryway. The Paria Contact Station includes directional signage to the White House Campground. Information regarding PCVCW is available at the contact center, along with hiking and overnight permits.

To access the White House Campground (Figure 3-3), visitors use the turnoff for Paria Contact Station and a two mile unpaved road. Tucked up against a rock bluff to the north, the White House Campground consists of a gravel cul-de-sac with: five walk-in tent sites; two vault toilets; picnic tables, grills and fire pits; interpretive signage; and a self-pay station. The White House Campground is open year-round. While there is no campground host, the area is patrolled. The White House Campground receives high use during the spring and throughout the fall, with some use in the summer (Stewart, 2009). BLM staff reported that 881 people used the White House Campground between October 1, 2008, and September 30, 2009 (Kiel, 2009a). 2015 annual visitation was 2,075.

3.2.4.9 Toadstools Trailhead

The Toadstools Trailhead is located on the north side of Highway 89, just east of the Paria Contact Station (Figure 3-3). The graveled trailhead provides parking for about ten vehicles and several interpretive signs. The 1.5 mile roundtrip Toadstools Trail receives heavy use. The sandy trail, which has a change in elevation gain of only 100 feet, leads hikers through colorful "hoodoos" and unusual rock formations. BLM staff reported use numbers of 5,232 for the Toadstools Trailhead between October 1, 2008, and September 30, 2009 (Kiel, 2009a). 2015 annual visitation was 15,643.

3.2.4.10 Catstair Canyon

The Catstair Canyon is located on the south side of Highway 89, at the hairpin turn just east of the Cockscomb (Figure 3-3). Sight lines for vehicles entering and exiting the trailhead are very poor. Gravel parking for a few vehicles is available and the area receives occasional visitation (Stewart, 2009).

3.2.4.11 House Rock Valley Road

House Rock Valley Road intersects with Highway 89 just west of the Cockscomb (Figure 3-3) and runs south for 30 miles until it intersects with Highway 89A in Arizona. Driving time between highways 89 and 89A is approximately two hours. When dry, this dirt and gravel road is usually passable for high clearance two-wheel-drive vehicles, but is not recommended for RVs, travel trailers, or passenger cars. Visitors from around the world use this road to access Coyote Butte (Kiel, 2009b). This road, which receives heavy use and is in fair condition, provides access to Five Mile Mountain Road (which intersects with Highway 89 west of the Paria Movie Set Road and is popular with OHVs), Buckskin Gulch Trailhead, Wire Pass Trailhead, and the Stateline Campground/Arizona National Scenic Trail Trailhead. The majority of recreational activities take place to the east (Stewart, 2009) of the road in the PCVCW and VCNM. BLM staff reported use numbers of 463 and 5,361 for the Buckskin Gulch and Wire Pass trailheads between October 1, 2008, and September 30, 2009 (Kiel, 2009a). 2015 annual visitation for the Buckskin Gulch Trailhead was 1,434.

3.2.4.12 Paria Movie Set and Pahreah Townsite

The Paria Movie Set and Pahreah Townsite historical marker is located along the north side of Highway 89 just west of the Cockscomb (Figure 3-3). An unpaved parking area allows visitors to view the historical marker and read several interpretive signs. From Highway 89 an unpaved road leads about five miles to the movie set and town site. A toilet and picnic area is located at the site. The last two to three miles of the dirt road are narrow, steep, and winding. It is passable with most normal-to-high clearance vehicles, except in wet weather. The Paria River bed in this vicinity can be experienced on foot or horseback.

The Paria Movie Set was previously located at this site as well. The original Paria Movie Set was torn down, and replaced with a replica (Stewart, 2009). The replica movie set was burned-down by vandals in 2006.

3.2.4.13 Off-Highway Vehicle Use and Hunting

To access Open/ATV roads in the southern portion of GSENM, visitors typically use Highway 89. BLM staff reported dispersed visitor use numbers of 68,086 for the Highway 89 corridor between October 1, 2008, and September 30, 2009 (Kiel, 2009a).

Several Open/ATV roads intersect with Highway 89 west of the Cockscomb. These roads, which are popular with recreational users year round and with rifle/muzzleloader deer hunters in the fall, lead north and south (to Buckskin Mountain) from Highway 89. This area is part of the Paunsaugunt hunting unit, well known for trophy-sized mule deer. Popular roads include Five Mile Mountain, 580, 721, 720, and 717.

3.2.4.14 Great Western Trail

The Great Western Trail (GWT) is to be a 4,000-mile, multiple use pathway that crosses BLM and US Forest Service lands in Arizona, Utah, Idaho, Wyoming, and Montana. Portions of the trail have been

designated, including that portion that crosses Highway 89 west of the Cockscomb near milepost 45 (Figure 3-3). Although not signed on Highway 89, the trail is signed just off the highway on both the north and south sides. Small parking areas are provided on both sides of the highway. The parking area on the north side of the highway is graveled, while that on the south side is natural surfaced. Beyond GWT signage on the south side of Highway 89, there is a gravel pullout/turn-around area with split-rail fencing and a trail sign-in station. From here the trail leads south (Road 730) to the Eagle Sink "Point of Interest". The GWT in this vicinity is mostly used by motorized vehicles, with some equestrian use (Stewart, 2009).

3.2.4.15 GSENM Visitor Center in Kanab

GSENM Visitor Center in Kanab is located on the north side of Highway 89, on the east side of Kanab (within the city limits), and several miles west of GSENM. The modern center includes ample, asphalt parking with space for cars and trailers, restrooms with running water, and signage. Indoor exhibits provide information regarding the geology, archaeology, and anthropology of GSENM. Hiking permits and overnight camping permits can be obtained at this visitor center.

Staff at the Kanab Visitor Center commented that the number of visitors received at the center annually had decreased in 2009 from previous years. Approximately 80 to 100 guests would typically visit the center each day in past years, but only 40 to 60 guests were doing so in 2009. 2015 annual visitation was 47,312. Many visitors come to the center seeking permits to the geologic feature in the PCVCW known as "The Wave."

3.2.5 BLM – Kanab Field Office

BLM's KFO manages lands located in south-central Utah (Figure 3-6). This area is bordered by: Piute and Wayne counties to the north; Washington County and Zion National Park in the west; Arizona state line (including a boundary with Kaibab-Paiute Indian Reservation) to the south; and GCNRA to the east. KFO. Approximately three percent (8,543 acres) of recreation resources study area lands are managed by KFO.

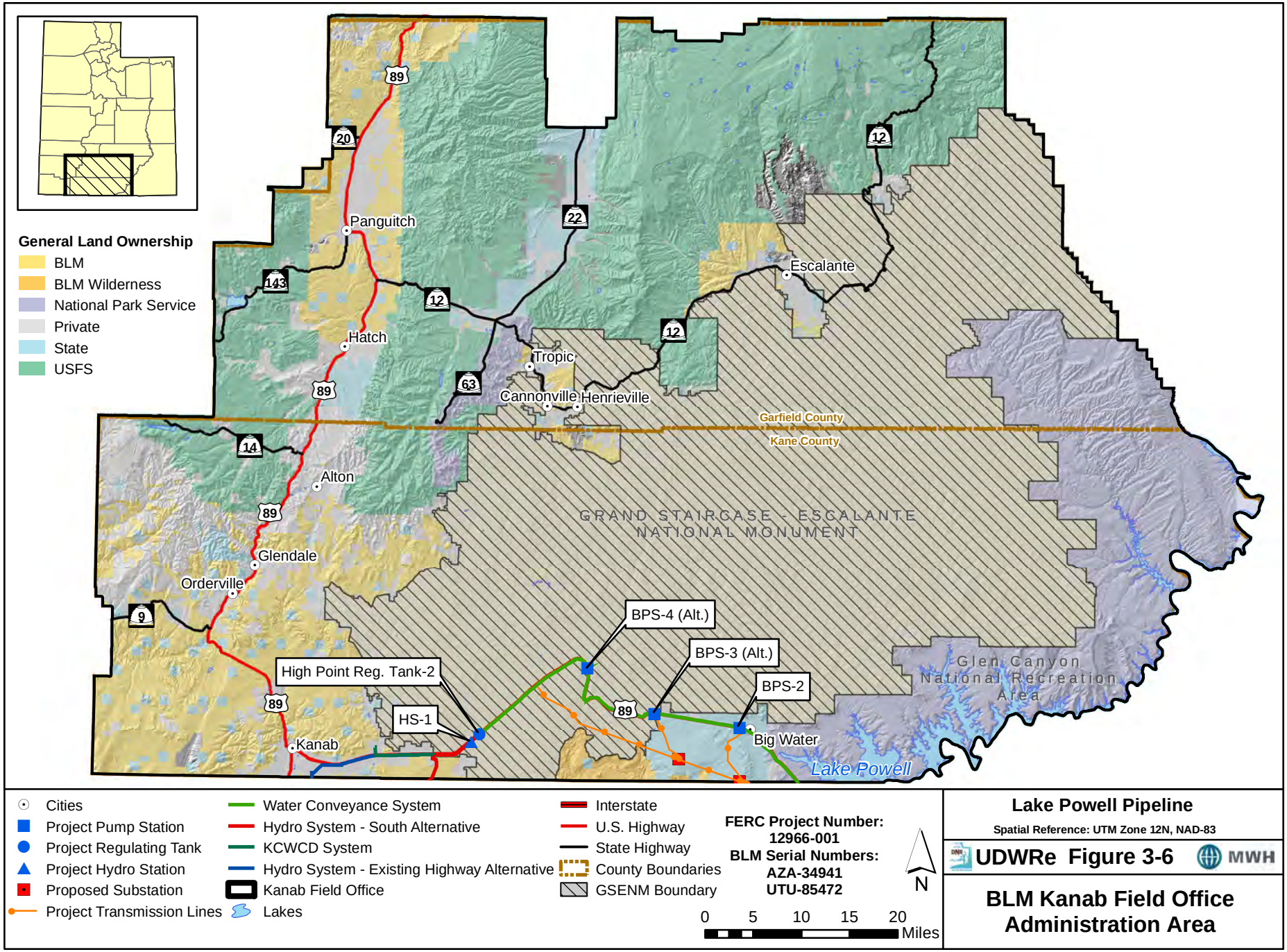
Those areas of KFO west of GSENM are used primarily by OHVs, dispersed campers, and wood cutters. Deer hunting is also popular in fall (Christensen, 2009). The general alignments of several historic trails (Honeymoon Trail, Old Spanish National Historic Trail, and Dominguez – Escalante Trail) are believed to pass through this same area.

3.2.6 BLM - Arizona Strip Field Office

BLM's ASFO encompasses roughly 1.98 million acres of land between the VCNM to the east and the Grand Canyon-Parashant National Monument to the west (Figure 3-7). The ASFO also borders GCNRA, GSENM, and KFO. The ASFO is located in both Coconino and Mohave Counties, Arizona, with: 1,679,896 acres of BLM lands, 170,165 acres of Arizona State Trust lands, and 130,962 acres of private lands. The communities of Fredonia and Colorado City, Arizona, are located on enclaves of private lands within ASFO, with the communities of St. George, Big Water, Hurricane, Hildale, and Kanab, Utah, directly across the state line. Since ASFO includes several communities within the Planning Area that are linked via US 89A, Arizona 389, and Interstate 15, together with large portions of the area being easily accessible via a number of unpaved county roads, it receives a fair amount of recreational use (BLM, 2008c). Approximately 25 percent (81,240 acres) of the recreation resources study area is managed by ASFO.

The ASFO attracts visitors interested in wildlife hunting and viewing opportunities. The region has long been known for its trophy-size mule deer, as well as populations of pronghorn, coyotes, quail, dove,

rabbits, waterfowl, and the seldom seen mountain lion. Bighorn sheep are also seen in portions of the ASFO. In contrast, many of the public lands in the region are near to and thus readily accessible from communities, making community interface lands extremely important for day-use recreation and organized group activities (BLM, 2008c).


General Land Ownership
BLM
BLM Wilderness
National Park Service
Private
State
USFS
Panguitch
Hatch
Alton
Glendale
Orderville
Kanab
Escalante
Tropic
Cannonville
Henrieville
Garfield County
Kane County
GRAND STAIRCASE - ESCALANTE NATIONAL MONUMENT
Glen Canyon National Recreation Area
Lake Powell
Big Water
BPS-4 (Alt.)
BPS-3 (Alt.)
BPS-2
High Point Reg. Tank-2
HS-1
89
20
22
12
143
14
63
9
Cities
Project Pump Station
Project Regulating Tank
Project Hydro Station
Proposed Substation
Project Transmission Lines
Water Conveyance System
Hydro System - South Alternative
KCWCD System
Hydro System - Existing Highway Alternative
Kanab Field Office
Lakes
Interstate
U.S. Highway
State Highway
County Boundaries
GSENM Boundary
FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472
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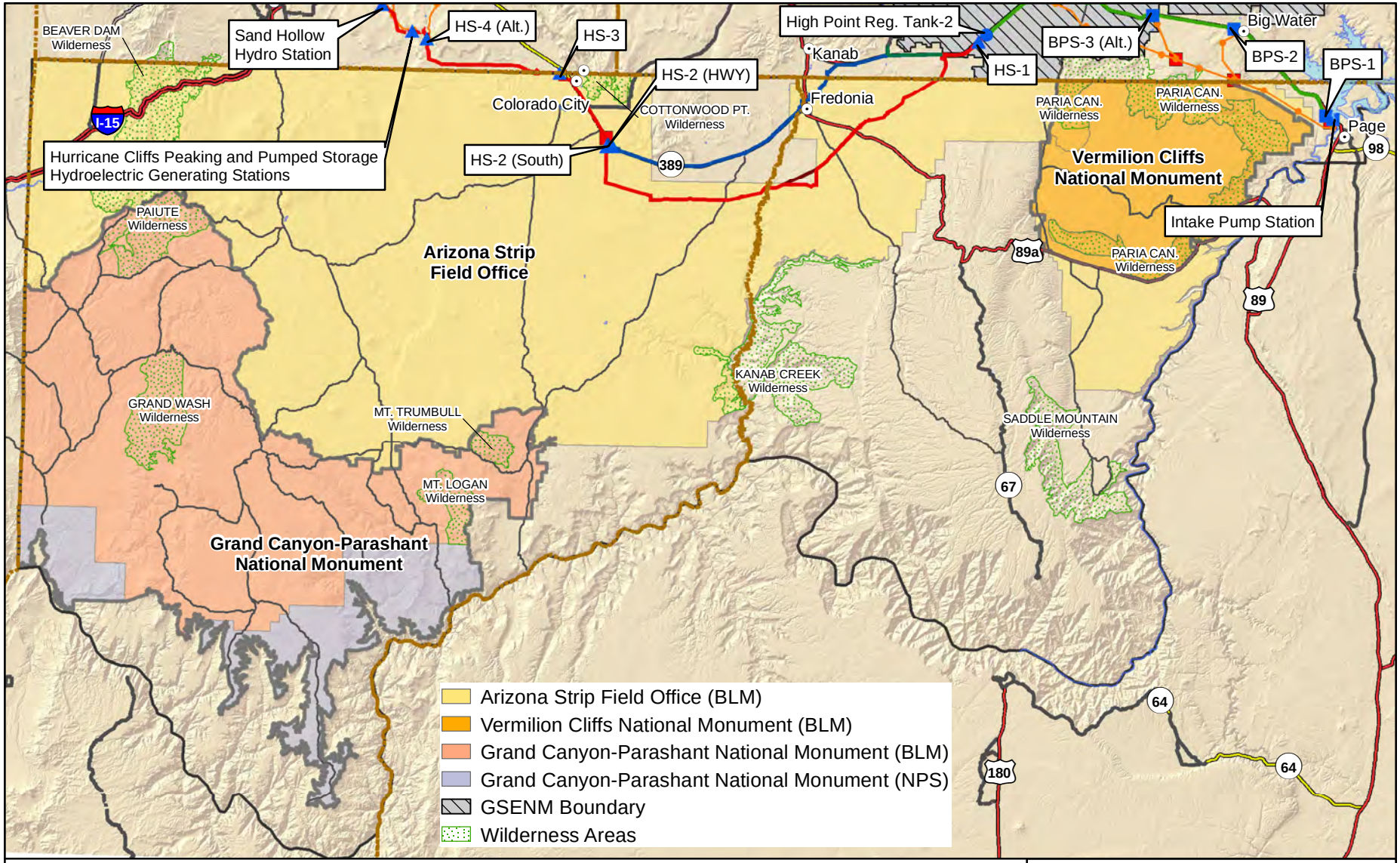
Lake Powell Pipeline
Spatial Reference: UTM Zone 12N, NAD-83
UDWRe Figure 3-6
MWH
BLM Kanab Field Office Administration Area



Cities
Lakes
County Boundaries
Kanab Field Office
Monument Boundary
Proposed Substation
Project Transmission Lines

Interstate
US Highway
ST Highway
Hwy
Major Road
Minor Road

Water Conveyance System
Hydro System - South Alternative
Hydro System - Southeast Corner Alternative
KCWCD System
Hydro System - Existing Highway Alternative
Project Pump Station

Project Regulating Tank
Project Hydro Station

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

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Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe Figure 3-7 MWH

BLM Arizona Strip Field Office Administration Area

Probably the most popular activities in the region involve some form of OHV driving for pleasure. Exploring or sightseeing constitutes the activity of choice for many visitors and can involve various modes of transportation, such as sports-utility vehicle, equestrian, small aircraft, walking, OHV, hiking, motorcycle, bicycle, sedan, or motor home. Other popular activities include visiting cultural sites, bird watching, viewing wildflowers, camping, hiking, backpacking, climbing, and seasonal whitewater boating. Flying radio-controlled aircraft, rock crawling, parasailing, and geocaching are also growing in popularity.

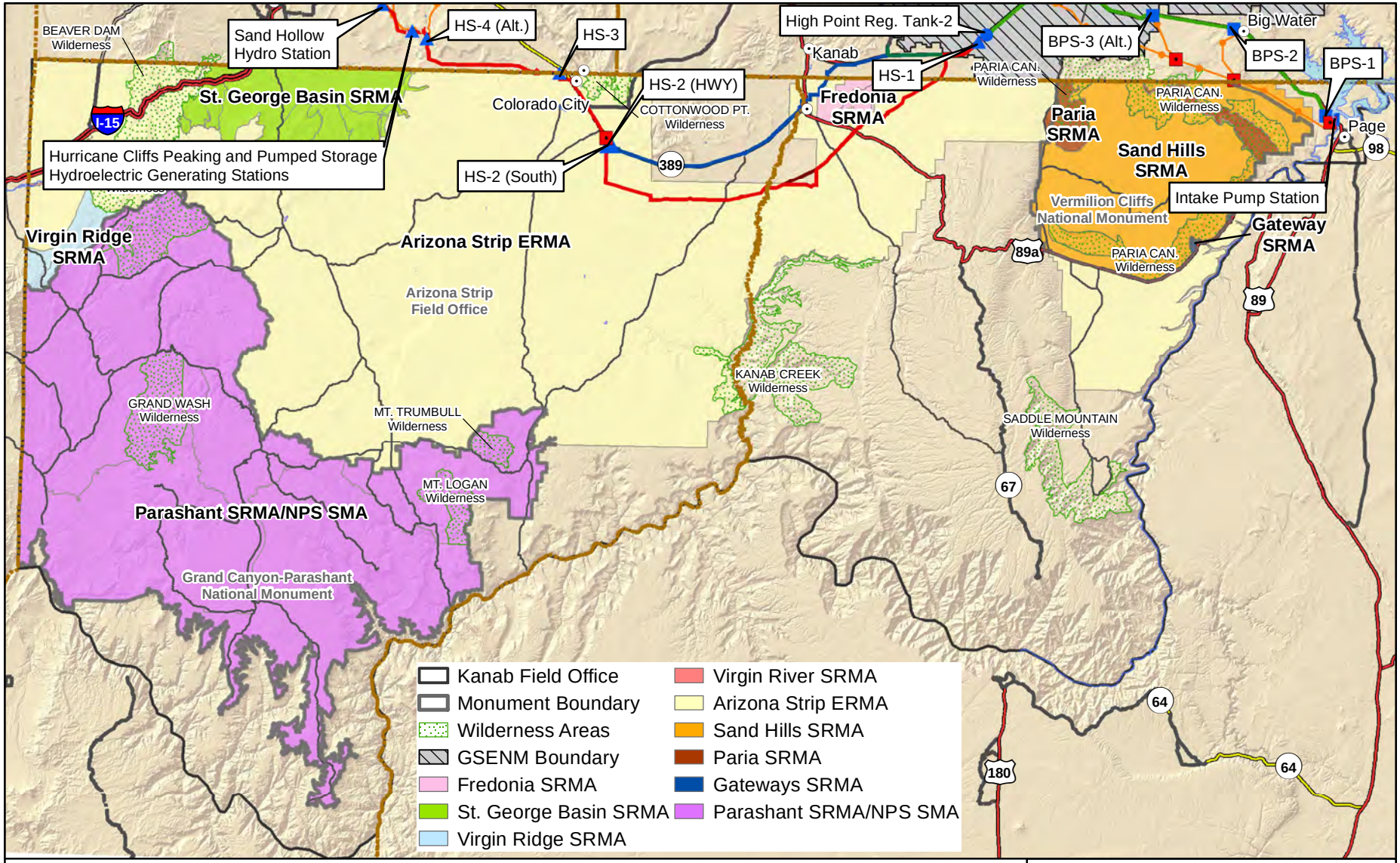
The majority of lands in ASFO are essentially a transition between the two extremes of urban and wilderness settings. These transitional lands offer a moderate to high degree of challenge and risk for visitors seeking outdoor adventures of many sorts. Opportunities for the public to enjoy a wide variety of motorized, mechanized, and non-motorized recreation activities are very good because of the ample supply of unpaved roads, primitive roads, trails, and a handful of backcountry airstrips. These lands contain a mix of trailheads (ranging from well-developed with facilities to backcountry airstrips), information/safety signs, and rudimentary recreation facilities that provide modest, setting-appropriate convenience for visitors. The near-urban public lands tend to be subjected to the greatest variety of simultaneous visitor use in the most confined space. While challenge and risk are typically not as important as in more remote settings, these lands can be important for competitive and challenge events. Many of the primary routes provide de facto "backcountry byway" opportunities, as no official backcountry byway designations exist.

Stateline Campground is a small campground located 9.3 miles south of Highway 89, along the House Rock Valley Road. It is one mile south of the Wire Pass Trailhead. Facilities at this campground include both drive-in and walk-in campsites (7 total), restrooms, picnic tables, and fire pits. There is no water and no trash pick-up, and no fee to camp. The Arizona Scenic Trail can be access from the Stateline Campground.

3.2.6.1 Sand Hills Special Recreation Management Area and Uplands Recreation Management Zone

The BLM - ASFO has identified several SRMAs within the recreation resources study area. These areas have a distinct primary recreation-tourism market (the targeted visitors and where they come from), as well as a corresponding and distinguishing recreation management strategy. Within each SRMA, one or more potential Recreation Management Zones (RMZs) were identified, with each zone providing a particular recreation niche within the larger targeted recreation-tourism market strategy.

The Sand Hills SRMA and Uplands RMZ are located at the east end of the recreation resources study area. These areas, which overlap with VCNM, are adjacent to GCNRA. Approximately 8,500 acres of the Sand Hills SRMA and Uplands RMZ are managed by ASFO (Figures 3-8 and 3-9).



Cities
Lakes
County Boundaries
Proposed Substation
Project Pump Station
Project Regulating Tank
Project Hydro Station
Water Conveyance System
Hydro System - South Alternative
Hydro System - Southeast Corner Alternative
KCWCD System
Hydro System - Existing Highway Alternative
Project Transmission Lines
Interstate
US Highway
ST Highway
Hwy
Major Road
Minor Road

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

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Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

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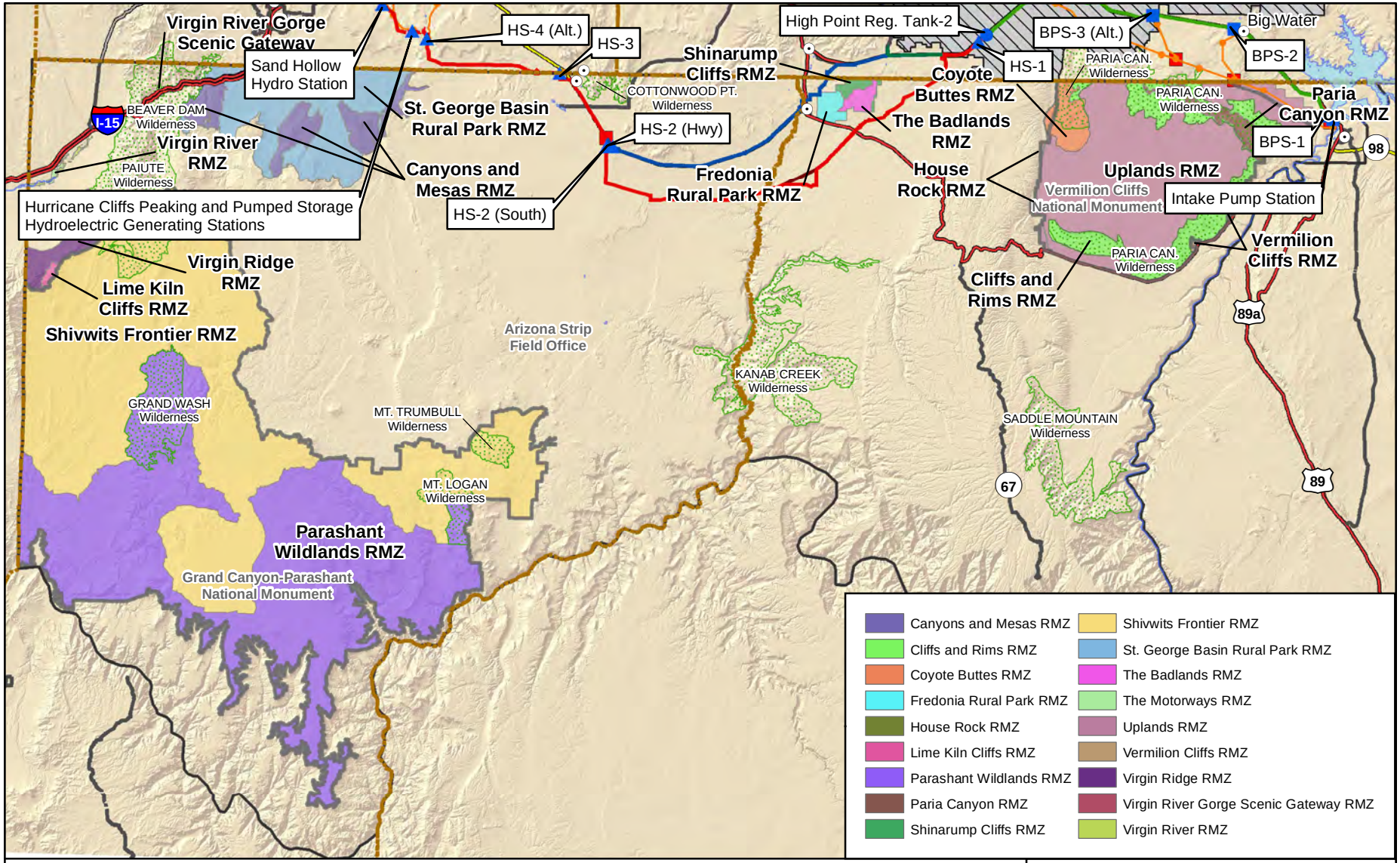
Sand Hills and Fredonia SRMAs


Virgin River Gorge Scenic Gateway
Sand Hollow Hydro Station
HS-4 (Alt.)
HS-3
High Point Reg. Tank-2
BPS-3 (Alt.)
Big Water
BPS-2
HS-1
Shinarump Cliffs RMZ
Coyote Buttes RMZ
PARIA CAN. Wilderness
PARIA CAN. Wilderness
Paria Canyon RMZ
BEAVER DAM Wilderness
I-15
COTTONWOOD PT. Wilderness
St. George Basin Rural Park RMZ
HS-2 (Hwy)
The Badlands RMZ
BPS-1
98
Virgin River RMZ
PAIUTE Wilderness
Canyons and Mesas RMZ
Fredonia Rural Park RMZ
House Rock RMZ
Uplands RMZ
Vermilion Cliffs National Monument
Intake Pump Station
HS-2 (South)
Hurricane Cliffs Peaking and Pumped Storage Hydroelectric Generating Stations
Vermilion Cliffs RMZ
PARIA CAN. Wilderness
Virgin Ridge RMZ
Cliffs and Rims RMZ
Lime Kiln Cliffs RMZ
89a
Shivwits Frontier RMZ
Arizona Strip Field Office
KANAB CREEK Wilderness
GRAND WASH Wilderness
MT. TRUMBULL Wilderness
SADDLE MOUNTAIN Wilderness
67
89
MT. LOGAN Wilderness
Parashant Wildlands RMZ
Grand Canyon-Parashant National Monument
Canyons and Mesas RMZ
Cliffs and Rims RMZ
Coyote Buttes RMZ
Fredonia Rural Park RMZ
House Rock RMZ
Lime Kiln Cliffs RMZ
Parashant Wildlands RMZ
Paria Canyon RMZ
Shinarump Cliffs RMZ
Shivwits Frontier RMZ
St. George Basin Rural Park RMZ
The Badlands RMZ
The Motorways RMZ
Uplands RMZ
Vermilion Cliffs RMZ
Virgin Ridge RMZ
Virgin River Gorge Scenic Gateway RMZ
Virgin River RMZ
Cities
Lakes
County Boundaries
Kanab Field Office
Monument Boundary
GSENM Boundary
Wilderness Areas
Project Pump Station
Project Regulating Tank
Project Hydro Station
Proposed Substation
Project Transmission Lines
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ST Highway
Hwy
Major Road
Water Conveyance System
Hydro System - South Alternative
KCWCD System
Hydro System - Southeast Corner Alternative
Hydro System - Existing Highway Alternative
FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472
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Lake Powell Pipeline
Spatial Reference: UTM Zone 12N, NAD-83
UDWRe Figure 3-9
MWH
Uplands, Shinarump Cliffs, Badlands, and Fredonia Rural Park RMZs

3.2.6.2 Fredonia Special Recreation Management Area and Associated Recreation Management Zones

The Fredonia SRMA (14,969 acres), Shinarump Cliffs RMZ (3,965 acres), Badlands RMZ (5,151 acres), and Fredonia Rural Park RMZ (5,853 acres) are located east of the Town of Fredonia (Figures 3-8 and 3-9).

The primary strategy for the Fredonia SRMA is to target a demonstrated community recreation-tourism market demand from primarily local communities (dependent on public lands recreation and/or related tourism use, growth, and/or development), as well as some regional visitors, for motorized/mechanized/non-mechanized exploring, managed target shooting, fitness activities, sightseeing, equestrian, hiking, competitive and organized events, viewing and appreciating natural landscapes and cultural sites. This demand is supported by the area's distinctive landscape and its close proximity to the communities of Fredonia, Arizona, and Kanab, Utah; local recreation-tourism visitors value these public lands as their own 'back-yard' recreation settings (BLM, 2008c).

The Badlands RMZ is managed for self-directed, primitive, adventure, challenge, exploration in a natural setting close to town. The Shinarump Cliffs RMZ is managed for close-to-home, self-directed motorized/mechanized adventure for scenic, natural, and historic appreciation. The Fredonia Rural Park RMZ is managed for quick, easy access from town to sustainable day-use adventure, challenge, exercise, social, and outdoor recreation (BLM, 2008c).

3.2.6.3 Cottonwood Point Wilderness

Cottonwood Point Wilderness is part of the impressive Navajo Sandstone plateau overlooking the Arizona Strip to the south. The 1,000-foot high, multicolored Vermilion Cliffs, wooded canyons, craggy pinnacles, and alcoves dominate the landscape and are visible from scenic Highway 389. The wilderness is contiguous to the southern end of BLM's Canaan Mountain Wilderness in Utah (BLM-SGFO, see Section 3.2.9). The wilderness is adjacent to the small communities of Colorado City, Arizona, and Hildale, Utah, and the rural settlement of Cane Beds. Urban sights and sounds are readily noticeable from much of the wilderness. The exterior wilderness boundary encompasses various parcels of private lands, primarily around the southern periphery of Lyon Point.

3.2.6.4 Fredonia Welcome Center

Located on Highway 89A, north of its intersection with Highway 389, is the Fredonia Welcome Center. This development, which is in good condition, includes a lighted parking lot with 20 parking spaces, four trailer spaces, four shaded picnic tables, restrooms, interpretive signage, a pet exercise area, an outdoor exhibit including a historic log cabin (built circa 1930), and a shop.

3.2.6.5 Historic Trails

The general alignments of several historic trails (Honeymoon Trail, Old Spanish National Historic Trail, and Dominguez – Escalante Trail) are believed to pass through the ASFO portion of the recreation resources study area. Additionally, portions of GWT are located in this area.

Honeymoon Trail (BLM - ASFO and SGFO) is located between St. George, Utah, and Lee's Ferry, Arizona. This historic wagon route was used for several years by young married couples from Arizona seeking a "temple" marriage in what was the only Mormon temple west of the Mississippi River, hence its interesting name. The trail is 138 miles one-way, with elevations ranging from 3,000 feet to 5,000 feet

mean sea level (MSL). Permitted uses on the trail include hiking, equestrian use, and some vehicle use. The trail can be used in any season, as long as it is dry. BLM categorizes Honeymoon Trail as easy-to-moderate, and notes that, while much of the trail is still visible, it is only sporadically marked (BLM, 2002).

3.2.6.6 Fredonia – Vermilion Cliffs Scenic Drive

Fredonia is a western point of departure for the Highway 89 and Highway 89A loop (BLM, 2009), which has been designated "Scenic" by the Arizona Department of Public Transportation. The best time for traveling on the road is between May and October (BLM, 2009). The road may not be passable in winter months. This loop proceeds east on Highway 89A from Fredonia through wide landscapes of rolling sage plains that slowly rise to the approach of the Kaibab Plateau, or west to the Kaibab Monocline. The loop circles the massive Paria Plateau and northern Kaibab Plateau Uplift. The loop continues through the Kaibab Plateau, Marble Canyon, Glen Canyon, and the Cockscomb.

Additional information concerning scenic roads is contained in the Final Visual Resources Study Report (UBWR 2016).

3.2.6.7 Arizona Strip Pull-Off

The Arizona Strip Pull-off is located on the west side of Highway 389 near milepost 9. The graveled pull-off is capable of accommodating about 20 cars, and includes interpretive signage on the Vermilion Cliffs and Honeymoon Trail.

3.2.7 Kaibab – Paiute Indian Reservation

The Kaibab-Paiute Indian Reservation encompasses more than 120,000 acres of plateau and desert grassland in northern Arizona, just southwest of Fredonia. Highway 389, which has been designated "Scenic", bisects the Reservation. Pipe Spring National Monument (PSNM, described below) is adjacent to Highway 389 and surrounded by Kaibab-Paiute Indian Reservation. The Kaibab Band of Paiute Indians offers interpretive programs and leads tours of ancient rock art sites. Kaibab band members work as seasonal rangers and help tell the Pipe Spring story from the Paiute point of view. Seasonal hunting and fishing is available to the general public by permit. Public travel on Kaibab-Paiute Indian Reservation is limited to the existing county roads (Rouch, Moccasin, and Mt. Trumball/Toroweap). Travel elsewhere requires a permit and/or guide services. Approximately 10 percent (33,561 acres) of the recreation resources study area lies on Kaibab-Paiute Indian Reservation.

The Kaibab Band of Paiute Indians tribal headquarters is located along the north side of Highway 389, adjacent to PSNM.

3.2.7.1 Kaibab-Paiute Tribe Campground and RV Park

The Kaibab-Paiute Tribe Campground and RV Park is located off of Highway 389, on Moccasin Road in the Pipe Spring National Monument. The 47-unit campground is open from April through October. Operated on a first-come-first serve basis, the campground includes amenities such as: potable water, vault restrooms, showers, grills, picnic tables, and fire rings. No utility hook-ups or waste disposal is available, and ATV use is prohibited. The Kaibab-Paiute Tribe Campground and RV Park charges user fees.

3.2.7.2 Trails

The general alignments of the Old Spanish National Historic Trail and the Honeymoon Trail are believed to pass through Kaibab-Paiute Indian Reservation.

Visitors to Kaibab-Paiute Indian Reservation can hike the Heart (or Mu'uputs) Canyon Trail for a fee, using a guide arranged in advance. This trail is located several miles north of Highway 389.

3.2.8 Pipe Spring National Monument

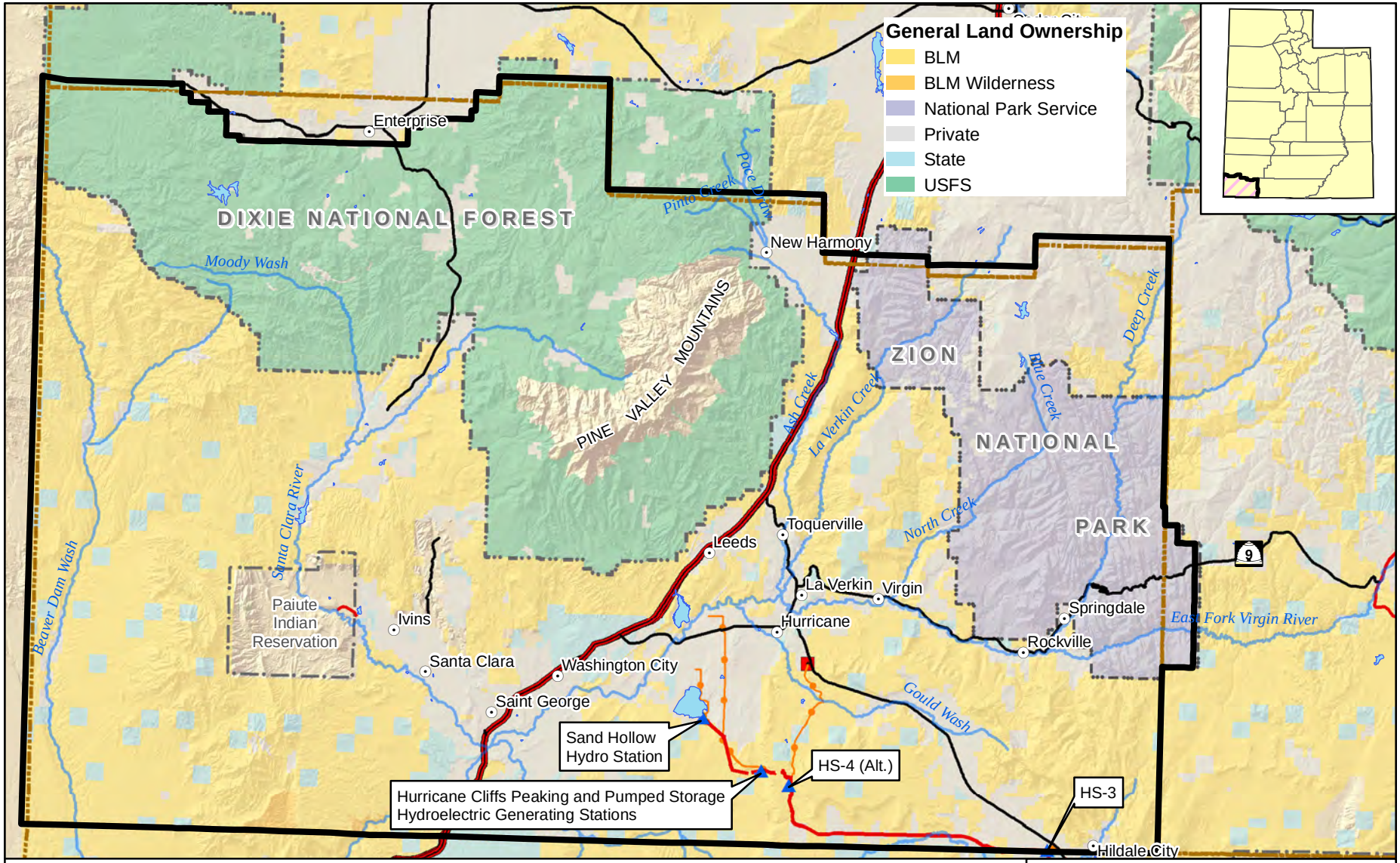
Surrounded by Kaibab-Paiute Indian Reservation and located just north of Arizona Highway 389, PSNM is a historic Mormon settlement that is part of the National Park system. Designated as a national monument since 1923, Pipe Spring commemorates western pioneer settlement and American Indian-pioneer interactions on the frontier. Living history in the monument depicts how an early Mormon settlement looked and worked in the 1800s. The view from the monument is an important part of its historic character, because it provides an appreciation of the settlement's isolation and of the commanding position provided by its location. Approximately 40 acres of the recreation resources study area is on land administered and managed by the Pipe Spring National Monument.

PSNM is a day-use park that includes a visitor center, bookstore, museum, ranch building and grounds (including corrals, an orchard, a seasonal garden, and cabins), the Winsor Castle fort, and a one-half mile loop known as Ridge Trail. The ranch and buildings are open daily and tours are offered at the historic fort every 30 minutes. In the summer, rangers also give 'living history' demonstrations (KCOTFC, 2010). Scenic views of the Arizona Strip can be observed along the Ridge Trail. Approximately 55,000 people visit PSNM annually.

3.2.9 BLM – St. George Field Office

The 629,000 acres of public lands administered by the BLM's SGFO lie almost entirely within Washington County, Utah (Figure 3-10). Situated in the southwestern corner of Utah, the area lies astride the transition between three major physiographic provinces including the Colorado Plateau, the Great Basin, and the Mojave Desert. This unique blend of geologic landforms creates a wealth of varying landscapes, open vistas, and spectacular scenery that is recognized in national and international sectors. Interstate 15 provides the primary north-south access through SGFO. Utah highways 9 and 59, which have been designated "Scenic", provide the primary east-west access. Zion National Park and the Pine Valley Mountains of the Dixie National Forest define the eastern and northern boundaries of SGFO. To the west lie the desert valleys and mountains of Nevada, while the broad, undeveloped expanses and rugged topography of the Arizona Strip lie immediately to the south (BLM, 1999). Approximately 12 percent (38,746 acres) of the recreation resources study area is managed by the SGFO.

In its 1999 *St. George Field Office Record of Decision and Resource Management Plan*, the BLM stated that its objective for recreation management was to "…provide an array of quality recreation experiences



Cities
BLM St. George Field Office
Lakes & Reservoirs
Major Rivers & Streams
County Boundaries
Proposed Substation
Project Transmission Lines
Interstate
U.S. Highway
State Highway
National Parks
Dixie National Forest
Indian Reservation
Project Pump Station
Project Regulating Tank
Project Hydro Station
Water Conveyance System
Hydro System - South Alternative
Hydro System - Southeast Corner Alternative
Hydro System - Existing Highway Alternative
KCWCD System

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 2.5 5 7.5 10 Miles

Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe Figure 3-10 MWH

BLM St. George Field Office Administration Area

within the agency's capability logical recreation niche to meet the reasonable needs and expectations of local residents and visitors from outside the area" (BLM, 1999). In its plan, the BLM also asserted that public lands in Washington County would generally remain open (excepts as otherwise prescribed) to most forms of outdoor recreation including, but not limited to: hiking, touring, camping, hunting, picnicking, sightseeing, rock hounding, mountain biking, equestrian use, swimming, fishing, rafting/kayaking, rock climbing, target shooting, and various forms of motorized recreation.

Traffic counter data collected by the BLM in 2010 showed that 10,931 vehicles used the 2800 Road South that leads into the Warner Valley from Hurricane. Roads and trails in this area are used for motorcycle, ATV, mountain bike, and equestrian events. These events include the Cholla Challenge mountain bike race and the Color Country Endurance Ride (equestrian).

3.2.9.1 Off-Highway Vehicle Use

Statewide OHV issues within Utah are addressed in a comprehensive fashion by the Utah Division of State Parks (UDSP) through the OHV Advisory Council. The approximately 629,000 acres of public land within the administrative boundary of SGFO are designated as "open to OHV use", "open for OHV use on existing or designated roads/trails", or "closed to OHV use". Approximately 13 percent (80,668 acres) of these lands are open to OHV use; approximately 65 percent (412,329 acres), are open for OHV use on existing or designated roads/trails; and approximately 22 percent (135,775 acres) are closed to OHV use.

OHV use on public lands in Washington County is, in large part, limited to use of existing roads and trails. OHV use in several special management areas and watersheds is limited to designated roads and trails. The Sand Mountain SRMA (see Section 3.2.9.2) is open to OHV use without limitation. Portions of the Red Cliffs National Conservation Area (RCNCA, see Section 3.2.9.3) are closed to OHV use.

3.2.9.2 Sand Mountain Special Recreation Management Area

The Sand Mountain SRMA encompasses 20,709 acres of public land just to the south and east of St. George, Utah (Figure 3-11). The SRMA is south of the towns of Washington and Hurricane, and immediately adjacent to Sand Hollow State Park (see Section 3.2.10). Primary recreation activities in the Sand Mountain SRMA include: OHV riding, competitive events (such as the OHV Rhino Rally and horseback endurance rides in Warner Valley), horseback riding, scenic driving and viewing, visiting historic and paleontological sites, natural history education, semi-private recreation, undeveloped camping, picnicking, guided tours, and recreation instruction. The area provides open riding opportunities on the dunes, and miles of technical trails suitable for full-size 4x4s. Views from atop Sand Mountain include downtown St. George, the Hurricane Cliffs, the Arizona Strip, the Pine Valley Mountains, and the RCNCA. Approximately 1.5 percent of the Sand Mountain SRMA (5,057 acres) lies within the recreation resources study area.

The SGFO considers the 20,000-acre, Sand Mountain Open OHV area to be the most important piece of recreation real estate in Southwest Utah. This area is an economic driver that hosts major motorized events and races. More importantly, it provides a play area for OHV's in a densely populated area that contains many sensitive plant and animal species. Having the OHV area in place helps protect habitat for those sensitive species.

The Sand Mountain SRMA is both a local and regional destination (Kiel, 2009b). Sand Mountain dunes are patrolled for the BLM by Utah State Park law enforcement staff. The area attracts people in early spring and late fall. BLM staff reported use numbers of 5,237 and 19,214 for dispersed use areas and active use areas of the Sand Mountain SRMA, respectively, between October 1, 2008, and September 30, 2009 (Kiel, 2009a).

There are three ways to access Sand Mountain. The first is through Sand Hollow State Park. After paying the park entrance fee, users can drive their ATVs through a tunnel (beneath the park access road) on the west side of Sand Hollow Reservoir and be on dunes in minutes. The second access is through the town of Washington, Utah, via Interstate 15, Telegraph Road, and Washington Dam Road. Access to the Sand Mountain SRMA from the Washington Dam Trailhead is free. The third access is through the Town of Hurricane, Utah, via 700 West Road, 2060 Road South, and Warner Valley Road. Access to the SRMA from the Warner Valley Road trailhead is also free. There is no published trail and facilities map of the Sand Mountain SMRA.

3.2.9.3 Red Cliffs National Conservation Area

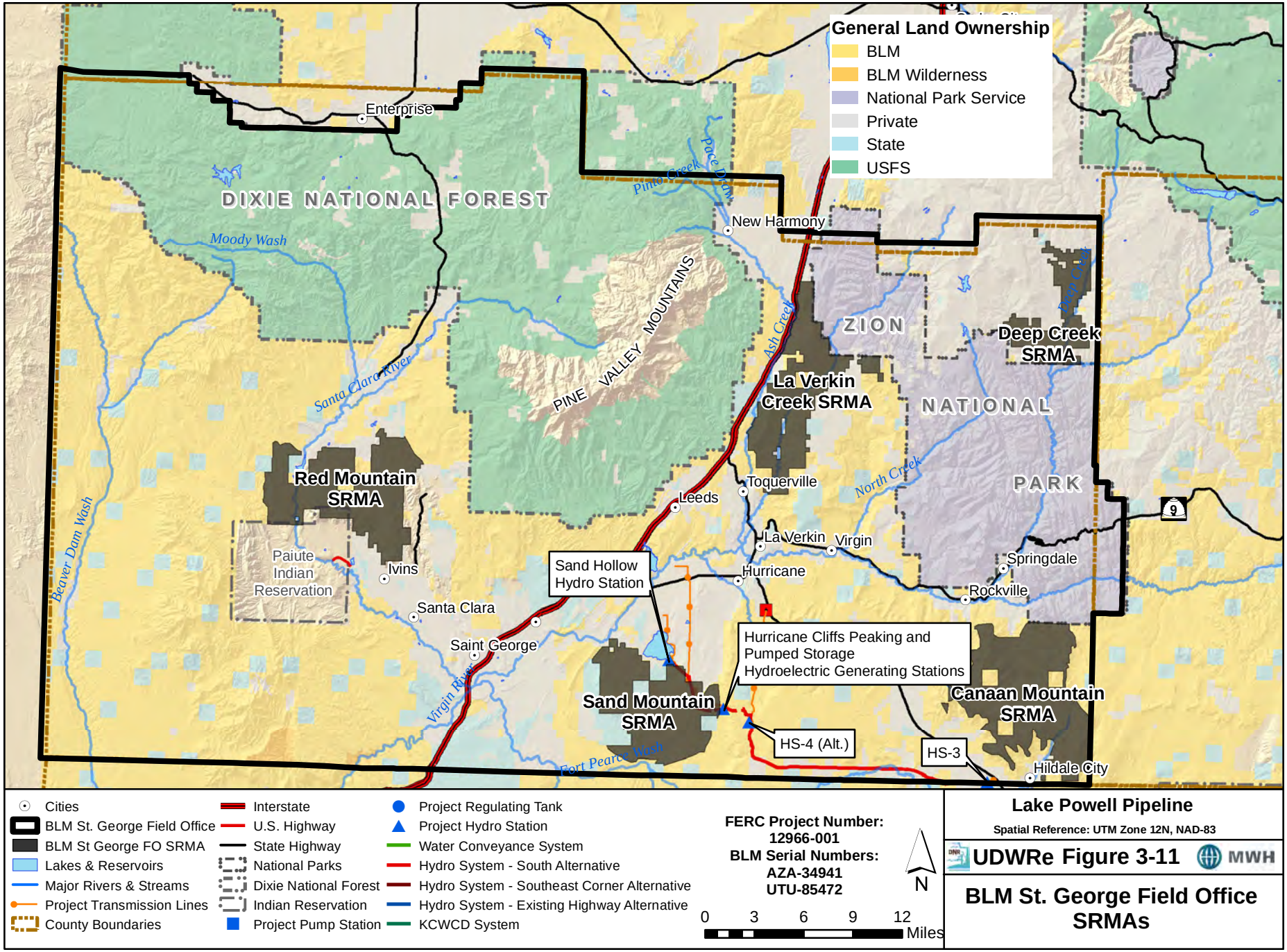
RCNCA is in central Washington County. Funding was obligated through the American Recovery and Reinvestment Act of 2009 to construct two new trailheads (White Reef and Red Mountain) that provide fenced parking areas, interpretive kiosks, vault toilets, and other visitor amenities. Both were completed in fiscal year 2010. The White Reef trailhead provides access to a newly designated approximately 6 mile long non-motorized trail system that provide connections to other trails in RCNCA. ARRA funding was also used in 2010 to repave/reconstruct the 3 mile paved access road to the Red Cliffs Recreation Site.

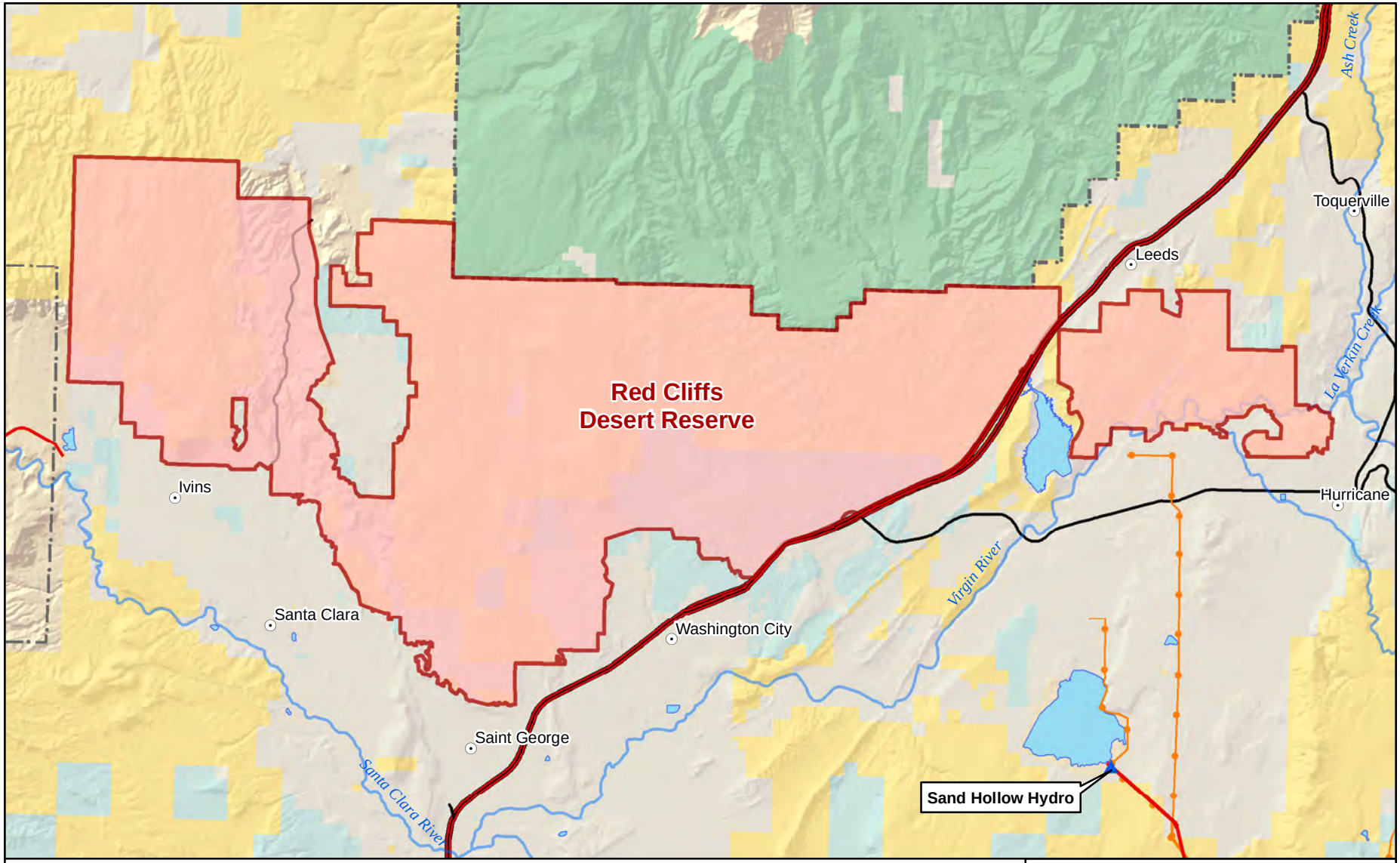
Set aside for the protection of desert tortoises and other rare and sensitive plants and animals, RCNCA includes 62,000 acres of scenic wildlife reserve. The area is located both east and west of Interstate 15, between the Town of Leeds on the north and Quail Creek State Park on the south (Figure 3-12). Approximately 0.2 percent (808 acres) of RCNCA lies within the recreation resources study area. The RCNCA is a popular recreation area as it is immediately adjacent to several growing communities, and provides a scenic red rock backdrop. Recreational opportunities in the reserve include mountain biking, hiking, horseback riding, wildlife viewing, geologic viewing, dispersed camping, and rock climbing. Within the recreation study area portion of RCNCA are portions of the Virgin River Trail, Arch Trail, West Cinder Knoll Trail, and East Cinder Knoll Trail (Figure 3-13).

3.2.9.4 Hurricane Cliffs Non-Motorized Trail System

The Hurricane Cliffs Non-Motorized Trail System is located east of RCNCA and south of Utah Highway 9 (Figure 3-14). The primary access to the trail system is from Utah Highway 59. The trail system traverses 23 miles of the Mojave Desert and is bordered by Gooseberry Mesa to the east, the Virgin River to the north, and Hurricane Cliffs to the west (BLM, Undated 4). This trail system affords visitors spectacular views of the surrounding geographic features. At an elevation of 4,000 feet above MSL, scenes include the face of Hurricane Mesa, the spires of Zion National Park, and chasms of the Virgin River and its tributaries.

The Hurricane Cliffs Trail System includes ten trails: Jem, Chinatown Wash, Rim, Canal, Gould's Rim, and Gould's, More Cowbell, Dead Ringer, Cryptobionic, and Goosebumps. Only non-motorized users are permitted on the trail system. Equestrians are limited to the Chinatown Wash and the Rim Trail, between the Chinatown Wash and the Virgin Dam Trailhead. The Canal Trail, a route that consists of a 1904 historic water canal, is open to hikers only. All trails are managed by the BLM, except the Canal Trail which is managed by the Hurricane City Historical Preservation Association. All trail intersections are signed, and some "reassurance" signs can be found along the trails. Dispersed camping is allowed, but campers are asked to use only those sites where previous camping use is evident. Campfires are permitted, but are generally discouraged. There is no trash collection in the area.


General Land Ownership
BLM
BLM Wilderness
National Park Service
Private
State
USFS
DIXIE NATIONAL FOREST
Enterprise
Moody Wash
Pinto Creek
Pace Dam
New Harmony
PINE VALLEY MOUNTAINS
Ash Creek
ZION
NATIONAL
PARK
Deep Creek SRMA
La Verkin Creek SRMA
Santa Clara River
Red Mountain SRMA
Beaver Dam Wash
Paiute Indian Reservation
Ivins
Santa Clara
Saint George
Virgin River
Leeds
Toquerville
North Creek
La Verkin
Virgin
Hurricane
Springdale
Rockville
9
Sand Hollow Hydro Station
Hurricane Cliffs Peaking and Pumped Storage Hydroelectric Generating Stations
Sand Mountain SRMA
Canaan Mountain SRMA
HS-4 (Alt.)
HS-3
Fort Pearce Wash
Hildale City
Cities
BLM St. George Field Office
BLM St George FO SRMA
Lakes & Reservoirs
Major Rivers & Streams
Project Transmission Lines
County Boundaries
Interstate
U.S. Highway
State Highway
National Parks
Dixie National Forest
Indian Reservation
Project Pump Station
Project Regulating Tank
Project Hydro Station
Water Conveyance System
Hydro System - South Alternative
Hydro System - Southeast Corner Alternative
Hydro System - Existing Highway Alternative
KCWCD System
FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472
N
0 3 6 9 12 Miles
Lake Powell Pipeline
Spatial Reference: UTM Zone 12N, NAD-83
UDWRe Figure 3-11
MWH
BLM St. George Field Office SRMAs



Cities
Red Cliffs Desert Reserve
Project Hydro Station
Hydro System - South Alternative
Project Transmission Lines
Lakes & Reservoirs
Major Rivers & Streams
Interstate
U.S. Highway
State Highway
County Boundaries
National Parks
Dixie National Forest
Indian Reservation
BLM
BLM Wilderness
National Park Service
Private
State
USFS

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 1 2 3 4 Miles

Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe Figure 3-12 MWH

Red Cliffs Desert Reserve

The Hurricane Cliffs Trail System is the home of three major off-road races every fall (mid-October to early November). The "25 and 6 Hours of Frog Hollow" are mountain bike races that attract large numbers of participants. The "Hurricane JEM" is a trail marathon that utilizes this trail system.

3.2.9.5 Frog Hollow Off-Highway Vehicle Area

The "Frog Hollow" OHV area is located south of the Goulds Rim and Goulds trails (see Section 3.2.9.4). Primary access to this area, which is very popular with mountain bikers and slow OHV users (Kiel, 2009b), is from Utah Highway 59 near Hurricane.

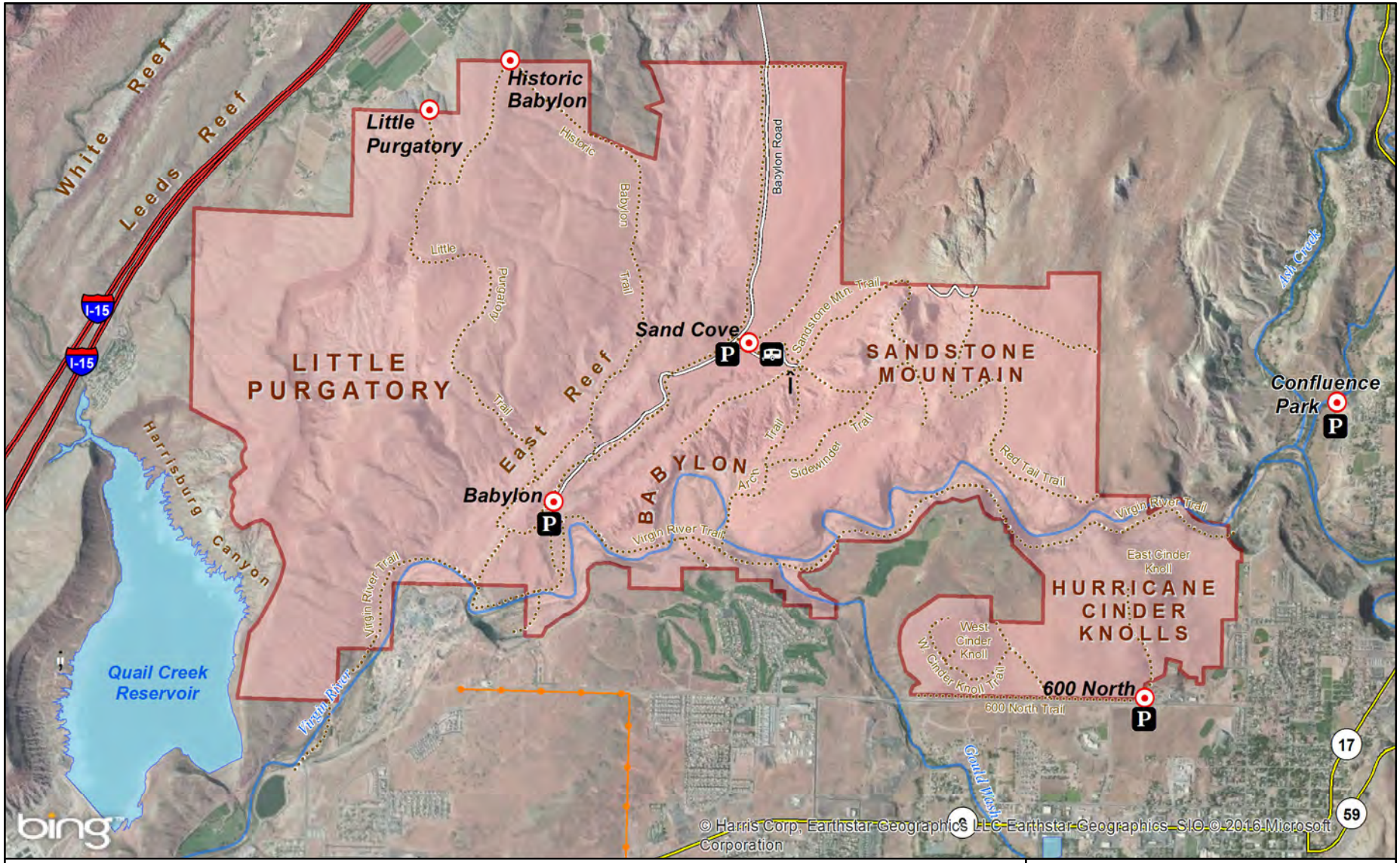
3.2.10 Sand Hollow State Park

Located about 10 miles east of St. George and about 5 miles southwest of Hurricane, the Sand Hollow Reservoir and surrounding lands have been designated one of Utah's newest state parks. Warm water fishing and boating opportunities are found here. Patrons also engage in OHV use on the Sand Mountain dunes, as well as RV and tent camping. This 20,000 acre park resides mostly on BLM land, and is one of the most visited destinations in the Utah State Park System (USP, 2009). Approximately 0.4 percent (1,315 acres) of Sand Hollow State Park lies within the recreation resources study area.

The park (Figure 3-15) includes an entry station and large parking lot next to the Sand Hollow Reservoir, along with a modern comfort station. The parking lot and comfort station are well-signed and well-lit, with ample trash facilities. A permit is required for watercraft launches and OHV access to the south and east sides of the reservoir. Sand Mountain is accessible by a tunnel located south of an OHV staging area.

Overnight camping facilities are available for a fee. The Westside Campground offers full hookups (water, sewer, and electric), barbeques, fire pits, tables, and cabanas (UTI, 2009a). "Sandpit" is the new OHV accessible campground located along the south shore of the reservoir. The 30-site campground includes six sites with water and electrical hookups and five large group sites. Restrooms and showers are provided. Primitive camping is available along the east and south shores of the reservoir. Up to eight people are allowed per vehicle, per site (UTI, 2009a). Picnic tables and pit toilets are available, but this area is largely undeveloped.

Sand Hollow State Park received between 183,000 and 300,000 visitors annually (UDSP 2010). Sand Hollow State Park was used by 351,339 visitors in 2015. The park is popular with local residents. Most visitation occurs from March through October with peak months being May through August.



Cities
Trail
Road
Lakes & Reservoirs
Major Rivers & Streams
Red Cliffs Desert Reserve
Interstate
US Highway
ST Highway
Hwy
Major Road
Project Transmission Lines
Recreation Point
Parking
Trailer Parking
Camping
Primitive Camping

FERC Project Number: 12966-001
BLM Serial Numbers: AZA-34941 UTU-85472

N

0 0.25 0.5 0.75 1 Miles

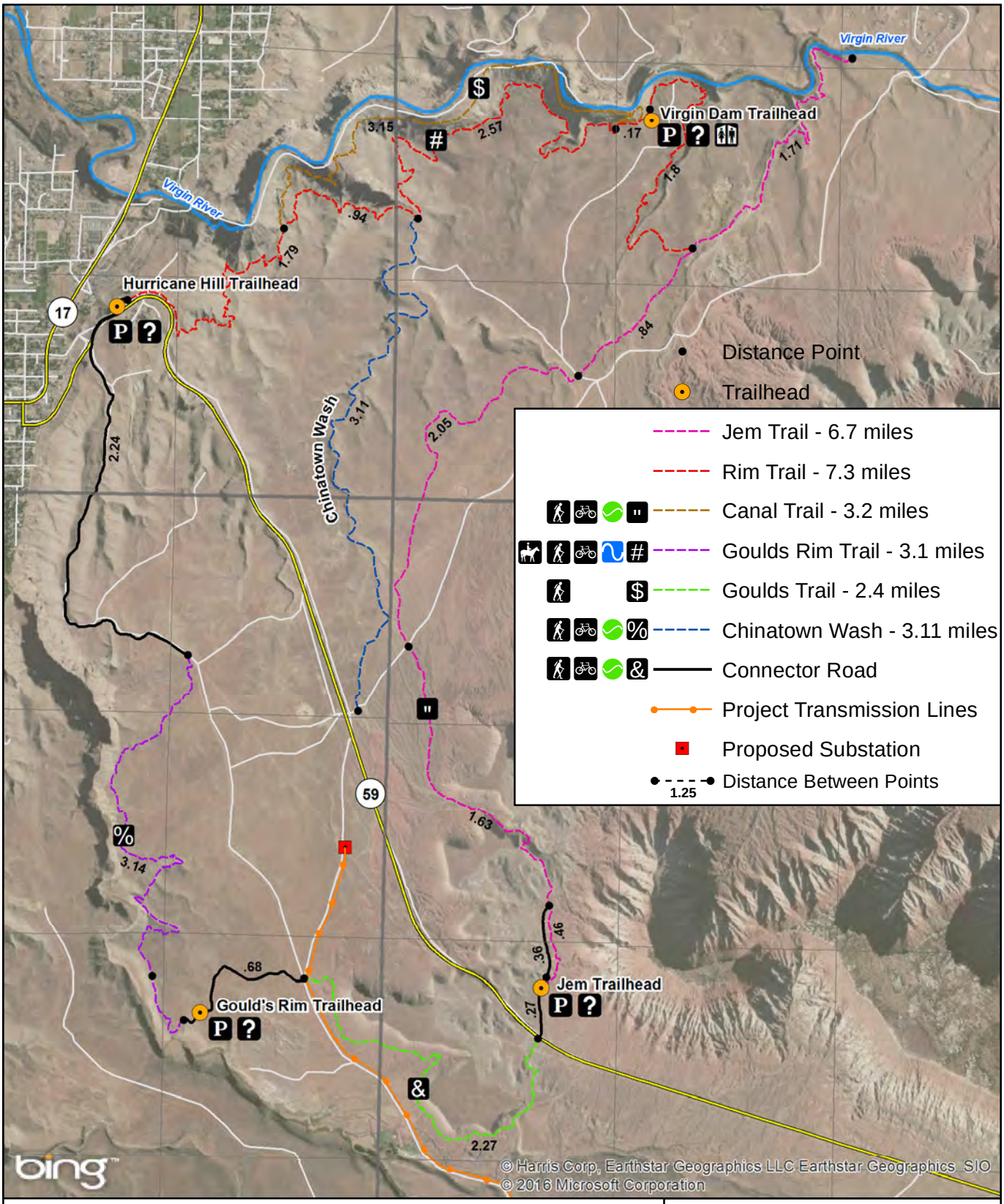
Lake Powell Pipeline

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe Figure 3-13

MWH

Red Cliffs Desert Reserve Recreation



ST Highway
Roads
Streams
Project Transmission Lines
Proposed Substation
Township
Section

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

N

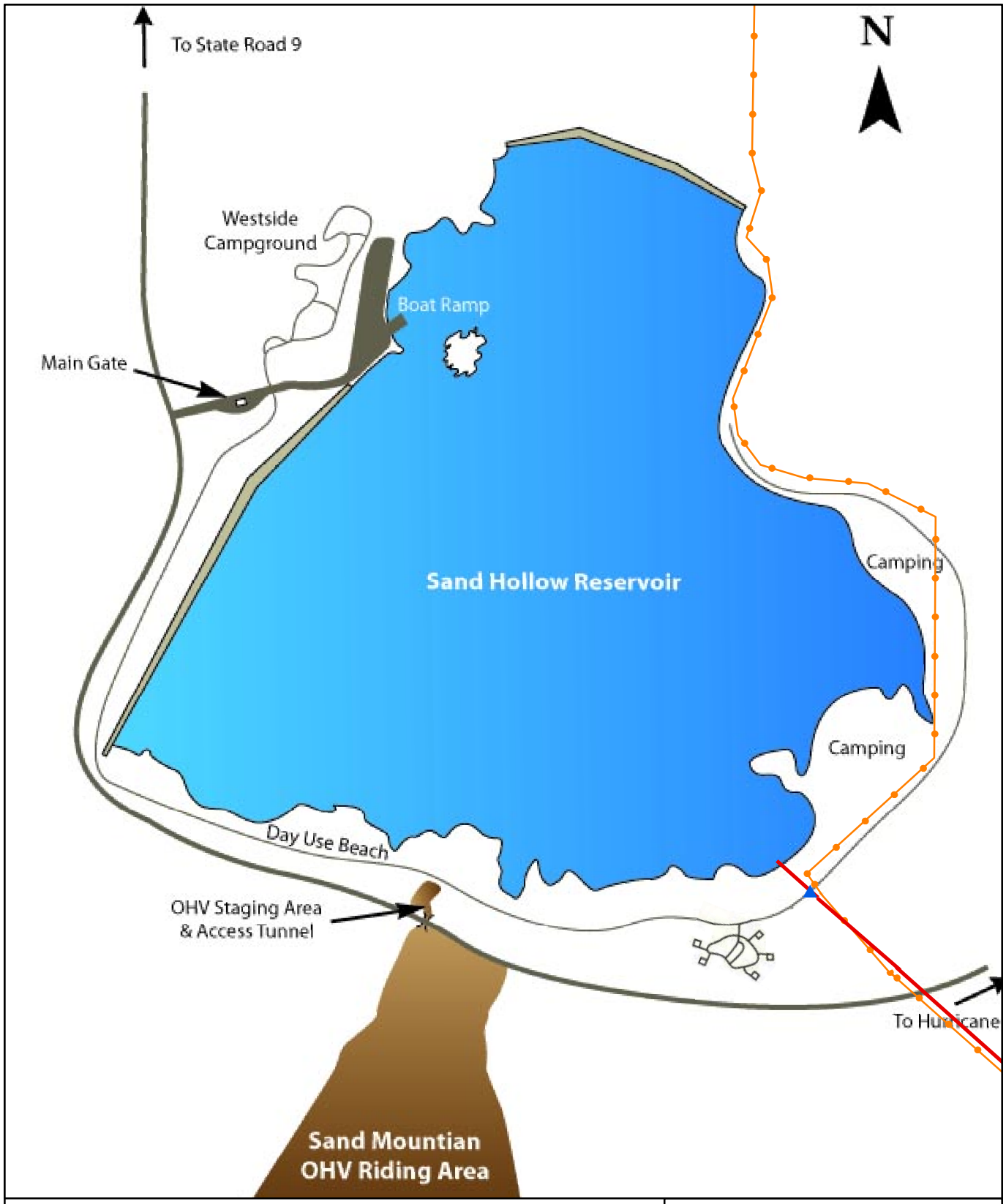
0 0.25 0.5 0.75 1 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 3-14** MWH

Hurricane Cliffs
Non-Motorized Trail System



Project Hydro Station

Hydro System - South Alternative

Project Transmission Lines

FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472

Source:
http://mappery.com/map-of/Sand-Hollow-State-Park-Map

N

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWRe **Figure 3-15** MWH

Sand Hollow State Park

3.2.11 Private Recreational Facilities

Several privately owned and operated recreational facilities are located in and around the recreation resources study area. These facilities are described in the following sections.

3.2.11.1 Amangiri Resort Spa and Villas at Lake Powell

The upscale, 600-acre Amangiri Resort Spa and Villas are located about a mile south of Highway 89 in Canyon Point, Utah, about three miles from the Arizona border. The resort, which opened in October 2009, is a 25 minute drive from Page, Arizona. Visitors to the resort enjoy scenic views of GSENM. Architecturally, the resort has been designed to blend into the landscape with natural hues, materials, and textures. Features at the resort include: pavilion, living room, gallery, library, dining room, private dining room, cellar, spa and beauty salon, fitness center, pool, and 34 suites (Amangiri, 2009).

3.2.11.2 Paria Outpost Resort and Paria Canyon Adventure Ranch

The Paria Outpost Resort is located just south of Highway 89 and less than a mile west of the BLM's Paria Contact Station (see Section 3.2.4.8). The resort offers rustic, yet comfortable bed and breakfast accommodations, a restaurant, RV camping in the resort parking lot, and tent camping (Paria Outpost, 2009). Guide and shuttle services are also available. On-site recreational activities include horseback riding, a climbing wall, wading fountain, outdoor volleyball area, and horseshoes.

Adjacent to the Paria Outpost Resort is the Paria Canyon Adventure Ranch. Facilities at the ranch include tent and RV camping, a 14-bed hostel, private cabin, horse stable, restaurant, shower house, laundry, and dance hall (Paria Campground 2016).

3.2.11.3 Olympus Academy

The Olympus Academy (site formerly was Diamond Ranch Academy) is located on 200 acres near Hurricane, Utah. The academy is reached by turning south from Utah Highway 59 (milepost 19) and traveling south on Antelope/Branham Ranch Road for approximately two miles. This road also serves those using BLM SGFO's Hurricane Cliffs trail system and the Frog Hollow OHV area (see Section 3.2.9.5). Founded in 2014, the Olympus Academy is a youth residential treatment center for troubled teenagers. Students are enrolled year-round. Recreational facilities at the ranch include fishing ponds, a fitness center, and equine facilities (Olympus Academy, 2016).

3.2.11.4 Willowind RV Park

The Willowind RV Park is located on Utah Highway 9, just west of Hurricane, Utah. Open year-round, the 173-site RV Park includes the following amenities for a fee: dumping facilities, flush toilets, full hook-ups, hot and cold running water, restrooms, a clubhouse/library, laundry facilities, picnic tables, cable television and television hook-ups, group sites, phones and phone hook-ups, and tent sites (Willowind RV Park, 2016).

3.2.11.5 Sand Hollow Resort

Located less than one mile west of Sand Hollow State Park's main entrance is the Sand Hollow Resort. The resort features 27 holes of gold on two courses, golf practice facilities, a clubhouse, and accommodations (for permanent, seasonal, or overnight purchase/rental) (Sand Hollow Resort 2014).

3.3 Identified Recreation Needs

Recreation needs identified for the areas and facilities described in Section 3.2 are listed in this section, as are recreation trends and needs identified for those portions of Arizona and Utah that lie within the recreation resources study area. While the LPP project is not generally expected to contribute to meeting the needs identified below, these and other needs would be considered as appropriate and agreed to in consultation with resources agencies during detailed LPP Project design and construction.

3.3.1 Arizona State Comprehensive Outdoor Recreation Plan

Pursuant to the 1964 Land and Water Conservation Fund Act, Arizona prepared an update to its Statewide Comprehensive Outdoor Recreation Plan (SCORP) in 2008. The purpose of the 2008 SCORP (Arizona State Parks (ASP), 2007) was to encourage greater recreation opportunities for the public. Arizona's SCORP provides, among other information, county profiles detailing existing and needed outdoor recreation opportunities. Relevant information regarding the State, Coconino County, and Mohave County is discussed in Sections 3.3.1.1 through 3.3.1.3.

Arizona prepared another update to its SCORP in 2013 (ASP, 2013). This update summarized the current outdoor recreation situation and trends. It provided decision makers and outdoor recreation managers with an analysis of issues facing Arizona and suggested strategies to address these issues. Top priority issues were: secure stable funding; improve collaborative planning and partnerships; and, respond to the needs of special populations and changing demographics.

3.3.1.1 State of Arizona

The 2000 US Census reported that Arizona had a population of less than 5 million. Conservative estimates place the Arizona population at 7.7 million by 2025, and at 11 million by 2050. As the Arizona population grows, so will the number of people participating in outdoor recreation activities. The anticipated population growth in the state will include an increase in the elderly population from 13.3 percent in 1995, to an estimated 21.3 percent in 2025. This elderly population increase may influence the demand in Arizona for different types of outdoor recreation.

Arizona outdoor recreation trends identified in the 2008 SCORP include the following:

- Visitation trends indicate parks, campgrounds, other recreation areas that used to have plenty of room for weekend visitors are now filling up by Thursday or Friday mornings.
- People are frequently choosing weekend destination points that are more than two hours away from home.
- More people are using sport utility vehicles and OHVs to access back country areas.
- Previously remote areas are now experiencing crowding or overuse.
- While there are still considerable open spaces and public lands in Arizona today, urban sprawl is rapidly reducing the amount of open space around cities and cutting off access to trails, roads, and public lands close to the cities.
- Rural areas are also experiencing substantial growth/development, reducing or eliminating access to public lands, recreational trials, and roads.

- Without adequate funding and local, regional, and statewide planning for the increasing demands for outdoor recreation opportunities, Arizona will find itself unable to meet demands for outdoor recreation opportunities.

In 2011 Arizona's population reached 6.4 million people. The rate of population growth slowed during the recession that began in 2009. As of 2011, Arizona was the eighth fastest growing state in the US (ASP, 2013).

3.3.1.2 Coconino County

The 2008 Arizona SCORP included a survey of Coconino County residents. In the survey, approximately 74 percent of Coconino households stated they had visited a park or recreation area an average of 8.9 times within the last 3 months; with a population of 116,320 (based on the 2000 US Census), this equates to 766,083 visits. According to the survey, 40 percent of county residents believe nature-oriented parks should be a priority when determining the allocation of funding, followed by open space areas (31 percent), neighborhood parks (16 percent), and multi-use parks (13 percent). With regards to prioritizing park projects, 48 percent of Coconino County residents believe existing facilities should be repaired, 32 percent would like to see new parks created, and 20 percent want new facilities developed. When asked about major problems parks and recreation areas face, the top issue reported by Coconino County residents was "too much litter", followed by "not enough funding", "too crowded", "not well maintained", and "no problems."

3.3.1.3 Mohave County

The 2008 Arizona SCORP included a survey of Mojave County residents. This survey indicates that approximately 66 percent of Mojave County households stated they had visited a park or recreation area an average of 7.2 times within the last 3 months; with a population of 155,032 (based on the 2000 US Census), this equates to 736,712 visits. According to the survey, 40 percent of county residents believe nature-oriented parks should be a priority when determining the allocation of funding, followed by neighborhood parks (23 percent), open space (23 percent), and multi-use parks (14 percent). With regards to prioritizing park projects, 49 percent of Mojave County residents believe existing facilities should be repaired, 30 percent would like to see new parks created, and 21 percent want new facilities developed. When asked about major problems parks and recreation, the top issue reported by Mohave County residents was "not well maintained", followed by "no problems", "too much litter areas face", "not enough parks", and lastly, "not enough funding."

3.3.2 Utah State Comprehensive Outdoor Recreation Plan

In the 2003 Utah SCORP (Utah Division of State Parks (UDSP), 2003), it was reported that the perceived need for and use of urban and wild land trails has significantly increased since 1993. The SCORP stated that Utah residents were greatly concerned about ensuring public access to public lands, and wanted to know more about their lands. Additional concerns identified in the Utah SCORP include: the need to renovate and repair local parks in rural areas; a desire to expand parks, trails, and recreation centers in urban areas; and issues involving the significant costs associated with operating and maintaining urban facilities compared to rural facilities.

The 2003 Utah SCORP included a survey of state districts. A common theme throughout all districts involved the need for more water-related projects and linear-shaped open spaces, including recreational corridors (e.g., trails, bikeways, and OHV routes), riparian corridors, riverways, stream and canyon protection, canyon access, corridors between subdivisions/town, and wildlife corridors. More funding for open spaces was also identified as a need. Officials in local areas reported that they would like to see

more local control in the decision process, and greater focus on projects that address local concerns. Outdoor recreation priorities identified for the St. George Planning District in the 2003 Utah SCORP include:

- Regulate boating on busy waters for good/safe experience.
- Designate areas for OHVs.
- Need more trails that go places or connect-including horse trails.
- Protect river corridors.
- Develop areas for displaced federal land/national park users (overflow)-camp, day use, OHVs.
- Improve existing parks and services.

The 2014 Utah SCORP (UDSP 2013) included the following conclusions regarding recreation demands, needs, and issues for the Five County Planning Area (which includes Washington and Kane counties):

- Popular activities were picnicking, hiking or backpacking, and walking for pleasure or exercise. Other popular activities included camping, swimming, and fishing. Among the Utah districts, the Five County District had the highest proportion of participants in rock climbing or rappelling.
- The greatest needs based on percentages of respondents reporting high importance but low satisfaction with availability were for OHV trails, swimming pools, and camping areas. Survey respondents expressed relatively high satisfaction with facility availability within the district. When asked about the top two needs for recreation facilities, respondents in the Five County District most commonly indicated parks and pools.
- In the municipal survey, officials indicated that ball fields and courts were the highest priority for new facility needs as well as other facility renovation needs. Estimated costs for top priority facilities reported by 18 responding municipalities totaled $6.6 million.

3.3.3 Glen Canyon National Recreation Area

No recreation needs relevant to the LPP project or hydropower system have been identified during review of existing GCNRA documents or during discussions with GCNRA personnel.

3.3.4 Vermilion Cliffs National Monument and Paria Canyon – Vermilion Cliffs Wilderness

No recreation needs relevant to the LPP project or hydropower system were identified during review of BLM planning documents or during discussions with BLM staff.

3.3.5 Grand Staircase-Escalante National Monument

The 1999 GSENM Management Plan states that BLM and Utah Department of Transportation will explore the possibility of developing bicycle lanes or parallel bicycle routes along Utah Highway 89. Furthermore, additional recreational opportunities may be developed to accommodate all visitors, and focus on learning about geology, history, archaeology, biology, paleontology, and scenic viewing. Short interpretive trails and scenic overlooks will be developed as well. According the 1999 Management Plan, BLM will look for appropriate opportunities to highlight GSENM resources along Highway 89, around the communities of Church Wells and Big Water.

3.3.6 BLM – Kanab Field Office and BLM – Arizona Strip Field Office

The ASFO Resources Management Plan states that in the Fredonia SRMA and its associated RMZs "the BLM will produce close-to-town opportunities for community residents and seasonal, regional visitors to enjoy directed day-use adventure activities in scenic landscapes along structured travel routes and open space areas associated with Woodhill Road…" Other BLM recreation actions in ASFO include, "to the extent practicable, the 'natural' or 'remote' settings in Specialized and Primitive Travel Management Areas will be restored and/or maintained…" Also, the Old Spanish National Historic Trail resources will be identified, recorded, and protected on federal land. Significant trail segments, corridors, and associated sites should be identified, protected, and interpreted for public use. Viewsheds, as observed from any of these areas (trail segments, trail corridors, or associated sites), will be maintained.

3.3.7 Kaibab – Paiute Indian Reservation and Pipe Springs National Monument

No recreation needs relevant to the LPP project or hydropower system were identified during project planning or consultation.

3.3.8 BLM – St. George Field Office

BLM will use innovative partnerships, pursue grant monies, and work with volunteers, organized user groups, and other recreation providers in developing and managing selected recreation opportunities on the public lands managed by the SGFO because the fiscal and staffing resources available to BLM are likely to remain inadequate to fully accomplish this objective (BLM, 1999).

The BLM's 1999 resource management plan also states that the BLM will work towards, among other things, up to 50 miles of equestrian trails near Sand Mountain to meeting growing demands. The plan also indicates that the BLM will assist in marking and signing portions of the Old Spanish National Historic Trail that cross public lands in Washington County.

A draft amendment to the SGFO resource management plan (BLM, 2015) and associated environmental impact statement (BLM, 2015) were issued in 2015. No recreation needs relevant to the LPP project or hydropower system were identified in these documents.

3.3.9 Sand Hollow State Park

The Sand Hollow State Park Resource Management Plan (UDSP, 2010) included a chapter titled "Issues and Recommendations". Included in this chapter are recommendations related to park access and improvements to facilities.

Chapter 4
Environmental Consequences

4.1 Introduction

This chapter describes the environmental consequences of the LPP Project alternatives on recreation resources. It identifies the construction (short term) and operation (long term) impacts on recreation areas, facilities and use on lands managed by federal, state and local government agencies and on privately owned land. The following LPP Project alternatives are described in Chapter 1:

- South Alternative
- Existing Highway Alternative
- Southeast Corner Alternative
- Transmission Line Alignments
- Natural Gas Pipeline and Generators Alternative
- No Lake Powell Water Alternative
- No Action Alternative

The significance criterion for determining if impacts on recreation resources are significant is as described in Study Plan 9. That is, potential impacts on recreation are considered "significant" if construction, operation, or maintenance activities would result in:

- Changes to recreation management settings
- Changes to existing and proposed recreation sites
- Changes to special recreation permitting
- Reduction or increase in recreation visitation at existing recreation sites
- Changes in overall operation of existing and proposed recreation facilities.

In addition, potential impacts on recreation may be temporary or permanent, and direct or indirect. Direct impacts interfere with use of a recreation facility or area, while indirect impacts result from noise, air pollution, and visual changes that affect the quality of recreation available at a facility or use area. Additional construction traffic experienced in route to a recreation facility or use area is also considered an indirect impact. LPP noise, air pollution, visual, and traffic impacts are described briefly below, and detailed in separate study reports.

4.2 Recreation Areas, Facilities and Use

Construction and operation activities associated with the LPP Project alternatives would occur on federal, state, and private lands in Arizona's Coconino and Mohave counties, and in Utah's Kane and Washington counties, and in. This section identifies the potential construction and operation impacts on recreation areas, facilities and use in the following management areas:

- Glen Canyon National Recreation Area (GCNRA)
- Vermilion Cliffs National Monument (VCNM)

- Paria Canyon – Vermilion Cliffs Wilderness (PCVCW)
- Grand Staircase – Escalante National Monument (GSENM)
- BLM – Kanab Field Office (KFO)
- BLM – Arizona Strip Field Office (ASFO)
- Kaibab-Paiute Indian Reservation
- Pipe Springs National Monument (PSNM)
- BLM – St. George Field Office (SGFO)
- Sand Hollow State Park (Utah)
- Private Recreational Facilities

4.2.1 South Alternative

4.2.1.1 Glen Canyon National Recreation Area

4.2.1.1.1 "Dead Dog" and "Ropes" Recreation Areas

4.2.1.1.1.1 Construction Impacts. The Water Conveyance System South Alternative, including BPS-1, would be constructed about 2,000 feet west of Highway 89 in the vicinity of the "Dead Dog" and "Ropes" dispersed recreational areas. Heavy equipment used to construct LPP Project facilities would result in significant, but temporary and indirect visual, air pollutant, noise, and additional LPP Project construction traffic impacts on recreation use.

4.2.1.1.1.2 Operation Impacts. Following construction and restoration (see Chapter 5, Mitigation and Monitoring), BPS-1 would be visible to recreationists accessing the "Dead Dog" and "Ropes" areas. This would be a minor, permanent, indirect impact on recreation. See the Visual Resources Study Report 16 (UBWR 2016) for additional impact analysis concerning the appearance of the booster pump station.

4.2.1.1.2 Colorado River Discovery Rafting Tours

4.2.1.1.2.1 Construction Impacts. The Water Conveyance System South Alternative would have no measurable impact on the Colorado River Discovery Rafting Tours. Minor temporary air pollutant and noise impacts associated with construction at the existing Glen Canyon Substation would occur.

4.2.1.1.2.2 Operation Impacts. There would be no change in annual river flows downstream of Glen Canyon Dam and, therefore, no impacts on the operations of Colorado River Discovery Rafting Tours. US Bureau of Reclamation would continue to release an average of 8.23 million acre-feet annually from Glen Canyon Dam during LPP Project operation.

4.2.1.1.3 Highway 89

4.2.1.1.3.1 Construction Impacts. BPS-1 would be constructed west of Highway 89. About 2,000 feet north of the Carl Hayden Visitor Center, the pipeline from the Intake Pump Station would cross the highway and head northwest to BPS-1. The buried pipeline would then run northwest, along the south side of Highway 89 within GCNRA. Heavy equipment used to construct these LPP Project facilities

would result in significant, indirect, temporary visual, air pollutant, noise, and additional LPP Project construction traffic impacts on recreation use.

4.2.1.1.3.2 Operation Impacts. BPS-1 and the Intake Pump Station would be visible to recreationists using Highway 89 after construction and restoration. These would be minor, indirect impacts on Highway 89 recreationists.

4.2.1.1.4 Carl Hayden Visitor Center

4.2.1.1.4.1 Construction Impacts. The buried pipeline from the Intake Pump Station would cross Highway 89 about 2,000 feet north of the Carl Hayden Visitor Center. Heavy equipment used to construct these facilities would result in significant, temporary, indirect impacts. These temporary, indirect impacts would include potential visual changes, air pollutants, and additional LPP Project construction traffic for up to 4 hours. Prevailing winds from the southwest would disperse air pollutants into an area away from the visitor center.

4.2.1.1.4.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational use at the Carl Hayden Visitor Center. These operations would be unnoticed by those at the visitor center.

4.2.1.1.5 Glen Canyon Dam Overlook

4.2.1.1.5.1 Construction Impacts. Construction of the LPP Project South Alternative would have no direct or indirect impacts on recreational use at Glen Canyon Dam Overlook during construction. Construction would be unnoticed by those at the overlook.

4.2.1.1.5.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational use at Glen Canyon Dam Overlook. These operations would be unnoticed by those at the overlook.

4.2.1.1.6 "Chains" Recreation Area and "Hanging Garden" Trail.

4.2.1.1.6.1 Construction Impacts. The Water Intake System and Intake Pump Station would be constructed on the Lake Powell shoreline directly opposite the "Chains" Recreation Area, and about 1,600 feet away. Heavy equipment used to construct these facilities would result in significant, temporary, visual impacts; and minor PM_{10} concentrations and noise levels in the "Chains" area. Most of the PM_{10} , carbon monoxide, nitrogen dioxide and sulfur dioxide generated from the construction would disperse within the work site to levels below the National Ambient Air Quality Standards (NAAQS) concentrations and prevailing southwest winds would transport any residual air pollutants north of the "Chains" area and over Lake Powell. The highest sound pressure levels generated at the Water Intake System site (94 dBA) during construction would attenuate to 64 dBA at the "Chains" area, which is equivalent to moderate conversational speech.

4.2.1.1.6.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreational use at the "Chains" area and "Hanging Garden" Trail. That is, operations would be unnoticed. Minor, indirect impacts would occur to recreationists in portions of the "Chains" area and "Hanging Garden" Trail, because of the visibility of the Water System Intake and Intake Pump Station.

4.2.1.1.7 Wahweap Recreation Area

4.2.1.1.7.1 Construction Impacts. The Water Conveyance System and BPS-1 would be constructed about 2,500 feet south of the Wahweap Recreation Area south access road (Lakeshore Drive) intersection with Highway 89. The conveyance system also would be constructed just south of the heavily used Wahweap north recreation access road (Wahweap Drive) intersection with Highway 89. Heavy equipment used to construct these facilities would result in minor, indirect, temporary, visual, air pollutant, noise, and additional LPP Project construction traffic impacts on recreationists accessing the Wahweap Area.

4.2.1.1.7.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or measurable indirect impacts on recreational use of the Wahweap Recreation Area. LPP operations would be unnoticed by those accessing and using the Wahweap Recreation Area.

4.2.1.1.8 Wahweap Overlook

4.2.1.1.8.1 Construction Impacts. The Water Conveyance System would be constructed about 1,000 feet south of the Wahweap Overlook access road intersection with Highway 89. Heavy equipment used to construct these facilities would result in minor, indirect, temporary visual, air pollutant, noise, and additional LPP Project construction traffic impacts on recreationists accessing the overlook.

4.2.1.1.8.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational use in the Wahweap Overlook. These operations would be unnoticed by those at the overlook. While BPS-1 would be visible to those accessing Highway 89 from the overlook, the view from the overlook, itself, is focused on Lake Powell and Wahweap.

4.2.1.1.9 Lone Rock Recreation Area

4.2.1.1.9.1 Construction Impacts. The Water Conveyance System would be constructed south of the Lone Rock recreation access road intersection with Highway 89. Heavy equipment used to construct these facilities would result in minor, indirect, temporary visual, air pollutant, noise, and additional LPP Project construction traffic impacts on recreationists accessing the Lone Rock Recreation Area.

4.2.1.1.9.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational use in the Lone Rock Recreation Area. These operations would be unnoticed by those using the recreation area.

4.2.1.2 Vermilion Cliffs National Monument

4.2.1.2.1 Construction Impacts. The Water Conveyance System construction would have moderate, temporary, direct impacts on recreational users accessing VCNM via the East Clark Bench Road (south from Highway 89), the White House Campground road, and the House Rock Valley Road. These impacts would occur as the pipeline construction blocks established access from Highway 89 to these roads. These temporary, direct impacts would have a maximum duration of 8 hours at each road crossing of the pipeline. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where these roads intersect with Highway 89. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment.

4.2.1.2.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreation resources in VCNM. These operations would be unnoticed by those using VCNM.

4.2.1.3 Paria Canyon – Vermilion Cliffs Wilderness

4.2.1.3.1 Construction Impacts. The Water Conveyance System construction would have significant, temporary, direct impacts on recreational users accessing the PCVCW via the East Clark Bench Road (south from Highway 89), the White House Campground road, roads in the Ferry Swale area, and the House Rock Valley Road. These impacts would occur as the pipeline construction blocks established access from Highway 89 to these roads. These temporary direct impacts would have a maximum duration of 8 hours at each road crossing of the pipeline. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where these roads intersect with Highway 89. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment.

4.2.1.3.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreation resources in PCVCW. These operations would be unnoticed by those using PCVCW.

4.2.1.4 Grand Staircase-Escalante National Monument

4.2.1.4.1 Guided Trips

4.2.1.4.1.1 Construction Impacts. The Water Conveyance System and Hydro System construction would have moderate direct and indirect impacts on guided trip providers and participants in GSENM. Temporary, direct impacts would occur on guided trip providers and participants as the pipeline construction blocks established access from Highway 89 to trailheads, interpretive sites, access roads and visitor centers. These temporary, direct impacts would have a maximum duration of 8 hours at a specific site. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on guided trip providers and participants. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment and at facility locations. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.1.4.1.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on guided trip providers and participants in GSENM. These operations would not interfere with access to GSENM recreation facilities or use areas. Guided trip providers and participants would experience minor, indirect impacts as they view specific LPP Project facilities (pump stations, hydro stations, etc.) along Highway 89. These facilities may not be in keeping with the desire of guided trip participants to experience unaltered, natural landscapes.

4.2.1.4.2 Cockscomb Wilderness Study Area

4.2.1.4.2.1 Construction Impacts. The Water Conveyance System, BPS-3 Alt., and BPS-4 Alt. would have moderate, temporary, direct and indirect impacts on recreational users of the nearby Cockscomb WSA during construction of these features. Direct impact would result from pipeline construction blocking established access (via Cottonwood Canyon Road) to this WSA from Highway 89. This temporary, direct impact would have a maximum duration of 8 hours. A temporary bypass road would provide temporary access to the recreation site, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Indirect impacts would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during

construction activities would attenuate to background levels within 3,000 feet of the BPS-3 Alt. and BPS-4 Alt. sites and would disrupt recreational experiences of users in the south and west portions of the WSA. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the WSA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.1.4.2.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreation resources in the Cockscomb WSA. These operations would not interfere with access to, or use of, the WSA. Recreational users of the WSA would experience minor, indirect impacts from viewing BPS-3 Alt. and BPS-4 Alt. facilities, because of their close proximity to the WSA boundaries.

4.2.1.4.3 Wahweap Wilderness Study Area

4.2.1.4.3.1 Construction Impacts. The Water Conveyance System and BPS-3 Alt. would have moderate, temporary, direct and indirect impacts on recreational users of the nearby Wahweap WSA during construction. Direct impact would result from pipeline construction blocking established access (via Cottonwood Canyon Road) to the west side of this WSA from Highway 89. This temporary, direct impact would have a maximum duration of 8 hours. A temporary bypass road would provide temporary access to the recreation site, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Indirect impacts would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 3,000 feet of the pipeline alignment and BPS-3 Alt. site, and would disrupt recreational experiences of users in Unit 13 of the WSA. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the WSA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.1.4.3.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreation resources in the Wahweap WSA. These operations would not interfere with access to, or use of, the WSA. Recreational users of the WSA would experience minor indirect impacts from viewing BPS-3 Alt. facility because of its proximity to the WSA boundaries.

4.2.1.4.4 Highway 89 Corridor Special Recreation Management Area

4.2.1.4.4.1 Construction Impacts. The Water Conveyance System, Hydro System, BPS-3 Alt., BPS-4 Alt., High Point Regulating Tank-2, and HS-1 would have moderate, temporary, direct impacts on recreational users of the nearby Highway 89 Corridor SRMA during construction of these features. These impacts would occur as the pipeline construction blocks established access from Highway 89 to trailheads, interpretive sites, access roads and visitor centers. These temporary direct impacts would have a maximum duration of 8 hours at a specific site. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

4.2.1.4.4.2 Operation Impacts. LPP Project operations would have no direct impacts on recreation resources in the Highway 89 Corridor SRMA. These operations would not interfere with access to, or use of, the WSA. Recreational users of the SRMA would experience minor indirect impacts from viewing facility sites because of their proximity to the SRMA.

4.2.1.4.5 Historic Trails

4.2.1.4.5.1 Construction Impacts. The impacts of construction on GSENM historic trails would be similar to those described above for the Highway 89 Corridor SRMA, as these trails are believed to follow the highway corridor through the GSENM.

4.2.1.4.5.2 Operation Impacts. LPP Project operations would have no direct impacts on recreation resources of GSENM historic trails. These operations would not interfere with access to, or use of, the trails. Users would experience minor indirect impacts from viewing LPP facilities.

4.2.1.4.6 Paria Canyons and Plateaus Special Recreation Management Area

4.2.1.4.6.1 Construction Impacts. The Water Conveyance System construction would have moderate, temporary, direct impacts on recreational users accessing the Paria Canyons and Plateaus SRMA via the East Clark Bench Road (south from Highway 89, mostly on State of Utah land), White House Campground road, and House Rock Valley Road. Temporary, direct impacts would occur on recreational users as the pipeline construction blocks established access from Highway 89 to these roads. These temporary, direct impacts would have a maximum duration of 8 hours at each road crossing of the pipeline. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where these roads intersect with Highway 89. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment.

4.2.1.4.6.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the Paria Canyons and Plateaus SRMA. These operations would be unnoticed by those using the SRMA.

4.2.1.4.7 GSENM Visitor Center in Big Water

4.2.1.4.7.1 Construction Impacts. The Water Conveyance System construction would have moderate to significant, temporary, direct and indirect impacts on recreational users accessing the GSENM Visitor Center in Big Water. Moderate, temporary, direct impacts would occur on recreational users as the pipeline construction blocks established access from Highway 89 to the visitor center. A temporary bypass road would provide temporary access to the recreation site, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. These temporary direct impacts would have a maximum duration of 8 hours. Significant, temporary, indirect impacts would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Impacts from noise would attenuate to background levels within 800 feet. Prevailing winds from the southwest would disperse air pollutants away from the visitor center.

4.2.1.4.7.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the GSENM Visitor Center in Big Water. These operations would be unnoticed by those using the visitor center.

4.2.1.4.8 Paria Contact Station, White House Campground, and Paria River Canyon

4.2.1.4.8.1 Construction Impacts. The Water Conveyance System construction would have significant, temporary, indirect impacts on recreational users accessing the Paria Contact Station, White House Campground and Paria River Canyon. These impacts would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources. Prevailing winds from the southwest would disperse air pollutants away from the Paria Contact Station, White House Campground, and Paria River Canyon.

4.2.1.4.8.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the Paria Contact Station, White House Campground and Paria River Canyon. Operations would be unnoticed by those using these areas.

4.2.1.4.9 Toadstools Trailhead

4.2.1.4.9.1 Construction Impacts. The Water Conveyance System construction would have moderate, temporary, direct and indirect impacts on recreational users accessing the Toadstools Trailhead and trail. Moderate, temporary, direct impacts would occur as the pipeline construction blocks established access from Highway 89 to the trailhead. These temporary direct impacts would have a maximum duration of 8 hours. A temporary bypass road would provide temporary access to the recreation site, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Temporary, indirect impacts from visual changes, noise, air pollutants, and additional LPP Project construction traffic would also occur on recreational users of the Toadstools Trailhead and trail. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users at the trailhead and along the trail may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Additional LPP Project construction traffic would occur along Highway 89 during pipeline construction and delay recreational users in their vehicles.

4.2.1.4.9.2 Operation Impacts. Following construction, restoration, and redevelopment of the parking area (see Chapter 5, Mitigation and Monitoring), LPP Project operations would have no direct or indirect impacts on recreational users of the Toadstools Trailhead and trail. These operations would be unnoticed by those using the trailhead and trail.

4.2.1.4.10 Catstair Canyon

4.2.1.4.10.1 Construction Impacts. The Water Conveyance System construction would have significant, temporary, indirect impacts on recreational users accessing Catstair Canyon. Impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur. The impacts from noise would attenuate to background levels within 800 feet of the sources. Prevailing winds from the southwest would disperse air pollutants away from Catstair Canyon.

4.2.1.4.10.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of Catstair Canyon. These operations would be unnoticed by those using the area.

4.2.1.4.11 House Rock Valley Road

4.2.1.4.11.1 Construction Impacts. The Water Conveyance System construction would have moderate, temporary, direct impacts on recreational users accessing the House Rock Valley Road and associated areas (Buckskin Gulch Trailhead, Wire Pass Trailhead, and the Stateline Campground/Arizona National Scenic Trail Trailhead). These impacts would occur as the pipeline construction blocks established access from Highway 89 to House Rock Valley Road. These temporary, direct impacts would have a maximum duration of 8 hours. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. This road serves as the primary access point for visitors hiking to the internationally renowned geological feature/destination known as “The Wave”. Hikers may wait days to obtain a hiking permit, and then have a relatively short window of time to make the hike.

Minor, temporary, indirect impacts from visual changes, air pollutants, noise and additional LPP Project construction traffic would also occur on recreational users of the House Rock Valley Road where it intersects with Highway 89. Impacts from noise would attenuate to background levels within 800 feet of the sources. Prevailing winds from the southwest would disperse air pollutants away from House Rock Valley Road.

4.2.1.4.11.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the House Rock Valley Road. These operations would be unnoticed by those using the road.

4.2.1.4.12 Paria Movie Set and Pahreah Townsite

4.2.1.4.12.1 Construction Impacts. The Water Conveyance System construction would have minor, temporary, indirect impacts on recreational users accessing the Paria Movie Set and Pahreah Townsite Point of Interest. Impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where the movie set and townsite access road intersects with Highway 89. Impacts from noise would attenuate to background levels within 800 feet of the sources.

4.2.1.4.12.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the Paria Movie Set and Pahreah Townsite. Operations would be unnoticed by those using these areas.

4.2.1.4.13 Off-Highway Vehicle Use and Hunting

4.2.1.4.13.1 Construction Impacts. The Water Conveyance System and Hydro System construction would have moderate to significant, direct and indirect impacts on Open/ATV roads and hunting in GSENM. Moderate, temporary, direct impacts would occur as pipeline construction blocks established access from Highway 89 to open/ATV roads located south of Highway 89. These temporary, direct impacts would have a maximum duration of 8 hours at a specific site. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Significant, temporary, indirect impacts from noise, air pollutants, visual changes, and additional LPP Project construction traffic would occur on ATV users and hunters. Impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment and at facility locations. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.1.4.13.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on OHV users and hunters in GSENM. While operations would be unnoticed, OHV users and hunters would experience minor, indirect impacts as they view specific LPP Project facilities (pump stations and hydro stations).

4.2.1.4.14 Great Western Trail

4.2.1.4.14.1 Construction Impacts. The Water Conveyance System and Hydro System construction would have moderate to significant, direct and indirect impacts on recreational users of the GWT. Significant, temporary, direct impacts would occur on GWT users as the pipeline and penstock construction blocks established access from Highway 89 to the south parking area and trail. These temporary direct impacts would have a maximum duration of 8 hours at the GWT crossing of the buried pipeline/penstock. A temporary bypass road would provide temporary access to the recreation site, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP

Project construction traffic would occur on GWT users. Impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.1.4.14.2 Operation Impacts. Following construction, restoration, and redevelopment of the south parking area (see Chapter 5, Mitigation and Monitoring), LPP Project operations would have no direct impacts on recreational users of the GWT. While operations would be unnoticed, GWT users would experience minor, indirect impacts as they view HS-1.

4.2.1.4.15 GSENM Visitor Center in Kanab

4.2.1.4.15.1 Construction Impacts. As it is located six miles or more from the GSENM Visitor Center in Kanab, construction of the South Alternative would have no direct impacts. A minor, indirect impact would result from additional LPP Project construction traffic temporarily delaying visitor center users along Highway 89.

4.2.1.4.15.2 Operation Impacts. As it is located six miles or more from the GSENM Visitor Center in Kanab, operation of the South Alternative would have no direct or indirect impacts on the GSENM Visitor Center in Kanab. That is, operations would be unnoticed by those using the visitor center.

4.2.1.5 BLM – Kanab Field Office

4.2.1.5.1 Construction Impacts. The Water Conveyance System and Hydro System construction would have moderate, temporary, direct and indirect impacts on recreation resources within the public lands administered by BLM KFO. Significant, temporary, direct impacts would occur on recreational users at BPS-3 Alt./Road 400 (south of Highway 89 at GSENM east boundary), and Road 705 as the penstock construction blocks established access from Highway 89 to these roads. These temporary direct impacts would have a maximum duration of 8 hours at the Road 400 crossing of the buried pipeline and at the Road 705 crossing of the buried penstock. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Other BLM access roads intersecting with Highway 89 between GSENM west boundary and Johnson Canyon Road would be temporarily blocked by the Kane County Pipeline construction, with a maximum duration of 4 hours at each road crossing of the 24-inch diameter buried pipeline. A temporary bypass road would provide temporary access to the Johnson Canyon Road, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

In addition to being a major access point for the eastern portion of the KFO, Johnson Canyon Road is also a major access point for the western portion of GSENM. A temporary bypass road would provide temporary access to the Johnson Canyon Road, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of Road 400 (north and south of Highway 89), Road 705, Road 563 and other BLM roads intersecting with Highway 89 between GSENM west boundary and Johnson Canyon Road, and on recreational users of Johnson Canyon Road, itself. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles accessing sites along Highway 89 and Johnson Canyon Road.

4.2.1.5.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreation resources in KFO-administered lands. Operations would be unnoticed by those using these lands.

4.2.1.6 BLM - Arizona Strip Field Office

4.2.1.6.1 Sand Hills Special Recreation Management Area and Uplands Recreation Management Zone

4.2.1.6.1.1 Construction Impacts. The Water Conveyance System construction would have moderate, temporary, direct impacts on recreational users accessing the Sand Hills SRMA and Uplands RMZ via the East Clark Bench Road (south from Highway 89), the White House Campground road, and the House Rock Valley Road. Temporary direct impacts would occur on recreational users as the pipeline construction blocks established access from Highway 89 to these roads. These temporary direct impacts would have a maximum duration of 8 hours at each road crossing of the pipeline. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where these roads intersect with Highway 89. Indirect impacts from noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment.

4.2.1.6.1.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational users of the Sand Hills SRMA and Uplands RMZ. Operations would be unnoticed by those using these areas.

4.2.1.6.2 Fredonia Special Recreation Management Area and Associated Recreation Management Zones

4.2.1.6.2.1 Construction Impacts. The Hydro System construction would take place several miles from the Fredonia SRMA and associated RMZs. Access to these areas would not be impacted by construction, and no visual changes, air pollutants, or noise would be apparent. Therefore, no direct or indirect recreational impacts would occur.

4.2.1.6.2.2 Operation Impacts. As described above, LPP Project facilities would be located several miles from the Fredonia SRMA and associated RMZs. Therefore, LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia SMRA and associated RMZs.

4.2.1.6.3 Cottonwood Point Wilderness

4.2.1.6.3.1 Construction Impacts. The Hydro System construction would have no direct impacts on the Cottonwood Point Wilderness. Access to the wilderness via Highways 389 and 237 would not be impeded. Minor, temporary, indirect impacts on wilderness recreational users would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Construction of facilities, including the pipeline, HS-2 South, and HS-3, would be visible from the western portions of the Cottonwood Point Wilderness; however, the indirect visual impacts of construction on recreation users would be minimal, because of distance. Noise generated during construction activities would attenuate to background levels within 3,000 feet of the pipeline, HS-2 South, and HS-3 sites. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the Cottonwood Point Wilderness may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.1.6.3.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreation resources in the Cottonwood Point Wilderness. These operations would not interfere with access to, or use of, the wilderness. Recreational users would experience minor,

indirect impacts from viewing HS-2 South and HS-3 facilities, because of their close proximity to the WSA boundaries.

4.2.1.6.4 Fredonia Welcome Center

4.2.1.6.4.1 Construction Impacts. The Hydro System construction would take place six miles or more east of the welcome center. Therefore, it would have no direct or indirect impacts on the recreation resources of the Fredonia Welcome Center.

4.2.1.6.4.2 Operation Impacts. LPP Project operations would take place six miles or more east of the welcome center. Therefore, Project operation would have no direct or indirect impacts on recreational users of the Fredonia Welcome Center following construction and restoration.

4.2.1.6.5 Historic Trails

4.2.1.6.5.1 Construction Impacts. The Hydro System, including HS-2 South and HS-3, would have moderate, temporary, direct and indirect impacts on recreational users of the historic trails during construction. Temporary direct impacts would occur on recreational users as the penstock construction crosses the historic trails. These temporary direct impacts would have a maximum duration of 8 hours at each trail crossing. Temporary bypass trails would provide temporary access to the trails, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Significant, temporary, indirect impacts due to visual changes, air pollution, noise, and additional LPP Project construction traffic would take place during construction. Noise generated during construction activities would attenuate to background levels within 800 feet of the penstock alignment and facility sites and would disrupt recreational experiences of historic trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the historic trails would be temporarily affected by construction activities and traffic during construction.

4.2.1.6.5.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreational users of the historic trails. These operations would not interfere with access to, or use of, the historic trail. However, users would experience minor, indirect impacts as they view HS-2 South and HS-3.

4.2.1.6.6 Fredonia – Vermilion Cliffs Scenic Drive

4.2.1.6.6.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct impacts on recreation resources where the penstock crosses Highway 89A. . The established road access would be interrupted for a maximum of 8 hours. A temporary bypass road would provide temporary access to the Highway 89A, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of the Fredonia – Vermilion Cliffs Scenic Drive where the buried penstock would cross under Highway 89A. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles traveling along Highway 89A.

4.2.1.6.6.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia – Vermilion Cliffs Scenic Drive. Operations would be unnoticed by those using the scenic drive following construction and restoration.

4.2.1.6.7 Fredonia-Vermilion Cliffs Scenic Road

4.2.1.6.7.1 Construction Impacts. The Water Conveyance System and Hydro System construction would have significant, temporary, direct impacts on recreation resources where the pipeline/penstock crosses Highway 89A. The established road access would be interrupted for a maximum of 8 hours. A temporary bypass road would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur where the pipeline/penstock crosses Highway 89A. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users.

4.2.1.6.7.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia-Vermilion Cliffs Scenic Road. Operations would be unnoticed by those using the scenic road, following construction and restoration.

4.2.1.6.8 Arizona Strip Pull-Off

4.2.1.6.8.1 Construction Impacts. The Hydro System construction would have no direct impacts on recreation resources at the Arizona Strip Pull-Off on Arizona Route 389. Access to the pull-off via Route 389 would not be impeded. Recreational users of the pull-off would experience significant, temporary, indirect visual, air pollutant, noise, and additional LPP Project construction traffic impacts from penstock construction and HS-2 South construction along Yellowstone Road. Noise generated during construction activities would attenuate to background levels within 800 feet of the penstock alignment and facility sites and would disrupt recreational experiences of pull-off users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; pull-off users may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.1.6.8.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on pull-off users. While operations would be unnoticed, pull-off users would experience minor indirect impacts as they view HS-2 South.

4.2.1.7 Kaibab – Paiute Indian Reservation

4.2.1.7.1 Kaibab-Paiute Tribe Campground and RV Park

4.2.1.7.1.1 Construction Impacts. The Hydro System construction would take place four miles or more south of the campground and RV park. Therefore, it would have no direct or indirect impacts on the recreation resources of these areas.

4.2.1.7.1.2 Operation Impacts. LPP Project operations would take place four miles or more south of the campground and RV park. Therefore, operations would have no direct or indirect impacts on recreational users of these areas.

4.2.1.7.2 Trails

4.2.1.7.2.1 Construction Impacts. The Hydro System construction would take place several miles south of Kaibab-Paiute Indian Reservation trails. Therefore, no direct or indirect impacts on recreation resources associated with these trails would occur.

4.2.1.7.2.2 Operation Impacts. LPP Project operations would take place several miles south of Kaibab-Paiute Indian Reservation trails. Therefore, no direct or indirect impacts on recreational users of these trails would occur.

4.2.1.8 Pipe Spring National Monument

4.2.1.8.1 Construction Impacts. The Hydro System construction would take place about four miles south of the PSNM. Therefore, no direct or indirect impacts on monument recreation resources would occur.

4.2.1.8.2 Operation Impacts. LPP Project operations would take place about four miles south of the PSNM. Therefore, no direct or indirect impacts on monument recreation resources would occur.

4.2.1.9 BLM – St. George Field Office

4.2.1.9.1 Off-Highway Vehicle Use

4.2.1.9.1.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct impacts on OHV use and access on public lands administered by BLM SGFO, including motorcycle, ATV, mountain bike, and equestrian events. These impacts would include temporary access interruptions or restrictions along gravel and dirt roads and trails crossing the penstock and pipeline alignments. Roads and trails crossed by the penstock and pipeline construction would be interrupted up to a maximum of 8 hours at each crossing site. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Direct impacts would occur on recreational users of the unnamed BLM road below the Hurricane Cliffs as construction occurs on the afterbay reservoir, penstock, hydropower plant, tailrace channel, and access bridge. Temporary road detours (see Chapter 5, Mitigation and Monitoring) would provide access to recreational users of the valley below the Hurricane Cliffs. Temporary detours and closures would affect access to BLM trails and other dispersed recreation sites as Hydro System construction proceeds.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational resources along and users of the unnamed BLM road below the Hurricane Cliffs. Noise generated during construction activities would attenuate to background levels within 800 to 1,600 feet of the pipeline alignment and facility sites and would disrupt recreational experiences of OHV and trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the roads and trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Additional LPP Project construction traffic would occur along the roads and OHV recreational users would experience delays.

4.2.1.9.1.2 Operation Impacts. LPP Project operations would have no direct impacts on OHV use of the unnamed BLM road below the Hurricane Cliffs. While LPP Project operations would go largely unnoticed by users in established OHV areas, vehicles accessing hydropower generation facilities via the unnamed BLM road below the Hurricane Cliffs would cause minor, temporary impacts on OHV recreational users of these roads because of occasional traffic delays.

LPP Project operations would require changes to the OHV area designations. Such land use plan decisions would require plan amendments.

4.2.1.9.2 Sand Mountain Special Recreation Management Area

4.2.1.9.2.1 Construction Impacts. The Hydro System construction would have significant direct impacts on recreation resources in the Sand Mountain SRMA. The Hurricane Cliffs afterbay reservoir and the penstock to Sand Hollow Hydro Station would be constructed within the eastern portion of the SRMA boundary. The afterbay reservoir construction would remove from use about 200 acres (1 percent of 20,709 acres) of ATV open riding area and technical trails suitable for full-size 4x4s. It would also disrupt access to the SRMA from Hurricane via the Warner Valley Road trailhead. The 3.8-mile long penstock construction would remove an additional 60 acres (0.3 percent of 20,709 acres) from recreational use in the eastern portion of the SRMA. Dispersed recreation and recreational access at penstock crossings of gravel and dirt roads would be closed until construction activities are completed.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational resources within the Sand Mountain SRMA near the afterbay reservoir and along the penstock alignment. Noise generated during construction activities would attenuate to background levels within 800 to 1,600 feet of the penstock alignment and afterbay site and would disrupt recreational experiences of SRMA users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor. Additional LPP Project construction traffic would occur along the roads and recreational users would experience delays.

Proposed measures to mitigate the effects of LPP construction on Sand Mountain SRMA recreation are described in Chapter 5 (Mitigation and Monitoring).

4.2.1.9.2.2 Operation Impacts. LPP Project operations would have significant direct and indirect impacts on recreational use of the Sand Mountain SRMA near the afterbay reservoir and hydropower generation facilities associated with the Hurricane Cliffs pumped storage project. The afterbay reservoir would not be available for recreational use because the water levels would fluctuate rapidly and would be unsafe for public recreation activities. The permanent removal of the afterbay reservoir area (approximately 200 acres in the eastern portion of the SRMA, 1 percent of 20,709 acres) from recreational use would be a significant, direct impact on recreation resources. The afterbay reservoir would not be designed for regular water discharge through a spillway; however, the afterbay reservoir would have an emergency spillway that would discharge water during emergency conditions and cause temporary flooding down-gradient (south) of the afterbay and affect recreational use of that portion of the Sand Mountain SRMA.

Significant, indirect visual impacts would result from HS-4 Alt., the forebay reservoir, the Hurricane Cliffs pumped storage project, the afterbay reservoir, and the penstock.

LPP Project operations would have temporary, indirect impacts on recreational users accessing the Sand Mountain SRMA. Vehicles accessing hydropower generation facilities via the unnamed BLM road below the Hurricane Cliffs could slightly increase traffic as recreational traffic passes through the area of the hydro facilities, resulting in occasional delays.

LPP Project operations would require changes to the Sand Mountain SRMA designation. Such land use plan decisions would require plan amendments.

Proposed measures to mitigate the effects of LPP operation and maintenance on Sand Mountain SRMA recreation are described in Chapter 5 (Mitigation and Monitoring).

4.2.1.9.3 Red Cliffs National Conservation Area

4.2.1.9.3.1 Construction Impacts. The Hydro System construction would take place five miles or more south of RCNCA. Therefore, no direct or indirect impacts on RCNCA recreation resources would occur.

4.2.1.9.3.2 Operation Impacts. Project operations would take place five miles or more south of RCNCA. Therefore, no direct or indirect impacts on RCNCA recreation resources would occur.

4.2.1.9.4 Hurricane Cliffs Non-Motorized Trail System

4.2.1.9.4.1 Construction Impacts. The Hydro System would have no direct impacts on users of the Hurricane Cliffs Non-Motorized Trail System. Access to this trail system would not be impeded during construction. However, minor, temporary, indirect impacts on trail system users would result from additional LPP Project construction traffic along Highway 59 and the unnamed BLM road below the Hurricane Cliffs.

4.2.1.9.4.2 Operation Impacts. LPP Project operations would have no direct impacts on users of the Hurricane Cliffs Non-Motorized Trail System. While LPP Project operations would go largely unnoticed by trail users, vehicles accessing hydropower generation facilities via Highway 59 and the unnamed BLM road below the Hurricane Cliffs would cause minor, temporary impacts, by creating occasional traffic delays.

4.2.1.9.5 Frog Hollow Off-Highway Vehicle Area

4.2.1.9.5.1 Construction Impacts. The impacts of construction on the Frog Hollow OHV Area would be similar to those described above for the Hurricane Cliffs Non-Motorized Trail System, as Frog Hollow is located just south of this trail system.

4.2.1.9.5.2 Operation Impacts. The impacts of LPP operation on the Frog Hollow OHV Area would be similar to those described above for the Hurricane Cliffs Non-Motorized Trail System, as Frog Hollow is located just south of this trail system.

4.2.1.10 Sand Hollow State Park

4.2.1.10.1 Construction Impacts. The Hydro System construction would have significant direct and indirect impacts on recreation resources within Sand Hollow State Park. The penstock construction would temporarily restrict dispersed recreation activities along the penstock alignment ROW. The Sand Hollow Hydro Station construction would displace dispersed camping sites along the east shore of Sand Hollow Reservoir.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational resources and users within Sand Hollow State Park. Noise generated during construction activities would attenuate to background levels within 800 to 1,600 feet of the pipeline alignment and Sand Hollow Hydro Station. Noise would disrupt the recreational experiences of Sand Hollow State Park users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; prevailing winds from the southwest would disperse air pollutants away from Sand Hollow State Park primary use areas. Additional LPP Project construction traffic would occur along the Sand Hollow Road and recreational users in vehicles would experience delays during Hydro System construction.

4.2.1.10.2 Operation Impacts. LPP Project operations would have significant, direct and indirect impacts on recreational use of Sand Hollow State Park. Lands around the Sand Hollow Hydro Station would be permanently closed to recreation. Recreational boating and water sports would be restricted in the immediate area of the Sand Hollow Hydro Station tailrace. Visual impacts would result from development of the Sand Hollow Hydro Station on the southeast shore of the reservoir. Sand Hollow Reservoir levels would not fluctuate measurably with the regular discharge of LPP Project water from the Sand Hollow Hydro Station.

Proposed measures to mitigate the effects of LPP operation and maintenance on Sand Hollow State Park recreation are described in Chapter 5 (Mitigation and Monitoring).

4.2.1.11 Private Recreational Facilities

4.2.1.11.1 Amangiri Resort Spa and Villas at Lake Powell

4.2.1.11.1.1 Construction Impacts. The LPP Project construction would have moderate, temporary, direct impacts on access to the Amangiri Resort Spa and Villas at Lake Powell. Pipeline construction along Highway 89 at the access road intersection would temporarily delay or disrupt access to and from the resort for a maximum of 8 hours. A temporary bypass road would provide temporary access to the resort, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur at the resort access road intersection with Highway 89. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants away from the resort. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles at the intersection of the resort access road and Highway 89.

4.2.1.11.1.2 Operation Impacts. Project operations would take place about a mile north and east of the resort spa and villas. Therefore, no direct or indirect impacts on Amangiri recreation resources would occur following construction and restoration.

4.2.1.11.2 Paria Outpost Resort and Paria Canyon Adventure Ranch

4.2.1.11.2.1 Construction Impacts. The LPP Project construction, which is to take place across Highway 89 from the Paria Outpost Resort and Paria Canyon Adventure Ranch, would have significant, temporary, indirect impacts. Visual changes, air pollutants, noise, and additional LPP Project construction traffic would temporarily affect recreational users at the resort and ranch. Construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants away from the resort and ranch. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles at each resort access road intersection with Highway 89.

4.2.1.11.2.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreation resources of the Paria Outpost Resort or Paria Canyon Adventure Ranch. Operations would be unnoticed by those using these facilities, following construction and restoration.

4.2.1.11.3 Olympus Academy for Youth

4.2.1.11.3.1 Construction Impacts. The Hydro System would have no direct impacts on the recreational resources of the Olympus Academy for Youth. Access to the Academy would not be impeded during construction. Minor, temporary, indirect impacts including visual changes, noise, air pollutants, and additional LPP Project construction traffic would temporarily affect recreational traffic along the Antelope /Branham Ranch Road between the Olympus Academy for Youth and Highway 59. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants away from the academy. Additional LPP Project construction traffic would temporarily delay academy users in vehicles at each access road intersection with Antelope /Branham Ranch Road during transmission line construction.

4.2.1.11.3.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on Olympus Academy for Youth use of the Antelope/Branham Ranch Road. The Sand Hollow Hydro Station would be approximately five miles southeast of the ranch. LPP Project operations involving access to the hydropower generation facilities along the Antelope/Branham Ranch Road would cause minor, temporary, indirect impacts on vehicles accessing the Olympus Academy for Youth, because of occasional traffic delays.

4.2.1.11.4 Willowind RV Park

4.2.1.11.4.1 Construction Impacts. The LPP Project construction, located six miles or more south and east of the RV park, would have no direct or indirect impacts.

4.2.1.11.4.2 Operation Impacts. LPP Project operation, located six miles of more south and east of the RV park, would have no direct or indirect impacts.

4.2.1.11.5 Sand Hollow Resort

4.2.1.11.5.1 Construction Impacts. Minor, temporary, indirect impacts, including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on Sand Hollow Resort recreational resources and users. Noise generated during construction activities would attenuate to background levels within 800 to 1,600 feet of the pipeline alignment and Sand Hollow Hydro Station. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; prevailing winds from the southwest would disperse air pollutants away from Sand Hollow State Park primary use areas. Additional LPP Project construction traffic would occur along the Sand Hollow Road and recreational users in vehicles would experience delays during Hydro System construction.

4.2.1.11.5.2 Operation Impacts. LPP Project operations, which are to take place three miles or more south and east of the resort, would have no direct or indirect impacts.

4.2.2 Existing Highway Alternative

The construction and operation impacts of the Existing Highway Alternative would be the same as the South Alternative (Section 4.2.1) except for the alignment segment from the west boundary of GSENM to Yellowstone Road west of Kaibab-Paiute Indian Reservation. The impacts of constructing and operating the LPP Project Existing Highway Alternative on recreation resources are presented in the following sections.

4.2.2.1 BLM – Kanab Field Office

4.2.2.1.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct and indirect impacts on recreation resources within the public lands administered by BLM KFO. BLM access roads intersecting with Highway 89 between GSENM west boundary and the established road leading to Lost Spring Gap would be temporarily blocked by the penstock construction, with a maximum duration of 8 hours at each road crossing. Temporary bypass roads would provide temporary access to the recreation sites, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of BLM roads intersecting with Highway 89 between GSENM west boundary and the road leading to Lost Spring Gap. Construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles accessing sites along Highway 89.

4.2.2.1.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreation resources on KFO-administered lands. Operations would be unnoticed, following construction and restoration.

4.2.2.2 BLM - Arizona Strip Field Office

4.2.2.2.1 Fredonia Special Recreation Management Area and Associated Recreation Management Zones

4.2.2.2.1.1 Construction Impacts. The Hydro System construction would have significant, temporary, direct and indirect impacts on the Fredonia SRMA and associated Recreation RMZs. The penstock construction would occur for 0.8 mile along the northwest boundary of the SRMA and Fredonia Rural Park RMZ. Public access to the construction area within the SRMA and RMZ would be restricted for up to one week.

Significant, temporary, indirect impacts, visual changes, air pollutants, noise, and additional LPP Project construction traffic would affect recreational use of portions of the SRMA and RMZs. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants along the northwest boundary of the SRMA, Fredonia Rural Park RMZ and Shinarump Cliffs RMZ.

4.2.2.2.1.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia SMRA and associated RMZs. Operations would be unnoticed by users, following construction and restoration.

4.2.2.2.2 Cottonwood Point Wilderness

4.2.2.2.2.1 Construction Impacts. The Hydro System would cross Arizona Highway 389 west of the wilderness area, near Colorado City. Access to the wilderness via highways 389 and 237 would not be impeded. Minor, temporary, indirect impacts on wilderness recreational users would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic. Construction of facilities, including the pipeline, HS-2 Highway, and HS-3, would be visible from the western portions of the

Cottonwood Point Wilderness; however, the indirect visual impacts of construction on recreation users would be minimal, because of distance. Noise generated during construction activities would attenuate to background levels within 3,000 feet of the pipeline, HS-2 Highway, and HS-3 sites. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the Cottonwood Point Wilderness may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.2.2.2.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreation resources in the Cottonwood Point Wilderness. These operations would not interfere with access to, or use of, the wilderness. Recreational users would experience minor, indirect impacts from viewing HS-2 Highway and HS-3 facilities, because of their close proximity to the WSA boundaries.

4.2.2.2.3 Fredonia Welcome Center

4.2.2.2.3.1 Construction Impacts. The Hydro System construction would have moderate to significant, direct and indirect impacts on the recreation resources of the Fredonia Welcome Center. The penstock would cross Highway 89A about 300 feet north of the welcome center, and recreational access to the center would be temporarily bypassed during construction of the crossing. The resulting impact would be interrupted recreational opportunity during construction in the vicinity of the center.

Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would temporarily affect recreational use of the Fredonia Welcome Center when open. Construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants away from the center. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles accessing the Fredonia Welcome Center from Highway 89A.

4.2.2.2.3.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia Welcome Center. These operations would be unnoticed by those using the welcome center, following construction and restoration.

4.2.2.2.4 Historic Trails

4.2.2.2.4.1 Construction Impacts. The Hydro System, including HS-2 Hwy., would have moderate, temporary, direct impacts on recreational users of the historic trails during construction of these features. Temporary direct impacts would occur on recreational users as the penstock construction crosses the historic trails. These temporary direct impacts would have a maximum duration of 8 hours at each trail crossing. Temporary bypass trails would provide temporary access to the trails, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

The Hydro System, including HS-2 Hwy., would have significant, temporary, indirect impacts on historic trails during construction of these features. These impacts include visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 800 feet of the pipeline alignment and facility sites. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the historic trails would be temporarily affected by construction activities and traffic during construction.

4.2.2.2.4.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct impacts on recreational users of the historic trails. Access to, and use of, these trails would not be impeded. Users would experience minor, indirect impacts as they view HS-2 Hwy and HS-3.

4.2.2.2.5 Fredonia – Vermilion Cliffs Scenic Drive

4.2.2.2.5.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct impacts on recreation resources where the penstock crosses Highway 89A, just north of the Fredonia Welcome Center. The road would be bypassed for a maximum of 8 hours. A temporary bypass road would provide temporary access, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of the Fredonia – Vermilion Cliffs Scenic Drive where the buried penstock would cross under Highway 89A. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles traveling along Highway 89A.

4.2.2.2.5.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia – Vermilion Cliffs Scenic Drive, following construction and restoration. These operations would be unnoticed by those using the scenic drive.

4.2.2.2.6 Fredonia-Vermilion Cliffs Scenic Road

4.2.2.2.6.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct impacts on recreation resources where the penstock crosses Highway 89A, just north of the Fredonia Welcome Center. The road would be bypassed for a maximum of 8 hours. A temporary bypass road would provide temporary access, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of the Fredonia – Vermilion Cliffs Scenic Road where the buried penstock would cross under Highway 89A. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline/penstock alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles traveling along Highway 89A.

4.2.2.2.6.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Fredonia-Vermilion Cliffs Scenic Road, following construction and restoration. These operations would be unnoticed by those using the scenic road.

4.2.2.2.7 Arizona Strip Pull-Off

4.2.2.2.7.1 Construction Impacts. The Hydro System construction would have no direct impacts on recreation resources at the Arizona Strip Pull-Off on Arizona Route 389. Access to the pull-off via Route 389 would not be impeded. Recreational users of the pull-off would experience significant, temporary, indirect visual, air pollutant, noise, and additional LPP Project construction traffic impacts from penstock construction and HS-2 Highway construction on the north side of Route 389. Noise generated during construction activities would attenuate to background levels within 800 feet of the penstock alignment and facility sites and would disrupt recreational experiences of pull-off users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; prevailing winds from the southwest would disperse residual air pollutants away from the pull-off.

4.2.2.2.7.2 Operation Impacts. LPP Project operations would have no direct impacts on recreational users of the Arizona Strip Pull-Off. Recreational users of the pull-off would experience minor indirect impacts from viewing HS-2 Hwy. in the middle ground distance zone.

4.2.2.3 Kaibab – Paiute Indian Reservation

4.2.2.3.1 Kaibab-Paiute Tribe Campground and RV Park

4.2.2.3.1.1 Construction Impacts. The Hydro System construction would have moderate, temporary, direct impacts on access to the Kaibab-Paiute Tribe Campground and RV Park. Penstock construction along Highway 389 at the access road intersection would temporarily delay or disrupt access to and from the campground and RV park for a maximum of 8 hours. A temporary bypass road would provide temporary access, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur at the campground and RV park access road intersection with Highway 389. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles at the intersection of the access road and Highway 389.

4.2.2.3.1.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the Kaibab-Paiute Tribe Campground and RV Park, following construction and restoration. These operations would be unnoticed by those accessing and using the campground and RV park.

4.2.2.3.2 Trails

4.2.2.3.2.1 Construction Impacts. The Hydro System would have significant, temporary, direct and indirect impacts on recreational users of the Kaibab-Paiute Indian Reservation trails during construction of the penstock. Temporary, direct impacts would occur on recreational users as the penstock construction crosses the trails (Old Spanish National Historic Trail and Honeymoon Trail). These temporary direct impacts would have a maximum duration of 8 hours at each trail crossing. Temporary bypass trails would provide temporary access to the trails, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. The Hydro System would have significant, temporary, indirect visual, noise, air pollution, and additional LPP Project construction traffic impacts on the Old Spanish National Historic Trail and Honeymoon Trail during construction. Noise generated during construction activities would attenuate to background levels within 800 feet of the penstock alignment and facility sites and would disrupt recreational experiences of historic trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the historic trails would be temporarily affected by construction activities and traffic during construction. No construction impacts on the Hearts Canyon Trail are anticipated, since this trail is located several miles north of Highway 389.

4.2.2.3.2.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of trails crossing through the Kaibab-Paiute Indian Reservation, following construction and restoration. These operations would be unnoticed by those accessing and using the trails.

4.2.2.4 Pipe Spring National Monument

4.2.2.4.1 Construction Impacts. The Hydro System construction would have moderate to significant, temporary, direct impacts on access to PSNM. Penstock construction along Highway 389 at the access road intersection would temporarily delay or disrupt access to and from the monument for a maximum of 8 hours. A temporary bypass road would provide temporary access, and the original access would be restored to pre-construction conditions by the end of the 8-hour duration. Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur at the PSNM access road intersection with Highway 389. Indirect impacts from construction noise would attenuate to background levels within 800 feet of the sources along the pipeline alignment. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles at the intersection of the PSNM access road and Highway 389.

4.2.2.4.2 Operation Impacts. LPP Project operations would have no direct or indirect impacts on recreational users of the PSNM, following construction and restoration. These operations would be unnoticed by those accessing and using the monument.

4.2.3 Southeast Corner Alternative

The construction and operation impacts of the Southeast Corner Alternative would be the same as the South Alternative (Section 4.2.1) except for the alignment segment crossing the southeast corner of Kaibab-Paiute Indian Reservation.

4.2.3.1 Kaibab – Paiute Indian Reservation

4.2.3.1.1 Construction Impacts. The Hydro System construction would have minor, temporary, direct impacts on recreation resources. The penstock alignment would roughly parallel an existing, single-track, dirt and gravel road along the existing Navajo-McCullough Transmission Line. Dispersed recreation activities that may occur along the penstock alignment would be disrupted during construction through the southeast corner of the Kaibab-Paiute Indian Reservation. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on dispersed recreation activities in close proximity to the penstock construction. Noise generated during construction activities would attenuate to background levels within 800 feet of the penstock alignment. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; dispersed recreation users may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.3.1.2 Operation Impacts. Following construction and restoration, LPP Project operations would have no direct or indirect impacts on recreational use along the Southeast Corner Alternative alignment within the boundaries of the Kaibab-Paiute Indian Reservation. These operations would be unnoticed by those recreating in the vicinity of the alignment, following construction and restoration.

4.2.4 Transmission Line Alignments

The construction and operation impacts of the electrical transmission lines system on recreation resources would be the same as the South Alternative (Section 4.2.1) for all transmission lines paralleling the Water Conveyance System pipeline and Hydro System penstock. All constructed transmission lines along pipeline and penstock alignments would be viewed by recreational users at various recreation sites, resulting in indirect, construction and operations impacts, as described in the Visual Resources Study Report 16 (UBWR 2016). Electrical transmission line system alignments that are independent of the

Water Conveyance System pipeline and Hydro System penstock alignments are presented in the following sections.

4.2.4.1 Glen Canyon National Recreation Area

4.2.4.1.1 "Dead Dog" and "Ropes" Recreation Areas

4.2.4.1.1.1 Construction Impacts. Transmission lines would be constructed about 2,000 feet west of Highway 89 and in the vicinity of the "Dead Dog" and "Ropes" dispersed recreational areas. Construction of the LPP Project transmission lines would result in significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic.

4.2.4.1.1.2 Operation Impacts. Following construction and restoration, the transmission line corridors would be closed to recreation (a significant, direct impact). In addition, these lines would be visible to recreationists accessing the "Dead Dog" and "Ropes" areas. This would be a minor, indirect impact on recreation.

4.2.4.1.2 Colorado River Discovery Rafting Tours

4.2.4.1.2.1 Construction Impacts. Transmission line construction would not impede access to, or use of, Colorado River Discovery rafts. Therefore, construction would have no direct impacts on the Colorado River Discovery Rafting Tours. Minor, temporary, indirect impacts would result from air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 1,600 feet of Glen Canyon substation upgrade. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.4.1.2.2 Operation Impacts. LPP Project transmission lines operation would have no direct or indirect impacts on recreation resources associated with Colorado River Discovery Rafting Tours. These operations would be unnoticed by rafters.

4.2.4.1.3 Highway 89

4.2.4.1.3.1 Construction Impacts. A transmission line would be constructed west of and parallel to Highway 89, west of Glen Canyon Dam. About 2,000 feet north of the Carl Hayden Visitor Center, the transmission line serving the Intake Pump Station would cross the highway and head northwest to BPS-1. Heavy equipment used to construct these transmission lines would result in significant, temporary, indirect impacts on recreation resources. These impacts would include visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW. Most air pollutants would disperse to below NAAQS concentrations within the transmission line ROW. Additional LPP Project construction traffic would delay recreational vehicles on Highway 89.

4.2.4.1.3.2 Operation Impacts. The transmission line would not impede access to, or recreational use of, US 89. Therefore, it would have no direct impacts. Following construction and restoration, the transmission line would be visible to recreationists traveling along Highway 89. This would be a minor, indirect impact on recreation, given that the area already contains many other transmission lines and developments.

4.2.4.1.4 Carl Hayden Visitor Center

4.2.4.1.4.1 Construction Impacts. The transmission line serving the Intake Pump Station would cross Highway 89 about 2,000 feet north of the Carl Hayden Visitor Center. Heavy equipment used to construct the transmission line would result in significant, temporary, indirect impacts. These temporary, indirect impacts would include potential visual changes, air pollutants, and additional LPP Project construction traffic for up to 4 hours. Prevailing winds from the southwest would disperse air pollutants into an area away from the visitor center.

4.2.4.1.4.2 Operation Impacts. Following construction and restoration, LPP Project transmission lines operation would have no direct or indirect impacts on recreational use at the Carl Hayden Visitor Center. The operations would be unnoticed by visitor center users.

4.2.4.1.5 Glen Canyon Dam Overlook

4.2.4.1.5.1 Construction Impacts. Construction of the electrical transmission lines system would not impede access to, or use of the Glen Canyon Dam Overlook during construction. Therefore, no direct impacts would result. Minor, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of Glen Canyon Dam Overlook. Construction noise would attenuate to background levels within 1,600 feet of Glen Canyon substation. Most air pollutants would disperse to below NAAQS concentrations within the substation area; prevailing southwest winds would transport any residual pollutants away from the overlook. Construction of the transmission line connections to Glen Canyon substation would be viewed from the overlook and result in visual impacts in the middle ground distance zone.

4.2.4.1.5.2 Operation Impacts. Operation of the electrical transmission lines system would not impede access to, or use of the Glen Canyon Dam Overlook. Therefore, no direct impacts would result. Following construction and restoration, the additional transmission lines would be visible to recreation users viewing the substation from the overlook. This would be a minor, indirect impact on recreation. The new transmission lines would match the line and form of numerous existing transmission lines entering and connecting to Glen Canyon substation.

4.2.4.1.6 "Chains" Recreation Area and "Hanging Garden" Trail

4.2.4.1.6.1 Construction Impacts. A transmission line would be constructed to the Water Intake System on the Lake Powell shoreline directly opposite (west shore of Lake Powell) the "Chains" Recreation Area about 1,600 feet away. Construction would result in significant, temporary, indirect impacts. These impacts would include visual changes, and air pollutants, and noise. The highest sound pressure levels generated at the Water Intake System site (94 dBA) during construction would attenuate to 64 dBA at the "Chains" area, which is equivalent to moderate conversational speech. Most of the air pollutants would disperse within the work site to levels below the NAAQS concentrations and prevailing southwest winds would transport any residual pollutants north of the "Chains" area and over Lake Powell.

4.2.4.1.6.2 Operation Impacts. Following construction and restoration, the additional transmission lines would be visible to recreation users viewing the Water Intake System from the "Chains" area and "Hanging Gardens." This would be a minor, indirect impact on recreational use at the "Chains" area and "Hanging Gardens" Trail.

4.2.4.2 Vermilion Cliffs National Monument

4.2.4.2.1 Construction Impacts. Transmission lines serving BPS-2, BPS-3 Alt., and other Water Conveyance System facilities would be constructed north of VCNM and would have no direct impacts on recreation resources. Heavy equipment used to construct the transmission lines would result in minor,

temporary, indirect noise impacts on VCNM users. Peak noise levels would attenuate to background sound levels within 1,600 feet of the sources. Prevailing winds from the southwest would prevent any temporary air pollutants from dispersing within VCNM.

4.2.4.2.2 Operation Impacts. There would be no direct impacts on recreation resources during operation of the transmission lines serving LPP Project facilities, which would be located one mile north of VCNM boundary. The new transmission lines, constructed adjacent and parallel to existing transmission lines, would be visible to recreationists using VCNM and result in minor, indirect impacts.

4.2.4.3 Paria Canyon – Vermilion Cliffs Wilderness

4.2.4.3.1 Construction Impacts. Electrical transmission lines system construction would have no direct impacts on recreation resources in the PCVCW, as it would take place at least one mile north of PCVCW boundaries. Minor, temporary, indirect impacts from noise would occur on recreational users of the PCVCW. Indirect impacts from construction noise would attenuate to background levels within 1,600 feet of the heavy equipment sources along the transmission line alignments. Prevailing winds from the southwest would prevent any temporary air pollutants from dispersing within PCVCW.

4.2.4.3.2 Operation Impacts. There would be no direct impacts on recreation resources during operation of the transmission lines serving LPP Project facilities, as these operations would take place outside of PCVCW boundaries. The new transmission lines, mostly constructed adjacent to existing transmission lines, would be visible to recreationists using PCVCW and would result in minor, indirect impacts.

4.2.4.4 Grand Staircase-Escalante National Monument

4.2.4.4.1 Guided Trips

4.2.4.4.1.1 Construction Impacts. Electrical transmission lines system construction, which would parallel existing lines already closed to recreation, would have no direct impacts on guided trip providers and participants in GSENM. Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on guided trip providers and participants along transmission line alignments. Noise would attenuate to background levels within 1,600 feet of the sources along the transmission line alignments. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Transmission line construction would be visible from vantage points used by guided trip providers and participants, and would, therefore, result in minor, indirect impacts.

4.2.4.4.1.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on guided trip providers and participants in GSENM. These transmission lines would parallel existing lines that are already closed to recreation. The LPP Project transmission lines would not impede access to any additional recreation area. Guided trip providers and participants would experience minor, indirect impacts as they view specific transmission lines along Highway 89, adjacent to the Navajo-McCullough Transmission Line, and near GSENM south boundary.

4.2.4.4.2 Cockscomb Wilderness Study Area

4.2.4.4.2.1 Construction Impacts. The electrical transmission lines system construction would have minor, temporary, indirect impacts on recreational users of the nearby Cockscomb WSA during construction. These impacts would include visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the BPS-3 Alt. and BPS-4 Alt. transmission lines and would temporarily

disrupt recreational experiences of users in the south and west portions of the WSA. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the WSA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the WSA would be temporarily affected by construction activities and traffic during construction. There would be no direct impacts on recreational users of the WSA, as the construction would take place outside of the WSA boundaries.

4.2.4.4.2.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources in the Cockscomb WSA, as the operations would take place outside of the WSA boundaries. Recreational users would experience minor indirect impacts from viewing the transmission lines, because of their proximity to the WSA boundaries (0.5 mile from BPS-3(Alt.) and BPS-4 (Alt.) at closest points).

4.2.4.4.3 Wahweap Wilderness Study Area.

4.2.4.4.3.1 Construction Impacts. The transmission lines serving BPS-3 Alt. would have minor, temporary, indirect impacts on recreational users of the nearby Wahweap WSA during construction. These impacts would include visual changes, air pollutants, noise, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW and would disrupt recreational experiences of WSA users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the WSA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the WSA would be temporarily affected by construction activities and traffic during construction. There would be no direct impacts on recreational users of the WSA, as the construction would take place outside of the WSA boundaries.

4.2.4.4.3.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources in the Wahweap WSA, as these operations would take place outside of the WSA boundaries. Recreational users of the WSA would experience minor indirect impacts from viewing the BPS-3 Alt. transmission line in the middle ground distance zone (1.5 miles to BPS-3 (Alt.) at closest point).

4.2.4.4.4 Highway 89 Corridor Special Recreation Management Area

4.2.4.4.4.1 Construction Impacts. The transmission lines serving BPS-4 (Alt.) and HS-1 would have no direct impacts on recreational users of the Highway 89 Corridor SRMA during construction. Transmission line construction would not impede access to, or recreational use of, Highway 89.

The transmission lines serving BPS-4 (Alt.) and HS-1 would have significant, temporary, indirect impacts on recreational users of the nearby Highway 89 Corridor SRMA during construction. These impacts would include visual changes, noise, air pollutants, and additional LPP Project construction traffic. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line alignments. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the SRMA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Several dispersed access points for the SRMA would be temporarily affected by construction activities and traffic during construction.

4.2.4.4.4.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources in the Highway 89 Corridor SRMA. These operations would not impede access to, or

use of the SRMA. Users would experience minor, indirect impacts from viewing transmission lines because of their proximity to the SRMA. This would affect their recreation experience.

4.2.4.4.5 Historic Trails

4.2.4.4.5.1 Construction Impacts. The impacts of transmission lines construction on GSENM historic trails would be similar to those described above for the Highway 89 Corridor SRMA, as these trails are believed to follow the Highway 89 corridor through the GSENM.

4.2.4.4.5.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources of GSENM historic trails. These operations would not impede access to, or use of the trails. Users of the historic trails would experience minor, indirect impacts from viewing transmission lines.

4.2.4.4.6 Paria Canyons and Plateaus Special Recreation Management Area

4.2.4.4.6.1 Construction Impacts. The electrical transmission lines system construction would have no direct impacts on recreational users accessing the Paria Canyons and Plateaus SRMA) via the East Clark Bench Road (south from Highway 89), the White House Campground road, and the House Rock Valley Road. Transmission line construction would not impede access to, or recreational use of, this SRMA. Significant, temporary, indirect impacts from visual changes, noise, air pollutants, and additional LPP Project construction traffic would occur. Indirect impacts from noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROWs. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the SRMA may temporarily detect nitrogen dioxide from construction equipment under worst-case conditions.

4.2.4.4.6.2 Operation Impacts. The Transmission Line Alternatives would have no direct impacts on recreation resources of the Paria Canyons and Plateaus SRMA. Operations of these lines would not impede access to, or use of the SRMA. Following construction and restoration, the transmission line would be visible to users in the SRMA. This would be a minor, indirect impact on recreation. The new transmission lines would match the line and form of numerous existing transmission lines in this vicinity.

4.2.4.4.7 Paria Contact Station, White House Campground, and Paria River Canyon.

4.2.4.4.7.1 Construction Impacts. The BPS-3 Alt. Transmission Line South construction would have no direct impacts on recreational users accessing the Paria Contact Station, White House Campground and Paria River Canyon. This construction would not impede recreational access or use. Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of the Paria Contact Station, White House Campground, and Paria River Canyon. Indirect impacts from noise would attenuate to background levels within 1,600 feet of the heavy equipment sources along the transmission line ROW. Prevailing winds from the southwest would disperse air pollutants away from the Paria Contact Station.

4.2.4.4.7.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources of the Paria Contact Station, White House Campground, and Paria River Canyon. Operation of these lines would not impede recreation access or use. Recreational users would experience minor, indirect impacts from viewing BPS-3 Alt. Transmission Line South.

4.2.4.4.8 House Rock Valley Road.

4.2.4.4.8.1 Construction Impacts. The LPP Glen Canyon to Buckskin Transmission Line would cross House Rock Valley Road about four miles south of Highway 89. Construction would not impede recreational access or use. Therefore, no direct impacts on recreation would result. Construction of the transmission line would result in significant, temporary, indirect visual, air pollutant, noise and additional LPP Project construction traffic impacts to recreation. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW. Most air pollutants would disperse to below NAAQS concentrations within the transmission line ROW.

4.2.4.4.8.2 Operation Impacts. Transmission line operation would have no direct impacts on House Rock Valley Road. Recreation access or use would not be impeded. Following construction and restoration, the additional transmission line would be visible to House Rock Valley Road users. This would be a minor, indirect impact on recreation. The new transmission line would match the line and form of the existing transmission lines in this ROW.

4.2.4.4.9 Off-Highway Vehicle Use and Hunting

4.2.4.4.9.1 Construction Impacts. The electrical transmission lines system construction would have no direct impacts on Open/ATV roads and hunting in GSENM. These uses would not be impeded by construction activities. Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and visual changes would occur. Indirect impacts from noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROWs. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Transmission line construction would be visible from vantage points used by guided trip providers and participants.

4.2.4.4.9.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on Open/ATV road users and hunters in GSENM. These uses would not be impeded by operations. Minor, indirect impacts would result from viewing transmission lines, which would affect user experiences.

4.2.4.4.10 Great Western Trail

4.2.4.4.10.1 Construction Impacts. The HS-1 Transmission Line construction would have minor indirect impacts on recreational users of GWT, trailheads for which are located on Highway 89, approximately a mile to the northeast. . Visual changes, air pollutants, and noise would occur within the 400-foot long construction ROW. Noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROW. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.4.4.10.2 Operation Impacts. Located about a mile southwest of GWT, the HS-1 transmission line operations would have no direct impacts on recreational users of GWT. Trail users would experience minor, indirect impacts as they view the transmission line.

4.2.4.5 BLM - Arizona Strip Field Office

4.2.4.5.1 Historic Trails

4.2.4.5.1.1 Construction Impacts. The HS-2 South transmission line would have minor, temporary, indirect impacts on recreational users of the historic trails during construction. Visual changes, air pollutants, and noise would occur. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission alignment and would disrupt recreational experiences of historic trail users. Air pollutants would mostly disperse to below NAAQS concentrations

within the ROW corridor; recreational users along the trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.4.5.1.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreational users of the historic trails on public lands administered by BLM ASFO. Access to, and use of, these trails would not be impeded. Historic trails users would experience indirect impacts as they view the HS-2 South transmission line.

4.2.4.5.2 Fredonia-Vermilion Cliffs Scenic Road

4.2.4.5.2.1 Construction Impacts. Significant, temporary, indirect impacts from visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational users of the Fredonia-Vermilion Cliffs Scenic Road where the transmission line would be parallel to or cross over Highway 89A. Construction noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROWs. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles traveling along the highways.

4.2.4.5.2.2 Operation Impacts. LPP Project transmission lines operation would not impede recreation use of the scenic road. Therefore, it would have no direct impacts on recreational users of the Fredonia-Vermilion Cliffs Scenic Road. Recreation vehicle users would experience significant, indirect impacts as they view transmission lines from the road, pull-outs, and interpretive sites associated with the scenic road.

4.2.4.5.3 Arizona Strip Pull-Off

4.2.4.5.3.1 Construction Impacts. The HS-2 South transmission line construction would have no direct impacts on recreation resources at the Arizona Strip Pull-Off on Arizona Route 389. This construction would not impede access to, or use of, the pull-off. Recreational users of the pull-off, which is 0.64 mile (i.e., the middle ground distance zone) from the transmission line, would experience minor, temporary, indirect visual, air pollutant, and noise impacts from this construction along Yellowstone Road. Noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROWs. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW.

4.2.4.5.3.2 Operation Impacts. LPP Project transmission lines operation would have not impede access to, or use of, the pull-off. Therefore, no direct impacts would occur to recreational users of the Arizona Strip Pull-Off. Users of the pull-off would experience minor, indirect impacts from viewing HS-2 South transmission line in the middle ground distance zone.

4.2.4.6 BLM – St. George Field Office

4.2.4.6.1 Off-Highway Vehicle Use

4.2.4.6.1.1 Construction Impacts. The HS-4 (Alt.) transmission line construction would have no direct impacts on recreation. This construction would not impede access to, or use of, OHV areas. Minor, temporary, indirect impacts on OHV use and access to public lands administered by BLMSGFO would occur. . Minor, temporary, indirect impacts would result from visual changes, air pollutants, noise, and additional LPP Project construction traffic along the Antelope/Branham Ranch Road. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW and would disrupt recreational experiences of OHV and trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the

roads and trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Additional LPP Project construction traffic would occur along the roads and OHV recreational users would experience delays.

4.2.4.6.1.2 Operation Impacts. LPP Project transmission lines operation would not impede access to, or use of, OHV areas along the Antelope/Branham Ranch Road. Therefore, no direct impacts on recreation would result. OHV users would experience minor, indirect impacts from viewing the HS-4 (Alt.) transmission line.

4.2.4.6.2 Sand Mountain Special Recreation Management Area

4.2.4.6.2.1 Construction Impacts. The Hurricane Cliffs Afterbay to Hurricane West transmission line and Hurricane Cliffs Afterbay to Sand Hollow transmission line construction would have significant, temporary, direct impacts on recreation resources in the Sand Mountain SRMA. These transmission lines would be within the eastern portion of the SRMA boundary, with recreation use on about 60 acres (along 3.8 miles, 0.3 percent of 20,709 acres) of the SRMA closed during construction.

Significant, temporary, indirect impacts including noise, visual changes, air pollutants, and additional LPP Project construction traffic would occur along the transmission line ROWs. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROWs and would disrupt recreational experiences of SRMA users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor. Additional LPP Project construction traffic would occur along the roads and recreational users would experience delays.

4.2.4.6.2.2 Operation Impacts. LPP Project transmission lines operation would have significant, direct impacts on recreational use in the eastern portion of the Sand Mountain SRMA. The Hurricane Cliffs Afterbay to Hurricane West transmission line and Hurricane Cliffs Afterbay to Sand Hollow transmission line corridors would be permanently closed to recreation, resulting in a loss of about 60 acres (0.3 percent of 20,709 acres) to the SRMA. LPP Project transmission lines would also have significant, indirect visual impacts on recreational users in the Sand Mountain SRMA.

4.2.4.6.3 Red Cliffs National Conservation Area

4.2.4.6.3.1 Construction Impacts. The Hurricane Cliffs Afterbay to Hurricane West transmission line would be constructed about two miles west and one-half mile south of RCNCA's Hurricane Cinder Knolls area. This construction would have minor, indirect impacts on recreational users in the Hurricane Cinder Knolls area. These impacts would include visual changes, noise, and air pollutants. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission lines. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users in the WSA may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions.

4.2.4.6.3.2 Operation Impacts. The Hurricane Cliffs Afterbay to Hurricane West transmission line operation would have no direct impacts on recreation resources in RCNCA, which are located some distance away. Recreational users would experience minor, indirect impacts from viewing the transmission line.

4.2.4.6.4 Hurricane Cliffs Non-Motorized Trail System

4.2.4.6.4.1 Construction Impacts. The HS-4 Alt. transmission line construction would have no direct impacts on the Hurricane Cliffs Non-Motorized Trail System. This construction would not impede access to, or use of, the trail system.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur along Gould's Trail during transmission line construction. Noise generated during transmission line construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW and would disrupt recreational experiences of trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; recreational users along the roads and trails may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Additional LPP Project construction traffic would occur along the roads and recreational users would experience delays.

4.2.4.6.4.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources of the Hurricane Cliffs Non-Motorized Trail System. These operations would not impede access to, or use of, the trail system. Recreation users of the Gould's Rim Trailhead and Gould's Trail would experience significant, indirect impacts as they view the transmission line in the foreground and middle ground.

4.2.4.6.5 Frog Hollow OHV Area

4.2.4.6.5.1 Construction Impacts. The HS-4 Alt. transmission line construction would have no direct impacts on the Frog Hollow OHV Area. This construction would not impede access to, or use of, the OHV area.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on users of the Frog Hollow OHV area during HS-4 Alt. transmission line construction. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; prevailing winds from the southwest would disperse air pollutants away from the Frog Hollow area. Additional LPP Project construction traffic would occur along the Antelope /Branham Ranch Road and recreational users would experience delays during transmission line construction.

4.2.4.6.5.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on recreation resources of the Frog Hollow OHV area. These operations would not impede access to, or use of, the OHV area. Users of the OHV area would experience significant, indirect impacts as they view the transmission line in the foreground and middle ground.

4.2.4.7 Sand Hollow State Park

4.2.4.7.1 Construction Impacts. The Hurricane Cliffs Afterbay to Sand Hollow transmission line and Sand Hollow to Dixie Springs transmission line construction would have significant, direct impacts on recreation resources within Sand Hollow State Park. The construction would temporarily restrict dispersed recreation activities along the transmission line ROWs, and would temporarily close the Sand Hollow Road.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational resources and users within Sand Hollow

State Park. Noise generated during transmission line construction activities would attenuate to background levels within 1,600 feet of the transmission line ROWs. Air pollutants would mostly disperse to below NAAQS concentrations within the ROW corridor; prevailing winds from the southwest would disperse air pollutants away from Sand Hollow State Park primary use areas. Additional LPP Project construction traffic would occur along the Sand Hollow Road and recreational users in vehicles would experience delays during transmission line construction.

4.2.4.7.2 Operation Impacts. The Sand Hollow to Dixie Springs Transmission Line ROW, a portion of which runs along the north shore of Sand Hollow Reservoir, would be permanently closed to recreation. This permanent closure would be a significant, permanent, direct impact on recreation. Park users would also experience significant, indirect impacts, as they view the transmission lines.

4.2.4.8 Private Recreational Facilities

4.2.4.8.1 Olympus Academy for Youth

4.2.4.8.1.1 Construction Impacts. The HS-4 (Alt.) transmission line construction would have no direct impacts on the Olympus Academy for Youth. This construction would not impede access to, or use of, academy recreation facilities. Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would temporarily affect recreational traffic along the Antelope /Branham Ranch Road between the Olympus Academy for Youth and Utah State Route 59. Indirect impacts from construction noise would attenuate to background levels within 1,600 feet of the sources along the transmission line ROW. Most air pollutants would disperse to below NAAQS concentrations within the construction ROW; prevailing winds from the southwest would disperse residual air pollutants away from the academy. Additional LPP Project construction traffic would temporarily delay academy users in vehicles at each access road intersection with Antelope /Branham Ranch Road and along the road during transmission line construction.

4.2.4.8.1.2 Operation Impacts. LPP Project transmission lines operation would have no direct impacts on the Olympus Academy for Youth. These operations would not impede access to, or use of, academy recreation facilities. Employees and users of the Olympus Academy for Youth would experience minor, indirect impacts as they view the HS-4 (Alt.) transmission line in the middle ground.

4.2.5 Natural Gas Pipeline and Generators Alternative

The Natural Gas Pipeline and Generators Alternative would have the similar impacts to those described for the South Alternative in Section 4.2.1, and the Existing Highway Alternative in Section 4.2.2. The Natural Gas Pipeline and associated structures would be constructed after the LPP and occupy the same ROW. Transmission lines providing power service to pump stations along the Water Conveyance System would be replaced with a natural gas pipeline and generators at the pump stations under this alternative.

4.2.6 No Lake Powell Water Alternative

The No Lake Powell Water Alternative would not construct and operate the LPP. Instead, it would involve construction and operation of reverse osmosis water treatment facilities and associated infrastructure near the Washington Fields Diversion and Warner Valley in the St. George metropolitan area, and eliminate residential outdoor watering in the St. George metropolitan area. Several of the recreation resources that would be affected by the Hydro System alternatives would be affected by the No Lake Powell Water Alternative. The following sections describe the direct and indirect impacts of constructing and operating the No Lake Powell Water Alternative on recreation resources.

4.2.6.1 BLM – St. George Field Office

4.2.6.1.1 Off-Highway Vehicle Use

4.2.6.1.1.1 Construction Impacts. The No Lake Powell Water Alternative construction would have significant, temporary, direct impacts on OHV use and access on public lands administered by BLMSGFO, including motorcycle, ATV, mountain bike, and equestrian events.. The Warner Valley Reservoir, the reverse osmosis water treatment facilities, and brine evaporation ponds would remove about 800 acres of public land from OHV recreational use in the Warner Valley area. These impacts would include access closures and restrictions along gravel and dirt roads and trails in the Warner Valley area. Direct impacts also would occur on OHV recreational users during transmission line construction from the proposed Purgatory Substation to the reverse osmosis water treatment plant site. Temporary detours and closures would affect access to dispersed recreation sites as the transmission line construction proceeds parallel to the Virgin River.

Significant, temporary, indirect impacts, including visual changes, air pollutants, noise, and additional LPP Project construction traffic, would occur on recreational resources along, and users of, Pecon Road near Warner Valley and the Washington Fields Diversion. Noise generated during construction activities would attenuate to background levels within 1,600 feet of the transmission line ROW and would disrupt recreational experiences of OHV and trail users. Air pollutants would mostly disperse to below NAAQS concentrations within the transmission line ROW and work areas; OHV users along the roads and trails surrounding the Warner Valley area may temporarily detect nitrogen dioxide from construction equipment emissions under worst-case conditions. Additional LPP Project construction traffic would occur along the roads and OHV recreational users would experience delays. Off-highway vehicle users would experience significant, indirect impacts as they view construction of the transmission lines, Warner Valley Dam and reservoir, brine evaporation ponds and reverse osmosis water treatment plant. This construction would disrupt the recreational experiences of OHV users.

4.2.6.1.1.2 Operation Impacts. The No Lake Powell Water Alternative operations would have significant, permanent, direct impacts on OHV use of roads and trails in the Warner Valley area, because some roads and trails would be permanently closed. OHV users would experience significant, indirect impacts from viewing the transmission line, Warner Valley Dam and reservoir, brine evaporation ponds and reverse osmosis water treatment plant. Viewing these structures would disrupt the recreational experiences of OHV users. See the Visual Resources Study Report 16 (UBWR 2016) for additional impact analysis concerning the appearance of No Lake Powell Water Alternative structures.

4.2.6.1.2 Sand Mountain Special Recreation Management Area.

4.2.6.1.2.1 Construction Impacts. The No Lake Powell Water Alternative construction would have significant, temporary, direct impacts on open riding opportunities and technical trails suitable for full-size 4x4s in the western portion of the Sand Mountain SRMA. The reverse osmosis water treatment plant, Warner Valley Dam and Reservoir, and brine evaporation ponds would be constructed within the SRMA boundary. Construction of these features would have direct impacts on recreation use of about 290 acres (1.4 percent of 20,709 acres) of the SRMA as the construction occurs in the Warner Valley area. Construction would also disrupt access to the SRMA via the Washington Dam Road trailhead and Warner Valley Road trailhead. No recreation activities would be allowed in the area surrounding the reverse osmosis water treatment plant, Warner Valley Reservoir, and the brine evaporation ponds during construction.

Significant, temporary, indirect impacts including visual changes, air pollutants, noise, and additional LPP Project construction traffic would occur on recreational resources within the Sand Mountain SRMA.

Noise generated during construction activities would attenuate to background levels within 1,600 feet of the heavy equipment construction sources and would disrupt recreational experiences of SRMA users. Air pollutants would mostly disperse to below NAAQS concentrations within the construction area and along the transmission line corridor. Additional LPP Project construction traffic would occur along Pecon Road and recreational users would experience delays.

4.2.6.1.2.2 Operation Impacts. The No Lake Powell Water Alternative operation would have significant, permanent, direct impacts on recreational use of the Sand Mountain SRMA. Approximately 290 acres (1.4 percent of 20,709 acres) of land in the western portion of the SRMA would be permanently removed from recreational access and use.

The No Lake Powell Water Alternative operation would also have significant, permanent, indirect impacts on recreational users in the Sand Mountain SRMA. Recreation resource users within the remaining SRMA would experience indirect impacts as they view the transmission lines, reverse osmosis water treatment plant, Warner Valley Dam and Reservoir, and the brine evaporation ponds. Viewing these structures would disrupt the recreational experiences of OHV users. In addition, users of the SRMA in the vicinity of the brine evaporation ponds would detect odors as the brine evaporates from the ponds.

4.2.6.2 Private Recreational Facilities

4.2.6.2.1 Sand Hollow Resort

4.2.6.2.1.1 Construction Impacts. The No Lake Powell Water Alternative features and facilities construction would have no direct impacts on the Sand Hollow Resort.

Minor, temporary, indirect impacts, including air pollutants, and additional LPP Project construction traffic would affect recreational use of the Sand Hollow Resort. Indirect impacts from construction noise would attenuate to background levels within 1,600 feet of the sources, which would be more than one mile away from the resort. Most air pollutants would disperse to below NAAQS concentrations within the transmission line ROW and construction areas; however, prevailing winds from the southwest would disperse residual air pollutants including nitrogen dioxide toward the resort. Additional LPP Project construction traffic would temporarily delay recreational users in vehicles along Pecon Road. Recreation users of the resort vicinity would experience temporary, indirect impacts as they view construction of Warner Valley Dam and other infrastructure constructed as part of the No Lake Powell Water Alternative.

4.2.6.2.1.2 Operation Impacts. The No Lake Powell Water Alternative operations would have no direct impacts on recreation resources of the Sand Hollow Resort. These operations would not impede access to, or use of, the resort.

4.2.6.3 Residential Landscapes, Public Parks and Landscaped Common Areas

Unlike the LPP action alternatives, the No Lake Powell Water Alternative would result in eliminating residential outdoor watering with potable water. This would have significant, indirect impacts on recreation throughout the St. George metropolitan area. Existing and future residential landscapes would be non-irrigated landscapes with no shade trees, ornamental shrubs, lawns or other vegetative cover typically growing in residential areas within the St. George metropolitan area. Recreational pursuits, including walking, running, playing games, and sports activities on residential lots and in public parks and landscaped common areas would be adversely impacted because the vegetation supporting these areas would become non-irrigated landscapes. Public parks with artificial turf would not be affected by eliminating residential outdoor watering.

4.2.7 No Action Alternative

The No Action Alternative would not have any construction or operation impacts on recreation resources within the LPP Project study area. No construction would occur and no operational activities would occur.

Chapter 5
Mitigation and Monitoring

This chapter describes mitigation and monitoring measures to avoid, minimize, or reduce impacts of LPP Project construction, and operation and maintenance, on recreation resources. Many of these measures would be incorporated into project "Standard Construction Procedures" (SCPs) to be used in the field as LPP Project features and facilities are being constructed.

5.1 General Mitigation Measures

The following protection, mitigation and enhancement measures would be applicable to all LPP Project features and facilities:

5.1.1 Noise

All construction equipment would be equipped with manufacturer's standard noise control devices (i.e., mufflers, acoustical lagging, and/or engine enclosures). All construction equipment would be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices.

Construction equipment would be operated conservatively, which means the operator would take special care not to throttle the engine excessively and would keep engine speed as low as possible. In addition, the operator would not leave the equipment running or idling needlessly.

When construction occurs in the vicinity of occupied residences located within 0.5 mile of the project, the occupants would be notified of the construction schedule with a written letter. To the extent possible, construction would occur during daytime hours within 0.5 mile of the residences to minimize the impacts from construction noise. Where campgrounds are located within 0.5 mile of the project, signage would be posted indicating the construction schedule.

5.1.2 Air Quality

Dust control permits would be obtained for each construction contract in accordance with local, county and/or state requirements. The permits would contain a Dust Control Plan listing all construction activities that would occur and the BMPs that would be used to mitigate construction dust. The BMPs would include site-specific dust control measures that are based on each project soil type, specific construction activities, phases and stages. They would include:

- Moisture conditioning of construction materials
- Controlling dust on construction access roads
- Covering or stabilizing soil with vegetation
- Using phased construction
- Limiting size of ingress and egress points
- Limiting size of staging areas
- Limiting vehicle speeds on the work site
- Proactive measures to prevent unauthorized access to disturbed areas

UDWRe would comply with all requirements of air quality and applicable dust control permits.

Any dust palliative, dust suppressant, or tackifier used within threatened and endangered species habitat or active drainages would be approved by the BLM or NPS and USFWS prior to use. Operating permits would be obtained as required from the local county and/or the state for stationary sources as necessary, such as aggregate rock handling equipment, rock crushers, conveyors, and screening equipment which may emit particulate matter. UDWRe would comply with all requirements of the operating permits.

Active construction sites and unpaved roads used for construction would be watered daily or chemical dust suppression approved by the BLM or NPS would be applied, as needed, to maintain effective dust control.

5.1.3 Visual Resources

Landscape berms would be constructed and vegetated with endemic vegetation species at specific facility sites on BLM, NPS and Reclamation-administered public lands to help screen public views of the LPP Project facilities.

Proposed electrical power transmission line alignments would be parallel to existing transmission or distribution lines to the extent practical to minimize new effects of proposed transmission lines on the visual landscape.

Proposed electrical power transmission line alignments would be parallel to existing electrical power transmission lines and would be aligned within a preferred West Wide Energy Corridor (Section 368 corridor 68-116), as designated and documented in the *Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States* (DOE and BLM 2008) to the extent practical.

Transmission line towers would be constructed with self-weathering steel or dull-galvanized steel to reduce visual resource impacts. Non-reflective, non-specular conductors would be installed to reduce visual resource impacts.

Rock cuts and other construction areas along the ROW in sensitive visual areas or landscapes would be painted or sprayed with an artificial desert varnish following construction completion to reduce the visual contract and restore the appearance of natural desert varnish. Application rates and color tint would be site-specific. Any artificial desert varnish used for visual resource impact mitigation purposes would be approved by the BLM or NPS prior to use.

Pumping stations, water treatment facility, buried storage reservoir, hydroelectric generating stations, substations and other project facilities would utilize architectural details and be painted or constructed of colored block or colored materials to blend with the colors of the surrounding landscape, per BLM Manual 8400 – Visual Resources Management. Architectural details would be approved as part of local building permit approvals.

Lighting needed to conduct construction at night would be limited to the basic requirements to conduct the work. Lighting would be shielded, and directed down towards the site and not into surrounding areas (particularly the Cockscomb and Wahweap WSAs) or onto roads.

Nighttime lighting during project operations at the pumping stations, hydroelectric generating stations, regulating tank, and electrical substations would either be manually controlled and used only when occupied or be motion activated if needed for safety and security. Lighting would be shielded and directed downwards and towards the facility site.

5.1.4 Recreation Resources

Landscape berms would be constructed and vegetated with endemic vegetation species at specific facility sites on BLM, NPS and Reclamation-administered public lands to help screen public views of the LPP Project facilities.

Proposed electrical power transmission line alignments would be parallel to existing transmission or distribution lines to the extent practical to minimize new effects of proposed transmission lines on the visual landscape.

Proposed electrical power transmission line alignments would be parallel to existing electrical power transmission lines and would be aligned within a preferred West Wide Energy Corridor (Section 368 corridor 68-116), as designated and documented in the *Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States* (DOE and BLM 2008) to the extent practical.

Transmission line towers would be constructed with self-weathering steel or dull-galvanized steel to reduce visual resource impacts. Non-reflective, non-specular conductors would be installed to reduce visual resource impacts.

Rock cuts and other construction areas along the ROW in sensitive visual areas or landscapes would be painted or sprayed with an artificial desert varnish following construction completion to reduce the visual contract and restore the appearance of natural desert varnish. Application rates and color tint would be site-specific. Available artificial desert varnish materials used for visual resource impact mitigation purposes would be approved by the BLM or NPS prior to use.

Pumping stations, water treatment facility, buried storage reservoir, hydroelectric generating stations, substations and other project facilities would utilize architectural details and be painted or constructed of colored block or colored materials to blend with the colors of the surrounding landscape, per BLM Manual 8400 – Visual Resources Management. Architectural details would be approved as part of local building permit approvals.

Lighting, if temporarily needed to perform construction at night, would be limited to the basic requirements to conduct the work. Lighting would be shielded, and directed down towards the site and not into surrounding areas or onto roads.

5.1.5 Best Management Practices

UDWRe would complete a detailed Plan of Development (POD) for the final project affecting BLM-administered land. The detailed POD would incorporate mitigation contained in the BLM Record of Decision and provide detailed project design and construction specifics, including but not limited to construction contract timing and phasing, construction access roads and ROW entry points, and other details. The POD would contain detailed plans, including, but not limited to, those listed below. The BLM would review and approve the POD prior to notice to proceed for any surface disturbance activity within the BLM ROW permit. Each of the following plans and strategies will be prepared as part of the final POD.

- Agency Coordination Plan – primary contacts including BLM authorized officer, UDWRe, construction management, environmental compliance inspection contractor, and construction contractors; identification of reporting procedures and frequency.

- Construction Plan – construction schedule, access roads, borrow pits, best management practices, vehicle/equipment washing locations, etc.
- Construction Traffic Management Plan – measures to reduce and manage construction traffic.
- Dust Control Plan – air quality standards and permits, dust control measures, general water sources, air quality monitoring, and reporting.
- Emergency Response Plan – emergency contacts, notification procedures, available resources, and emergency procedures.
- Integrated Weed Management Plan – management of areas with noxious/invasive weeds, treatment and control measures, monitoring, and reporting.
- Mitigation Plan – summary of environmental commitments and mitigation measures, responsible parties, timing, and reporting.
- Public Information Plan – public notification measures.
- Restoration Plan –topsoil (growth medium) and vegetative cover salvage, stockpiling and replacement; plant salvage, maintenance and replacement, seeding, soil stabilization, and post-construction monitoring.
- Spill Prevention, Control, and Countermeasure Plan – procedures for storage and handling of hazardous and toxic materials, necessary permits, spill response and cleanup.
- Stormwater Pollution Prevention Plan – erosion and sediment control measures, compliance inspections and reporting.

The Construction Plan would describe a process under which changes from the POD can be requested in the field during construction.

UDWRe would provide a Compliance Inspector (CI) for the project. The CI would provide environmental oversight and compliance/regulatory activities for the permitee during LPP Project construction activities. The CI would be responsible for ensuring that the permitee complies with all terms, conditions, stipulations and other measures required for the project, and would have the authority to halt activities that are in non-compliance.

A pre-construction meeting between permitting agencies, UDWRe, CI, and the construction contractor would be required prior to any surface disturbing activity occurring. The CI would provide reports to permitting agencies on a schedule based upon the type of ongoing construction activity, and as described in the approved Agency Coordination Plan.

All activities directly or indirectly associated with the construction of the project on BLM- or NPS-administered land would be conducted within the authorized limits of the ROW grant. Any facility relocation, additional construction area, or other use on BLM- or NPS-administered land that is not in accord with the ROW grant would not be initiated without prior approval of BLM or NPS. Cross-country vehicular travel outside of the ROW would be prohibited, unless prior approval is obtained from the BLM.

UDWRe would notify each BLM field office (ASFO, KFO, Grand Staircase-Escalante Field Office, and SGFO) and the NPS GCNRA office at least 10 days before initiation of project construction. Notification would be made to the designated BLM or NPS representative.

A worker education program would be developed by UDWRe and used during construction. It would be presented to all personnel who would be on-site, including but not limited to contractors, contractor's employees, supervisors, inspectors, and subcontractors. A handout would be developed addressing environmental protection measures incorporated into the proposed project, and the responsibility of each worker in environmental protection. Each worker would be briefed on his or her environmental compliance responsibilities, provided a handout, and required to sign a certification that he or she understands and would comply with those environmental protection measures.

A Public Information Plan would be developed by UDWRe in coordination with permitting agencies to notify the public and appropriate agencies in advance of the start of each construction phase. Measures that would be implemented to inform the public would include public notices, public meetings, letters to nearby residents, road signs, and other measures.

5.1.6 Fencing

Range improvements, including fence lines and cattle guards, located within the ROW and along designated access roads would be documented prior to the start of construction. If range improvements are temporarily removed or damaged as a result of construction, they would be repaired to existing BLM or NPS standards and be functional upon completion of construction.

Temporary security fencing would be used as applicable to enclose staging areas and facility sites during construction. This fencing would consist of standard 6- to 8-foot high chain-link fencing and would be removed at the completion of construction activities. Security fencing of the entire pipeline ROW during construction is not anticipated, but may be used in specific areas for security or safety concerns.

Temporary construction fencing would be installed as necessary for management of sensitive big game species. The type and location of fencing would be coordinated with the Utah Division of Wildlife Resources and other wildlife management agencies as applicable.

5.1.7 Access Roads

A Construction Traffic Management plan would be developed and coordinated with BLM or NPS and other relevant state and local authorities prior to the start of construction for each major phase of the project. The plan would include measures to reduce the number of construction trips, scheduling of work shifts and materials deliveries, designation of access routes, and other measures to minimize traffic effects. The plan would also take into account active seasons for hunting, camping, and/or other recreational activities that occur within the same time and place as each phase of construction.

While driving on paved roads or marked dirt roads, posted speed limits would be maintained. While driving within the construction area, on un-posted dirt roads, a maximum speed limit of 25 miles per hour would be required to reduce dust and allow for observation and avoidance of wildlife, livestock or visitors in the road.

Public access routes within or crossing the ROW would be maintained or detour routes would be identified during construction activities. Detours needed for temporary road closures because of safety concerns would be established in coordination with permitting agencies and local authorities.

Signing and traffic controls would be placed well in advance of the construction area to warn motorists of detour routes available during construction.

Signs and persons with flags would be used within the construction area as necessary to direct traffic in accordance with all applicable Utah Department of Transportation, Arizona Department of Transportation, county, and local rules and ordinances.

Sediment transported onto a public paved road surface by construction equipment or other vehicles would be removed immediately. This material would be disposed at an approved area within the ROW. Road washing would be allowed after the sediment is removed.

Vehicle washing facilities would be installed at vehicle ingress and egress locations between unpaved roads (within the permanent ROW and temporary construction easement (TCE)) and paved roads (outside the permanent ROW and TCE). Excess dirt on the wheels, undercarriage, and bodies of trucks exiting work areas would be removed to reduce track-out of soils, debris, and invasive and noxious weeds. UDWRe's CI would supervise and monitor use of the vehicle washing facilities.

During construction, all unpaved access roads used by construction personnel, equipment, and materials deliveries would be maintained in coordination with agency permit requirements. This maintenance may include use of additional road base materials to maintain road integrity.

At the completion of construction, previously existing access roads would be restored to pre-construction conditions or better. Improvements made for construction would be left in place.

5.1.8 Restoration

A detailed Restoration Plan would be prepared and submitted to permitting agencies for approval prior to the start of construction. The portion of the plan pertaining to restoration in listed species habitat would be in accordance with approved study reports and permits and submitted to USFWS for approval. The Restoration Plan would describe reclamation and rehabilitation objectives and methods to be used, species of plants and/or seed mixture to be used, time of planting, success standards, and follow-up monitoring.

Signs indicating that restoration activities are being conducted would be installed where needed to deter public off-road vehicular damage to restored areas. Placement and design of signs would be coordinated with permitting agencies and identified in the Restoration Plan.

5.2 South Alternative

In addition to the measures described above, the following protection, mitigation, and enhancement measures are applicable to the South Alternative:

- Construction flaggers would be used as applicable to manage public vehicle access during construction activities at and near recreation sites to avoid or minimize risks to recreationists and construction personnel.
- LPP Project access roads to surface facilities and following pipeline and transmission line right-of-way would have access controls (locked gates) wherever possible.
- LPP Project monitoring, operations and maintenance vehicles would be restricted to safe operating speeds according to road locations.
- The Toadstools Trailhead parking area would be restored immediately after LPP Project construction in the vicinity is complete, in coordination with GSENM recreation management and other resource specialists, as applicable.

- The GWT south parking area would be restored immediately after LPP construction in the vicinity is complete, in coordination with the GSENM recreation management specialist and other resource specialists, as applicable. Mitigation measures for permanent effects on BLM SGFO non-motorized trails include replacing horse riding trails in-kind on nearby BLM land, constructing new horse trailer loading and unloading ramps and trailer-vehicle parking areas on BLM land, constructing mountain bike trails in-kind on nearby BLM land, and constructing new vehicle parking areas for mountain bike enthusiasts adjacent to the replaced mountain bike trails. The SGFO recreation mitigation measures would be specifically designed and constructed in coordination with the BLM SGFO recreation management specialist and other resource specialists, as applicable.
- Effects on the Sand Mountain SRMA would be mitigated using a combination of on-site and off-site measures. On-site measures would include: 1) Maintaining vehicle access during and after construction through and/or around all LPP development; 2) Developing an ATV trailhead (trailer parking, restroom, information kiosk with maps and other interpretation) south of Hurricane, but north of the Hurricane Cliffs afterbay; and 3) Developing an ATV trailhead at Washington Dam Road. If this trailhead has already been developed, expand access in this area by constructing new ATV trails that access upper Sand Mountain. Off-site mitigation would include developing maps and other interpretation for recreation in the Sand Mountain vicinity. The Sand Mountain SRMA recreation mitigation measures would be specifically designed and constructed in coordination with the BLM SGFO.

5.3 Existing Highway Pipeline Alternative

The Existing Highway Alternative would have the same protection, mitigation and enhancement measures for recreation resources as described in sections 5.1 and 5.2.

5.4 Southeast Corner Pipeline Alternative

The Southeast Corner Alternative would have the same protection, mitigation and enhancement measures for recreation resources as described in sections 5.1 and 5.2.

5.5 Transmission Line Alignments

The Transmission Line Alignments would have the same protection, mitigation and enhancement measures for recreation resources as described in sections 5.1 and 5.2.

5.6 Natural Gas Pipeline and Generators Alternative

The Natural Gas Pipeline and Generators Alternative would have protection, mitigation and enhancement measures for recreation resources similar to those described in sections 5.1 and 5.2.

5.7 No Lake Powell Water Alternative

The No Lake Powell Water Alternative would have protection, mitigation and enhancement measures for recreation resources similar to those described in sections 5.1 and 5.2.

5.8 No Action Alternative

No features or facilities would be constructed, operated or maintained under the No Action Alternative, therefore no mitigation or monitoring would be required.

Chapter 6
Unavoidable Adverse Impacts

This chapter describes unavoidable adverse impacts from construction, operation and maintenance of the LPP Project alternatives. Unavoidable adverse impacts are those remaining after application of mitigation and monitoring measures described in Chapter 5. Only resources that would have unavoidable adverse impacts are described here. Unavoidable adverse impacts may not meet or exceed the significance criterion.

6.1 South Alternative

6.1.1 Construction Phase

6.1.1.1 Existing and Proposed Recreation Facilities and Use

6.1.1.1.1 Direct Impacts. Construction of the Hurricane Cliffs afterbay reservoir would permanently remove about 200 acres of the Sand Mountain Special Recreation Management Area from recreation use. Construction of the penstock from the Hurricane Cliffs afterbay reservoir to the Sand Hollow Hydro Station would temporarily restrict recreational use of 60 acres of the Sand Mountain SRMA for about 3.8 miles along the penstock right-of-way. The permanent removal of 200 acres of the Sand Mountain SRMA from recreational use would be an unavoidable adverse impacts on recreation resources.

Recreation access to existing and proposed recreation facilities from Highway 89, Highway 89A, Arizona Route 389, Utah State Route 59 and Utah State Route 9 would be temporarily restricted or closed during pipeline, penstock and facility construction at the access points. Recreation users would be delayed or unable to access specific recreation sites for up to a maximum of 8 hours, which would be an unavoidable adverse impacts on recreation resources.

6.1.1.1.2 Indirect Impacts. Recreation resource users would experience residual noise, air pollutants from heavy equipment emissions, additional LPP Project construction traffic along highways and roads, and changes in views during recreational activities pursued adjacent to active construction at specific facility sites and along pipeline rights-of-way. These indirect impacts would be unavoidable adverse impacts on recreation resource users.

Recreation resource users would experience additional LPP Project construction traffic and changes in views during recreational activities pursued adjacent to Proposed Action pump stations, hydro stations, regulating tanks, the forebay reservoir, and afterbay reservoir during operations. These indirect impacts would be unavoidable adverse impacts on recreation resource users.

6.1.2 Operation Phase

6.1.2.1 Existing and Proposed Recreation Facilities and Use

6.1.2.1.1 Direct Impacts. Operation of the Hurricane Cliffs afterbay reservoir and hydropower station would have direct impacts on recreational use of the Sand Mountain SRMA. The afterbay reservoir would not be available for recreational use because the water levels would fluctuate rapidly and would be unsafe for public recreation activities. This would be an unavoidable adverse impact on recreation resources. The afterbay reservoir would not be designed for regular water discharge through a spillway; however, the afterbay reservoir would have an emergency spillway that would discharge water during emergency conditions and cause temporary flooding down-gradient (south) of the afterbay and affect recreational use

of that portion of the Sand Mountain SRMA. This would be an unavoidable adverse impact on recreation resources.

6.1.2.1.2 Indirect Impacts. Recreation resource users would experience additional LPP Project construction traffic and changes in views during recreational activities pursued adjacent to LPP Project pump stations, hydro stations, regulating tanks, the forebay reservoir, and afterbay reservoir. These indirect impacts would be unavoidable adverse impacts on recreation resource users.

6.2 Existing Highway Alternative

6.2.1 Construction Phase

6.2.1.1 Existing and Proposed Recreation Facilities and Use

The unavoidable adverse direct and indirect impacts described in Section 6.1.1.1 for the South Alternative would be the same for the Existing Highway Alternative. Additional unavoidable adverse impacts of the Existing Highway Alternative on recreation resources are presented in the following sections.

6.2.1.1.1 Direct Impacts. Construction of the penstock adjacent to the Fredonia Welcome Center would temporarily close recreational access to the center. The lost recreational opportunity during closure of the Fredonia Welcome Center would be an unavoidable adverse impact on recreation resources.

Recreation access to the Kaibab-Paiute Tribe Campground and RV Park and PSNM would be interrupted during penstock construction. Recreation use access would be provided by temporary bypasses to access these sites for up to a maximum of 8 hours, which would be an unavoidable adverse impacts on recreation resources.

6.2.1.1.2 Indirect Impacts. Recreation resource users at the Kaibab-Paiute Tribe Campground and RV Park and at PSNM would experience residual noise and air pollutants, such as nitrogen dioxide and sulfur dioxide, from heavy equipment during penstock construction. These users would also experience changes in views. Recreationists accessing Pipe Springs Road from Highway 389 would experience temporary delays during penstock construction. These indirect impacts would be unavoidable adverse impacts on recreation resources users.

6.2.2 Operation Phase

6.2.2.1 Existing and Proposed Recreation Facilities and Use

6.2.2.1.1 Direct Impacts. LPP operations would have no unavoidable adverse direct impacts on recreation resources.

6.2.2.1.2 Indirect Impacts. Recreation resource users would experience a change in views toward HS-2 Highway from the Arizona Strip Pull-Off and from Arizona Route 389. This indirect impact would be an unavoidable adverse impact on recreation resource users.

6.3 Southeast Corner Pipeline Alternative

Unavoidable adverse impacts would be the same as described in Section 6.1.

6.4 Transmission Line Alignments

6.4.1 Construction Phase

6.4.1.1 Existing and Proposed Recreation Facilities and Use

6.4.1.1.1 Direct Impacts. Construction of the transmission line alignments would result in temporary access delays or closures to recreation resource sites where access roads would be crossed by the transmission lines. These temporary direct impacts would be unavoidable adverse impacts.

6.4.1.1.2 Indirect Impacts. Recreation resource users would experience residual noise, air pollutants from heavy equipment emissions, additional LPP Project construction traffic along highways and roads, and changes in views during recreational activities pursued adjacent to active construction at specific facility sites and along transmission line rights-of-way. These indirect impacts would be unavoidable adverse impacts on recreation resource users.

6.4.2 Operation Phase

6.4.2.1 Existing and Proposed Recreation Facilities and Use

6.4.2.1.1 Direct Impacts. LPP operations of transmission lines would have no unavoidable adverse direct impacts.

6.4.2.1.2 Indirect Impacts. Recreation resource users of recreation sites along transmission line rights-of-way would experience indirect impacts as they view the transmission lines.

6.5 Natural Gas Pipeline and Generators Alternative

Unavoidable adverse impacts would be the similar to those described in Section 6.1.

6.6 No Lake Powell Water Alternative

6.6.1 Construction Phase

6.6.1.1 Existing and Proposed Recreation Facilities and Use

6.6.1.1.1 Direct Impacts. Construction of the No Lake Powell Water Alternative including the Warner Valley Reservoir, brine evaporation ponds and a reverse osmosis water treatment plant would permanently remove 290 acres of BLM SGFO OHV area and recreation resource use from the Sand Mountain SRMA. This would be an unavoidable adverse impact on recreation resources.

6.6.1.1.2 Indirect Impacts. Temporary indirect impacts including noise, air pollutants, additional LPP Project construction traffic and changes in visual resources would occur on recreational resources within the Sand Mountain SRMA, which would be unavoidable adverse impacts on recreation resource users.

6.6.2 Operation Phase

6.6.2.1 Existing and Proposed Recreation Facilities and Use

6.6.2.1.1 Direct Impacts. Operation of the No Lake Powell Water Alternative would permanently remove 290 acres of the Sand Mountain SRMA from recreation resource use, which would be an unavoidable adverse impact.

6.6.2.1.2 Indirect Impacts. Recreation resource users within the Sand Mountain SRMA would experience indirect impacts as they view the transmission lines, the reverse osmosis water treatment plant, Warner Valley Dam and Reservoir and the brine evaporation ponds. Recreation resource users of the Sand Mountain SRMA in the vicinity of the brine evaporation ponds would detect odors in the air as the brine evaporates from the ponds. These indirect impacts would be unavoidable adverse impacts.

Eliminating residential outdoor watering would have permanent unavoidable adverse indirect impacts on recreation use of residential properties, public parks and landscaped common areas. The outdoor watering cessation would lead to replacing traditional residential landscapes with non-irrigated landscapes that would not support typical residential outdoor recreation activities.

6.7 No Action Alternative

The No Action Alternative would not cause unavoidable adverse impacts.

Chapter 7
Cumulative Impacts

This chapter analyzes cumulative impacts that may occur from construction and operation of the proposed completed LPP Project when combined with the impacts of other past, present and foreseeable future actions and projects after all proposed mitigation measures are implemented. Only those projects with the potential to contribute to cumulative impacts are analyzed in this chapter.

Cumulative impacts may be defined as those that result from the incremental impacts upon a resource from interaction of two or more individual actions. For the purposes of this study report, the cumulative impact analysis is based on identifying past, present and future projects that may occur in and around the recreation resources study area. Past, present and reasonably foreseeable future projects are examined to determine if they would have cumulative impacts on recreation resources in the study area when combined with impacts of the LPP Project.

The Arizona and Utah SCORPs indicate that the resident population would continue to grow in the counties comprising the recreation resources area of potential effect. Population growth is expected to be especially rapid in the St. George metropolitan area. As the population grows, so would its demand for outdoor recreation. Population growth and a corresponding increase in demand for recreation would result in higher occupancy rates for existing recreation facilities in the LPP recreation resources area of potential effect. This cumulative impact would apply to all of the geographic areas and alternatives evaluated in this chapter.

Surveys performed as part of the SCORP process revealed that residents in the counties comprising the recreation resources study area desired trails, water-related parks, OHV use areas, and interpretive features. It is expected that these facilities would be built over time in the recreation resources area of potential effect, which would alleviate crowding at existing facilities.

The 1999 GSENM Management Plan states that the BLM and Utah Department of Transportation will explore the possibility of developing bicycle lanes or parallel bicycle routes along Highway 89. The BLM will look for appropriate opportunities to highlight GSENM resources along Highway 89, around the communities of Church Wells and Big Water. Furthermore, additional recreational opportunities may be developed to accommodate all visitors, and focus on learning about geology, history, archaeology, biology, paleontology, and scenic viewing. Short interpretive trails and scenic overlooks will be developed as well. These potential actions by the BLM could have cumulative impacts on recreation resources when combined with the impacts of the LPP Project alternatives construction. These potential cumulative impacts on recreation resources would be short-term.

Past, present and future projects included in the cumulative impact analysis are described in Section 7.1.

7.1 Actions and Projects Included in the Cumulative Impact Analysis

7.1.1 Past and Present Actions and Projects

The historic period of southern Utah and northern Arizona began with early exploration by Spanish explorers who were looking for a trail to connect their colonies in New Mexico with those in California. These efforts began with the Dominguez-Escalante Expedition in 1776, followed by Armijo in 1829 to 1830 and the establishment of the Spanish Trail in 1830 by Wolfskill. Later, exploring parties consisted of trappers looking for furs and then by U.S. government and scientific expeditions evaluating new routes and territories.

With the arrival of Mormon pioneers in 1849 to 1850, permanent European-American settlement of the area soon followed. The Mormon Wagon Road was established as the primary transportation route between Salt Lake City and Los Angeles. The settlement of Iron and Washington counties was carried out, for the most part, under the direction and supervision of Mormon Church leaders in Salt Lake City. During the settlement period, these efforts were under the direction of Brigham Young from 1850 to 1876. The Old Arizona Road and Mormon Honeymoon Trail completed in the 1870s functioned as transportation routes connecting the southern Utah settlement of St. George to settlements in northern and central Arizona.

Agriculture was a primary component of the St. George area economy and iron ore mining and processing dominated the Cedar City economy through the 1890s. The Hurricane Canal, completed in 1904, diverted Virgin River water into the Hurricane Bench area, which became a productive agricultural community that continues to produce fruit, nuts and other crops today. The Dixie National Forest was created in 1903 and Indian Reservations were established in the region between 1913 and 1917. Cattle and sheep ranching became important components of the local and regional economy. National Parks were established in southern Utah and northern Arizona in 1919 (Zion and Grand Canyon) and 1928 (Bryce Canyon). The Mormon Wagon Road was improved to become the Arrowhead Trail, upgraded to Highway 91 and eventually was incorporated into Interstate 15. Portions of the Old Arizona Road were combined with portions of U.S. Route 89 to form an east-west transportation corridor from St. George through the Kaibab-Paiute Indian Reservation to Fredonia, Kanab and Page.

The U.S. Congress authorized construction of Glen Canyon Dam in 1956 as a key component of the Colorado River Storage Project. The dam began impounding water in 1963, creating Lake Powell, the second largest reservoir in the U.S. The development of Lake Powell allowed the Upper Colorado River Basin states of Utah, Wyoming, Colorado and New Mexico to utilize their share of the Colorado River, especially during drought periods, and provided the required delivery of water to the Lower Basin states of Arizona, Nevada and California, and to Mexico to fulfill water delivery obligations under the 1944 Water Treaty. Glen Canyon National Recreation Area was formally established in 1972.

The 1.9 million acre Grand Staircase-Escalante National Monument was established by presidential executive order in 1996. Highway 89 crosses through the southern portion of the monument. The U.S. Congress designated a utility corridor along Highway 89 through the monument in 1998.

Ranching and grazing in southern Utah and northern Arizona continue to be significant components of the regional economy; however, the growth of tourism has created a large service economy, primarily because of the popular nearby national park and recreation areas including Glen Canyon, Grand Canyon, Zion and Bryce Canyon. Tourism has gradually become the economic mainstay of southern Utah and northern Arizona.

The Southern Corridor is a four-lane/two-lane, limited-access highway beginning at Interstate 15 (I-15) near the southwest end of St. George about 2 miles from the Arizona border at the Atkinville interchange and connects with state Route 9 (S.R. 9) at about 2800 West, near Hurricane. UDOT planned the highway project to be compatible with the surrounding natural and built environments. UDOT filed the Southern Corridor Final Environmental Impact Statement (EIS) on April 23, 2005. The Southern Corridor Highway has been constructed and is in partial service from I-15 to S.R. 9. Future planned construction includes expanding the highway from 2 lanes to 4 lanes throughout its length.

7.1.2 Foreseeable Future Actions and Projects

7.1.2.1 Glen Canyon National Recreation Area

The National Park Service issued an Environmental Assessment in April 2004, analyzing potential impacts from proposed development of a new pump station that would be located in the Chains Recreation Area (NPS, 2009b). The pump station and associated conveyance pipeline would be constructed and operated by the City of Page, Arizona, to augment its existing water supply system.

7.1.2.2 Grand Staircase-Escalante National Monument

The 1999 GSENM Management Plan states that the BLM and Utah Department of Transportation will explore the possibility of developing bicycle lanes or parallel bicycle routes along US Highway 89. The BLM will look for appropriate opportunities to highlight GSENM resources along US Highway 89, around the communities of Church Wells and Big Water. Furthermore, additional recreational opportunities may be developed to accommodate all visitors, and focus on learning about geology, history, archaeology, biology, paleontology, and scenic viewing. Short interpretive trails and scenic overlooks will be developed as well.

The LPP Project alternatives would have minor, short-term cumulative impacts on recreation-based vehicle traffic along Highway 89 during pipeline construction.

7.1.2.3 BLM St. George Field Office

Rapid population growth and urban development in the vicinity of St. George is displacing OHV use. These OHV users, in turn, are recreating on other portions of BLM land administered by SGFO, which is frequented by mountain bikers, hikers, and other non-motorized users. Conflicts between these user groups are increasing. The LPP Project alternatives impacts on recreation resources in the Sand Mountain SRMA would further increase conflicts between user groups because of reduced recreation area. This would be a long-term moderate cumulative impact on recreation resources.

The approximately 629,000 acres of public land within the administrative boundary of the SGFO are designated as “open to OHV use”, “open for OHV use on existing or designated roads/trails”, or “closed to OHV use”. In the draft amendment to the SGFO resource management plan (BLM, 2015) approximately 3 percent (21,442 acres; a decrease of 10 percent relative to existing conditions) of these lands are open to OHV use; approximately 76 percent (474,913 acres; an increase of 11 percent relative to existing conditions), are open for OHV use on existing or designated roads/trails; and approximately 21 percent (132,416 acres; a decrease of 1 percent relative to existing conditions) are closed to OHV use.

7.1.2.4 Kern River-Hurricane Natural Gas Pipeline – Questar Gas Company

Questar Gas Company is proposing a natural gas pipeline from the existing Kern River Gas Pipeline to Hurricane, Utah. One alternative follows State Route 18 to the Southern Parkway where it turns north and follows it to Hurricane, Utah. The second alternative runs south of Gunlock Reservoir to State Route 8, where it then follows to the Southern Parkway. It then follows the Southern Parkway north to Hurricane. There are two proposed gate stations associated with this new gas pipeline. One is on the southeast end of Sand Hollow Reservoir and the other is near the Hurricane City Power Substation just east of the intersection of N 200W and W 600 N. The natural gas pipeline is anticipated to be operational by 2019.

Based on the limited available information, this project should be included in the cumulative impacts analysis.

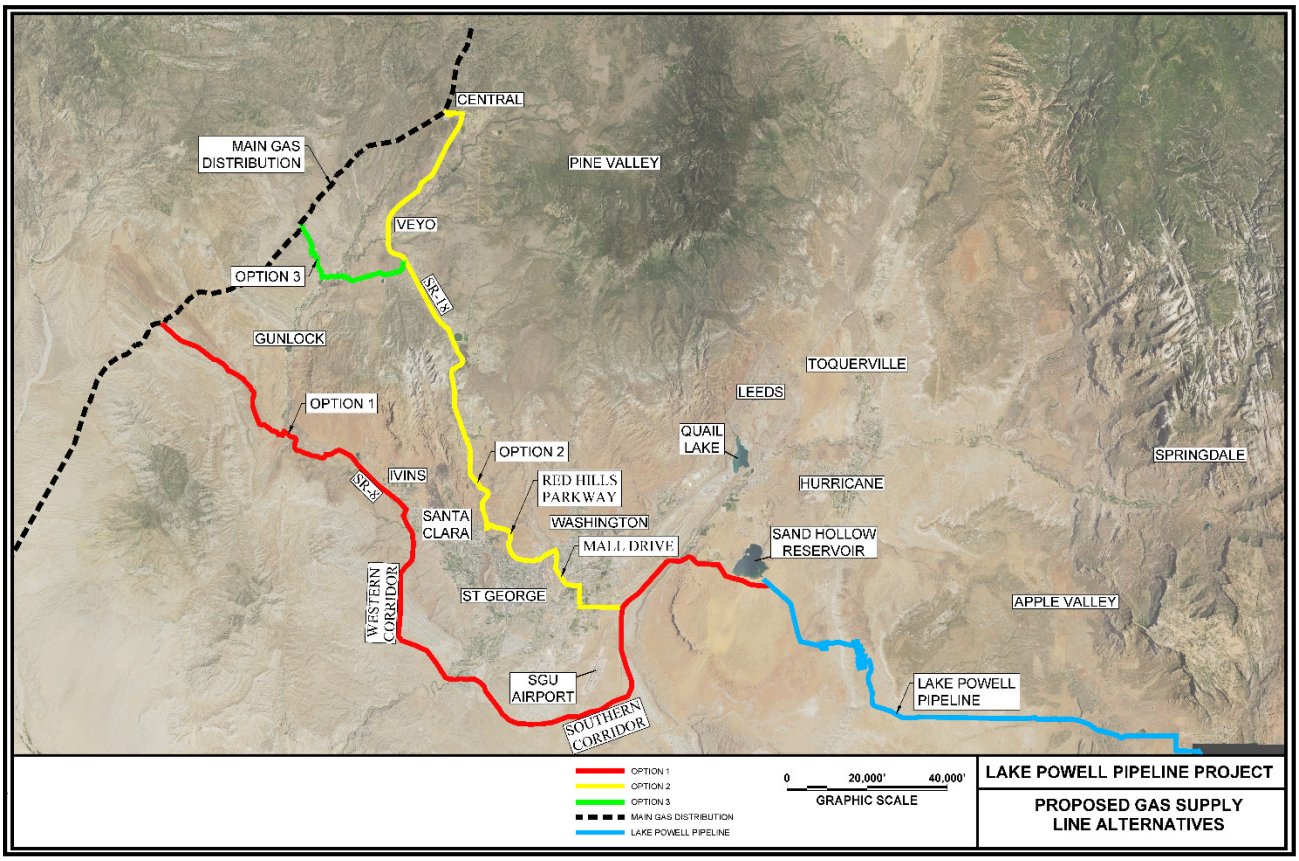


Figure 7-1
Proposed Questar Natural Gas Pipeline

7.1.2.5 Bureau of Reclamation and National Park Service LTEMP EIS

The Bureau of Reclamation and National Park Service are developing a long-term management plan that will determine the timing and volume of water flows from Glen Canyon Dam. Those flows affect hydroelectricity production, beach recreation, native fish and other river-related plants and animals, as well as archaeological sites in Grand Canyon National Park and Glen Canyon National Recreation Area.

The long-term management plan will address routine operations as well as "experimental" flows that provide additional scientific information about how to protect endangered fish and lessen the impacts of dam operations on downstream ecology and other resources. The plan will ensure that regulated flows on the Colorado River meet the goals of supplying hydroelectricity and water for communities, agriculture and industry at the same time they protect the ecologies of the Grand Canyon and Glen Canyon.

Work on the new plan, known as the Long-Term Experimental and Management Plan (LTEMP), is the first comprehensive review of Glen Canyon Dam operations in 15 years. The purpose of LTEMP is to use current and newly developed science to improve and protect resources pursuant to the 1992 Grand Canyon Protection Act while also complying with the Law of the River, the Endangered Species Act, and

other applicable laws. The LTEMP process will determine the need for future modifications of Glen Canyon Dam operations, and whether to establish an Endangered Species Act Recovery Implementation Program for endangered fish species below Glen Canyon Dam. The LTEMP EIS is intended to review whether or not and how to update Glen Canyon Dam operations in effect based on the 1996 Record of Decision.

Changes to dam operations and other actions taken by the Department of the Interior (DOI) will be evaluated as "alternatives" in an Environmental Impact Statement. The EIS will document and evaluate impacts of the alternatives. The Final EIS is currently in preparation and is scheduled to be released in summer 2016.

7.1.2.6 Warner Valley Reservoir - WCWCD

The proposed Warner Valley Reservoir would be located on lands administered by BLM, SITLA and on privately owned lands, all located southwest of the existing Sand Hollow Reservoir. Permanent facilities would consist of 742-acre reservoir and earth-fill dam, spillway and access road, de-silting ponds, regulating pond, pump station, and associated pipelines. The reservoir would store approximately 55,000 acre-feet of water diverted from the Virgin River and reuse water pumped from the St. George Regional Water Reclamation Facility. Permanent facilities would occupy approximately 767 acres. Permanent facilities on BLM-administered land would occupy approximately 442 acres.

7.2 South Alternative

The South Alternative would have indirect, cumulative impacts on recreation resources when combined with the impacts of the Southern Corridor Highway, which would cross the South Alternative penstock alignment near Sand Hollow Reservoir. The Southern Corridor Highway construction permanently removes open space recreation resources in the vicinity of the South Alternative impacts on the Sand Mountain SRMA, with the intensity of the cumulative impacts decreasing with distance from the intersection of the two projects. The long-term, indirect cumulative impacts on recreation resources would be significant.

The South Alternative would also have indirect, cumulative impacts on recreation resources when combined with the impacts of the proposed Kern River-Hurricane Natural Gas Pipeline, which would parallel the Southern Corridor Highway. The Kern River-Hurricane Natural Gas Pipeline construction would permanently remove open space recreation resources in the vicinity of the South Alternative and have impacts on the Sand Mountain SRMA, with the intensity of the cumulative impacts decreasing with distance from the intersection of the two projects. The long-term, indirect cumulative impacts on recreation resources would be significant.

The indirect, cumulative impacts of the South Alternative, Southern Corridor Highway and Kern River-Hurricane Natural Gas Pipeline construction on recreation resources would be long-term, with the Southern Corridor Highway and South Alternative impacts permanent and the Kern River-Hurricane Natural Gas Pipeline cumulative impacts occurring only during construction.

The South Alternative would have no measurable cumulative impacts on recreation resources when combined with LTEMP EIS and future Record of Decision (ROD) actions. The South Alternative impacts on Glen Canyon Dam releases would not be measurable in the Colorado River downstream from Lake Powell, therefore the potential cumulative impacts of the South Alternative and LTEMP EIS and ROD actions would not be measurable.

The South Alternative would have direct cumulative impacts on recreation resources with the Warner Valley Reservoir on BLM-administered land and SITLA land. The 260-acre permanent use of BLM Sand Mountain SRMA for the afterbay reservoir and transmission lines would combine with the 290 acres of BLM Sand Mountain SRMA land occupied by the Warner Valley Reservoir to reduce the 20,709-acre SRMA by 550 acres (2.7 percent). OHV use and other recreational use would be permanently affected and long-term, direct cumulative impacts on recreation resources would be significant.

7.3 Existing Highway Pipeline Alternative

The Existing Highway Alternative would have the same cumulative impacts as described for the South Alternative in Section 7.2.

7.4 Southeast Corner Pipeline Alternative

The Southeast Corner Alternative would have the same cumulative impacts as described for the South Alternative in Section 7.2.

7.5 Transmission Line Alignments

The transmission line Alignments would have the same cumulative impacts as described for the South Alternative in Section 7.2.

7.6 Natural Gas Pipeline and Generators Alternative

The Natural Gas Pipeline and Generators Alternative would have the same cumulative impacts as described for the South Alternative in Section 7.2.

7.7 No Lake Powell Water Alternative

The No Lake Powell Water Alternative would have long-term, significant, cumulative impacts on recreation resources in the Sand Mountain SRMA from the development of the reverse osmosis treatment facility, Warner Valley Reservoir, and the brine evaporation and management pond system when combined with the increased demand for recreation space by multiple, competing user groups, and with foreseeable future actions and projects (see 7.1.2). The No Lake Powell Water Alternative would further increase conflicts between user groups because of the reduced SRMA land area. This would be a significant, long-term, cumulative impact on the Sand Mountain SRMA and the St. George area.

The BLM's 1999 resource management plan states that it may develop up to 50 miles of equestrian trails near Sand Mountain to meeting growing demands. This recreation resource action would conflict with the No Lake Powell Water Alternative features, including the reverse osmosis treatment facility, Warner Valley Reservoir, and the brine evaporation and management pond system. While developing these new trails would alleviate some of the opportunities lost due to the No Lake Powell Water Alternative, long-term, significant, cumulative impact would result on recreation resources in the Sand Mountain SRMA and the St. George area.

7.8 No Action Alternative

There would be no cumulative impacts because the LPP Project would not be constructed or operated, resulting in no impacts to be combined with the impacts of other projects.

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Abbreviations and Acronyms

Abbreviation/Acronym	Meaning/Description
Alt	Alternative
ASFO	Arizona Strip Field Office
ASP	Arizona's State Parks
ATV	All-Terrain Vehicle
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
BPS	Booster Pump Station
Commission	Federal Energy Regulatory Commission
CRD	Colorado River Discovery
dBA	A-weighted decibels
FERC	Federal Energy Regulatory Commission
GCNRA	Glen Canyon National Recreation Area
GIS	Geographic Information System
gpcd	gallons per capita per day
GSENM	Grand Staircase-Escalante National Monument
GWT	Great Western Trail
HS	Hydro System
KCOTFC	Kane County Office of Tourism and Film Commission
KCWCD	Kane County Water Conservancy District
KFO	Kanab Field Office
kV	Kilovolt
LPP	Lake Powell Pipeline
M&I	Municipal and Industrial
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NPS	National Park Service
O&M	Operations and Maintenance
OHV	Off-highway Vehicle
PAD	Preliminary Application Document
PCVCW	Paria Canyon Vermillion Cliffs Wilderness
RMZ	Recreation Management Zones
RO	Reverse Osmosis
ROW	Rights of Way
RV	Recreational Vehicle
SCORP	State Comprehensive Outdoor Recreation Plans
SCP's	Standard Construction Procedures
SGFO	Saint George Field Office
SITLA	School and Institutional Trust Lands Administration
SRMA	Special Recreation Management Area
TDS	Total Dissolved Solids
UBWR	Utah Board of Water Resources
UDSP	Utah Division of State Parks
UDWRe	Utah Division of Water Resources
USP	Utah State Park System

Abbreviation/Acronym	Meaning/Description
UTI	Utah Travel Industry
VCNM	Vermilion Cliffs National Monument
WCWCD	Washington County Water Conservancy District
WSA	Wilderness Study Area

Glossary

3-ring switch station: A particular type of substation where energy is routed either from different sources or lines.

Afterbay reservoir: A downstream pond or reservoir for conducting water away from a hydroplant, re-regulating flows from the plant or temporarily holding water.

Bore: To make a hole in or through, with or as if with a drill. To form a tunnel, for example, by drilling, digging, or burrowing.

Conduit: A pipeline or tunnel used to convey water or a tube or pipe for enclosing electric wires or cables.

Conveyance: The process of water moving from one place to another. .

Culinary water: also referred as potable water, domestic water and/or drinking water.

Desert xeriscapes: trademark for a method of landscaping developed for dry and semiarid climates that stresses saving of water and requires very little or no irrigation for maintaining plants and trees.

Dissolved solids (TDS): (See also, Total Dissolved Solids) is a measure or the total ions in solution, analysed by filtering out the suspended material, evaporating the filtrate and weighing the remaining residue.

Dry washes: the dry bed of an intermittent stream (as at the bottom of a canyon).

Forebay reservoir/tank: The water intake area for a canal, penstock, or turbine designed to reduce water velocity and turbulence in order to settle suspended material and keep it from entering the system. It can also be a pond or reservoir area used to hold or store water for later use.

Intake System: A structure to divert water into a conduit or conveyance system.

Penstock: A high-pressure conduit extending from the first upstream water surface or source to the turbine.

Pipeline: A line of connected pipes used for carrying water over a long distance.

Reverse osmosis (RO): High pressure membrane filtration used for removal of dissolved submicrometer particles (0.001 to 0.0015µm) by solution/diffusion and exclusion

Rights-of-way (ROWs): grants that authorize rights and privileges for a specific use of the land for a specific period of time.

Sleeve (hydraulic): a tubular piece that is forced or shrunk into a cylindrical bore to reduce the diameter of the bore or to line it with a different material.

Temporary Construction Easement (TCE): are easements that are temporary in nature to allow legal access to land for the duration of a projects construction.

Total Dissolved Solids: (See also, Dissolved Solids) is a measure or the total ions in solution, analysed by filtering out the suspended material, evaporating the filtrate and weighing the remaining residue.

Utility corridor: a linear strip of land identified for the present or future location of utility features within its boundaries.

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Appendix A

Lake Powell Pipeline

DRAFT

Recreation Resource Site Photographs

April 2016

Glen Canyon National Recreation Area (Arizona, Utah)

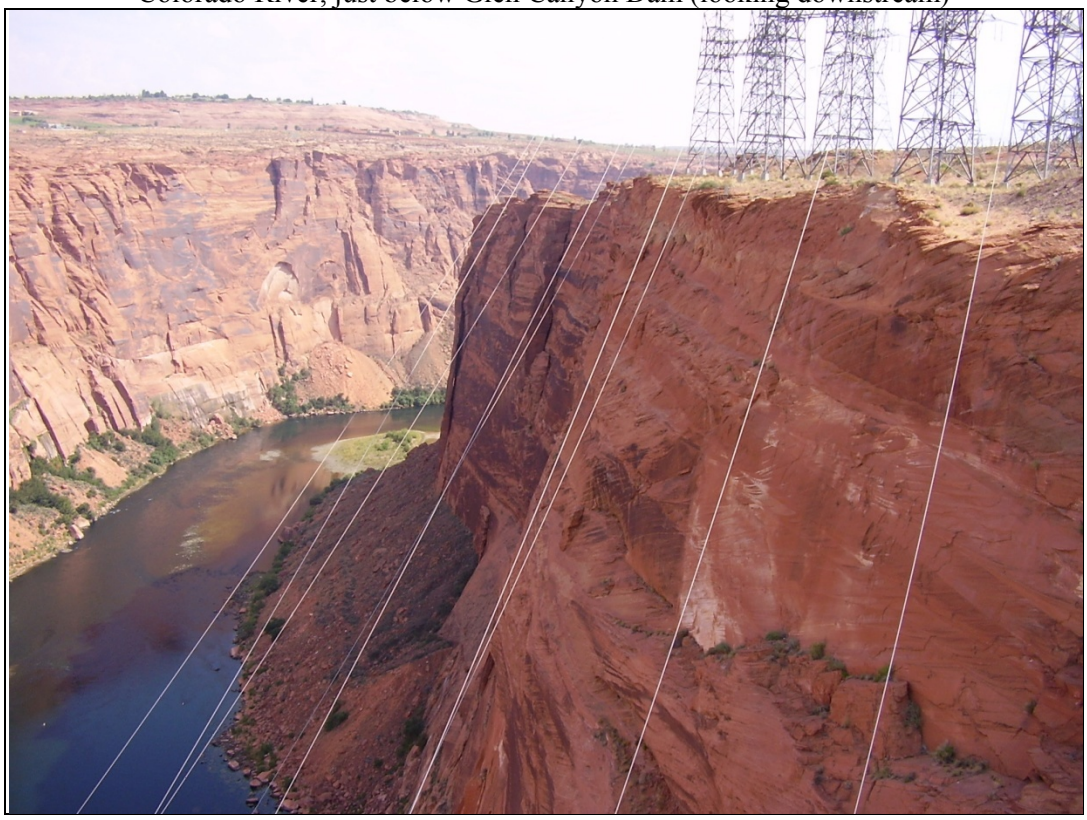
Lake Powell in vicinity of Glen Canyon Dam (looking upstream from Wahweap North Entrance Road)

Lake Powell in vicinity of Glen Canyon Dam (looking upstream from "Chains" Area)

Entry to “Ropes” and “Dead Dog” Areas (looking south from US Highway 89)

“Dead Dog” Area (looking northwest along US Highway 89)

Colorado River, just below Glen Canyon Dam (looking downstream)



Colorado River Discovery rafts, below Glen Canyon Dam

Carl Hayden Visitor Center (looking south from parking lot)

Carl Hayden Visitor Center (looking north from parking lot)

Glen Canyon Dam Overlook (looking upstream)

Glen Canyon Dam (looking southwest from “Chains” Area)

Glen Canyon Dam Overlook, looking southwest (downstream)

Glen Canyon Dam Overlook (looking north from parking lot)

Chains Recreation Area, vault toilet and garbage facilities

Hanging Garden Trailhead (looking northwest)

Hanging Garden Trail, near “Chains” Trailhead (looking west)

Wahweap Road North Pay Station (looking east)

Wahweap Road North Pay Station (looking north to Lake Powell)

Wahweap Overlook (looking west)

Wahweap Marina from Wahweap Overlook

Lone Rock Access Road (looking north from US Highway 89)

Looking south from Lone Rock Access Road intersection with US Highway 89

Vermilion Cliffs National Monument (Arizona): Buckskin Gulch

Source: Crossly, John (Undated). "The American Southwest." Online: http://www.americansouthwest.net/slot_canyons/buckskin_gulch/canyon.html

Grand Staircase – Escalante National Monument (Utah)
Wahweap Wilderness Study Area (looking north from end of Church Wells Road)

Highway 89 at the "Cockscomb" (looking north from House Rock Valley Road)

Big Water Visitor Center (looking southwest)

Big Water Visitor Center, outdoor exhibits and amphitheater

Paria Contact Station (looking south from Entry Road off US Highway 89)

Paria Contact Station

White House Campground (looking north)

White House Campground (looking east)

White House Trail (looking southeast)

White House Trail (looking south to Wilderness)

Toadstools Trailhead (looking north from US Highway 89 parking area)

Toadstools Trailhead (looking south across US Highway 89)

Catstair Canyon Trailhead (looking west, US Highway 89 in middle ground)

Catstair Canyon Trailhead (looking south from US Highway 89)

Pahreah Point of Interest (looking north from US Highway 89 parking area)

Pahreah Point of Interest (looking northeast from US Highway 89 parking area)

Intersection of US Highway 89 (left) and House Rock Valley Road (right), looking south

House Rock Valley Road signage (looking southwest)

House Rock Valley Road at Five Mile Mountain (710) Road (looking south)

House Rock Valley Road at Buckskin Gulch Trailhead (looking east)

House Rock Valley Road at Buckskin Gulch Trailhead (looking north)

South Great Western Trailhead (looking southeast)

North Great Western Trailhead (looking northwest, US Highway 89 in foreground)

730 Road near Eagle Sink Point of Interest (looking northeast)

Kanab Visitor Center (looking northeast)

GSENM Visitor Center parking area in Kanab (looking northwest)

BLM - Kanab Field Office (Utah)
Johnson Canyon Road (looking north from intersection with US Highway 89)

BLM – Arizona Strip Field Office (Arizona)
South Alignment at US Highway 89A (looking northeast)

Arizona Strip (Highway 389) Pull-Off (looking west to Hydro Station 2 South)

Arizona Strip Pull-Off (looking southeast to Hydro Station 2 on left)

Kaibab – Paiute Indian Reservation (Arizona)

Tribal Headquarters (looking west from Moccasin Road near 389)

Tribal Headquarters (looking south from Moccasin Road at 389)

Pipe Spring National Monument (Arizona)

Visitor Center (looking west from parking area)

Visitor Center (looking southwest from parking area)

BLM - St. George Field Office (Utah)
Sand Mountain SRMA (looking south from Sand Hollow State Park OHV Tunnel)

Red Cliffs Desert Reserve

Source: Red Rock Backcountry Adventures (Undated). "Red Cliffs Desert Reserve, UT." Online: http://southwestbackcountry.wordpress.com/2009/01/16/red-cliffs-desert-reserve-utah/

Frog Hollow OHV Area and Gould's Rim Trail Connector Road (looking southwest from Diamond Ranch Academy Access Road)

Jem Trail (looking northwest from road/LPP ROW leading to Virgin Dam Trailhead)

Sand Hollow State Park (Utah)

Day-Use and Boat Ramp Area (looking northeast)

Sand Mountain OHV Tunnel (looking northeast)

RV Campground (looking northwest from Day Use Area)

Sand Hollow Reservoir (looking southeast from Day Use Area to Sand Hollow Hydro)

Private Recreation Areas, Facilities, and Use

Amangiri Resort Spa and Villas at Lake Powell (Utah, south of US Highway 89)

Source: Aman Resorts (Undated). "Amangiri." Online: http://www.amanresorts.com/uploadedFiles/Aman/amangiri/Amangiri_E_%2028%20Aug%2009.pdf

Paria Outpost Resort (Utah, US Highway 89 near BLM Paria Contact Station)

Source: Paria Outpost (Undated). "Paria Outpost and Outfitters". Online: http://www.paria.com

Access road to Olympus Academy (Utah), south of Utah Highway 59

Willowind RV Park (Hurricane, Utah)

Source: Cottam's Willowind RV (Undated). "Willowind RV Park." Online: http://www.willowindrvpark.net/

Appendix B

Lake Powell Pipeline
Draft Recreation Resources Mitigation Plan

April 2016

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Introduction

As described in the Lake Powell Pipeline (LPP) Final Recreation Resources Study Report (UBWR, 2016), the LPP Project action alternatives studied include various pipeline and penstock system configurations. Each action alternative would deliver 86,249 acre-feet of municipal and industrial (M&I) use water to the following southwest Utah water conservancy district service areas:

- Washington County Water Conservancy District (WCWCD) would receive 82,249 acre-feet annually.
- Kane County Water Conservancy District (KCWCD) would receive up to 4,000 acre-feet annually.

Three primary pipeline and penstock alignment alternatives, along with the electrical power transmission line alternatives for providing power to the pump stations and a natural gas supply line alignment alternative, were studied. The pipeline and penstock alignment alternatives share common segments between the intake at Lake Powell and delivery at Sand Hollow Reservoir, and they differ spatially in, through and around the Kaibab-Paiute Indian Reservation.

The South Alternative (Proposed Action) extends south around the Kaibab-Paiute Indian Reservation. The Existing Highway Alternative follows an Arizona state highway through the Kaibab-Paiute Indian Reservation. The Southeast Corner Alternative follows the Navajo-McCullough Transmission Line Corridor through the southeast corner of the Kaibab-Paiute Indian Reservation. The Electric Transmission Line Alignments are common to all the pipeline and penstock alignment alternatives. The Natural Gas Supply Line Alignment Alternative is common to all pipeline and penstock alignment alternatives.

Figure 1-1 in Chapter 1 of the Final Recreation Resources Study report shows the overall proposed project from Lake Powell near Page, Arizona to Sand Hollow Reservoir, Utah.

This draft Recreation Mitigation Plan (RMP) document is an appendix to the LPP Final Recreation Resources Study Report. As such, it makes frequent reference to information contained in that study report.

The Final RMP document will be prepared after issuance of a Federal Energy Regulatory Commission (FERC) license to construct and operate the LPP Project. The FERC license may contain an article that requires preparation of an RMP in consultation with recreation resource agencies and other stakeholders.

Comments received on this draft document will be addressed and incorporated as applicable into a Final RMP.

Existing Recreation Resources

Existing recreation areas, facilities, use, and identified recreation needs associated with the LPP Project are detailed in Chapter 3 of the Final Recreation Resources Study Report.

Construction and operation activities associated with the LPP Project would occur on federal, state, and private lands in Utah's Kane and Washington counties, and in Arizona's Coconino and Mohave counties. The following recreation jurisdictions are included in the Project vicinity:

- Glen Canyon National Recreation Area (GCNRA)
- Vermilion Cliffs National Monument (VCNM)

- Grand Staircase – Escalante National Monument (GSENM)
- Bureau of Land Management (BLM) Kanab (Utah) Field Office (KFO)
- BLM Arizona Strip Field Office (AZFO)
- Kaibab-Paiute Indian Reservation (KPIR)
- Pipe Springs National Monument (PSNM)
- BLM St. George (Utah) Field Office (SGFO)
- Sand Hollow (Utah) State Park
- Various privately owned and operated recreational amenities

Figures 3-1 through 3-15 in Chapter 3 of the Final Recreation Resources Study Report show the location of recreation jurisdictions and amenities in the Project vicinity. The LPP Project does not propose any project recreation sites.

Potential Recreation Impacts

Potential LPP recreation impacts are detailed in Chapter 4 of the Final Recreation Resources Study Report. These impacts are described as significant (changing recreation management settings, sites, or permitting; increasing or decreasing visitation; changing overall operations) or minor (not significant); direct (interfering with use of a recreation facility) or indirect (noise, air quality degradation, visual resource impacts, additional construction traffic, etc.); temporary or permanent; and construction or operations and maintenance-related.

Figures 3-1 through 3-15 in Chapter 3 of the Final Recreation Resources Study Report depict all affected recreation resources, including trails, trailheads, campsites, and points of public access. These figures also indicate the nature of direct impacts on recreation resources.

Recreation Resources Mitigation Plan

No recreational facilities or use areas open to the public are proposed as part of the LPP Project because of security and public safety concerns.

Identified recreation opportunities and needs for the LPP Project vicinity are included in the Arizona and Utah State Comprehensive Outdoor Recreation Plans (SCORPs) and various resource management plans (see Section 3.3 of the Final Recreation Resources Study Report). While the LPP Project is not generally expected to contribute to meeting identified recreation needs, these would be considered as appropriate and agreed to in consultation with resources agencies during detailed LPP Project design and construction.

Exhibits G-1 through G-22 describe the proposed FERC Project boundaries for the LPP Project. As described above, no lands within these boundaries are currently proposed to be open to the public for recreational purposes due to security and public safety concerns. The draft Recreation Resources Mitigation Plan described herein focuses on protection, mitigation, and enhancement (PME) measures to take place during construction of the LPP Project, and on PME measures to take place on surrounding lands during the term (anticipated to be 50 years from the date of FERC License issuance) of the LPP FERC License. These PME measures are detailed below and included in Chapter 5 of the Final Recreation Resources Study Report.

Protection, Mitigation, and Enhancement Measures to Take Place During LPP Construction

PME measures to take place during LPP construction include those related to noise, air quality, visual resources, best management practices, fencing, access roads, restoration, and recreational resources. These measures include:

Noise

All construction equipment would be equipped with manufacturer's standard noise control devices (i.e., mufflers, acoustical lagging, and/or engine enclosures). All construction equipment would be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices.

Construction equipment would be operated conservatively, which means the operator would take special care not to throttle the engine excessively and would keep engine speed as low as possible. In addition, the operator would not leave the equipment running or idling needlessly.

When construction occurs in the vicinity of occupied residences located within 0.5 mile of the project, the occupants would be notified of the construction schedule with a written letter. To the extent possible, construction would occur during daytime hours within 0.5 mile of the residences to minimize the impacts from construction noise. Where campgrounds are located within 0.5 mile of the project, signage would be posted indicating the construction schedule.

Air Quality

Dust control permits would be obtained for each construction contract in accordance with local, county and/or state requirements. The permits would contain a Dust Control Plan listing all construction activities that would occur and the BMPs that would be used to mitigate construction dust. The BMPs would include site-specific dust control measures that are based on each project soil type, specific construction activities, phases and stages. They would include:

- Moisture conditioning of construction materials
- Controlling dust on construction access roads
- Covering or stabilizing soil with vegetation
- Using phased construction
- Limiting size of ingress and egress points
- Limiting size of staging areas
- Limiting vehicle speeds on the work site
- Proactive measures to prevent unauthorized access to disturbed areas

UDWRe would comply with all requirements of air quality and applicable dust control permits.

Any dust palliative, dust suppressant, or tackifier used within threatened and endangered species habitat or active drainages would be approved by the BLM or NPS and USFWS prior to use. Operating permits would be obtained as required from the local county and/or the state for stationary sources as necessary, such as aggregate rock handling equipment, rock crushers, conveyors, and screening equipment which may emit particulate matter. UDWRe would comply with all requirements of the operating permits.

Active construction sites and unpaved roads used for construction would be watered daily or chemical dust suppression approved by the BLM or NPS would be applied, as needed, to maintain effective dust control.

Visual Resources

Landscape berms would be constructed and vegetated with endemic vegetation species at specific facility sites on BLM, NPS and Reclamation-administered public lands to help screen public views of the LPP Project facilities.

Proposed electrical power transmission line alignments would be parallel to existing transmission or distribution lines to the extent practical to minimize new effects of proposed transmission lines on the visual landscape.

Proposed electrical power transmission line alignments would be parallel to existing electrical power transmission lines and would be aligned within a preferred West Wide Energy Corridor (Section 368 corridor 68-116), as designated and documented in the *Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States* (DOE and BLM 2008) to the extent practical.

Transmission line towers would be constructed with self-weathering steel or dull-galvanized steel to reduce visual resource impacts. Non-reflective, non-specular conductors would be installed to reduce visual resource impacts.

Rock cuts and other construction areas along the ROW in sensitive visual areas or landscapes would be painted or sprayed with an artificial desert varnish following construction completion to reduce the visual contract and restore the appearance of natural desert varnish. Application rates and color tint would be site-specific. Available artificial desert varnish materials used for visual resource impact mitigation purposes would be approved by the BLM or NPS prior to use.

Pumping stations, water treatment facility, buried storage reservoir, hydroelectric generating stations, substations and other project facilities would utilize architectural details and be painted or constructed of colored block or colored materials to blend with the colors of the surrounding landscape, per BLM Manual 8400 – Visual Resources Management. Architectural details would be approved as part of local building permit approvals.

Lighting, if temporarily needed to perform construction at night, would be limited to the basic requirements to conduct the work. Lighting would be shielded, and directed down towards the site and not into surrounding areas or onto roads.

Best Management Practices

UDWRe would complete a detailed Plan of Development (POD) for the final project affecting BLM-administered land. The detailed POD would incorporate mitigation contained in the BLM Record of Decision and provide detailed project design and construction specifics, including but not limited to construction contract timing and phasing, construction access roads and ROW entry points, and other details. The POD would contain detailed plans, including, but not limited to, those listed below. The BLM would review and approve the POD prior to notice to proceed for any surface disturbance activity within the BLM ROW permit. Each of the following plans and strategies will be prepared as part of the final POD.

- Agency Coordination Plan – primary contacts including BLM authorized officer, UDWRe, construction management, environmental compliance inspection contractor, and construction contractors; identification of reporting procedures and frequency.
- Construction Plan – construction schedule, access roads, borrow pits, best management practices, vehicle/equipment washing locations, etc.
- Construction Traffic Management Plan – measures to reduce and manage construction traffic.
- Dust Control Plan – air quality standards and permits, dust control measures, general water sources, air quality monitoring, and reporting.
- Emergency Response Plan – emergency contacts, notification procedures, available resources, and emergency procedures.
- Integrated Weed Management Plan – management of areas with noxious/invasive weeds, treatment and control measures, monitoring, and reporting.
- Mitigation Plan – summary of environmental commitments and mitigation measures, responsible parties, timing, and reporting.
- Public Information Plan – public notification measures.
- Restoration Plan –topsoil (growth medium) and vegetative cover salvage, stockpiling and replacement; plant salvage, maintenance and replacement, seeding, soil stabilization, and post-construction monitoring.
- Spill Prevention, Control, and Countermeasure Plan – procedures for storage and handling of hazardous and toxic materials, necessary permits, spill response and cleanup.
- Stormwater Pollution Prevention Plan – erosion and sediment control measures, compliance inspections and reporting.

The Construction Plan would describe a process under which changes from the POD can be requested in the field during construction.

UDWRe would provide a Compliance Inspector (CI) for the project. The CI would provide environmental oversight and compliance/regulatory activities for the permitee during LPP Project construction activities. The CI would be responsible for ensuring that the permitee complies with all terms, conditions, stipulations and other measures required for the project, and would have the authority to halt activities that are in non-compliance.

A pre-construction meeting between permitting agencies, UDWRe, CI, and the construction contractor would be required prior to any surface disturbing activity occurring. The CI would provide reports to permitting agencies on a schedule based upon the type of ongoing construction activity, and as described in the approved Agency Coordination Plan.

All activities directly or indirectly associated with the construction of the project on BLM- or NPS-administered land would be conducted within the authorized limits of the ROW grant. Any facility relocation, additional construction area, or other use on BLM- or NPS-administered land that is not in accord with the ROW grant would not be initiated without prior approval of BLM or NPS. Cross-country vehicular travel outside of the ROW would be prohibited, unless prior approval is obtained from the BLM.

UDWRe would notify each BLM field office (ASFO, KFO, Grand Staircase-Escalante Field Office, and SGFO) and the NPS GCNRA office at least 10 days before initiation of project construction. Notification would be made to the designated BLM or NPS representative.

A worker education program would be developed by UDWRe and used during construction. It would be presented to all personnel who would be on-site, including but not limited to contractors, contractor's employees, supervisors, inspectors, and subcontractors. A handout would be developed addressing environmental protection measures incorporated into the proposed project, and the responsibility of each worker in environmental protection. Each worker would be briefed on his or her environmental compliance responsibilities, provided a handout, and required to sign a certification that he or she understands and would comply with those environmental protection measures.

A Public Information Plan would be developed by UDWRe in coordination with permitting agencies to notify the public and appropriate agencies in advance of the start of each construction phase. Measures that would be implemented to inform the public would include public notices, public meetings, letters to nearby residents, road signs, and other measures.

Fencing

Range improvements, including fence lines and cattle guards, located within the ROW and along designated access roads would be documented prior to the start of construction. If range improvements are temporarily removed or damaged as a result of construction, they would be repaired to existing BLM or NPS standards and be functional upon completion of construction.

Temporary security fencing would be used as applicable to enclose staging areas and facility sites during construction. This fencing would consist of standard 6- to 8-foot high chain-link fencing and would be removed at the completion of construction activities. Security fencing of the entire pipeline ROW during construction is not anticipated, but may be used in specific areas for security or safety concerns.

Temporary construction fencing would be installed as necessary for management of sensitive big game species. The type and location of fencing would be coordinated with the Utah Division of Wildlife Resources and other wildlife management agencies as applicable.

Access Roads

A Construction Traffic Management plan would be developed and coordinated with BLM or NPS and other relevant state and local authorities prior to the start of construction for each major phase of the project. The plan would include measures to reduce the number of construction trips, scheduling of work shifts and materials deliveries, designation of access routes, and other measures to minimize traffic effects. The plan would also take into account active seasons for hunting, camping, and/or other recreational activities that occur within the same time and place as each phase of construction.

While driving on paved roads or marked dirt roads, posted speed limits would be maintained. While driving within the construction area, on un-posted dirt roads, a maximum speed limit of 25 miles per hour would be required to reduce dust and allow for observation and avoidance of wildlife, livestock or visitors in the road.

Public access routes within or crossing the ROW would be maintained or detour routes would be identified during construction activities. Detours needed for temporary road closures because of safety concerns would be established in coordination with permitting agencies and local authorities.

Signing and traffic controls would be placed well in advance of the construction area to warn motorists of detour routes available during construction.

Signs and persons with flags would be used within the construction area as necessary to direct traffic in accordance with all applicable Utah Department of Transportation, Arizona Department of Transportation, county, and local rules and ordinances.

Sediment transported onto a public paved road surface by construction equipment or other vehicles would be removed immediately. This material would be disposed at an approved area within the ROW. Road washing would be allowed after the sediment is removed.

Vehicle washing facilities would be installed at vehicle ingress and egress locations between unpaved roads (within the permanent ROW and temporary construction easement (TCE)) and paved roads (outside the permanent ROW and TCE). Excess dirt on the wheels, undercarriage, and bodies of trucks exiting work areas would be removed to reduce track-out of soils, debris, and invasive and noxious weeds. UDWRe's CI would supervise and monitor use of the vehicle washing facilities.

During construction, all unpaved access roads used by construction personnel, equipment, and materials deliveries would be maintained in coordination with agency permit requirements. This maintenance may include use of additional road base materials to maintain road integrity.

At the completion of construction, previously existing access roads would be restored to pre-construction conditions or better. Improvements made for construction would be left in place.

Restoration

A detailed Restoration Plan would be prepared and submitted to permitting agencies for approval prior to the start of construction. The portion of the plan pertaining to restoration in listed species habitat would be in accordance with approved study reports and permits and submitted to USFWS for approval. The Restoration Plan would describe reclamation and rehabilitation objectives and methods to be used, species of plants and/or seed mixture to be used, time of planting, success standards, and follow-up monitoring.

Signs indicating that restoration activities are being conducted would be installed where needed to deter public off-road vehicular damage to restored areas. Placement and design of signs would be coordinated with permitting agencies and identified in the Restoration Plan.

Recreation Resources

To the maximum extent possible, construction activities would be performed in recreational "off seasons", which vary by facility and use.

Pipeline rights-of-way, transmission line rights-of-way, and LPP Project access roads would be closed to OHV and other recreational users to minimize environmental impacts and enhance LPP Project security.

Identified recreation needs would be considered, as appropriate and agreed to in consultation with resource agencies, during LPP Project design and construction.

Some recreation access roads may require permanent closure, because they lead to LPP Project facilities. Permanently closed recreation access roads may be rerouted prior to the commencement of construction in consultation with resource management agencies to facilitate continued recreation use in the vicinity following LPP Project completion. In BLM-managed areas of flat topography and open terrain that is

sparsely vegetated and where practical, it may be decided to leave recreation access roads open to prevent OHV users from driving around a closure (and causing more damage than would occur from leaving the road open). Any recreation access roads that are permanently closed would be restored using native landscape materials.

LPP Project facilities, pipeline and penstock alignments, and electric power transmission line alignments would be constructed to avoid or minimize direct and indirect impacts on recreation resources associated with Federal lands administered by the BLM and NPS.

A temporary access route would be established to each affected trailhead access and designated or established recreation site that would be temporarily blocked during construction. Appropriate signage and construction safety measures (safe distance from construction, temporary exclusion fencing from construction areas, construction site safety coordinator) would be implemented to protect trailhead and recreational users during construction activities affecting trailhead and recreation site access. To the maximum extent possible, single -lane vehicle access would be maintained into each affected trailhead and recreation site across temporary trench cover panels. Recreation vehicle access at each trailhead access point would be managed using appropriate traffic control measures.

Protection, Mitigation, and Enhancement Measures to Take Place During the Term of the LPP FERC License

PME measures to take place during the anticipated term of the LPP FERC license include those related to noise, air quality, visual resources, best management practices, fencing, and recreational resources. These measures include:

Noise

Pumping and hydroelectric generating stations would be enclosed and utilize design features (e.g., acoustical louvers and noise absorbing panels) to minimize operational noise levels. Pressure reducing station valves would be fully enclosed in vaults.

Potential facility noise levels would be estimated during facility design, and features would be incorporated to minimize normal operational noise levels with an objective of 70 dBA or less at 500 feet from the facility.

Air Quality

Operating permits would be obtained for combustion equipment such as stationary internal combustion engines (greater than 250 horsepower) used during operation of the project. The Operating Permit would include operating requirements, reporting requirements and pollutant emission limits.

Visual Resources

Nighttime lighting during project operations at the pumping stations, hydroelectric generating stations, regulating tank, and electrical substations would either be manually controlled or programmed and used when occupied or needed for safety and security. Lighting would be shielded and directed downwards and towards the facility site.

All activities directly or indirectly associated with the operation and maintenance of the project on BLM- or NPS-administered land would be conducted within the authorized limits of the ROW grant. Any facility relocation, additional construction area, or other use on BLM- or NPS-administered land that is not in accord with the ROW grant would not be initiated without prior written approval of the BLM or NPS. Cross-country vehicular travel outside of the ROW would be prohibited for construction work, unless prior approval is obtained from the permitting agency.

Fencing

Permanent site security fencing would be used to enclose facility sites, including pumping stations, regulating tanks, hydro stations, forebay and afterbay reservoirs, and remote substations and switchyards. This fencing would generally consist of standard 6- to 8-foot high chain-link fencing. Block walls may be constructed at some facility sites instead fencing, depending on site requirements.

There would be no permanent site fencing along the pipeline alignment, in order to avoid restricting seasonal movement patterns of big game.

Recreation Resources

Pipeline rights-of-way, transmission line rights-of-way, and LPP Project access roads would be accomplished in conjunction with existing uses and closed to OHV and other recreational users to minimize environmental impacts and enhance LPP Project security.

LPP access roads to surface facilities and following pipeline and transmission line right-of-way would have access controls (locked gates) wherever possible.

The Toadstools Trailhead parking area would be restored immediately after LPP construction in the vicinity is complete, in coordination with the GSENM recreation management specialist and other resource specialists, as applicable.

The Great Western Trail parking area south of Highway 89 would be restored immediately after LPP Project construction in the vicinity is complete, in coordination with GSENM recreation management and other resource specialists, as applicable.

Non-motorized trail features including horse riding trails, horse trailer loading and unloading ramps, and trailer-vehicle parking as well as mountain bike trails and parking areas would be coordinated with the respective land management agency and replaced.

Effects on the Sand Mountain SRMA would be mitigated with on-site and off-site measures. On-site measures may include: 1) Maintaining vehicle access during and after construction through and/or around all LPP development; 2) Developing an ATV trailhead (trailer parking, restroom, information kiosk with maps and other interpretation) south of Hurricane, but north of the Hurricane Cliffs afterbay; and 3) Developing an ATV trailhead at Washington Dam Road. If this trailhead has already been developed, expand access in this area by constructing new ATV trails that access upper Sand Mountain. Off-site mitigation may include developing maps and other interpretation for recreation in the Sand Mountain vicinity. The Sand Mountain SRMA recreation mitigation measures would be specifically designed and constructed in coordination with the BLM SGFO.

Maintenance and monitoring activities to take place during construction and during the term of the LPP FERC License are described above. Those activities taking place within the LPP FERC Project boundaries would comply with requirements contained in the LPP FERC License and subsequent FERC orders.

Monitoring Reports

Monitoring reports to be prepared during construction and during the term of the LPP FERC License are described above. Monitoring reports for activities taking place within the LPP FERC Project boundaries would comply with requirements contained in the LPP FERC License and subsequent FERC orders.

Implementation Schedule

(This section will be developed in consultation with the affected resource management agencies)

Agency Consultation

(This section will be developed after comments are received on the draft document)