Lake Powell Pipeline

Draft Study Report 1
Air Quality

March 2011

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Draft Air Quality Study Report
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ES-1 Introduction

This study report describes the results and findings of an analysis to evaluate air quality impacts along the proposed alternative alignments of the Lake Powell Pipeline Project (LPP Project), No Lake Powell Water Alternative, and No Action Alternative. The purpose of the analysis, as defined in the 2008 Air Quality Study Plan prepared for the Federal Energy Regulatory Commission (Commission), was to identify potential impacts from LPP Project air emissions during construction and operations, document the potential influence of these emissions on human and wildlife receptors and identify measures to mitigate impacts from the various sources as necessary.

ES-2 Methodology

The analysis of impacts on air quality follows methodology identified and described in the Preliminary Application Document, Scoping Document No. 1 filed with the Commission.

ES-3 Key Results of the Air Quality Impact Analyses

The significance criteria for the LPP project involve impacts on human health and significant impacts on humans and wildlife from the exceedance of the National Ambient Air Quality Standards (NAAQS). Air pollutant levels would be considered to have a significant impact on human and wildlife receptors if they are above NAAQS levels. The following sections summarize the key results of the air quality impact analyses.

ES-3.1 Water Conveyance System / Cedar Valley Pipeline System

The Water Conveyance System alignment would be routed near several residential areas and could possibly affect human receptors during construction. Most residential areas are outside the pollutant dispersion zone and would not be significantly impacted. Residents living within the dispersion zone could be temporarily affected from pollutant levels above NAAQS, but these direct impacts would be mitigated by implementing Best Management Practices (BMPs). Wildlife receptors in the area are expected to temporarily relocate and should not be significantly impacted by LPP Project emissions.

The Cedar Valley Pipeline System would be aligned near several residential areas and impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts. No significant air quality impacts are expected to occur.

ES-3.2 Hydro System - Existing Highway Alternative

The Hydro System Existing Highway Alternative would be constructed near residential areas from the Grand Staircase-Escalante National Monument west boundary to Fredonia, and in the Pipe Springs area on the Kaibab-Paiute Indian Reservation. Temporary direct air quality impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts. No significant air quality impacts are expected to occur.

ES-3.3 Hydro System – South Alternative / Southeast Corner Alternative

Residential areas were not identified along the eastern portion of the Hydro System South Alternative alignment from the High Point Regulating Tank 2 to the intersection of Yellowstone Road with Highway 389. Therefore, human receptors would not be affected. Wildlife receptors in the area are expected to temporarily relocate and would not be significantly affected.

The proposed pipeline alignment from the Yellowstone Road-Highway 389 intersection to Sand Hollow Reservoir is shared by the Existing Highway and South alternatives. Residents could be temporarily affected from exposure to levels of pollutants above NAAQS, although significant impacts are not expected because BMPs would be implemented to mitigate the direct air quality impacts and most residential areas are outside of the pollutant dispersion zone.

ES-3.4 Transmission Line Alternatives

The transmission lines alignment alternatives would be aligned near several residential areas and direct impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts. No significant impacts are expected to occur.

ES-3.5 Indirect Effects from LPP Project from Population Growth

The additional population served by the LPP water following commencement of operations in 2020 could cause indirect impacts on air quality. Emissions from vehicles, residential construction, and other anthropogenic sources associated with population growth after 2020 could result in increased levels of pollutants; however, the air emissions levels are not expected to exceed the NAAQS and no significant indirect impacts would result from the LPP Project operation.

ES-3.6 No Lake Powell Water Alternative

Air quality would be temporarily affected by xeriscape landscape construction activities and increased airborne particulate matter generated from increased exposed soil areas resulting from restrictions on outdoor residential watering with culinary supplies. The particulate concentrations could exceed NAAQS beyond dispersion zones, resulting in significant indirect air quality impacts. These indirect impacts may be partially mitigated by implementing BMPs.

ES-3.7 No Action Alternative

The No Action Alternative would not result in air quality impacts. No significant impacts are expected to occur. Factors not associated with the LPP project, such as population growth, would continue to affect air quality.

ES-3.8 Air Quality Impacts Resulting from Additional Power Demand

Preliminary project design and meetings with local and regional power entities indicate that additional power generating facilities would not be needed to supply electricity for the LPP project because there is currently enough power available to meet the projected power demands. Therefore, the LPP project would not cause indirect air quality impacts resulting from new power generation emissions.

Chapter 1
Introduction

1.1 Introduction

This chapter presents a summary description of the alternatives studied for the Lake Powell Pipeline (LPP) project, located in north central Arizona and southwest Utah (Figure 1-1) and identifies the issues and impact topics for the Draft Air Quality Study Report. The alternatives studied and analyzed include different alignments for pipelines and penstocks and transmission lines, a no Lake Powell water alternative, and the No Action alternative. The pipelines would convey water under pressure and connect to the penstocks, which would convey the water to a series of hydroelectric power generating facilities. The action alternatives would each deliver 86,249 acre-feet of water annually for municipal and industrial (M&I) use in the three southwest Utah water conservancy district service areas. Washington County Water Conservancy District (WCWCD) would receive 69,000 acre-feet, Kane County Water Conservancy District (KCWCD) would receive 4,000 acre-feet and Central Iron County Water Conservancy District (CICWCD) could receive up to 13,249 acre-feet each year.

1.2 Summary Description of Alignment Alternatives

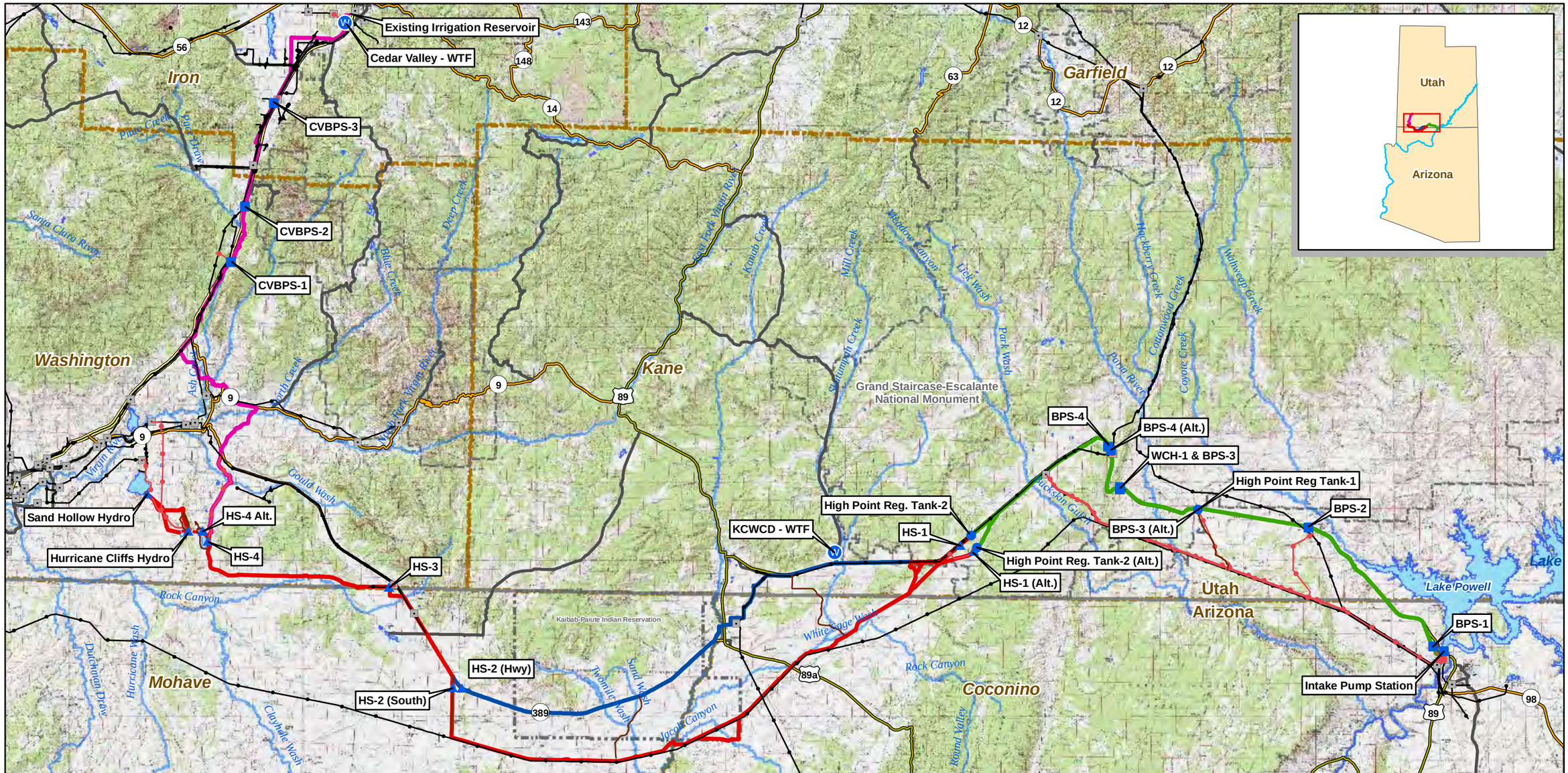
Three primary pipeline and penstock alignment alternatives are described in this section along with the electrical power transmission line alternatives. The pipeline and penstock alignment alternatives share common segments between the intake at Lake Powell and delivery at Sand Hollow Reservoir, and they are spatially different in the area through and around the Kaibab-Paiute Indian Reservation. The South Alternative 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 transmission line alignment alternatives are common to all the pipeline and penstock alignment alternatives. Figure 1-1 shows the overall proposed project and alternative features from Lake Powell near Page, Arizona to Sand Hollow and Cedar Valley, Utah.

1.2.1 South Alternative

The South Alternative consists of five systems: Intake, Water Conveyance, Hydro, Kane County Pipeline, and Cedar Valley Pipeline.

The **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 (Figure 1-2). The pump station enclosure would house vertical turbine pumps with electric motors, electrical controls, and other equipment at a ground level elevation of 3,745 feet mean sea level (MSL).

The **Water Conveyance System** would convey the Lake Powell water from the Intake System for about 51 miles through a buried 69-inch diameter pipeline parallel with U.S. 89 in Coconino County, Arizona and Kane County, Utah to a buried regulating tank (High Point Regulating Tank-2) on the south side of U.S. 89 at ground level elevation 5,695 feet MSL, which is the LPP project topographic high point



- Water Treatment Facility
- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Project Transmission Line
- Existing Substation
- Existing Transmission Line
- Water Conveyance
- Hydro System - South Alignment Alternative
- Hydro System - Highway Alignment Alternative
- KCWCD Pipeline System
- Cedar Valley Pipeline
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- US Highway
- ST Highway
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- 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:
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UTU-85472

N

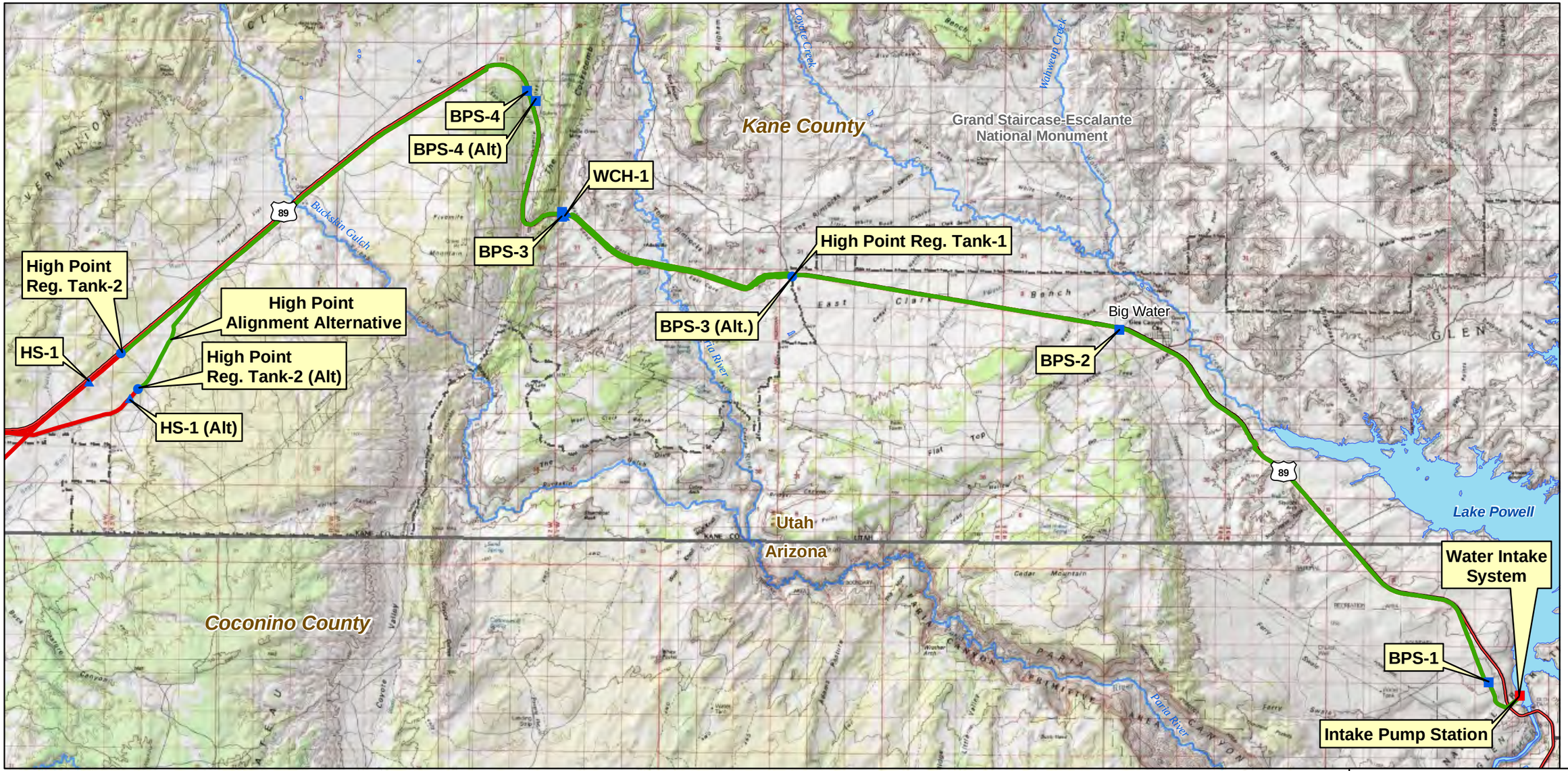
0 2.5 5 10 15 20 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 1-1** MWH

Lake Powell Pipeline Proposed Project and Alternative Features



- Project Intake Pump Station
- Project Booster Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
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- Major Rivers & Streams
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- GSENM Boundary
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Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 1-2** MWH

Lake Powell Pipeline Intake and Water Conveyance Systems

(Figure 1-2). The pipeline would be sited within a utility corridor established by Congress in 1998 which extends 500 feet south and 240 feet north of the U.S. 89 centerline on public land administered by the Bureau of Land Management (BLM) (U.S. Congress 1998). Four booster pump stations (BPS) located along the pipeline would pump the water under pressure 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 substation, buried forebay tank and a surface emergency overflow detention basin. BPS-1 would be sited within the Glen Canyon National Recreation Area adjacent to an existing Arizona Department of Transportation maintenance facility located west of U.S. 89. BPS-2 would be sited on land administered by the Utah School and Institutional Trust Lands Administration (SITLA) near the town of Big Water, Utah on the south side of U.S. 89. BPS-3 and an in-line hydro station (WCH-1) would be sited at the east side of the Cockscomb geologic feature in the Grand Staircase-Escalante National Monument (GSENM) within the Congressionally-designated utility corridor. BPS-3 (Alt) is an alternative location for BPS-3 on land administered by the BLM Kanab Field Office near the east boundary of the GSENM on the south side of U.S. 89 within the Congressionally-designated utility corridor. Incorporation of BPS-3 (Alt.) into the LPP project would replace BPS-3 and WCH-1 at the east side of the Cockscomb geologic feature. BPS-4 would be sited on the west side of U.S. 89 and within the Congressionally-designated utility corridor in the GSENM on the west side of the Cockscomb geologic feature.

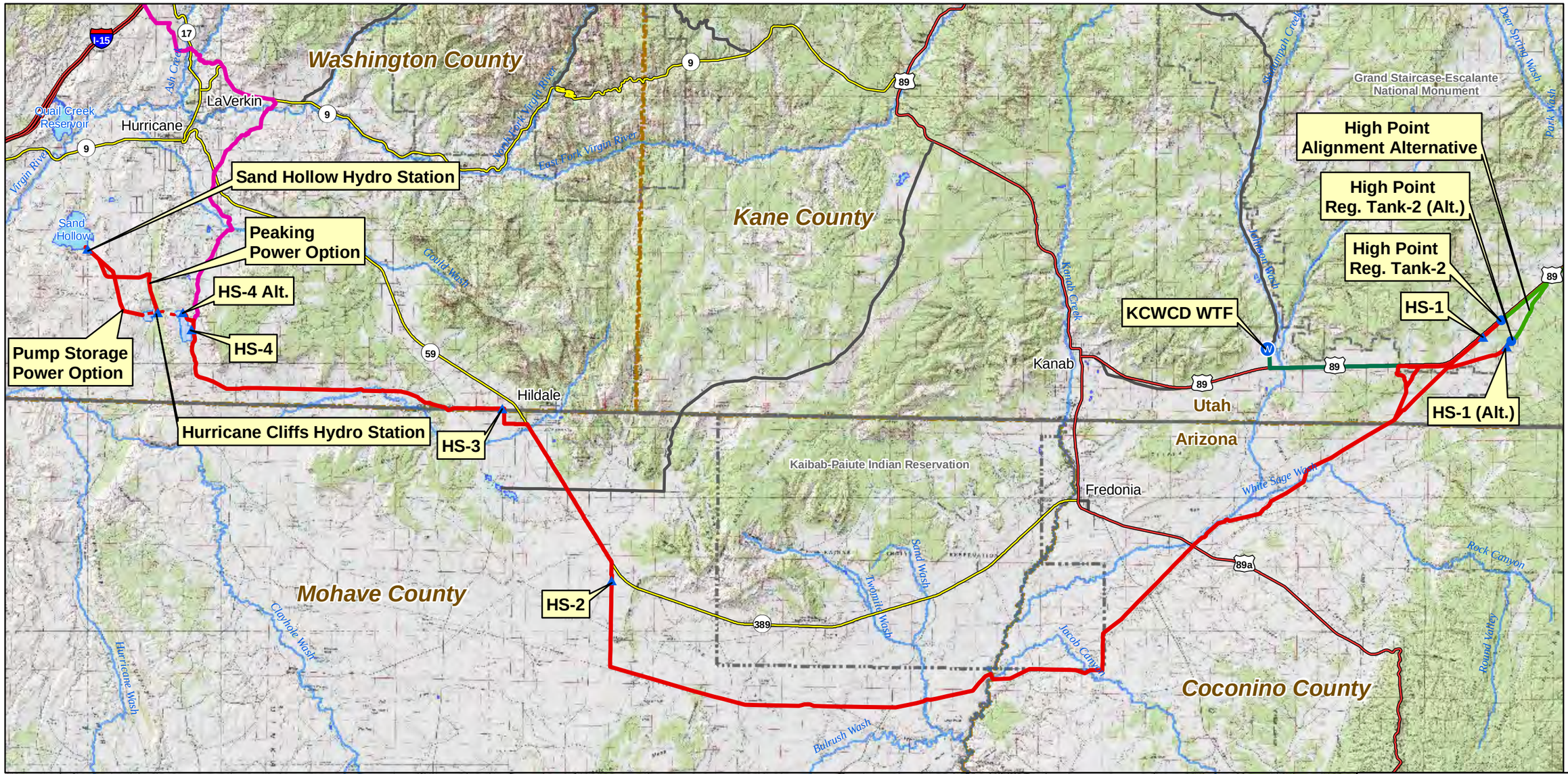
The High Point Alignment Alternative would diverge south from U.S. 89 parallel to the K4020 road and continue outside of the Congressionally-designated utility corridor to a buried regulating tank (High Point Regulating Tank-2 (Alt.) at ground level elevation 5,630 feet MSL, which would be the topographic high point of the LPP project along this alignment alternative (Figure 1-2). The High Point Alignment Alternative would include BPS-4 (Alt.) on private land east of U.S. 89 and west of the Cockscomb geologic feature (Figure 1-2). Incorporation of the High Point Alignment Alternative and BPS-4 (Alt.) into the LPP project would replace the High Point Regulation Tank-2 along U.S. 89, the associated buried pipeline and BPS-4 west of U.S. 89.

A rock formation avoidance alignment option would be included immediately north of Blue Pool Wash along U.S. 89 in Utah. Under this alignment option, the pipeline would cross to the north side of U.S. 89 for about 400 feet and then return to the south side of U.S. 89. This alignment option would avoid tunneling under the rock formation on the south side of U.S. 89 near Blue Pool Wash.

A North Pipeline Alignment option is located parallel to the north side of U.S. 89 for about 6 miles from the east boundary of the GSENM to the east side of the Cockscomb geological feature.

The **Hydro System** would convey the Lake Powell water from High Point Regulating Tank-2 at the high point at ground level elevation 5,695 feet MSL for about 87 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 1-3). The High Point Alignment Alternative would convey the Lake Powell water from High Point Regulating Tank-2 (Alt.) at the high point at ground level elevation 5,630 feet MSL 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 1-3). Four in-line hydro generating stations (HS-1, HS-2 HS-3 and HS-4) with substations located along the penstock would generate electricity and help control water pressure in the penstock. HS-1 would be sited on the south side of U.S. 89 within the Congressionally-designated utility corridor through the GSENM. The High Point Alignment Alternative would include HS-1 (Alt.) along the K4020 road within the GSENM and continue along a portion of the K3290 road.

The proposed penstock alignment and two penstock alignment options are being considered to convey the water from the west GSENM boundary south through White Sage Wash. The proposed penstock



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- Project Hydro Station
- Hurricane Cliffs Forebay/Afterbay
- Lakes & Reservoirs
- Major Rivers & Streams
- Hydro System - South Alignment Alternative
- Water Conveyance System
- Cedar Valley Pipeline
- KCWCD Pipeline System
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N

0 1.25 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 1-3** MWH

Lake Powell Pipeline Hydro System South Alternative

alignment would parallel the K3250 road south from U.S. 89 and follow the Pioneer Gap Road alignment around the Shinarump Cliffs. One penstock alignment option would parallel the K3285 road southwest from U.S. 89 and continue to join the Pioneer Gap Road around the Shinarump Cliffs. The other penstock alignment option would extend southwest through currently undeveloped BLM land from the K3290 road into White Sage Wash.

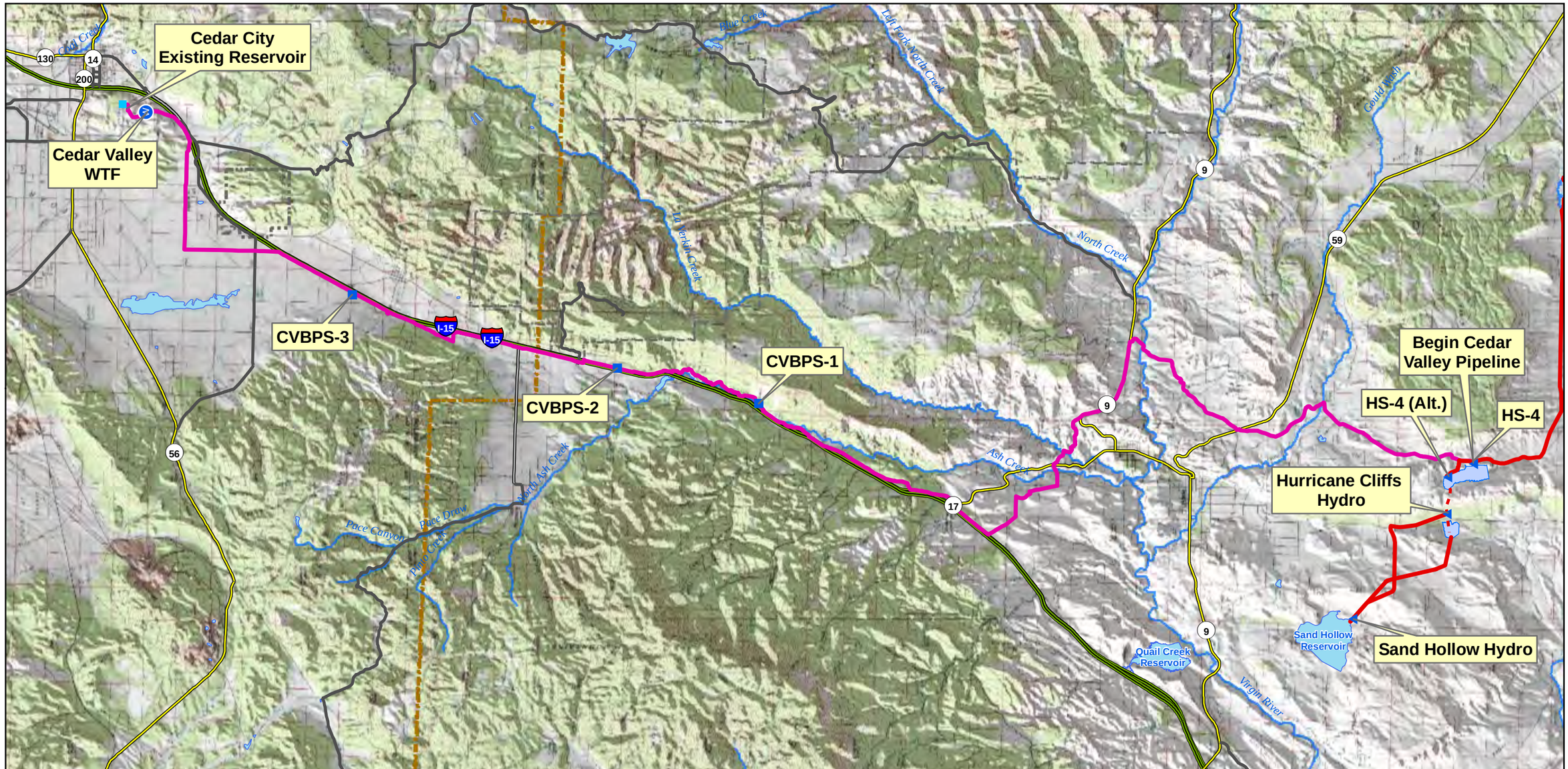
The penstock alignment would continue through White Sage Wash and then parallel to the Navajo-McCullough Transmission Line, crossing U.S. 89 Alt. and Forest Highway 22 toward the southeast corner of the Kaibab Indian Reservation. The penstock alignment would run parallel to and south of the south boundary of the Kaibab Indian Reservation, crossing Kanab Creek and Bitter Seeps Wash, across Moonshine Ridge and Cedar Ridge, and north along Yellowstone Road to Arizona State Route 389 west of the Kaibab Indian Reservation. HS-2 would be sited west of the Kaibab Indian Reservation. 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.

The penstock alignment would follow Uzona Road west through Canaan Gap and south of Little Creek Mountain and turn north to HS-4 (Alt.) above the proposed Hurricane Cliffs forebay reservoir. The forebay reservoir would be contained in a valley between a south dam and a north dam and maintain active storage of 11,255 acre-feet of water. 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 pumped storage hydro generating station. The pumped storage hydro generating station would connect to an afterbay reservoir contained by a single dam in the valley below the Hurricane Cliffs. A low pressure tunnel would convey the water northwest to a penstock continuing on to the Sand Hollow Hydro Station. The water would discharge into the existing Sand Hollow Reservoir.

The peaking hydro generating station option would involve a smaller, 200 acre-foot forebay reservoir with HS-4 discharging into the forebay reservoir, with the peaking hydro generating station discharging to a small afterbay connected to a penstock running north along the existing BLM road and west to the Sand Hollow Hydro Station. 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 peaking hydro generating station, which would discharge into a 200 acre-foot afterbay reservoir. A penstock would extend north from the afterbay reservoir along the existing BLM road and then west to the Sand Hollow Hydro Station. The water would discharge into the existing Sand Hollow Reservoir.

The **Kane County Pipeline System** would convey the Lake Powell water from the Lake Powell Pipeline at the west GSENM boundary for about 8 miles through a buried 24-inch diameter pipe in Kane County, Utah to a conventional water treatment facility located near the mouth of Johnson Canyon. The pipeline would parallel the south side of U.S. 89 across Johnson Wash and then run north to the new water treatment facility site (Figure 1-3).

The **Cedar Valley Pipeline System** would convey the Lake Powell water from the Lake Powell Pipeline just upstream of HS-4 or HS-4 (Alt.) for about 58 miles through a buried 36-inch diameter pipeline in Washington and Iron counties, Utah to a conventional water treatment facility in Cedar City, Utah (Figure 1-4). Three booster pump stations (CVBPS) located along the pipeline would pump the water under pressure to the new water treatment facility. The pipeline would follow an existing BLM road north from HS-4, cross Utah State Route 59 and continue north to Utah State Route 9, with an aerial crossing of the Virgin River at the Sheep Bridge. The pipeline would run west along the north side of Utah State Route 9 and parallel an existing pipeline through the Hurricane Cliffs at Nephi's Twist. The pipeline



- Water Treatment Facility
- Project Pump Station
- Project Hydro Station
- Hydro System - South Alignment Alternative
- Water Conveyance System
- Hurricane Cliffs Pressure Tunnel
- Cedar Valley Pipeline
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- Tribal Lands

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0 1 2 4 6 8 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 1-4** MWH

Cedar Valley Pipeline System

would continue across LaVerkin Creek, cross Utah State Route 17, and make an aerial crossing of Ash Creek. The pipeline would continue northwest to the Interstate 15 corridor and then northeast parallel to the east side of Interstate 15 highway right-of-way. CVBPS-1 would be sited adjacent to an existing gravel pit east of Interstate 15. CVBPS-2 would be sited on private property on the east side of Interstate 15 and south of the Kolob entrance to Zion National Park. CVBPS-3 would be sited on the west side of Interstate 15 in Iron County. The new water treatment facility would be sited near existing water reservoirs on a hill above Cedar City west of Interstate 15.

1.2.2 Existing Highway Alternative

The Existing Highway Alternative consists of five systems: Intake, Water Conveyance, Hydro, Kane County Pipeline, and Cedar Valley Pipeline. The Intake, Water Conveyance and Cedar Valley Pipeline systems would be the same as described for the South Alternative.

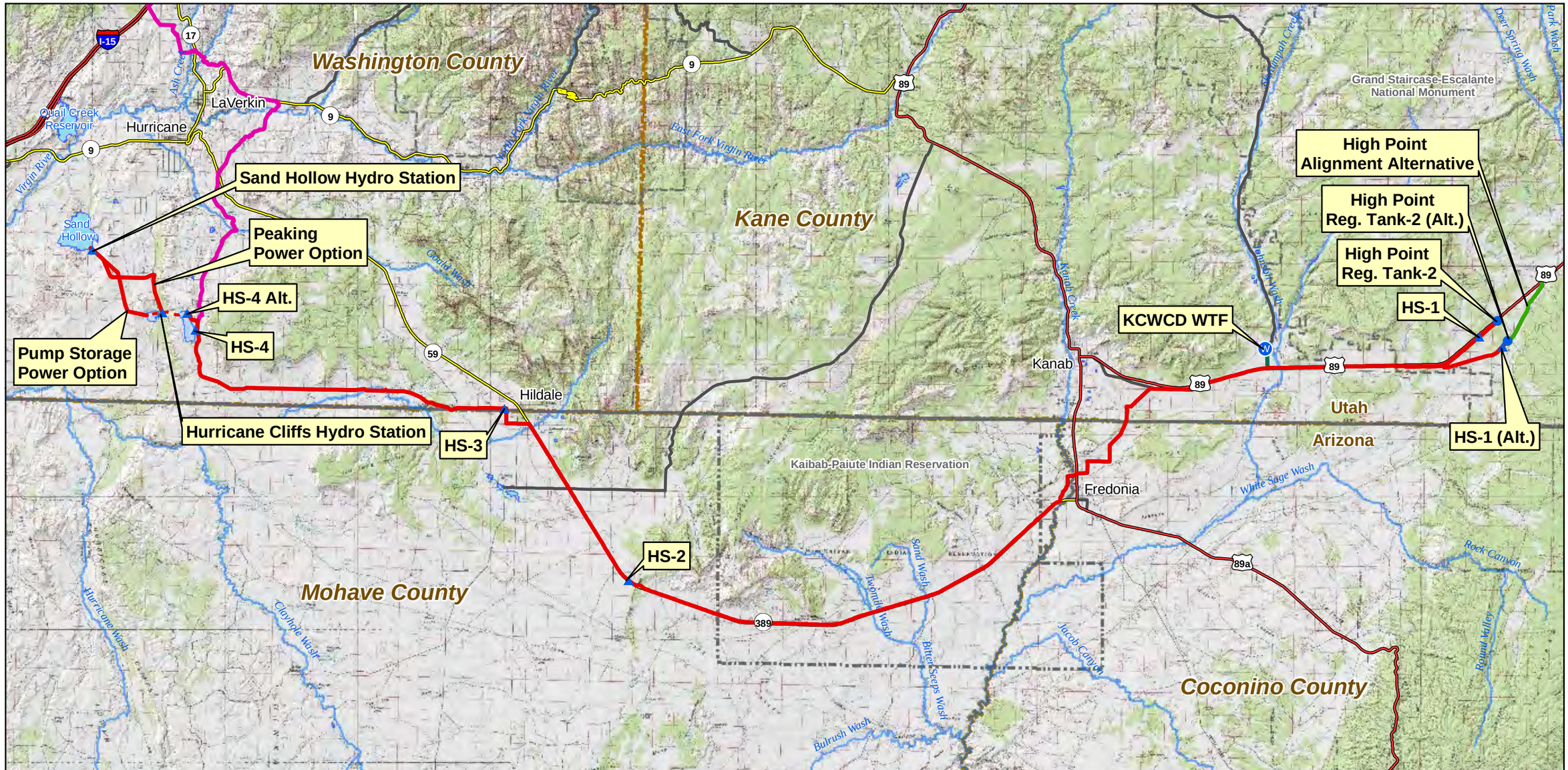
The **Hydro System** would convey the Lake Powell water from the regulating tank at the high point at ground elevation 5,695 feet MSL for about 80 miles through a buried 69-inch diameter penstock in Kane and Washington counties, Utah and Coconino and Mohave counties, Arizona to Sand Hollow Reservoir near St. George, Utah (Figure 1-5). The High Point Alignment Alternative would convey the Lake Powell water from High Point Regulating Tank-2 (Alt.) at the high point at ground level elevation 5,630 feet MSL 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 1-3). The High Point Alignment Alternative would rejoin U.S. 89 about 2.5 miles east of the west boundary of the GSENM. Four in-line hydro generating stations (HS-1, HS-2 HS-3 and HS-4) located along the penstock would generate electricity and help control water pressure in the penstock. HS-1 would be sited on the south side of U.S. 89 within the Congressionally-designated utility corridor through the GSENM. The High Point Alignment Alternative would include HS-1 (Alt.) along the K4020 road within the GSENM and continue along a portion of the K3290 road to its junction with the pipeline alignment along U.S. 89.

The penstock would parallel the south side of U.S. 89 west of the GSENM past Johnson Wash and follow Lost Spring Gap southwest, crossing U.S. 89 Alt. and Kanab Creek in the north end of Fredonia, Arizona. The penstock would run south paralleling Kanab Creek to Arizona State Route 389 and run west adjacent to the north side of this state highway through the 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 the Kaibab-Paiute Indian Reservation to 1.8 miles west of Cedar Ridge (intersection of Yellowstone Road with U.S. 89), from where it would follow the same alignment as the South Alternative to Sand Hollow Reservoir. HS-2 would be sited 0.5 mile west of Cedar Ridge along the north side of Arizona State Route 389.

The **Kane County Pipeline System** would convey the Lake Powell water from the Lake Powell Pipeline crossing Johnson Wash along U.S. 89 for about 1 mile north through a buried 24-inch diameter pipe in Kane County, Utah to a conventional water treatment facility located near the mouth of Johnson Canyon (Figure 1-5).

1.2.3 Southeast Corner Alternative

The Southeast Corner Alternative consists of five systems: Intake, Water Conveyance, Hydro, Kane County Pipeline, and Cedar Valley Pipeline. The Intake, Water Conveyance, Kane County Pipeline and Cedar Valley Pipeline systems would be the same as described for the South Alternative.



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

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Hydro System - South Alignment Alternative
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0 1.25 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 1-5** MWH

Lake Powell Pipeline
Hydro System
Existing Highway Alternative

The **Hydro System** would be the same as described for the South Alternative between High Point Regulating Tank-2 and the east boundary of the 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 Indian Reservation for about 3.8 miles and 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).

1.2.4 Transmission Line Alternatives

Transmission line alternatives include the Intake (3 alignments), BPS-1, Glen Canyon to Buckskin, Buckskin Substation upgrade, Paria Substation upgrade, BPS-2, BPS-2 Alternative, BPS-3 North, BPS-3 South, BPS-3 Underground, BPS-3 Alternative North, BPS-3 Alternative South, BPS-4, BPS-4 Alternative, HS-1 Alternative, HS-2 South, HS-3 Underground, HS-4, HS-4 Alternative, Hurricane Cliffs Afterbay to Sand Hollow, Hurricane Cliffs Afterbay to Hurricane West, Sand Hollow to Dixie Springs, Cedar Valley Pipeline booster pump stations, and Cedar Valley Water Treatment Facility.

The proposed new **Intake Transmission Line** would begin at Glen Canyon Substation and run parallel to U.S. 89 for about 2,500 feet to a new switch station, cross U.S. 89 at the Intake access road intersection and continue northeast to the Intake substation. This 69 kV transmission line would be about 0.9 mile long in Coconino County, Arizona (Figure 1-7). One alternative alignment would run parallel to an existing 138 kV transmission line to the west, turn north to the new switch station, cross U.S. 89 at the Intake access road intersection and continue northeast to the Intake substation. This 69 kV transmission line alternative would be about 1.2 miles long in Coconino County, Arizona (Figure 1-7). Another alternative alignment would bifurcate from an existing transmission line and run west, then northeast to the new switch station, cross U.S. 89 at the Intake access road intersection and continue northeast to the Intake substation. This 69 kV transmission line alternative would be about 1.3 miles long in Coconino County, Arizona (Figure 1-7).

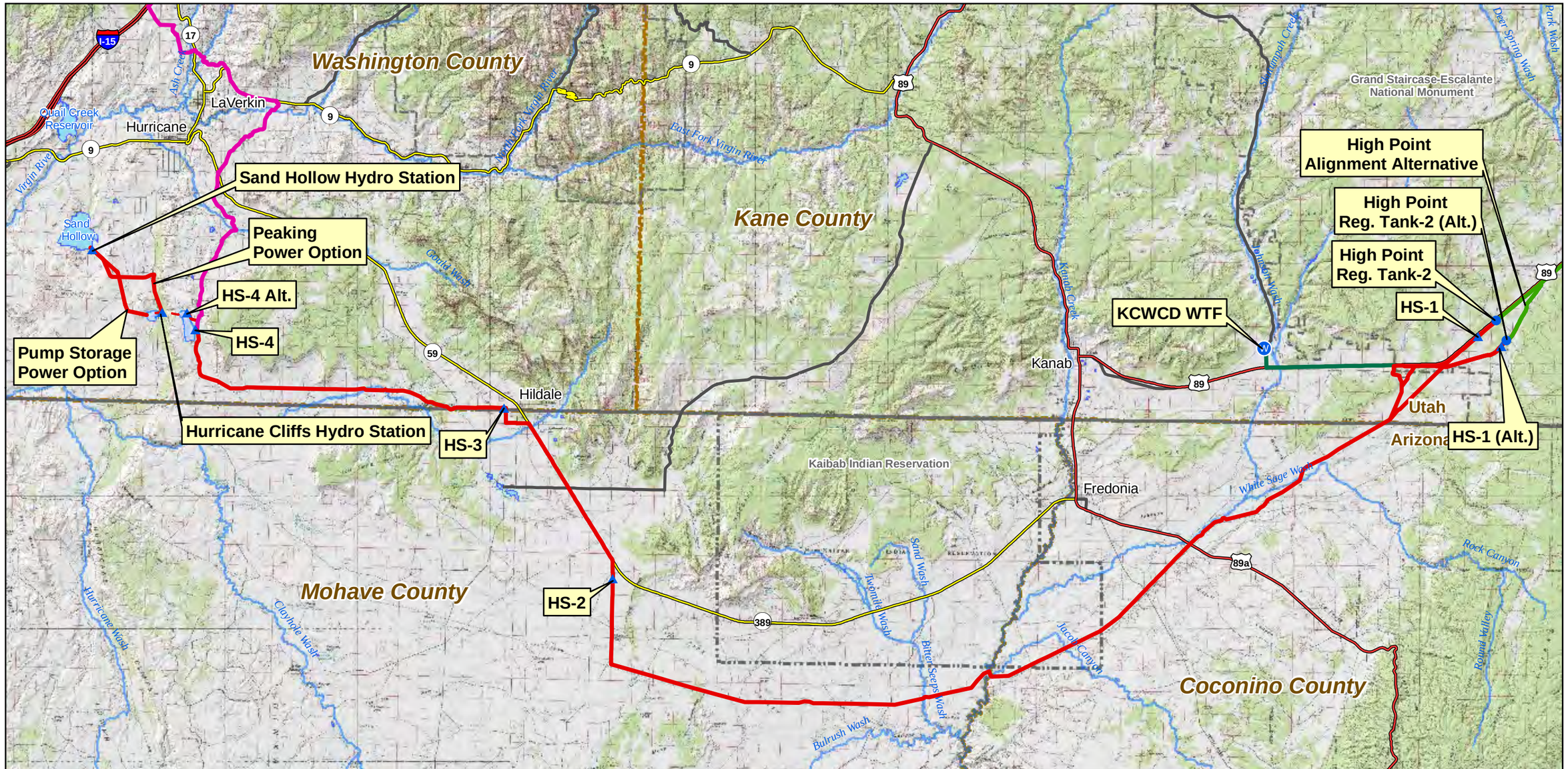
The proposed new **BPS-1 Transmission Line** would begin at the new switch station located on the south side of U.S. 89 and parallel the LPP Water Conveyance System alignment to the BPS-1 substation west of U.S. 89. This 69 kV transmission line would be about 1 mile long in Coconino County, Arizona (Figure 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 5 acres of land within the 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 Alternative. The substation upgrade would require an additional 2 acres of privately-owned land adjacent to the existing substation in Kane County, Utah (Figure 1-7).

The proposed new **BPS-2 Transmission Line** alternative would consist of a new 3-ring switch station along the existing 138 kV Glen Canyon to Buckskin Transmission Line and 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



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Water Conveyance System
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0 1.25 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

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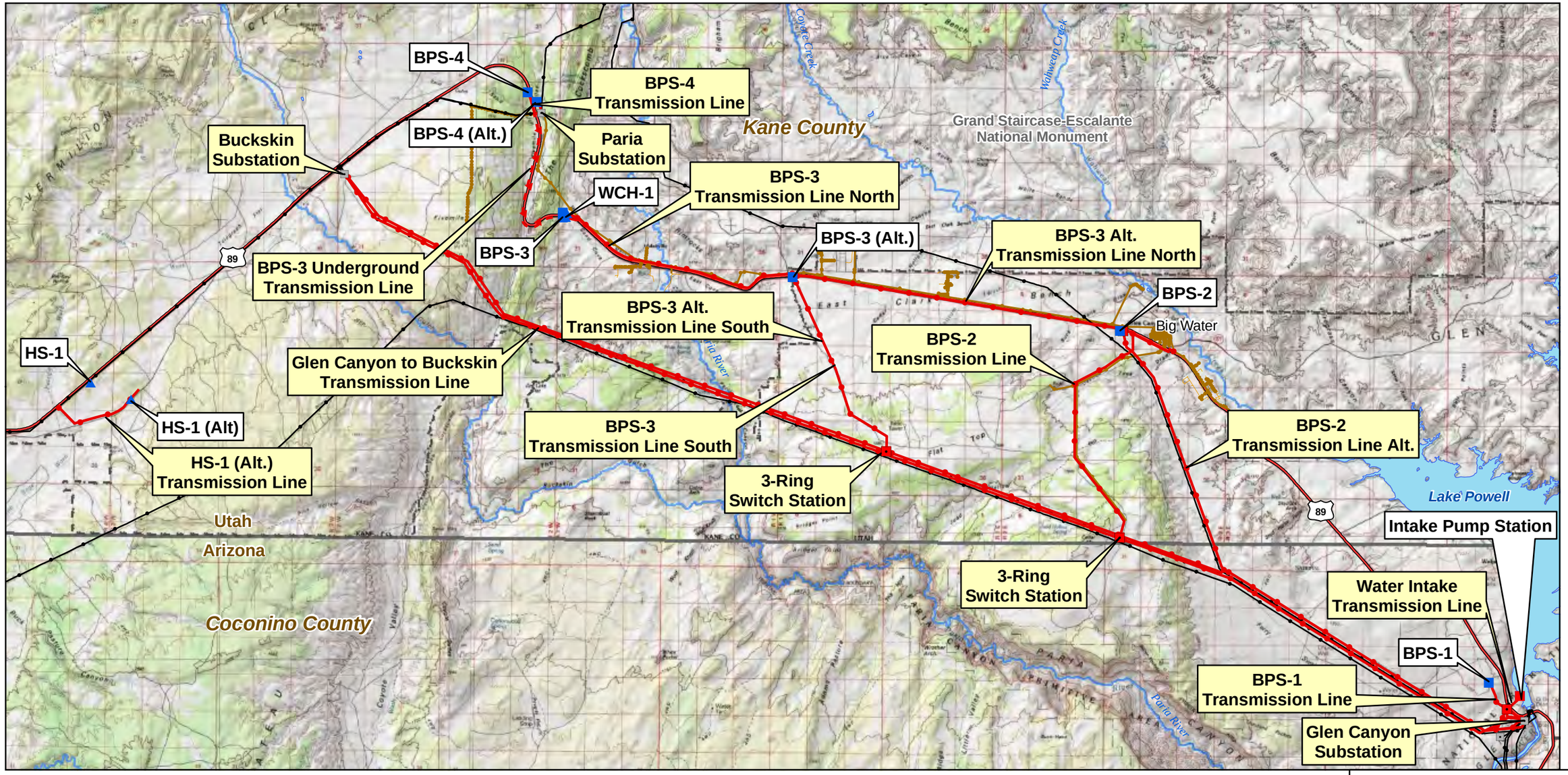
UDWR **Figure 1-6** MWH

Lake Powell Pipeline
Hydro System
Southeast Corner Alternative


BPS-4
BPS-4 Transmission Line
BPS-4 (Alt.)
Paria Substation
Buckskin Substation
Kane County
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WCH-1
BPS-3 Transmission Line North
BPS-3
BPS-3 (Alt.)
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BPS-3 Underground Transmission Line
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Big Water
BPS-3 Alt. Transmission Line South
BPS-2 Transmission Line
HS-1
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HS-1 (Alt)
BPS-3 Transmission Line South
BPS-2 Transmission Line Alt.
HS-1 (Alt.) Transmission Line
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Lake Powell
Utah
Arizona
Intake Pump Station
3-Ring Switch Station
Water Intake Transmission Line
Coconino County
BPS-1
BPS-1 Transmission Line
Glen Canyon Substation
Project Intake Pump Station
Project Booster Pump Station
Project Hydro Station
Existing Substation
Proposed Substation
Project Transmission Line
Underground Project Transmission Line
Existing Transmission Line
Existing OH Primary Line
Existing UG Primary Line
Interstate
US Highway
ST Highway
Hwy
Major Road
Lakes & Reservoirs
Major Rivers & Streams
National Park/Monument
GSENM Boundary
State Boundaries
NGS USA Topographic Maps
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
UDWR
Figure 1-7
MWH
Lake Powell Pipeline Transmission Line Alternatives East

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 alternative would be about 7 miles long across Utah SITLA-administered land, with a 138 kV connection to the BPS-2 substation (Figure 1-7).

The new **BPS-2 Alternative Transmission Line** would consist of a new 138 kV transmission line from Glen Canyon Substation parallel to the existing Rocky Mountain Power 230 kV transmission line, connecting to the BPS-2 substation west of Big Water. This new 138 kV transmission line alternative would be about 16.5 miles long in Coconino County, Arizona and Kane County, Utah crossing National Park Service-administered land, BLM-administered land and Utah SITLA-administered land (Figure 1-7).

The new **BPS-3 Transmission Line North** alternative would consist of a new 138 kV transmission line from BPS-2 paralleling the south side of U.S. 89 within the Congressionally designated utility corridor west to BPS-3 at the east side of the Cockscomb geological feature. This new 138 kV transmission line alternative would be about 15.7 miles long in Kane County, Utah (Figure 1-7).

The new **BPS-3 Transmission Line South** alternative would consist of a new 3-ring switch station along the existing 138 kV Glen Canyon to Buckskin Transmission Line and a new transmission line from the switch station north along an existing BLM road to U.S. 89 and then west along the south side of U.S. 89 within the Congressionally designated utility corridor to BPS-3 at the east side of the Cockscomb. This new 138 kV transmission line alternative would be about 12.3 miles long in Kane County, Utah (Figure 1-7).

The new **BPS-3 Underground Transmission Line** alternative would consist of a new buried 24.9 kV transmission line (2 circuits) from the upgraded Paria Substation to BPS-3 on the east side of the Cockscomb geological feature. This new underground transmission line would be parallel to the east and south side of U.S. 89 and would be about 4.1 miles long in Kane County, Utah (Figure 1-7).

The new **BPS-3 Alternative Transmission Line North** alternative would consist of a new 138 kV transmission line from BPS-2 paralleling the south side of U.S. 89 west to BPS-3 Alternative near the GSENM east boundary within the Congressionally-designated utility corridor. This new 138 kV transmission line alternative would be about 9.3 miles long in Kane County, Utah (Figure 1-7).

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

The new **BPS-4 Transmission Line** alternative would begin at the upgraded Paria Substation and run parallel to the west side of U.S. 89 north to BPS-4 within the Congressionally designated utility corridor. This new 138 kV transmission line would be about 0.8 mile long in Kane County, Utah (Figure 1-7).

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

The proposed new **HS-1 Alternative Transmission Line** would begin at the new HS-1 Alternative and run southwest parallel to the K4020 road and then northwest parallel to the K4000 road to the U.S. 89 corridor where it would tie into the existing 69 kV transmission line from the Buckskin Substation to the

Johnson Substation. This 69 kV transmission line would be about 3 miles long in Kane County, Utah (Figure 1-7).

The proposed new **HS-2 South Transmission Line** alternative 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 proposed new **HS-3 Underground 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 underground circuit would be about 0.6 mile long in Washington County, Utah (Figure 1-8).

The proposed new **HS-4 Transmission Line** would consist of a new transmission line from the HS-4 hydroelectric station and substation north along an existing BLM road to an existing transmission line parallel to Utah State Route 59. The new 69 kV transmission line would be about 8.2 miles long in Washington County, Utah (Figure 1-8).

The new **HS-4 Alternative Transmission Line** alternative would connect the HS-4 Alternative 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).

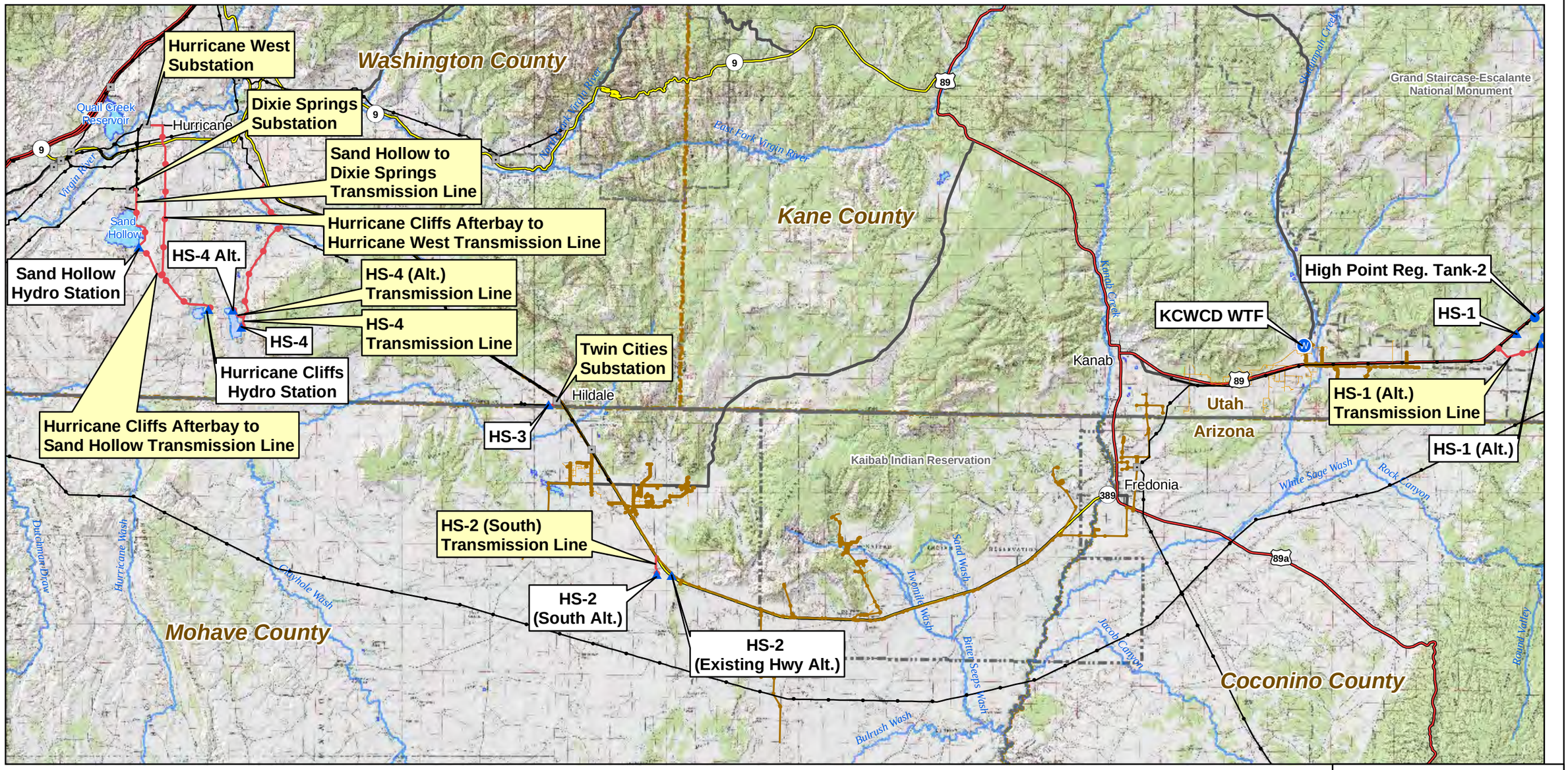
The proposed new **Hurricane Cliffs Afterbay to Sand Hollow Transmission Line** would consist of a new 69 kV transmission line from the Hurricane Cliffs peaking power plant and substation, and run northwest to the Sand Hollow Hydro Station substation. This new 69 kV transmission line would be about 4.9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

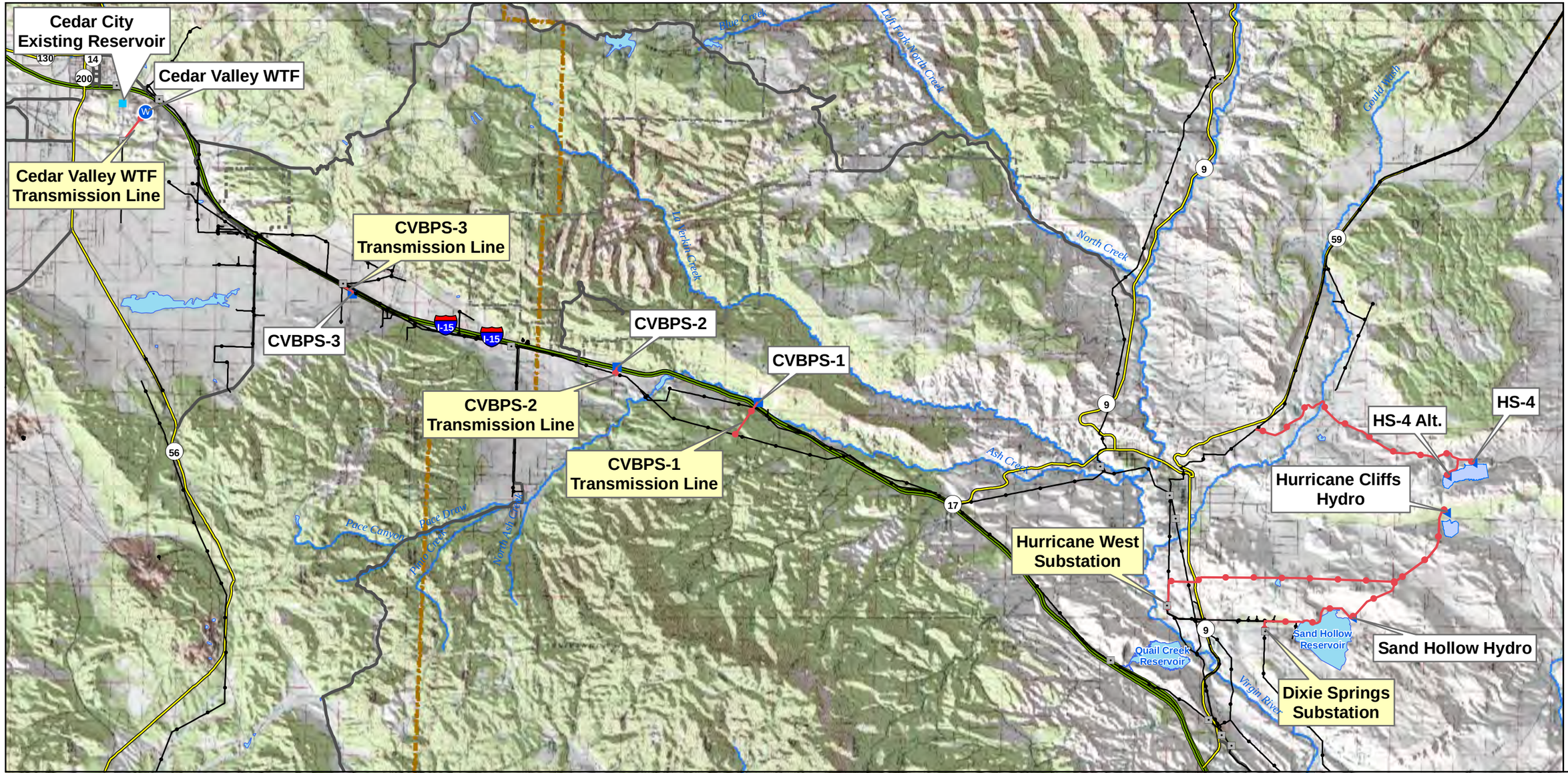
The proposed new **Hurricane Cliffs Afterbay to Hurricane West Transmission Line** would consist of a new 345 kV transmission line from the Hurricane Cliffs pumped storage power plant and run northwest and then north to the planned Hurricane West 345 kV substation. This new 345 kV transmission line would 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 from the Sand Hollow Hydro Station 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).

The three **Cedar Valley Pipeline** booster pump stations would require new transmission lines from existing transmission lines paralleling the Interstate 15 corridor. The new CVBPS-1 transmission line would extend southeast over I-15 from the existing transmission line to the booster pump station substation for about 1.3 miles in Washington County, Utah (Figure 1-9). The new CVBPS-2 transmission line would extend east over I-15 from the existing transmission line to the booster pump station substation for about 0.2 mile in Washington County, Utah (Figure 1-9). The new CVBPS-3 transmission line would extend west over I-15 from the existing transmission line and southwest along the west side of Interstate 15 to the booster pump station substation for about 0.6 mile in Iron County, Utah (Figure 1-9).

The **Cedar Valley Water Treatment Facility Transmission Line** would begin at an existing substation in Cedar City and run about 1 mile to the water treatment facility site in Iron County, Utah (Figure 1-9).


Hurricane West Substation
Washington County
Quail Creek Reservoir
Hurricane
Dixie Springs Substation
Sand Hollow to Dixie Springs Transmission Line
Virgin River
Sand Hollow
Hurricane Cliffs Afterbay to Hurricane West Transmission Line
HS-4 Alt.
Sand Hollow Hydro Station
HS-4 (Alt.) Transmission Line
HS-4 Transmission Line
HS-4
Hurricane Cliffs Hydro Station
Twin Cities Substation
Hildale
Hurricane Cliffs Afterbay to Sand Hollow Transmission Line
HS-3
Kane County
North Fork Virgin River
East Fork Virgin River
Kanab Creek
Kanab
Grand Staircase-Escalante National Monument
Skutumpah Creek
High Point Reg. Tank-2
KCWCD WTF
HS-1
HS-1 (Alt.) Transmission Line
Utah
Arizona
HS-1 (Alt.)
Kaibab Indian Reservation
Fredonia
White Sage Wash
Rock Canyon
HS-2 (South) Transmission Line
Dutchman Draw
Hurricane Wash
Cowhole Wash
HS-2 (South Alt.)
Mohave County
Twomile Wash
Sand Wash
Bitter Seeps Wash
Jacob Canyon
HS-2 (Existing Hwy Alt.)
Coconino County
Round Valley
Bulrush Wash
Water Treatment Facility
Project Regulating Tank
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Existing Substation
Project Transmission Line
Existing Transmission Line
Existing OH Primary Line
Existing UG Primary Line
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 1.25 2.5 5 7.5 10 Miles
Lake Powell Pipeline Project
Spatial Reference: UTM Zone 12N, NAD-83
UDWR Figure 1-8 MWH
Lake Powell Pipeline Transmission Line Alternatives West



Water Treatment Facility
Project Pump Station
Project Hydro Station
Existing Substation
Project Substation
Project Transmission Line
Existing Transmission Line
Existing OH Primary Line
Existing UG Primary Line
Interstate
US Highway
ST Highway
Hwy
Major Road
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
National Park/Monument
County Boundaries
Tribal Lands

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

UDWR Figure 1-9 MWH

Cedar Valley Transmission Line Alternatives

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 reducing residential outdoor water use in the WCWCD and CICWCD service areas. This alternative could provide a total of 86,249 acre-feet of water annually to WCWCD, CICWCD and KCWCD for M&I use without diverting Utah's water from Lake Powell.

1.3.1 WCWCD No Lake Powell Water Alternative

The WCWCD would implement other future water development projects currently planned by the District, develop additional water reuse/reclamation, and convert additional agricultural water use to M&I use as a result of urban development in agricultural areas through 2020. Remaining planned and future water supply projects through 2020 include the Ash Creek Pipeline (5,000 acre-feet per year), Crystal Creek Pipeline (2,000 acre-feet per year), and Quail Creek Reservoir Agricultural Transfer (4,000 acre-feet per year). Beginning in 2020, WCWCD would convert agricultural water to secondary use and work with St. George City to maximize existing wastewater reuse, bringing the total to 96,258 acre-feet of water supply per year versus demand of 98,427 acre-feet per year, incorporating currently mandated conservation goals. The WCWCD water supply shortage in 2037 would be 70,000 acre-feet per year, 1,000 acre-feet more than the WCWCD maximum share of the LPP water. Therefore, the WCWCD No Lake Powell Water Alternative needs to develop 69,000 acre-feet of water per year to meet comparable supply and demand requirements as the other action alternatives.

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 40,000 acre-feet per year of Virgin River water with high total dissolved solids (TDS) concentration and other contaminants. The RO advanced water treatment facility would produce up to 36,279 acre-feet per year of water suitable for M&I use. The WCWCD would develop the planned Warner Valley Reservoir to store the diverted Virgin River water, which would be delivered to the RO advanced water treatment facility. The remaining 3,721 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 remaining needed water supply of 32,721 acre-feet per year to meet WCWCD 2037 demands would be obtained by reducing and restricting outdoor residential water use in the WCWCD service area. The Utah Division of Water Resources (UDWR) estimated 2005 culinary water use for residential outdoor watering in the communities served by WCWCD was 97.4 gallons per capita per day (gpcd) (UDWR 2009). This culinary water use rate is reduced by 30.5 gpcd to account for water conservation attained from 2005 through 2020, yielding 66.9 gpcd residential outdoor water use available for conversion to other M&I uses. The equivalent water use rate reduction to generate 32,721 acre-feet per year of conservation is 56.6 gpcd for the 2037 population within the WCWCD service area. Therefore, beginning in 2020, the existing rate of residential outdoor water use would be gradually reduced and restricted to 10.3 gpcd, or an 89.4 percent reduction in residential outdoor water use.

The combined 36,279 acre-feet per year of RO product water and 32,721 acre-feet per year of reduced residential outdoor water use would equal 69,000 acre-feet per year of M&I water to help meet WCWCD demands through 2037.

1.3.2 CICWCD No Lake Powell Water Alternative

The CICWCD would implement other future groundwater development projects currently planned by the District, purchase agricultural water from willing sellers for conversion to M&I uses, and convert additional agricultural water use to M&I use as a result of urban development in agricultural areas through 2020. Remaining planned and future water supply projects through 2020 include additional groundwater development projects (3,488 acre-feet per year), agricultural conversion resulting from M&I development (3,834 acre-feet per year), and purchase agricultural water from willing sellers (295 acre-feet per year). Beginning in 2020, CICWCD would have a total 19,772 acre-feet of water supply per year versus demand of 19,477 acre-feet per year, incorporating required progressive conservation goals. The CICWCD water supply shortage in 2060 would be 11,470 acre-feet per year. Therefore, the CICWCD No Lake Powell Water Alternative needs to develop 11,470 acre-feet of water per year to meet comparable supply and demand limits as the other action alternatives.

The remaining needed water supply of 11,470 acre-feet per year to meet CICWCD 2060 demands would be obtained by reducing and restricting outdoor residential water use in the CICWCD service area. The UDWR estimated 2005 culinary water use for residential outdoor watering in the communities served by CICWCD was 84.5 gpcd (UDWR 2007). A portion of this residential outdoor water would be converted to other M&I uses. The equivalent water use rate to obtain 11,470 acre-feet per year is 67.8 gpcd for the 2060 population within the CICWCD service area. Therefore, the existing rate of residential outdoor water use would be gradually reduced and restricted to 16.7 gpcd beginning in 2023, an 80 percent reduction in the residential outdoor water use rate between 2023 and 2060. The 11,470 acre-feet per year of reduced residential outdoor water use would be used to help meet the CICWCD demands through 2060.

1.3.3 KCWCD No Lake Powell Water Alternative

The KCWCD would use existing water supplies and implement future water development projects including new groundwater production, converting agricultural water rights to M&I water rights as a result of urban development in agricultural areas, and developing water reuse/reclamation. Existing water supplies (4,039 acre-feet per year) and 1,994 acre-feet per year of new ground water under the No Lake Powell Water Alternative would meet projected M&I water demand of 6,033 acre-feet per year within the KCWCD service area through 2060. The total potential water supply for KCWCD is about 12,140 acre-feet per year (4,039 acre-feet per year existing culinary plus secondary supply, and 8,101 acre-feet per year potential for additional ground water development up to the assumed sustainable ground water yield) without agricultural conversion to M&I supply. Short-term ground water overdrafts and new storage projects (e.g., Jackson Flat Reservoir) would provide reserve water supply to meet demands during drought periods and other water emergencies.

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. 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 or released according to the operating guidelines. Future population growth as projected by the Utah Governor's Office of Planning and Budget (GOPB) would continue to occur in southwest Utah until water and other potential limiting resources such as developable land, electric power, and fuel begin to curtail economic activity and population in-migration.

1.4.1 WCWCD No Action Alternative

The WCWCD would implement other future water development projects currently planned by the District, develop additional water reuse/reclamation, convert additional agricultural water use to M&I use as a result of urban development in agricultural areas, and implement advanced treatment of Virgin River water. The WCWCD could also limit water demand by mandating water conservation measures such as outdoor watering restrictions. Existing and future water supplies under the No Action Alternative would meet projected M&I water demand within the WCWCD service area through approximately 2020. The 2020 total water supply of about 96,528 acre-feet per year would include existing supplies, planned WCWCD water supply projects, wastewater reuse, transfer of Quail Creek Reservoir supplies, and future agricultural water conversion resulting from urban development of currently irrigated lands. Each future supply source would be phased in as needed to meet the M&I 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). Maximum reuse of treated wastewater effluent for secondary supplies would be required to meet the projected M&I water demand starting in 2020. The No Action Alternative would not provide adequate water supply to meet projected water demands from 2020 through 2060. There would be a potential water shortage of approximately 139,875 acre-feet per year in 2060 under the No Action Alternative (UDWR 2008b).

1.4.2 CICWCD No Action Alternative

The CICWCD would implement future water development projects including converting agricultural water rights to M&I water rights as a result of urban development in agricultural areas, purchasing “buy and dry” agricultural water rights to meet M&I demands, and developing water reuse/reclamation. The Utah State Engineer would act to limit existing and future ground water pumping from the Cedar Valley aquifer in an amount not exceeding the assumed sustainable yield of 37,600 ac-ft per year. Existing and future water supplies under the No Action Alternative meet projected M&I water demand within the CICWCD service area during the planning period through agricultural conversion of water rights to M&I use, wastewater reuse, and implementing “buy and dry” practices on irrigated agricultural land. Each future water supply source would be phased in as needed to meet the M&I demand associated with the forecasted population. The CICWCD No Action Alternative includes buying and drying of agricultural water rights covering approximately 8,000 acres between 2005 and 2060 and/or potential future development of West Desert water because no other potential water supplies have been identified to meet unmet demand. The No Action Alternative would not provide CICWCD with any reserve water supply (e.g., water to meet annual shortages because of drought, emergencies, and other losses) after 2010 (i.e., after existing supplies would be maximized).

1.4.3 KCWCD No Action Alternative

The KCWCD would use existing water supplies and implement future water development projects including new ground water production, converting agricultural water rights to M&I water rights as a result of urban development in agricultural areas, and developing water reuse/reclamation. Existing water supplies (4,039 acre-feet per year) and 1,994 acre-feet per year of new ground water under the No Action Alternative would meet projected M&I water demand of 6,033 acre-feet per year within the KCWCD service area through 2060. The total potential water supply for KCWCD is about 12,140 acre-feet per year (4,039 acre-feet per year existing culinary plus secondary supply, and 8,101 acre-feet per year potential for additional ground water development up to the assumed sustainable ground water yield) without agricultural conversion to M&I supply. Short-term ground water overdrafts and new storage projects (e.g., Jackson Flat Reservoir) would provide reserve water supply to meet demands during drought periods and other water emergencies.

1.5 Identified Issues

1.5.1 Purposes of Study

This technical report describes the results and findings of an air quality analysis to evaluate conditions along the proposed alternative pipeline alignments of the LPP Project. The purpose of the analysis, as defined in the 2008 Air Quality Study Plan prepared for the Federal Energy Regulatory Commission (Commission), is to identify potential impacts from LPP Project air emissions during construction and operations, document the potential influence of these emissions on human and wildlife receptors and identify measures to mitigate impacts from the various sources as necessary.

1.5.2 Identified Issues

The issues identified for analyses include the following:

- Potential human and wildlife receptors near the LPP Project.
- Current background air quality levels in the region.
- Equipment needed for various construction activities and associated emissions.
- Combined emissions from the construction equipment for pipeline, facility, and transmission line construction.
- Emissions from operations.
- Distances at which the air pollutants disperse below significant impact levels.
- Areas of potential impacts from LPP Project construction and operation air pollution.
- Cumulative impacts of air pollution within the LPP Project area from construction and operation emissions.

1.6 Impact Topics

The following impact topics are addressed in the Air Quality Study Report:

- What pollution thresholds would be unacceptable for human or wildlife receptors?
- Would air emissions caused by LPP Project construction result in unacceptable pollution levels for human receptors?
- Would pollution caused by LPP Project construction result in disruption of wildlife habitat?
- Would pollution levels caused by LPP Project operations result in unacceptable levels for human or wildlife receptors?

Chapter 2
Methodology

2.1 General

This Air Quality Study Report (Study Report) analyzes the air quality impacts resulting from the LPP and CVP, herein collectively referred to as the LPP Project. This Study Report also uses the methodology previously identified and described in the Preliminary Application Document (PAD) and Scoping Document No. 1.

Construction of the pipeline and associated facilities will require installation through native soils and rock. These activities are analyzed to characterize and quantify the pollutants and dust resulting from the operation of the required construction equipment. In addition, operational activities are analyzed for emissions to identify possible effects on air quality.

2.2 Data Used

The following data and information were used for the Study Report (complete references are found at the end of this Study Report):

- United States Federal Register – 40 CFR Part 51
- Southern Utah Air Quality Task Force – St. George Air Quality Standards
- US Environmental Protection Agency (USEPA) – Region 9 Federal Class 1 Areas – Air Quality Maps
- Utah Department of Environmental Quality (UDEQ) – Area Designation Recommendations for the 2006 $PM_{2.5}$ NAAQS
- National Park Service – National Resource Management Policies 2006
- USEPA – National Ambient Air Quality Standards (NAAQS)
- Utah State Division of Air Quality – Dust Control and the Aggregate Industry
- USEPA AP-42 Section 13.3-1 and 11.9-2
- Utah State Division of Air Quality – PM_{10} data
- Airmonitoring.Utah.gov – Air quality data
- UDEQ – State Implementation Plan – Sulfur Dioxide
- USA Dieselnet.com – Non road diesel engines
- USEPA – Emission Standards Reference Guide for Heavy Duty and Non road Engines
- MWH Field Data – LPP wind measurement field data
- Western Regional Climate Center (WRCC) – Prevailing wind data
- Arizona Department of Environmental Quality (ADEQ) – LPP Scoping Notice

2.2.1 Agency Resource Management Goals

The Clean Air Act (42 U.S.C Section 7401) requires that federal standards be set to limit the maximum levels of pollutants in the outdoor air. Each state is responsible for developing plans to achieve and maintain the standards, known as state implementation plans (SIPs). The rules set forth in the plans are enforced by the states; however, the rules are also federally enforceable once the plans have received federal approval. These plans are the framework for each state's program to protect air quality.

In areas where the air quality has improved to the point that the National Ambient Air Quality Standards (NAAQS) are no longer exceeded, the implementation plan remains in effect and a maintenance plan is prepared to demonstrate how the air will be kept clean for the next twenty years or longer. These maintenance plans become part of the SIP.

The SIPs in Utah and Arizona are primarily focused on the population centers in each respective state where non-attainment areas exist. Non-attainment areas do not exist in the LPP Project area (UDAQ 2006) (ADEQ 2010).

The Utah SIP has identified parks, including Zion National Park, to be protected from Significant Deterioration of Air Quality. This includes visibility protection in Zion National Park as well. Consideration of impacts on visibility in Zion National Park is included in this Study Report because portions of the park are in the vicinity of the LPP Project. Other national parks that are in the region, but are not likely to be affected include Bryce Canyon, Capitol Reef and Arches.

2.2.1.1 UDEQ – Division of Air Quality

The management of air quality in Utah is addressed through the UDEQ SIP.

2.2.1.2 ADEQ – Air Quality Division

The management of air quality in Arizona is addressed through the ADEQ SIP.

2.2.1.3 EPA

EPA administers resource management plans through land management agencies such as the National Park Service and the Bureau of Land Management.

2.2.1.4 Kaibab Band of Paiute Indians

No specific resource management goals were identified by the Kaibab Band of Paiute Indians, other than to adhere to the goals and requirements established by the State of Utah, State of Arizona, and EPA.

2.2.1.5 Bureau of Land Management (BLM)

The BLM has an expressed goal to “maintain air quality in accordance with standards prescribed by federal and state laws and regulations.” Within the jurisdiction of the Kanab Field Office, the BLM has adopted federal and state requirements through the Kanab Office Management Resource Plan (BLM 2008). The BLM does not maintain regulatory control over air quality. BLM relies on the agency with jurisdiction over air quality to set regulatory standards and criteria to protect the air quality in a particular

area. Once these standards are established, BLM references them in its permitting documents and ensures that all permitted activities on public lands refer to the appropriate agency's standard.

2.2.1.6 National Park Service

The National Park Service (NPS) has a responsibility to protect air quality under both the 1916 Organic Act and the Clean Air Act (NPS 2006). Class I areas (parks greater than 6,000 acres) are to be protected from human made visibility impairment. The Clean Air Act recognizes the importance of integral vistas and the NPS strives to protect these vistas through cooperative means.

It is the position of the NPS that external programs need to remedy existing impacts and prevent future impacts from human caused air pollution. NPS will participate in these programs to develop pollution control plans and regulations. NPS will review new sources of pollution and will recommend denial of a construction permit if they are determined to cause an adverse impact (NPS 2006).

2.2.1.7 Bureau of Reclamation

The U.S. Bureau of Reclamation (Reclamation) defers to federal and state air quality requirements for lands and facilities under its jurisdiction. No specific Reclamation goals were identified.

2.2.1.8 Southern Utah Air Quality Task Force

Other than following federal and state requirements, there are no specific resource management goals identified for the region; however, St. George has specific Air Quality Regulations in Chapter 9 of the City Code Book. Chapter 9 primarily pertains to dust creation from construction and other activities and it regulates and further defines requirements of these activities and the standards these activities must uphold (SUAQTF 2009).

2.2.1.9 Five County Association, Counties, and Local Agencies Information

In discussions with representatives from the Five County Association, Washington County, Iron County, Kane County, Coconino County, and Mohave County, no specific requirements, goals or regulations outside of the federal and state air quality requirements were identified.

2.3 Assumptions

Assumptions made during the development and analysis of this study include the following:

- Emissions from the LPP Project construction activities are representative of emissions from a typical construction site. This typical construction site analysis was chosen because of the preliminary level of accuracy and detail available at the time the analysis was performed.
- The worst case emission scenario is used as the standard. Calculations are generally based on worst-case scenarios.
- Equipment exhaust particulate emissions for the project are assumed to be PM_{10} (particulate matter smaller than 10 micron diameter). This results in a conservative air quality analysis.
- Each piece of construction equipment operates 8 hours per day, 5 days per week.

- Each construction service truck travels 100 miles per day based on previous construction experience.
- Dust emission rate from construction is based on an eight-hour per day period.
- Equipment emissions are calculated assuming all equipment is operating at the same time and in the same general area. This provides for a conservative air quality analysis based on a point source.
- Background pollutant levels are difficult to determine as there is little local monitoring data. Regional park data was used to estimate background levels.
- Fugitive dust emissions for typical LPP construction sites are represented by dust emissions from EPA's AP-42 document (EPA 1995).
- EPA's SCREEN3 model was used to determine worst-case pollutant concentrations after dispersion from the construction site. This model was chosen because of its EPA approval, and the preliminary nature of the data available.
- SCREEN3 assumptions are listed in the SCREEN3 Modeling results section.
- The impact analysis addresses only the temporary effects of construction activities of exhaust from heavy equipment and dust produced during construction.
- If air quality modeling projects that Zion National Park would not be affected by the LPP Project, then other more distant national parks would not be affected.
- Non-road (off-road) diesel engine standards (Tiers 1-3) were adopted in 1994 with Tier 3 phased in by 2008. Tier 4 will be phased in by 2015. Tier 3 or higher equipment will be used.
- Historical air quality is assumed to be typical of high desert, rural areas.

2.4 Impact Analysis Methodology

The air quality impact analysis was performed by reviewing existing information and data, performing field investigations to determine background pollutant levels, and calculating probable construction and operation air pollution levels using methods consistent with EPA approved methodologies as described in this section.

The analysis included the following elements:

- Determine background levels of pollutants
- Determine if there are any existing areas of non-attainment
- Determine typical construction layout for emissions
- Calculate potential emissions from construction of the LPP Project
- Calculate potential emissions from operation of the LPP Project
- Model dispersion of pollutants from point sources and determine levels of pollutants at various distances from the point sources
- Compare dispersion model results to significance criteria to determine if significant air quality impacts would occur
- Document air quality impacts that are expected to occur

2.4.1 Review Existing Information

Technical reports, internet research, scientific and engineering journal publications, and other literature were reviewed as identified in Section 2.2. The objective of the literature review was to identify and review available technical reports and information to determine known regional air quality conditions at specific locations along the alternative alignments.

2.4.2 Field Investigations

Field investigations within the project area included visual inspections of general air quality in the region (visible pollutants) and measurements to confirm typical wind patterns in the area. Data from field investigations regarding the prevailing wind directions was obtained and used in the modeling of wind directions.

2.4.3 Perceived Aesthetic Valuable Areas

The region contains numerous visually valuable areas which could be adversely affected in the event of poor air quality. These areas are generally in the State and National Parks, including the Class I national parks of Zion, Bryce Canyon, Grand Canyon, Coral State Sand Dunes, and Gooseneck, although aesthetically valuable areas exist throughout the proposed pipeline corridor.

2.4.4 Equipment Estimates and Emissions

It is difficult to determine the exact number of equipment operation hours for each construction activity and which equipment is in operation at any given time. Therefore, the annual emissions estimates were based on the conservative assumption that all equipment would be running 8-hours per day, 5-days per week for the life of the construction.

Pipeline and facility construction activities were identified and the equipment needed for each activity, the length of use, and the typical emissions from the equipment were determined.

Typical construction was assumed and the analysis of emissions was based on the following activities:

- Clearing and Grubbing/Earthwork
- Pipe Installation
- Structure Construction
- Cleaning and Restoring
- Dam Work/Blasting

Each activity was assumed to include the types and quantities of equipment shown in Table 2-1. These assumptions were based upon engineering estimates and previous projects and assessments.

Table 2-1 Construction Equipment[1]				
Clearing and Grubbing / Earthwork	**Pipelines**	**Structures[2]**	**Cleaning and Restoring[3]**	**Dam Work/ Earthwork**
Pickup Truck (4)	Pickup Truck (2)	Pickup Truck (2)	Pickup Truck (2)	Pickup Truck (3)
Dump Truck (2)	Dump Truck	Excavator	Dump Truck	Dump Truck (2)
Loader	Excavator (2)	Grader	Excavator	Loader (2)
Dozer	Pipelayer Crane	Crane	Paver	Excavator (2)
Grader		Compactor	Roller	Dozer (2)
		Welder	Grader	Scraper
		Concrete Trucks (3)		Compactor

Notes:
[1] Numbers of equipment are the expected equipment used at one time.
[2] Concrete trucks for short-term use only and not included for duration of project.
[3] Pipe backfill compaction included in this activity.

Calculations were performed to obtain daily pollution estimates from projected equipment emissions. An example of the calculations is detailed below.

Example Daily Emission Calculation (345 hp excavator)

Horsepower – 345 hp
Daily Usage – 8 hours
NO_2 Emissions (from equipment specifications) – 9.6 grams/hp-hour

NO_2 Emissions = (345 hp) x (8 hours use/day) x (9.6 grams/hp-hour) x (0.0022 lbs/gram) = 58.3 lbs/day

Once each of these individual equipment emissions was calculated, they were summed for each activity. The activity with the largest aggregate emission was used for the modeling to provide conservative emissions results.

2.4.4.1 Particulate Matter (PM) Calculations

Dust can arise from construction area activities such as travelling over unpaved surfaces, clearing, excavating, blasting, etc. EPA AP-42 provides a general dust emission value of 1.2 tons per acre per month of construction activity (EPA, 2005). This is a total suspended particulate concentration (TSP), which is generally comprised of 30-micron and smaller particle sizes.

Investigations of construction dust particle size distribution have shown that 30 percent of the particulate are in the PM_{10} range at 165 feet downwind of the sources (Grelinger 1988). It was assumed that an additional 50 percent of the dust could be reduced by consistent watering or other dust suppression efforts (EPA 1995).

Example Daily Particulate Matter Emission Calculation

- Area (Booster Pump Station No. 3) = (600 ft) x (300 ft) = 180,000 sf or 4.1 acres
- Dust Emission = (4.1 acres) x (1.2 tons/acre/month) x (1 month/30 days) x (2,000 lbs/ton) x (30% as PM_{10})
- Dust Emission (no dust suppression) = 98 lbs/day
- Dust Emissions (with 50% suppression) = 49 lbs/day

The dust emissions and PM_{10} equipment exhaust emissions were added together for each construction site and the data were converted to grams/second for modeling input. These numbers were used for the SCREEN3 modeling for dispersion and concentration estimates. This was added to background concentrations to compare to NAAQS. A summary of all the major facilities and pipeline dust emissions is shown in Section 3.

Blasting would occur during construction of selected pipeline segments and selected structures. Approximately 75 miles of the LPP pipeline alignment and 23 miles of the CVP alignment would require blasting. The primary LPP pipeline segments that would require blasting are near the intake, near the Cockscomb geological feature, and along the South Alignment Alternative south and east of the Kaibab-Paiute Indian Reservation. The primary CVP pipeline segments that would require blasting are near the Hurricane Cliffs. Fugitive dust emissions from trench and site blasting would be minimal because blasting activities are single, controlled events and PM_{10} levels resulting from blasting are typically low as indicated in AP-42, Compilation of Air Pollutant Emission Factors, Chapter 11. Therefore, the emissions associated with blasting are considered insignificant for purposes of this Study Report.

2.4.5 Review Air Quality Dispersion Models

There are numerous EPA models used to determine air quality, dispersion and concentrations. The SCREEN3 model was used in this Study Report for several reasons, including:

- It is a single source plume model which provides maximum ground-level concentrations for point, area, flare, and volume sources, as well as concentrations, and concentrations caused by inversion break-up.
- It is an EPA-approved model and is available through the EPA website.
- It is a screening model that is used before applying refined air quality modeling and it helps to determine if more refined modeling is necessary.
- It allows a moderate amount of variability which is appropriate for this preliminary level of study.

2.4.6 Construction Air Quality Calculations

Numerous assumptions were made and models were run to calculate the air quality impacts at specified distances from the construction areas and long term operation of the new facilities to estimate the air quality conditions expected from LPP Project. Data were entered into the SCREEN3 model for analysis of the LPP and facility construction. The total emission levels were entered into the model to determine ambient air impacts compared to the National Ambient Air Quality Standards (NAAQS).

2.4.6.1 Particulate Matter (PM_{10})

Assumptions for the fugitive dust modeling include:

- Construction of facilities (pump stations, etc) produces 1.2 tons/acre/month, assuming a 30-day construction month.
- Facilities will be in construction for a 12-month period.
- A maximum of 1,000 feet of pipeline construction could be completed without final dust mitigation efforts being implemented at any one time.
- Twenty pipeline construction operations could be simultaneously performed. Each segment would be approximately ten miles.

2.4.6.2 Nitrogen Dioxide (NO_2)

Nitrogen oxides (NO_2) are regulated in the National Ambient Air Quality Standards (NAAQS). NO_2 is typically produced through the burning of fuels at high temperature, as in a combustion process. The NO_2 standard is shown in Table 3-5. The LPP Project area is an attainment area for NO_2.

2.4.6.3 Carbon Monoxide (CO)

Carbon monoxide is generally the result of incomplete combustion of fuels such as gasoline from automobile engines and other combustion engines. CO standards are set under the NAAQS and are shown in Table 3-5. The LPP Project area is an attainment area for CO.

2.4.6.4 Other Pollutants

Pollutants such as ozone (O_3), sulfur dioxide (SO_2) and lead (Pb) have standards established under the NAAQS. The LPP Project area is an attainment area for these pollutants. Other pollutant NAAQS levels are shown in Table 3-5.

2.4.7 Operations Air Quality Calculations

The impact analysis from operations included exhaust from facility equipment. The facilities are not anticipated to include any combustion equipment, except for possible backup generators; therefore, the analysis is limited to these potential point sources.

The facilities (pump stations and hydro stations) would have little or no pollutant emissions from standard operations. The primary concern is from small stationary sources at each facility. Small stationary sources can be exempted from being required to receive an approval order if it emits (UDEQ 2010):

- less than 5 tons/year of SO_2, CO, NO_X, PM_{10}, O_3, or VOC's.
- less than 500 lbs/year of any hazardous pollutant and less than 2,000 lbs/year of any combination of hazardous air pollutants.
- less than 500 lbs/year of any air contaminant not listed above and less than 2,000 lbs/year of any combination of air contaminants not listed above.

Chapter 3
Affected Environment

3.1 Impact Area

This Study Report encompasses the areas surrounding the LPP project features shown in Figures 1-1 through 1-9. The study involved reviewing air quality impacts on areas of possible cultural sensitivity, tourism, environmental sensitivity, endangered species, sensitive wildlife habitats, locations of economic or perceived aesthetic value, relatively dense population areas, or national monuments (wilderness areas, parks, etc.).

3.2 Overview of Baseline Conditions

The baseline air quality in the study area has been evaluated based on general regional studies and some specific areas that have been monitored. Limited information is available about local historical background air quality levels outside of populated areas, however it is assumed they are typical of high desert, rural areas with low pollutant levels and possible occasional fugitive dust concerns.

The following is an analysis of the air quality related baseline conditions and impact topics for the project. Areas potentially impacted by emissions resulting from the LPP Project are identified in this report.

3.2.1 Baseline Conditions

3.2.1.1 Dense Population Areas

Densely populated areas are mainly confined to the St. George metropolitan area (approximate population of 110,000 in 2005) and Cedar City (approximate population of 29,000 in 2005) (UDWR 2007). All other areas along the proposed and alternative pipeline alignments are either sparsely populated or run through small rural towns with populations of less than 15,000.

3.2.1.2 Historical Air Quality (Baseline)

Nearly all areas in the region are classified as attainment areas. There are minimal local data and the regional air quality research is focused on St. George and the surrounding area. A recent concern in St. George is particulate matter, specifically $PM_{2.5}$, as levels have increased. Monitoring of $PM_{2.5}$ has been performed in the St. George area; however, no violations of the 24-hour or annual standard have occurred. UDAQ continues to monitor the air quality in St. George and the area is currently described as “unclassifiable” (UDEQ 2007).

Data for the region are detailed in Table 3-1. These data represent maximum background levels for the calculations and modeling because these are likely the highest levels in the region.

Table 3-1 Regional Air Quality Data				
Location	**Pollutant**	**Averaging Time**	**Highest Concentration Average**	**National Ambient Air Quality Standards**
Grand Junction, CO	CO	8-hour	8,000 µg/m^3	10,000 µg/m^3
		1-hour	14,000 µg/m^3	40,000 µg/m^3
Kanab	NO_2	Annual	0.91 µg/m^3	100 µg/m^3
Kanab	O_3	8-hour	0.046 ppm	0.08 ppm
		1-hour	No data	0.12 ppm
St. George	$PM_{2.5}$	Annual Arithmetic Mean	<15 µg/m^3	15 µg/m^3
		24-hour	<35 µg/m^3	35 µg/m^3
St. George	PM_{10}	Annual	31 µg/m^3	50 µg/m^3
		24-hour	123 µg/m^3	150 µg/m^3
Kanab	SO_2	Annual	0.43 µg/m^3	80 µg/m^3
		24-hour	No data	365 µg/m^3
		3-hour	No data	1,300 µg/m^3

3.2.1.3 Meteorological Characteristics

Much of the region has an arid to semi arid climate. Precipitation ranges from less than 10 inches per year near St. George to nearly 20 inches of precipitation per year south of Cedar City. Inversions, which create stagnant air in valleys and tend to increase air quality issues by confining pollutants, are not common, but can occur in the region from time to time, especially near St. George. Prevailing winds are generally from the west and southwest, although they can vary locally, seasonally and in connection with weather conditions. Temperatures can be extreme in this region with maximum temperatures over 100 degrees Fahrenheit in the summer and minimum temperatures below 0 degrees Fahrenheit in the winter. Local climate data are included in Tables 3-2 and 3-3.

Table 3-2
St. George Climate Data

Month	Average Max. Temperature (F)	Average Min. Temperature (F)	Average Total Precipitation (in.)	Average Total SnowFall (in.)	Average Wind Speed (mph)	Prevailing Wind Direction
January	53.6	25.8	1.07	1.3	3.4	E
February	59.9	30.6	1.02	0.6	4.6	ENE
March	67.9	36.3	0.93	0.2	5.8	ENE
April	76.7	43.1	0.53	0	7.7	W
May	86.1	51.1	0.39	0	8.3	W
June	96.2	59.1	0.19	0	8.5	W
July	101.7	66.5	0.67	0	7.8	W
August	99.5	65.2	0.76	0	7.3	ENE
September	92.6	55.4	0.6	0	6.2	ENE
October	80.2	43.3	0.68	0	4.7	ENE
November	64.8	32	0.64	0.2	3.4	E
December	54	25.9	0.77	0.9	3.2	E
Annual	77.8	44.5	8.25	3.2	5.9	

Table 3-3
Kanab Climate Data

Month	Average Max. Temperature (F)	Average Min. Temperature (F)	Average Total Precipitation (in.)	Average Total SnowFall (in.)	Average Snow Depth (in.)
January	47.3	22	1.53	7.3	1
February	52.1	25.7	1.5	4.2	1
March	59.2	29.8	1.49	2.6	0
April	67.8	35.7	1.01	1.4	0
May	77.5	43	0.62	0	0
June	87.5	50.5	0.35	0	0
July	92.7	58.2	1.04	0	0
August	90.2	57.2	1.42	0	0
September	83.8	50.1	1.18	0	0
October	72.2	39.6	1.07	0.2	0
November	58.8	30.1	1.03	1.5	0
December	48.5	23.3	1.23	5.2	1
Annual	69.8	38.8	13.49	22.5	0

3.3 Overview of LPP Project Conditions

3.3.1 Air Pollutants of Concern

Following review of existing information and direct contacts with ADEQ and UDEQ staff and other officials, the primary air quality concerns were identified for the LPP Project (ADEQ 2010b; ADEQ 2010c; ADEQ 2010d; BLM 2009; SGU 2009; FCAOG 2010; ICA 2010; KBPI 2009; KCP&Z 2010; MCDPH 2010; NPS 2010; and UDEQ 2010b). The primary air quality concern along the LPP Project alternative alignments is fugitive dust emissions during construction, and in particular throughout the St. George metropolitan area. Small emission sources are a concern to the state agencies and the regulations regarding small stationary source emissions would apply if the exemption criteria are exceeded (UDEQ 2010a). In general, the pipeline and associated facilities would be constructed in rural areas that are not likely to affect residents during short periods of NAAQS exceedance at or near the construction sites.

3.3.1.1 Fugitive Dust and Particulate Matter

Fugitive dust is a type of nonpoint source air pollution with small airborne particulate matter (PM) that does not originate from a specific point such as a gravel quarry or grain mill. Fugitive dust originates in small quantities over large areas. The PM in fugitive dust is generally a mixture of dust from various sources (soot is from combustion emissions but is also a PM) and is usually labeled as PM_{10} or $PM_{2.5}$. PM_{10} and $PM_{2.5}$ are defined as matter with diameters of 10 micrometers and less and 2.5 micrometers and less, respectively. Sources include, but are not limited to, unpaved roads, agricultural cropland, desert areas and construction sites.

Recent research indicates that there may be significant health considerations resulting from overexposure to PM (EPA 2010). These particles are so small that they can become imbedded in human lung tissue, causing or exacerbating respiratory diseases and cardiovascular problems. Other negative effects include reduced visibility and accelerated deterioration of buildings.

The LPP Project area is designated as an attainment area with regard to fugitive dust. Local areas are designated as either Attainment, Unclassified, or within tribal lands and under specific tribal requirements (UDEQ 2007). St. George is currently designated as Unclassified and UDEQ is monitoring the St. George air quality further to determine the appropriate designation for PM. Results from past surveys in St. George have indicated there have been no violations of either the 24-hour or annual PM standards. For purposes of this study it is assumed that the St. George area would remain as an Unclassified or Attainment area. Kane, Iron, Washington, San Juan and Garfield Counties are designated as Unclassified.

Table 3-4 shows the calculated PM emissions from the various construction activities.

Table 3-4
PM_{10} from Facility Construction

Activity	Area (acres)	TSP (lbs/day)	PM_{10} (lbs/day 50% suppression)	PM_{10} from Combustion (lbs/day)	Total PM_{10} (lbs/day)
IPS-1 Pump Station	4.6	362	54	5.0	59
BPS1	13.1	1,030	155	5.0	160
BPS2	5.5	435	65	5.0	70
BPS3	4.1	326	49	5.0	54
BPS4	3.6	285	43	5.0	48
Reg Tank-1	1.8	145	22	5.0	27
HS1	3.1	245	37	5.0	42
HS2	4.6	362	54	5.0	59
HS3	4.0	317	48	5.0	53
HS4	1.7	136	20	5.0	25
HC - Forebay S. Dam	32.0	2,735	410	8.4	419
HC - Forebay N. Dam	4.7	433	65	8.4	73
HC - Forebay Channel	1.5	149	22	5.0	27
HC - Afterbay S. Dam	16.4	1,725	259	8.4	267
HC - Afterbay N. Dam	15.8	1,766	265	8.4	273
HC - Powerhouse	7.3	869	130	5.0	135
HC Hydro	9.4	743	111	5.0	116
SH Hydro	2.1	163	24	5.0	29
CBPS1	3.1	245	37	5.0	42
CBPS2	5.0	395	59	5.0	64
CBPS3	5.0	395	59	5.0	64
Reg Tank-2	2.0	158	24	5.0	29
Pipeline	2.3	362	54	5.0	59

Table 3-4 indicates that the Hurricane Cliffs Forebay construction would be the area of greatest particulate matter and fugitive dust generation. Results of dispersion calculations show that the particulate matter disperse to concentrations below NAAQS standards at a distance of 1,100 meters (3,608 feet) from the source. Most of the PM would be dispersed before it leaves the construction area because the site is quite large. Figures 3-1 (key sheet for Figures 3-2 to 3-13), 3-2, 3-3, and 3-4 show the extent of the likely PM pollution above NAAQS levels. Smaller sources such as Regulating Tank-1 are projected to produce PM levels that are dispersed to concentrations below NAAQS limits at a distance of 200 meters (650 feet), which is largely within the limits of the construction area. These PM levels are very conservative estimates and most of the construction effort would emit significantly less PM and would disperse at shorter distances.

The NAAQS limits are shown in Table 3-5 (EPA 2008).

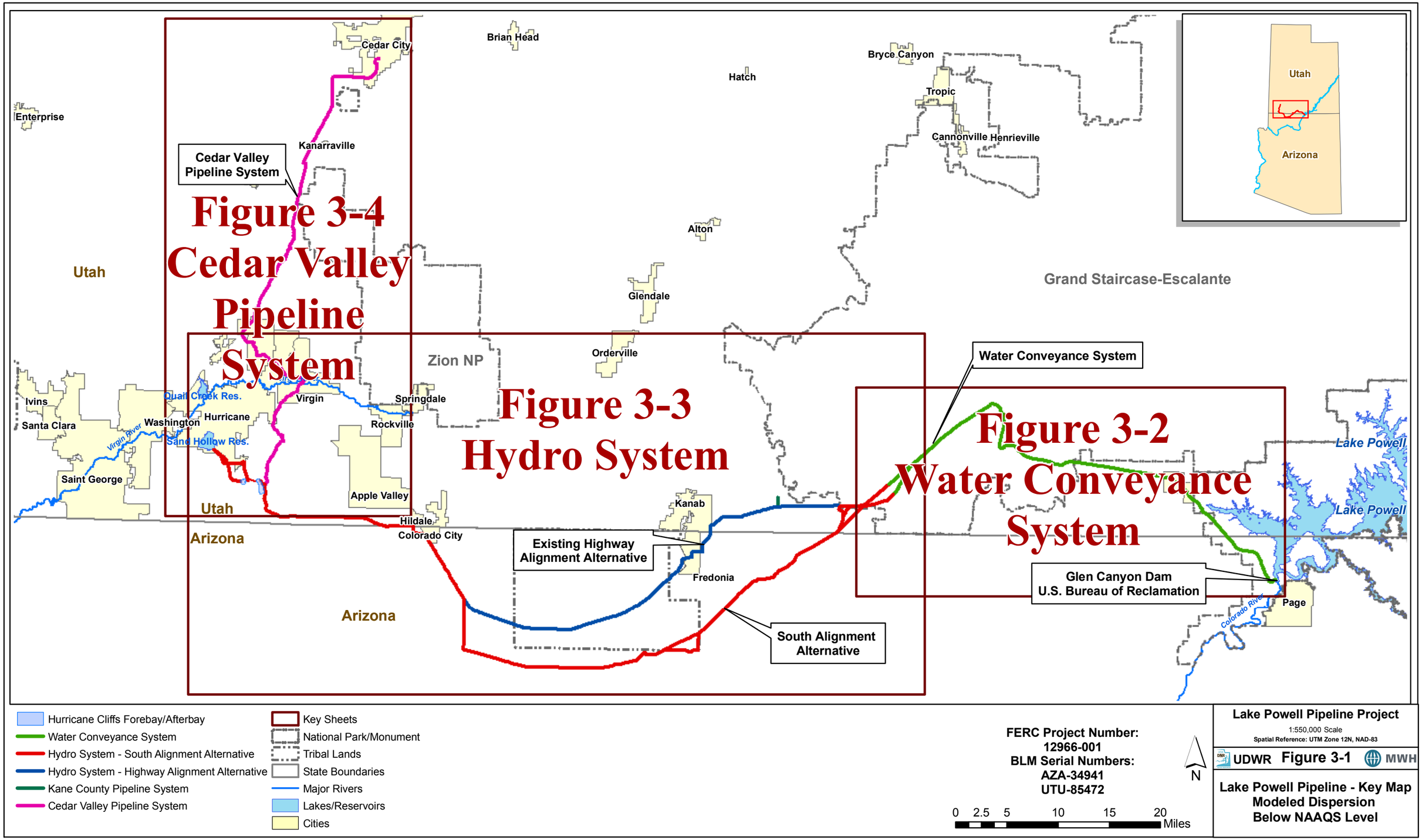
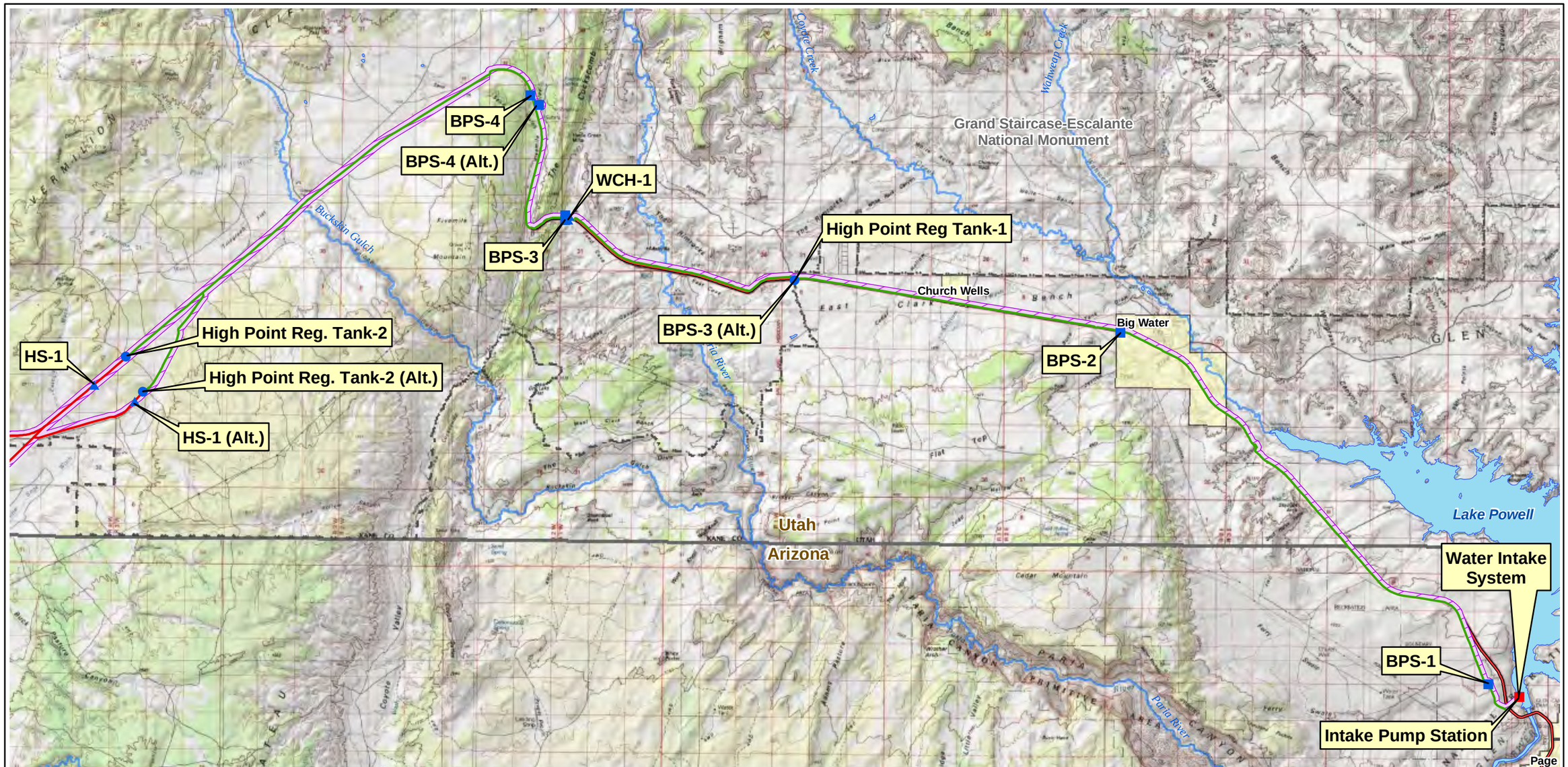


Figure 3-4
Cedar Valley Pipeline System
Figure 3-3
Hydro System
Figure 3-2
Water Conveyance System
Cedar Valley Pipeline System
Water Conveyance System
Existing Highway Alignment Alternative
South Alignment Alternative
Glen Canyon Dam
U.S. Bureau of Reclamation
Utah
Arizona
Grand Staircase-Escalante
Zion NP
Lake Powell
Cedar City
Brian Head
Hatch
Bryce Canyon
Tropic
Cannonville
Henrieville
Enterprise
Kanarraville
Alton
Glendale
Orderville
Ivins
Santa Clara
Washington
Hurricane
Virgin
Springdale
Rockville
Quail Creek Res.
Sand Hollow Res.
Virgin River
Saint George
Apple Valley
Hildale
Colorado City
Kanab
Fredonia
Page
Colorado River
Hurricane Cliffs Forebay/Afterbay
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
Kane County Pipeline System
Cedar Valley Pipeline System
Key Sheets
National Park/Monument
Tribal Lands
State Boundaries
Major Rivers
Lakes/Reservoirs
Cities
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
1:550,000 Scale
Spatial Reference: UTM Zone 12N, NAD-83
UDWR Figure 3-1 MWH
Lake Powell Pipeline - Key Map
Modeled Dispersion
Below NAAQS Level



- Project Intake Pump Station
- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Particulate Matter 10 (PM 10) 650 ft Dispersion Corridor
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- Lakes & Reservoirs
- Major Rivers & Streams
- National Park/Monument
- GSENM Boundary
- State Boundaries
- Cities

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

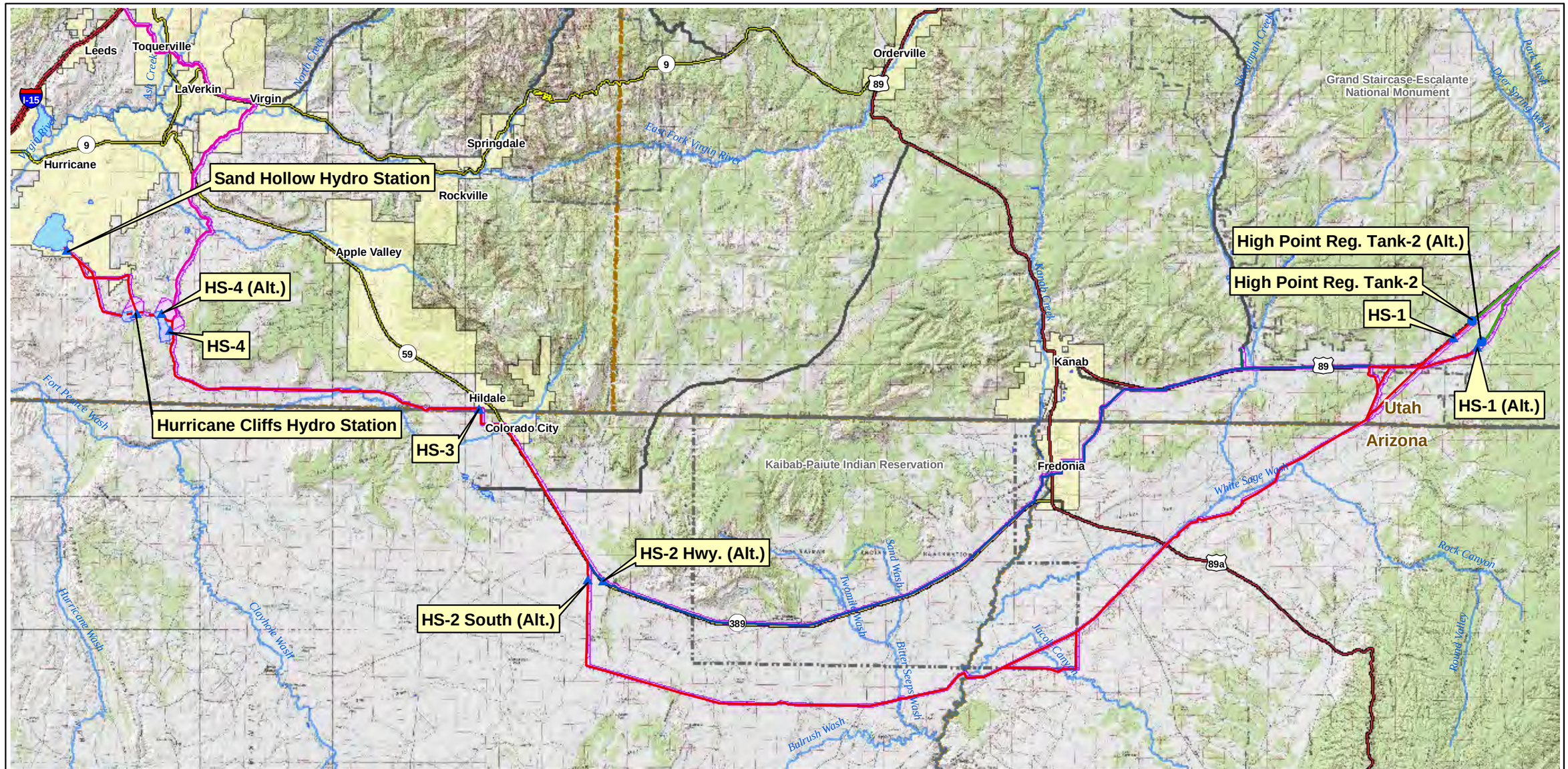
0 0.5 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-2** MWH

Lake Powell Pipeline
Water Conveyance System
PM 10 - Modeled Dispersion
Below NAAQS Levels



- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Hurricane Cliffs Forebay/Afterbay
- Lakes & Reservoirs
- Major Rivers & Streams
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Hydro System - Highway Alignment Alternative
- KCWCD Pipeline System
- Cedar Valley Pipeline
- Particulate Matter 10 (PM 10) 650 ft Dispersion Corridor Except at Hurricane Cliffs (3,600 ft)
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- National Park/Monument
- GSENM Boundary
- Tribal Lands
- State Boundaries
- Cities
- County Boundaries

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

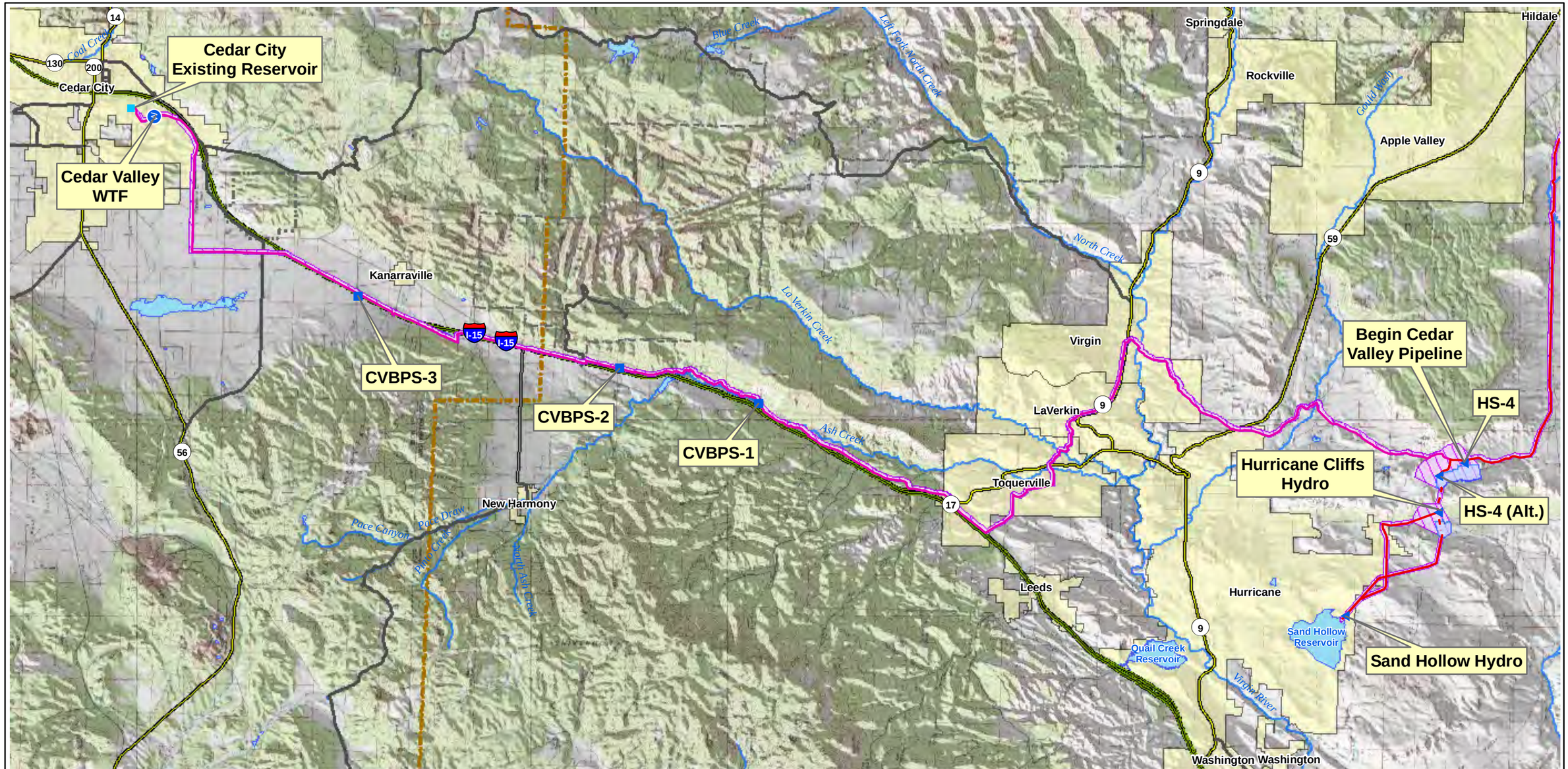
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-3** MWH

Lake Powell Pipeline
Hydro System
PM 10 - Modeled Dispersion
Below NAAQS Levels



Water Treatment Facility
Project Pump Station
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Particulate Matter 10 (PM 10) 650 ft Dispersion Corridor except at Hurricane Cliffs (3,600 ft)
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
County Boundaries
Cities
Tribal Lands

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-4** MWH

Cedar Valley Pipeline System PM 10 - Modeled Dispersion Below NAAQS Levels

Table 3-5
National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10,000 µg/m^3)	8-hour [(1)]	None	
	35 ppm (40,000 µg/m^3)	1-hour [(1)]		
Lead	0.15 µg/m^3 [(2)]	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour [(3)]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [(4)] (Arithmetic Mean)	Same as Primary	
	35 µg/m^3	24-hour [(5)]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [(6)]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [(7)]	Same as Primary	
	0.12 ppm	1-hour [(8)]	Same as Primary	
Sulfur Dioxide	0.03 ppm (78 µg/m^3)	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m^3)	3-hour [(1)]
	0.14 ppm (364 µg/m^3)	24-hour [(1)]		

Notes:

(1) Not to be exceeded more than once per year.
(2) Final rule signed October 15, 2008.
(3) Not to be exceeded more than once per year on average over 3 years.
(4) To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
(7) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(8) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.
(b) As of June 15, 2005 EPA has revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas. For one of the 14 EAC areas (Denver, CO), the 1-hour standard was revoked on November 20, 2008. For the other 13 EAC areas, the 1-hour standard was revoked on April 15, 2009.

3.3.1.2 Nitrogen Dioxide (NO_2)

Assuming Tier 3 equipment is used at the Hurricane Cliffs forebay construction site, NO_2 levels are projected to disperse to concentrations below NAAQS levels (100 µg/m^3) at a distance of approximately 900 meters (2,952 feet). Most of the NO_2 material would be dispersed before it leaves the construction area because the site covers a large area. Smaller facility construction, such as Regulating Tank-1, is projected to generate dispersed concentrations below 100 µg/m^3 at less than 700 meters (2,300 feet). Figures 3-5, 3-6, and 3-7 show the extent of the likely NO_2 pollution above NAAQS levels.

If Tier 4 equipment is used, NAAQS levels for NO_2 dispersion would be achieved in less than 100 meters (328 feet). Tier 4 equipment was not assumed to be used for purposes of this study.

3.3.1.3 Carbon Monoxide (CO)

The dispersion modeling shows that the CO levels would disperse below NAAQS limits (10 mg/m^3) in less than 100 meters (328 feet) for the largest facilities, which are generally within the construction boundaries. The CO concentrations would be lower for small facilities and would be dispersed below NAAQS limits within the small facility construction area. Figures 3-8, 3-9 and 3-10 show the extent of the projected CO pollution concentrations above NAAQS levels.

3.3.1.4 Sulfur Dioxide (SO_2) and Other Pollutants

SO_2 emissions were modeled to determine the estimated distance from the construction source to achieve dispersion of the concentrations to less than the NAAQS Primary Standard of 0.14 ppm. The model shows that the SO_2 levels would be below 3-hour NAAQS limits at less than 500 meters (1,640 feet) for large facility construction and less for smaller facility construction. The SO_2 emissions likely would be dispersed prior to leaving the construction sites. Figures 3-11, 3-12, and 3-13 show the extent of the projected SO_2 pollution concentrations above NAAQS levels.

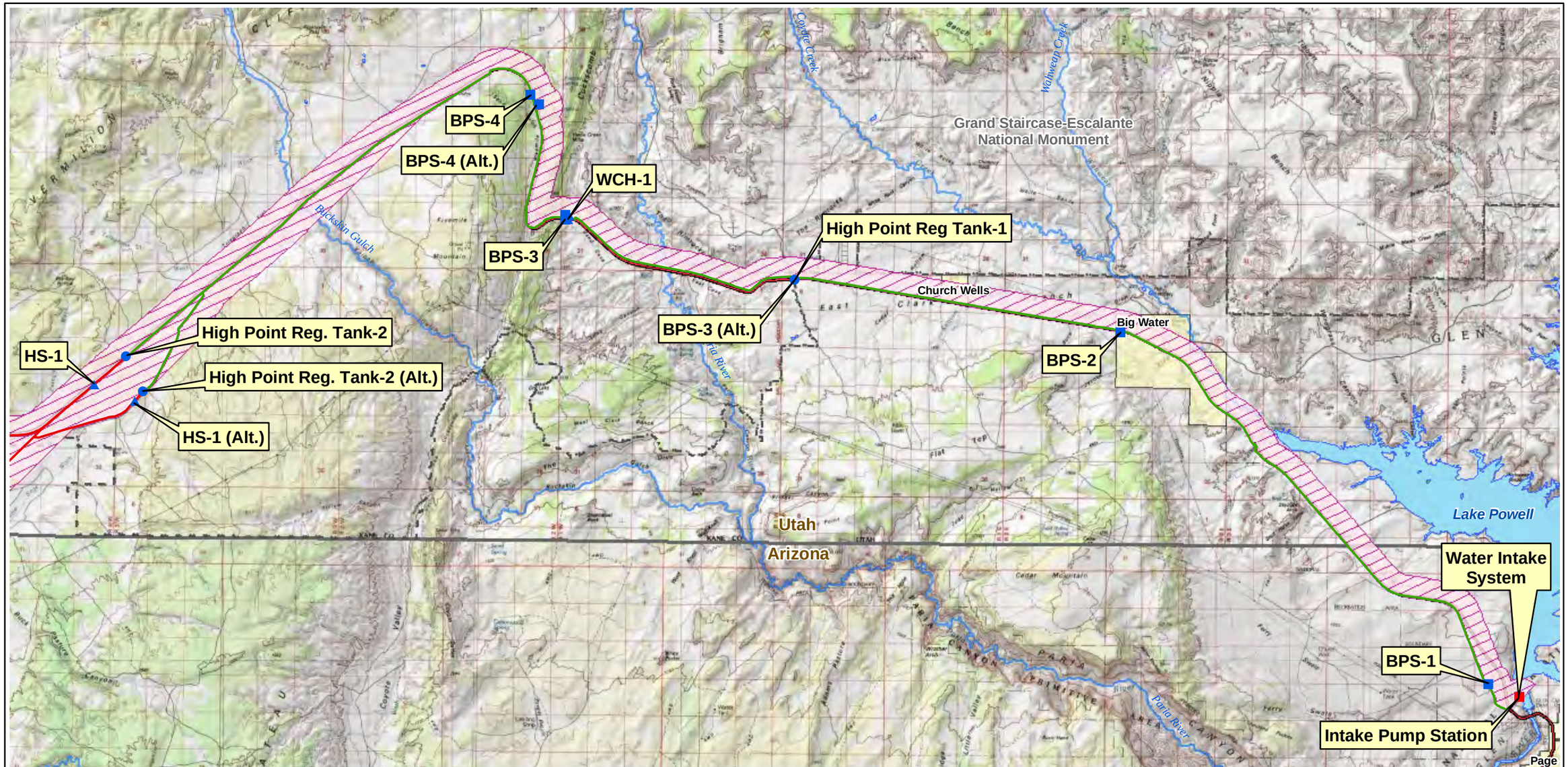
Lead was not modeled because measurable emissions of airborne lead from construction activities are not anticipated.

3.3.2 Nonattainment Areas

The Nonattainment areas in the State of Utah and Arizona are shown in Figure 3-14. All of the Nonattainment areas are outside of the LPP Project area.

3.3.3 Operations Air Quality Calculations

The small stationary sources for the LPP Project may include small backup generators. Small stationary sources are expected to emit a minimal amount of the above mentioned pollutants as the backup generator systems would only be sized to keep the facilities warm and would not be used to keep the facilities operating. In addition, these backup generators would be used very infrequently. Assuming a maximum 25kW diesel generator is installed and operated continuously throughout the year, it would still not produce enough local air pollution to exceed the threshold for Small Source Exemptions.



- Project Intake Pump Station
- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Nitrogen Dioxide (NO2) 3,000 ft Dispersion Corridor
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- Lakes & Reservoirs
- Major Rivers & Streams
- National Park/Monument
- GSENM Boundary
- State Boundaries
- Cities

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

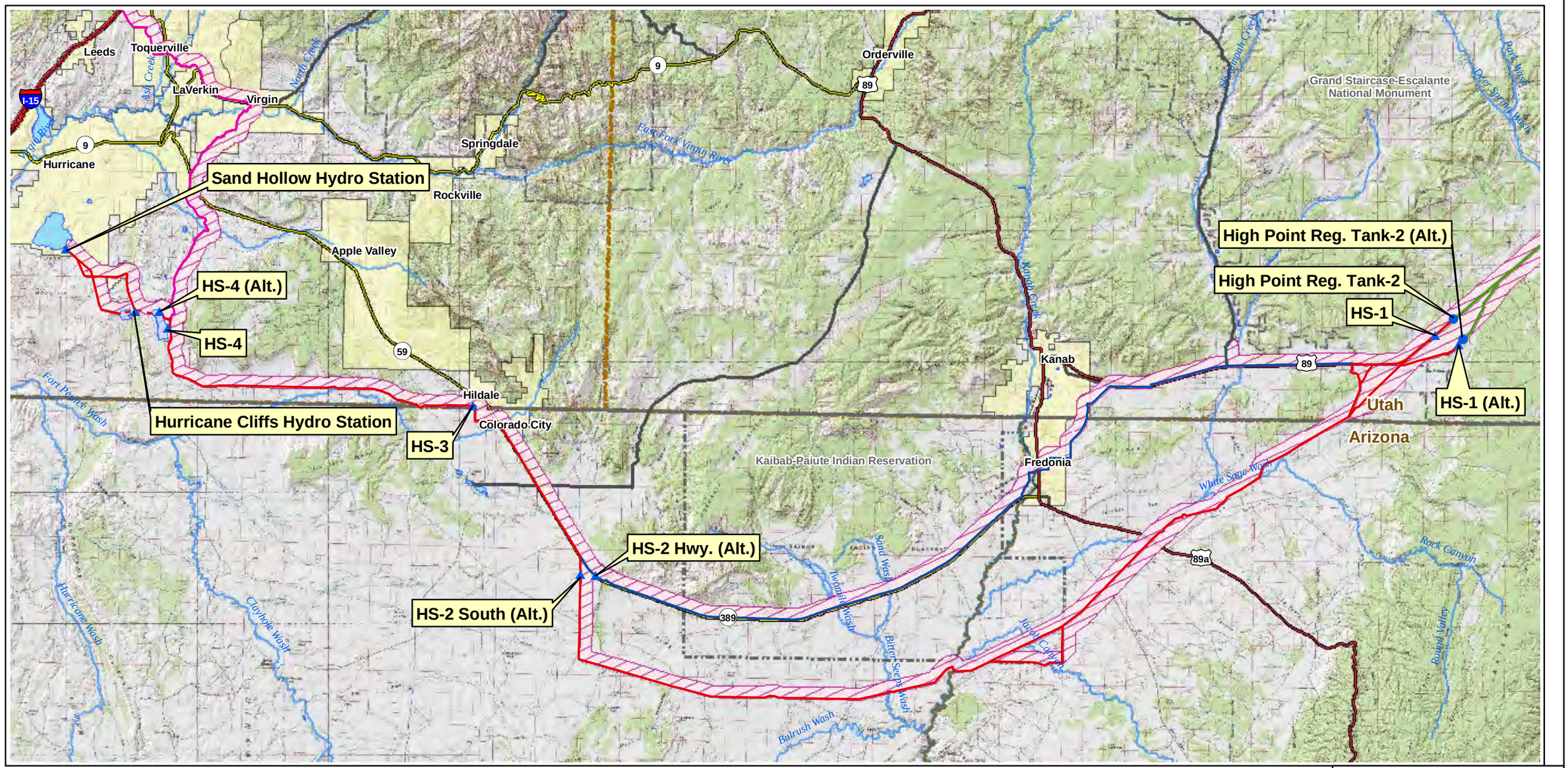
0 0.5 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-5** MWH

Lake Powell Pipeline
Water Conveyance System
NO2 - Modeled Dispersion
Below NAAQS Levels



- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Hurricane Cliffs Forebay/Afterbay
- Lakes & Reservoirs
- Major Rivers & Streams
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Hydro System - Highway Alignment Alternative
- KCWCD Pipeline System
- Cedar Valley Pipeline
- Nitrogen Dioxide (NO2) 3,000 ft Dispersion Corridor
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- National Park/Monument
- GSENM Boundary
- Tribal Lands
- State Boundaries
- Cities
- County Boundaries

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

0 2.5 5 7.5 10 Miles

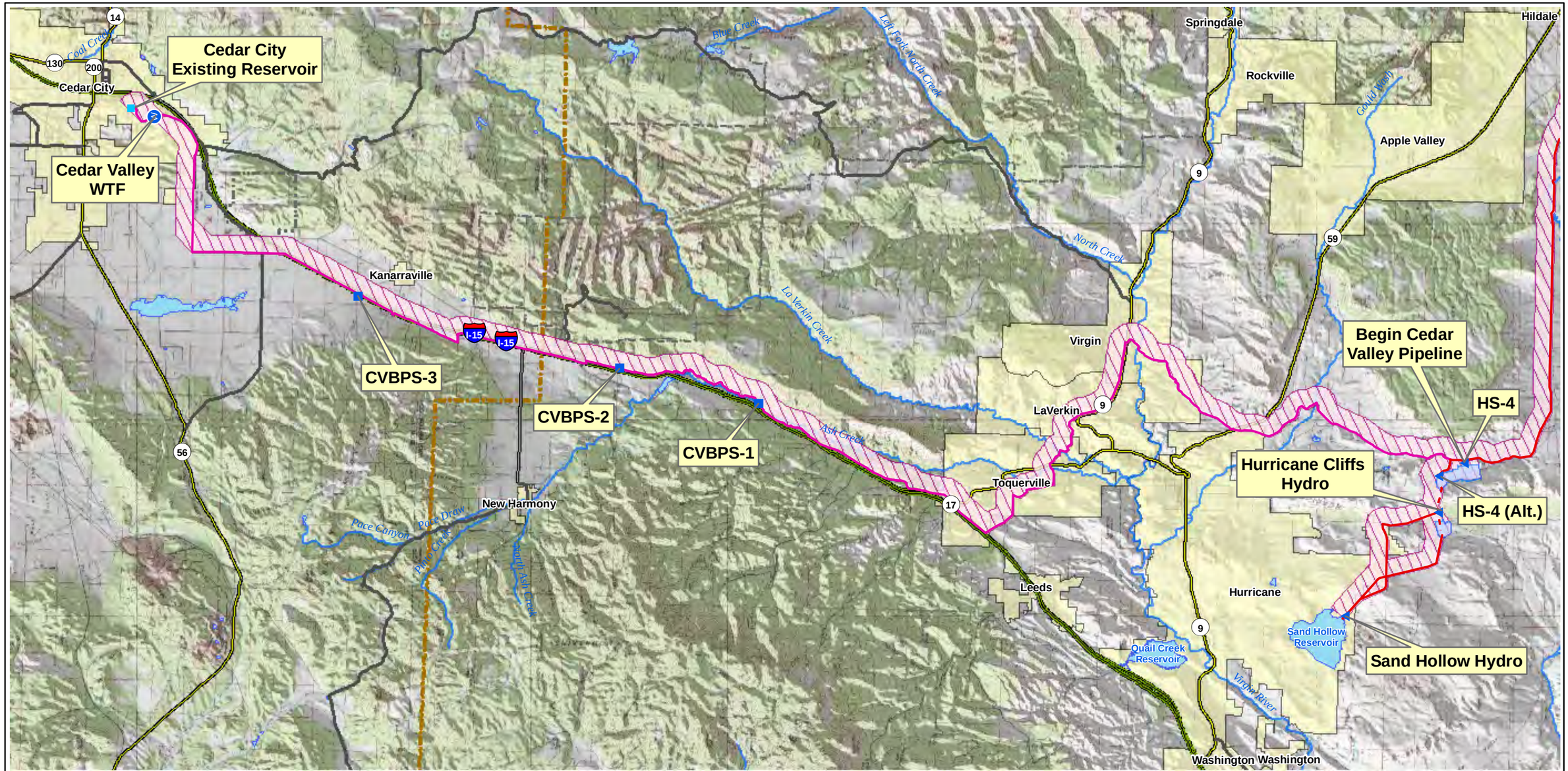
Lake Powell Pipeline Project

1:300,000 Scale

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-6** MWH

Lake Powell Pipeline
Hydro System
NO2 - Modeled Dispersion
Below NAAQS Levels



Water Treatment Facility
Project Pump Station
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Nitrogen Dioxide (NO2) 3,000 ft Dispersion Corridor
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
County Boundaries
Cities
Tribal Lands

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

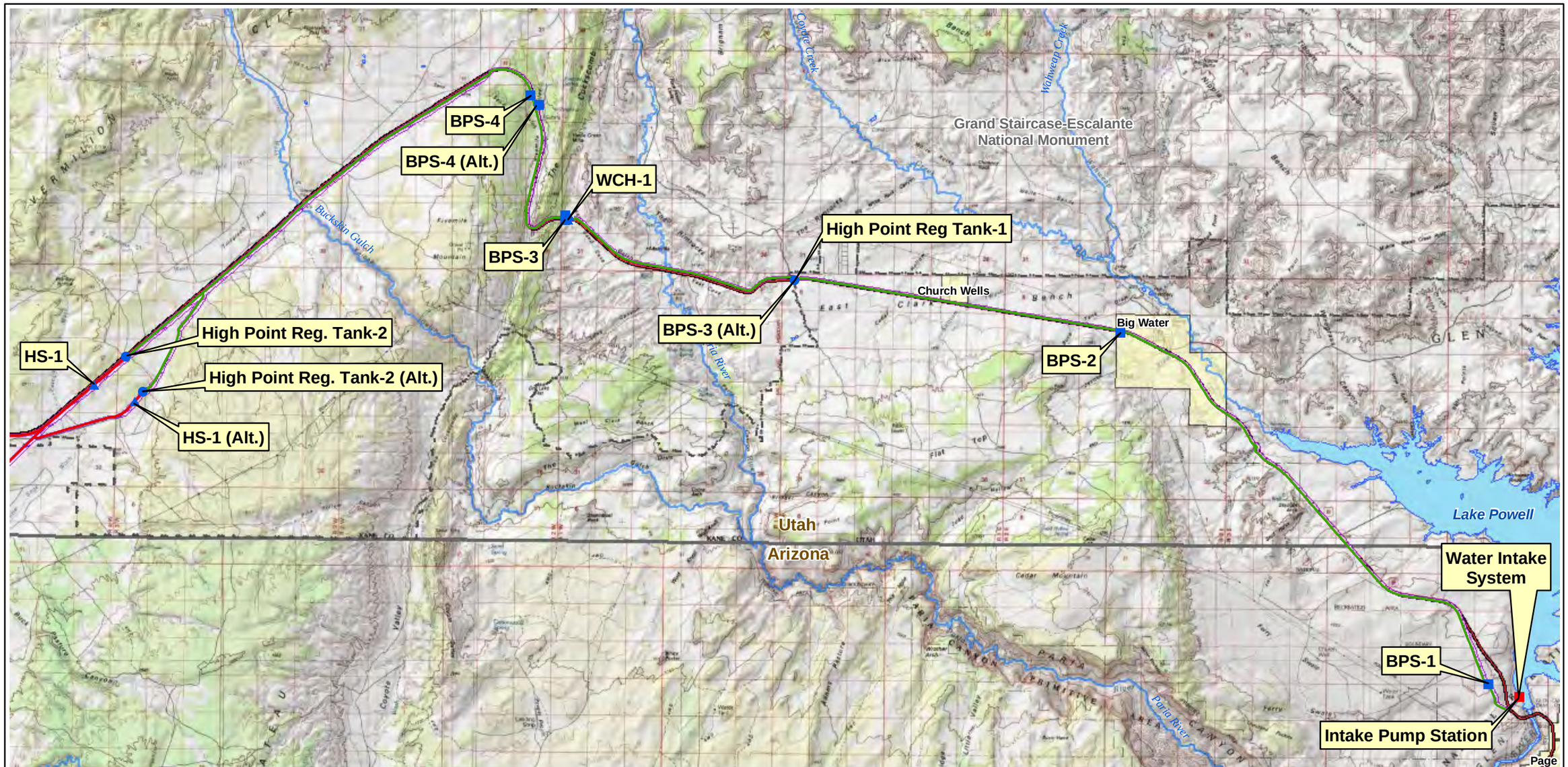
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-7** MWH

Cedar Valley Pipeline System
NO2 - Modeled Dispersion
Below NAAQS Levels



- Project Intake Pump Station
- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Carbon Monoxide (CO) 350 ft Dispersion Corridor
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- Lakes & Reservoirs
- Major Rivers & Streams
- National Park/Monument
- GSENM Boundary
- State Boundaries
- Cities

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

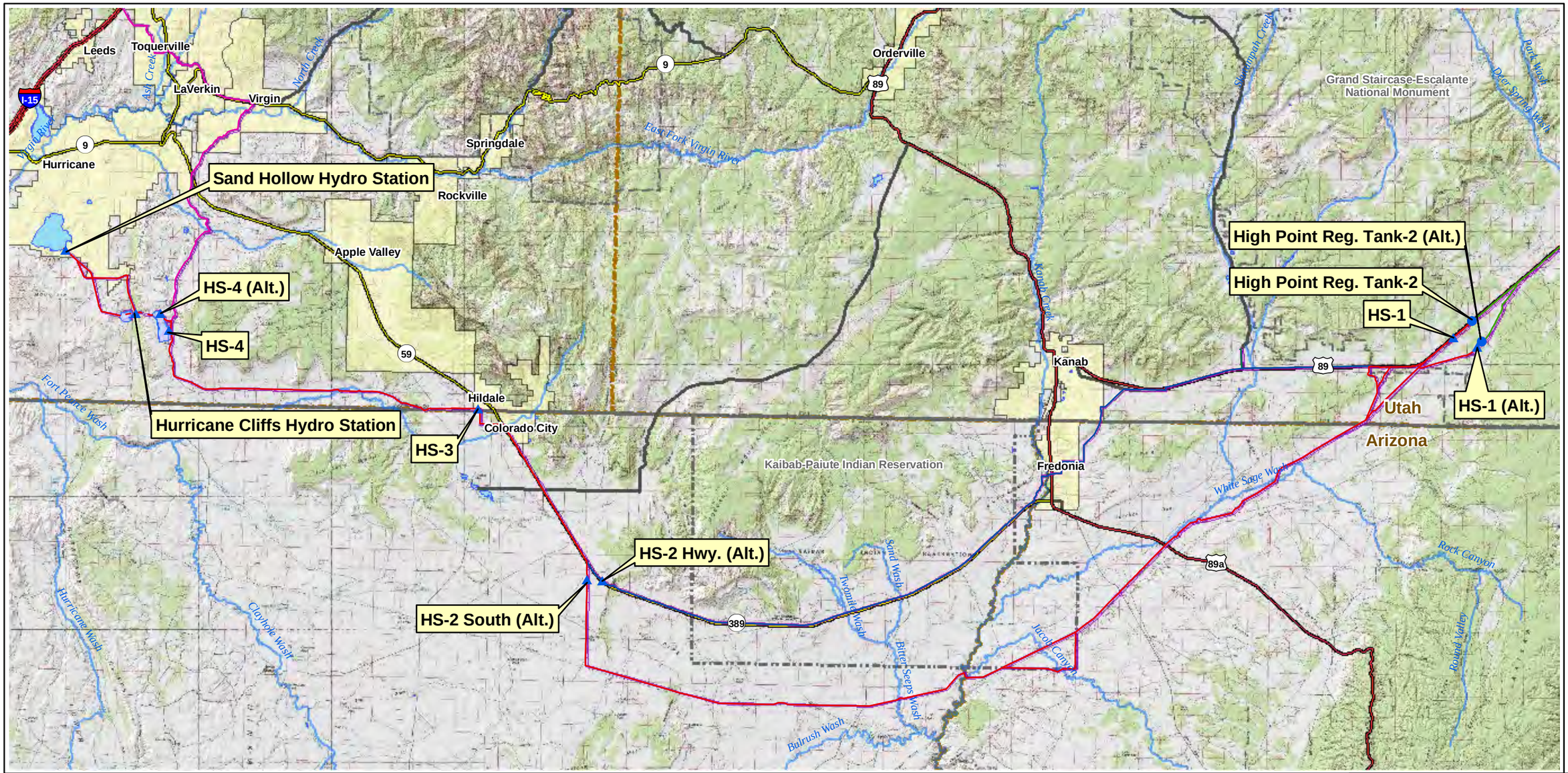
0 0.5 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-8** MWH

Lake Powell Pipeline
Water Conveyance System
CO - Modeled Dispersion
Below NAAQS Levels



Project Pump Station
Project Regulating Tank
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Carbon Monoxide (CO) 350 ft Dispersion Corridor
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
Cities
County Boundaries

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

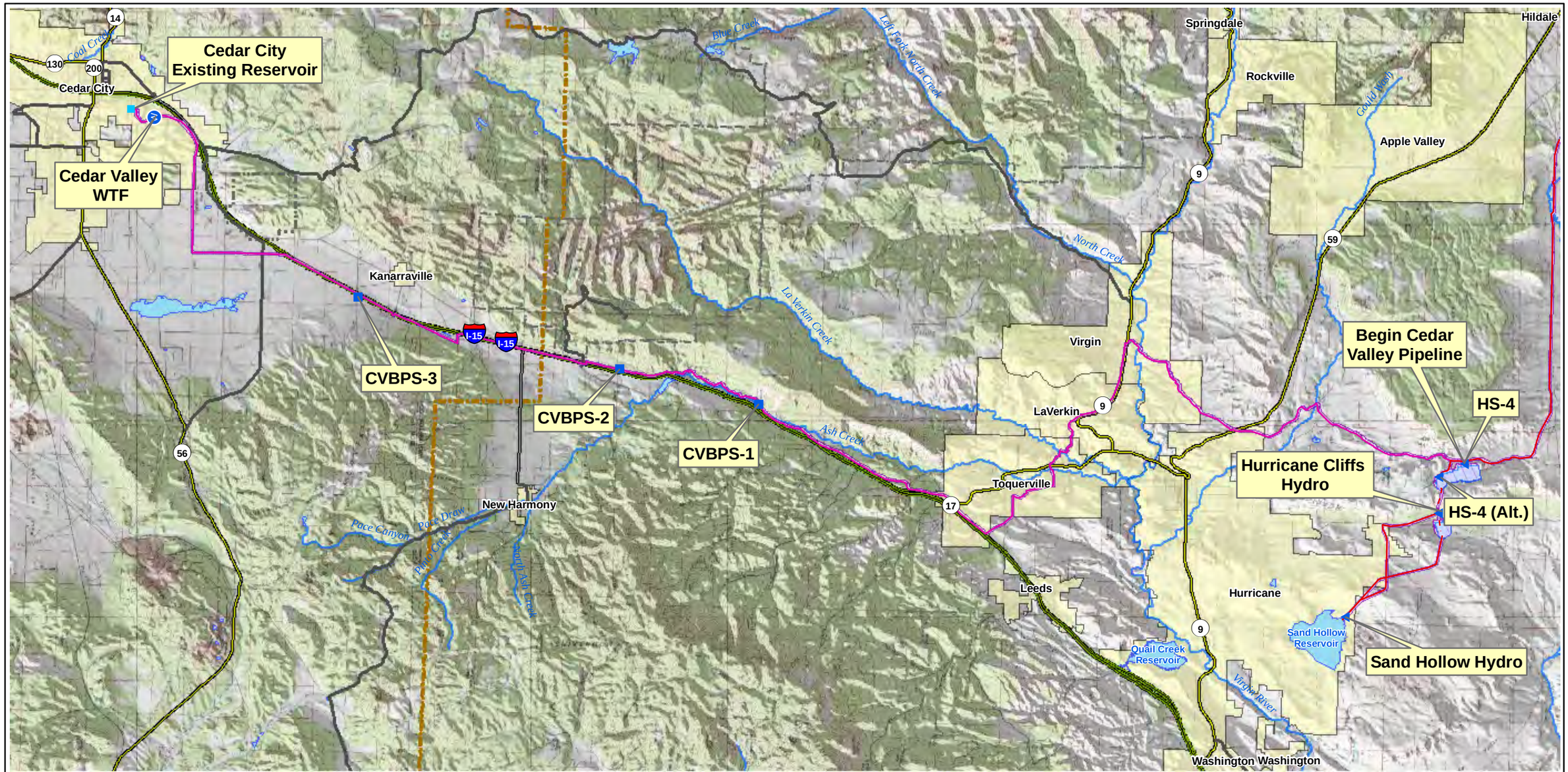
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-9** MWH

Lake Powell Pipeline Hydro System CO - Modeled Dispersion Below NAAQS Levels



Water Treatment Facility
Project Pump Station
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Carbon Monoxide (CO) 350 ft Dispersion Corridor
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
County Boundaries
Cities
Tribal Lands

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

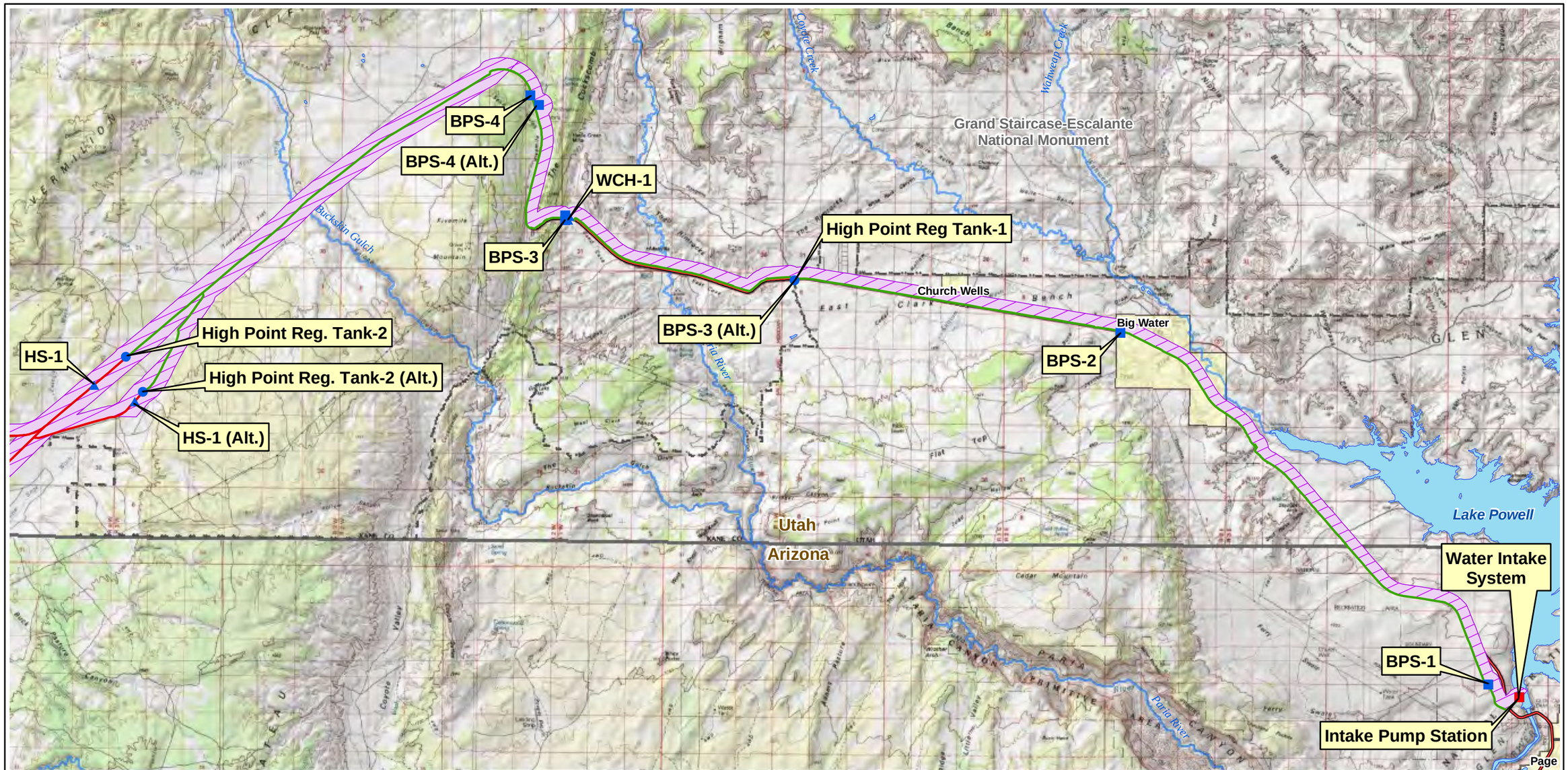
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-10** MWH

Cedar Valley Pipeline System
CO - Modeled Dispersion
Below NAAQS Levels



- Project Intake Pump Station
- Project Pump Station
- Project Regulating Tank
- Project Hydro Station
- Water Conveyance System
- Hydro System - South Alignment Alternative
- Sulfur Dioxides (SO2) 1,640 ft Dispersion Corridor
- Interstate
- US Highway
- ST Highway
- Hwy
- Major Road
- Lakes & Reservoirs
- Major Rivers & Streams
- National Park/Monument
- GSENM Boundary
- State Boundaries
- Cities

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

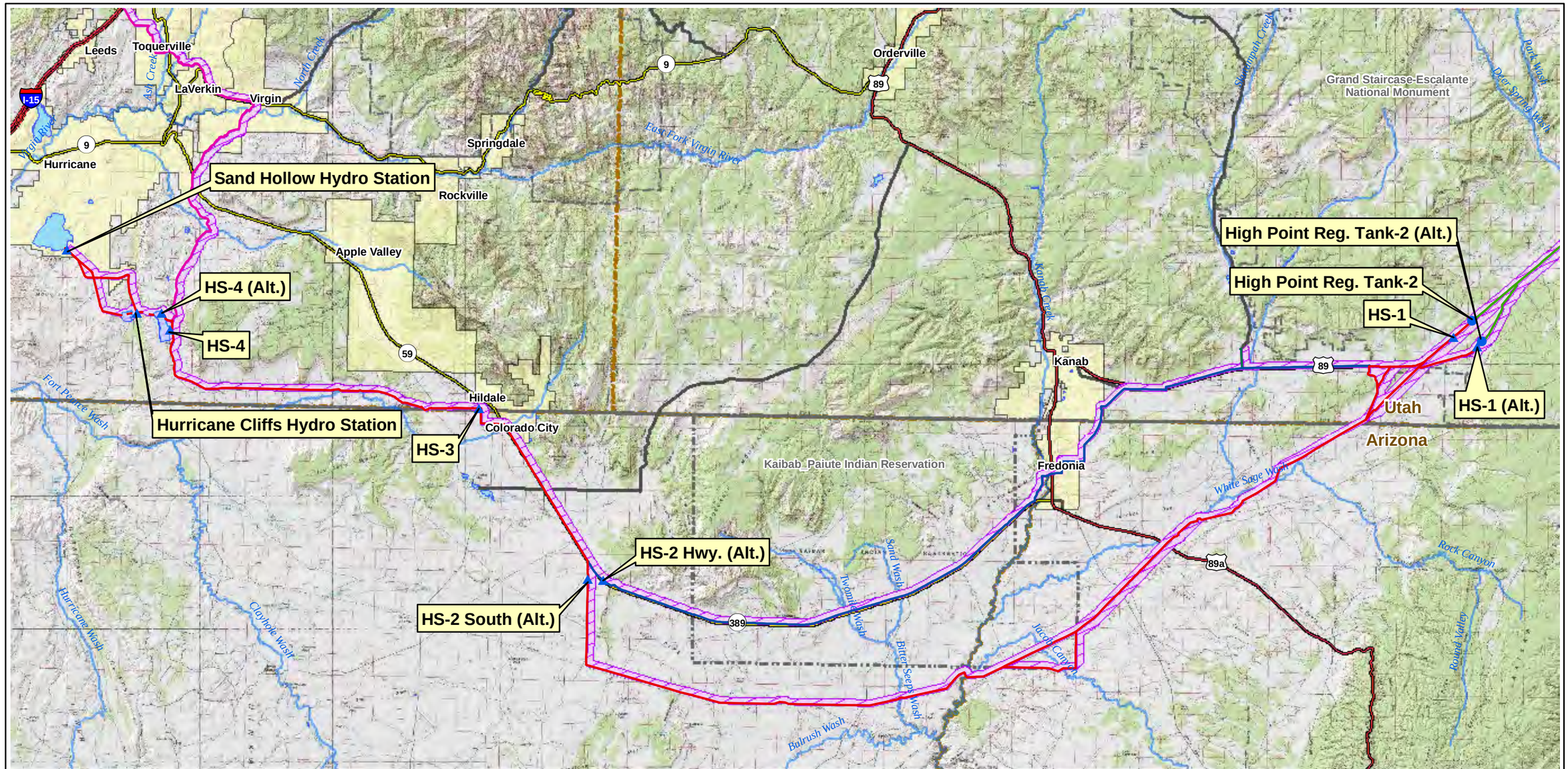
0 0.5 1 2 3 4 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-11** MWH

Lake Powell Pipeline
Water Conveyance System
SO2 - Modeled Dispersion
Below NAAQS Levels



Project Pump Station
Project Regulating Tank
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Sulfur Dioxides (SO2) 1,640 ft Dispersion Corridor
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
GSENM Boundary
Tribal Lands
State Boundaries
Cities
County Boundaries

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

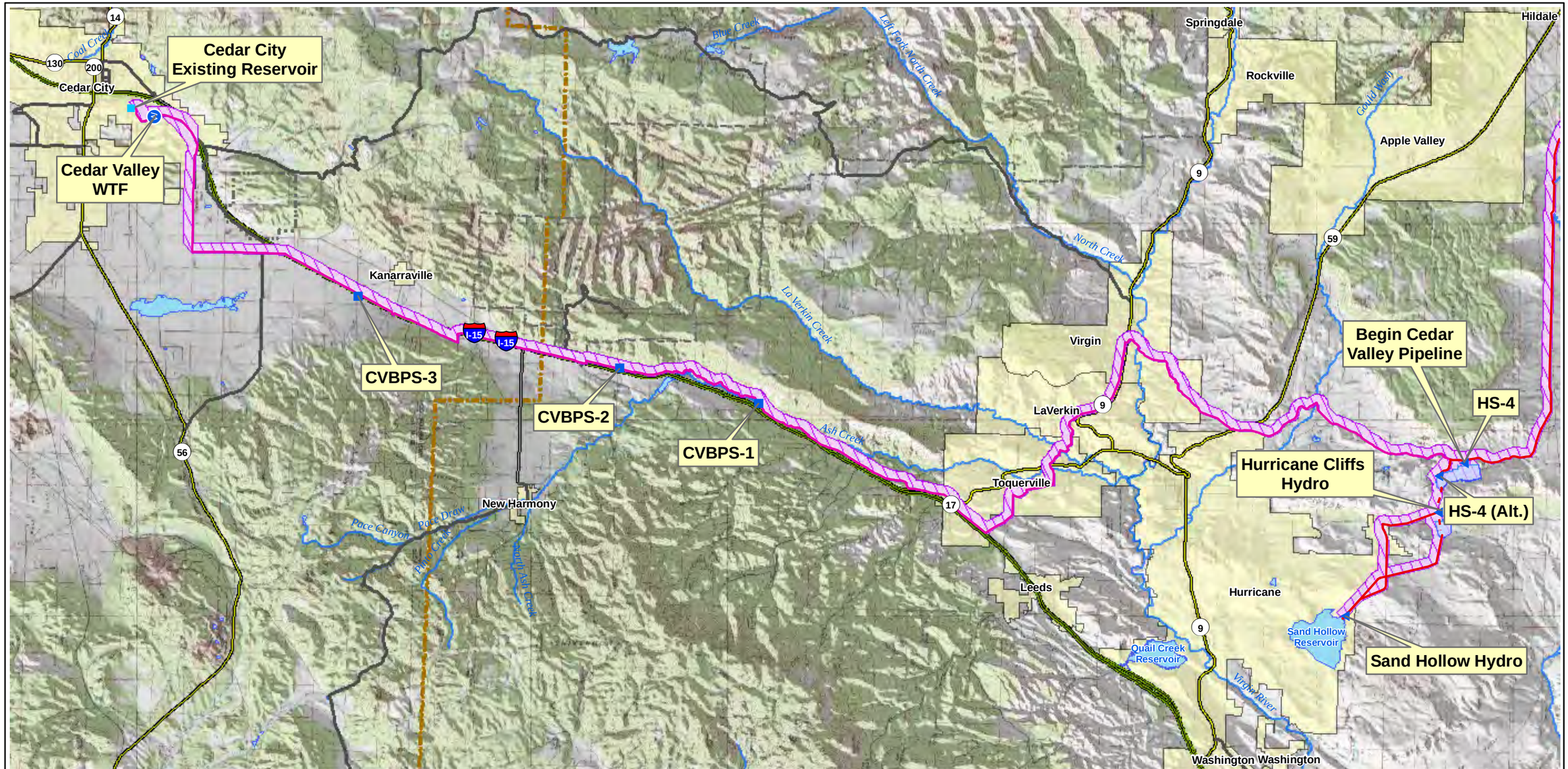
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-12** MWH

Lake Powell Pipeline
Hydro System
SO2 - Modeled Dispersion
Below NAAQS Levels



Water Treatment Facility
Project Pump Station
Project Hydro Station
Hurricane Cliffs Forebay/Afterbay
Lakes & Reservoirs
Major Rivers & Streams
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
KCWCD Pipeline System
Cedar Valley Pipeline
Sulfur Dioxide (SO2) 1,640 ft Dispersion Corridor
Interstate
US Highway
ST Highway
Hwy
Major Road
National Park/Monument
County Boundaries
Cities
Tribal Lands

Note:
The Lake Powell Pipeline Project Area prevailing wind is from the Southwest.

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

N

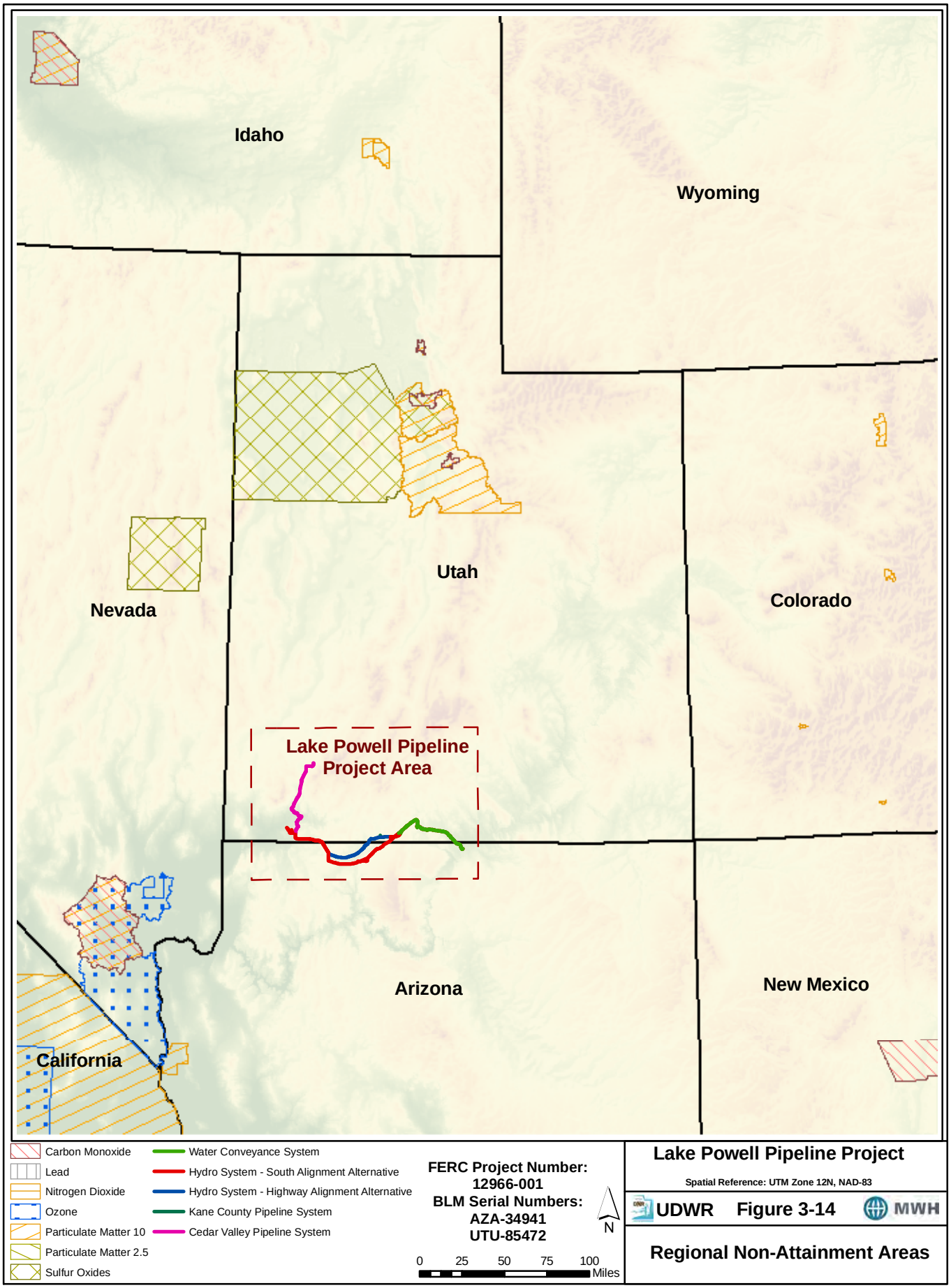
0 2.5 5 7.5 10 Miles

Lake Powell Pipeline Project

Spatial Reference: UTM Zone 12N, NAD-83

UDWR **Figure 3-13** MWH

Cedar Valley Pipeline System SO2 - Modeled Dispersion Below NAAQS Levels


Idaho
Wyoming
Utah
Nevada
Colorado
Lake Powell Pipeline
Project Area
Arizona
New Mexico
California
Carbon Monoxide
Lead
Nitrogen Dioxide
Ozone
Particulate Matter 10
Particulate Matter 2.5
Sulfur Oxides
Water Conveyance System
Hydro System - South Alignment Alternative
Hydro System - Highway Alignment Alternative
Kane County Pipeline System
Cedar Valley Pipeline System
FERC Project Number:
12966-001
BLM Serial Numbers:
AZA-34941
UTU-85472
N
0 25 50 75 100 Miles
Lake Powell Pipeline Project
Spatial Reference: UTM Zone 12N, NAD-83
UDWR
Figure 3-14
MWH
Regional Non-Attainment Areas

3.3.4 Construction of Pipelines and Facilities

The potential maximum pollutant concentrations were calculated for the construction of pipelines and facilities and the distance at which these pollutants disperse to less than NAAQS levels is detailed in Table 3-6.

Table 3-6
Pipeline and Facility Construction Pollutant Dispersion

Pollutant	Concentration at 300 ft ($\mu g / m^3$)	NAAQS Concentration ($\mu g / m^3$)	Distance to NAAQS Concentration (ft)
CO	5,400	10,000 (8 hour)	<300
NO_2	3,200	100 (annual mean)	2,300
PM_{10}	500	150 (24 hour)	650
SO_2	500	78 (arithmetic mean)	1,640

These pollution concentration levels would be temporary but represent a worst-case scenario. The extent of the plumes from the pollutants depends upon prevailing wind direction and speed.

3.3.5 Construction of Transmission Lines

Although it is likely the effort to construct transmission lines would not create as many pollutants as the pipeline or facility construction, a worst-case scenario is used to estimate pollution from the transmission line construction by using the emissions estimates from pipelines and facilities construction.

3.3.6 Construction of Reservoirs (Afterbay and Forebay)

The construction of reservoirs (forebay and afterbay) would require additional equipment which could emit additional pollutants. These pollutant levels were calculated and are as detailed in Table 3-7 below.

Table 3-7
Reservoir Construction Pollutant Dispersion

Pollutant	Concentration at 300 ft ($\mu g / m^3$)	NAAQS Concentration ($\mu g / m^3$)	Distance to NAAQS Concentration (ft)
CO	7,800	10,000 (8 hour)	<300
NO_2	4,700	100 (annual mean)	3,000
PM_{10}	7,200	150 (24 hour)	3,600
SO_2	500	78 (arithmetic mean)	1,640

3.3.7 Operation of Facilities

The emissions from the operating the facilities are expected to be minimal. The equipment would be run via electrical power with virtually no emissions. Traffic to and from each facility would be minimal with resulting minimal vehicular emissions. As described above, insignificant emissions would result from the infrequent use of small backup generators. The potential air quality pollutants from facilities operation are not analyzed further.

Chapter 4
Environmental Consequences (Impacts)

4.1 Significance Criteria

The significance criteria for the LPP project involve impacts on human health and significant impacts on humans and wildlife from the exceedance of air quality standards. The Clean Air Act, as amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for air pollutants harmful to the environment and public health. There are two standards applied, Primary Standards and Secondary Standards. Primary Standards are emission limits to protect public health, especially the health of "sensitive" populations (those easily effected by air quality conditions). Secondary Standards set emission limits to protect public welfare (protect visibility, damage to crops, animals, vegetation and buildings). Primary Standards were used for the purpose of this study and air quality impacts from the LPP Project are considered significant if the Primary Standards would be exceeded.

4.1.1 Human Receptors

Air pollutant levels would be considered to have a significant impact on human receptors if they are above NAAQS levels. Potential human receptors are defined as persons in the area that could potentially receive or be affected by the air pollutants created by the LPP Project, such as persons working on construction sites, visitors, tourists, and local residents. The locations of potential human receptors are identified in Table 4-1. These receptors primarily include residents, although there are utilities and some businesses that could be affected.

Table 4-1
Potential Human Receptors

Page 1 of 2

Potential Human Receptor Location	Receptor	Receptor Distance to Pollutant Source (feet)
Pipeline Construction		
Water Conveyance System		
Glen Canyon Dam Facilities	utility facility	< 5,000
Greenhaven	residential	< 1,000
Lower Big Water	residential	< 1,000
Upper Big Water	residential	< 1,000
Church Wells	residential	< 1,000
Adairville (West of Paria River)	residential	< 1,000
Hydro System - Existing Highway Alternative		
Near S. Johnson Road and SR-89	residential	< 1,000
Near Bryce Canyon Road and SR-89	residential	< 1,000
Near Kaibab Trail and SR-90	residential	< 1,000
Near Old Highway 89 and SR-89	residential	< 1,000
Near Fredonia	residential	< 1,000
Pipe Springs	residential	< 1,000

Table 4-1
Potential Human Receptors

Potential Human Receptor Location	Receptor	Receptor Distance to Pollutant Source (feet)
Hydro System - South and Southeast Corner Alternative		
Near School Bound Road South of Colorado City	residential	< 1,000
Colorado City	residential	< 1,000
Diamond Ranch Academy	residential	< 1,000
Cedar Valley Pipeline System		
Sheep Ridge Road West of Virgin	residential	< 1,000
Toquerville	residential	< 1,000
Near Anderson Junction Road	residential	< 1,000
Along I-15	residential	< 1,000 to 5,000
Rest stop Along I-15 and Old Highway 91	rest area	< 1,500
Near I-15 and Old SR-144	residential	< 1,000
Near Harris Gubler Reservoir	rest area	< 1,000
Along Taylor Mountain/West Frontage Road	residential	< 1,000
Along 5700 W. Lane	residential	< 1,000
Hamilton's Fort	residential	< 2,000
South Cedar City	school/business	< 1,000
Transmission Line Construction		
Near Hurricane Cliffs/Arizona Strip Road	residential	< 2000
Along W. Cross Hollow Road (E. of Cedar City)	residential	< 1000
Near SR-9 and West Hurricane	residential	< 1000
Near Hurricane Cliffs Power Station	residential/industrial	< 1000

4.1.2 Wildlife Receptors

Impacts of air quality on wildlife are difficult to quantify as most studies pertain to air pollution effects on human receptors. Therefore, it is assumed that significant impacts on humans would be significant impacts on wildlife in the region.

It is anticipated that most large wildlife would temporarily abandon the areas near construction sites because of the general disturbance of construction activities and would not be affected by the construction emissions.

The construction is temporary in nature with pipeline construction near most areas being completed within a few weeks and facility construction within a few months, and any wildlife that temporarily relocate are expected to move back into the area and are not expected to be significantly impacted.

4.2 Potential Impacts Eliminated From Further Analysis

Several potential impacts were deleted from further analysis. These items include:

- Facility operations were deleted from further analysis because they would not generate measurable air quality pollutants.
- Pollutants generated by operations vehicles are unlikely to be measurable because of the infrequent nature of facility inspections and maintenance during facility operations. These potential air quality impacts are not analyzed further.
- Impacts from ozone were eliminated because: 1) the impact area is in an attainment area, and 2) ozone is uniquely formed from precursor compounds (volatile organic compounds and nitrogen oxides) that are emitted. A photochemical reaction occurs after an emission creates ozone, often several hours later. Ozone would likely form several miles downwind of the source and it would be dispersed below NAAQS limits by the time it could form.
- Annual impacts from pipeline construction sources were eliminated from further analysis. Temporary direct impacts are considered in the impact analysis because the pipeline and transmission line construction locations would constantly change.
- Particulate matter resulting from blasting was eliminated because each blast is a one-time emission, with substantial time periods between blasts. Most dust generated by blasts settles within or just outside the blast zone. Typically very little PM_{10} remains suspended from bedrock blasting.
- Short-term exposure to construction emissions would not create impacts on human health in the immediate construction area because of the temporary nature of the construction activities and the accomplishment of work in accordance with OSHA guidelines. Exposure of construction workers to emissions as an air quality impact was eliminated from further consideration.

4.3 Air Quality Impacts

The direct and indirect air quality impacts of the alternative alignments and alternatives are described in the following sections.

4.3.1 Water Conveyance System

The Water Conveyance System alignment would be routed near several residential areas and could possibly affect human receptors during construction. Most residential areas are outside the pollutant dispersion zone and would not be significantly impacted. Residents living within the dispersion zone could be temporarily affected from pollutant levels above NAAQS, but these direct impacts would be mitigated by implementing the Best Management Practices (BMPs) described in Chapter 5. In addition, many of the NAAQS are based on annual mean values or other averaged values, thereby reducing the impact of temporary construction emissions. Wildlife receptors in the area are expected to temporarily relocate and should not be significantly impacted by LPP Project emissions. Wildlife resources are expected to return to the area following construction completion.

4.3.2 Hydro System - Existing Highway Alternative

The Hydro System Existing Highway Alternative would be constructed near residential areas from the GSENM west boundary to Fredonia and in the Pipe Springs area on the Kaibab-Paiute Indian Reservation. Temporary direct air quality impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts, and these impacts would be mitigated through the use of the BMPs described in Chapter 5. No significant air quality impacts are expected to occur.

4.3.3 Hydro System - South Alternative

Residential areas were not identified along the eastern portion of the Hydro System South Alternative alignment from the High Point Regulating Tank 2 to the intersection of Yellowstone Road with Highway 389. Therefore, human receptors would not be affected by construction emissions along this alignment. Wildlife receptors in the area are expected to temporarily relocate and would not be significantly affected by LPP Project emissions. Wildlife resources are expected to return to the area following construction completion.

The proposed pipeline alignment from the Yellowstone Road-Highway 389 intersection to Sand Hollow Reservoir is shared by the Existing Highway and South alternatives. Residential areas were identified along this portion of the alignment. Residents could be temporarily affected from exposure to levels of pollutants above NAAQS, although significant impacts are not expected because BMPs would be implemented to mitigate the direct air quality impacts and most residential areas are outside of the pollutant dispersion zone. Those within the pollutant dispersion zone could be temporarily affected, but the direct air quality impacts would be mitigated by implementing BMPs. In addition, many of the NAAQS are based on annual mean values or other averaged values, thereby reducing the impact of temporary construction emissions.

4.3.4 Hydro System - Southeast Corner Alternative

Air quality impacts caused by the Hydro System Southeast Corner Alternative would be the same as for the Hydro System South Alternative. No significant impacts are expected to occur.

4.3.5 Cedar Valley Pipeline System

The Cedar Valley Pipeline System would be aligned near several residential areas and impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts. No significant air quality impacts are expected to occur.

4.3.6 Transmission Line Alternatives

The transmission lines alignment alternatives would be aligned near several residential areas and direct impacts on human and wildlife receptors would be similar to the Water Conveyance System impacts. Emissions from transmission line construction are not expected to be significant because the temporary construction activities would disturb small land areas such as transmission tower bases, substation sites and access roads. Fugitive dust emissions from these small land areas would be controlled by implementing BMPs to minimize particulate matter generation and dispersion. No significant impacts are expected to occur.

4.3.7 Indirect Effects of LPP Project from Population Growth

The LPP Project would supply water for the projected growing populations in the WCWCD, CICWCD and KCWCD service areas. The LPP Project operation would gradually increase the raw water supply to each district as demands for M&I water increase. The additional population served by the LPP water following commencement of operations in 2020 could cause indirect impacts on air quality. Emissions from vehicles, residential construction, and other anthropogenic sources associated with population growth after 2020 could result in increased levels of pollutants; however, the air emissions levels are not expected to exceed the NAAQS and no significant indirect impacts would result from the LPP Project operation.

4.3.8 No Lake Powell Water Alternative

Air quality would be temporarily affected by xeriscape landscape construction activities resulting from restrictions on outdoor residential watering with culinary supplies as part of the No Lake Powell Water Alternative. Converting traditional residential landscapes to xeriscape landscapes would increase the disturbed land area within residential communities in the St. George metropolitan area and Cedar Valley, potentially exposing residents to particulates dispersed by the wind during construction activities. The particulate concentrations could exceed NAAQS beyond dispersion zones, resulting in significant indirect air quality impacts. These indirect impacts may be partially mitigated by implementing BMPs; however, water could not be used to control dust because it would not be available for outdoor watering and dust control.

Air quality could be permanently affected by converting traditional residential landscapes to xeriscape landscapes within the St. George metropolitan area and Cedar Valley, resulting in increased airborne particulate matter generated from increased exposed soil areas. The particulate concentrations could occasionally exceed the NAAQS beyond dispersion zones during windstorms and affect human receptors, resulting in significant indirect air quality impacts. The indirect impacts could be partially mitigated by implementing BMPs, such as placing crushed stone or other natural materials over exposed soils; however, water could not be used to control dust particles because it would not be available for outdoor watering and dust control.

4.3.9 No Action Alternative

The No Action Alternative would not result in air quality impacts. No significant impacts are expected to occur. Factors not associated with the LPP project, such as population growth, would continue to affect air quality.

4.3.10 Air Quality Impacts Resulting From Additional Power Demand

Preliminary project design and meetings with local and regional power entities indicate that additional power generating facilities would not be needed to supply electricity for the LPP project because there is currently enough power available to meet the projected power demands. The power required to pump water through the intake and the booster pump stations would be generated at existing power stations in Arizona and transmitted to the pump station sites. The proposed pumped storage hydro generating station at the Hurricane Cliffs would consume available electric power during off-peak hours to pump water into the forebay reservoir for storage and then release during peak demand hours to generate electricity. Therefore, the LPP project would not cause indirect air quality impacts resulting from new power generation emissions.

4.4 Environmentally Preferred Alternative Alignment

From an air quality perspective, the environmentally preferred alternative alignments for the LPP Project Hydro System are the South Alternative or Southeast Corner Alternative. These alignments have fewer potential human receptors which could be temporarily affected by construction activity emissions.

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Chapter 5
Mitigation and Monitoring

5.1 Introduction

The direct and indirect air quality impacts associated with the LPP alternative alignments would be caused by fugitive dust generated during construction activities and emissions from construction equipment. Best Management Practices (BMPs) would be implemented to mitigate temporary air quality impacts during construction to control fugitive dust and construction equipment emissions. The BMPs would help avoid or minimize direct and indirect air quality impacts on human receptors.

5.1.1 LPP Alternative (Intake System, Water Conveyance System, Hydro System, Cedar Valley Pipeline System and Transmission Lines)

Air quality BMPs would be implemented for all construction activities, including pipeline construction, site-specific construction for pump stations and hydro stations, helicopter use for transmission line construction, and access road improvements. Mitigation of direct and indirect air quality impacts caused by fugitive dust generated from construction activities would be accomplished using dust suppression methods such as physical coverings, spraying with water, or application of other liquid-based dust suppressants. Construction site restoration and revegetation would be performed as soon as feasible after the construction of pipeline and transmission line segments and site specific pump stations and hydro stations has been completed. All dust suppression would be performed to meet federal, state and local requirements and according to standard construction practices. Mitigation of potential air quality impacts caused by emitted pollutants would be accomplished by using construction equipment with diesel engines rated as Tier 3 or Tier 4 equipment, designed to control diesel combustion emissions.

Air quality monitoring would be performed during construction to make sure BMPs adequately mitigate temporary air quality impacts from fugitive dust and construction equipment emissions. The temporary monitoring would be terminated after completing construction of pipeline and transmission line segments, site-specific pump stations and hydro stations, and construction use of improved access roads.

The indirect air quality effects of LPP Project operations from population growth in the WCWCD, CICWCD and KCWCD service areas following 2020 could increase air pollutant emissions from a variety of sources. Standard emissions control measures and BMPs implemented as emission sources increase would mitigate some of the indirect impacts on air quality, and air emissions levels are not expected to exceed the NAAQS. Regional air quality monitoring would continue as a result of the many factors contributing to population growth in Southwest Utah and the number of emission sources increases.

5.1.2 No Lake Powell Water Alternative

The indirect air quality impacts resulting from the No Lake Powell Water Alternative could be partially mitigated by implementing BMPs including physical covers and other liquid-based dust suppressants throughout residential landscapes converted to xeriscapes. These mitigation measures are not expected to control all fugitive dust over the long term and air quality impacts would continue to occur. Monitoring would be necessary to determine the effectiveness of dust suppression mitigation measures implemented on residential xeriscapes.

5.1.3 No Action Alternative

The No Action Alternative would not require air quality mitigation or monitoring.

Chapter 6
Unavoidable Adverse Impacts

6.1 LPP Alternative (Intake System, Water Conveyance System, Hydro System, Cedar Valley Pipeline System and Transmission Lines)

There would be no unavoidable adverse impacts on air quality from the LPP Project during construction, operation and maintenance activities.

6.2 No Lake Powell Water Alternative

The No Lake Powell Water Alternative could result in periodic unavoidable adverse impacts on air quality during high wind events. Fugitive dust not controlled by the BMPs would be mobilized beyond dispersion zones and occasionally exceed NAAQS. These periodic unavoidable adverse impacts on air quality could be permanent.

6.3 No Action Alternative

No unavoidable adverse impacts would occur under the No Action Alternative.

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Chapter 7 Cumulative Impacts

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

7.1 South Alternative

(The cumulative impacts analysis is pending completion for identification of inter-related projects that would cause cumulative impacts with the LPP project.)

7.2 Existing Highway Alternative

(The cumulative impacts analysis is pending completion for identification of inter-related projects that would cause cumulative impacts with the LPP project.)

7.3 Southeast Corner Alternative

(The cumulative impacts analysis is pending completion for identification of inter-related projects that would cause cumulative impacts with the LPP project.)

7.4 Transmission Line Alternatives

(The cumulative impacts analysis is pending completion for identification of inter-related projects that would cause cumulative impacts with the LPP project.)

7.5 No Lake Powell Water Alternative

(The cumulative impacts analysis is pending completion for identification of inter-related projects that would cause cumulative impacts with the LPP project.)

7.6 No Action Alternative

The No Action Alternative would have no cumulative impacts.

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Glossary

Attainment. An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act.

Fugitive Dust. Particulate matter (PM) consisting of very small liquid and solid particles. Fugitive dust is PM suspended in the air by the wind and human activities. It originates primarily from the soil and is not emitted from vents, chimneys, or stacks.

NAAQS (National Ambient Air Quality Standards). Standards established by the United States Environmental Protection Agency under authority of the Clean Air Act (42 U.S.C. 7401 et seq.) that apply for outdoor air throughout the country. Primary standards are designed to protect human health, with an adequate margin of safety, including sensitive populations such as children, the elderly, and individuals suffering from respiratory disease. Secondary standards are designed to protect public welfare from any known or anticipated adverse effects of a pollutant (e.g. building facades, visibility, crops, and domestic animals).

PM_x. Particulate matter smaller than x microns.

Reverse Osmosis. The movement of freshwater through a semipermeable membrane when pressure is applied to a solution (as seawater) on one side of it.

Substation. A subsidiary station in which electric current is transformed.

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Abbreviations and Acronyms

Abbreviation/Acronym	Meaning/Description
ADEQ	Arizona Department of Environmental Quality
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
BPS	Booster Pump Station
CBPS	Cedar Booster Pump Station
CFR	Code of Federal Regulations
CICWCD	Central Iron County Water Conservancy District
CO	Carbon Monoxide
CVP	Cedar Valley Pipeline
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GSENM	Grand Staircase-Escalante National Monument
HS	Hydro System
KCWCD	Kane County Water Conservancy District
kW	Kilowatt
LPP	Lake Powell Pipeline
M&I	Municipal and Industrial
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NPS	National Park Service
NO_2	Nitrogen Dioxide
O&M	Operations and Maintenance
PAD	Preliminary Application Document
PM	Particulate Matter
ppm	Parts Per Million
SIP	State Implementation Plan
SO2	Sulfur Dioxide
TSP	Total Suspended Pollutants
UDAQ	Utah Division of Air Quality
UDEQ	Utah Department of Environmental Quality
UDWR	Utah Department of Water Resources
VOC	Volatile Organic Carbon
WCWCD	Washington County Water Conservancy District
WRCC	Western Regional Climate Center

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