# Lake Powell Pipeline

## Draft Study Report 6 Land Use Plans and Conflicts

March 2011

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## Land Use Plans and Conflicts Executive Summary

#### **ES-1 Introduction**

This study report describes the results and findings of an analysis to evaluate available land management plans and guidelines 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 Land Use Plans and Conflicts Study Plan prepared for the Federal Energy Regulatory Commission (Commission), was to identify potential land use impacts from construction, maintenance, and operation of the alternatives, and identify and document measures to mitigate potential impacts as necessary.

## **ES-2** Methodology

The analysis of impacts on land management guidelines and resources follows methodology identified and described in the Preliminary Application Document, Scoping Document No. 1 and the Land Use Plans and Conflicts Study Plan #6 prepared for and filed with the Commission.

## ES-3 Key Results of the Land Use Impact Analyses

Eleven land use topics were analyzed for direct and indirect impacts from the LPP project and its alternatives. The following sections summarize the key results of the land use impact analyses.

## ES-3.1 Land Ownership and Management

The LPP Water Conveyance System would have permanent direct impacts on five acres of private land, and temporary direct impacts on management of 198 acres of public land. The South Alternative alignment would have permanent direct impacts on 17 acres of private land and 757 acres of public land, and temporary direct impacts on management of 1,027 acres of public land. The Existing Highway Alternative alignment would have permanent direct impacts on nine acres of private land and 749 acres of public land, and temporary direct impacts on management of 779 acres of public land. Additionally, the Existing Highway Alternative would have a significant impact on land use management across the Kaibab-Paiute Indian Reservation. The Southeast Corner Alternative alignment would have permanent direct impacts of public land, and temporary direct impacts on management of 1,082 acres of public land. The Transmission Line Alternatives would have permanent direct impacts on nine acres of private land.

Land use management restrictions resulting from the No Lake Powell Water Alternative would have indirect impacts on more than 9,000 acres of existing developed land within the growth analysis study area. By 2060, land use management restrictions resulting from the No Lake Powell Water Alternative would have indirect impacts on more than 25,000 acres of projected developed land.

## **ES-3.2 Farmland**

The LPP South Alternative alignment would have permanent direct impacts on five acres of prime farmland and temporary direct impacts on 393 acres of prime farmland. The Existing Highway Alternative alignment would have permanent direct impacts on five acres of prime farmland and temporary direct impacts on 276 acres of prime farmland. The Southeast Corner Alternative alignment would have the same impacts as the South Alternative alignment. The Transmission Line Alternatives would have temporary direct impacts on two acres of prime farmland.

The No Lake Powell Water Alternative would have permanent indirect impacts on 40,537 acres of prime farmland from pressure to convert agricultural irrigation water to raw water supply for treatment by reverse osmosis processes.

## ES-3.3 Floodplain

The Water Conveyance System would have temporary direct impacts on 13 acres of floodplain. The South Alternative alignment would have temporary direct impacts on 15 acres of floodplain. The Existing Highway Alternative alignment would have temporary direct impacts on 33 acres of floodplain. The Southeast Corner Alternative alignment would have temporary direct impacts on 15 acres of floodplain.

## ES-3.4 Waste Disposal and Hazardous Waste

The potential direct and indirect impacts of waste disposal and hazardous waste would be the same across all action alternatives.

## ES-3.5 Wild Land

The Water Conveyance System could have minor indirect effects on recreational users in the southern portion of a wilderness study area near The Cockscomb geological feature. The remaining features of the LPP project alternatives and other alternatives would have no direct or indirect impacts on designated wilderness or wilderness study areas.

## ES-3.6 Wild and Scenic Rivers

The proposed 230 kV Glen Canyon to Buckskin Transmission Line would cross over the Lower Paria River-1 suitable segment, which is eligible for designation as a Wild and Scenic River. The transmission line would cross the Paria River Canyon, ranging from 230 to 290 feet deep, parallel and adjacent to two existing high-voltage transmission lines (500 kV Navajo-McCullough Transmission Line and 169 kV Glen Canyon to Buckskin Transmission Line). The remaining features of the LPP project alternatives and other alternatives would have no direct or indirect impacts on river corridors designated or eligible as Wild and Scenic Rivers.

## ES-3.7 Grazing Land

The LPP Water Conveyance System would have permanent direct impacts on five acres of grazing land and temporary direct impacts on 198 acres of grazing land. The South Alternative alignment would have permanent direct impacts on 757 acres of grazing land and temporary direct impacts on 1,027 acres of grazing land. The Existing Highway Alternative alignment would have permanent direct impacts on 749 acres of grazing land and temporary direct impacts on 779 acres of grazing land. The Southeast Corner Alternative alignment would have permanent direct impacts on 757 acres of grazing land and temporary direct impacts on 1,082 acres of grazing land. The Transmission Line Alternatives would have temporary direct impacts on 25 acres of grazing land.

The No Lake Powell Water Alternative would have no direct or indirect impacts on grazing land.

## ES-3.8 Rights-of-Way

The LPP alternatives would have minor direct and indirect impacts on established rights-of-way. The No Lake Powell Water Alternative would have no impacts on established rights-of-way.

## ES-3.9 Trails and National Historic Trails

The LPP project alternative alignments would have temporary direct impacts on historic trails and national historic trails at several pipeline and penstock crossing locations. The trails and surrounding vegetation would be restored to pre-disturbance conditions at each crossing site.

The No Lake Powell Water Alternative would have no direct or indirect impacts on trails and national historic trails.

## ES-3.10 Areas of Critical Environmental Concern (ACEC)

The LPP South Alternative and Southeast Corner Alternative would have temporary direct impacts on 12 acres of the Kanab Creek ACEC where the penstock would cross Kanab Creek Canyon and Bitter Seeps Wash. The other LPP action alternative features would have no impacts on ACECs.

The No Lake Powell Water Alternative would have no direct or indirect impacts on ACECs.

## ES-3.11 Growth

The LPP project alternative alignments would have no direct impacts on growth in the St. George metropolitan area. The LPP project alternative would support continued population growth and in-fill development within municipal boundaries served by transportation networks, schools, power, water distribution, sewer collection and other utility infrastructure. The growth scenario analysis excludes threatened and endangered species habitat, existing developed land, state parks, BLM-administered land, Indian reservations, conservation land, Red Cliffs Desert Reserve, U.S. Forest Service land, wilderness areas/wilderness study areas, open water, floodplains, wetlands and riparian areas, slopes greater than 25 percent, ridgelines, streams, and dry washes. Four growth scenarios were modeled; three of these scenarios were further modeled to exclude development in soil and rock hazard areas.

Scenario 1 would result in developing 106,770 acres within the growth study area including soil and rock hazard areas, and demonstrates the potential for urban and suburban sprawl without incorporating smart growth principles. Developable areas not connected to municipal boundaries, not proximate to existing or planned transportation networks, and not having infrastructure to support new development are excluded from growth Scenarios 2, 3, and 4. Scenario 2 represents growth on developable land incorporating smart growth principles. Scenario 3 represents growth on developable land with no land use conflicts and incorporates smart growth principles. Scenario 4 represents growth on developable land based on urban preference and incorporates smart growth principles. Scenarios 2A, 3A and 4A include development in soil and rock hazard areas; Scenarios 2B, 3B and 4B exclude development in soil and rock hazard areas. Table ES-1 shows the results of the growth scenario modeling for Scenarios 2B, 3B and 4B. The housing unit densities indicated under Scenarios 2B, 3B and 4B are within normal densities for urban

Table ES-1 Results of Growth Scenario Modeling in the Washington County Growth Study Area, 2060									
	Demographic Indicators for Future Development								
Scenario	2060 Population <sup>1</sup>	Housing Units <sup>1</sup>	Household Size <sup>1</sup>	Housing Units Per Square Mile <sup>2</sup>	Housing Units Per Acre <sup>2</sup>				
2B	772,606	309,273	2.50	2,201	3.44				
3B	772,606	309,273	2.50	2,539	3.97				
4B	772,606	309,273	2.50	2,331	3.64				
<b>Notes:</b> <sup>1</sup> Data compiled from Utah Governor's Office of Planning and Budget, 2008 Baseline Projections <sup>2</sup> Values include existing (2009) and future (2060) housing units									

development. These analyses demonstrate the 2060 population of 772,606 people could be accommodated within the Washington County growth study area and within areas already served by infrastructure, incorporating conservative development assumptions. The LPP project would supply water to meet Washington County needs through approximately 2037, when the growth study area population would be slightly less than 500,000 with an average housing unit density of 2 units per acre. Therefore, the potential indirect impacts of the LPP operation on urban and suburban growth within the Washington County growth study area would not be significant.

The No Lake Powell Water Alternative would have no direct impact on growth in the St. George metropolitan area and Cedar Valley. Water developed from local supplies, conserved by restricting residential outdoor watering, and treating Virgin River water using reverse osmosis treatment would meet the population growth projected by the Utah Governor's Office of Planning and Budget through 2037. This alternative could have indirect impacts on growth because restrictions on residential outdoor watering may deter some potential in-migrants to settle in other communities with no restrictions on outdoor water users in the form of rate increases could deter some potential in-migrants to settle in other communities with normal in-migrants to settle in other communities with normal in-migrants to settle in other some potential in-migrants to settle in other vegetation. Increased costs of reverse osmosis treatment passed onto water users in the form of rate increases could deter some potential in-migrants to settle in other communities with lower water rates. The population growth rate could be slower than that projected by the Utah Governor's Office of Planning and Budget.

## 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 Land Use Plans and Conflicts 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 (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 South 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





(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 inline 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 Congressionallydesignated 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



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 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



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 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 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.



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 substation. This 69 kV transmission line 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 substation. This 69 kV transmission line alternative alignment would bifurcate from an existing transmission line and run west, then 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





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 3ring 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).





## **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 inmigration.

## 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 Purpose of Study**

This study was proposed by the Utah Department of Water Resources (UDWR) in the Lake Powell Pipeline Project Pre-Application Document (PAD) (UDWR 2008). During the scoping period, several agencies, groups and individuals including, but not limited to, the National Park Service, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, LPP Coalition, Great Basin Water Network, Citizens Education Project, the Kaibab Band of Paiute Indians, and others requested additional information, provided comments, and provided reference to materials applicable to the Land Use Plans and Conflicts Study Report. Comments received during the study plan development process were incorporated into the revised study plan. The Land Use Plans and Conflicts Study Report provides land use information about the LPP Project area that will be incorporated into the Federal Energy Regulatory Commission (Commission) license application and right-of-way permit applications submitted to the U.S. Bureau of Reclamation (Reclamation), National Park Service (NPS) and U.S. Bureau of Land Management (BLM).

The purpose of this study is to document impacts, both direct and indirect, of construction and operation on land use plans resulting from the proposed LPP Project. This information will be a factor in determining the methods for planning and design of the LPP and CVP Projects, herein collectively referred to as the LPP Project, as previously defined and addressed by the Pre-Application Document (PAD) submitted to the Commission on March 4, 2008. This study addresses comments made at the June 2008 public scoping meetings and responds to comments received on review of the PAD and Scoping Documents 1 and 2, as well as those provided in the September and October 2008 study plan meetings in Salt Lake City and St. George, Utah.

This study report describes the results and findings of a preliminary land use plans and conflicts analysis to evaluate conditions along the proposed alternative pipeline and transmission alignments of the LPP Project. This study also identifies and documents measures to mitigate impacts from the various land use plans as necessary.

## **1.5.2 Identified Issues**

The land use issues identified in this analysis include the following:

- Identify all land-administering agency intentions and guidelines for land use
- Identify, evaluate, and quantify primary land use types and management goals for the topics listed below:
  - Farmland that may be converted to other uses
  - Floodplains that may be affected
  - o Locations for dispersal of LPP Project waste and potential locations of hazardous waste
  - Land designated as "wild land" and road-less areas
  - o Potential and current Wild and Scenic Rivers and limitations of associated classifications
  - Disruptions to public and private grazing land including access roadway closure, rotation disruption, facility damage (fences, water, etc), loss of forage, and forage rehabilitation time periods
- Community growth in developable and undevelopable areas as an indirect effect of the LPP Project

- Identify effects of construction and operation of the LPP Project on all of the above topics regarding changes in existing land use types
- Identify anticipated mitigation measures

## **1.6 Impact Topics**

The following impact topics are addressed in the Land Use Plans and Conflicts Study Report:

- Land Ownership and Management
- Farmland
- Floodplain
- Waste Disposal and Hazardous Waste
- Wild Land
- Wild and Scenic Rivers
- Grazing Land
- Rights-of-Way
- Trails and National Historic Trails
- Areas of Critical Environmental Concern
- Growth

## Chapter 2 Methodology

## **2.1 Introduction**

As described in the Revised Land Use Plans and Conflicts Study Plan (December 16, 2008), the purpose of this study is to gather and analyze additional information about land within the LPP Project area to support decision-making related to LPP Project affects and requirements. The study plan defines the procedures for analyzing potential conflicts with land uses within the LPP Project. This study presents the issues identified during the scoping period, presents additional issues identified during the study, and summarizes available data.

## 2.2 Data Used

The following plans and data were used for this report (complete references can be found in Chapter 8):

- Arizona Administrative Code Agency, Board & Commission Rules, Title 12, Chapter 5
- Arizona Revised Statutes, Title 37, Public Lands
- Cedar City General Plan, Cedar City, Utah
- Cedar City General Plan Land Use Plan Update
- Cedar City Land Use Map
- City of Hurricane General Plan
- Sensitive Lands Ordinance, City of Hurricane, Utah
- Future Land Use Map, City of Hurricane, Utah
- City of Kanab General Planning Future Land Use, Kanab, Utah
- City of Kanab General Planning Parks and Trails master Plan, Kanab, Utah
- Coconino County Comprehensive Plan, Coconino County, Arizona
- Enoch City General Plan, Enoch City, Utah
- Mohave County, Arizona General Plan, Kansas City, Missouri.
- Kane County Land Use Map, Kane County, Utah
- National Wild and Scenic Rivers Act of 1968
- Revised Proposal Town of Leeds General Plan, Leeds, Utah
- Toquerville City Land Management Code, Toquerville, Utah
- Town of Leeds Land Use Ordinance, Leeds, Utah
- General Plan Adopted, Town of Leeds, Utah
- Arizona Strip Field Office ROD Route Designations Map and Report, BLM, Utah.
- Arizona Strip Field Office Resource Management Plan Record of Decision, BLM, St. George, Utah
- Vermilion Cliffs National Monument ROD Resource Management Plan Map and Report BLM, St. George, Utah
- Sand Hollow Recreation Area Recreation Management Plan, BLM, WCWCD, and Utah Division of Parks and Recreation, St. George, Utah
- Virgin River Watershed Management Plan, BLM, WCWCD, Department of Agriculture, Forest Service, Utah DEQ, St. George, Utah
- Dixie Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement, BLM - Utah State Office, Cedar City District, Dixie Resource Area

- St. George Field Office (formerly Dixie Resource Area) Record of Decision and Resource Management Plan, BLM, St. George Field Office, Utah
- Grand Staircase-Escalante National Monument Approved Management Plan Record of Decision. BLM, GSENM Field Office, Cedar City, Utah
- Kanab Field Office Record of Decision and Approved Resource Management Plan and Environmental Impact Statement, BLM Kanab Field Office, Kanab, UT
- Approved Resource Management Plan Amendments/ROD for Designation of Energy Corridors on BLM-Administered Lands in the 11 Western States, BLM, Utah
- Cedar-Beaver-Garfield Antimony, BLM, Cedar City, Utah
- Draft Environmental Impact Statement: Wild and Scenic River Suitability Study for National Forest System Lands in Utah, Forest Service, Utah
- Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States, BLM, Utah
- Rivers, Trails, and Conservation Assistance Program, NPS
- Strategic Plan for Glen Canyon NRA and Rainbow Bridge National Monument, NPS
- Director's Order #25. Land Protection, NPS
- Utah State Water Plan Kanab Creek/ Virgin River Basin, Salt Lake City, Utah
- Kanab General Plan, Cedar Hills, Utah
- LaVerkin City General Plan, Cedar Hills, Utah
- Utah State Trust Land Rules, Title R850, Utah

## **2.3 Assumptions**

- The majority of topics to be studied are defined in the Land Use Plans and Conflicts Study Plan, as described in the Pre-Application Document
- The sum of quantities presented in the study conclusions are not representative of the final LPP Project impact, as the final preferred alternative has not been identified and impacts of alternatives would overlap
- Best Management Practices (BMPs) would be developed and implemented during construction and operation of the LPP Project to reduce or eliminate adverse impacts associated with the use of land
- Federal Highway crossing (I-15) construction would use trenchless technologies (no opencutting) for pipe installation.
- State Highway (SR) crossings would use trenchless technologies for pipeline installation, but open-cutting would be considered on a case-by-case basis.
- County and local roadways would be open-cut for pipe installation.
- New and improved access roads to various facilities would be graveled.
- Minor access road upgrades would include clearing and grading to enable access for equipment and vehicles (non 4-wheel drive type).
- New access roads would include clearing, grading, minor excavation for roadways, and placement of roadway gravel.
- Imported roadway gravel material would typically be 1-inch minus material. In-situ graded material can vary significantly.
- The LPP Project would take into account state, Federal, and private land use goals and would not adversely affect the effort to maintain those goals.
- Regional roadway projects would not conflict with the LPP Project. Final design and preconstruction efforts would be coordinated with all regional projects to confirm that conflicts would not exist.
• Utility easements would be needed for the transmission lines where ROWs cannot be used.

# 2.4 Impact Analysis Methodology

This study investigates and defines ownership information for land that falls within the LPP Project study area, and it provides land use status and management information based on land use management plans, zoning codes, comprehensive plans, and Geographic Information System (GIS) data from federal, state, and local agencies, and other groups and tribes. The study provides detailed information about existing land management plans and protections associated with land management designations and identifies where conflicts exist between resource management activities and proposed LPP Project activities.

The study area consists of all areas associated with foreseen direct and indirect disturbances from construction, operations, and maintenance pertaining to the LPP Project alignment. It also includes ancillary features that would provide services or utilities to the LPP Project such as construction work areas, borrow pits, access roads and transmission lines.

The following sections describe the methodology for analyzing specific topics in the land use study. Upon evaluation of applicable land use plans and resource management goals and objectives, additional issue topics were identified for further investigation. The following impact topics outline those additional potential impact analysis topics that were not included in the Commission-approved Land Use Plans and Conflicts Study Plan and are addressed in this study report.

# 2.4.1 Land Ownership and Management

The land uses identified in this study report include open space, rural and urban residential uses, commercial and industrial uses, agricultural uses, and utility use land affected by the LPP Project. Recent aerial photography and GIS data showing land status was utilized to identify primary uses and where the afore-mentioned land use types would be affected. Community General Plans and Resource Management Plans were reviewed and evaluated for conflicts with LPP Project construction and operation plans; a list of the acquired documents is presented in Appendix A.

# 2.4.2 Farmland

As part of the Farmland Protection Policy Act of 1981, agencies are to examine their actions to ensure they do not contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses or that those conversions are minimized. Prime and Unique farmland as defined by the Natural Resource Conservation Service were evaluated for any potential impacts along the alignments and for all LPP Project features. All agency intentions were identified through the inspection of General Plans, Land Use Plans, and Resource Management Plans.

# 2.4.3 Floodplain

Under Executive Order 11988 of 1977, Federal agencies are to minimize impacts of projects and actions on floodplains. Agencies are to take actions to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out their responsibilities for conducting Federal activities and programs affecting land use. This study identifies designated floodplains and how the LPP Project facilities might impact or alter floodplain function or use. A similar Executive Order regarding wetland protection was addressed in the Wetlands and Riparian Resources study.

In addition to evaluating land use plans and land and resource management goals and objectives relevant to the LPP Project placement, construction, and operation, the following impact topics are also addressed in detail.

#### 2.4.4 Waste Disposal and Hazardous Waste

The Arizona Strip BLM Office identified the need to determine what quantities and types of trash, construction debris, solid waste and hazardous waste that might be generated during construction and operations and expressed concern regarding waste disposal within and outside of the proposed LPP Project ROW. BLM asked for clarification of the types of waste that would be deposited and where and how waste deposition would occur.

# 2.4.5 Wild Land

During the scoping period, several individuals and groups expressed general concerns that "wild land" character and road-less areas would be impacted by the LPP Project. An analysis of all designated land uses and management framework for land within the LPP Project boundary was performed to determine if there are any wild or wilderness designations within or adjacent to the study area. LPP Project transmission lines were analyzed for potential effects on managed wild land.

# 2.4.6 Wild and Scenic Rivers

During scoping, the BLM St. George Field Office indicated that no designated, eligible, or suitable Wild and Scenic River segments are within or adjacent to the proposed alignment within their jurisdiction. The BLM Arizona Strip Field Office requested that discussion of Wild and Scenic Rivers not be contained within the recreation section of the analysis, but rather be included in a "special designations" section. Therefore, Wild and Scenic Rivers are addressed as part of this land use study.

# 2.4.7 Grazing Land

Coordination with public and private land owners would be necessary to address temporary impacts on livestock grazing management during construction and operation of the LPP Project. The following are issue topics associated with livestock grazing management that require further planning and coordination:

- Impeded access to grazing allotments during construction
- Damage to existing access roads during and following construction
- Damage to grazing facilities (i.e. fences, water pipelines and corrals)
- Disruption to current grazing rotations
- Loss of forage resulting from pipeline construction and access
- Loss of forage at reservoir sites
- Compensation to livestock operators for loss of forage
- Need for rest period to allow disturbed areas to be rehabilitated

All parcels within the LPP Project boundary that are designated for grazing use have been identified via GIS mapping. This study identifies typical LPP Project activities and subsequent impacts anticipated to occur within land managed for grazing. Potential mitigation measures are discussed for consideration in minimizing impacts.

# 2.4.8 Rights-of-Way

During scoping, the BLM provided comment concerning how land and realty activities would be addressed; in particular, who would have authority over LPP Project easements, and the types of monitoring and compliance that would be required of the right-of-way holder. Land and realty issues pertaining to right-of-way requirements and allowances are addressed in this study at the project planning level.

# 2.4.9 Trails and National Historic Trails

National historic trails have been designated under Section 5 of the National Trails System Act. National historic trails are intended to be "extended trails" which follow as closely as possible and practicable, the original trails or routes of travel of national historic significance. Designation of these trails (or routes) is continuous (meaning there are no mapped breaks in the trails); however, the developed trail itself may not be continuous. National historic trails have as their purpose the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment. Other historic trails are recognized and managed as such by the BLM in Utah and Arizona. Areas where the LPP Project may cross trails or nationally designated historic trails and other regional historic trails were identified to LPP Project impacts on trails in the region. LPP Project conflicts with appropriate land use plans are evaluated (Trails are also addressed in the Recreation Resources Study Report).

# 2.4.10 Areas of Critical Environmental Concern (ACEC)

ACECs are defined in the Federal Land Policy and Management Act (FLPMA), Section 103(a), as areas where special management attention is required to protect and prevent damage to a particular resource. Regulations for implementing ACEC provisions of FLPMA are located in 43 CFR 1610.7-2. ACECs are considered for designation as part of the BLM land use process and must meet certain relevance and importance criteria to be considered for designation. ACEC areas are managed to protect certain resources within a specific area, but the designation itself does not automatically prohibit other uses within that area.

A literature and mapping review was performed to verify the location of all ACECs that are within or adjacent to the boundary of the LPP Project area. The LPP Project South Alternative alignment would cross the Kanab Creek ACEC and would be situated nearby other ACECs. Further review is provided to identify potential constraints or conflicts within the Kanab Creek ACEC.

# 2.4.11 Growth

This section of the land use study was intended to identify land in southern Washington County, Utah that would have the potential for growth and development resulting from the LPP Project or associated with the No Lake Powell Water or No Action alternatives. Figure 2-1 shows the land areas evaluated in the growth study. The municipalities within the growth study area include: St. George, Ivins, Santa Clara, Washington City, Hurricane, Leeds, Toquerville, LaVerkin, Virgin and a portion of Apple Valley. This growth study area does not encompass the entire area potentially affected by the LPP Project in terms of providing water to cities; however, it would likely be the area that experiences the largest contribution of future growth and thus was the focus of this growth analysis. Criteria for determining potentially developable lands were identified by reviewing local, state, and federal general plans and associated development policies and historical practices. Developable lands were generally undeveloped or existing agricultural land that could be used or converted to new urban, suburban, rural residential, commercial, industrial and recreational uses. Future growth patterns and rates of growth may change based on future



public policy decisions, implemented through general plans, and community zoning. These changes could not be predicted in this analysis but it was recognized that these decisions would be made based on managing growth in the region. This growth study analysis was focused on utilizing geographic-based criteria to identify potential growth areas with current development codes and standards identified in the region to project the siting of new urban and suburban development. The identification of future growth areas was intended to assist in assessing potential indirect effects and potential growth-inducing impacts of LPP alternatives in land use and other resource areas.

The following land use plans and planning documents were used to identify developable land areas available for growth:

- City of Hurricane General Plan (1999)
- City of Hurricane Sensitive Lands Ordinance
- Confluence Nature Park Final Plan (2007)
- Dixie Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement (1998)
- Ivins City General Plan (1998)
- LaVerkin City General Plan
- Santa Clara General Plan (2001)
- Santa Clara River Reserve Recreation and Open Space Management Plan (2005)
- St. George Field Office Record of Decision and Resource Management Plan (1999)
- St. George General Plan (2002)
- Town of Leeds General Plan (2004)
- Vision Dixie Land-Use and Transportation Vision (2007)
- Vision Dixie Suggested Comprehensive Planning Checklist (2007)
- Washington City General Plan (2005)
- Washington County, Utah Critical Lands Resource Guide (2008)

Upon review of these plans, a list of screening factors was developed. Some of the factors were identified as limiting areas of potential growth. These factors were used to exclude land areas from future growth, thus categorizing them as undevelopable. The exclusion criteria proposed in this analysis include:

- Slopes greater than 25 percent
- Dry washes
- 100-year flood plains
- 100-foot setback from ridgelines and mesa tops
- Existing Conservation Areas
- State Parks
- BLM Administered Land
- Indian Reservations
- Threatened and Endangered Species (TES) Habitat Areas
- Open Water
- Wetlands
- Lava Beds
- Hazardous Rock and Soil

The exclusion criteria utilized in this study report attempt to screen land use based on "smart growth" planning concepts and typical "sensitive" land planning factors. Many of these practices and concepts were outlined in the existing general plans and were incorporated or are intended to be incorporated into

zoning and building ordinances. In addition to the approved general plans, other planning documents such as the "Vision Dixie Suggested Comprehensive Planning Checklist", "Vision Dixie Land-Use and Transportation Vision", and the "Washington County, Utah Critical Lands Resource Guide" were evaluated for verification and review of the screening criteria identified for the analysis.

Older developed areas (more than 14 years old) were first identified and digitized by using aerial photograph interpretation techniques. Aerial photography included 1993- to 1995-era black and white Digital Ortho Quadrangle (DOQ) mosaics at 1-meter pixel resolution. Existing developed areas were categorized using 2009 aerial photos from the National Agriculture Imagery Program (NAIP) at 1-meter pixel resolution and were digitized using on screen digitizing techniques. In both cases a "developed area" was identified as an area, of about 1/4-acre or more in size that had existing residential, commercial, industrial, or developed recreation uses on it. If an area showed signs of basic infrastructure for residential or commercial uses, but did not have a structure on it, the land was not included as developed. This allowed the analysis to consider in-filling of developed areas.

A set of four scenarios were examined in this study to allow consideration of a range of possible growth patterns. Scenario 1 considered developable land areas using all of the exclusion criteria except for hazardous rock and soil (locations that indicate expansive rock and soil). Scenario 2 (A and B), identified developable land areas using all of the exclusion criteria. In Scenario 1 and Scenario 2, two types of developable areas were determined; highly favorable and moderately favorable. Highly favorable land was land that was closer to existing utilities, schools hospitals, retail stores, business centers, and existing development. This was determined using GIS and spatial analysis to establish Euclidean distances to the local amenities. Scenario 3 (A and B) identified areas of potential land use conflict which could have an effect on growth. Scenario 4 (A and B) identified areas of land use preference and conflict. This scenario showed where land use preferences may occur under a given set of criteria and analysis.

The intent of examining both Scenarios 1 and 2 was to identify possible developable land by following historical patterns (not limiting development based on hazardous rock or soil types) and following more modern planning techniques using sound engineering methods and practices, but avoiding the most hazardous soil and rock types. Historically, the municipalities in Washington County had allowed residential and business developments to build on moderate and highly expansive rock and soil areas. The hypothesis contemplated was that if this practice continues, a much larger amount of land would be available for development (Scenario 1) than if development were curtailed based on these hazards (Scenario 2 (A and B)). For the moderately expansive soils, there would be engineering and mitigation solutions that could be employed at a higher cost but could allow for additional development in high soil hazard areas. This analysis was not intended to predict future policies and practices of the county and municipal planning agencies, but rather present a range of possibilities based on available information.

The growth analysis was performed using GIS modeling. Raster-based GIS analysis was performed using a 10-meter cell size. The land use and growth conflict-based analysis (Scenarios 3 and 4) was conducted using the Land-Use Conflict Identification Strategy (LUCIS<sup>®</sup>) methodology (Carr and Zwick 2007). The LUCIS<sup>®</sup> model method is a goal-driven GIS model which spatially represents probable future land use patterns and probable areas of future land use conflict and preference. It was developed over a period of 10 years at the University of Florida. Geospatial data for this analysis were obtained from the Bureau of Land Management (BLM), Washington County, City of Santa Clara, City of St. George, Washington City, Hurricane City, Utah Department of Natural Resources (DNR), and Utah Automated Geographic Reference Center (AGRC). The methodology of the LUCIS<sup>®</sup> model incorporates multiple layers of data that are ranked and weighted for determining land use suitability and then combined to create final output analysis raster data. In the LUCIS<sup>®</sup> model three general goals are set: identify lands most suitable for agricultural use; identify lands most suitable for conservation and protection strategies; and identify lands most suitable for urban development. Ranked beneath these goals are objectives and sub-objectives which

ultimately represent the raster layers to be ranked and weighted for use in the analysis model. Once this is completed, the model can be run to determine areas of potential land use conflict and preferences. Through this analysis model, land use conflicts and preferences can be identified to better aid in visualization and planning.

# Chapter 3 Affected Environment (Baseline Conditions)

### 3.1 Impact Area

Although federal and state owned and managed land and recreation areas comprise much of the landscape associated with the LPP Project, other land ownership types and uses occur as well. Federal and state areas near and within the LPP Project alignment are utilized for recreation, grazing, mineral exploration and mining, resource harvesting, wildlife habitat, and scientific research, as well as for other uses. These same activities often occur on private land within the LPP Project boundaries. Agricultural, urbanized, utility rights-of-way, and open space land are noted uses within the LPP Project alignment. In addition to land, the LPP Project lies within the water bodies of Lake Powell and Sand Hollow Reservoir. These water resources are utilized for recreation, habitat, urban water supply, as well as other beneficial uses. The primary land use within the Arizona Strip, which constitutes a large portion of land associated with the LPP Project, is livestock grazing, which occurs on both private and public land. South of the Utah/Arizona border, the LPP Project alternatives would traverse either south of the Kaibab-Paiute Indian Reservation or through it (depending on the alternative), where the landscape includes desert, open range, pinyon pine, juniper, natural springs, and ephemeral washes. In Utah, land uses consist of urban use, agricultural use (mainly irrigated farmland), livestock grazing, and protected land such as state or national parks and monuments. As development in southern Utah continues and urbanization increases, some existing land used for grazing and agriculture is likely to be converted to urban land use (NRCS 2007 and Utah Division of Water Resources 2007).

In areas not irrigated for agricultural use or used as urban space or ROWs, the general land cover consists of desert scrub, desert grassland, desert shrub, pinyon-juniper shrub land, and pinyon-juniper woodlands.

The Federal and state land crossed by the LPP Project includes: Reclamation – Bureau of Reclamation; BLM – Grand Staircase - Escalante National Monument; BLM – Kanab Field Office; BLM – Arizona Strip Field Office; BLM – St. George Field Office; BLM – Cedar City Field Office; Kaibab–Paiute Indian Reservation; Arizona State Land Department; School and Institutional Trust Lands Administration – SITLA, Utah; NPS – National Park Service; Utah State Parks and Recreation; and the WCWCD – Washington County Water Conservancy District. Figure 3-1 shows land ownership along all LPP Project alternatives.

#### **3.2 Description of Baseline Conditions**

Land use includes the following topics that are generally associated with land management plans and policies.

- Land ownership and management
- Farmland
- Floodplain
- Waste disposal and hazardous waste
- Wild land
- Wild and scenic rivers

- Grazing land
- Rights-of-way
- Trails and national historic trails
- Areas of critical environmental concern
- Growth

The following sections describe the baseline conditions for these land use topics.



# 3.2.1 Land Ownership and Management

# 3.2.1.1 NPS-Administered Land

Glen Canyon National Recreation Area was established by Act of Congress in 1972. It is located in northern Arizona and southern Utah. Containing 1.25 million acres, the park was established "... in order to provide for public outdoor recreation use and enjoyment of Lake Powell and land adjacent thereto in the States of Arizona and Utah and to preserve scenic, scientific, and historic features contributing to public enjoyment of the area..." (USNPS 2008). The Glen Canyon National Recreation Area and Rainbow Bridge National Monument five-year Strategic Plan was completed in December 2006 to fulfill the requirements of Section 104 of the National Parks Omnibus Management Act of 1998.

# 3.2.1.2 Reclamation-Administered Land

Established in 1902, Reclamation is responsible for developing and conserving the Nation's water resources in the western United States. Reclamation's original purpose was "to provide for the reclamation of arid and semiarid land in the West." Today Reclamation covers a wide range of interrelated functions. These include providing municipal and industrial water supplies, hydroelectric power generation, irrigation water for agriculture, water quality improvement, flood control, river navigation, river regulation and control, fish and wildlife enhancement, outdoor recreation, and water-related research (Reclamation 2001). Reclamation administers the public land surrounding the Glen Canyon Dam Hydropower station and the subsequent substation downstream of the dam. The LPP Project would occupy a portion of the public land administered by Reclamation upstream of Glen Canyon Dam.

## 3.2.1.3 BLM-Administered Land

Grand Staircase – Escalante National Monument (GSENM) was established on September 18, 1996 when President Clinton issued a Proclamation under the provisions of the Antiquities Act of 1906. The GSENM includes about 1,870,000 acres of Federal land in south-central Utah. There are approximately 15,000 acres of land within the GSENM boundary that are privately owned. The GSENM Monument Management Plan (MMP) and Record of Decision (ROD) were signed in November, 1999 and became effective in February, 2000 (BLM 2000). The GSENM was created to protect a spectacular array of historic, biological, geological, paleontological, and archaeological objects. Protection and support of each of these characteristics are discussed throughout the GSENM MMP.

The Kanab Field Office signed an ROD approving a Resource Management Plan (RMP) in October, 2008. The Kanab Field Office approved RMP replaces public land decisions within the Escalante Management Framework Plan (MFP) (1981), Paria MFP (1981), Vermilion MFP (1981), Zion MFP (1981), Cedar-Beaver-Garfield-Antimony (CBGA) RMP (1986) and amendments. The planning area contains historical communities, diverse terrains, scenic landscapes, and recreational attractions which figure prominently in the settlement, history, culture, and enjoyment of southern Utah (BLM 2008b). The approved plan describes the land use and management objectives for the Kanab Field Office including:

- Manage public land for multiple uses of public resources within the framework of applicable laws, regulations, and agency policies.
- Use adaptive management to meet resource objectives.
- Apply rangeland standards and guidelines to the decision area.
- Implement ecosystem management in an open, cooperative, responsive atmosphere to involve agencies, groups, and individuals in monitoring and addressing resource issues on public land—issues that often span administrative and ownership boundaries.

- Maintain, improve, and restore (where needed) healthy ecosystems and habitat to support viable populations of fish, plants, and wildlife species while reducing habitat loss and fragmentation.
- Protect and enhance cultural and natural resources and values using the diversity of tools available to the BLM.
- Provide a variety of recreational, educational, and interpretive opportunities for people to experience public land resources and values.
- Reduce conflicts between uses and user groups.
- Recognize the unique cultural, historical, and social values of the decision area in developing a plan that manages the land and protects the heritage it engenders.

The BLM Arizona Strip, St. George, and Cedar City field offices have resource management plans with similar land use and management objectives.

### 3.2.1.4 Arizona State Land Department

Since the State Land Department's inception, its mission has been to manage the Land Trust and to maximize its revenues for the beneficiaries (ASLD Current). ASLD administers land owned by, belonging to, and under the control of the state through the rules outlined in the Arizona Revised Statues within the Arizona State Legislature.

### 3.2.1.5 Utah School and Institutional Trust Lands Administration (SITLA)

The Utah Trust Lands Administration is legally obligated to manage trust land to optimize the financial return for Utah's schools and the other 11 beneficiaries. SITLA manages a 3.5 million-acre real estate portfolio of both surface land and mineral land (USTL Undated). SITLA leases and sells land to provide revenue for the beneficiaries. SITLA administers the land entrusted to it by the federal government through a set of guidelines called 'Utah State Trust Land Rules.'

#### 3.2.1.6 Utah State Parks and Recreation

The Sand Hollow Recreation Area is managed cooperatively between the Washington County Water Conservancy District (WCWCD), the Utah Division of State Parks (State Parks) and BLM's St. George Field Office (BLM). These agencies work in conjunction with local stakeholders, a citizen-based planning team, and the public through a Recreation Management Plan to manage the WCWCD's 4,047-acre Sand Hollow reservoir site together with 16,564 acres of the BLM's 40,725-acre Sand Mountain Special Recreation Management Area (BLM 2001).

#### 3.2.1.7 Kaibab-Paiute Indian Reservation

Tribal land is held in trust by the U.S. Department of the Interior, Bureau of Indian Affairs. The Energy Transport Corridor Siting for Tribal Planners Guidance Manual (BIA 2010) provides guidance for energy development both for tribes and private organizations. Construction of conveyance projects within Tribal land is limited to designated energy transport corridors, which ensures that future development occurs in a planned manner with minimal environmental impacts. For this reason, a tribe may require that future right-of-way applicants locate their proposed project in a designated energy transport corridor.

# 3.2.1.8 Local and Private Land

The LPP Project would cross through five counties and 13 incorporated municipalities. Following is a list of the municipalities and counties and the land use and general plans that were used to identify potential

conflicts with LPP Project construction, operation, and maintenance. A list of applicable land management plans is included in Section 2.2.

<u>Cities</u>

- Greenhaven, AZ
- Big Water, UT
- Church Wells, UT
- City of Kanab, UT
- Fredonia, UT
- Colorado City, AZ
- Hildale City, UT
- City of Hurricane, UT
- Virgin, UT
- LaVerkin, UT
- Toquerville City, UT
- Pintura, UT
- Cedar City, UT

### 3.2.2 Farmland

### 3.2.2.1 Natural Resource Conservation Service (NRCS)

Counties [Variable]

- Washington County, UT
- Kane County, UT
- Iron County, UT
- Mohave County, AZ
- Coconino County, AZ

The Farmland Protection Policy Act (FPPA) of 1981 is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, municipal government, and private programs and policies to protect farmland. Federal agencies are required to develop and review their policies and procedures to implement the FPPA every two years (NRCS 2011).

The FPPA does not authorize the Federal Government to regulate the use of private or nonfederal land or, affect the property rights of owners in any way. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water storage or urbanized land (NRCS 2011). Each of the above farmland terms are defined as follows:

- Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of the Interior. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber. It does not include land already in or committed to urban development or water storage.
- Unique farmland is land other than prime farmland that is used for production of specific highvalue food and fiber crops, as determined by the Secretary of the Interior. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and

managed according to acceptable farming methods. Examples of such crops include citrus, tree nuts, olives, cranberries, fruits, and vegetables.

• Farmland, other than prime or unique farmland, that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate state or unit of local government agency or agencies, and that the Secretary of the Interior determines should be considered as farmland for the purposes of this subtitle.

## 3.2.2.2 Incorporated Areas

The municipal and county general plans have general consensus on conserving and preserving agricultural land. Development is permitted, but urban sprawl is discouraged. Inefficient urban development patterns on agricultural land are discouraged.

# 3.2.3 Floodplain

In the 1980s, the Federal Emergency Management Agency (FEMA) performed hydrologic and hydraulic studies to identify and map special flood hazard areas. The areas are defined as a 100-year storm event, or a 1 percent chance of a flood occurring in any given year. The 100-year flood is designated as the flow rate or water surface elevation during a 100-year stream or river flood. These studies resulted in the development of Flood Insurance Rate Maps (FIRMs) that depict the floodplains identified for each river and stream analyzed.

### 3.2.3.1 FEMA

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities" for the following actions (FEMA 2011):

- Acquiring, managing, and disposing of federal land and facilities
- Providing federally-undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities

Where the LPP Project would cross or have facilities sited within a designated floodplain, the effects must be considered. Following avoidance techniques, measures would need to be developed to minimize the impacts and restore and preserve the floodplain, as appropriate (FEMA 2011).

# 3.2.3.2 BLM

Public land within floodplains would generally be managed so as to preserve or restore the natural and beneficial values served by the floodplains. Structural developments within the floodplain that would be subject to recurring flood damage or which, in turn, would create adverse impacts to land, resources, or developments in or adjacent to the floodplain would be discouraged or not authorized. Multiple uses of the floodplain, including recreation, would be encouraged where such uses would not disrupt the broad purposes for which the floodplain is being managed (BLM 1999).

Prior to taking actions within designated floodplains, BLM would work with LPP Project sponsors to seek alternatives that involve no floodplain disturbance. Where suitable alternatives do not exist, BLM would work with local and state agencies to evaluate the potential effects of such actions and apply measures needed to minimize the impact of floods on human safety, health, and welfare and to maintain the functionality of the floodplain and related natural values. Where suitable mitigation cannot be applied to eliminate unacceptable impacts, BLM would not approve the action (BLM 1999).

#### 3.2.3.3 Incorporated Areas

Each LPP Project-affected municipality desires to discourage development within the 100-year floodplain, except development that would be compatible with periodic flooding, i.e. golf courses, crops, orchards, etc.

# 3.2.4 Waste Disposal and Hazardous Waste

#### 3.2.4.1 Waste

Review of BLM and state land resource management plans revealed no specific policies regarding waste, except that which involves illegal dumping. Research was completed through telephone calls to the municipalities of Page, Arizona; Kanab, Utah; Colorado City, Utah; LaVerkin, Utah; Washington City, Utah; St. George, Utah; and Cedar City, Utah; regarding the availability of landfills that would accept materials generated from both construction and operation of the LPP Project. These investigations revealed the availability of several transfer stations near the alignment alternatives, and a landfill in St. George, Utah.

LPP Project waste may be defined by both materials that are typically considered trash and by excess soil left over from pipe displacement and bedding or backfill. There are no known active or abandoned landfills or waste transfer sites directly within the impact area of the LPP Project, its alternative alignments, and associated facilities. There are however, several borrow and spoil pits near the alignments that are anticipated to be utilized for spoils stockpiling and permanent spoil deposition. Borrow and spoil is discussed more thoroughly in the Geology and Soil Resources study report (UBWR 2011).

# 3.2.4.2 Hazardous Waste

There are no known occurrences of hazardous waste, remediation sites, nor active hazardous waste sites within the study area. For this analysis, the study area is defined as those areas impacted by LPP Project construction and operation for all proposed alignments and associated facilities. Issues of concern that are typically associated with such sites are:

- Short- and long-term liability associated with the acquisition of environmentally distressed properties
- Spread of existing soil or groundwater contamination caused by construction activities
- Worker health and safety
- Construction cost impacts

The Utah Division of Environmental Response and Remediation (DERR) maintains environmental databases of sites with known contamination and sites that are regulated according to the requirements of state or federal laws. Following is a list of environmental databases maintained by DERR:

- Superfund Sites, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- National Priorities List (NPL), priority CERCLA sites
- Underground Storage Tanks (UST), Resource Conservation and Recovery Act (RCRA)
- Leaking Underground Storage Tanks (LUST)
- Brownfield Projects
- Toxic Release Inventory (TRI)
- Voluntary Cleanup Program (VCP)

Based upon a review of DERRs interactive map (which includes links to the databases listed above) on the Utah Department of Environmental Quality (UDEQ) web page coupled with telephone correspondence with both UDEQ and the Arizona Department of Environmental Quality (ADEQ), no known areas of hazardous waste are present along any of the LPP Project alignments. Also, there were no DEUR (declaration of environmental use restriction) sites, nor LQG (large quantity generator) sites. These databases represent both public and private land records.

# 3.2.5 Wild Land

This study considers wild land as both designated Wilderness Areas and Wilderness Study Areas (WSAs). The LPP Project alignment alternatives would be located near several WSAs. However, the LPP Project alternatives would not physically intersect any designated wilderness areas or WSAs. Wilderness Areas and WSAs in close proximity to the LPP Project features include Paria Canyon-Vermilion Cliffs, The Cockscomb, Paria-Hackberry, Cottonwood Point, Canaan Mountain, Spring Creek Canyon, and Wahweap (BLM 1999 and BLM 2000).

The congressionally authorized utility corridor that the LPP Project would be constructed within is adjacent to The Cockscomb WSA. The Cockscomb WSA covers 10,827 acres and was recommended suitable for designation as wilderness to Congress in 1991. WSAs are managed under BLM's Interim Management Policy and Guidelines for Lands Under Wilderness Review (BLM Manual H-8550-1). Under these guidelines, WSAs are administered as designated wilderness areas. Figure 3-2 shows the location of the WSAs within proximity of the LPP Project.

# 3.2.6 Wild and Scenic Rivers

If a river segment becomes officially designated by Congress, there are three different classifications that could apply: Wild, Scenic, and Recreational. They provide a range of resource protection from the most sensitive to least sensitive, respectively. In general, the river and a corridor consisting of <sup>1</sup>/<sub>4</sub> mile from the median water level of each bank would be protected to ensure no adverse impacts to its free flowing character, no degradation to its water quality, and no identified 'outstandingly remarkable' resources are affected. The river classification, a measure of how much development exists at the time of designation, must be maintained. This does not mean that no additional development may occur; rather the overall character must remain the same.



The Wild and Scenic Rivers Act, enacted October 2, 1968, strives to balance river development with protection of free-flowing rivers found to have outstanding characteristics (WSR 1968). The Act prohibits federal support for various actions including dam construction and other in-stream activities that would diminish the river's free flow or outstanding resource values (ORVs). The act protects outstanding natural, cultural or recreation values (BLM 2000). A literature review has been performed for all drainages that would be directly crossed by LPP Project components. Although some river reaches in Utah are eligible for Wild and Scenic classification, currently none are designated; in Arizona, only the Verde River, which is outside of the LPP Project footprint, is a designated Wild and Scenic River. In Utah, the Paria and portions of the Virgin River have been determined eligible and suitable for designation into the Wild and Scenic Rivers (WSR) System. These river segments are managed to maintain the WSR qualities.

The LPP Project pipeline and transmission line alternatives were evaluated for potential conflicts with these designations through the review of Resource Management Plans (RMPs) from each BLM field office. This study report treats suitable WSRs as if they were designated WSRs, because designation could occur at any time. Table 3-1 identifies the rivers found eligible and suitable for WSR designation located in or near the LPP Project and alternative alignments:

Table 3-1     Suitable Wild and Scenic River Corridors								
Name	Location/Description	Affected by LPP Project	Page 1 of 2 Administering Agency					
LaVerkin Creek	<b>LaVerkin</b> : Public land north of Zion National Park to northernmost private land parcel south of Zion National Park	Wild	No	St George BLM				
North Fork Virgin River	BLM-managed portion north of Zion National Park	Wild	No	St George BLM				
Virgin River	Segment B within Beaver Dam Mountains Wilderness Area (Arizona)	Wild	No	St George BLM				
North Fork Virgin River—Segment 48-49	Northwest of Mt Carmel - Kolob Terrace - T39S, R9W - Zion National Park	Wild	No	Kanab BLM				
East Fork Virgin River—Segment 37-40a	West of Mt Carmel - White Cliffs - T42S, R8W - Zion National Park	Scenic	No	Kanab BLM				
East Fork Virgin River—Segment 40a-41	West of Mt Carmel - White Cliffs - T42S, R9W - Zion National Park	Wild	No	Kanab BLM				
Orderville Gulch (Esplin Gulch)— Segment 44-45	Northwest of Mt Carmel - T40S, R9W - Zion National Park	Wild	No	Kanab BLM				
Meadow Creek/Mineral Gulch— Segment 33- 35, 35-38	West of Mt Carmel - White Cliffs - T41S, R8W - Zion National Park	Wild	No	Kanab BLM				
Paria River —Segment 68-69	Adairville - The Rimrocks - T43S, R1W	Wild	No	Kanab BLM				

Table 3-1   Suitable Wild and Scenic River Corridors   Page 2 of 2								
Name	Location/Description	Class	Affected by LPP Project	Administering Agency				
Upper Paria River - 1	T38S, R2W, Sec 21 to T41S, R1W, Sec 7 - Little Dry Valley	Wild	No	GSENM BLM				
Upper Paria River - 2	T41S, R1W, Sec 7 to T42S, R1W, Sec 28 - Crosses US Highway 89	Rec	No	GSENM BLM				
Lower Paria River - 1	T43S, R1W, Sec 10 to T43S, R1W, Sec 23 – from U.S. Highway 89 south to the Wilderness Boundary	Rec	Yes	GSENM BLM				
Paria River Tributaries	Lower Paria, Sheep Cr., Deer Cr. Cnyn, Snake Cr., Hogeye Cr, Kitchen Cnyn, Starlight Cnyn, Cottonwood Cr., Hackberry Cr.	Wild	No	GSENM BLM				
Virgin River	Beaver Dam Mountains	W/S/R	No	AZ Strip BLM				

During scoping, the BLM St. George Field Office indicated that no designated, eligible, or suitable WSR segments are within or adjacent to the proposed alignment within their jurisdiction. The nearest suitable WSR within the St. George BLM jurisdiction is LaVerkin Creek. However, this eligible segment currently ends at private land northeast of LaVerkin, and the Cedar Valley Pipeline Alignment Alternative would not cross this watercourse.

The GSENM Monument Management Plan (MMP) shows the Upper Paria River -2 segment as WSR eligible. This 16.9 mile river reach has a tentative WSR classification of "Recreational" (BLM 2000). The reach is identified as being eligible for WSR designation because of scenery, recreational attraction, exposed geologic strata and arches, and historic sites. The Paria River upstream and downstream of the US Highway 89 bridge flows through privately-owned land. The Water Conveyance System pipeline would cross the Paria River through the private land, and the transmission line alternative would cross over the Paria River above the private land. The Water Conveyance alignment crosses Buckskin Gulch along US Highway 89, which further downstream is classified as a suitable WSR outside the GSENM management area. This reach of Buckskin Gulch would not be directly affected because the eligible segment begins far downstream of the US 89 highway crossing. The Glen Canyon to Buckskin Transmission Line alternative (230 kV) would cross the Lower Paria River – 1 segment parallel to the existing Navajo-McCullough Transmission Line and Glen Canyon to Buckskin Transmission Line. The GSENM MMP articulates plans for the Paria River segment to curtail motorized use, enhance southwestern willow flycatcher habitat, enhance deer and other wildlife populations, and close the area to cross-country vehicle use to manage the area to maintain the qualities for which it was found eligible under the WSR Act (BLM 2000).

If any of the above rivers were to acquire WSR designation from Congress under the WSR Act, a new river management plan could further constrain certain uses including some water diversions and livestock driveway uses. This would add more conditions on maintenance and construction of existing power lines, pipelines, transportation, and other utility corridors. Additionally, the new corridor within the management plan would become Visual Resource Management (VRM) class I, which is further discussed in the Visual Resources Study Report (UBWR 2011).

## 3.2.7 Grazing Land

Upon review of the GIS mapping information retained from BLM and the states of Utah and Arizona, it was concluded that approximately 33 percent (65 miles) of the LPP Project pipeline alternatives would cross grazing land administered by the three agencies. Also, about 24percent (48 miles) of the LPP Project transmission line alignments would cross land administered by the BLM and states. Following is a list of agencies that administer public grazing land within the LPP Project area:

- BLM Arizona Strip Field Office (ASFO)
- BLM Grand Staircase-Escalante National Monument (GSENM)
- BLM Kanab Field Office (KFO)
- BLM St. George Field Office (SGFO)
- BLM Cedar City Field Office (CCFO)
- National Park Service (NPS)
- School Institutional Trust Lands Administration, Utah (SITLA)
- Arizona State Land Department (ASLD)
- Utah Division of Parks and Recreation

The LPP Project as a whole would affect 21 ASFO grazing allotments, 8 GSENM grazing allotments, 16 SGFO grazing allotments, 11 SITLA grazing allotments, and 10 ASLD grazing allotments (Figure 3-3). Following is a list of issues that could be encountered during the construction and operation of the LPP Project facilities:

- Need for continued access to grazing allotments during construction
- Loss of use or damage to access roads during and following construction
- Destruction of fences, water pipelines and corrals
- Disruption to current grazing rotations
- Loss of forage resulting from pipeline construction and access restoration and at reservoir sites

In establishing the Glen Canyon National Recreation Area (GCNRA) in 1972, Congress directed that, "The administration of...grazing leases within the recreation area shall be by the BLM. The same policies followed by the BLM in issuing and administering...grazing leases on other land under its jurisdiction shall be followed in regard to land within the boundaries of the recreation area, subject to provisions of Section 3(a) and 4 of this Act." The BLM administers grazing on the GCNRA subject to this enabling legislation and in accordance with the NRA Strategic Plan, Grazing Management Plan, and interagency agreements, and Memoranda of Understanding. The GCNRA administers livestock grazing on three allotments that occur on public land and within Glen Canyon NRA: the Ferry Swale, Wahweap, and Bunting Well allotments (BLM 2008c).

Each of the applicable BLM field offices follows a set of standards for managing rangeland: Utah Standards for Rangeland Health and Guidelines for Grazing Management; Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (both approved in 1997). The guidelines are used to evaluate all surface disturbing activities on public land where BLM administers grazing privileges (BLM 2008a, BLM 2008b, BLM 2008c).

SITLA rules do not specifically identify suggested measures to follow in the event of disruption of grazing land. The rules identify rangeland management and permitting procedures.



The Arizona State Legislature does not specifically identify measures to follow or limitations in the event of disruption of grazing land during construction within the jurisdiction of ASLD-administered land. The rules identify rangeland management, permitting procedures, and laws governing the lease of state land.

Utah State Parks and Recreation administers two grazing allotments within the Sand Hollow Recreation Area. The allotments are managed according to the Utah Standards for Rangeland Health and Guidelines for Grazing Management (BLM 1999a).

# 3.2.8 Rights-of-Way

The proposed LPP Project would require right-of-way (ROW) grants and approvals from the NPS, Reclamation, BLM and state and local agencies including agreements with ADOT, UDOT and various transmission organizations in the region. Research was performed on ROW acquisition and issues with crossing other ROWs through approved Resource Management Plans (RMPs) and Records of Decision (RODs) of the land management agencies mentioned above. Following are the BLM field offices affected by the LPP Project that have approved RMPs:

- Arizona Strip Field Office
- Grand Staircase-Escalante National Monument Field Office
- Kanab Field Office
- St. George Field Office
- Cedar City Field Office

Upon reviewing the appropriate BLM RMPs pertaining to the LPP Project construction limits, it was determined the Utah and Arizona BLM field offices have provisions accommodating utilities within identified utility corridors. Much of the LPP Project construction would take place within several existing highway ROWs while other portions lie within existing utility corridors. Using existing ROWs is encouraged as it helps restrict construction and associated disturbance to the least sensitive areas.

The St. George Field Office RMP provides a general overview statement on ROWs: "*This plan will continue to make public land available for a variety of rights-of-way where consistent with planning goals and prescriptions for other resources. Where possible, BLM will encourage project sponsors to locate new rights-of-way in existing or designated utility and transportation corridors.*" (BLM 1999a). This mandate is consistent across the BLM jurisdictions that could be crossed by the LPP Project. Applications for ROWs are analyzed on a case-by-case basis, and compared to planning decisions within the agency and to the standards of NEPA. All applications would be subject to applicable standards for surface disturbing activities. Consideration of a plan amendment if conflicts arise with the introduction of a new ROW corridor is mentioned in this RMP and those following.

The GSENM RMP has planning measures in place that allow for acquisition of a ROW within a portion of the Congressionally-designated utility corridor along U.S. 89. It states that planning and environmental studies would be necessary, along with compliance on specific ROW acquisition guidelines and NEPA standards, all considered on a case-by-case basis (BLM 2000).

The Cedar-Beaver-Garfield-Antimony (CBGA) RMP states that to the maximum extent possible, project ROWs would be encouraged to locate within designated corridors. Statewide and regional studies are required, and a plan amendment is possible if the new ROW is not within an existing corridor. The BLM expresses interest in expediting any process involving ROW acquisition for the legitimate use of public land. The Kanab ROD and RMP have replaced the CBGA RMP but the Cedar City Field Office is required to follow the direction of the 1986 CBGA RMP.

The BLM Kanab Field Office RMP directs BLM to expedite processes involving ROW acquisition for legitimate uses of public land. All ROWs are issued with use stipulations and other mitigation measures to minimize resource impacts (BLM 2008b).

Within the NPS administered land, the LPP Project would require ROW grants on Federal land within the Glen Canyon National Recreation Area (GCNRA) along the State Highway 89 corridor, which bisects the GCNRA in Coconino County, Arizona. The portion of State Highway 89 that bisects the GCNRA is managed by a ROW agreement that ADOT and UDOT have with the NPS. Section 7 of Public Law 92-593 (GCNRA Enabling Act), passed in October 27, 1972, says that the Secretary of the Interior has the right to "grant easements and rights-of-way on a nondiscriminatory basis upon, over, under, across, or along any component of the recreation area unless he finds that the route of such easements and rights-of-way would have significant adverse effects on the administration of the recreation area". The ROWs that ADOT and UDOT hold do not allow them to issue easements or ROWs to other entities; rather they may only issue encroachment permits that have been previously approved by the NPS. Therefore, the State of Utah must apply for a NPS ROW as well as an encroachment permit from ADOT and UDOT to construct and operate the LPP Project.

The proposed LPP Project would include the Lake Powell intake pump station facilities and a short initial pipeline section on Reclamation-managed land adjacent to Glen Canyon Dam. Reclamation has provided the State of Utah an initial agreement to allow for access to Reclamation land and/or facilities to conduct site investigations in connection with LPP Project permit and licensing activities. Once final design requirements are known, the right-of-way or use and occupancy agreement can be finalized with Reclamation.

UDOT has indicated that acquisition of an LPP Project ROW within the Highway 89 ROW is possible. But where possible, it is the preference of UDOT that the LPP Project ROW lie outside the Utah highway ROWs. With the proposed CVP Alternative lying outside of the I-15 ROW, there is no conflict with the UDOT transportation plan. All UDOT highway and interstate crossings would be bored to avoid any conflict with current transportation planning.

Acquisition of ROW easements within Arizona would require the applicant to follow guidelines set forth by the Arizona Revised Statutes (ARS) and all applicable federal regulations. These guidelines apply to ADOT-administered land as well as state, tribal, federal, and private land. ADOT has indicated that boring is mandatory unless extreme circumstances exist where LPP Project highway crossings would occur. The LPP Project is currently intended to stay within ADOT ROWs at all times when traversing US Highway 89 and Arizona State Route 389.

In Section 368 of the Energy Policy Act of 2005, Congress directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate, under their respective authorities, corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal land in the 11 contiguous Western States (BLM 2009). This action led to the identification of the West Wide Energy Corridor, which the LPP Project would make use of in several areas along the pipeline alignments. The West Wide Energy Corridor does not cross land administered by Reclamation.

The proposed Southern Corridor Highway will be a four-lane, limited-access highway beginning at Interstate 15 (I-15) roughly 2 miles north of the Arizona border near the southwest end of St. George (at the proposed Atkinville interchange) and connecting with State Route 9 (SR 9) near Hurricane (UDOT 2005). The highway will be 26 miles long. A multiple-use trail for pedestrians, bicyclists, and equestrians would parallel the highway. The primary purpose of the Southern Corridor is to provide a regional transportation facility between St. George, Washington City, and Hurricane that would complement local

land use plans. Construction would be complete on the corridor before construction begins on the LPP Project.

Utah State Parks and Recreation administers 4,047-acres of WCWCD-owned land called the Sand Hollow Recreation Area. Therefore, within that area, ROW acquisition is managed by WCWCD.

Tribal lands are vested in a particular tribe, community, or individual (allottee), but the land itself is held in trust by the Bureau of Indian Affairs (BIA). The approval of Indian land usage or ROW acquisition requires consent of the tribal council of the tribe whose lands would be affected and the authorizing document from BIA. All such acquisitions would need to be in accordance with the Code of Federal Regulations (25 CFR 169) (ADOT ITD 2010).

# **3.2.9 Trails and National Historic Trails**

There are three historic trails within the LPP Project area: The Honeymoon Trail, The Dominguez-Escalante Trail and The Old Spanish Trail. Of these trails, the Old Spanish Trail is a National Historic Trail. "The National Trail System Act of 1968" was established to designate and protect national scenic trails, national historic trails and national recreational trails. Each of the trails is managed by the appropriate federal agency whose administered land the trail resides on (USFS, BLM, or NPS). The BLM protects its National and Historic Trails through the designation of Visual Resource Management Class. A report of the analysis of VRM-designated land can be found in the LPP Visual Resources Study Report (UBWR 2011).

The Honeymoon Trail is a four-hundred mile long trail through the desert of Arizona and Utah that connected the Latter Day Saint (LDS) settlers to the St. George LDS temple. The St. George Temple was built in 1877, and the first trip to the Temple took place in 1881.

The Dominguez-Escalante Trail is approximately two thousand miles long and defines the route of the 1776 expedition led by Father Francisco Atanasio Dominguez and Father Silvestre Velez de Escalante. It originated in Santa Fe, NM and headed northwest along the San Juan, Dolores, Gunnison, and White Rivers in Colorado. It then headed west to Utah Lake where it turned south to Arizona before returning the loop back to Santa Fe. Only general mapping of the trail is available making it difficult to determine exactly where the crossings would be located.

The Old Spanish National Historic Trail (NHT) includes roughly 2,700 miles from Abiquiu and Santa Fe, NM through Colorado, Utah, Nevada, and Arizona to its terminus in Los Angeles, CA. During the height of its use between 1829 and 1848 mule pack-trains and traders brought woolen goods west and herds of stock east. The trail was added to the National Trails System in 2002 in coodination with the National Trails System Act, to "promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open air, outdoor areas and historic resources of the Nation" (BLM 2006, NPS 2006).

# **3.2.10** Areas of Critical Environmental Concern (ACEC)

ACECs are part of a conservation ecology program outlined in the Federal Land Policy and Management Act (FLPMA) of 1976. Section 103(a) of FLPMA, defines ACECs as areas where special management attention is required to protect and prevent damage to a particular resource. Regulations for implementing ACEC provisions of FLPMA are outlined in 43 CFR 1610.7-2. ACECs are considered for designation as part of the BLM land management planning process and must meet certain relevance and importance criteria to be considered for designation (BLM 1999a). ACECs are managed to protect certain resources within that area, but the designation does not automatically prohibit other uses in the designated area. The

following restrictions generally apply to all Arizona Strip ACEC areas that may have relevance to the LPP Project:

- Motorized travel is permitted on existing or designated open routes
- The sale and collection of vegetative materials located within ACECs is prohibited
- Seasonal grazing is to have limitations
- New mineral material disposal sites are not to be authorized

LPP Project facilities have been sited outside of most ACECs to avoid unnecessary impacts on sensitive habitats and riparian areas. However, the South Alternative would cross the Kanab Creek ACEC in two places. Table 3-2 shows the ACECs that are within or adjacent to the LPP Project area.

Table 3-2   ACECs Within Project Vicinity							
Name	Size (ac)	Admin.	Resource				
Johnson Spring	3444	AZ Strip	T/E Plants (Siler's pincushion)				
Shinarump	3237	AZ Strip	T/E Plants (Siler's pincushion)				
Water Canyon South Fork Indian Canyon	222	St. George	T/E Wildlife, Riparian Resources				
Kanab Creek	13075	AZ Strip	T/E Wildlife (SWFC) Riparian Resources				
Moonshine Ridge	9310	AZ Strip	T/E Plants (Siler's pincushion)				
Lone Butte	1762	AZ Strip	T/E Plants (Jones Cyclad)				
Lost Spring Mtn	19247	AZ Strip	T/E Plants (Siler's pincushion)				
Canaan Mountain	31355	St. George	Topography and Scenic Values				
Little Creek Mountain	19302	St. George	Historic Values, Cultural Resources				
Fort Pierce	5560	AZ Strip	T/E Plants (Siler's pincushion) soils/riparian				
Fort Pierce	164	AZ Strip	T/E Plants (Siler's pincushion)				
Little Black Mountain	241	AZ Strip	Cultural Resources				
Warner Ridge Fort Pierce	4281	St. George	T/E Plants (Siler's pincushion) soils/riparian				

# 3.2.11 Growth

Development in the study area was started by Mormon settlers in the 1800s. In the 1970s land use began to change from rural, agricultural and open space to more urban developed area. The main reason for this change was an increase in population as people began to migrate from colder climates to a warmer year-round climate. A large number of those migrants were retirees. Between 2000 and 2004 St. George, Utah was the fastest growing small metropolitan area in the nation with a 20.5 percent population increase according to an article by the Brookings Institution (Fry, 2005). Between 2000 and 2009, Washington County Utah was the 16<sup>th</sup> fastest growing county in the nation in terms of housing units with an increase of 20,571 new units, an increase of 56.4 percent (U.S. Census Bureau, 2010). Table 3-3 shows the population and housing unit trends for the cities in the growth study area along with housing densities and average household sizes.

Table 3-3   Population and Housing Trends									
								Page 1 of 2	
		1990	2000	2009 (Est.)	1990-2000 Change	1990-2000 % Change	2000-2009 Change	2000-2009% Change	
Ivins	Population	1,630	4,450	7,414	2,820	173.0	2,964	105.1	
	Housing Units	458	1,598	3,104	1,140	248.9	1,506	132.1	
	Household Size	3.56	2.78	2.39	-0.77	-21.75	-0.40	-14.23	
	HU/mi2	48	168	327	120	250.0	159	132.5	
Santa Clara	Population	2,322	4,630	6,473	2,308	99.4	1,843	79.9	
	Housing Units	606	1,294	1,992	688	113.5	698	101.5	
	Household Size	3.83	3.58	3.25	-0.25	-6.62	-0.33	-9.18	
	HU/mi2	101	216	332	115	113.9	116	100.9	
St. George	Population	28,502	49,663	69,374	21,161	74.2	19,711	93.1	
	Housing Units	11,148	21,083	29,847	9,935	89.1	8,764	88.2	
	Household Size	2.56	2.36	2.32	-0.20	-7.87	-0.03	-1.33	
	HU/mi2	157	297	420	140	89.2	123	87.9	
Washington City	Population	4,198	8,186	16,150	3,988	95.0	7,964	199.7	
	Housing Units	1,541	3,199	6,497	1,658	107.6	3,298	198.9	
	Household Size	2.72	2.56	2.49	-0.17	-6.07	-0.07	-2.86	
	HU/mi2	46	96	197	50	108.7	101	202.0	
Hurricane	Population	3,915	8,250	12,486	4,335	110.7	4,236	97.7	
	Housing Units	1,517	3,375	5,031	1,858	122.5	1,656	89.1	
	Household Size	2.58	2.44	2.48	-0.14	-5.28	0.04	1.53	
	HU/mi2	30	67	101	37	123.3	34	91.9	
Leeds	Population	254	547	782	293	115.4	235	80.2	
	Housing Units	131	240	295	109	83.2	55	50.5	
	Household Size	1.94	2.28	2.65	0.34	17.55	0.37	16.31	
	HU/mi2	44	80	98	36	81.8	18	50.0	
Toquerville	Population	488	910	1,334	422	86.5	424	100.5	
	Housing Units	172	325	496	153	89.0	171	111.8	
	Household Size	2.84	2.80	2.69	-0.04	-1.31	-0.11	-3.95	
	HU/mi2	12	23	35	11	91.7	12	109.1	
La Verkin	Population	1,771	3,392	4,301	1,621	91.5	909	56.1	
	Housing Units	629	1,158	1,360	529	84.1	202	38.2	
	Household Size	2.82	2.93	3.16	0.11	4.03	0.23	7.97	
	HU/mi2	50	91	107	41	82.0	16	39.0	

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Table 3-3   Population and Housing Trends									
		1990	2000	2009 (Est.)	1990-2000 Change	1990-2000 % Change	2000-2009 Change	2000-2009% Change	
Virgin	Population	229	394	457	165	72.1	63	38.2	
	Housing Units	114	170	171	56	49.1	1	1.8	
	Household Size	2.01	2.32	2.67	0.31	15.38	0.35	15.31	
	HU/mi2	7	10	10	3	42.9	0	0.0	
Growth Study A	rea								
	Population	43,309	80,422	118,771	37,113	85.7	38,349	47.7	
	Housing Units	16,316	32,442	48,793	16,126	98.8	16,351	50.4	
	Household Size	2.65	2.48	2.43	-0.18	-6.61	-0.04	-1.81	
	HU/mi2	63	125	189	62	98.4	64	51.2	
	HU/acre	0.098	0.195	0.295	0.19	98.4	0.10	51.2	
Notes: HU/mi2 = Housing Units per square mile									

HU/acre = Housing Units per acre

Household Size refers to the average number of people living in a household

Source data for this table came from: U.S. Census Bureau, Census 1990; U.S. Census Bureau, Census 2000; and U.S. Census Bureau, 2005-2009 American Community Survey.

Washington County has experienced significant growth and development including areas of urban sprawl and strip-type commercial development. The general definition of sprawl by Robert W. Burchell (Burchell, Robert W., et al, 1998) is development that expands in an unlimited and noncontiguous (leapfrog) manner outward from the solidly built-up core of a metropolitan or downtown area and includes both residential and nonresidential development. A common trait of sprawl is the consumption of agricultural and sensitive lands in abundance found at the periphery of development. The loss of agricultural land in significant amounts often occurs because it is the cheapest land available for development and sensitive lands are often lost due to a lack of environmental protection. The conversion of land to more urban uses has historically taken place on open space, agricultural land, along major transportation routes, and on sensitive resource land such as steep slopes, hillsides and ridgelines. In a report titled "Costs of Sprawl – 2000" (Burchell, Robert W., et al, 2002) Iron County Utah, Washington County, Utah and Mohave County, Arizona showed significant sprawl status (Figure 3-4). As urban sprawl continues, some urban decay is becoming apparent in the core areas as populations move farther away from city centers and downtown areas (Figure 3-5). During the last decade, Washington County has experienced more infill and city center revitalization. Additional planning, zoning, development requirements, and regulation show what may be the beginning of "smart growth" practices, which would help reduce and control sprawl and strategically plan where development should take place to reduce impacts on sensitive land resources, reduce the conversion of agricultural land and open space land, and reduce the costs associated with infrastructure expansion and maintenance (Figure 3-6).

The growth analysis study area includes 498,580 acres within the more highly populated areas encompassing the cities of Ivins, Santa Clara, St. George, Washington City, Hurricane, Virgin, LaVerkin, Toquerville, and Leeds (Figure 2-1). In the mid 1990s there were approximately 15,140 acres of developed land, of which, 1,868 acres was on high hazard rock and soil areas (Figure 3-7). In 2009, there

were approximately 32,423 acres of developed land. At the time of the study, there were 4,351 acres of developed land that were on what is considered high hazard rock and soil areas (Figure 3-8). Historically, the presence of hazardous rock and soil did not appear to constrain development. However, in more recent years, land use plans appear to be pushing more stringent engineering practices along with policies which would constrain use and development on the higher hazard rock and soil areas.



Projected Sprawl in the United States: Uncontrolled-Growth Scenario

Figure 3-4 Projected Sprawl in the United States: Uncontrolled-Growth Scenario

This figure was obtained from TCRP Report 74 "Cost of Sprawl 2000" (Burchell, Robert W., et al, 2002)









# Chapter 4 Environmental Consequences

# 4.1 Significance Criteria

The following would be significant impacts on land use and land use plans.

#### 4.1.1 Land Ownership and Management

- LPP Project activities that would be contradictory to guidelines set forth in Federal, state, and local general plans and Resource Management Plans (RMPs)
- LPP Project activities resulting in the rendering of a portion of land as not-useable by the current land-administering agency

#### 4.1.2 Farmland

• LPP Project activities that would convert designated farmland from one level to another (prime, unique, and state-important) or to an non-farm land use

#### 4.1.3 Floodplain

• LPP Project activities that would permanently alter floodplain characteristics

#### 4.1.4 Waste Disposal and Hazardous Waste

• LPP Project activities resulting in the production of unmanageable quantities of waste

#### 4.1.5 Wild Land

• LPP Project activities resulting in converting land characterized as 'wild land' or road-less land to any other type of land characterization

#### 4.1.6 Wild and Scenic Rivers

• LPP Project activities resulting in crossing any land or waterway designated or eligible for designation as Wild, Scenic, or Recreational under the National Wild and Scenic Rivers System

#### 4.1.7 Grazing Land

• LPP Project activities resulting in the termination of grazing contracts between public landadministering agencies and private livestock operations

#### 4.1.8 Trails and National Historic Trails

• LPP Project activities resulting in permanent disturbance of a National Historic Trail

#### 4.1.9 Areas of Critical Environmental Concern

• LPP Project activities that would permanently disturb land designated as an ACEC, or activities that would require a change in status of an ACEC

# 4.1.10 Growth

• LPP Project operation causing growth outside of existing infrastructure and designated municipal boundaries, resulting in conversion of agricultural, conservation and open space land to additional urban land use

# 4.2 Potential Impacts Eliminated From Further Analysis

There are no potential impacts eliminated from further analysis.

#### 4.3 Impacts

Land use would be affected by construction (short-term) of the LPP Project in several different ways, all of which are reviewed and explained in the following sections. However, while the construction footprint would be somewhat large (120-feet wide along the pipeline and 50-feet wide along access roads), the direct impact of the permanent LPP Project footprint would only involve the area needed for above-ground facilities. These facilities include the intake pump station, booster pump stations, storage and regulating tanks, hydropower stations, forebays, and afterbays. Cumulatively, these facilities would require approximately 785-acres of land transfers or leases, mostly from SITLA, BLM, and ASLD. The land would be converted from generally open space use to utility use.

Much of the pipeline would be sited within existing utility corridors, transportation corridors, and within existing highway ROWs. However, a significant portion of private and incorporated land would also be disturbed. Illustrations of the temporary and permanent impacts on both public and private land are shown in Figures 4-1, 4-2, and 4-3.



Figure 4-1 Highway Right-of-Way Construction



Figure 4-2 Not Adjacent to Highway Right-of-Way Construction



Figure 4-3 Typical Access Road Improvement

# 4.3.1 Land Ownership and Management

The LPP Project would require authorization of use on both public and private land, and in some facility locations, land acquisition would be necessary. Figure 3-1 illustrates the Federal, state, tribal and private land that would be affected by LPP Project alternatives. All land acquisitions, leases and associated studies would need to occur on an as-needed basis upon final determination of the preferred alignment. The Water Conveyance System would require five acres of private land acquisition for BPS-4 (Alt.). All other Water Conveyance System facilities would be located on public land and the land could be acquired or leased. The South Alternative would require approximately 17 acres of private land for two permanent access roads and Hydro Station-2. The Existing Highway Alternative would require approximately nine acres of private land for one permanent access road and Hydro Station-2. The Southeast Corner Alternative would have the same private land acquisition requirements as the South Alternative. The Transmission Line Alternatives would require approximately nine access road.

LPP Project construction would affect approximately 16.5 miles of Kaibab-Paiute Indian Reservation land under the Existing Highway Alternative. The Arizona Department of Transportation (ADOT) maintains a transportation ROW along the Arizona State Route 389; however, ADOT has requested the construction limits be set outside the ROW through the Reservation land. This would result in a significant land use impact on Reservation land because of there is no energy corridor in the vicinity. Therefore, LPP Project sponsors would need to complete all necessary applications and studies outlined in the Energy Transport Corridor Siting for Tribal Planners Guidance Manual (BIA 2010). The Southeast Corner Alternative would affect Reservation land for a distance of approximately 4 miles and would follow an established energy corridor. The South Alternative would avoid all land use impacts on Reservation land.

### 4.3.2 Farmland

Farmland impacts were identified based on GIS analysis of data from the Geospatial Data Gateway collected by NRCS soil surveys (NRCS Current). The soil surveys have been performed in the counties of Iron and Washington, Utah, and Mohave and Coconino, Arizona. Within Kane County, only the GSENM has been surveyed, with data available to the public. The NRCS is currently performing a survey within the remainder of Kane County, but data is not yet available to the public. Upon request, the NRCS evaluated the LPP Project areas, and provided preliminary conclusions based on their most current data. The LPP Project would not affect any prime farmland affected within Kane County.

LPP Project construction would have a short-term affect on farmland; land would be disrupted within the Temporary Construction Easement (TCE), but shortly after installation of the pipeline, topsoil would be replaced to the original contours and to a condition as good as or better than existing. Farmland would not be converted to nonagricultural use unless a new access road is constructed above the pipeline, or a permanent LPP Project facility is planned within the farmland. Figures 4-4, 4-5, and 4-6 illustrate soils designated as prime farmland that would be traversed by the LPP Project.

There would be no impacts on existing farmland along the transmission line alternative alignments for two reasons: First, the area where transmission lines would cross farmland near Sand Hollow Reservoir is adjacent to the new Southern Corridor transportation route and would not require excessive excavation. Second, all other transmission line alternatives would either not cross farmland or an existing access road would be utilized during construction, operation, and maintenance.

LPP Project operation would a have a significant impact upon farmland where planned facilities and access roads would convert the land from agricultural to nonagricultural use. Development of the alternative alignments was based in part on preventing unnecessary and irreversible conversion of farmland to nonagricultural uses. Upon submittal and evaluation of USDA's AD 1006 Farmland Impact Rating Form, mitigation options would be explored and implemented.

The following site-specific facilities would require a conversion of prime farmland soil to industrial use and would result in significant impacts on prime farmland soil:

- Cedar Valley Booster Pump Station-2
- Hydro Station-2 South Alternative
- Hydro Station-2 Existing Highway Alternative






## 4.3.3 Floodplain

An analysis of Flood Insurance Rate Maps (FIRMs) by the Federal Emergency Management Agency (FEMA) within the LPP Project vicinity and its alternatives led to the identification of several waterways with associated floodplains that would be crossed during construction. There are several dry washes that convey storm water runoff. However, it was determined that these washes have no defined floodplain regulatory boundaries. Table 4-1 defines the impacted waterways and quantifies the affected areas of designated floodplains.

Table 4-1   100-Year Floodplain Crossings						
County	Waterway	Alternative Alignment	Disturbance Area (Acres)			
Mohave	Short Creek	South/Exist. Highway	0.5			
Mohave	Cottonwood Wash	Exist. Highway	16.4			
Mohave	Pipe Valley Wash	South	1.7			
Mohave	Sand Wash	Exist. Highway	1.9			
Mohave	Two Mile Wash	Exist. Highway	1.4			
Mohave	Bitter Seeps Wash	South	1.1			
Mohave	Kanab Creek	South/Exist. Highway	1.1			
Kane	Johnson Canyon	Exist. Highway	2.0			
Kane	Buckskin Gulch	Water Conveyance	1.1			
Kane	Sand Gulch	Water Conveyance	0.8			
Kane	Paria River	Water Conveyance	10.6			
Coconino	Lost Spring Wash	Exist. Highway	8.5			
Coconino	Kanab Creek	South/Exist. Highway	0.9			
Coconino	White Sage Wash	South	9.5			
Iron	Cross Hollow Creek	Cedar Valley Pipeline	1.1			
Washington	Gould Wash	Cedar Valley Pipeline	0.5			
Washington	Nephi's Twist	Cedar Valley Pipeline	5.1			
Washington	LaVerkin Creek	Cedar Valley Pipeline	2.7			
Washington	Ash Creek	Cedar Valley Pipeline	2.1			

The Existing Highway Alignment Alternative is the only LPP Project alternative that is proposed to parallel a waterway (Lost Spring Wash), thus potentially affecting the floodplain for an extended length of the stream. However, the alignment is located outside of the floodplain to avoid disturbance of existing floodplain functions and riparian habitat.

Any project in a floodway must be reviewed to determine if the project would significantly increase flood heights (FEMA 2011). The No-rise Certification for Floodways under the National Flood Insurance Program (NFIP) is met by the LPP Project because of the nature of construction and operation. Within all floodplains, the pipeline would be installed underground and the landscape would be reclaimed to the original contours of the area. Surface water flows, flooding risk increase, and significant encroachments

would not be experienced either during LPP Project construction or during operation and maintenance. The LPP Project would have minor impacts on vegetation and habitat of each of the floodplains crossed.

## 4.3.4 Waste Disposal and Hazardous Waste

## 4.3.4.1 Waste Disposal

During construction, cardboard, steel, plastic, asphalt, general trash, and pipe remnants would be transported to the appropriate local landfills, transfer stations, and recycling stations by truck. Research indicates that there is availability for disposal of all anticipated trash, including large pieces of steel, within designated facilities in Cedar City, St. George, and Page. It appears that all of the above jurisdictions have adequate landfills and/or transfer stations that would accommodate construction waste.

Excess soil resulting from trench excavation would be spread in an approximately nine-inch thick layer over most of the temporary construction easement where appropriate. Where the spoils do not provide for adequate re-vegetation of the area, they would be transported by truck to nearby spoil disposal pits, which are discussed in the Geology and Soils study report. Negligible effects on local transfer sites or landfills are expected from operations and maintenance of the LPP Project. There are no apparent conflicts found with provisions and policies of relevant land use plans regarding the waste disposal aspects of the LPP Project.

## 4.3.4.2 Hazardous Waste

Construction, operation, and maintenance activities would not be expected to create any measureable amounts of hazardous wastes. However, some oils and solvents would likely be used for maintenance and operation of construction equipment. Construction Best Management Practices (BMPs) would be followed by the contractors and would be expected to avoid or minimize potential problems with on-site spills of equipment fuels and oils. BMPs would require that any soils contaminated with pollutants be removed from the site and properly disposed of in an approved facility. Disposal of some types of hazardous materials would be possible through the solid waste landfill in St. George, Utah, which accepts oil/fuel-contaminated soils.

If a previously unidentified hazardous waste site is encountered in Utah, the construction contractor would be required to complete a remedial work plan to clean up the site with approval from Utah DEQ and/or EPA. Within Arizona, if a previously unidentified hazardous waste site is encountered, construction work would stop and testing would be undertaken to determine disposal and handling requirements following Arizona DEQ standards and guidelines.

# 4.3.5 Wild Land

The Cockscomb Wilderness Study Area (WSA) is the only wild land area that the LPP Project may affect. The LPP Project could have indirect impacts on the Cockscomb WSA including residual noise, air pollutants, and visual changes because of the close proximity to construction and operation. Further documentation of potential indirect impacts are contained in the Visual Resources, Noise, Recreation Resources and Air Quality study reports (UBWR 2011). There are no apparent conflicts with the Grand Staircase-Escalante National Monument, Monument Management Plan (GSENM MMP) regarding uses adjacent to a WSA.

## 4.3.6 Wild and Scenic Rivers (WSR)

No designated WSRs would affected by the LPP Project. The Upper Paria River at the US Highway 89 crossing is the only river suitable for designation as a WSR that could be affected by the LPP Project. This portion of the Paria River flows through privately-owned land. The Upper Paria River-2 crossing is located west of Church Wells at LPP Project station 1510+00 of the Water Conveyance System Alignment (BLM 2000). The temporary construction easement is expected to require approximately eight-acres of land and water where it crosses the Paria River. The BPS-3 Transmission Line North would cross within the same segment of the Paria River. The new transmission line would parallel an existing distribution line. The transmission lines would span the river corridor, with transmission towers on either side of the Paria River east and west of the bridge abutments. The new transmission line would have direct visual impacts on the Paria River corridor through the privately owned area.

The Glen Canyon to Buckskin Transmission Line alternative (230 kV) would cross over the Lower Paria River – 1 suitable segment, parallel to two existing transmission lines (Navajo-McCullough 500 kV Transmission Line and Glen Canyon to Buckskin 169 kV Transmission Line) north of the Paria Canyon Wilderness boundary. The new transmission line would have direct visual impacts on the Paria River corridor, although it would be difficult to visually distinguish the Glen Canyon to Buckskin Transmission Line alternative from the two existing transmission lines from observation points within the deep canyon.

Typical construction practices include restoring the temporary construction easement to original conditions and functions, with the exception of facility locations and new access roads.

## 4.3.7 Grazing Land

The temporary construction easement would be 120-feet wide throughout most of the alignment, except near aboveground LPP Project facilities and at select areas where extra workspace is required. Access to grazing allotments and local access roads could be temporarily restricted because of open trenches, pipe material stockpiling, and spoil stockpiling. Fences, water lines, corrals, water tanks, loading chutes, and reservoirs that need to be removed would be replaced with equal or better materials. There would be intermittent disruption to grazing rotations depending on the location of the crossing with respect to the rotation patterns and specific allotment size and configuration. The constructed areas are expected to be void of vegetation for one growing season during re-vegetation and reclamation activities. LPP Project sponsors would notify and coordinate with all grazing leaseholders and landowners prior to construction activities to identify potential concerns and reduce potential impacts on grazing activities. All fences crossed during construction would be braced and secured prior to cutting. Temporary gates would be used if construction were to result in damage to natural barriers used for livestock control.

Following construction, affected areas would be reseeded with annual and endemic species and then allowed to re-vegetate naturally. The length of time to restore vegetation to preconstruction conditions may take several years, depending on available soil moisture and growing season temperatures. Following construction and restoration, grazing activity could return to its pre-construction pattern, except near facilities. Typical cross section profiles illustrating the limits of construction disturbance are shown in Figures 4-1, 4-2, and 4-3.

Construction along an existing highway ROW would require an additional 30-foot path of disturbance beyond the highway ROW (Figure 4-1). However, this extra workspace is not expected to be needed for all of the pipeline alignments paralleling highways. Using the typical ROW construction layouts, the amount of impacted grazing land area by allotment can be calculated. Tables 4-2 and 4-3 present a summary of the affected areas by allotment names and numbers for Utah and Arizona respectively. The

Table 4-2Utah Grazing Allotments (BLM/State) – East to West								
Allotment Name	Number	Desc.	Area (ac)	% Total	Admin.	Align. Alt.	Comments	
Five Mile Mount	24043	New	91	0.51	GSENM	Conv.	Buckskin Wash	
Mollies Nipple	24083	New	80	0.29	GSENM	Conv.	Buckskin Wash	
Vermillion	4130	New	27	1.33	GSENM	Conv.		
Vermillion	4130	New	42	4.51	GSENM	South/Hwy		
White Sage	4134	New	22	8.20	GSENM	South/Hwy		
Rock Reservoir	5345	New	32	0.31	AZ Strip	South	Seaman Wash	
Perkins	5205	Rehab	2	0.12	St George	South/Hwy	Colorado City	
Canaan Flat	4099	New	11	0.64	St George	South/Hwy		
Canaan Gap	4141	New	22	0.99	St George	South/Hwy		
Short Creek	5270	New	13	0.42	St George	South/Hwy		
Haslem Spr	5239	New	16	0.37	St George	South/Hwy		
West Canyon	4074	Rehab	36	0.70	St George	South/Hwy	Hurricane Hydro	
Lost Creek	4028	New	10	0.07	St George	South/Hwy		
Middle Canyon	4082	new	11	0.05	St George	South/Hwy		
Lakeside	4028	Rehab	25	1.36	St George	South/Hwy		
Allen Bsn/Snd Mt	4045	New	31	0.20	St George	South/Hwy		
West Grassy	4042	New	8	0.10	St George	South/Hwy		
Lost Creek	4027	Rehab	6	0.04	SITLA	CVP		
Lost Creek	4028	Rehab	62	0.45	St George	CVP		
Trail	4053	Rehab	36	0.90	St George	CVP		
Chipman	4079	Rehab	4	0.19	St George	CVP		
New Harmony	5159	Rehab	9	1.87	St George	CVP	Anderson Junct.	
Lake Mountain NE	4076	Rehab	9	0.38	SITLA	CVP	Pintura	
Lake Mountain NE	4077	Rehab	14	0.56	St George	CVP	Pintura	
State		Rehab	18	1.27	SITLA	CVP	Cedar City	
State		New	8	9.85	SITLA	CVP	Cedar City	
Notes: The 'Desc' fi	eld describe	es whether	r the affected	land lies in a	an area where	a new 120-foc	ot wide path is	

**Notes:** The 'Desc' field describes whether the affected land lies in an area where a new 120-foot wide path is necessary or if the construction lies on top of an existing roadway that would be rehabilitated and widened. The 'Area' field consists of the total acreage of land that is expected to be disturbed during construction, and is computed with a variable width directly relating to the aforementioned cross sections. The '% Total' column consists of the ratio of the construction-affected allotment to the entire allotment.

tables outline the impact areas associated with construction. After construction, all land would be restored to original conditions or better except where 12-foot wide access roads would be retained along the pipeline centerline outside the highway ROW areas.

Arizona Grazing Allotments (BLM/State) – East to West							
Allotment Name	ID	Descr.	Area (ac)	% Total	Admin.	Align. Alt.	Comments
Fuller Road	185	New	46	0.16	AZ Strip	South	Seaman Wa.
Chatterly	62	New	37	0.65	AZ Strip	South	Muggins Fla.
Muggins Flat	63	New	14	0.11	AZ Strip	South	
Button	58	Rehab	33	0.57	AZ Strip	South	
Sunshine	57	Rehab	15	0.40	AZ	South	Hwy 89
Highway	58	Rehab	15	0.09	AZ	South	
Highway	58	Rehab	13	0.08	AZ Strip	South	
	1041	Rehab	44	0.66	AZ Strip	South	
	337	Rehab	45	0.03	Kaibab R.	South	
	1041	New	21	0.32	AZ Strip	SE Corner	
Rock C. Tank	53	New	79	0.06	AZ Strip	SE Corner	
Loco Point	217	Rehab	53	0.81	AZ Strip	South	Bitter Seeps
Valley Wash	951	Rehab	12	0.37	AZ	South	
Valley Wash	952	Rehab	21	0.66	AZ Strip	South	
Pipe Spring	951	Rehab	6	0.57	AZ Strip	South	
Scotties Seep	215	Rehab	10	0.15	AZ Strip	South	
Pipe Valley	950	Rehab	13	0.19	AZ Strip	South	
Pipe Valley	212	Rehab	12	0.75	AZ	South	Indian Knoll
Pipe Valley	205	Rehab	15	0.66	AZ	South	
Sand Wash	207	Rehab	13	0.67	AZ	South	
	337	Rehab	12	0.01	AZ	South	Cedar Ridge
Cane Beds	203	Rehab	7	0.05	AZ Strip	South	
Lost Spring	46	New	19	0.75	AZ	Highway	
Cowboy Butte	49	New	28	0.58	AZ	Highway	
Cowboy Butte	49	New	8	0.16	AZ Strip	Highway	
Fredonia West	219	Rehab	7	0.40	AZ	Highway	
	337	New	240	0.18	Kaibab R.	Highway	
Short Creek	193	Rehab	20	0.18	AZ Strip	South/Hwy	
	334	Rehab	3	0.15	AZ Strip	South/Hwy	Co. City
Caanan Gap	189	Rehab	3	0.06	AZ Strip	South/Hwy	Co. City

Table 4.2

Notes: The 'Desc' field refers to weather the affected land lies in an area where a new 120-foot wide path is necessary or if the construction lies on top of an existing roadway that would be rehabilitated and widened. The 'Area' field consists of the total acreage of land that is expected to be disturbed during construction, and is computed with a variable width directly relating to the aforementioned cross sections. The '% Total' column consists of the ratio of the construction-affected allotment to the entire allotment.

The LPP Project would affect private property with active grazing operations between the crossings of state and federal land. Construction, operation, and maintenance activities for private property would follow the same standard techniques as those followed on public land, including minimizing construction and operational footprints and construction of access roads as much as possible.

Most of the transmission lines serving the LPP Project would be constructed within existing transmission corridors, within a highway ROW, or directly within the pipeline ROW. For the proposed transmission lines, existing access roads may need to be upgraded to accommodate construction traffic, which is not expected to significantly disturb grazing land. Where new transmission lines would cross land with little-to-no access, a new 12-foot wide access road would be constructed along the new transmission line ROW. Table 4-4 quantifies the effects of the new and upgraded access roads for transmission line construction in both Utah. Transmission line access road construction is not anticipated to disturb grazing land in Arizona. Table 4-5 summarizes temporary and permanent impacts of LPP Project construction on BLM and state grazing land along all alignments.

Table 4-4 Utah Grazing Allotments (BLM/State) – East to West – Transmission							
Allotment Name	Number	Descr.	Area (ac)	% Total	Admin.	Align. Alt.	Comments
Ferry Swale	5336	Rehab	8	0.02	SITLA	Trans Line	Blue Pool Wash
Bunting Well	25026	Rehab	10	0.08	SITLA	Trans Line	Judd Hollow
Wiregrass	4145	Rehab	7	0.11	SITLA	Trans Line	S Wiregrass
Bunting Well	25026	New	6	0.05	SITLA	Trans Line	Judd Hollow
Bunting Well	25027	New	11	0.08	SITLA	Trans Line	Judd Hollow
Wiregrass	4145	New	26	0.44	SITLA	Trans Line	S Wiregrass
Bunting Well	25026	Rehab	8	0.07	SITLA	Trans Line	Cedar Mt
Bunting Well	25026	Rehab	10	0.08	SITLA	Trans Line	Judd Hollow
State Block	25002	Rehab	12	0.09	SITLA	Trans Line	
Bunting Well	25026	Rehab	7	0.10	GSENM	Trans Line	East Clark Bench
State Block	25001	Rehab	2	0.02	GSENM	Trans Line	
State Block	25002	Rehab	21	0.17	SITLA	Trans Line	
State Block	25002	Rehab	1	0.01	GSENM	Trans Line	Outback
Clark Bench	15003	Rehab	22	0.09	GSENM	Trans Line	Outback
Five Mile Mount	2403	Rehab	9	0.05	SITLA	Trans Line	Front Country
Five Mile Mount	2403	Rehab	22	0.12	SITLA	Trans Line	Outback
Mollies Nipple	24083	Rehab	2	0.27	GSENM	Trans Line	Passage
Allen Basin	4045	Rehab	7	0.04	GSENM	Trans Line	

Table 4-5   Total Disturbed Grazing Land (acres)							
	Ut	ah	Ari	zona			
Alternative	Pipeline Const.	Roads (new/old)	Pipeline Const.	Roads (new/old)			
South	423	27	604	22			
Highway	422	18	357	8			
Water Conveyance	198	0	N/A	N/A			
Southeast Corner	423	27	659	37			
Kane County Pipeline	0	0	N/A	N/A			
Cedar Valley Pipeline	224	0	N/A	N/A			
Transmission Line	0	25	0	0			
<b>Notes:</b> The 'Pipeline Const.' column indicates the grazing land that would be affected by the 120-foot wide temporary construction easement. Affected grazing land on the Kaibab-Paiute Indian Reservation is included in the Arizona 'Pipeline Const.' column as applicable. The 'Roads (new/old)' column indicates the total land that would be permanently affected by roads construction/reconstruction.							

The permanent right-of-way for the pipeline components of the LPP Project would be 100-feet wide. Above-ground facilities such as the hydropower stations, regulating tanks, and booster pump stations would require additional land with some permanently affecting grazing land. Impacts on grazing allotments from above-ground facility placement are presented in Table 4-6.

Table 4-6   Grazing Allotments By Above-Ground Facilities								
Allotment Name	Number	Facility	Area (ac)	% Total	Admin.			
Wahweap	05340	BPS-1	15	0.26	AZ Strip BLM			
Wiregrass	4145	BPS-2	5	0.08	SITLA			
Bunting Well	25026	Tank-1	3	0.04	GSENM BLM			
Clark Bench	15003	BPS-3	5	0.01	GSENM BLM			
Five Mile Mount	24043	BPS-4	5	0.02	GSENM BLM			
Vermilion	4130	Tank-2	2	0.10	GSENM BLM			
Vermilion	4131	Hydro-1	5	0.24	GSENM BLM			
West Canyon	4074	Hydro-4	5	0.10	St. George BLM			
Middle Canyon	4082	HC Hydro	5	0.02	St. George BLM			
Middle Canyon	4083	HC Forebay	500	2.45	St. George BLM			
Middle Canyon	4084	HC Afterbay	200	0.98	St. G. BLM/SITLA			
West Grassy	West Grassy4042SH Hydro50.06WCWCD							
<b>Notes:</b> The '% Total' column indicates the amount of land that would be affected by construction of facilities compared to the total size of the affected grazing allotment.								

The loss of grazing forage from access road improvement and the addition of new access roads is expected to be minor compared to the sizes of each of the affected allotments. However, the affected areas have been quantified in the "roads" columns of summary Table 4-5. A typical access road improvement section is shown in Figure 4-3, which illustrates most of the long-term effects of the LPP Project access roads.

Some existing range resources would be lost on land occupied by aboveground LPP Project facilities, and coordination with landowners and grazing lessees would be necessary before construction begins. Each permit holder's impacted animal unit months (AUMs) quantity and other land improvements would need to be negotiated on a case-by-case basis to determine potential compensation. In areas affected by permanent facilities, mitigation measures would entail modification or termination of leases and some form of compensation. For those areas where complete reclamation would occur after construction, mitigation measures would be implemented on an as-needed basis. These actions would be consistent between the states of Utah and Arizona and all BLM field offices.

From the two grazing allotments administered by Utah Parks and Recreation, only one would be affected by the LPP Project. Approximately 31-acres of the Sand Mountain grazing allotment would be affected by the Sand Hollow Hydro Station and the pipeline. There would be no conflict with the current management plan because the area is managed under BLM guidelines.

## 4.3.8 Rights-of-Way

Detailed ROW centerline alignments within BLM jurisdiction have not been identified at this time. However, each of the BLM Resource Management Plans (RMPs) generally states that ROW issues would be resolved on an as-needed basis. Utilization of existing ROWs is planned for both public and private land uses. Existing utility corridors would be utilized to the maximum extent possible. Typical ROW impacts on surrounding land are illustrated in Figures 4-1, 4-2, and 4-3. Table 4-7 identifies four known corridors within the LPP Project vicinity that would be utilized.

Table 4-7 Designated Utility Corridors Within the Project Area							
Administration	Width	Location	Туре	Alternative			
	(ft)			Alignment			
Kanab BLM	750	From GSENM boundary west and north to Mt. Carmel Junction along Highway 89	Utility	Existing Highway			
GSENM BLM	750	Along US Highway 89 from east GSENM boundary to west GSENM boundary	Utility	Water Conveyance and Hydro System			
AZ Strip BLM	5280	Overlaps West Wide Energy Corridor in AZ from Page to near Colorado City	Utility	Transmission Lines			
BLM	5280	West Wide Energy Corridor from Page to St. George	Utility	Transmission Lines/South/Exist. Highway/Conv./SE			
UDOT	4 Lanes	Southern Corridor (St. George/Hurricane)	Transportation	Highway/South			

Where the pipeline traverses land within GSENM, the alternative paralleling the highway would be constructed and operated entirely within the congressionally-designated utility corridor. The High Point Alternative Alignment would run outside of the congressionally-designated utility corridor for approximately 6.6 miles. The utility corridor is situated within the GSENM front country management zone, which is the focal point for monument visitation. This zone accommodates primary interpretation areas, overlooks, trails, and associated facilities. This is the least sensitive zone within the monument in terms of preserving GSENM's primary focus of protecting monument resources, but is the most frequented by the public and the most utilized for recreation (BLM 2000).

The LPP Project would make use of the GSENM utility corridor beginning at Highpoint Regulating Tank-1 and following US Highway 89 to a point near Seaman Wash where the South Alternative proceed would south, departing from both the highway and utility corridor. From the previous departure point, the Existing Highway Alternative would continue west along the highway utility corridor for approximately 10 miles before turning southwest near Lost Spring Wash.

The Transmission Line Alternatives would be within the Arizona Strip Utility Corridor for approximately 11 miles near Lake Powell within the BLM Arizona Strip district. The Transmission Line Alternatives then follows the West Wide Energy Corridor for approximately 8 miles within the state of Utah. The South Alternative would follow the Arizona Strip Utility Corridor for approximately 32 miles; the Southeast Corner Alternative would leave the Arizona Strip Utility Corridor for approximately 4 miles.

Reclamation administers a small land area which extends approximately 2000-feet downstream of Glen Canyon Dam and approximately 2500-feet north of the dam on the west side of Lake Powell. The LPP Project intake pump station lies within Reclamation-administered area. A use agreement would need to be authorized by Reclamation.

The LPP Project Hydro System facilities would cross the UDOT Southern Corridor Highway near Sand Hollow Reservoir. Through coordination with UDOT, an agreement was reached to install a sleeve under the corridor in preparation for the LPP Project penstock crossing.

The LPP Project would follow approximately 31 miles of US Highway 89 and approximately 4 miles of Arizona State Route 389 within ADOT-administered roadways. ADOT has indicated that it would be acceptable to place the LPP Project within their ROW. Therefore an easement could be acquired following the proper filing and fees procedure. However, ADOT has indicated that it would be necessary to bore the pipeline under the highway at all highway crossings to avoid unnecessary disruption of traffic.

On private land, the land required for each of the above-ground facilities may be leased or purchased. Public access to the land occupied by the above-ground facilities would be permanently restricted. Further discussions with the BLM would be necessary to determine if other compensating actions are needed to allow for LPP Project use of these lands. Table 4-8 presents the public land in rights-of-way that would be required for above-ground facilities.

Table 4-8   Land Required for Above-Ground Facilities						
Facility	Area (acres)	Administration				
IPS	34	Reclamation				
BPS-1	15	NPS				
BPS-2	5	SITLA				
Regulating Tank-1	3	GSENM BLM				
BPS-3 (or BPS-3 Alt.)	5	GSENM BLM (or Kanab BLM)				
BPS-4	5	GSENM BLM				
Regulating Tank-2	2	GSENM BLM				
Hydro-1	5	GSENM BLM				
Hydro-4	5	St. George BLM				
HC Hydro	5	St. George BLM				
HC Forebay	500	St. George BLM				
HC Afterbay	200	St. George BLM/SITLA				
Sand Hollow Hydro	5	WCWCD				
<b>Notes:</b> The 'Area (acres)' column is an approximate facility footprint upon the public land administered by the designated agency under 'Administration'. Facility names are: Intake Pump Station (IPS), Booster Pump Station (BPS), Regulating Tank (Tank), Hydropower Facility (Hydro), Hurricane Cliffs (HC).						

The LPP Project would cross approximately 16.5 miles of Kaibab Tribal land if the Existing Highway Alternative is selected for construction. The State of Utah would have to negotiate an easement with the Kaibab Band of Paiute Indians to obtain access though the Kaibab-Paiute Indian Reservation, who would then have to contact the BIA. A study of the area and alternatives would be requested by the BIA, then a decision would be made regarding the granting of an easement for the LPP Project.

## 4.3.9 Trails and National Historic Trails

The Honeymoon Trail would be crossed by the South and Existing Highway Alternatives as part of the Hydro System. The Existing Highway Alternative would cross the trail near Pipe Spring, Arizona at approximately milepost 17 along Arizona highway 389. The South Alternative would cross the trail about three miles south of Arizona State Route 389 on BLM road #239.

The Dominguez-Escalante Trail would be crossed by the LPP Project in several locations. The South Alternative would cross the trail at White Sage Wash approximately four miles northeast of mile marker 603 on US Highway 89 Alt. The second crossing would be approximately 1.6 miles southwest of the southwest corner of the Kaibab Indian Reservation. All LPP Project alternatives would cross the trail where the penstock runs west of the Hurricane Cliffs approximately two miles south of the Sky Ranch Airfield. The Cedar Valley Pipeline System may cross the trail in a few locations on its alignment along Interstate 15 from Anderson Junction to Cedar City, Utah.

The Water Conveyance System would cross the Old Spanish National Historic Trail (NHT) just south of Big Water, Utah, where the Paria River intersects US Highway 89 and would also cross the trail near mile post 30 along US Highway 89. The Existing Highway Alternative would potentially cross the trail

northwest of Fredonia, Arizona where it goes through Lost Spring Wash. The South Alternative would cross the trail near mile post 49 on US Highway 89 and just north of HS-2 (South Alt.)

Construction BMP guidelines would be followed through each of the trail crossings. Following construction, affected areas would be reseeded with species adapted to the region and then allowed to revegetate naturally. The re-establishment of native and endemic vegetation species to preconstruction conditions may take more than one growing season years depending on available soil moisture and temperatures during the growing season. Typical cross section profiles illustrating the limits of pipeline and penstock construction disturbance are shown in Figures 4-1, 4-2, and 4-3.

Where the LPP Project would cross historic trails the following criteria would be met as stipulated in the BLM RMPs for the LPP Project area:

- Where significant trail corridor segments and associated sites are documented, viewsheds, as observed from these areas, would be maintained
- Any changes to the characteristic landscape must be low in the Old Spanish NHT corridor on public land (Visual Resource Management Class II)
- Reduce and minimize potential visual (including night sky conditions), audible, and recreation setting impacts associated with surface disturbing activities and construction of above ground structures. Exceptions to these measures may be specifically authorized through a permit issued by the federal surface management agency if it is shown to the satisfaction of the authorized officer that the proposed operations and occupancy would not adversely affect the recreation opportunities in the vicinity of the trails.

## 4.3.10 Areas of Critical Environmental Concern (ACEC)

The LPP Project would avoid crossing into ACECs to the maximum extent possible; however, the South Alternative would cross the Kanab Creek ACEC in Arizona. The ACEC is administered by the BLM Arizona Strip Field Office and is the only ACEC that would be directly affected by the LPP Project (BLM 2008c). The Kanab Creek ACEC is located on the south side of the Kaibab-Paiute Indian Reservation and is a headwater of the Colorado River. The Arizona Strip BLM management direction for this ACEC includes the following provisions:

- The ACEC would be inventoried for cultural resources at a Class II or III level, and boundary adjustments would be made after acquiring data from inventories
- Individual land use authorizations (ROWs, permits, easements) are to be evaluated on a case-bycase basis in accordance with RMP provisions and NEPA compliance
- New land use authorizations are to be discouraged in ACEC, riparian areas, and areas managed to maintain wilderness characteristics. Such new uses are to be only allowed in such areas when no reasonable alternative exists and impacts can be mitigated.
- New ROWs are to be routed away from high-density listed species populations and cultural sites, and along the edges of avoidance areas

The South Alternative would cross the Kanab Creek ACEC in two places; on the east side crossing through Kanab Creek Canyon for a distance of approximately 2,990 feet and again where it traverses through Bitter Seeps Wash crossing approximately 1,350 feet of the ACEC. The two crossings would temporarily disturb 8-acres and 4-acres, respectively. A permanent ROW would be established, however, a permanent access road would not be necessary within the ACEC. The BLM would continue to work with the Utah Division of Water Resources to further identify and analyze the most suitable route for the LPP Project based on botanical and wildlife surveys.

## 4.3.11 Growth

The study area considered for future growth and development potential consists of private land, existing agricultural land, School and Institutional Trust Lands Administration (SITLA) and BLM land appropriated for disposal. In the initial screening, land excluded from potential development includes existing developed land, state parks, BLM land, Indian Reservations, conservation land, Red Cliffs Desert Reserve, U.S. Forest Service land, wilderness areas/wilderness study areas, open water, flood plains, wetlands, slopes greater than 25 percent, ridgelines, streams, dry washes, and threatened and endangered species (TES) areas. The total study area is 498,580 acres. The land excluded from future development potential consists of 391,810 acres, with 106,770 acres of land potentially available for urban and suburban development (Figure 4-7).

In Scenario 1, there would be 106,770 acres of land available for growth and development. Scenario 1 excludes the lands described above. Of the 106,770 acres, 51,775 acres are considered highly favorable for growth and development, and 54,940 are considered favorable for growth and development (Figure 4-8). The highly favorable land is identified based on its proximity to features such as existing utilities, schools, hospitals, retail stores, business centers, and existing development. Closer proximity to existing features is more favorable for development because of the availability of existing infrastructure. The proximities are determined using geospatial analysis to calculate Euclidian distances from each of the given features. The Euclidian distance data is then categorized into a set of bands at given distances which are ranked and weighted for computer analysis in the model. The computer model then combines the multiple data sets to calculate the more favorable land. Table 4-9 shows the projected population, housing units and average household size for the study area. It also shows the housing density as the number of housing units per square mile and the number of housing units per acre for the existing developed land and land available for development in Scenario 1 in ten year increments. Future development on 106,770 acres of land would result in converting some agricultural land to urban land and the increased conversion of current undesignated open space areas to developed areas. Zoning ordinances may have to be modified to accommodate higher density residential areas depending on the rate of expected growth. Additional BLM land possibly could be transferred to private uses for future land development, however, potential additional land disposal by BLM is not considered in the scenario analysis.

Table 4-9 Scenario 1							
Demographic Indicator	2020	2030	2040	2050	2060		
Growth Study Area Population	251,517	373,242	502,579	637,156	772,606.0		
Growth Study Area Housing Units	96,788	142,916	195,188	250,904	309,273		
Growth Study Area Household Size	2.60	2.61	2.57	2.54	2.50		
Growth Study Area HU/mi <sup>2</sup>	446	659	899	1,156	1,425		
Growth Study Area HU/acre	0.69	1.03	1.40	1.81	2.23		
<b>Notes:</b> HU/mi <sup>2</sup> = Housing Units per square mile; values include existing and future development							
HU/Acre = Housing Units per acre; values include existing and future development Population and housing data were compiled using the Governor's Office of Planning and Budget, 2008 Baseline Projections							





Developable land within the growth study area not connected to municipal boundaries, not proximate to existing or planned transportation networks, and not having infrastructure to support new development are excluded from Scenarios 2 (A and B), 3 (A and B), and 4 (A and B). Excluding these developable lands focuses the growth analysis on areas that would infill with development to accommodate future housing and population.

Scenario 2A excludes land that is categorized as having high hazard rock and soils and would provide about 69.613 acres of land available for growth and development. Under this scenario, 37,157 fewer acres of land is available for development compared to Scenario 1 because land with highly expansive rock and soil is excluded. Highly expansive rock and soil can cause foundation and structural damage to businesses and dwellings, resulting in expensive or irreparable damage and economic loss. If mitigation were not possible or too costly, this land may be better suited for recreation, open space, or agriculture rather than development. Scenario 2A includes 43,781 acres that would be highly favorable for growth and development, based on proximity analysis, and 25,832 acres that would be favorable for growth and development (Figure 4-9). The highly favorable land receives a higher rating because it has closer proximity to features such as existing utilities, schools, hospitals, retail stores, business centers, and existing development. The highly favorable land is closer to developed features, and would help to promote infill, smart growth and minimize sprawl. The impacts of growth and development on 69,613 acres of land would include an increase of agricultural land conversion to urban land and the conversion of current undesignated open space areas to developed areas. Table 4-10 shows the projected population, housing units and average household size for the study area. It also shows the housing density in number of housing units per square mile and number of housing units per acre for the existing developed land and land available for development in Scenario 2A in ten year increments.

Table 4-10 Scenario 2A							
Demographic Indicator	2020	2030	2040	2050	2060		
Growth Study Area Population	251,517	373,242	502,579	637,156	772,606.0		
Growth Study Area Housing Units	96,788	142,916	195,188	250,904	309,273		
Growth Study Area Household Size	2.60	2.61	2.57	2.54	2.50		
Growth Study Area HU/mi <sup>2</sup>	607	896	1,224	1,573	1,939		
Growth Study Area HU/acre	0.95	1.40	1.91	2.46	3.03		
Notes: HU/mi <sup>2</sup> = Housing Units per square mile; values include existing and future development HU/acre = Housing Units per acre; values include existing and future development Population and housing data was compiled using the Governor's Office of Planning and Budget, 2008 Baseline Projections.							



Scenario 2B excludes high and moderate hazard rock and soil areas and would provide about 57,467 acres of land available for growth and development. Under this scenario, 49,303 fewer acres of land would be available for development than Scenario 1 and by excluding moderately expansive rock and soil areas, Scenario 2B would have 12,146 fewer acres of land available for development than Scenario 2A. Moderately expansive rock and soil do not have as great a potential for foundation and structural damage or severity of damage compared to highly expansive rock and soil; however, it is hazardous and is excluded in Scenario 2B to provide a broader range of future development possibilities depending on how future growth would be constrained or managed. Scenario 2B includes 37,502 acres that would be highly favorable for growth and development, based on proximity analysis, and 19,965 acres would be favorable for growth and development (Figure 4-10). The highly favorable land receives a higher rating because it is closer in proximity to features such as existing utilities, schools, hospitals, retail stores, business centers, and existing development. The impacts of growth and development on 57,467 acres of land would include an increase of agricultural land conversion to urban land and the conversion of current undesignated open space areas to developed areas. Table 4-11 shows the projected population, housing units and average household size for the study area. It also shows the housing density as the number of housing units per square mile and the number of housing units per acre for the existing developed land and land available for development in Scenario 2B in ten year increments.

Table 4-11Scenario 2B							
Demographic Indicator	2020	2030	2040	2050	2060		
Growth Study Area Population	251,517	373,242	502,579	637,156	772,606.0		
Growth Study Area Housing Units	96,788	142,916	195,188	250,904	309,273		
Growth Study Area Household Size	2.60	2.61	2.57	2.54	2.50		
Growth Study Area HU/mi <sup>2</sup>	689	1,017	1,389	1,786	2,201		
Growth Study Area HU/acre	1.08	1.59	2.17	2.79	3.44		
Notes: HU/mi <sup>2</sup> = Housing Units per square mile; values include existing and future development HU/acre = Housing Units per acre; values include existing and future development Population and housing data was compiled using the Governor's Office of Planning and Budget, 2008   Development   President							

Scenarios 3A and 3B are land use and growth conflict-based analyses which fully incorporate the LUCIS<sup>®</sup> model. These two scenarios include the total developable land from Scenario 2 (A and B) and analyze where land conversion conflicts would most likely occur. Developable land within the growth study area not connected to municipal boundaries, not proximate to existing or planned transportation networks, and not having infrastructure to support new development are excluded from Scenarios 3A and 3B.



Scenario 3A considers potential land use conflicts that could impede conversion of agricultural or conservation land to more urbanized uses. This scenario identifies where the greatest probability of conflicts between land uses would likely occur within the growth study area. Rock and soil hazard areas are not excluded from the Scenario 3A analysis. Available land is ranked according to agricultural, conservation and urban suitability to identify areas of potential land use conflict. Land with high suitability for more than one type of use would have a higher potential for land use conflicts. Land with high suitability for only one type of use would have low or no potential land use conflicts. Developable land areas with no land use conflict total 58,195 acres. The existing developed land and developable land areas would have a 2060 housing density of 2,184 housing units per square mile (3.41 housing units per acre). Areas with major land use conflicts total 179 acres. Areas with urban/conservation land use conflicts total 2,732 acres. Areas with urban/agriculture land use conflicts total 17,563 acres. Areas with agriculture/conservation land use conflicts total 20 acres. The Scenario 3A analysis identifies the land use conflicts that may be more controversial for future development (Figure 4-11).

Scenario 3B is similar to Scenario 3A; however, rock and soil hazard areas are excluded from the Scenario 3B analysis. The Scenario 3B hazard areas consist of highly and moderately expansive rock and soil. Developable land areas with no land use conflict total 45,508 acres. The existing developed land and developable land areas would have a 2060 housing density of 2,539 housing units per square mile (3.97 housing units per acre). Areas with major land use conflicts total 377 acres. Areas with urban/conservation land use conflicts total 16,320 acres. Areas with urban/agriculture land use conflicts total 16,230 acres. The Scenario 3B analysis identifies the land use conflicts that may be more controversial for future development (Figure 4-12).

Scenarios 4A and 4B are land use preference and conflict-based analyses which fully incorporate the LUCIS<sup>®</sup> model. These two scenarios include the total developable land from Scenario 2 (A and B) and analyze where land use preference and conflicts would most likely occur. Developable land within the growth study area not connected to municipal boundaries, not proximate to existing or planned transportation networks, and not having infrastructure to support new development are excluded from Scenarios 4A and 4B.

Scenario 4A identifies areas of land use preference and conflict. Available land is ranked according to agricultural, conservation and urban suitability. Land areas with high and medium potential for land use conflicts, as demonstrated by high suitability for multiple use types, are designated as high or moderate conflict areas, respectively. Land showing high suitability for only one type of use is designated as having either an agricultural, conservation or urban preference. Rock and soil hazard areas are not excluded from the Scenario 4A analysis. The analysis results indicate there would be 219 acres of land with high land use conflicts; 13,463 acres of land with moderate land use conflicts; 60,325 acres of land with an urban land use preference; 4,660 acres of land with an agricultural land use preference; and 22 acres with a conservation land use preference (Figure 4-13). The existing developed land and developable land areas would have a 2060 housing density of 2,133 housing units per square mile (3.33 housing units per acre).

Scenario 4B is similar to Scenario 4A; however, rock and soil hazard areas are excluded from the Scenario 4B analysis. The Scenario 4B hazard areas consist of highly and moderately expansive rock and soil. The analysis results indicate there would be 843 acres of land with high land use conflicts; 19,283 acres of land with moderate land use conflicts; 52,483 acres of land with an urban land use preference; 5,505 acres of land with an agricultural land use preference; and 575 acres with a conservation land use preference (Figure 4-14). The existing developed land and developable land areas would have a 2060 housing density of 2,331 housing units per square mile (3.64 housing units per acre).

An increase in urban and suburban growth and development around the Southern Corridor highway alignment (Figure 4-15) would likely occur as demonstrated along other regional transportation routes. The phased construction of the Southern Corridor highway and the results of this growth analysis demonstrate the continued need for strong regional cooperation and planning among communities and municipalities to determine what land should and could be available for growth.











## 4.4 Impact Analysis Conclusions

## 4.4.1 Water Conveyance System

The Water Conveyance System is common to all LPP Project alignment alternatives. This section summarizes the impact analysis conclusions for the land use impact topics.

## 4.4.1.1 Land Ownership and Management

There are numerous locations along the Water Conveyance System that could involve transfer of land ownership because of permanent facility construction, operation, and maintenance. Permanent facilities would cover a total of 74 acres, with five acres on private land and 69 acres on public land. Access roads and pipelines would not require transfer of land ownership. Pipeline and access road construction would not permanently affect land ownership, thus a minimum amount of land title transfer would be necessary.

## 4.4.1.2 Farmland

The Water Conveyance System would have no significant direct or indirect impacts on farmland.

## 4.4.1.3 Floodplain

The Water Conveyance System alignment was identified to minimize disturbance of land character or scenic designation. Pipeline alignments parallel to floodplains were moved outside of them to avoid impacts. Potentially affected floodplains would be at pipeline crossings along waterways, which would be reclaimed and placed back to original contours to avoid long term impacts on floodplains. The Water Conveyance System would have temporary direct impacts on 12.5 acres of floodplains at pipeline crossings during construction and no measurable impacts during operation. The Water Conveyance System would have no significant impacts on floodplains.

## 4.4.1.4 Waste Disposal and Hazardous Waste

The Water Conveyance System construction, operation, and maintenance actions would result in manageable waste disposal for excess fill and hazardous water materials. Local and regional disposal facilities are available to accept both types of waste materials. There are no apparent hazardous waste sites within the Water Conveyance System alignment. The Water Conveyance System would have no significant impacts on waste disposal and hazardous waste management.

## 4.4.1.5 Wild Land

The Water Conveyance System would be constructed adjacent to The Cockscomb WSA, which is managed as wild land. The Water Conveyance System would have no direct impacts on the Cockscomb WSA; there could be minor temporary indirect impacts from residual noise, air pollutants, and changes in views from the WSA. There would be no land use constraints associated with the WSA on the Water Conveyance System. The Water Conveyance System would have no significant impacts on wild land.

## 4.4.1.6 Wild and Scenic Rivers

The Water Conveyance System would have no direct impacts and no significant impacts on Wild and Scenic Rivers or eligible WSR segments.

## 4.4.1.7 Grazing Land

Water Conveyance System construction would directly impact a narrow band of grazing land covering 198 acres and removing it from utilization during the following growing season, depending on available soil moisture and temperatures. Operation and maintenance activities would have minimal impacts on grazing land along the pipeline. Permanent facilities would remove currently grazed lands from future livestock grazing. The Water Conveyance System would not have significant impacts on grazing land.

## 4.4.1.8 Rights-of-Way

The Water Conveyance System construction and operation would involve ROW acquisition throughout much of its length. Easement acquisition would be necessary where utility ROWs are currently available. These impacts on rights-of-way would be minor.

## 4.4.1.9 Trails and National Historic Trails

The Water Conveyance System would cross a National Historic Trail in two places. These pipeline crossings would temporarily impact the trail during construction. The trail and surrounding areas would be restored back to original condition. Water Conveyance System operation would have no direct or indirect impacts on the trail. The Water Conveyance System would have no significant impacts on National Historic Trails.

## 4.4.1.10 Areas of Critical Environmental Concern

The Water Conveyance System construction and operation would have no direct impacts and no significant impacts on ACECs.

## 4.4.1.11 Growth

The Water Conveyance System construction would have no direct impacts on growth. Water Conveyance System operation, in conjunction with the Hydro System delivering water to the St. George metropolitan area, would support continued population growth and in-fill development within municipal boundaries served by transportation networks, schools, power, water distribution, sewer collection and other infrastructure. The growth scenario analysis excludes threatened and endangered species habitat, existing developed land, state parks, BLM land, Indian reservations, conservation land, Red Cliffs Desert Reserve, U.S. Forest Service land, wilderness areas/wilderness study areas, open water, flood plains, wetlands, slopes greater than 25 percent, ridgelines, streams, and dry washes. Scenario 1 includes all developable land and demonstrates the potential for urban and suburban sprawl. Potentially developable land on highand moderate-hazard rock and soil areas are successively excluded in Scenarios 2A and 2B, respectively. Developable areas not connected to municipal boundaries, not proximate to existing or planned transportation networks, and that would not have infrastructure to support new development are excluded from Scenarios 2A, 2B, 3A, 3B, 4A and 4B. Scenarios 2A, 3A and 4A include development in rock and soil hazard areas; Scenarios 2B, 3B and 4B exclude development in rock and soil hazard areas. The Scenario 2B analysis indicates the resulting developable land areas for future growth would have an average housing unit density of 2,201 per square mile (3.44 housing units per acre) to support the growth study area population of 772,606 people in 2060 using smart growth principles. The Scenario 3B analysis indicates the resulting developable land with no land use conflicts based on current land uses would have an average housing unit density of 2,539 per square mile (3.97 housing units per acre) to support the growth study area population of 772,606 people in 2060 using smart growth principles. The Scenario 4B analysis indicates the resulting developable land based on urban preference with no land use conflicts

would have an average housing unit density of 2,331 per square mile (3.64 housing units per acre) to support the growth study area population of 772,606 people in 2060 using smart growth principles. The housing unit densities indicated under Scenarios 2B, 3B and 4B are within the densities for urban development and would be consistent with smart growth principles. These analyses demonstrate the 2060 population could be accommodated within the growth study area and within areas already served by infrastructure, incorporating conservative development assumptions. The LPP project would supply water to meet Washington County needs through approximately 2037, when the growth study area population would be slightly less than 500,000 with an average housing unit density of 2 units per acre. Therefore, the potential indirect effects of the LPP operation on urban and suburban growth within the Washington County growth study area would not be significant. Sensitive habitat areas and resources would be outside of the areas developed to support population growth from 2020 through 2060, based on using smart growth principles.

## 4.4.2 Hydro System South Alternative

## 4.4.2.1 Land Ownership and Management

There are numerous locations along the South Alternative that could involve transfer of land ownership because of permanent facility construction, operation, and maintenance. Permanent facilities would cover a total of 757 acres, with 17 acres on private land and 740 acres on public land. Access roads and pipelines would not require transfer of land ownership. Penstock, pipeline and access road construction would not permanently affect land ownership, thus a minimum amount of land title transfer would be necessary. The South Alternative would have no direct land use impacts on the Kaibab-Paiute Indian Reservation.

## 4.4.2.2 Farmland

LPP Project construction, operation and maintenance would require converting approximately five acres of designated prime farmland soil to industrial use for one proposed permanent facility (HS-2), which would be a significant impact on designated prime farmland soil. Farmland disrupted during penstock construction (393 acres) would be rehabilitated back to original condition by replacing removed topsoil to the original contours and to a condition as good as or better than existing.

## 4.4.2.3 Floodplain

The South Alternative alignment was identified to minimize disturbance of land character or scenic designation. Pipeline alignments parallel to floodplains were moved outside of them to avoid impacts. Potentially affected floodplains would be at pipeline crossings along waterways, which would be reclaimed and placed back to original contours to avoid long term impacts on floodplains. The South Alternative would have temporary direct impacts on 14.8 acres of floodplains at pipeline crossings during construction and no measurable impacts during operation. The South Alternative would have no significant impacts on floodplains.

## 4.4.2.4 Waste Disposal and Hazardous Waste

The impacts would be the same as described in Section 4.4.1.4.

## 4.4.2.5 Wild Land

The South Alternative would not cross any designated wilderness or WSA's. The South Alternative would have no direct impacts and no significant impacts on wilderness or WSA's.

#### 4.4.2.6 Wild and Scenic Rivers

The South Alternative would not cross any designated Wild and Scenic Rivers or eligible segments. The South Alternative would have no direct impacts and no significant impacts on Wild and Scenic Rivers.

#### 4.4.2.7 Grazing Land

South Alternative construction would directly impact a narrow band of grazing land covering 1,027 acres and remove it from utilization during the following growing season, depending on available soil moisture and temperatures. Operation and maintenance activities would have minimal impacts on grazing land along the penstock. Permanent surface facilities would remove 757 acres of currently grazed lands from future livestock grazing. The South Alternative would have no significant impacts on grazing land.

#### 4.4.2.8 Rights-of-Way

The impacts would be the same as described in Section 4.4.1.8.

#### 4.4.2.9 Trails and National Historic Trails

The South Alternative would cross trails and National Historic Trails in several places. These pipeline crossings would temporarily impact the trails during construction. The trails and surrounding areas would be restored back to original condition. South Alternative operation would have no direct or indirect impacts on the trails. The South Alternative would have no significant impacts on trails and National Historic Trails.

#### 4.4.2.10 Areas of Critical Environmental Concern

The Kanab Creek ACEC is the only ACEC that would be directly impacted by the LPP Project. The two penstock crossings would temporarily disturb approximately 12 acres of land and water. Long term impacts would be avoided by implementing construction BMPs and the area would be rehabilitated to its original condition and contours. The South Alternative would have no significant land use impacts on the Kanab Creek ACEC.

#### 4.4.2.11 Growth

The impacts would be the same as described in Section 4.4.1.11.

## 4.4.3 Hydro System Existing Highway Alternative

#### 4.4.3.1 Land Ownership and Management

There are numerous locations along the Existing Highway Alternative that could involve transfer of land ownership because of permanent facility construction, operation, and maintenance. However, access roads and pipelines would not require transfer of land ownership. Penstock, pipeline and access road construction would not permanently affect land ownership, therefore a minimum amount of land title transfer would be necessary.

The Existing Highway Alternative would have temporary direct land use impacts on the Kaibab-Paiute Indian Reservation. The penstock alignment parallel to the Arizona State Route 389 ROW would not follow a designated energy corridor. This would be a significant impact on land use and management within the Kaibab-Paiute Indian Reservation boundaries because the penstock alignment would contradict guidelines in the Energy Transport Corridor Siting for Tribal Planners Guidance Manual (BIA 2010).

## 4.4.3.2 Farmland

LPP Project construction, operation and maintenance would require converting approximately five acres of designated prime farmland soil to industrial use for one proposed permanent facility (HS-2), which would be a significant impact on designated prime farmland soil. Farmland disrupted during penstock construction would be rehabilitated back to original condition by replacing removed topsoil to the original contours and to a condition as good as or better than existing.

## 4.4.3.3 Floodplain

The Existing Highway Alternative alignment was identified to minimize disturbance of land character or scenic designation. Pipeline alignments parallel to floodplains were moved outside of them to avoid impacts. Potentially affected floodplains would be at pipeline crossings along waterways, which would be reclaimed and placed back to original contours to avoid long term impacts on floodplains. The South Alternative would have temporary direct impacts on 32.7 acres of floodplains at pipeline crossings during construction and no measurable impacts during operation. The Existing Highway Alternative would have no significant impacts on floodplains.

## 4.4.3.4 Waste Disposal and Hazardous Waste

The impacts would be the same as described in Section 4.4.1.4.

## 4.4.3.5 Wild Land

The Existing Highway Alternative would not cross any designated wilderness or WSA's. The Existing Highway Alternative would have no direct impacts and no significant impacts on wilderness or WSA's.

## 4.4.3.6 Wild and Scenic Rivers

The Existing Highway Alternative would not cross any designated Wild and Scenic Rivers or eligible segments. The Existing Highway Alternative would have no direct impacts and no significant impacts on Wild and Scenic Rivers.

## 4.4.3.7 Grazing Land

Existing Highway Alternative construction would directly impact a narrow band of grazing land covering 779 acres and remove it from utilization during the following growing season, depending on available soil moisture and temperatures. Operation and maintenance activities would have minimal impacts on grazing land along the penstock. Permanent surface facilities would remove 749 acres of currently grazed lands from future livestock grazing. The Existing Highway Alternative would have no significant impacts on grazing land.

## 4.4.3.8 Rights-of-Way

The impacts would be the same as described in Section 4.4.1.8.

#### 4.4.3.9 Trails and National Historic Trails

The impacts would be the same as described in Section 4.4.2.9.

#### 4.4.3.10 Areas of Critical Environmental Concern

The Existing Highway Alternative would not cross any Areas of Critical Environmental Concern. The Existing Highway Alternative would have no direct impacts and no significant impacts on Areas of Critical Environmental Concern.

#### 4.4.3.11 Growth

The impacts would be the same as described in Section 4.4.1.11.

#### 4.4.4 Hydro System Southeast Corner Alternative

#### 4.4.4.1 Land Ownership and Management

The Southeast Corner Alternative alignment would have similar impacts on land management to the South Alternative alignment described in Section 4.4.2.1. The Southeast Corner Alternative would have temporary direct land use impacts on the Kaibab-Paiute Indian Reservation where the penstock would parallel the Navajo-McCullough Transmission Line corridor for 3.8 miles across the southeast corner of the Reservation. This would not be a significant impact on land use and management within the Kaibab-Paiute Indian Reservation boundaries because the penstock would be within an established energy corridor and consistent with the Energy Transport Corridor Siting for Tribal Planners Guidance Manual (BIA 2010).

#### 4.4.4.2 Farmland

The impacts would be the same as described in Section 4.4.2.2.

#### 4.4.4.3 Floodplain

The impacts would be the same as described in Section 4.4.2.3.

#### 4.4.4.4 Waste Disposal and Hazardous Waste

The impacts would be the same as described in Section 4.4.1.4.

## 4.4.4.5 Wild Land

The impacts would be the same as described in Section 4.4.2.5.

## 4.4.4.6 Wild and Scenic Rivers

The impacts would be the same as described in Section 4.4.2.6.

#### 4.4.4.7 Grazing Land

Southeast Corner Alternative construction would directly impact a narrow band of grazing land covering 1,082 acres and remove it from utilization during the following growing season, depending on available soil moisture and temperatures. Operation and maintenance activities would have minimal impacts on grazing land along the penstock. Permanent surface facilities would remove 757 acres of currently grazed lands from future livestock grazing. The Southeast Corner Alternative would have no significant impacts on grazing land.

## 4.4.4.8 Rights-of-Way

The impacts would be the same as described in Section 4.4.1.8.

## 4.4.4.9 Trails and National Historic Trails

The impacts would be the same as described in Section 4.4.2.9.

## 4.4.4.10 Areas of Critical Environmental Concern

The impacts would be the same as described in Section 4.4.2.9.

## 4.4.4.11 Growth

The impacts would be the same as described in Section 4.4.1.11.

## 4.4.5 Cedar Valley Pipeline

## 4.4.5.1 Land Ownership and Management

The impacts would be the same as described in Section 4.4.1.1.

#### 4.4.5.2 Farmland

Cedar Valley Pipeline construction, operation and maintenance would require converting approximately five acres of designated prime farmland soil to industrial use for one proposed permanent facility (CVBPS-2), which would be a significant impact on designated prime farmland soil. Farmland and prime farmland soils disrupted during pipeline construction would be rehabilitated back to original condition by replacing removed topsoil to the original contours and to a condition as good as or better than existing.

## 4.4.5.3 Floodplain

The Cedar Valley Pipeline alignment was identified to minimize disturbance of land character or scenic designation. Pipeline alignments parallel to floodplains were moved outside of them to avoid impacts. Potentially affected floodplains would be at pipeline crossings along waterways, which would be reclaimed and placed back to original contours to avoid long term impacts on floodplains. The Cedar

Valley Pipeline would have temporary direct impacts on 11.5 acres of floodplains at pipeline crossings during construction and no measurable impacts during operation. The Cedar Valley Pipeline would have no significant impacts on floodplains.

#### 4.4.5.4 Waste Disposal and Hazardous Waste

The impacts would be the same as described in Section 4.4.1.4.

## 4.4.5.5 Wild Land

The Cedar Valley Pipeline would not cross any designated wilderness or WSA's. The Cedar Valley Pipeline would have no direct impacts and no significant impacts on wilderness or WSA's.

#### 4.4.5.6 Wild and Scenic Rivers

The Cedar Valley Pipeline would not cross any designated Wild and Scenic Rivers or eligible segments. The Cedar Valley Pipeline would have no direct impacts and no significant impacts on Wild and Scenic Rivers.

## 4.4.5.7 Grazing Land

Cedar Valley Pipeline system construction would directly impact a narrow band of grazing land covering 224 acres and remove it from utilization during the following growing season, depending on available soil moisture and temperatures. Operation and maintenance activities would have minimal impacts on grazing land along the pipeline. The Cedar Valley Pipeline system would have no significant impacts on grazing land.

## 4.4.5.8 Rights-of-Way

The impacts would be the same as described in Section 4.4.1.8.

## 4.4.5.9 Trails and National Historic Trails

The impacts would be the same as described in Section 4.4.2.9.

## 4.4.5.10 Areas of Critical Environmental Concern

The Cedar Valley Pipeline system construction and operation would have no direct impacts and no significant impacts on ACECs.

#### 4.4.5.11 Growth

The impacts would be the same as described in Section 4.4.1.11.

## 4.4.6 Transmission Line Alternatives

## 4.4.6.1 Land Ownership and Management

There are numerous locations along the Transmission Line Alternatives that could involve transfer of land ownership because of permanent facility construction, operation, and maintenance. However, access roads and transmission lines would not require transfer of land ownership. Transmission line and access road construction would not permanently affect land ownership, thus a minimum amount of land title transfer would be necessary.

## 4.4.6.2 Farmland

LPP Project transmission line construction, operation and maintenance would require converting narrow corridors of prime farmland to permanent access roads. The prime farmland soils that would be disturbed by permanent access roads are located between the Hurricane Cliffs and Sand Hollow Reservoir and near Cedar Valley Booster Pump Station 2. Farmland disrupted during transmission line construction would be rehabilitated back to its original condition by replacing removed topsoil to the original contours and to a condition as good as or better than existing.

## 4.4.6.3 Floodplain

Construction and operation of transmission line alternatives would have no direct impacts on floodplains. Indirect impacts could occur on existing access roads extending across dry washes for transmission line inspection and repair activities. Transmission line access roads would have no significant impacts on floodplains and their functions.

## 4.4.6.4 Waste Disposal and Hazardous Waste

The impacts would be the same as described in Section 4.4.1.4.

## 4.4.6.5 Wild Land

Construction and operation of transmission line alternatives would have no direct impacts on designated wilderness, WSAs and ACECs. Several transmission line alternatives could be visible from the boundaries of WSAs and ACECs, potentially resulting in indirect visual impacts on users of these areas. The transmission line alternatives would not have any significant impacts on wilderness, WSAs or ACECs.

## 4.4.6.6 Wild and Scenic Rivers

The transmission line alternatives would not cross any designated WSR segments. The Glen Canyon to Buckskin Transmission Line Alternative would cross the Paria River in a segment eligible for designation as a Wild and Scenic River for recreational values. This alternative would have direct visual impacts on the Lower Paria River – 1 eligible segment; however, the transmission line would be installed parallel to two existing transmission lines and would be difficult to distinguish from the existing transmission lines crossing the Paria River canyon, which ranges from 230 to 290 feet deep at the crossing. Therefore, the impacts of the proposed transmission line would not be considered significant.
#### 4.4.6.7 Grazing Land

Access road construction and improvement along transmission line alternatives would directly impact up to 25 acres of grazing land. Most of the transmission line alternatives have existing access roads along them that would be used during the construction. New access roads along transmission line alternatives would be constructed between the Hurricane Cliffs peaking and pumped storage hydro stations and Sand Hollow hydro station. Following transmission line construction, the access roads would be periodically used for transmission line inspection and maintenance activities. The transmission line alternatives and associated access roads would not have significant impacts on grazing land or specific grazing allotments.

#### 4.4.6.8 Rights-of-Way

The impacts would be the same as described in Section 4.4.1.8.

#### 4.4.6.9 Trails and National Historic Trails

The impacts would be the same as described in Section 4.4.2.9.

#### 4.4.6.10 Areas of Critical Environmental Concern

The Transmission Line Alternatives would not cross any Areas of Critical Environmental Concern. The Transmission Line Alternatives would have no direct impacts and no significant impacts on Areas of Critical Environmental Concern.

#### 4.4.6.11 Growth

The impacts would be the same as described in Section 4.4.1.11.

#### 4.4.7 No Lake Powell Water Alternative

#### 4.4.7.1 Land Ownership and Management

The No Lake Powell Water Alternative would not directly change residential land use to another type of land use. However, residential landscapes and the physical uses of those landscapes would be indirectly changed by converting residential landscapes to desert xeriscapes resulting from restrictions on outdoor watering. Residential landscapes including shade trees, shrubs, gardens, lawns, and other water consuming vegetation would be converted to desert xeriscapes, which would support only the type of vegetation that naturally grows in the St. George metropolitan area and the Cedar Valley area. Individual private lots and residential common areas would no longer be allowed to use the water supply for outdoor watering because it would need to be used only for indoor uses to meet the growing population demands. Therefore, outdoor use of residential land by residents would change and likely decrease or diminish to a minimum level. The restrictions on residential outdoor water use would have an indirect impact on local general plans and would be a significant impact. Land use management restrictions resulting from the No Lake Powell Water Alternative would have indirect impacts on more than 9,000 acres of existing developed land within the growth analysis study area. By 2060, land use management restrictions resulting from the No Lake Powell Water Alternative would have indirect impacts on more than 25,000 acres of projected developed land.

#### 4.4.7.2 Farmland

The No Lake Powell Water Alternative would have no direct impacts on farmland because the restrictions on outdoor watering would be applied only to residential areas. However, prime farmland and other farmland currently receiving agricultural grade irrigation water would be pressured to convert that water to raw water supply for treatment in the reverse osmosis water treatment facility comprising part of the No Lake Powell Water Alternative. Therefore, prime farmland and other farmland in the St. George metropolitan area could be indirectly impacted by converting agricultural irrigation water to culinary water supply through treatment by reverse osmosis processes. The conversion of agricultural irrigation water supply to culinary water supply would be a significant impact on prime farmland.

#### 4.4.7.3 Other Land Uses

The No Lake Powell Water Alternative would have no direct or indirect impacts on the following other land uses:

- Floodplains
- Waste Disposal and Hazardous Waste
- Wild Land
- Wild and Scenic Rivers
- Grazing Land
- Rights-of-Way
- Trails and National Historic Trails
- Areas of Critical Environmental Concern

## 4.4.7.4 Growth

The No Lake Powell Water Alternative would have no direct impact on growth in the St. George metropolitan area and Cedar Valley. The water developed from local surface water and groundwater supplies, conserved by restricting residential outdoor watering, and treatment of Virgin River water using reverse osmosis treatment would meet the population growth projected by the Utah Governor's Office of Planning and Budget through 2037.

The No Lake Powell Water Alternative could have indirect impacts on growth in the St. George metropolitan area and Cedar Valley. Restrictions on residential outdoor watering may result in some potential in-migrants to the St. George metropolitan area and Cedar Valley to settle in other communities where there would be no restrictions on outdoor watering of trees, shrubs, gardens, lawns and other vegetation. The increased cost of reverse osmosis water treatment passed onto water users in the form of higher water rates could result in some potential in-migrants to the St. George metropolitan area to settle in other communities with lower water rates. The indirect impacts on growth and growth rates over time are difficult to assess. The areas of St. George identified for future growth would continue to infill with population as long as power, water, sewer, gas, and other infrastructure are available; the rate of growth could be slower than that projected by the Utah Governor's Office of Planning and Budget.

## 4.4.8 No Action Alternative

Under No Action Alternative, there would be no construction of the water intake, conveyance, or hydroelectric system facilities. Therefore, the no action alternative would not result in construction, operation, or maintenance impacts on land use and land use plans.

## Chapter 5 Mitigation and Monitoring

All of the alignment alternatives have been developed to avoid or minimize environmental impacts on land use resulting from LPP Project construction and operation. Mitigation may be necessary to reduce an impact below a significance criterion threshold or to minimize impacts on land use and natural resources. Monitoring is performed as necessary following implementation of mitigation measures to evaluate them for effectiveness and determine the need for any adjustments to meet mitigation objectives.

Mitigation measures and monitoring would be implemented in addition to applying Best Management Practices (BMPs) during construction, operation, and maintenance of the LPP project. The following BMPs would be incorporated into the LPP project construction, operation and maintenance to control impacts on land use.

- Fences and gates removed during construction will be replaced with fences and gates of equal or better construction and materials. Temporary fences and gates will be installed as necessary to control livestock and human access during construction.
- Erosion control measures will be implemented in disturbed areas to minimize soil erosion and sedimentation. Temporary slope breakers will be placed to reduce runoff velocity and divert water and sediments away from construction areas within the rights-of-way and easements. Temporary slope breakers would be constructed with materials such as soil, silt fence, staked hay or straw bales, sandbags, biologs, or similar at 300 foot spacing on 5 to 15 percent slopes, 200 foot spacing on 15 to 30 percent slopes, and 100 foot spacing on greater than 30 percent slopes.
- Erosion control matting or crimped mulch will be installed on soil slopes greater than 15 percent as necessary to help retain soil during revegetation periods following final grading.
- Farmland topsoil will be carefully removed and stored prior to pipeline trenching and replaced after pipeline trenches are backfilled. Topsoil stripping will not be performed during excessively wet weather. Topsoil will not be stockpiled in one location for longer than two years. Topsoil stockpiles maintained longer than one growing season will be planted with an annual seed mix to help control erosion and keep soil micro-organisms active. Farmland topsoil replaced over backfilled pipeline trenches will be ripped and left bare for the landowner to cultivate and plant at the same time as adjacent farmland, unless other arrangements are negotiated with the landowner.
- Maintain livestock watering outside of construction rights-of-way if access to livestock watering is interrupted by construction activities.
- Vegetated areas disturbed during construction will be revegetated following construction, with the objective of returning the surface land use back to the original condition.
- Existing land uses will be continued over buried pipeline rights-of-way following construction; however, trees and shrubs will not be allowed to re-grow above pipelines.

The following sections define the mitigation measures and monitoring efforts that would be proposed to avoid and minimize LPP project impacts on land use.

#### 5.1 LPP Project Alternative - Water Conveyance System, Hydro System, Cedar Valley Pipeline, and Transmission Lines

## 5.1.1 Mitigation

#### 5.1.1.1 Land Ownership and Management

Potential impacts on land use within Temporary Construction Easements (TCEs) would be anticipated and agreements would be negotiated between LPP project sponsors, landowners, and public land administrators. The negotiated agreements could include compensation for lost use during construction.

#### 5.1.1.2 Farmland

Owners of farmland within the LPP Project TCE would be compensated according to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (URAA), as amended (FHA 2010).

#### 5.1.1.3 Floodplain

No mitigation measures are identified for construction and operation of the LPP project. Floodplain areas disturbed during construction would be restored to original conditions and functions.

#### 5.1.1.4 Waste Disposal and Hazardous Waste

It is recommended during construction that final surveying and of the pipeline alignments and facility locations that visual inspection of soils in previously disturbed areas be performed to check for the potential presence of contaminated soils. If contaminated soil areas are identified, proper sampling and waste disposal procedures would need to be followed in coordination with either Arizona's or Utah's Department of Environmental Quality. The LPP Project sponsors must notify waste disposal facility operators in advance of transferring a large series of waste loads to each corresponding disposal facility, per requests from waste disposal facility operators.

If significant amounts of irrecoverable hazardous materials are encountered during LPP Project construction, a land disposal plan by the land administering agency (State or Federal) could become necessary. The BLM policy in the St. George Field Office states: "*To eliminate potential long-term public liability, BLM policy does not authorize public land to be used for hazardous waste disposal unless such lands are first transferred out of public ownership.*" (BLM 1999a). This statement was written to comply with all applicable state and federal laws and regulations pertaining to the use and storage of hazardous materials on public land.

#### 5.1.1.5 Wild Land

No mitigation measures are identified for construction and operation of the LPP project because it would not have any significant impacts on designated wilderness or wilderness study areas.

#### 5.1.1.6 Wild and Scenic Rivers

No mitigation measures are identified for construction and operation of the LPP project because it would not have any significant impacts on designated or suitable segments of eligible Wild and Scenic Rivers.

Construction and operation of the Glen Canyon to Buckskin Transmission Line would cross over the top of the Paria River canyon in the Lower Paria River-1 suitable segment, parallel to two existing high-voltage transmission lines. Non-reflective conductor wire could be installed over the Paria River canyon at the proposed transmission line crossing to minimize potential visual impacts.

## 5.1.1.7 Grazing Land

Prior to construction, grazing permits on public lands directly affected by permanent surface features of the LPP Project would be modified or terminated. If necessary, all permit-issuing land administration agencies would review each permit holder's impacted Animal Unit Months (AUMs) and other land improvements on a case-by-case basis to determine potential compensation to lessees. Private grazing land directly and permanently impacted by project construction would be evaluated for AUM compensation and negotiations would be held between the LPP project sponsors and private landowners to reach agreements on use of the land.

## 5.1.1.8 Rights-of-Way

All rights-of-way (ROWs) would be surveyed to meet BLM, National Park Service, Utah SITLA, Arizona State Land Department and other agency requirements. All pipeline segments, aboveground facilities, extra workspace, staging areas, contractor yards and access roads would be mapped on 1:24,000-scale or larger maps with milepost markers. Mileposts or engineering stationing would be used to locate and specify mitigation measures for significantly impacted resources. ROW surveys would be used to help negotiate agreements to use ROWs with Federal and state agencies and to establish ROWs or easements with private landowners.

## 5.1.1.9 Trails and National Historic Trails

No mitigation measures are identified for construction or operation of the LPP project because there would be no significant impacts on national historic trails. Temporary crossings of national historic trails would involve restoring the affected trail areas to original condition following construction.

## 5.1.1.10 Areas of Critical Environmental Concern

The State of Utah would identify site-specific mitigation measures in a plan submitted to the Arizona Strip BLM as part of the application for special use permit and ROW to construct, operate and maintain the LPP project. Construction impacts on the Kanab Creek ACEC would be mitigated by restoring disturbed areas to original condition and ecological functions. Pipeline trenches on slopes above the riparian area would be backfilled to original grade and re-vegetated with upland species. The pipeline crossing the riparian area at the bottom of Kanab Creek Canyon would be encased in concrete at an elevation below the scour depth of the stream channel. Riparian vegetation areas disturbed by the construction would be restored to original contours and re-vegetated with non-invasive riparian plant species. Trees growing over the top of the pipeline alignment would be removed during operations to protect the pipeline from deep roots.

## 5.1.1.11 Growth

Mitigation measures that could minimize indirect impacts of growth include smart growth, planning, zoning, re-zoning, community involvement, and strictly-enforced policies. Typical measures used to control or mitigate growth impacts include zoning and re-zoning to guide desired types of development within planned community growth areas. Allowable housing densities can be increased in identified

growth areas to accommodate increasing population. Community planners and zoning authorities can utilize land use growth models and land use conflict models to predict where potential conflicts may occur and determine zoning and housing density standards and plan smart growth more efficiently and accurately. Additionally, modeling results could be mapped and used to visually and spatially show different development scenarios to government and community constituents to aid in zoning, re-zoning, future land public land disposal, land transfer, and general plan updates. Modeling can aid in implementing smart growth practices to avoid impacts of urban sprawl and effects on adjacent natural resources.

## 5.1.2 Monitoring

## 5.1.2.1 Land Ownership and Management

No specific monitoring of mitigation measures would be necessary.

## 5.1.2.2 Farmland

No specific monitoring of mitigation measures would be necessary.

## 5.1.2.3 Floodplain

Restored floodplains would be monitored using visual observations of stream flow, vegetation and erosion for one year following construction to document that original conditions and functions have been achieved.

#### 5.1.2.4 Waste Disposal and Hazardous Waste

No specific monitoring of mitigation measures would be necessary.

## 5.1.2.5 Wild Land

No specific monitoring of mitigation measures would be necessary.

#### 5.1.2.6 Wild and Scenic Rivers

No specific monitoring of mitigation measures would be necessary.

#### 5.1.2.7 Grazing Land

Grazing land directly affected by project construction would be monitored using visual observations of vegetation cover for two-growing seasons following construction to document that original conditions and functions have been achieved.

## 5.1.2.8 Rights-of-Way

No specific monitoring of mitigation measures would be necessary.

#### 5.1.2.9 Trails and National Historic Trails

Restored portions of national historic trails affected by project construction activities would be monitored using visual observations of vegetation cover and erosion control for two growing seasons following construction to document that original conditions and functions have been achieved.

#### 5.1.2.10 Areas of Critical Environmental Concern

The restored pipeline corridors across the Kanab Creek ACEC would be monitored using visual observations of the land surface, vegetation cover, stream channel alignment, and erosion control for two growing seasons following construction to document that original conditions and functions have been achieved. The pipeline alignment crossing the riparian area would continue to be monitored annually during operations to identify and remove small trees that could grow roots down to the pipeline.

#### 5.1.2.11 Growth

Community planners and zoning authorities could annually utilize land use growth models and land use conflict models to monitor where potential conflicts may occur, determine zoning and housing density standards, and plan smart growth more efficiently and accurately. Modeling results could be mapped and used to visually and spatially analyze projected development scenarios to guide government leaders and community constituents to aid in making decisions regarding zoning, re-zoning, future land public land disposal, land transfer, and general plan updates.

#### 5.2 No Lake Powell Water Alternative

#### **5.2.1 Mitigation Measures**

#### 5.2.1.1 Land Ownership and Management

Mitigation measures for the No Lake Powell Water Alternative would include implementing dust and particulate suppression and controls on residential landscapes and common areas converted to desert xeriscapes. Prevailing winds from the southwest and other wind storm events would mobilize soil particles throughout residential areas, resulting in soil erosion, poor visibility, and particulate air pollution. Water would not be available for particulate suppression and control, and chemical stabilizers applied to soil may not be compatible with xeriscape vegetation species, limiting the effectiveness of particulate suppression mitigation measures. Individual landowners would be responsible for managing their desert xeriscapes and particulate suppression, with management actions ranging from none to full.

#### 5.2.1.2 Farmland

The only mitigation measure to avoid indirect impacts of converting prime farmland agricultural irrigation water to raw water supply for reverse osmosis treatment would be to compensate water right holders and users for the value of their irrigation water. Agreements would be negotiated individually between the water district and water right holders/users to determine acceptable compensation.

#### 5.2.1.3 Growth

The mitigation measures would be the same as described in Section 5.1.1.11.

#### 5.2.2 Monitoring

#### 5.2.2.1 Land Ownership and Management

Residential properties and common areas within developments would require extensive monitoring during and following implementation of outdoor watering restrictions leading to converting residential landscapes to desert xeriscapes. The water districts and/or communities would need to hire full-time residential water monitors to inspect, document, and enforce the restrictions on residential outdoor watering. The water monitors would have to patrol residential areas 24-hours per day to monitor outdoor water use and visually identify violators. Individual landowners would be required to install water meters at their connections with water distribution systems, and the meters would be regularly monitored and recorded to determine if residential water users are within or exceeding per capita water use levels. Residential water customers found to be exceeding per capita water use levels based on monitoring records would receive violation notices and would be successively fined for each violation until water service is turned off for non-compliance.

#### 5.2.2.2 Growth

Monitoring would be the same as described in Section 5.1.2.11.

#### **5.3 No Action Alternative**

No specific mitigation or monitoring measures would be necessary.

## Chapter 6 Unavoidable Adverse Impacts

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

#### 6.1 LPP Project Alternative - Water Conveyance System, Hydro System, Cedar Valley Pipeline, and Transmission Lines

#### 6.1.1 Land Ownership and Management

The LPP project would have unavoidable adverse impacts on land ownership and management because of permanent facilities constructed for the Water Conveyance System, the Hydro System alternative alignments, Cedar Valley Pipeline and Transmission Line Alternatives. Land ownership would be permanently affected on five acres for the Water Conveyance System. The South Alternative of the Hydro System would permanently affect private land ownership of 17 acres and permanently affect the public land management of 757 acres. The Existing Highway Alternative of the Hydro System would permanently affect private land ownership of nine acres, permanently affect the public land management of 749 acres, and require compliance with the Energy Transport Corridor Siting for Tribal Planners Guidance Manual (BIA 2010). The Southeast Corner Alternative of the Hydro System would permanently affect private land ownership of 17 acres and permanently affect the public land management of 757 acres. The Transmission Line Alternatives would permanently affect private land ownership of 17 acres and permanently affect private land ownership of 17 acres. The Transmission Line Alternatives would permanently affect private land ownership of nine acres.

#### 6.1.2 Farmland

The Hydro System alignment alternatives each would have unavoidable adverse impacts on five acres of prime farmland that would be converted to use as a hydro station.

#### 6.1.3 Wild and Scenic River

The Glen Canyon to Buckskin Transmission Line would have an unavoidable adverse indirect impact on the Lower Paria River-1 suitable segment of this eligible Wild and Scenic River. The proposed 230 kV transmission line would cross over the Paria River Canyon parallel to two existing high voltage transmission lines, resulting in potential visual impacts from observations points in the canyon.

#### 6.1.4 Grazing Land

The Water Conveyance System would have unavoidable adverse impacts on five acres of grazing land. The South and Southeast Corner alternatives of the Hydro System would have unavoidable adverse impacts on 757 acres of grazing land. The Existing Highway Alternative of the Hydro System would have unavoidable adverse impacts on 749 acres of grazing land. The Transmission Line Alternatives would have unavoidable adverse impacts on 25 acres of grazing land. The grazing land impacts would result from converting grazing land use to permanent features of the LPP project.

#### 6.1.5 Areas of Critical Environmental Concern

The South and Southeast Corner alternatives of the Hydro System would have temporary unavoidable adverse impacts on the Kanab Creek ACEC where it would be crossed by the pipeline in two places. Wildlife habitat would be temporarily unavailable within the construction corridor in Kanab Creek Canyon and Bitter Seeps Wash until construction activities are completed and re-vegetation objectives are accomplished.

#### 6.2 No Lake Powell Water Alternative

#### 6.2.1 Land Ownership and Management

Land management actions on privately-owned residential properties and common areas in residential developments converted to desert xeriscapes would result in uncontrolled particulate emissions causing chronic unavoidable adverse impacts on soil erosion, visibility, and air quality during wind storm events.

Monitoring of restrictions on residential outdoor watering would be difficult to implement and enforce, resulting in unavoidable adverse impacts on residential water users. These impacts could include higher rates to pay for enforcement activities, fines for violations of water use restrictions, and no water service for successive violations of water use restrictions.

#### 6.3 No Action Alternative

There would be no unavoidable adverse impacts resulting from the LPP project construction, operation, and maintenance.

## 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 LPP Project Alternative - Water Conveyance System, Hydro System, Cedar Valley Pipeline, and Transmission Lines

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

#### 7.2 No Lake Powell Water Alternative

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

#### 7.3 No Action Alternative

The No Action Alternative would have no cumulative impacts.

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## Abbreviations and Acronyms

Abbreviation/Acronym	Meaning/Description	
ACEC	Area(s) of Critical Environmental Concern	
ADEQ	Arizona Department of Environmental Quality	
ADOT	Arizona Department of Transportation	
AGRC	Automated Geographic Reference Center	
Alt.	Alternative	
ARS	Arizona Revised Statutes	
ASFO	Arizona Strip Field Office	
ASLD	Arizona State Land Department	
AUM	Animal Unit Month	
BIA	Bureau of Indian Affairs	
BLM	Bureau of Land Management	
BMPs	Best Management Practices	
BPS	Booster Pump Station	
CBGA	Cedar-Beaver-Garfield-Antimony	
CBPS	Cedar Booster Pump Station	
CCFO	Cedar City Field Office	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	
CICWCD	Central Iron County Water Conservancy District	
Commission	Federal Energy Regulatory Commission	
CVBPS	Cedar Valley Booster Pump Station	
CVP	Cedar Valley Pipeline	
DEO	Department of Environmental Quality	
DERR	Division of Environmental Response and Remediation	
DEUR	Declaration of Environmental Use Restriction	
DNR	Department of Natural Resources	
DOQ	Digital Ortho Ouadrangle	
FEMA	Federal Emergency Management Agency	
FHWA	Federal Highway Administration	
FIRMs	Flood Insurance Rate Maps	
FLPMA	Federal Land Policy and Management Act	
FPPA	Farmland Protection Policy Act	
GIS	Geographic Information System	
GOBP	Governor's Office of Planning and Budget	
gpcd	gallons per capita per day	
GSENM	Grand Staircase-Escalante National Monument	
HS	Hydro System	
HU	Housing Unit	
KCWCD	Kane County Water Conservancy District	
KFO	Kanab Field Office	
kV	Kilovolt	

LDS	Latter Day Saint	
LPP	Lake Powell Pipeline	
LQG	large quantity generator	
LUCIS®	Land-Use Conflict Identification Strategy	
LUST	Leaking Underground Storage Tanks	
M&I	Municipal and Industrial	
MFP	Management Framework Plan	
MMP	Monument Management Plan	
MSL	Mean Sea Level	
NAD	North American Datum	
NAIP	National Agriculture Imagery Program	
NFIP	National Flood Insurance Program	
NHT	National Historic Trail	
NPS	National Park Service	
ORVs	Off Road Vehicles	
PAD	Pre-Application Document	
PFYC	Potential Fossil Yield Classification	
RCRA	Resource Conservation and Recovery Act	
Reclamation	US Bureau of Reclamation	
RMP	Resource Management Plan	
RO	Reverse Osmosis	
ROD	Record of Decision	
ROW	Right-of-Way	
SGFO	St. George Field Office	
SITLA	School and Institutional Trust Lands Administration	
SR	State Route	
STIP	State Transportation Improvement Program	
TCE	Temporary Construction Easement	
TCRP	Transit Cooperative Research Program	
TDS	Total Dissolved Solids	
TES	Threatened and Endangered Species	
TRI	Toxic Release Inventory	
UBWR	Utah Bureau of Water Rights	
UDEO	Utah Department of Environmental Quality	
UDOT	Utah Department of Transpiration	
UDWR	Utah Division of Water Resources	
UGS	Utah Geological Survey	
	Uniform Relocation Assistance and Real Property Acquisition	
UKAA	Policy Act	
USDA	United States Department of Agriculture	
USNPS	United States National Park Service	
UST	Underground Storage Tanks	
USTL	Utah State Trust Land	
UTM	Universal Transverse Mercator	
VCP	Voluntary Cleanup Program	

VRM	Visual Resource Management
WCH	Water Conveyance Hydro
WCWCD	Washington County Water Conservancy District
WSA	Wilderness Study Area
WSR	Wild and Scenic River

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