Insert to Application for Individual Permit
Lake Powell Pipeline
Coconino and Mohave Counties, Arizona
Kane and Washington Counties, Utah
Corps File No. SPK-2008-00354

November 16, 2018

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Introduction

The Utah Division of Water Resources (Applicant) is providing the following information in support of an application for a Clean Water Act (CWA) Section 404 Individual Permit (IP). The information is presented in sections that generally follow the order of the Application for Department of the Army Permit Form 4345 and, when appropriate, are specifically referenced in the text.

The Lake Powell Pipeline (LPP) Project would deliver a portion of the State of Utah's Colorado River water from Lake Powell to the service areas of Washington County Water Conservancy District (WCWCD) and Kane County Water Conservancy District (KCWCD) and would include energy recovery through hydropower generation (Figure 1-1). The Applicant's proposed project would include six lateral intake tunnels from Lake Powell, 140 miles of a 69-inch-diameter steel pipeline (starting at Lake Powell and terminating at Sand Hollow Reservoir), a forebay, an afterbay, hydro stations, booster pump stations, a regulating tank, and a power transmission line (including substations and switch stations).

Name of Waterbody (Block 13)

Waters of the U.S.

Regulatory Framework

Construction of the Lake Powell intake would require the placement of fill material into Lake Powell, a Section 10 waters, and the construction of pipelines, a forebay and an afterbay which would require the placement of fill material into waters of the U.S. The U.S. Army Corps of Engineers (Corps or USACE) regulates these activities under Section 10 of the River and Harbors Act and Section 404 of the Clean Water Act.

In addition, the Corps defines wetlands (33 Code of Federal Regulations (CFR) 323.2[c]) as:

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

Under existing regulations, waters tributary to navigable waters are considered waters of the U.S. and are subject to the Corps' jurisdiction (jurisdictional). Jurisdictional wetlands are those that meet the Corps' definition of wetlands and are adjacent, neighboring, or have a surface tributary connection to interstate or navigable waters of the U.S.

Methods

On September 22, 23, and 24, 2009, biologists from Stantec reviewed the LPP project facilities' footprint for wetlands, streams, and open waters (2009 site visit). The facilities reviewed included the proposed conveyance system, hydro system, pump stations, regulating tank, forebays, afterbay, intakes and outfalls, and transmission line alignment. Data on vegetation, soils, and hydrology at stream crossings and washes were collected in the field. The boundaries of wetland areas and channel cross-sections were mapped in the field using global positioning system (GPS) instruments with data conversion to geographic information systems (GIS). Site conditions are assumed to have remained the same since the 2009 site visit.

A wetland determination was performed in all vegetated areas that were potential wetlands following the methods outlined in the 1987 Wetland Delineation Manual (Environmental Laboratory 1987) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual for the Arid West (Corps 2006). This included an evaluation of vegetation, soils, and hydrology. Data were collected at a paired set of points at the boundary of each potential wetland, including excavation of soil pits to 18 inches below ground surface, or at refusal, if refusal occurred at less than 18 inches. More information on the investigation for wetlands, including wetland determination data forms, is in the March 2011 Wetland Delineation Report for the Lake Powell Pipeline Project prepared by MWH Americas, Inc. for the Utah Division of Water Resources that was previously submitted to the Corps for this project.

Wetlands

Within the LPP project facility footprints, none of the ephemeral, intermittent, or perennial drainages or the intake on Lake Powell have associated wetland vegetation that met the Corps criteria for wetlands (UDWRe 2016a). There are also no "special aquatic sites" (e.g., mud flats, sanctuaries and refuges, vegetated shallows, or pool and riffle complexes) associated with the proposed LPP project facilities.

Streams and Open Water

The six lateral tunnels for the intake would occur below the ordinary highwater mark of Lake Powell. The proposed pipeline alignment (South Alternative) would cross 259 waters of the U.S. As preliminarily defined, four waters of the U.S. occur within the Hurricane Cliffs forebay footprint, and two occur within the Hurricane Cliffs afterbay footprint. Additional information on the channels in the forebay and afterbay was provided to the Corps in a June 9, 2016 submittal. More detailed information on the channels in the forebay and afterbay is provided in the Proposed Impacts section below. A total of 266 waters, including Lake Powell, occur within the LLP project facilities' footprint. Table 1 provides information, including the water of the U.S. identifier (S001 through S266) given in the field, the Cowardin (Cowardin et al. 1979) and Hydrogeomorphic (HGM) code (Brinson 1993), the latitude and

longitude, and the project feature for each water found within the LPP project facilities' footprint. Figure 1-2 through Figure 1-9 shows the location of the waters labeled with the identifiers.

On November 16, 2016, Eric Millis of the State of Utah Department of Natural Resources, requested a preliminary jurisdictional determination (JD) for the LPP project. On March 13, 2017, Craig Brown, Senior Project Manager for the Corps responded to the request for a preliminary JD. On April 12, 2017, Mr. Millis sent an executed copy of the Preliminary JD form to the St. George Regulatory Office. Mr. Brown visited the Hurricane Cliffs forebay during a September 15, 2016 field visit and the Hurricane Cliffs afterbay during an October 2017 field visit. The Corps confirmed that the drainages within the forebay and afterbay are subject to Corps jurisdiction. Based on the 2017 preliminary JD, all waters, including the 265 drainages within the LPP project facilities' footprint and Lake Powell, are assumed for purposes of this application to be subject to Corps jurisdiction.

Location of Project (Blocks 15 and 16)

The Lake Powell Pipeline project is in parts of Coconino and Mohave counties, Arizona and Kane and Washington counties, Utah. The latitude/longitude of the approximate center of the pipeline alignment is 39.9892°N/-112.4276°W. The Lake Powell Intake would occur in Section 24, Township 41 North, Range 8 East of the Gila and Salt River Meridian, AZ. The terminal point of the pipeline at Sand Hollow Reservoir would occur in Section 30, Township 42 South, Range 13 West of the Salt Lake Meridian, UT.

Proposed Activity (Block 18)

Project Description

The Applicant's Proposed Action is the Lake Powell Pipeline with the South Alternative alignment (Figure 1-1). The proposed project has four primary systems that comprise the overall LPP project: 1) Water Intake System (six lateral tunnels that divert water from Lake Powell); 2) Water Conveyance System (pipeline from Lake Powell intake to the high point regulating tank); 3) Hydro System (pipeline from the high point regulating tank to Sand Hollow Reservoir; and 4) the KCWCD System (a lateral pipeline that delivers water to the KCWCD service area near Johnson Canyon). These systems are described in more detail below.

Water Intake System

The Water Intake System would pump Lake Powell water via submerged horizontal tunnels and vertical shafts into the LPP. The intake pump station would be constructed and operated adjacent to the west side of Lake Powell, approximately 2,000 feet northwest of Glen Canyon Dam in Coconino County, Arizona. An enclosed pump station building would house vertical turbine pumps with electric motors, electrical controls, and other equipment at a ground level elevation of 3,745 feet above mean sea level (AMSL). Figure 1-10 through Figure 1-12 shows details of the intake.

Water Conveyance System

The Water Conveyance System would convey water diverted from Lake Powell at the Intake System through a buried 69-inch-diameter pipeline for about 51 miles, parallel with Highway 89 in Coconino County, Arizona and Kane County, Utah, to a buried regulating tank (High Point Regulating Tank-2) along Highway 89 at ground level elevation 5,691 feet AMSL. The High Point Regulating Tank-2 would be the LPP Project topographic high point. The pipeline would be sited within a utility corridor established by Congress in 1998 that extends 500 feet south and 240 feet north of the Highway 89 centerline on public land administered by Bureau of Land Management (BLM) (U.S. Congress 1998). The pipeline right-of-way (ROW) would be 150 feet wide comprised of a 100-foot permanent ROW and a 50-foot temporary ROW for construction. Figure 1-13 through Figure 1-15 shows the typical cross section for crossings on waters of the U.S. for pipelines.

Four booster pump stations (BPS) along the pipeline would pump water to the high point regulating tank. Each BPS would house vertical turbine pumps with electric motors, electrical controls, and other equipment. Additionally, each BPS site would have a buried forebay tank, buried surge tanks, pig retrieval and launching stations, and a surface emergency overflow detention basin.

Hydro System

The Hydro System would convey the water from High Point Regulating Tank-2, at a topographic high point in the LPP Project with ground level elevation 5,691 feet AMSL, for about 87.5 miles through a buried 69-inch-diameter penstock in Kane and Washington counties, Utah, and Coconino and Mohave counties, Arizona, to Sand Hollow Reservoir near St. George, Utah (Figure 1-1). A short penstock segment would convey the water to Hydro Station(HS)-1. This in-line hydro station would generate up to one megawatt (MW) of electricity at a site along Highway 89 within Grand Staircase-Escalante National Monument (GSENM), and the penstock would continue west along Highway 89 to the GSENM west boundary.

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

The penstock alignment would follow Uzona Road west through Canaan Gap and south of Little Creek Mountain, turning north to HS-4 (Alt.) above the proposed Hurricane Cliffs forebay reservoir. HS-4 (Alt.) would discharge into the forebay reservoir.

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

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

generating system to meet peak power demands. Water would be pumped from the afterbay reservoir into the forebay reservoir during periods of off-peak power demand. The forebay and afterbay reservoirs would not be open to public access because the water levels would fluctuate rapidly during daily operations. A low pressure tunnel would convey the water northwest from the afterbay reservoir to a penstock, continuing to the Sand Hollow Hydro Station, which would generate up to 4.2 MW of electricity. The LPP Project water would discharge from the Sand Hollow Hydro Station into the existing Sand Hollow Reservoir.

Figure 1-16 shows the site plan of the Hurricane Cliffs Hydro Station Facility which includes the forebay and afterbay. Figure 1-17 shows the profile of the waterway between the forebay and afterbay.

Forebay Construction

Dam Foundation Treatment

Embankments – North and South Dams

The proposed embankment sections for the North and South Dams of the forebay are shown in Figure 1-18 and Figure 1-19. The recommended section includes a clay core with upstream and downstream earthfill sections. The forebay will be lined at specific locations to minimize infiltration and seepage. A deep channel excavation will be required along the centerline of the forebay to maximize storage in the Forebay. This excavation would result in the movement of over 2 million cubic yards of alluvium, weathered mudstone and mudstone. For this option, it has been assumed that the excavated material will be processed and used to construct the embankments.

Riprap and Bedding. Protection of the upstream slope against wave action and erosion will be required. It is anticipated that a 2-foot-thick layer of rock riprap (perpendicular to the slope), underlain by 1 foot of sandy gravel bedding will be required to protect the slope.

Waterway Channel. A channel with side slopes of 3 horizontal to 1 vertical and a 50-foot bottom width was assumed. To protect the slopes from erosion, the engineers have assumed that the channel would be lined with 1 foot of sandy gravel and 2 feet of riprap size rock.

Outlet Works. The engineers have assumed that an outlet works would be required for emergency draining of the reservoir. This outlet may be incorporated into the pumped storage waterway or include a low-level outlet near the maximum section of the South Dam.

Spillway. Since the proposed forebay reservoir is an off-stream site, spillway requirements to pass the probable maximum flood are not anticipated to be large. It is anticipated that a spillway can be efficiently constructed around the west abutment of the South Dam.

Afterbay Construction

Figure 1-20 shows the embankment section for the afterbay. Lining of the reservoir basin is not required. It is assumed that a grout curtain extending about 60 feet below the base of the cutoff trench and a continuous concrete filled slot extending about 10 feet below the cutoff trench will be constructed. The embankment would include a central clay core (Zone I). Filter and Drain material (Zones II and III) have been assumed to come from a commercial aggregate source. Zone IV for the earthfill dam would be excavated from the reservoir basin and area to the east, if needed.

KCWCD System

The KCWCD System is a lateral line that would convey water diverted from Lake Powell through the LPP at the west GSENM boundary for about eight miles through a buried 24-inch-diameter pipeline in Kane County, Utah, near the mouth of Johnson Canyon. The pipeline would parallel the south side of Highway 89 across Johnson Wash and then run north for 5,000 feet to the mouth of Johnson Canyon for water delivery to the KCWCD service area (Figure 1-4).

Other Proposed Project Elements

Transmission Lines

Transmission line alignments have been identified to transmit electric power to pump stations in the Water Intake and Water Conveyance systems, and to transmit electric power generated by hydroelectric stations in the Hydro System (Figure 1-1). The transmission lines that would serve the Water Intake and Water Conveyance systems are located in the east half of the LPP Project. The transmission lines that would serve the Hydro System are located in the west half of the LPP Project. While the transmission lines would be part of the LLP project, based upon a review of the transmission line alignments and the proposed construction design, the transmission lines would not result in the placement of fill or dredged materials into waters of the U.S. (e.g., no new access or construction road crossings would be constructed in waters of the U.S. and transmission poles would not be placed in waters of the U.S.). Because construction of the transmission lines would avoid the discharge of dredged or fill material into waters of the U.S., they are not discussed further.

Permanent Access Roads

Facility access for operations and maintenance will primarily use existing highways and roads, with short spurs as needed. New permanent access roads that will parallel the pipeline and cross waters of the U.S. will be constructed as drivable dips with bed armoring instead of place culverts. Permanent access roads will be constructed between the U.S. Highway 89 vertical curve to the K4020 road, between White Sage Wash and Johnson Wash to the existing road along the Navajo-McCullough Transmission Line, and between west of Hildale City along the penstock through Canaan Gap to the penstock intersection with a BLM-road southwest of Little Creek Mountain.

Exchange Contract

Pursuant to a recently negotiated Exchange Contract between Applicant and the Bureau of Reclamation, rather than diverting its water right at a point directly below Flaming Gorge Reservoir, Applicant will allow the water released therefrom to flow over 400 river miles downstream, benefitting the existing endangered fish Recovery Program and general riparian zone values. The water will then be withdrawn by Applicant from Lake Powell for use by WCWCD and KCWCD. The Contract will be executed upon issuance of the NEPA ROD.

Project Purpose (Block 19)

Under E.O. 13807 and the accompanying One Federal Decision Memorandum of Understanding as they pertain to LPP, the Federal Regulatory Commission (FERC), as lead agency, and the Bureau of Land Management (BLM), National Park Service (NPS), the Bureau of Reclamation (Reclamation), and the Corps as cooperating agencies, are to coordinate and cooperate in the timely processing of environmental reviews and authorizations. The Kaibab Band of the Paiute Indians is also a cooperating agency and will provide guidance and consultation on tribal historical, cultural, and archaeological issues.

Project Purpose

The Utah Board of Water Resources (UBWR) proposes building and operating the LPP, a water conveyance and hydroelectric system spanning from Lake Powell's Glen Canyon Dam in Page, Arizona, to water storage facilities near St. George, Utah to bring a necessary second source of water to Washington and Kane Counties to meet future water demands through 2060. LPP will diversify the regional water supply portfolio and enhance its reliability, while also generating electric supplies. The LPP will supply up to 86,249 acre-feet of existing Colorado River water rights to Washington County (82,249 acre-feet) and Kane County (4,000 acre-feet), while supplying water to operate the proposed hydroelectric developments at multiple points along the pipeline. LPP involves construction and operation activities on federal lands in both Utah and Arizona and will entail review by multiple federal agencies.

The UBWR, pursuant to the Lake Powell Pipeline Development Act, proposes to hold the LPP FERC license and other federal, state and local authorizations, own the LPP facilities not otherwise owned by another party as a result of regulatory requirements, and oversee operation of the LPP with the assistance of the Utah Division of Water Resources (UDWRe) and sponsoring water conservancy districts. The LPP meets the following UBWR needs:

- The development of additional water supplies legally available from the Colorado River system to meet the water demands of the existing and projected future population of Kane and Washington counties through 2060, with a necessary margin of safety, while simultaneously maximizing the use of existing available and identified water supplies.
- The development of clean, renewable energy sources wherever possible.

- Diversification of the primary M&I water sources for the counties, adding necessary resiliency and reliability to the water delivery system given the risks of variability associated with both water supplies and water supply delivery systems.

Need for Action

Based on projected population growth in the region, water demands will exceed Virgin River Basin surface and groundwater supplies, resulting in shortages. The WCWCD demand is projected to exceed supply by about 85,520 ac-ft per year in 2060, with the shortfall projected to start in about 2028. KCWCD reliable supplies are projected to be in deficit by 2035 (UDWRe 2016b). The UBWR identified Utah's Colorado River water right as the best source to meet rising water demands, while also providing needed source diversity to the regional water portfolio and enhancing its reliability. It will also supply water to operate the proposed hydroelectric developments at multiple points along the pipeline. Risks associated with infrastructure failure and climate variability underscore the need for the project. Conservation efforts in the region have significantly reduced per capita water use, and continued efforts are predicted to further reduce per capita use between now and 2060. However, conservation alone will never be adequate to meet existing and future demands and reduce supply risks. Additional information on the estimated future water demands and supply for WCWCD and KCWCD are presented in the Water Needs Assessment Final Report (UDWRe 2016) and the November 2018 supplement thereto.

Hydroelectric power will be generated at six stations along the LPP with a combined total installed capacity of up to 307 MW. LPP power will help meet summer peaking demands and maintain reliable operation of the transmission grid to balance supply and demand. The Basin subregion experiences summer peaking demands that are primarily dependent on coal-fired, gas-fired, and hydroelectric generation. Demand for coal-fired, gas-fired and hydroelectric generation is forecast to increase during the period from 2020 through 2060. Peak summer load within the geographic area overseen by the Western Electricity Coordinating Council (WECC), the agency responsible for ensuring regional electric system reliability, is projected to increase from 170 gigawatts (GW) in 2020 to 347 GW in 2060. Operation of the LPP will provide hydroelectric generation to meet part of the regional power demand, including demands associated with LPP water conveyance.

Reason for Discharge (Block 20)

The proposed project would result in the unavoidable discharge of fill material into waters of the U.S. As described below under the LPP with the South Alternative Alignment, the proposed activity is the least environmentally damaging practicable alternative (LEDPA) that meets the project purpose and objectives.

Compliance with 40 CFR 230.10 (a)(2)

Section 404(b)(1) of the CWA prohibits the discharge of dredged or fill material into waters of the U.S. unless the proposed discharge is the LEDPA that meets the project purpose. An alternative is practicable

if "it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" [40 CFR Part 230.10(a)(2)]. The National Environmental Policy Act (NEPA) requires that reasonable alternatives, including a no action alternative, be evaluated. Under NEPA, the no action alternative and action alternatives that meet the objectives or purpose and need of the proposed project are considered reasonable alternatives.

The Applicant considered five alternatives to meet the project purpose: 1) the No Action Alternative, 2) LPP with the South Alternative alignment (Applicant's Proposed Action), 3) LPP with the Existing Highway Alternative, 4) LPP with the Southeast Corner Alternative, and 5) No Lake Powell Water Alternative. The LPP with the South Alternative is the Applicant's preferred alternative.

Alternatives

No Action Alternative

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

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

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

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

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

The No Action Alternative was dismissed because it does not meet the overall project purpose of providing the additional water supply needed to meet the projected 2060 water supply needs of WCWCD and KCWCD. Additionally, in the case of the No Action Alternative there would not be an Exchange Contract with the Bureau of Reclamation and the environmental benefits associated with allowing water flow from below Flaming Gorge Reservoir to Lake Powell would be lost.

LPP with the South Alternative Alignment (Proposed Action)

The LPP with the South Alternative Alignment is the Applicant's preferred alternative. As described under Proposed Activity (Block 18), the proposed project has four primary systems that comprise the overall LPP project: 1) Water Intake System (six lateral tunnels that divert water from Lake Powell); 2) Water Conveyance System (pipeline from Lake Powell intake to the high point regulating tank); 3) Hydro System (pipeline from the high point regulating tank to Sand Hollow Reservoir; and 4) the KCWCD System (a lateral pipeline that delivers water to the KCWCD service area near Johnson Canyon). A transmission line would also be part of the project. The Water Intake System would require construction of six lateral tunnels below the ordinary high water mark of Lake Powell, a Section 10 water. Construction of pipelines associated with Water Conveyance system, the Hydro System, and the KCWCD System would result in the temporary impacts on 259 waters of the U.S., most of which are dry ephemeral channels. Construction of the forebay, afterbay and Hurricane Cliffs hydroelectric generating stations and tailrace channel would result in permanent impacts on waters of the U.S., all of which are dry ephemeral channels.

The LPP with the Southern Alignment is the Applicant's preferred alternative and meets the criteria for the LEDPA because:

- It meets the overall project purpose;
- Impacts on waters of the U.S. would not be greater than the other alternatives;
- It avoids effects on the Kaibab-Paiute Indian Reservation; and
- It would benefit aquatic resources in the Colorado River between Flaming Gorge Reservoir and Lake Powell.

LPP with the Existing Highway Alternative Alignment

The LPP with the Existing Highway Alternative Alignment consists of four primary systems: Water Intake System, Water Conveyance System, Hydro System, and KCWCD System. The Water Intake and Water Conveyance systems would be the same as described for the Proposed Action (LPP with the South Alternative alignment). The Hydro System would convey water diverted at Lake Powell from High Point Regulating Tank 2 at the LPP Project topographical high point (5,691 feet AMSL) for about 80.5 miles through a buried 69-inch-diameter penstock in Kane and Washington Counties, Utah, and Coconino and Mohave Counties, Arizona, to Sand Hollow Reservoir near St. George, Utah (Figure 1-21).

The alternative alignment parallels Highway 89 to the west and south boundary of GSENM and continues along Highway 89 to Lost Spring Gap. Four in-line hydro generating stations (HS-1, HS-2 [Hwy], HS-3, and HS-4 [Alt.]) located along the penstock would generate electricity and help control water pressure in the penstock. The HS-1, HS-3 and HS-4 (Alt.) hydro stations would be the same as described for the South Alternative.

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

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

Impacts on wetland and other waters from this alternative are expected to be similar to the Proposed Action (UDWRe 2016a). Impacts from the placement of dredged and fill material for this alternative would be determined for the Environmental Impact Statement. This alternative was dismissed as the preferred alternative because the effects on waters of the U.S. would be similar as the Applicant's Preferred Alternative, but this alternative would impact 4.4 acres more riparian habitat than the Applicant's Preferred Alternative and would cross the Kaibab-Paiute Indian Reservation.

LPP with the Southeast Corner Alternative Alignment

The Southeast Corner Alternative consists of four systems: Water Intake, Water Conveyance, Hydro, and KCWCD. The Water Intake, Water Conveyance, and KCWCD systems would be the same as described for the Proposed Action (LPP with the South Alternative alignment).

The Hydro System would be the same as described for the LPP with the South Alternative Alignment from High Point Regulating Tank 2 at the LPP Project topographical high point (5,691 feet AMSL) to the east boundary of Kaibab-Paiute Indian Reservation. At the east boundary of Kaibab-Paiute Indian Reservation, the penstock alignment would parallel the north side of the Navajo-McCullough Transmission Line corridor in Coconino County, Arizona, through the southeast corner of the Kaibab-Paiute Indian Reservation for about 3.8 miles. The penstock would then follow the South Alternative alignment south of the south boundary of the Kaibab-Paiute Indian Reservation, continuing to Sand

Hollow Reservoir (Figure 1-22). The Southeast Corner Alternative would be about 85.7 miles long from High Point Regulating Tank-2 to Sand Hollow Reservoir.

Impacts on wetlands and other waters from this alternative are expected to be similar to the Applicant's Proposed Action (UDWRe 2016a). Impacts from the placement of dredged and fill material for this alternative would be determined for the Environmental Impact Statement. This alternative was not selected as the as the preferred alternative because the effects on waters of the U.S., riparian habitat and other aquatic resources would be similar to the Applicant's Preferred Alternative, and it would cross the Kaibab-Paiute Indian Reservation.

No Lake Powell Water Alternative

Background

The No Lake Powell Water Alternative would involve a combination of developing remaining available surface water and groundwater supplies, developing reverse osmosis treatment of existing low quality water supplies, and eliminating residential outdoor water use in the WCWCD service area (Figure 1-23). In addition to existing and currently planned ware supplies, this alternative could provide a total of 74,983 acre-feet of water annually to WCWCD and 6,615 acre-feet of water annually to KCWCD for M&I use without diverting Utah's water from Lake Powell.

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

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

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

WCWCD No Lake Powell Water Alternative Features

Beginning in 2025, Washington County residential outdoor potable water use would be permanently re-purposed to indoor potable water use to help meet increasing indoor potable water demands. The WCWCD would develop a reverse osmosis (RO) advanced water treatment facility near the Washington Fields Diversion in Washington County, Utah, to produce up to 57,883 acre-feet per year of diverted Virgin River water, which has a high total dissolved solids (TDS) concentration, mixed with an additional 19,030 acre-feet per year of reuse water. WCWCD would develop the Warner Valley Reservoir to store the reuse water and diverted Virgin River water prior to RO treatment. A water distribution pump station and pipeline would be constructed to convey 13,249 acre-feet of potable water from Quail Creek Water Treatment Plant to the Apple Valley area of Washington County. Figure 1-11 shows the primary conceptual components of the No Lake Powell Water Alternative.

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

Reverse Osmosis Water Treatment. Washington County's additional future water supply under the No Lake Powell Water Alternative would be dependent on two water sources: 1) Virgin River water diverted at the Washington Fields Diversion; and 2) reuse water from an expanded St. George Regional Water Reclamation Facility. WCWCD would develop a RO advanced water treatment facility near Washington Fields Diversion in Washington County, Utah. The RO facility would be designed to produce up to 57,883 acre-feet of de-silted water per year diverted from the Virgin River at Washington Fields Diversion and reusable effluent from the St. George Regional Wastewater Reclamation Facility. The RO facility would be necessary to remove the high concentrations of TDS present in both the Virgin River and the effluent from the St. George Regional Wastewater Reclamation Facility. The reuse facility has a current capacity

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

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

Secondary Water Storage in Warner Valley Reservoir. WCWCD would develop the Warner Valley Reservoir to store diverted Virgin River water and reuse water from the St. George Regional Water Reclamation Facility, which would be delivered as inflow to the RO advanced water treatment facility. Warner Valley Reservoir would be located south-southwest of the Washington Fields Diversion. An earth-fill embankment with a clay core and rock-riprap facing would be constructed across the north entrance to the natural valley. The reservoir would have a maximum active storage volume of 69,030 acre-feet and would cover approximately 1,130 acres, including the earth-fill embankment. A large pump station would be constructed at the Washington Fields Diversion to pump the diverted Virgin River water into the Warner Valley Reservoir. The pump station would be powered by electricity via the 69-kV transmission line from the Purgatory Substation to the RO water treatment plant. The reservoir

would store Virgin River water diverted at the Washington Fields Diversion (50,000 acre-feet per year) mixed with St. George Regional Water Reclamation Facility effluent (19,030 acre-feet per year), accounting for annual average evaporation (4,717 acre-feet per year), to produce up to 57,883 acre-feet of RO product water (assuming 90 percent recovery). The brine product from RO treatment would total approximately 6,430 acre-feet per year.

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

KCWCD No Lake Powell Water Alternative

The KCWCD No Lake Powell Water Alternative would rely on existing water supplies, water conservation measures resulting in reduced water use, and future water development projects consisting of new groundwater production. Reliable water supplies (projected to be 2,170 acre-feet per year in 2035) for the area served by KCWCD (Kanab City and Johnson Canyon) would be exceeded by projected M&I water demands by 27 acre-feet per year within the KCWCD service area in 2035. KCWCD projected potable water demand in 2060 would be 3,435 acre-feet per year, with a potable water deficit of 1,334 acre-feet per year (UDWRe 2016b). Additional groundwater in the Kanab Creek drainage basin could be developed to provide up to 6,615 acre-feet per year of potable water within the aquifer's estimated safe yield. The quality of this water would likely require advanced water treatment. The developed groundwater from the Kanab Creek drainage basin would be pumped and conveyed through an eight-mile-long pipeline to the Johnson Canyon drainage basin. The Johnson Canyon drainage basin comprises the potable water supply service area served by KCWCD in the area that could be served by the LPP Project.

Environmental Consequences

The No Lake Powell Water Alternative would have different effects on ephemeral drainages than the Proposed Action because it involves the construction of different facilities at different locations. The No Lake Powell Water Alternative would have indirect impacts on riparian areas along the Virgin River and its tributary streams under the influence of shallow subsurface recharge from water supplies used for outdoor residential landscape watering. Outdoor watering of residential landscapes recharge surface and subsurface soils and shallow aquifers in the St. George metropolitan area. Reaches of area streams tributary to the Virgin River and some reaches of the Virgin River would experience reduced stream flows. Riparian vegetation may not grow along these reduced stream flow reaches or riparian vegetation communities would diminish as outdoor residential watering is eliminated. Loss or decrease of riparian vegetation would result in increased stream water temperatures because shade over these streams would decrease, which would adversely affect aquatic resources. These indirect impacts would be permanent. This alternative was dismissed as the preferred alternative because the project would result in greater indirect environmental effects on wetlands and riparian vegetation, such as along the Virgin

River, the alternative would rely on the actions of individual land owners with an uncertain outcome (logistically unsound), and the cost of RO and implementation would be about 1.5 times higher than the cost of the Applicant's Proposed Action. This alternative would result in loss of grazing land and upland habitat from constructing Warner Valley Reservoir, the RO facility and brine disposal ponds, and the 2,000 acres of brine disposal ponds would attract and harm wildlife and waterfowl. Warner Valley Reservoir and the brine disposal ponds would likely be constructed in areas with ephemeral drainages. Additionally, the No Lake Powell Water Alternative would not have the environmental benefits of letting water flow from below Flaming Gorge Reservoir to Lake Powell as previously described for the proposed action that includes an Exchange Contract with the Bureau of Reclamation.

Proposed Impacts

Effects on Waters of the U.S. (Blocks 21 and 22)

The Applicant's Proposed Action would require the unavoidable discharge of fill material into waters of the U.S., most of which are ephemeral drainages. The effects on waters of the U.S. are described below for each project feature and type of effect (direct vs. indirect and permanent vs. temporary).

Lake Powell Intake

The Lake Powell Intake would result in permanent impacts on 0.04 acre and 30 linear feet of Lake Powell below the ordinary high water mark. Figure 1-10 through Figure 1-12 show the construction details for the intake.

Hurricane Cliffs Forebay

The Hurricane Cliffs forebay would result in permanent impact on 2.74 acres and 19,602 linear feet of waters of the U.S. Construction of the dam would have a permanent direct loss of 0.32 acre and 1,379 linear feet, and inundation from the reservoir would have a permanent indirect effect on 2.42 acres and 18,223 linear feet. Drainage channels that would be impacted by the forebay are shown on Figure 1-24. Impacts that correspond to the labels on Figure 1-24 are provided in Table 2. The functions associated with the loss of these ephemeral drainages may be more than offset by the facility (see Compensatory Mitigation).

Hurricane Cliffs Afterbay

The Hurricane Cliffs afterbay would result in permanent impact on 1.47 acres and 12,938 linear feet of waters of the U.S. Construction of the dam and the hydrostation would have a permanent direct loss of 0.65 acre and 6,900 linear feet of waters of the U.S., and inundation from the reservoir would have a permanent indirect effect on 0.82 acres and 6,038 linear feet of water of the U.S. Drainage channels that would be impacted by the afterbay are shown on Figure 1-25. Impacts that correspond to the labels on Figure 1-25 are provided in Table 3. The functions associated with the loss of these ephemeral drainages may be more than offset by the facility (see Compensatory Mitigation).

The total permanent direct and indirect loss of waters of the U.S. from the forebay and the afterbay are shown in Table 4.

Table 4. Permanent direct and indirect loss of waters of the U.S.

Project Feature	Inundation		Earthen Fill Material		
	Length (ft)	Area (acres)	Length (ft)	Area (acres)	Volume (cu yd)
Forebay	18,223	2.42	1,379	0.32	2,171
Afterbay	6,038	0.82	6,900	0.65	765
Total	**24,261**	**3.24**	**8,279**	**0.97**	**2,936**

Pipelines

The Water Conveyance and Hydro systems pipelines would result in temporary direct effects on 259 waters of the U.S., totaling 6.29 acres and 19,066 linear feet of impacts. Access for project construction and maintenance would use existing roads and would not have new impacts on waters of the U.S. The types and amount of fill for the pipeline crossings on waters of the U.S. was summarized in a spreadsheet and provided to the Corps in June 2016 (ORM_Upload_Sheet_AqResources_LPP_June_2016_edited for JD format). The ORM upload sheet area calculations have been revised to account for the increased width of the pipeline ROW and the potential for temporary disturbances from construction and will be submitted to the Corps separate from this application. The following approximate amounts of fill would be placed within waters of the U.S. as result of construction of the pipelines:

- 19,278 cubic yards of pipe
- 42,875 cubic yards of riprap fill
- 37,226 cubic yards of native backfill
- 71,483 cubic yards of bedding fill

Endangered Species Act Compliance

The Applicant's Proposed Action would not jeopardize the continued existence of species listed as endangered under the Endangered Species Act and would not result in destruction or modification of critical habitat as a result of discharge of dredged or fill material. A preliminary draft Biological Assessment was prepared for the Applicant's Proposed Action and submitted to the Federal Energy Regulatory Commission (FERC) as part of the Integrated Licensing Process license application. The preliminary draft is currently being revised and a draft BA will be submitted by FERC to the Fish and Wildlife Service. The Corps designated FERC as lead agency for Section 7 ESA compliance for the LPP project (Letter from Corps to FERC Secretary, 02-14-2012). As the lead agency, FERC is consulting with the U.S. Fish and Wildlife Service on Endangered Species Act compliance.

National Historic Preservation Act Compliance

The Corps designated FERC as lead agency for Section 106 NHPA compliance for the LPP project (Letter from Corps to FERC Secretary, 02-14-2012). Cultural resources coordination and communication for the

Lake Powell Pipeline are ongoing and have included various outreach activities, meetings, contacts, and document filings and review. The communication timeline for general cultural resources coordination and Draft Class III Report and Draft Historic Properties Management Plan development is shown in Table 5. Additional information regarding cultural resources document submittals and agency and stakeholder comments can be found in the FERC Project No. 12966 docket. Communications with Native American tribes and nations are documented in the filings record (FERC docket) and in the January 2012 Draft Study Report 23: Ethnographic Resources.

Table 5. Lake Powell Pipeline cultural resources coordination and communication timeline.

Date or Timeframe	Summary Description of Coordination and Communication
December 5, 2007	Field trip to Kanab Creek Canyon held between UDWRe, Kaibab Band of Paiute Indians, BLM AZ Strip Field Office and BLM Utah State Office
2008	Start of LPP data research
March 31, 2008	UDWRe LPP Community Information meeting held in Kanab
June 9-10, 2008	FERC site visit of LPP alignment and surface features (hydro station sites, surface reservoir sites, Kaibab-Paiute Indian Reservation)
June 10, 2008	FERC Public Scoping Meeting in Kanab, Utah.
September 9, 2008	UBWR Initial Study Plan meeting in St. George, Utah; identification of study tasks from scoping meetings and scoping comments, and discussion of field studies to be performed for applicable resources
October 27-28, 2008	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona
January 13, 2009	LPP Management Committee Meeting held in St. George, Utah
March 3-4, 2009	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona
May 2009	Start of LPP fieldwork
June 2-3, 2009	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona
October 27-28, 2009	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona
January 12, 2010	UBWR Cultural Resources Working Group meeting in St. George, Utah
March 19, 2010	LPP Management Committee meeting held in St. George, Utah
March 6 and 23, 2010	Meeting with Utah SHPO to discuss HPMP development
May 2010	Preliminary Draft Class III Report in FERC format distributed to agencies and tribes
June 29-30, 2010	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona to discuss Class III Report and HPMPs
July 13, 2010	LPP Management Committee Meeting held in St. George, Utah
June to December 2010	Agency review, LPP team report revisions, and additional field work for reroute around newly acquired tribal land
November 8, 2010	LPP Management Committee meeting in St. George, Utah
December 2010	Draft Class III Report distributed to agencies and tribes
January 25-26, 2011	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona to discuss Class III Report and HPMPs
January 2011 to July 2013	Agency review, LPP team report revisions, and additional field work for changes in project feature alignments
March 17, 2011	LPP Management Committee meeting in St. George, Utah
March 22, 2011	UBWR Initial Study Report (ISR) meeting held in St. George, Utah for interested and involved parties, agencies and tribes.
February 7, 2012	UBWR modified study report meeting at St. George, Utah.
May 22-23, 2012	UBWR Cultural Resources Work Group meeting in St. George, Utah and Phoenix, Arizona to discuss Class III Report and HPMPs
July 2013	Draft Class III Report distributed to agencies and tribes

Date or Timeframe	Summary Description of Coordination and Communication
August 2013 to May 2014	Agency review and LPP team report revisions
September 12, 2013	UDWRe meeting at BLM GSENM headquarters.
May 2014	Draft Class III Report distributed to agencies and tribes
July to December 2014	Agency review and LPP team report revisions
January 2015	BLM submits Draft Class III Report to SHPOs
April 2015	SHPO and BLM comments were received
May 2015 to April 2016	Agency review, LPP team report revisions, and additional field work to address SHPO and BLM comments on previous surveys
January 12-13, 2016	UDWRe LPP Open House held at Kane County Commission chambers in Kanab, Utah and in WCWCD in St. George, Utah
May 2016	Submittal of Draft Class III Report to FERC as part of Final License Application
July 26, 2016	FERC requests a Final Class III Report and HPMPs by January 31, 2017
September 20-21, 2016	UBWR field tour of LPP alternatives for FERC and public
December 16, 2016	LPP team requested an extension to submit the Final Class III Report on January 5, 2018 and Draft HPMPs on June 30, 2017
January 20, 2017	Revised Draft Class III Report submitted to BLM for review
January to February 2017	BLM submitted revised Draft Class III Report to BLM field offices, DOI agencies and Kaibab Band of Paiute Indians for review
March to June 2017	Class III comments received from BLM field offices, DOI agencies and Kaibab Band of Paiute Indians
June and July 2017	Draft HPMPs submitted to FERC and consulting parties
April to June 2017	Class III comments received from BLM
July 6, 2017	Revised Draft Class III Report submitted to BLM
August to September 2017	BLM and LPP team finalize the revised Draft Class III Report
August 11, 2017	FERC requests revised HPMPs by October 10, 2017
September and October, 2017	BLM submits revised Draft Class III Report to SHPOs and tribes
October 2017 to November 2017	SHPO and tribal review period for Draft Class III Report
November 7, 2017	Concurrence with the Class III report received from UT SHPO. No tribal comments were received.
November 11, 2017	Additional comments/questions on the Class III report received from AZ SHPO. No tribal comments were received.
November 2017 to January 2018	BLM and LPP team finalize the Class III Report
January 2018	Final Class III Report submitted to Arizona and Utah SHPO
January 5, 2018	Final Class III Report filed with the FERC.
May 2018	Final Distribution of Class III to Tribes and SHPOs
July 3, 2018	Final AZ SHPO Concurrence Letter Received
July 2018 – Present	Curation of final records and site forms with Utah and Arizona SHPO

Compensatory Mitigation (Block 23)

Avoidance and Minimization of Impacts

The proposed project has been designed to minimize impacts on waters of the U.S. to the greatest extent practicable. Wetlands impacts from the LLP project would be avoided. In addition to avoiding and minimizing direct impacts on other waters of the U.S., Best Management Practices (BMPs) would be implemented during construction to minimize indirect impacts on the waters of the U.S. as well as riparian and upland areas.

The following BMPs and standard construction procedures would be used during construction to avoid, minimize, or reduce impacts on waters of the U.S. and riparian areas.

- Riparian vegetation clearing of pipeline crossings would be minimized.
- Construction of pipeline crossings of ephemeral drainages would be performed when the drainages are dry.
- Construction of pipeline crossings of perennial or intermittent flowing streams (e.g., Paria River and Kanab Creek) would be performed when the streams are either at low flows or are dry.
- When construction activities would take place upstream from wetlands, silt fences or straw bales would be temporarily installed upstream or up-gradient of wetlands to filter suspended sediments and bedload sediments to avoid sedimentation impacts during construction. If necessary, silt fences and/or straw bales would be installed in series to control sediments generated by construction activities.
- Temporary coffer dams upstream of pipeline crossings for diversion of Paria River flows would be used during construction. If necessary, culvert pipes would be installed at the existing slope of the streams to divert flow around the pipeline crossing work area. Stream flows would be diverted through the culvert pipes to control turbidity during construction of the pipeline crossings.
- Equipment usage and operation within temporarily dewatered reaches of stream channels would be minimized to protect stream bed substrates.
- Construction equipment working within the temporarily dewatered reaches of stream channels would be checked and regularly monitored for leaking hydraulic fluid, oil, grease, and fuel.
- All construction equipment refueling would be performed on upland areas within spill containment areas at least ⅛ mile from stream channels to prevent fuel spills from contaminating stream substrates and the dewatered stream reaches.
- Construction trenches within dewatered stream reaches would be pumped as necessary to remove subsurface water. The water would be pumped into settling basins prior to disposal.
- Dewatered construction areas would have a downstream berm to capture any sediment which may be mobilized by precipitation or disturbance during construction activities. As an alternative, silt fences would be installed across the stream channels within the dewatered construction areas downstream of the pipeline crossing excavation to capture sediments that may be mobilized by precipitation events during construction activities. The silt fence toe would be anchored into the stream bed with native material. The silt fence would be removed following completion of the pipeline crossing construction and native material used to anchor the silt fence toe would be returned to pre-construction conditions.
- For live streams, the streambed substrates at the surface of dewatered stream beds would be removed, stockpiled and replaced on the stream bed as part of the construction site restoration. All disturbed area within the dewatered stream beds would be restored with natural sand, gravel, cobble, and/or boulder material to the same condition, as practical, as before construction.
- All gravel and sand materials used for pipe bedding in pipeline crossings of dewatered stream channels would be clean imported material free of biological materials, chemicals or other pollutants.

- Concrete placed around steel pipelines to form encasements would be cleaned prior to exposure to live stream flows.
- Pipeline encasements would be placed to a depth below the scour depth of the stream or river, determined by best engineering practice.
- Equipment operators would be trained in appropriate work methods within sensitive aquatic or wetland environments.
- Stream and river bank restoration plans would be prepared before construction begins within live stream channels and in riparian areas. Restoration plans would focus on restoring riparian vegetation and stream bed conditions to the same condition as before construction.
- There would be compliance with all state 401 certification conditions as such relate to construction procedures.

Compensatory Mitigation

Temporary impacts on waters of the U.S. would be mitigated in place by reestablishing pre-construction contours of each channel. No long-term loss of function would occur. Mitigation for unavoidable impacts on dry ephemeral drainages that would be permanently filled or inundated by the construction of the forebay and afterbay for the Lake Powell Pipeline project were discussed with the Corps in an April 26, 2018 conference call with the LLP team. Approximately 3.24 acres and 24,261 linear feet of channel would be inundated and 0.97 acre and 8,279 linear feet of channel would be unavoidably and permanently impacted as a result of placement of earthen fill material for construction of the dams and hydrostations associated with the forebay and afterbay (Table 4).

The following options for permanent impacts on dry ephemeral drainages within the forebay and the afterbay are proposed as compensatory mitigation:

1. **Functional Equivalency –** This option would involve performing a functional assessment of the drainage reaches that would be lost (pre-project). The functional assessment would guide the type and design of the compensatory mitigation. For example, based on a field review with the Corps on October 17, 2017, it preliminarily appears that the functions provided by the existing ephemeral drainages are sediment transport, sediment storage, and groundwater recharge. It may be that the forebay and afterbay would provide the same functions to the same or greater degree than the existing drainage reaches that would be lost. This would be determined by a functional assessment of the forebay and afterbay design based on size and landscape position. By trapping sediment and providing a perennial source of water that can contribute to groundwater recharge, the forebay and afterbay could provide replacement functions in the same general area and watershed in which the impacts would occur.
2. **Establish and Enhance Riparian Vegetation –** WCWCD owns lands along the Virgin River. These riparian lands provide opportunities to establish and enhance riparian vegetation. This could include, for example, habitat for the listed southwestern willow flycatcher. The mitigation area would be protected as part of the mitigation package. This option could result in additional important riparian habitat for the region. Though the ephemeral drainage reaches that would be lost do not support riparian vegetation, this type of mitigation would enhance important values and functions.

3. **Construct Replacement Ephemeral Drainages –** This option would involve taking spring water near Sand Hollow Resort on WCWCD-owned land and spreading it out through multiple channels to grow riparian vegetation and establish riparian habitat. This too could provide habitat for the listed southwestern willow flycatcher. It could also potentially involve constructing ephemeral distributary drainage channels in parallel across the alluvial fan around the afterbay reservoir to convey Hurricane Cliffs drainage, hydrostation surface drainage, and other intercepted drainage to existing channels downgradient of the afterbay embankment with the purpose of replicating the functions currently provided by the existing channel reaches that would be inundated by the afterbay and filled with afterbay embankment materials. This option has the potential of providing replacement resources and functions in the same general area and watershed in which the impacts would occur.

Mitigation banking is not an option for the LPP project because of the lack of established banks nearby. The applicant will continue to coordinate with the Corps to develop a suitable mitigation plan that will comply with the final Compensatory Mitigation Rule (73 Federal Regulation 19670 (April 10, 2008)).

Addresses of Adjoining Landowners (Block 25)

This information will be provided to the Corps in a format requested by the Corps prior to issuance of a public notice.

List of Other Certificates, Approvals/Denials from Agencies (Block 26)

Agency	Type Approval	Identification Number	Date Applied	Date Approved	Date Denied
FERC	Hydropower License	P-12966	April 30, 2016	Pending	
BLM	ROW Permits	UTU-85472; AZA-34941	December 8, 2006	Pending	
NPS	ROW Permit	Pending	April 26, 2016	Pending	
USBR	ROW Permit	Pending	April 26, 2016	Pending	
UDEQ	Section 401 Permit	n/a	April 30, 2016	Pending, original application has been withdrawn by UDEQ and will be continued after Draft EIS	
ADEQ	Section 401 Permit	LTF No. 64155, Reading File SWGP16-0121	April 30, 2016	July 8, 2016	n/a
State of Utah	Stream Alteration Permit	Pending	Pending	Pending	

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