

**Lake Powell Pipeline**  
**FERC Project No. P-12966-004**  
**Water Needs Assessment: Demand and Supply Update**  
**Public Filing**

**1. Introduction**

In April 2016, the state of Utah submitted Final Study Report 19, which included the Climate Change Report and Water Needs Assessment, as part of its license application for the Lake Powell Pipeline (LPP). In August of 2017, FERC issued a Request for Additional Information for total per capita water use data for the years 2011 to 2016. The Utah Division of Water Resources (UDWRe) informed FERC on October 10, 2017 that the data necessary to respond would be available in 2018. In July of 2017, the state of Utah released new population projections prepared by the Kem C. Gardner Policy Institute at the University of Utah (Institute). In June of 2018, UDWRe published its “2015 Municipal and Industrial Water Use Data” (M&I Report), which contained total per capita water use data for 2015.

In addition, after the 2016 submission of Study Report 19, both the U.S. Bureau of Reclamation (Reclamation) and the seven Colorado River basin states continued to model and monitor Colorado River flows, track Colorado River Storage Project (CRSP) reservoir storage levels, and develop “options and strategies” to reduce the risk of future Colorado River compact shortage. In 2018, the Applicant and Reclamation reached agreement in principle on an exchange contract involving the movement of water from below Flaming Gorge Reservoir to Lake Powell, where it could be diverted through the LPP.

In view of the above developments, Applicant is submitting the following supplemental information for purposes of ensuring that the FERC administrative record contains the most up-to-date information on water demand and supply and related information pertaining to the LPP.

**2. Demand Projections**

The new population projections and water use data will update the demand estimates set forth in Study Report 19.

**2.1. Population Projections**

The Institute prepared baseline, high and low population projections to address the uncertainty associated with high growth areas such as Washington County (Policy Institute 2018). Past projections have underestimated actual population growth in Washington County (Policy Institute 2018, UDWRe 2016). The Institute projections for Washington County anticipate a baseline of 468,830 by 2060 with a projected low population of 419,269 and a projected high population of 501,382 by 2060 (Table 1).

**Table 1. WCWCD Population Projections**

Year	Washington County Total Population - Baseline	WCWCD Service Population - Baseline	Washington County Total Population - High	WCWCD Service Population - High
2010	138,579	135,662	138,579	135,662
2020	186,618	182,689	187,078	183,140
2030	251,636	246,338	256,759	251,354
2040	320,956	314,199	337,051	329,955
2050	391,468	383,227	417,124	408,343
2060	468,830	458,960	501,382	490,827

Source: Policy Institute 2018, UDWRe 2018

## 2.2. Current and Projected Water Use

Utah has one of the most comprehensive water use accounting practices in the United States. Unlike other cities or states, Utah includes all secondary and reuse water in its gallons per capita per day (GPCD) reporting, thereby reflecting more complete water use information. The latest per capita water use numbers, as found in the M&I report, are in Table 2.

**Table 2. 2015 Per Capita Per Day Water Use**

Year <sup>1</sup>	Water Use (GPCD)	Washington County <sup>2</sup>			Kane County <sup>2</sup>		
		Culinary (potable)	Secondary (untreated)	Total <sup>3</sup>	Culinary (potable)	Secondary (untreated)	Total <sup>3</sup>
2015	Residential	177	16	193	129	58	187
	Commercial, Industrial, Institutional <sup>4</sup>	52	57	108	81	15	97
	Total System Water Use	229	73	302	210	73	283

Source: UDWRe 2018

Note:

<sup>1</sup> 2016 and 2017 water use information has been submitted to the Utah Division of Water Rights and the Utah Division of Water Resources is currently evaluating the data.

<sup>2</sup> Kanab-Virgin River Basin water use

<sup>3</sup> Differences between base values and totals due to rounding.

<sup>4</sup> The Division of Water Resources included second home water use (e.g., vacation or seasonal homes) in commercial, industrial, and institutional quantities in the 2010 M&I Water Use report. Second home water use is now included in residential quantities in the 2015 M&I Water Use report.

Key:

GPCD = gallons per capita per day

The 2015 M&I Water Use Data report employed a revised methodology to examine residential, commercial, industrial and institutional (CII) uses in comparison to the 2010 M&I Water Use Data report. The reports differed in approaches for determining service area populations, residential lot sizes, classification of second home water use, and estimates of secondary or

nonpotable use. Second home water use (e.g., vacation or seasonal homes) was included in the CII category in 2010, but was shifted to the residential category in 2015. Although water use of second homes is included in the GPCD numbers, second home occupants are not included in the population estimate. As a result, Washington County residential use reflects a substantial increase in GPCD due to second home water use.

Following the recent completion of a Legislative Water Audit, the State of Utah is developing updated regional water conservation goals. According to the state, “the purpose of [a] regional goal setting process is to combine scientific/engineering analysis with regional input to develop goals appropriate for different areas of the state.” It is anticipated that the updated water conservation goals will be made public in coming months. The Districts, in coordination with area retail water providers, will consider the results of this initiative in updating their programs and establishing their future goals. In the interim, in WCWCD’s current water resource planning, it has assumed further water use reductions from the reported 2015 per capita use by 20 percent by 2060. Table 3 below uses the 20 percent reduction from reported 2015 levels to calculate WCWCD per capita water use projections through 2060.

**Table 3. WCWCD Per Capita Total System Water Use Projections with 2060 Conservation Goals**

Year	WCWCD Total System GPCD with 20% Conservation
2010	325
<b>2015</b>	<b>302</b>
2020	296
2030	271
2040	250
2050	240
<b>2060</b>	<b>240</b>

Key:

GPCD = gallons per capita per day  
 WCWCD = Washington County Water Conservancy District

### 2.3. System Loss and Planning Reserve

The updated future demand projections integrate system loss and a 15 year planning reserve. Study Report 19 did not include either factor in the demand projections.

Consistent with nationwide averages (EPA 2013), Washington County water systems lose approximately 15 percent of supplied water due to pipe leakage and overflows, meter inaccuracies, and data/calculation errors. WCWCD is primarily a wholesale water supplier. In that capacity it does not directly control the commercial or residential water supply lines or water meters. These are the property and responsibility of the direct retail water providers. WCWCD

will, however, work with its municipal customers to reduce system loss county-wide. Much of this reduction will depend on the actions of municipal customers given that most of the identified system loss occurs in their systems.

As noted in Study Report 19, WCWCD has adopted a policy of maintaining a planning reserve equal to the estimated water demand for fifteen years. Water is simply not a “real time” commodity in the sense that it can be immediately produced upon request. The reserve will protect against:

- unanticipated variations in supply and demand related to climatic conditions
- system infrastructure failure or catastrophic events
- delays associated with complex permitting processes
- unanticipated population growth

Table 4 below represents future water demand taking into consideration all of the above information and factors. Figure 1 is a graphic representation of these demand projections.

**Table 4. WCWCD Water Demand Projections**

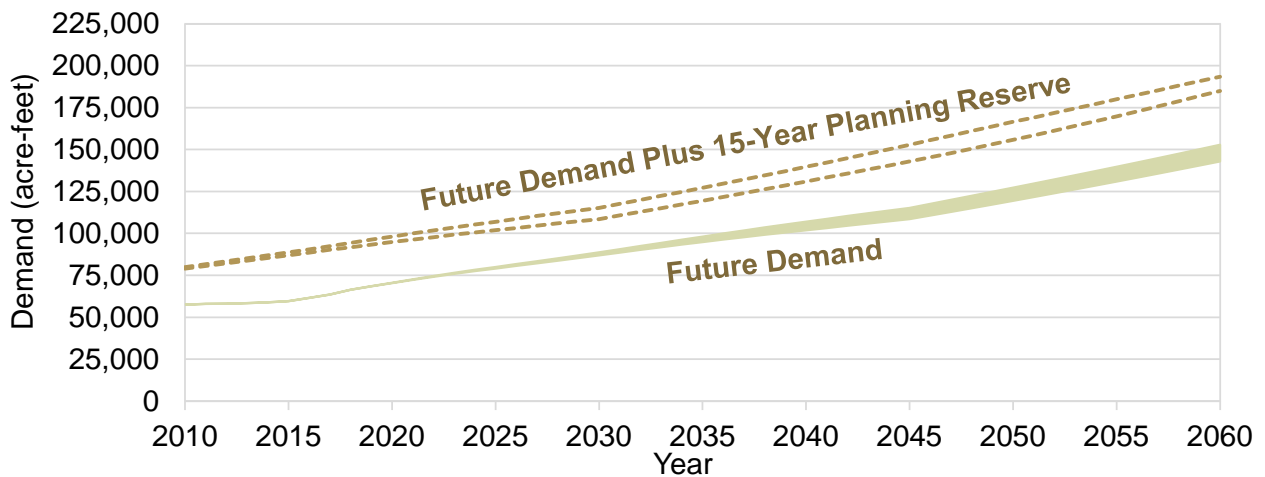
Year	WCWCD Water Demand (acre-feet) <sup>1</sup>		WCWCD Water Demand Plus 15-Year Planning Reserve (acre-feet) <sup>1</sup>	
	<i>Baseline Population Growth</i>	<i>High Population Growth</i>	<i>Baseline Population Growth</i>	<i>High Population Growth</i>
2010	56,923	56,923	78,483	79,363
2020	69,791	69,963	94,289	97,483
2030	86,370	88,128	107,999	114,610
2040	101,326	106,407	130,399	139,161
2050	118,909	126,702	155,250	165,997
2060	142,408	152,296	184,513	192,953

Key:

WCWCD = Washington County Water Conservancy District

Note:

<sup>1</sup> Demand projections based on State of Utah 2017 population and 2015 municipal water use updates.



**Figure 1. Demand Projections for Washington County Water Conservancy District**

### 3. Supply Projections

Since the submission of Study Report 19, there have not been any significant modifications in the current and future local water supplies. The Virgin River Basin remains the sole surface water source of water supply for the rapidly growing area. Climate change will only elevate the risks associated with such sole source reliance. The development of a second water supply, i.e., Utah’s Upper Colorado River allocation, remains essential.

#### 3.1. Colorado River Developments

LPP will use a portion of Utah’s remaining undeveloped Upper Colorado River Basin Compact allocation. Since the April 2016 filing, there have been a number of developments on the Colorado River system, both natural and human-induced, including those related to water levels in CRSP storage facilities.

##### 3.1.1. U.S. Bureau of Reclamation Exchange Contract

In late 2017, Applicant and Reclamation reached agreement in principle on an Exchange Contract (see Appendix A). Under a 1996 assignment agreement with Reclamation (Reclamation and the State of Utah 1996), the State of Utah agreed that if it were to benefit from a CRSP facility in using the assigned water, the state would “enter into a water service contract with the United States.” The Exchange Contract meets this requirement and its terms are mutually beneficial. The water, which as originally conceived would have been taken from the Green River upstream, will now flow downstream through both the Green and Colorado rivers to Lake Powell. The resulting instream flows will improve instream habitat and will “contribute to meeting the ESA Recovery Program requirements in reaches 1 and 2” on the Green River, and thereby “assist Reclamation in its obligations under the 2006 ROD covering the operation of

Flaming Gorge Dam” (see Appendix A). In turn, LPP will withdraw water from the existing Lake Powell Reservoir.

Final execution of the Exchange Contract will occur upon completion of the NEPA process. In the meantime, the parties have executed an interim letter agreement memorializing their understanding of the Contract (see Appendix A).

### 3.1.2. Colorado River Drought Response

The Bureau of Reclamation planned, constructed, and now operates the two key reservoirs in the Colorado River Basin. While both are Federal facilities, they were established by very different and separate acts of Congress. In 1928 the Boulder Canyon Project Act authorized Hoover/Boulder Dam which impounds Lake Mead. In 1956 the Colorado River Storage Project Act authorized Glen Canyon Dam which impounds Lake Powell. In common reference, Lake Mead was constructed mostly for the benefit of the Lower Division States of Arizona, Nevada, and California while Lake Powell was constructed mostly for the benefit of the Upper Division States of Colorado, Wyoming, New Mexico, and Utah.

The Long-Term Operating Criteria, Annual Operation Plans, and the Coordinated Operation of Lakes Powell and Mead (2007 Guidelines) are handled as seamlessly as possible by the Reclamation Team made up of staff from the Lower Colorado Region’s Boulder City, Nevada office and the Upper Colorado Region’s Salt Lake City, Utah offices.

The basic operation philosophy of the two reservoirs is, however, quite different. In the case of Lake Mead, because of the issues surrounding its origin and the subsequent history, the Secretary of the Interior (through Reclamation) acts as the Water Master for Lake Mead and the Lower Colorado River and delivers water by contract to the Lower Basin water users. In the case of Lake Powell, Reclamation operates the reservoir in close coordination with the Upper Division States and the Upper Colorado River Commission (Commission). Water delivery to Upper Basin users is the purview of the Upper Division States based upon their respective water rights processes. This distinction makes for considerable differences in the way these reservoirs are managed.

For the combined operations decisions for the Colorado River System, the seven Colorado River Basin States (“Basin States”), the Commission and Reclamation work closely together to assure that the Long Range Operating Criteria and all other operational criteria, including the 2007 Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead are adhered to. Moreover, Annual Operations planning and execution must be accomplished with review and consultation with a wide array of interested parties, and needed compliance with the NEPA and ESA must be satisfied.

Specifically, for the Lake Powell Pipeline the water supply will be derived from the Exchange Contract referenced above. As with the use of all water rights in the State of Utah, the Utah Division of Water Rights will administer the process.

It is important to understand that while each state administers its own water rights system the states have an allocation of water that can be used from the Colorado River. These allocations

are governed by the 1922 Colorado River Compact. In the Upper Basin, those quantities are also governed by the 1948 Upper Colorado River Basin Compact.

Reclamation's benchmark 2012 Colorado River Basin Study and associated climate model projections indicate a potential decrease in mean natural flow of approximately 9 percent over the next 50 years (Reclamation 2012). Recent modeling (Reclamation 2018) conducted by Reclamation for the Basin States in August 2018, taking into account future uses in the Upper Basin including the LPP, indicate a near zero percent chance of a declared Compact shortage for the Upper Basin through the year 2050 if hydrology remains similar to what the Basin has experienced over the last century. If the hydrology of the future looks more like the last 30 years, including the recent period of historic drought which is similar to drier, hotter climate change predictions, the risk of a declared Compact shortage rises to approximately 13 percent during the same period.

An important point of discussion is “What happens if there is not enough water in the Colorado River system to meet all the allocated uses?”<sup>1</sup> For Lower Division States, the generic answer is that shortages will be applied. For the Upper Division States, the issue is a bit more complicated. The 1922 and 1948 Compacts allocate a share of the total Colorado River supply to the Upper Division States and divide that share among the individual states using a percentage approach. In addition, the Upper Division States are required “not to deplete the flow reaching the Lower Basin” such that the 10-year rolling average at Lee Ferry (the basin dividing point) is less than 75 million acre feet. In the history of the administration of the system there has never been a time when the 10-year rolling average was not met. The 1948 Compact indicates that if such a situation were to occur, the Upper Division States would have to curtail their depletions to correct the problem. It goes on to say that the Commission will decide when and how much curtailment each Upper Division State will be required to take.

Just how this process would be implemented is not certain. Although there is some specific direction in the 1948 Compact, there are no additional, detailed implementation rules or procedures in place at this time. Such a shortage has never happened and is not currently very likely to happen in the near future given that the current 10-year rolling average of deliveries is near 90 million acre feet. Such a potential curtailment process would not be applied only to the Lake Powell Pipeline Project water right but to potentially all the post-1922 Compact water rights in the Upper Basin. The process would be administered from a basin-wide standpoint by the Commission, which is made up of representatives appointed by the Governors of the four Upper Division States and one representative appointed by the President of the United States. Individual state curtailment actions would be determined by the states in accordance with their water rights laws.

In addition, the above-referenced Basin Study identifies a number of “options and strategies to resolve supply and demand imbalances” and encourages the Compact states and stakeholders to

---

<sup>1</sup> Primarily due to the lack of upstream storage, some Upper Basin water users see a hydrologic shortage somewhere in the Basin nearly every year due to variable and localized dry hydrology.

work together in advancing the same. That work has been ongoing and continues to this day. By way of example:

- The states and stakeholders, including conservation organizations, initiated a “Moving Forward” effort designed to pursue the “next steps” identified in the Reclamation Study. These steps included the formation of a Coordination Team and several workgroups, including Municipal and Industrial Conservation and Reuse, Agricultural Water Conservation and Transfers, and Environmental and Recreational Flows. Each workgroup, in turn, identified future opportunities and potential actions (Reclamation 2015).
- Reclamation has been working on a Climate Change Adaptation Strategy and released a progress report in November 2016 (Reclamation 2014, 2016). The four goals of the Strategy include: an increase in water management flexibility, an enhancement of climate adaptation planning, the improvement of infrastructure resiliency, and the expansion of information sharing. The Climate Change Adaptation Strategy effort has advanced the science in this area and provided funding in furtherance of the implementation of drought response/climate change measures.
- The Basin States, including Utah, have also been actively engaged in the preparation of drought contingency plans (DCPs) designed to further reduce water shortage risks. The draft plans and process documents were released for public review on October 10, 2018 (Reclamation and Colorado River Basin States 2018). These Upper and Lower Basin DCPs will supplement the 2007 Interim Guidelines, which were themselves designed to reduce shortage risks. It is anticipated that the DCPs will be fully negotiated and implemented well in advance of any construction activity associated with LPP. The final DCPs may include a variety of voluntary state water use reductions, new reservoir drought operation protocols, demand management, and system conservation programs with associated water banking.
- Reclamation, in coordination with the Commission and Basin States, has begun to run what is being referred to as a “stress test” approach to modelling , utilizing the 1988 to 2015 hydrology, which includes the current historic drought. This recent 28-year period is a more conservative estimate of future water supply and assumes less water is available than under the climate change predictions used in the Basin Study. This conservative future supply scenario planning will assist the Basin States and Reclamation in identifying approaches to water development and use that will support future reservoir storage levels and avoid reservoir levels falling below critical elevations triggering shortage or interruption of hydroelectric power generation.

Though the Basin States are diligently working on risk mitigation strategies, there is no imminent threat to LPP supplies. It must not be forgotten that the availability of water under the governing Colorado River Compacts, unlike that available under state allocation systems, is not based on a priority or prior appropriation approach. Although LPP may be built later in time than other projects that does not mean LPP will be “called out” under the Compacts before other projects in the basin may suffer a curtailment.



### 3.1.3. Applicant Is Prepared for Any Interim Curtailment

Finally, it should be noted that even if there is an interruption of LPP deliveries due to a Colorado River system shortage declaration, it would be temporary in nature, may not entail more than a partial curtailment of LPP deliveries, and would be accommodated under applicable comprehensive water supply plans. Project beneficiaries would, for a period of time, rely on underground storage, enhanced groundwater pumping, and other interim measures. Such a low risk eventuality, for which a prudent back-up plan is nevertheless in place, does not affect the viability of this essential second source of supply for southwestern Utah. A determination of the level of acceptable risk should be, and has been, made at the state and local level.

## 4. References

Kem C. Gardner Policy Institute at the University of Utah (Policy Institute). 2018. Technical Memorandum: Washington County Long-Term Projection Scenarios. January.

U.S. Bureau of Reclamation (Reclamation). 2018. August 2018 Colorado River Modeling Results.

\_\_\_\_\_. 2016. Climate Change Adaptation Strategy: 2016 Progress Report. November.

\_\_\_\_\_. 2015. Colorado River Basin Stakeholders Moving Forward to Address Challenges Identified in the Colorado River Basin Water Supply and Demand Study: Phase 1 Report. May.

\_\_\_\_\_. 2014. Climate Change Adaptation Strategy. November.

\_\_\_\_\_. 2012. Colorado River Basin Water Supply and Demand Study. December.

U.S. Bureau of Reclamation (Reclamation) and Colorado River Basin States. 2018. Draft Agreement Concerning Colorado River Drought Contingency Management and Operations. October.

U.S. Bureau of Reclamation (Reclamation) and the State of Utah. 1996. Assignment of Water Right No. 41-3479 (A30414d) from the United States of America to the State of Utah. Available at: <https://waterrights.utah.gov>.

U.S. Environmental Protection Agency (EPA). 2013. Water Audits and Water Loss Control of Public Water Systems. Office of Water (4606M). EPA 816-F-13-002. July.

Utah Division of Water Resources (UDWRe). 2018. 2015 Municipal and Industrial Water Use Data. June.

\_\_\_\_\_. 2016. LPP Final Study Report 19, Climate Change Report and Water Needs Assessment. April.

Appendix A. U.S. Bureau of Reclamation Exchange Contract