September 2, 2020

Conserve Southwest Utah
321 North Mall Drive, B202
St George, UT 84790

Expert opinion and analysis regarding water demands and statement of need for the Lake Powell Pipeline Project DEIS

To Whom It May Concern:

At the request of Conserve Southwest Utah, I have prepared this expert letter report regarding water demands pertaining to the Lake Powell Pipeline (LPP) Project Draft Environmental Impact Statement (DEIS) and statement of Purpose and Need (Appendix B).

In summary, this letter report concludes that the future water demand forecast for Washington County is grossly inflated. The forecast is inflated through several mechanisms including:

- A population forecast that increases by 293%.
- An excessive level of per capita water use that would make Washington County water users among the highest in the US.
- Improper inclusion and inflation of raw secondary irrigation water in the forecast.
- A 15.4% water loss factor which never improves and thus wastes approximately $300 million in value of the $2 billion dollar project.

A statement of need and water demand forecast for a project of this size and scope must be based on sound data, reasonable assumptions, and conservative resource principles to ensure the water will not be wasted. Water customers across the Western United States have successfully implemented effective water efficiency that today reduced per capita use far below levels shown the DEIS forecast for 2020 and 2075. The forecast in the DEIS provides for an excessive level of per capita water use over the next 55 years with efficiency improvements that simply end at year 2045 with no further improvement in efficiency achieved over the next 30 years. This is neither realistic nor reasonable.

The DEIS forecasts a future population of more than 500,000 people which is equivalent to a city the size of Tucson, Arizona. With this level of development, current housing patterns will change and fewer people are likely to live in large sprawling single-family homes with a supply of secondary water for irrigation as is common today. Under this high growth scenario, water use will necessarily change and become more efficient. The DEIS forecast should reflect realistic, efficient levels of future use, not wasteful and excessive levels as currently presented.

Arguments that Washington County is somehow different or exceptional from other communities in the West because it has second homes, resorts, pools, golf courses, and such

and is thus immune to national trends towards higher efficient are nonsense. Water is a precious and expensive commodity and least cost planning principles must be applied when considering expensive infrastructure projects such as the Lake Powell Pipeline.

Water in Washington County will be expensive in the future, regardless of the source, and economics alone will press down demand. New technology for remotely managing irrigation and for detecting both utility and customer leakage will reduce demands and losses in the future, something ignored in the DEIS forecast. Communities across the Western US, including Aspen, Las Vegas, and Tucson - with many second homes and traditionally high irrigation demand - have successfully reduced both indoor and outdoor water use to levels today that are far below what is forecast in the DEIS for year 2075.

For the past 30 years water demand forecasts prepared by utilities grossly over-estimate water demands because the ignore they impacts of water efficiency and conservation. The demand forecast in the DEIS makes the same mistake and is inflated and unrealistic. The DEIS forecast ignores obvious trends in usage and future technological improvements as well as economic pressures that have reduced demand and will continue to do so, because water is such a precious commodity.

This report provides a detailed review and analysis of each component of the DEIS demand forecast and shows how it compares with current water use in other communities across the Western US. The analysis in this report shows that the DEIS forecast is highly inflated and likely unrealistic. Even if this exceptional (and highly unlikely) level of population growth were to occur in the southern Utah desert, the water demands required to serve these people have been improperly inflated though several mechanisms. The proposed future level of per capita water use and water loss are excessive and ignore today's best practices regarding the ongoing impact of water efficiency.

Summary of Qualifications

I am the Principal of Water Demand Management, LLC (WaterDM), based in Boulder, Colorado. WaterDM is a water consulting firm providing expertise and services in the following areas:

- Municipal and industrial water use, research, and analysis
- Water conservation and demand management planning and implementation
- Integrated water resources planning
- Water loss control
- Analysis of municipal water rates and rate structures
- Drought preparedness and response
- Demand forecasting
- Evaluation of changes in demand
- Statistical analysis of water demand and modeling
- Meter technology implementation
- Meter and service line sizing

I have a Master of Science in Engineering (1995) from the University of Colorado, Boulder and a Bachelor of Arts (1986) from Oberlin College. I am a registered and licensed Professional Engineer in Colorado.

I am a civil engineer and the focus of my career for over 25 years has been on urban water systems and demand management including conservation planning and implementation, rate analysis, water demand research, demand forecasting, drought preparation, utility metering, and water loss control. Since 1995, I have served as a consultant and researcher to urban water providers, US EPA, the Water Research Foundation, the Alliance for Water Efficiency, state governments, and municipal and industrial water users in the US and Canada.

Over my 25 -year engineering and consulting career, I have worked with and advised hundreds of water providers and organizations such as the California Department of Water Resources; Salt Lake City Public Utilities; Marina Coast Water District; Tucson Water; New York City Water Board; the Colorado Water Conservation Board; Hilton Head, SC; Denver, CO; Scottsdale, AZ; San Antonio, TX; Metropolitan Water District of Southern California; US EPA; the US Department of Justice; the Alliance for Water Efficiency and many others. I have served as the principal investigator and lead or co-author of numerous national and state-level water demand research studies including: Residential End Uses of Water (2016, 1999); Assessing Water Demand Patterns to Improve Sizing of Water Meters and Service Lines (2020); Peak Demand Management (2018); Colorado Water Plan and Update (2010, 2018); National Submetering and Allocation Billing Program Study (2004); Water Budgets and Rate Structures (2008); Commercial and Institutional End Uses of Water (2000); and many others.

I Chair of the subcommittee and am lead author of the American Water Works Association (AWWA) M22 Sizing Water Service Lines and Meters 3rd. ed. (2014) and 4th ed. (pending). I am co-author of the AWWA G480 Water Conservation Standard (2013 and 2020) and co-author of the Colorado Best Practices Guidebook for Municipal Water Conservation (2010). I served as Trustee of the AWWA Water Conservation Division from 2001-2007 during which time I worked with EPA to create the WaterSense™ program and helped establish the Alliance for Water Efficiency. I have been a Senior Technical Advisor to the Alliance for Water Efficiency since 2007. I am a member of the American Water Works Association, the Alliance for Water Efficiency, the American Water Resources Association, the American Society of Civil Engineers (ASCE), the Colorado Water Congress, and the Colorado River Water Users Association.

In 2016, I testified as an expert witness on municipal and industrial water use at the US Supreme Court (FL v. GA, 142 Original) on behalf of the State of Georgia.

A copy of my curriculum vitae is available at www.waterdm.com.

Lake Powell Pipeline DEIS Water Demand Forecast

The LPP Project is proposed to deliver 86,249 acre-feet (af) of water annually from Lake Powell to Washington County, Utah to supplement approximately 100,000 af of local surface water supplies to meet a forecast water demand in 2075 of 184,593 af (reproduced below).[1]

This volume of water is ostensibly required to meet a forecast 2075 population in Washington County of 594,660 people, a 293% increase over 60 years. As part of this forecast, per capita water use (inclusive of all uses except system losses) starts at 302 gallons per capita per day (gpcd) in 2015 and is reduced by 20% to 240 gpcd by 2045. After year 2045 there are no additional efficiency improvements and gpcd is forecast to remain at 240 gpcd through 2075. System water losses start at 15.4% in 2015 and continue unchanged through 2075.

Table 1: Future Water Requirements for Washington County WCD produced from Table 6.2-1 from the DEIS

Table 6.2-1 Future Water Requirements for Washington County Water Conservancy District

Year	WCWCD Service Area Population - Baseline Projection (calculated using the Gardner estimate multiplied by UDWRe system ratio)	GPCD per Applied Analysis that includes 20% conservation	System loss from Applied Analysis model	Demand (acre-feet) with System Loss
2015	151,360	302	0.154	59,038
2020	182,689	296	0.154	69,791
2025	214,408	283	0.154	78,483
2030	246,338	271	0.154	86,370
2035	280,731	260	0.154	94,289
2040	314,199	250	0.154	101,326
2045	348,064	240	0.154	107,999
2050	383,226	240	0.154	118,909
2055	420,257	240	0.154	130,399
2060	458,960	240	0.154	142,408
2065	500,349	240	0.154	155,250
2070	545,470	240	0.154	169,251
2075	594,660	240	0.154	184,513

Key:
GPCD = gallons per capita per day
UDWRe = Utah Division of Water Resources
WCWCD = Washington County Water Conservancy District

The 2015 demand data which forms the basis for the future water requirements for Washington County are published by the Utah Division of Water Resources (Table A-5 County

[1] Reclamation. 2020. Lake Powell Pipeline Project, Draft Environmental Impact, Statement, Coconino and Mohave Counties, Arizona, Kane and Washington Counties, Utah. U.S. Department of the Interior, Bureau of Reclamation. June 2020. Table 6.2-2 Future Water Requirements of the Washington County Water Conservancy District.

2015 Community Water use[2]). These data show an average of 302 gpcd in Washington County made of up 231 gpcd of potable water and 71 gpcd of secondary water.[3] In addition to this, the 15.4% water loss added on top in the DEIS, further increasing demand. Figure 1 shows the breakdown of potable use into relevant categories along with secondary water use and water loss calculated at 15.4% to match the DEIS. Secondary use accounts for 20% of the total demand in Figure 1 of 59,038 AF and which matches the DEIS forecast shown in Table 1.

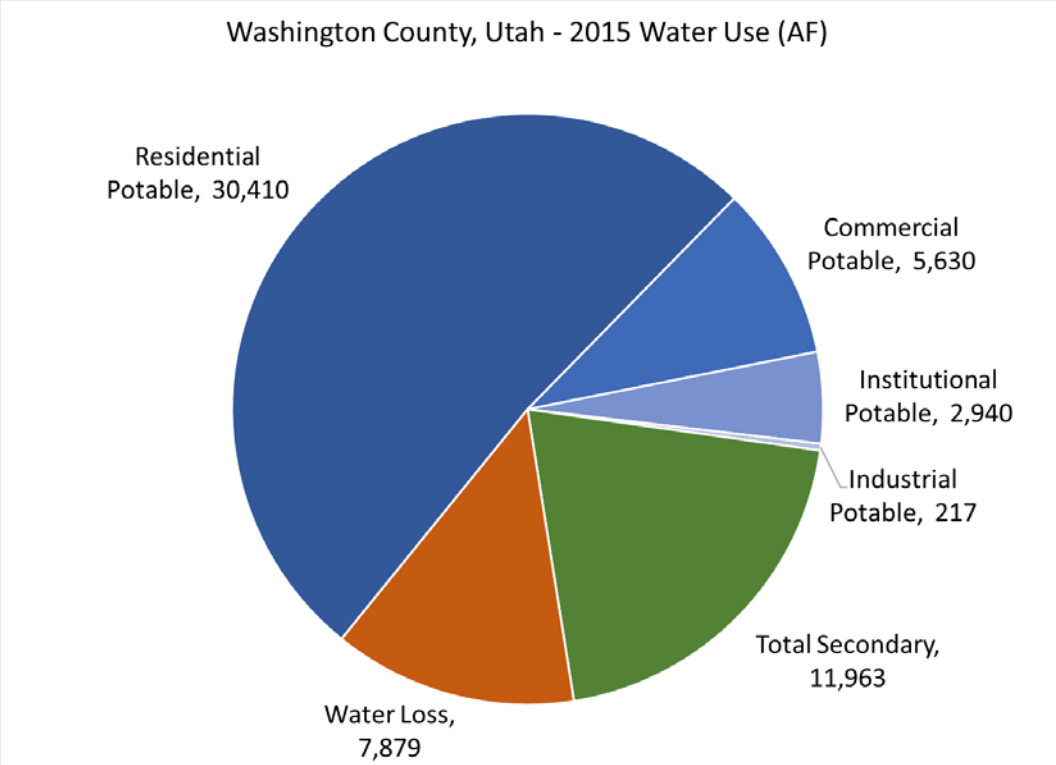

Figure 1: 2015 potable and secondary water use, Washington County, Utah

Using the data in Table 1, WaterDM prepared Figure 2 which show the DEIS forecast from 2015 – 2075. A 20% conservation factor is applied through 2045, but once the 20% conservation factor ends, demand in Washington County is forecast to increase steeply and unabated for another 30 years. Under this forecast Washington County, which increases demand in each sector proportionally over time, is predicted to have annual water losses of more than 24,000 AF by year 2075, which is more than the potable demands of the commercial and industrial sectors combined.

Figure 2 shows a tripling of water demand in Washington County and assumes that more than

[2] 2015 Municipal and Industrial Water Use Data. 2020 version 3. Utah Division of Water Resources. Salt Lake City, Utah.

[3] Secondary water is defined as "non-potable or untreated water that does not meet EPA Safe Drinking Water requirements. Generally, irrigation and canal companies deliver secondary water through open ditch systems or pressurized pipelines for irrigation of lawns, gardens, landscape, parks, cemeteries, golf courses, and other open areas." (p. 5 2015 Municipal and Industrial Water Use Data. 2020 version 3).

500,000 future residents will only increase efficiency modestly over the next 25 years and that beyond that, no additional efficiency will occur, in spite of high water rates necessitated by expensive infrastructure like the LPP, a dry desert climate, and codes and standards that have reduced demand and will continue to reduce demand across the United States. The forecast also includes a staggering 293% population increase over the forecast period.

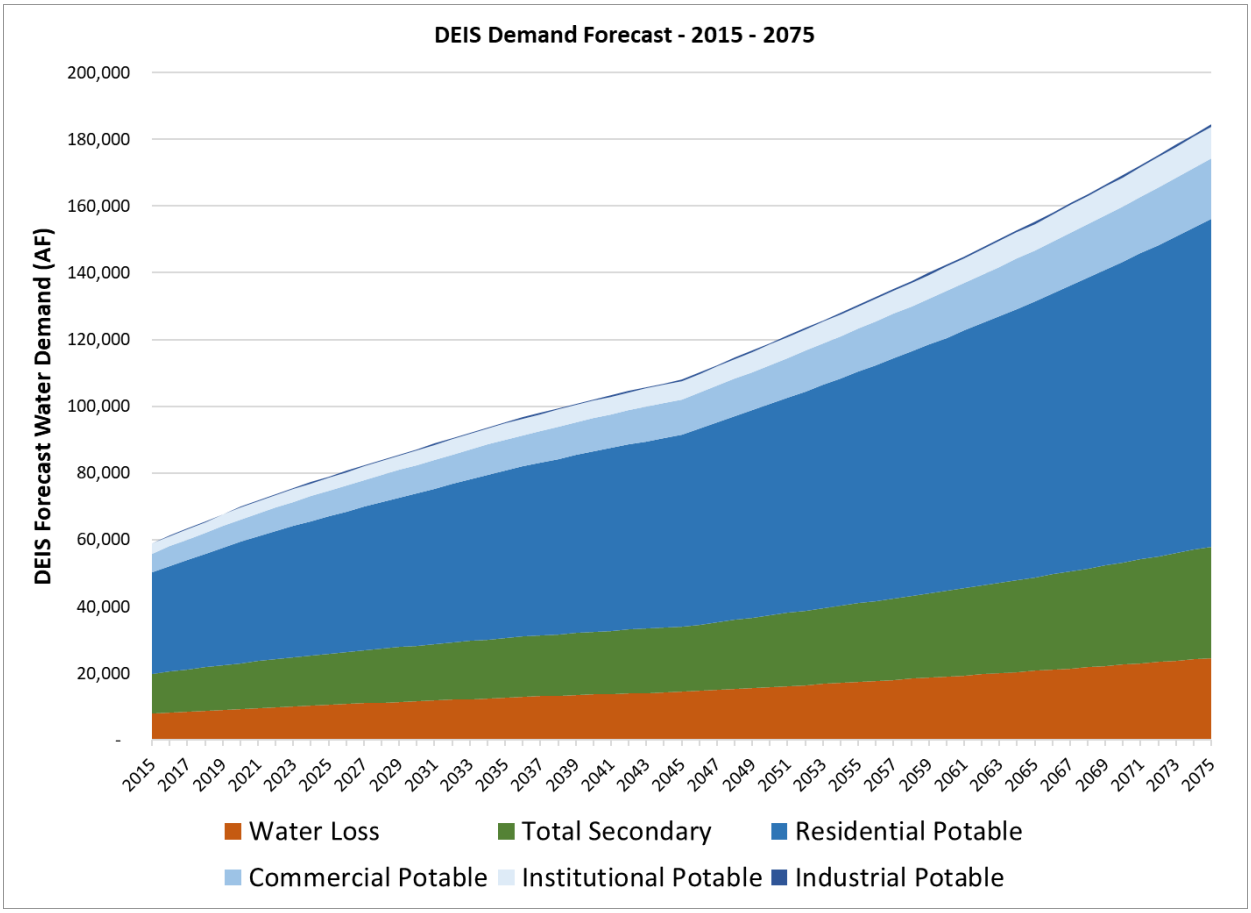

Figure 2: DEIS water demand forecast for Washington County, Utah (2015 – 2075)

WaterDM reviewed each component of the DEIS water demand forecast shown in Table 1 for reasonableness and accuracy as is required to justify construction of a $2 billion infrastructure project.

Per Capita Use Forecast

As part of the DEIS forecast, per capita water use (inclusive of all uses except system losses) starts at 302 gpcd in 2015 and is reduced by 20% to 240 gpcd by 2045. After year 2045 there are no additional efficiency improvements and gpcd is forecast to remain at 240 gpcd through 2075. The reasonableness of this forecast must be considered in the context of changes in water demands that occurred over the past 25 years and comparisons with other water providers in the Western US.

System Per Capita

Annual system per capita use is calculated by taking the total volume of water produced in a year for a water system and dividing that volume by the population and the number of days. Water production volumes are usually measured at water treatment plants before water is put into the distribution system and thus system per capita use typically includes system water losses that occur as water is transported to customers. The per capita use values presented in the DEIS are inclusive of all water use (residential, commercial, irrigation, etc.) with the notable exception of system water losses which the DEIS separates into a separate category.

Per Capita Use Has Declined Nationally

The US Geologic Survey publishes national water use data every five years and Figure 3 shows the public supply withdrawals in the US and population for 1950 through 2015, the most recent year for which data are available. Public supply withdrawals peaked in 2005 and declined in 2010 and 2015.

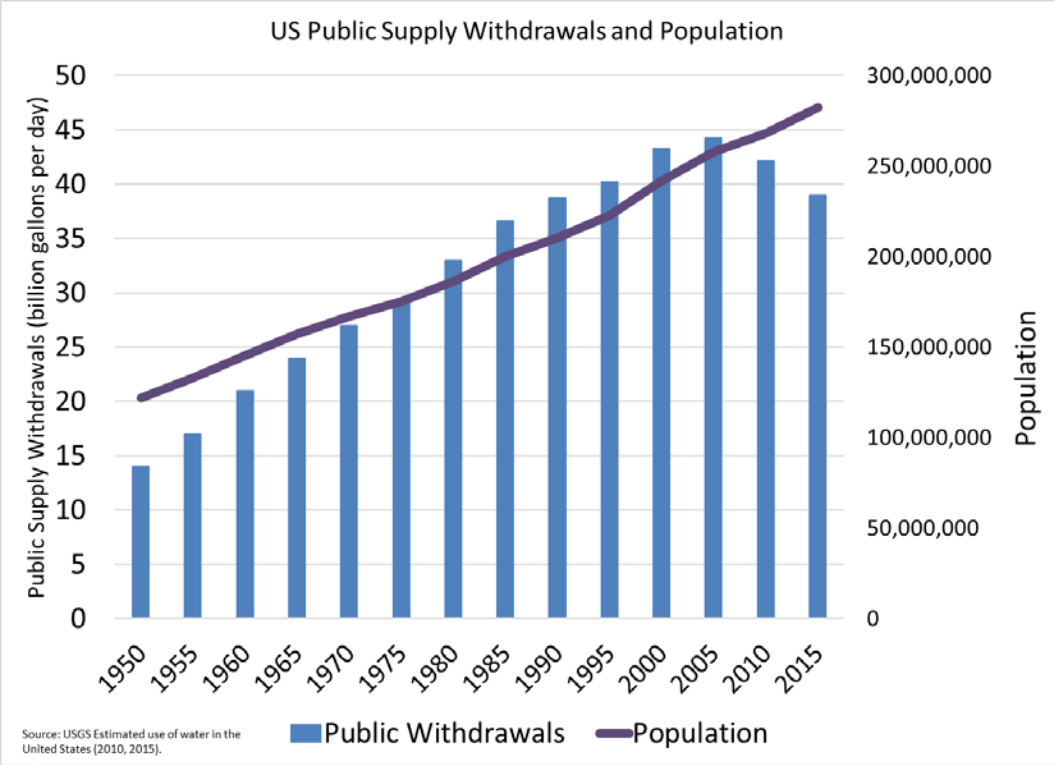

Figure 3: US Public Supply Withdrawals and Population, 1950 – 2015

Figure 4 shows the same US public supply withdrawals along with the average annual gallons per capita per day. Nationally, per capita use peaked in 1985 at about 184 gpcd and by 2015 had declined to less than 140 gpcd. **The DEIS forecasts the 2075 gpcd in Washington County to be 71% higher than the national average in 2015.**

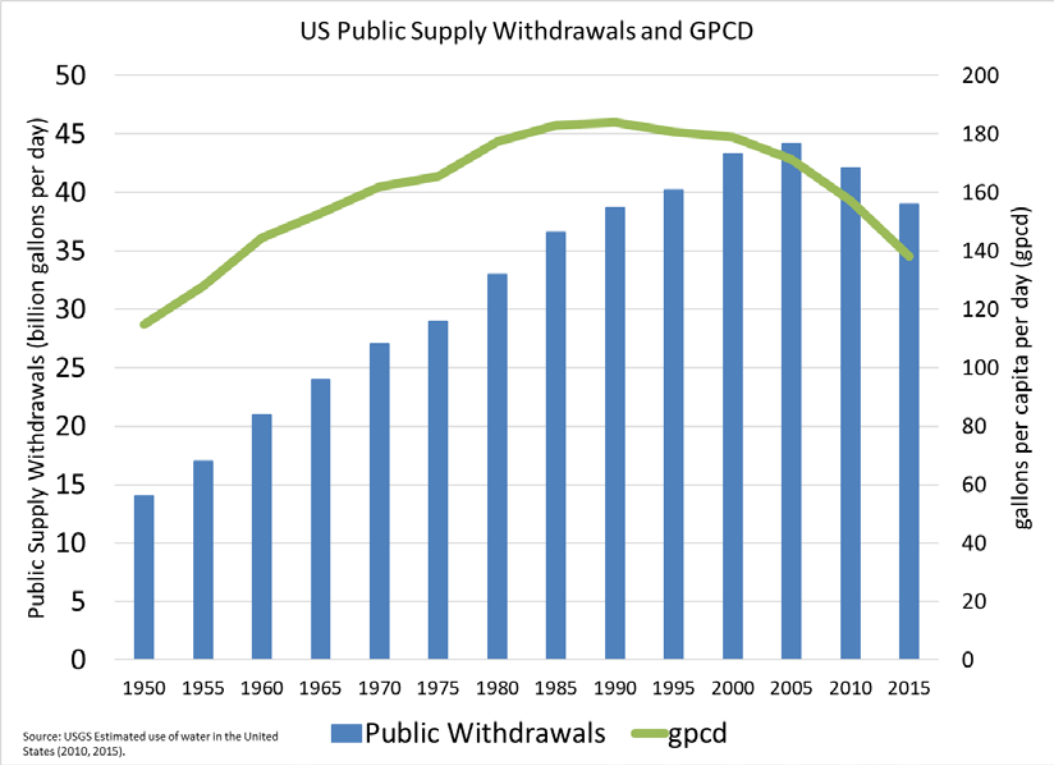

Figure 4: US Public Supply Withdrawals and GPCD, 1950 – 2015

Residential water use in Utah remains among the highest in the US according to the USGS as shown in Figure 5 which was prepared by the City of Tucson to understand how water use around the western US compares. This suggests that Utah, as a state, and Washington County as the highest water using region in the state, have ample room for increased efficiency in the future. Downstream users on the Colorado River like California, Arizona and Nevada are paying attention. Water efficiency is the norm up and down the Colorado River basin as supplies have dwindled as a result of drought and climate change.

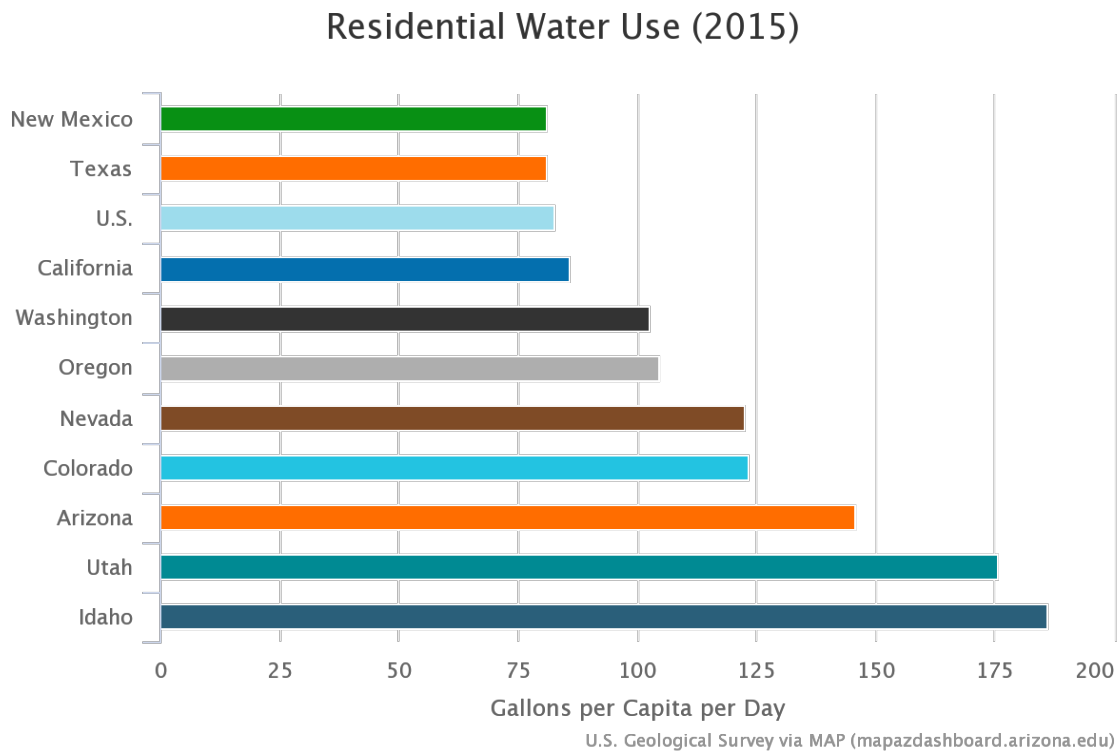

Figure 5: Comparison of per capita residential water use in the US, 2015.[4]

Per Capita Comparisons Show High Usage in Washington County

To better understand the scale of the forecast gpcd values in the DEIS, these data were compared against per capita use from cities that participated in the 2016 Residential End Uses of Water Study.[5] Per capita use was calculated for this study using the same approach as the DEIS with water losses explicitly excluded, but all other uses (residential, commercial, irrigation, etc.) included. The most "apples to apples" comparison of gpcd is to compared potable gpcd and this and other comparisons are presented in Table 2: Per Capita Comparisons. In 2015, even potable water use by itself in Washington County averaged 231 gpcd, placing it among the highest levels of per capita use of comparable western cities as shown in Table 2.

It should be noted that most western cities have concluded that such a high levels of per capita water use are unsustainable (not to mention expensive) in arid environments and they have all implemented metering, conservation pricing and various other water efficiency programs to reduce demand and extend existing supplies. The DEIS in recognition of this, applies a steady reduction factor until a 20% reduction is achieved in 2045.

Even with the conservation factor applied, DEIS forecast total per capita use for Washington County in year 2075 is higher than any utility that participated in the 2016 Residential End Uses

[4] https://mapazdashboard.arizona.edu/infrastructure/residential-water-use
[5] DeOreo, W.B., P. Mayer, J. Kiefer, and B. Dziegielewski. 2016. Residential End Uses of Water, Version 2. Water Research Foundation. Denver, CO

Study, including Scottsdale Arizona which in addition to having high water use also has a well-funded and staffed utility-sponsored water efficiency program.[6]

Table 2: Per Capita Comparisons

Agency	Population	GPCD
Washington County WCD - 2015 potable + secondary + water loss	**151,360**	**348.2**
Washington County WCD - 2015 potable + secondary	**151,360**	**302.0**
Washington County WCD - 2075 potable + secondary + water loss forecast	**594,660**	**277.0**
Scottsdale, AZ – 2010 potable	217,385	273.1
Henderson, NV – 2010 potable	277,502	256.9
Washington County WCD - 2075 potable + secondary forecast	**594,660**	**240.0**
Washington County WCD - 2015 potable	**151,360**	**231.0**
Colorado Springs, CO – 2010 potable	441,000	212.3
Washington County WCD - 2075 potable forecast	**594,660**	**190.0**
Fort Collins, CO – 2010 potable	129,000	157.9
Denver, CO – 2010 potable	1,174,000	156.7
Tacoma, WA – 2010 potable	317,450	150.0
Otay, CA – 2010 potable	198,616	149.9
Tucson, AZ – 2010 potable	545,975	144.0
Mountain View, CA – 2010 potable	72,800	132.6
Aurora, CO – 2010 potable	325,078	126.6
Austin, TX – 2010 potable	886,768	121.9
San Diego, CA – 2010 potable	1,312,000	118.2
Santa Barbara, CA – 2010 potable	91,416	115.0
San Antonio, TX – 2010 potable	1,360,000	105.7
Philadelphia, PA – 2010 potable	1,500,000	104.5
Chicago, IL – 2010 potable	5,300,000	98.4
Sacramento, CA – 2010 potable	430,437	91.4
Portland, OR – 2010 potable	915,800	61.0

Sources: Table 6.2-2 Future Water Requirements of the Washington County Water Conservancy District., DeOreo, W.B., P. Mayer, J. Kiefer, and B. Dziegielewski. 2016. Residential End Uses of Water, Version 2. Water Research Foundation. Denver, CO

Water Efficiency Impacts Not Considered After 2045

The forecast for Washington County in year 2075 would place its water use among the very highest water using communities in the western US today and in the future. With the Lake Powell Pipeline, Washington County must necessarily also have high water rates. A strong price signal through rates is proven effective at reducing consumption, even in communities with second homes and significant volumes of irrigation. Yet the DEIS shows no efficiency improvements or demand reductions in Washington County for a 30-year period.

[6] https://www.scottsdaleaz.gov/water/rebates

It is unclear why efficiency improvements are stopped in 2045. This is neither reasonable, nor realistic, particularly given the anticipated impacts of climate change which will drive up the cost of providing water and will reduce supplies. All of the new demand in Washington County will come from new residents and new buildings that will be constructed in compliance with modern plumbing codes and standards. These national codes and standards, such as the 1992 Energy Policy Act require that all toilets sold in the US use 1.6 gallons or less per flush. Stores like Home Depot only offer EPA WaterSense certified toilets use that 1.28 gallons per flush or less. New buildings will necessarily be more water efficient that old buildings. Assuming future water use in 2075 will be the same as it was in 2045 without efficiency improvement is not reasonable and not a sound basis for least-cost infrastructure planning.

Recent failures of demand forecasting (discussed below) have exposed demand forecasting methods that fail to include long term efficiency improvements and thus, water efficiency and efficiency improvement are now standard consideration for most demand forecasts. These forecasting failures have been largely due to inflated future per capita demands and inflated population forecasts – two problems clearly evident in the DEIS.

The changes and efficiency improvements that have been made in indoor residential water use are documented in research conducted by the Water Research Foundation and the American Water Works Association. A summary is presented in Table 3. These data shown that modern, water efficiency homes in the US will use about 40 gpcd indoors. In the future they could use even less.

Table 3: Summary of per capita use from Residential End Uses of Water Studies (REUWS)

	1999 REUWS (indoor gpcd)	2016 REUWS (indoor gpcd)	WaterSense New Home (indoor gpcd)
Toilet	18.5	14.2	7.7
Clothes Washer	15	9.6	4.4
Faucet	10.9	11.1	8.1
Shower	11.6	11.1	11.0
Dishwasher	1.0	0.7	0.5
Leak	9.5	7.9	5.0
Bath	1.2	1.5	1.5
Other	1.6	2.5	1.6
Indoor Total	**69.3**	**58.6**	**39.8**

Sources: Mayer, P.W., W.B. DeOreo, et. al. 1999. Residential End Uses of Water. American Water Works Association Research Foundation, Denver, CO.; DeOreo, W.B., P. Mayer, J. Kiefer, and B. Dziegielewski. 2016. Residential End Uses of Water, Version 2. Water Research Foundation. Denver, CO; W.B. DeOreo, A. Dieteman, T. Skeel, P. Mayer, et. al. 2001. Retrofit Realities. Journal American Water Works Association, March 2001.

A major emerging trend in water utilities is the use of advanced metering infrastructure (AMI) to detect customer leaks and alert customers about abnormal usage. Recent research has

shown that these programs are capable of reducing customer-side leakage by about 50%.[7] As the cost of water increases over the next 50 years, outdoor use will become more and more expensive and landscaping will be adapted accordingly.

Secondary Water Use Improperly Forecast

Baked into the DEIS demand forecast is a substantial component of secondary water use. As shown in Figure 1, secondary water use accounts for about 20% of 2015 demand once water losses are included.

Figure 1: 2015 potable and secondary water use, Washington County, UtahSecondary water is defined as "non-potable or untreated water that does not meet EPA Safe Drinking Water requirements. Generally, irrigation and canal companies deliver secondary water through open ditch systems or pressurized pipelines for irrigation of lawns, gardens, landscape, parks, cemeteries, golf courses, and other open areas."[8]

Because secondary water use is imbedded into the 2015 water demand of 302 gpcd (71 gpcd is secondary water), secondary water demand is automatically increased throughout the 60-year forecast. In Washington County today, most of the secondary water is supplied by irrigation companies with limited water rights. These supplies cannot possibly grow proportionally with population into the future as shown in Figure 2, yet they have been improperly imbedded into the 2015 baseline demand.

Even with the 20% conservation factor applied through 2045, secondary water use, which is embedded into the forecast, must necessarily increase through the demand forecast and after 2045 because of the forecasting methodology. This is not reasonable. The LPP should not be constructed to provide secondary water use for irrigation, rather the project is only properly considered as a potable supply. Use of secondary water is seasonal, thus including it as part of the annual gpcd is misleading from the perspective of supply timing as well.

Secondary water is a separate supply and thus demand for secondary water should be determined distinctly from the potable demand into the future. Lumping them together, as has been done in the DEIS, is improper from multiple planning and forecasting perspectives and should be corrected. WaterDM estimates that including secondary water in the demand forecast has improperly inflated per capita demands in the DEIS by at least 20%.

The DEIS should be corrected and the Bureau of Reclamation must clarify to what extent irrigation company water shares will be carried in the Lake Powell Pipeline, if at all. The cost of secondary water is generally much lower than for potable water and it is not clear how the economics of the $2 billion Lake Powell Pipeline work if 20% of the supply is sold at secondary water rates not to mention being subject to 15.4% of the supply lost to leakage.

[7] https://sfwater.org/index.aspx?page=947

[8] 2015 Municipal and Industrial Water Use Data. 2020 version 3. Utah Division of Water Resources, p. 5.

Future Per Capita Use Improperly Inflated

If more than 500,000 people live in Washington County Utah in 2075 and use an average of 277 gpcd (including water losses) it will be one of the most water-inefficient communities in America in that year or any year. It is not reasonable to plan for such inefficiency and profligate water use.

The future per capita use presented in the DEIS has been improperly inflated given that 30 years of potential efficiency gains are ignored, secondary water use is incorrectly included and allowed to increase, and water loss is never addressed.

System Loss Forecast

In the DEIS, a 15.4% water loss factor is applied each year to account for real losses in the system. The 15.4% water loss factor, presumably based on current water loss rates*, does not change over the 60-year period of the forecast* and is applied to both potable and secondary water use. As shown in Figure 2, **the DEIS predicts real annual water losses (e.g., the physical loss of water from the system) of more than 24,000 AF by year 2075**, which is an astonishingly high volume and more than the potable demands of the commercial and industrial sectors combined.

The Lake Powell Pipeline is a $2 billion dollar project and the DEIS forecast states that 15.4% of the product or value delivered through this LPP will be lost each year. This implies that approximately $300 million in value of the initial $2 billion dollar project will be wasted along with an additional value of the operation, maintenance, and the repair costs wasted over the life of the project. This is an outrageous, wasteful, and completely unreasonable assumption to foist upon water rate payers in Utah. The economic consequences of $300 million in water losses are simply too large to ignore. State and national policies are increasing accountability for water loss and requiring utilities to reduce real loss to the extent it is economically reasonable. In 2020, Utah passed HB 40 which will improve water loss accounting across the state.[9] This increased scrutiny of water losses will certainly apply to Washington County as well.

The starting point for water loss in Washington County, 15.4%, is an extremely high level of real losses for a system to endure. For many years an industry rule of thumb was that anything above 10% “unaccounted for water” constituted a real problem. Over the past 20 years water loss accounting has improved and advanced which has improved understanding of typical water loss rates, though they vary tremendously depending upon the age of a water system. Properly designed and installed new distribution systems have lower levels of loss than older water systems and managing system pressure has a significant impact.

It is unreasonable that water loss levels for Washington County do not improve over time in the DEIS forecast. This implies that this high level of waste and loss is tolerable, acceptable, and affordable, none of which is true. More properly, the DEIS forecast should show a decreasing level of water loss over time until a level below 10% is achieved. A level of 6% - 8% would not

[9] https://le.utah.gov/~2020/bills/static/HB0040.html

be an unreasonable target for a well-managed system with many new components, based upon my experience. Maintaining a loss level of 15.4% unreasonably and unnecessarily inflates the final demand forecast by at least 5.4% - 9.4%.

Population Forecast

The single most significant aspect driving future demand in the DEIS forecast is anticipated population growth in Washington County. The DEIS population forecast is based on state forecasts developed by the Kem C. Gardner Policy Institute,[10] but extends the Gardener forecasts another 10 years to 2075. This DEIS forecasts that population of Washington County in 2075 to be 594,660 people, a 293% increase over 60 years. The Gardner forecasts show Washington County to be the fastest growing county in Utah over the next sixty years. If realized, Washington County will be the most populated stretch of I-15 from Las Vegas to Provo.

The rate of population growth starts at a rip-roaring 3.4% per year and reduces by about 50% finishing the 60-year forecast in 2075 at a still remarkably high growth rate of 1.7% per year. It is interesting to note that the DEIS population forecast extends 10-years beyond the 2017 published Gardner Institute forecasts, adding more than 94,000 people during from 2065 – 2075.

I have reviewed numerous population forecasts over my 25-year career, but I have seldom encountered a growth forecast as aggressive as the one presented in the Lake Powell Pipeline DEIS. The level of growth projected would create a community the size of Tucson, Arizona, Fresno, California, or Albuquerque, New Mexico, in Washington County by 2075. Even spread out across the county, this would represent a tremendous level of growth across what is now a largely rural area. What is the expected economic driver for this exceptional level of growth?

It is rare in the US for an isolated region to experience a 293% growth surge without a corresponding economic driver. For example, Gilbert, Arizona, one of the fastest growing communities in the US over the past 30 years saw growth driven by technology companies and large businesses that chose to locate nearby. What will drive a similarly high level of growth to Washington County? Tourism to Zion National Park and other attractions in the region may be part of the answer, but certainly not all so it remains unclear what will drive the 293% growth projected for 65 years in Washington County. It seems likely that the population forecast has also been inflated.

An inflated future population results in an inflated future demand forecast. It seems quite possible that the population forecast presented for Washington County is unrealistic and the future population will more likely be much lower. Data and information supporting a 293% population growth has not been offered to my knowledge. Support for a population forecast

[10] Utah's Long-Term Demographic and Economic Projections Summary. July 2017. Principal Researchers: Pamela S. Perlich, Mike Hollingshaus, Emily R. Harris, Juliette Tennert & Michael T. Hogue

with an escalating growth rate has not been offered and the DEIS population forecast extends ten years beyond forecasts published by the Gardner Institute.

Inflated Demand Forecasts, Costly Decisions

The factors that combine to create a greatly inflated demand forecast in the DEIS are not unique. Water utilities have struggled with making accurate demand forecasts since the mid-1980s when federal plumbing codes and energy standards began reducing the water used for toilets, showers, faucets, clothes washers, dishwashers, and more.

An August 2020 report found that California water providers consistently inflated forecasts of future demand even as they tried to incorporate the impacts of efficiency. On average, the report found water suppliers projected that per capita demand would decline by less than one percent per year; but actual per capita demand declined twice as fast.[11] The report states:

> *" Urban water suppliers routinely overestimated future water demand, projecting increases in water demand even as actual demand declined. The is largely due to inflated estimates of future per capita demand, although overestimates of population are also a contributing factor." (p.8)*

The consequences of an unrealistic and inflated demand forecast can be significant and can impact a community for years to come. The report states:

> *"Overestimates of future water demands have important implications for local communities and the state. Specifically, they can result in unneeded water supply and treatment infrastructure, higher costs to ratepayers, and unnecessary adverse environmental impacts." (p.8)*

The consequences of the inflated water demand in the DEIS include all of the problems noted by the Pacific Institute such as over-sized expensive infrastructure, higher costs to rate payers, and unnecessary environmental impacts. Even if the LPP is constructed and the full population forecast appears, future per capita use is likely to be substantially lower than forecast in the DEIS. An unrealistic population forecast and unreasonably high levels of water loss compound the problem and further inflate demands to unrealistic levels compared with communities across the western US.

[11] An Assessment of Urban Water Demand Forecasts in California. August 2020. Pacific Institute. Oakland, CA.

Conclusions

The analysis in this report clearly illustrates how the DEIS water demand forecast for Washington County has been grossly inflated. The forecast is inflated through multiple mechanisms including:

- A population forecast that increases by 293%.
- An excessive level of per capita water use that would make Washington County water users among the highest in the US, even after more than 50 years of available efficiency improvements.
- Improper inclusion and inflation of raw secondary irrigation water in the forecast
- A 15.4% water loss factor which never improves and thus wastes approximately $300 million in value of the $2 billion dollar project.

A statement of need and water demand forecast for a project of this size and scope must be based on sound data, reasonable assumptions, and conservative resource principles to ensure the water will not be wasted. Water customers across the Western United States have successfully implemented effective water efficiency that today reduced per capita use far below levels shown the DEIS forecast for 2020 and 2075. The forecast in the DEIS provides for an excessive level of per capita water use over the next 55 years with efficiency improvements that simply end at year 2045 with no further improvement in efficiency achieved over the next 30 years. This is neither realistic nor reasonable.

The DEIS forecasts a future population of more than 500,000 people which is equivalent to a city the size of Tucson, Arizona, or Albuquerque, New Mexico. With this level of development, even across Washington County with its rural setting, current housing patterns will necessarily change and fewer people are likely to live in large sprawling single-family homes with a supply of secondary water for irrigation, as is common today. Under this high growth scenario, water use will necessarily change and become more efficient. The DEIS forecast should reflect realistic efficient levels of future use, not wasteful and excessive levels as currently presented.

Arguments that Washington County is somehow different or exceptional from other communities in the West because it has second homes, resorts, pools, golf courses, and such and is thus immune to national trends towards higher efficiency are nonsense. Water is a precious and expensive commodity and least cost planning principles must be applied when considering expensive infrastructure projects such as the Lake Powell Pipeline.

Water in Washington County will be expensive in the future, regardless of the source, and economics alone will press down demand. New technology for remotely managing irrigation and for detecting both utility and customer leakage will reduce demands and losses in the future, something ignored in the DEIS forecast. Communities across the Western US, including Aspen, Las Vegas, and Tucson — with many second homes and traditionally high irrigation

demand — have successfully reduced both indoor and outdoor water use to levels today that are far below what is forecast in the DEIS for year 2075.

For the past 30 years water demand forecasts prepared by utilities have grossly over-estimated water demands because they ignored the impacts of water efficiency and conservation. The demand forecast in the DEIS makes the same mistake and is inflated and unrealistic. The DEIS forecast ignores obvious trends in usage and future technological improvements as well as economic pressures that have reduced demand, and will continue to do so, because water is such a precious commodity.

This report provides a detailed review and analysis of each component of the DEIS demand forecast and shows how it compares with current water use in other communities across the Western US. The analysis in this report shows that the DEIS forecast is highly inflated and likely unrealistic. Even if this exceptional (and highly unlikely) level of population growth were to occur in the southern Utah desert, the water demand forecast for this population has been improperly inflated though several mechanisms. The proposed future level of per capita water use and water loss are excessive and ignore todays best practices and the ongoing impact of water efficiency.

Sincerely,

Peter Mayer, P.E.
Principal

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