Regional Water Supply Agreement
Administration Advisory Committee
Wednesday, August 28, 2024
12:00 – 2:00 pm
AGENDA

Meeting date:	August 28, 2024
Time:	12:00 – 2:00 pm
Location:	2603 Santa Clara Drive, Santa Clara, UT 84765
Participants:	Administration Advisory Committee members Zach Renstrom, Justin Sip, Ben Billingsley, Kelly Wilson, Kress Staheli, Jeremy Redd, Rick Rosenberg, Brock Jacobsen, John Willis, Chris Hart, Kaden DeMille. Also present were Washington County Commissioners Adam Snow, Victor Iverson, and Gil Almquist. Kyle Gubler, Nannette Billings, Dale Coulam, and Michele Randall were not present. Other meeting attendees are noted on the attached sign-in sheet.

Minutes

Washington County population projections

Morgan Drake, the reuse program manager, discussed Washington County population projections. The District's 20-year plan was originally based on population projections from the Kem C Gardner Institute in 2017. However, the current plan incorporated projections from 2022, which were higher. Now, the District is in the process of updating both the master plan and the impact fee facility plan using the 2022 high projections. Interestingly, the Kem C Gardner Institute has indicated that the growth scenarios are actually lower than those projected in 2022. As a result, the District will not be implementing these lower projections into the master plan. Instead, they will align the facilities plan with the 20-year plan similar to the production of 2017.

Water rates analysis

Ms. Drake explained the District has three primary revenue sources, which are impact fees, property tax and water rates. A fourth potential revenue source is grants.

Impact fee:
The current impact fee is $13,500 per equivalent residential connection with the level of service of .59-acre feet. The purpose of impact fees is to ensure that new development pays their fair share for the use of existing excess capacity and future capacity. To calculate impact fees the District starts with the existing facilities looking at the current impact fee facilities plan and seeing what portion is attributable to new growth. The percentage of existing facilities that can be allocated to new growth is usually a low percentage. The percentage of future facilities that will be used for new growth is typically a higher percentage.

To calculate the proportionate cost, existing and future facilities are added to get the total cost. To determine the proportionate yield, both existing and future facilities are combined. The impact fee is calculated by dividing the total cost by the total yield to get the cost per acre-foot.

Property Tax:
The District currently levies property tax in the county at .06 cents per dollar, with the potential to levy up to 0.1 cents. The tax contributes to funding for conservation, species, and watershed protection. Over the past few years, there has been legislation proposed to eliminate the ability of special districts to levy property taxes for a source of revenue.

Grants:
The District is actively pursuing grants to help pay for the regional reuse system program. Also, the District's program partners, St. George City and Ash Creek Special Service District have secured $15 million in grants. Grants are unpredictable and not always available or a reliable source for planning purposes.

Water rates:
Water rates are typically used to recover costs from three categories: operation and maintenance, repair and replacement, and capital costs not covered by impact fees. The current wholesale water rate is $1.77 per 1,000 gallons for potable water and $1.23 per 1,000 gallons for secondary water. Expenses are separated by facility, considering the type of water (potable or secondary).

Ms. Drake provided an illustration of how water rates might be calculated for a hypothetical reuse system that costs $1 billion. Under the scenario, if O&M (operations and maintenance) costs are assumed to be 1% of capital costs, based on a feasibility study for a $1 billion system, that would equal $10 million annually. R&R (repair & replacement) costs are estimated at 2% of system value annually, which would be $20 million. These percentages are hypotheticals that would be determined by a detailed analysis for the real system. The amount of revenue not collected by impact fees is assumed to be $1.5 million. Under the hypothetical, total revenue requirements would therefore be $31.5 million annually. Assuming the reuse system's yield would be 24,000 acre-feet, the cost per gallon for the wholesale rate would be calculated to be $4.03 per one thousand gallons.

This is a high-level illustration of the calculations that go into determining a rate. Any actual rates will be adjusted based on detailed analysis of the actuals costs and yields. Reuse water is expensive due to the need to pump it, especially in dry years. Rates will increase gradually as projects come online and more R&R funds are collected.

Review of findings related to ornamental water features

Conservation Manager Doug Bennett discussed the findings related to ornamental water features.
Mr. Bennett explained he started with pan evaporation. The period of record for pan evaporation in St. George area spans from 1862 to 2005. Pan evaporation data is not collected during winter months because the pan freezes. However, the infer is that both vapor transpiration and evaporation occur during this time. To estimate pan evaporation during the winter months, Mr. Bennett used evapotranspiration data obtained from the university and compared it to relative pan evaporation.

Mr. Bennett conducted a demonstration project, although not a full-fledge research study, was an empirical study on ornamental water feature which combined scientific data with practical observations. The water feature is modest fountain that gurgles at a moderate height, unlike waterfalls or high-pressure streams. The fountain does not accelerate evaporation.

The study aimed to compare water use between a circulating water feature and a still body of water.
The maintenance water (draining, cleaning, refilling) accounts for approximately 15% of the operating water. Water features may also leak into the surrounding soil, contributing to consumptive use. Based on research, the estimated annual consumptive demand for ornamental water features is 111 gallons per square foot of surface area. The experiment was conducted by turning off the pump while keeping the rocks in place, and without the pump running, the rocks still contribute to wicking action and surface area, resulting in some evaporation. This finding aligns with the previous discussion on pondless designs.

Mr. Bennett also conducted research which revealed that companies in the region primarily engaged in construction, excavation, and landscaping and no businesses exclusively dedicated to building ornamental water features.

Mr. Bennett emphasized that the maximum twenty-five square feet standard for water features is unlikely to have a significant economic impact. The limitation ensures that water features remain within reasonable bounds. A twenty-five square foot feature, based on the 111 gallons per square foot estimate, would require approximately 2800 gallons of water. The twenty-five square foot limit is reasonable, there is a possibility that some individuals may not be satisfied. Without additional controls, people might exploit loopholes (e.g., using swimming pool codes) to build larger water features.

Mayor Hart said that he reiterates his comment from the previous meeting where he proposed that residents are allocated a maximum allowable area of grass and if they want to put it in a pool, the water usage is deducted from the allowable area of grass.

Town of Leed's request to join the Regional Water Supply Agreement (introduction and discussion only)

Mr. Renstrom explained that the Town of Leeds has made a formal request to join the Regional Water Supply Agreement. The Regional Water Supply Agreement allows cities to come into the agreement. The town of Leeds is unique because they have a water system that is owned and operated by a non-profit private entity, so the city is not involved in their own water system. The existing system has limitations and will not be able to accommodate additional growth. The city is looking at a couple of large developments.

Leeds Mayor Bill Hoster explained that with the existing infrastructure there is no conflict in accommodating the growth in Grapevine wash and other areas but the city wants to ensure the infrastructure can support the growth in specific areas.

Discussion:

Mayor Kelly Wilson commented if water is allocated to Leeds and not reclaimed for reuse, it becomes a long-term usage issue, and any new development in Leeds joining the District should be integrated into similar water systems to ensure sustainable usage and reuse.

In response to a question from Gil Almquist regarding whether Leeds two water systems would be separate or connected, Mr. Renstrom responded that the two systems would be separated.

Mayor Hart stated that during the town of Virgin's recent discussions regarding joining the RWSA, Virgin was required to return 300 connections to the District. In addition, each previous partner provided its own water, and some cities provided more. Mayor Hart asked what Leeds will be contributing to the district. Mayor Hart said that that since Leed's current water system is provided by a private contractor, he understood that there will not be any demand on the District for your current population. Mayor Hoster replied that there would be no demand for Leed's current population.

In response to a question regarding whether Leeds would install a sewer system throughout the city or only in the new areas, Mayor Hoster responded that the City has been in ongoing discussion with Ash Creek and cost is one of the considerations. The new development's location in the Grapevine wash makes it economical to work with Ash Creek on establish a connection, but it would be cost prohibitive to go further south up in the Silver Reef area.

In response to a question from Mayor Staheli regarding where Leeds' water is coming from, Mr. Renstrom said that the District has a pipeline that goes up the center of Leeds and in a few years, the district will have the ability to take water from the water treatment plant and pump it to Leeds.

Mayor Hart commented that he understands that Leeds' current system draws water from wells which provide sufficient water for exiting needs and that the system is maintained and reliable with ongoing effort to replace pipes and keep infrastructure up to date. But Mayor Hart expressed concerns about future restrictions or diminished water sources due to various factors, and the risk of the private water company facing financial or catastrophic issues that could impact the water supply. There is a need to ensure that Leeds' integration into the RWSA includes provisions for such scenarios. Unlike other cities, Leeds' water system is managed by a private entity which introduces different risks and responsibilities. There may need to be specific language in the agreement to address the potential failure of the private water supplier and the subsequent obligation of Leeds.

Victor Iverson said that he knows of the one main private water company and a canal company and asked whether there is a secondary smaller provider in the Silver Reef area. Mayor Hoster explained there are two: LDWA (Leeds Domestic Water Association) which is culinary, and the other is an irrigation water supplier that holds a significant percentage of the water shares.

In response to a question from Scott Taylor about the potential for growth in Leeds, Mayor Hoster said that the proposed project has around 740 units. There is another project just north on the left side of Anderson Junction and there is some uncertainty whether these will be in Leeds or Toquerville and that will be about 500 to 1000 units.

Mr. Renstrom said that the District could have Aaron Anderson from Bowen and Collins do an analysis of how many units could be added to Leeds and the impact on services. The 2019 master plan did not account for servicing areas outside of the current scope until 2040. The current 20-year master plan may need to be adjusted to incorporate these new developments.

Other

Mr. Renstrom explained with the accelerating development of the regional reuse system, the AAC board may need to meet more frequently to get feedback from the cities. For now, the plan is to meet quarterly. The next meeting is scheduled for October 30th.

Mr. Renstrom introduced Ben Billingsley who was recently hired as the new City Manager for Toquerville City. Mr. Billingsley said he has worked for Washington County, Washington County Solid Waste, Apple Valley, and Moab.

Consider approval of May 29, 2024 minutes

Kelly Wilson made a motion to approve the May 29, 2024 minutes, the motion was seconded by Justin Sip, and all voted aye.

Next meeting Wednesday, October 30, 2024 from 12:00 pm to 2:00 pm

The meeting was adjourned upon motion.

Mindy Mees

Secretary

Ornamental Water Features
Regulatory Review and Guidance

July 2024

Prepared by:
Doug Bennett, Conservation Manager
Washington County Water Conservancy District

Background

In 2023, the Washington County Water Conservancy District (District) adopted restrictions for development of ornamental water features for new development. The rationale for regulation was that ornamental water features:

- are discretionary features. Most homes in the region do not have ornamental water features.
- are a wholly consumptive use of water.
- provide little or no human recreation benefit (as compared to pools or spas).
- may color public opinion about our community's commitment to water efficiency.
- can provide some of the perceived benefits when used on a smaller scale.

The District developed draft water efficiency standards (standards) for new development at the request of the State of Utah Division of Water Resources in April 2023. In developing the proposed standards, the District reviewed all current water conservation ordinances in eight jurisdictions: Santa Clara, Ivins, St. George, Washington City, Hurricane, La Verkin, Toquerville and unincorporated Washington County. The District attempted to integrate and align existing regulations and proposed additional regulatory measures, including a restriction on the size of ornamental water features.

The proposed standards were intended to afford jurisdictions the opportunity to develop their own regulatory language to meet the intent. The standards were vetted with multiple staff at all eight agencies, both through the Technical Advisory Committee (TAC) and through one-on-one meetings with each agency. During these technical reviews, no agency expressed concern regarding proposed restrictions on ornamental water features.

On May 29, 2024, Hurricane City brought a request before the Administrative Advisory Committee (AAC) of the District in which the city requested that limitations on ornamental water features be removed from the standards in entirety. The role of the AAC is to make recommendations to the District's board of directors, particularly regarding conservation programs. Following discussion, the committee voted unanimously to have District staff prepare a more detailed analysis on the issue to be delivered to the AAC.

This document has been prepared to meet the committee's request.

Definitions

Relative to ornamental water features, the standards currently state:

> "Manmade ornamental water features are limited to 25 square feet per parcel and are limited to the parcel."

Some participants in the AAC discussion felt the definition of ornamental water feature in the District standard was vague. Although not specifically defined in the policy, the intent was to limit the surface area from which evaporation would occur to not more than 25 square feet. The 25 square foot limitation was intended to be wetted and/or ponded surfaces. The provision limiting the feature to the parcel was intended to prevent a multi-dwelling development from aggregating 25 square feet for every parcel to build a large water feature.

Code language was adopted in all eight jurisdictions that the district deemed to meet the intent of the standard. Each jurisdiction had its own effective date and the restriction applied only to building permits issued after the effective date. All existing properties and permits were exempt from the restriction, unless otherwise stated in a jurisdiction's code.

Clark County, Nevada, which has the most stringent, comprehensive and long-standing water efficiency codes in the intermountain west, defines an ornamental water feature as "any manmade stream, fountain, waterfall, or other ornamental water feature containing water that flows or is sprayed into the air, constructed for decorative, scenic or landscape purposes, excluding swimming pools, manmade lakes and recreational water parks."

Clark County limits such features to residential uses and a maximum of 10 square feet in their development code (30.04.10) as follows:

D. Ornamental Water Features

1) The following ornamental water features are permissible:

   i. A water feature of not more than 10 square feet surface area when in conjunction with a single-family residence.

   ii. Those in conjunction with a resort hotel must enter into an abatement agreement with the purveyor, if required.

2. The following shall not be considered ornamental water features:

i. Those that are necessary and/or functional components serving other allowable uses, including but not limited to an interpretive feature of an educational exhibit; or

ii. Water features enclosed within a climate-controlled structure.

Estimated Water Resource Impacts

Ornamental water features are a wholly consumptive use, in that, water lost from the feature is primarily evaporated and lost from the region's resource portfolio. Many variables can influence the water use of a water feature, including but not limited to:

- Temperature – increasing temperature increases evaporation.
- Solar exposure – increased solar exposure drives air and water temperature and increases evaporation.
- Relative humidity – low humidity increases evaporation.
- Wind exposure – greater wind exposure increases evaporation and wind drift, especially where water is circulating as a waterfall, discharged from a spout or vertically sprayed.
- Water temperature – small water bodies are more influenced by ambient temperature. Higher water temperature increases evaporation.
- Turbulence of flow – turbulence increases water surface area exposed to evaporation and increases loss of water from the feature from splash out.
- Splash out – splashing water is lost from the feature or evaporated quickly from surfaces.
- Wicking materials – when material with any absorptive capacity comes in contact with water, it can wick water away from the feature and accelerate evaporation. Examples include concrete and natural rock.
- Aquatic vegetation – aquatic plants may increase transpiration loss but may decrease evaporation through shading.
- Maintenance regimen (drain, refill, cleaning, etc) – water is lost in maintenance operations such as drain/refill, cleaning surfaces, removing sediment, etc.
- Leakage – water feature reservoirs are subject to leakage due to damage and aging.

Evaporation Potential

For purposes of estimating typical evaporation demand, this analysis uses historic pan evaporation data from the Western Regional Climate Center at St. George, Utah for the period of 1862-2005.[1]

Pan evaporation measurements are standardized by the National Weather Service. The Class A evaporation pan is a metal cylinder with a diameter of 47.5 in (120.7 cm) and a depth of 10 in (25 cm). The pan rests on a carefully leveled wooden base and is enclosed by wire to prevent animals from drinking. Evaporation is measured daily as the depth of water (in inches) evaporates from the pan. The measurement day begins with the pan filled to exactly two inches (5 cm) from the pan top. At the end of 24 hours, the amount of water needed to refill the pan to exactly two inches from its top is measured.

If precipitation occurs in the 24-hour period, it is considered in calculating evaporation. Sometimes precipitation exceeds evaporation, and measured increments of water must be dipped from the pan. Evaporation cannot be measured in a Class A pan when the pan's water surface is frozen. No pan evaporation data were in the historical record for December, January and February, however, evaporation does occur in those months. To estimate evaporation in winter months, the District used evapotranspiration data from Utah State University[2] to estimate pan evaporation in December, January and February. On average, evapotranspiration was 73 percent of pan evaporation. The estimated pan evaporation values for December, January and February are estimated by dividing evapotranspiration by a value of 0.73.

Average Pan Evaporation (inches) at St. George, Utah (1862-2005) and monthly evapotranspiration data.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOT
Pan	2.19	3.01	4.57	7.36	10.08	12.22	13.17	11.55	8.22	4.83	2.68	1.88	81.76
ET	1.6	2.20	3.92	5.23	7.06	8.47	8.69	7.72	5.83	3.82	2.13	1.37	59.68

Twelve-month average annual pan evaporation at St. George over the 143-year period of record is estimated at 81.76 inches, or 50.96 gallons per square foot. Although pan evaporation is typically higher than a large body of water such as a lake or pond, it is similar to evaporation loss that might be seen in a small, man-made water feature. In fact, because pan evaporation is measured from a still body of water, the flowing and splashing water from an ornamental fountain with a pump is higher than pan evaporation.

District staff were unable to find reliable, scientifically derived data on the influence of the eleven described variables in an operating fountain upon water demand.

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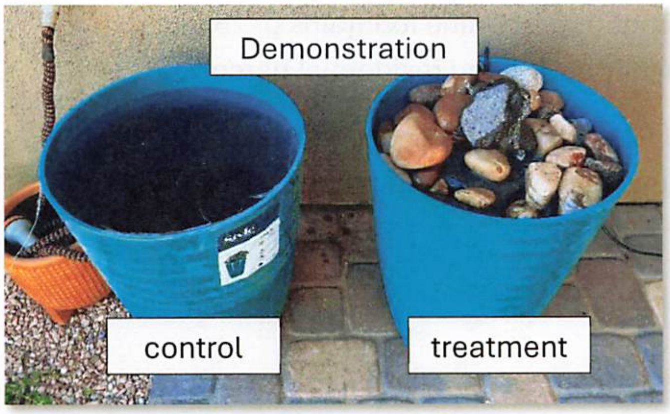
[1] https://wrcc.dri.edu/Climate/comp_table_show.php?stype=pan_evap_avg

[2] https://extension.usu.edu/irrigation/research/evapotranspiration-and-precipitation-data

To estimate the influence of circulation, wicking and splash out upon water demand, the District conducted a demonstration project using two identical vessels. One vessel was equipped with a submersible pump and filled with river rock, then filled with water to one inch below the rim. The other vessel was filled only with still, uncirculated water.



While the results were insightful and are used in this analysis, it's important to understand that this comparative demonstration does not meet the rigor of a scientific study. The demonstration methodology is described in Appendix A.

From June 4 through June 9, the pump on the treatment vessel was operated continuously. Each morning, vessels were refilled to the original water level and the volume of water required was recorded for each vessel. Over the six-day period, the treatment (fountain) consumed an average of 88 percent more water than the control vessel.

For three consecutive 24-hour periods beginning June 11, the circulation pump was turned off. This exercise was intended to help determine the relative water loss related specifically to the circulating water versus the presence of the stones, alone. This exercise demonstrated that the vessel with the stones evaporated 19 percent less water than the control vessel.

This short-term demonstration was not intended to accurately measure all the variables, but to establish a defensible ratio of loss between standing water (which is akin to the evaporation pan) and conditions associated with a fountain. The resulting "circulation coefficient" will determine the relationship between water use of a circulating water feature and historic pan evaporation data.

To accommodate the influence of circulating water, leakage and maintenance, the District applied the following coefficients. The leakage coefficient assumes the typical feature will use 15 percent more water than that which is lost to evaporation to leakage from the basin and/or pump fittings. The maintenance coefficient assumes an additional 15 percent will be used annually for maintenance activities, such as draining, cleaning and refilling the feature.

Circulation coefficient:	1.88
Leakage coefficient	0.15
Maintenance coefficient	0.15
Total	**2.18**

By applying the coefficients, the total estimated water use per square foot of surface area of a fountain operating continuously is:

50.96 gallons x 2.18 = 111.10 gal/sf/yr

The District estimates a continuously operating fountain will use 218 percent of pan evaporation, or 111 gallons per square foot annually. For a water feature of 25 square feet, District staff estimate consumptive demand of 2,777 gallons annually, or approximately enough to meet the indoor water demands of a single-family home for one month. Sixty-nine fountains of 25 square feet have the same water demand (0.59 acre-feet) as a fully developed residential parcel.

Because the demonstration project used a modest fountain that only propelled the water a few inches above the stone, some fountain designs would use much more water than this estimate.

Public Perception Challenges

While water features are not a principal use in the region, their conspicuity in a region grappling with water challenges colors public perception and can negatively influence water management policy. If citizens perceive water is being used inappropriately, especially in new development, they can conclude their efforts to conserve are fruitless or unappreciated. This can dramatically undermine conservation progress and tarnish the reputation of the agencies implementing conservation efforts.

To date, the District is unaware of any significant public concern regarding restrictions on ornamental fountains.

Economic Consequences

The District was unable to identify any Washington County business that relies exclusively upon ornamental water features for their livelihood. Most of the companies that perform these functions provide other services and fountains are just one aspect of their business model. For example, most fountain builders are excavation contractors, pool builders and landscapers.

While no empirical data was available to estimate the economic consequence of fountain restrictions, the District's ability to supply water to a growing population has more economic value than any single segment of our economy. Washington County's $9.5 billion annual economy is dependent upon the ability of the District and its municipal partners to provide reliable water. While businesses that build large water features will certainly see a decline in revenue from this segment of their business, any impediment to supplying water to new customers would have a much greater impact upon their business and the larger economy. In that context, District staff do not see any negative economic impact to the restriction.

The Swimming Pool/Water Feature Nexus

Regulatory efforts sometimes spawn unintended consequences as regulated parties will probe the regulation for weaknesses or loopholes.

In requesting reconsideration of the fountain restriction, Hurricane officials pointed out that there are no limitations on swimming pools. While this is true, the lack of policy for pools poses a risk that merits the committee's attention.

Whereas the primary purpose of an ornamental fountain is for visual and auditory pleasure, swimming pools are intended for human recreation and cannot achieve their intended purpose without scale. The average residential swimming pool is about 425 square feet of surface area.

The Las Vegas region first regulated ornamental water features in the early 2000's. It wasn't until 15 years later that the community realized one of the unanticipated consequences of the regulation: While luxury homes were no longer able to build elaborate ornamental water features, they were able to exploit the pool and spa code to create water features in the thousands of square feet. To the eye and based upon functionality, much of the "pool" area was purely ornamental, however, they meet the code requirements to be considered a swimming pool, even if a person never enters the water.

In response to the proliferation of "non-functional" pool surfaces that had little or no recreational purpose, the jurisdictions implemented a maximum surface area of 600 square feet in 2021. An analysis showed that 76 percent of all existing residential pools were within the new limit, which suggests that 600 square feet typically met or exceeded the needs of residential households.

Regulatory Considerations

While standing water is often said to have similar water demands as an irrigated lawn, a turbulent fountain may use up to three times as much water as lawn irrigation on a per-square foot basis. Some of the potential considerations for alternative regulatory structures are discussed below:

Allocation budgeting – Lawn grass is limited to eight percent of the parcel with a cap for large lots by all jurisdictions. Water features could be included in the lawn area budget, such that the combined surface area of a pool, lawn and/or water feature could not exceed 8 percent of the parcel. Whereas the District's demonstration project suggests a water feature will use up to three times as much water as a lawn, it may be appropriate to implement a policy that each square foot of water feature area is equivalent to three square feet of lawn or pool surface. This approach, however, would significantly complicate the design and compliance process, both for property owners and regulators.

Requiring additional conservation measures – There are various measures that can be taken to reduce demand of an ornamental water feature. If the District considered increasing the allowable size, it may be prudent to require additional technical and design features to help offset the demand. Scheduled circulation, (such as a pump on a timer), subterranean reservoirs ("pondless") and limiting the height and breadth of waterfall features would help manage demand.

Conclusions

1. District staff have seen little or no public concern regarding the water feature restriction. Public sentiment generally favors regulation of ornamental water features.
2. The policy allows fountains on a limited scale. Washington County cities allow fountains to be 2.5 times larger than other water challenged communities in the region.
3. Fountains are estimated to use 111 gallons (almost 15 feet) of water per square foot of surface area, which is approximately twice as much water as a cool season lawn of the same size.
4. There is potential to improve the definition of a fountain to improve comprehension, compliance and enforcement of the standard.
5. "Pondless" fountains, where the reservoir is an engineered vessel buried below ground, have the potential to conserve water when compared to features with exposed water surface area. The demonstration suggests pondless features can reduce evaporation from the reservoir by about 20 percent when compared to an exposed reservoir surface.
6. Circulation and the attendant splashing, wind drift and thin film wetting of surfaces is a major contributor to evaporation. In the demonstration, operating the pump increased water demand 54%. Reducing hours of circulation would produce lower evaporation rates.
7. Smart devices (such as pump timers, wind sensors and freeze sensors) could reduce water consumption.
8. In a water-scarce environment, the economic benefit of the restriction exceeds the economic loss.
9. The region risks exploitation of the swimming pool code to construct ornamental water features, particularly on high-value residential projects.

APPENDIX A

Demonstration Project Methodology and Data

Objective – To compare the water demand of a small, static water body to the demand of an identically sized ornamental water feature with rock and circulating water.

The vessel with static, exposed water is the "control" and the vessel with decorative rock, a water pump and circulating water is the "treatment."

1. Two identical impermeable vessels[3] were obtained from Lowes Home Improvement (see image). The vessels were 15.59 inches in diameter and 21.6 inches deep. The exposed surface area at the top of the vessel is 1.31 square feet. The vessels have sloped sides and were not cylindrical.
2. Using a combination square, a marking was placed one inch below the rim of the vessels.
3. In the treatment vessel, a small electric pump with ½ inch diameter vinyl tubing was placed into the bottom of the vessel. A 14" diameter commercial platform[4] was placed to support decorative river rock and the pump discharge was positioned above the river rock to create a small fountain.
4. Both vessels were placed on a level surface on a residential patio in Ivins, Utah, against a dark colored west-facing stucco wall. The area is shaded in the morning and receives full sun in the afternoon.
5. Both vessels were filled with Ivins' municipal water to the marking one inch below the rim of the vessel.
6. The pump in the treatment vessel was operated continuously for four days.
7. Once per day for seven consecutive days, pump operation was suspended and both vessels were replenished to the original water level using a 500 ml graduated beaker. The replenishment volume was recorded in milliliters to the nearest 10 mL increment.
8. Since water depletion was measured in the early morning, weather data from the prior day was recorded.
9. For an additional three days of observation, pump operation was suspended, and replenishment volumes were measured every 24 hours. This measurement was intended to better understand the influence of wicking and evaporation from the rock surfaces without water circulation.

Figure 1 - Image of vessel

[3] https://www.lowes.com/pd/Style-Selections-15-6-in-W-x-21-7-in-H-Aqua-Resin-Planter/5001941579
[4] https://www.lowes.com/pd/Bloem-14-in-Plastic-Planter-Insert/1000447219

Continuous Pump Operation								
					24-hour prior weather data			
Measurement Date 2024	Time	Milliliters required to replenish control vessel	Milliliters required to replenish treatment vessel	Treatment/ control (coefficient)	Observations	High Temp (F)	Low Temp (F)	RH %
June 4	8:27 a	Start	Start	NA	PM winds	95	70	15%
June 5	8:27 a	1,180	3,830	3.25		98	72	14%
June 6	7:40 a	1,450	2,730	1.88		103	70	17%
June 7	7:01 a	1760	2680	1.52		107	74	14%
June 8	6:59 a	1670	3130	1.87		104	76	14%
June 9	7:05 a	1410	2310	1.64		102	76	15%
June 10	6:55 a	1650	2500	1.52		100	76	17%
June 11	6:57 a	1850	2630	1.42		98	72	14%
TOTAL/AVG		1520	2863	1.88				

No Pump Operating								
					24-hour prior weather data			
Measurement Date 2024	Time	Milliliters required to replenish control vessel	Milliliters required to replenish treatment vessel	Treatment/control (coefficient)	Observations	High Temp (F)	Low Temp (F)	RH %
June 12	7:08 a	1880	1500	0.80	Pump off	103	68	11%
June 13	7:03 a	2050	1620	0.79	Pump off	104	71	11%
June 14	7:04 a	1200	1050	0.88	Pump off	100	71	11%
TOT/AVG		1710	1390	0.81				

RWSA AAC Meeting

August 28, 2024

Agenda

Washington County population projections

Water rates analysis

Review of findings related to ornamental water features

Town of Leeds request to join the RWSA *(introduction and discussion only)*

Other

Consider approval of May 29, 2024 minutes

Next meeting Wednesday, October 30, 2024 from 12:00 pm to 2:00 pm

Washington County population projections

20-Year Plan & Updated Growth Projections

2017

20-Year Plan based on KCG projections developed in 2017

2022

Updated projections were released in 2022

Uniformly higher growth scenarios

2022

Current planning scenario based on 2022 high projection

2024

KCG is working on another update for 2024

Lower growth scenarios

Water Rate Analysis

Revenue Sources

IMPACT FEES

PROPERTY TAXES

WATER RATES

GRANTS

Impact Fees

Currently $13,500 per ERC for residential

Level of service of 0.59 acre-feet per year

New development pays its proportional share of cost for:

the use of existing excess capacity in the system, and

the use of future facilities capacity

Existing Facilities

TABLE 10: PROPORTIONATE SHARE OF EXISTING FACILITIES

EXISTING FACILITIES	ORIGINAL COST	EXCESS SHARE TO FUTURE GROWTH	COST OF EXCESS CAPACITY
Sand Hollow Well 11	$971,077	31.0%	$301,034
Sand Hollow Well 13	$1,154,985	31.0%	$358,045
Sand Hollow Groundwater Treatment Plant	$11,219,320	22.9%	$2,569,224
Sand Hollow Regional Pipeline	$11,734,991	74.7%	$8,766,038
Total			**$11,994,342**

Future Facilities

TABLE 11: PROPORTIONATE SHARE OF FUTURE SYSTEM IMPROVEMENTS

PLANNED WATER SYSTEM FACILITIES	SHARE ATTRIBUTABLE TO NEW DEVELOPMENT[21]	PROJECTED CAPITAL EXPENSE	IMPACT FEE ELIGIBLE EXPENSE
Cottam Well 3	100.0%	$1,977,000	$1,977,000
Sand Hollow Well 7	100.0%	$1,815,000	$1,815,000
Cottam Wells 3 MG Tank	91.9%	$6,330,000	$5,817,270
Sand Hollow North Dam to West Dam Pipeline	100.0%	$3,660,000	$3,660,000
Sand Hollow Well 15	100.0%	$1,815,000	$1,815,000
Sand Hollow 2 MG Tank B	91.9%	$6,050,000	$5,559,950
Quail Creek to Cottam Pipeline and Pump Stations, Phase 1	98.8%	$14,890,250	$14,711,567
Ash Creek Pipeline/Toquer Reservoir Project	100.0%	$97,334,371	$97,334,371
Quail Creek WTP Expansion (80 MGD)	100.0%	$151,135,312	$151,135,312
Quail Creek WTP Ozone Addition	25.0%	$50,378,438	$12,594,609
Quail Creek 10 MG Tank B	91.9%	$35,645,125	$32,757,870
Regional Pipeline to Sand Hollow Pump Station	100.0%	$2,904,000	$2,904,000
Additional Water Rights Useable in Existing Facilities	100.0%	$200,000	$200,000
Sullivan Wells Project (Wells, Pipelines)	100.0%	$18,943,250	$18,943,250
Sullivan Wells 1 MG Tank	91.9%	$3,307,000	$3,039,133
Quail Creek to Cottam Pipeline and Pump Stations, Phase 2	87.8%	$11,922,000	$10,467,516
Toquerville Springs to Cottam Pipeline Pump Station	100.0%	$925,000	$925,000

Impact Fee Calculation

TABLE 12: CALCULATION OF IMPACT FEE

	IMPACT FEE QUALIFYING COSTS	YIELD (ACRE-FEET)
Total Cost of Supply Facilities	$2,082,851,190	87,504
Cost of Existing Excess Capacity in Supply Facilities	$11,994,342	661
Cost of New Supply Facilities	$2,070,856,848	86,843
Cost of Supply Facilities per Acre-Foot		$23,803
Acre-Foot per ERC		0.59
Cost of Supply Facilities per ERC		**$14,044**

- Total Cost / Total Yield = Cost per AF
- Cost/AF * Level of Service = Cost per ERC

Property Taxes

Currently levying property tax rate of $0.000590 per dollar of a property's taxable value

Authorized to assess a tax of up to $0.001

Fund conservation initiatives, watershed protection, species preservation, etc.

Legislation proposed to remove property taxes as a revenue source for special districts

Grants

Actively pursuing applicable grant funding opportunities

Program Partners have secured $50,000,000 for reuse system

Not a reliable source of revenue for planning purposes

No guarantee of grant funding availability or amount

Water Rates Include…

OPERATIONS & MAINTENANCE (O&M) COSTS

REPAIR & REPLACEMENT (R&R) COSTS

CAPITAL COSTS NOT COVERED BY IMPACT FEE

Current Wholesale Water Rates

Potable water rate = $1.77 per 1,000 gallons

Secondary water rate = $1.23 per 1,000 gallons

Expenses separated by facility and water delivery type

Rate Comparison

- Average rate increase in 2023 for water systems serving 5,000 people or more was 7.5%*
  - Average rate $5.75 per 1,000 gallons*

- Water Rate for ¾ meter for 6,000 gallons:
  - Fort Collins, Colorado: $6.37 per 1,000 gallons
  - Las Vegas, Nevada: $7.51 per 1,000 gallons
  - Scottsdale, Arizona: $6.33 per 1,000 gallons

*Survey data was solicited from utilities in Colorado, Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wisconsin. https://www.ae2snexus.com/2023-utility-rate-survey-results/.

Hypothetical Rate Exercise

Assume a $1 billion dollar project cost for the Regional Reuse Purification System

Hypothetical Rate Analysis

Rate components:

- Operations and Maintenance (O&M)
- System Repair and Replacement (R&R)
- Capital project (depending on Impact Fee revenue) or other cash flow requirements to fund projects/debt service

Hypothetical Rate Analysis – O&M

O&M estimated to be approximately 1% of capital cost

Annual O&M cost of $10,000,000

Hypothetical Rate Analysis – R&R

R&R Budget of 2% of System Value (Assumes average service life of components to be 50 years)

Annual R&R Cost of $20,000,000

Hypothetical Rate Analysis – Capital Costs/Cash Flow

Assume that 5% of construction costs not covered by Impact Fee

2.5% of construction cost to wholesale rates, amortized over 20-30 years

~$1,000,000 - $1,500,000 per year

Hypothetical Rate Analysis – Total Revenue Requirement

- Estimated annual expenses
  - O&M: $10,000,000
  - R&R: $20,000,000
  - Capital expenses: $1,500,000
- Total revenue required: $31,500,000/year

Hypothetical Rate Analysis

Revenue: $31.5 million/year

Yield: 7.82 billion gallons/year
(Over 20-year timeframe)

Cost per 1,000 gallons: escalating up to $4.03

Potable v Secondary Water Rate

- The potable rate will largely pay for the water rate portion of the reuse system
  - Reuse will be included in both the potable and secondary rate

Reuse Authorization Contracts

Treatment

Ash Creek Special Service District

St. George City

Delivery

Municipal partners (separate agreements with each)

Reuse exchange

Irrigation and canal companies (separate agreements with each)

Municipal Contract Review

June

- Issue reuse authorization contracts for review
- Meet with each municipal partner

July

- Meet with municipal partners, as needed
- Receive feedback

August

- Review feedback and send responses to municipal partners

September

- Present contracts to city councils for approval
- Execute reuse authorization contracts

Review of findings related to ornamental water features

Water Features: Methodology

- Pan evaporation and evapotranspiration data applied
- Comparative demonstration project to estimate influence of circulation on evaporation
- Applied estimates for maintenance activities (15%) and reservoir leakage (15%)

Water Features: Key Findings

- Estimated annual consumptive demand of 111 gallons per square foot of surface area.
- Pondless designs and pump timers may reduce water consumption.
- Economic impact of the restriction is neutral or positive.
- Limited to the parcel, may not be combined to construct larger features.
- Without additional controls, potential exists to exploit the swimming pool code to create purely aesthetic water features.
- There is potential to refine definitions and consider exemptions in the public interest, such as educational displays.

Town of Leeds request to join the RWSA (introduction & discussion)

Other discussion items

Approve May 29, 2024 meeting minutes

Next meeting

Wednesday, October 30, 2024 from 12:00 pm to 2:00 pm