Golf Course Irrigation Water Update April 2023

Immediate Critical Water Needs:

1. Can you fill me in on how the wells are performing after the rehab?
2. How is the pump keeping up at present?
3. What additional volumes are needed to meet critical needs at present?

Long-Range Sustainability Solutions:

To review this long-range plan, you would first want to remember in the state of Kansas, water is a public resource. You do not own the water under your land. If you own the land, you have the right to use it for domestic purposes, anything other than that requires a water right. For the city to utilize well or surface water for golf course irrigation, we had to obtain water rights and if we choose to look for more water to use, we will have to request to obtain and justify the need for the water right or buy an existing water right.

To acquire a water right: The only way to determine if you can obtain a water right is to make an application to the Division of Water Resources (DWR) and allow them to complete their process of determination. This would be based upon water availability in the area you are wanting the water, meeting the rules for establishment, evaluating safe yield in a two-mile radius, etc… You do not need to submit pump test data to verify yield, the water right is not based on what you can produce but on what is available by right in the 2-mile area. However, you would want pump test data for your own investigation to make sure you CAN produce the volume you are requesting as part of your internal evaluation process and to know how far you would want to invest in obtaining land, wells, or water rights.

Note: If submitting an application on a **new** well, you would not need a pump test, but you would need to submit test hole data as DWR does need to see the formation as part of their evaluation purposes.

You do not have to own the land a well is on to make application. You can buy an existing water right and relocate it. However, if you do not own the land you have to have a Legal Access Agreement to the well in place with the landowner to make the application to DWR.

There is an application fee depending on how much water you are asking for: $200 for up to 100-acre ft or $300 for 100–300-acre feet.

One critical part of this process is justification to the State of Kansas that the City of Anthony needs more water. The Golf Board has provided a study performed in 2022 by the United States Golf Association (USGA) indicating that the golf course irrigation requirements would need 11,600,000 gallons of water in a normal year with average precipitation. The city currently has water rights for irrigation out of the the lake of 23 acre-feet of surface water (7,494,000 gal) and at the golf course's three combined wells of 9.5 acre-feet of well water (3,095,000 gal). There is a MAXIMUM total

combined water right of 27 acre-feet per year (8,797,000). The following is a recap of the city's current water rights:

1. HP-07 - Recreation potion of the Lake: 200 acre-feet.
2. Permit 41864 – Irrigation portion of the Lake: 23 acre-feet.
3. Permit 41865 – Irrigation of the three wells located by the Golf Course: 9.5 acre-feet.

   (Permit 41864 & 41865 have the combined right not to exceed 27 acre-feet.

4. HP-02 – Wells 1-8 Bluff Creek Municipal Use: 488 acre-feet (159,000,000 gpy)
5. Permit 1850-A – Wells 1-5 Municipal Use: 620 acre-feet

Reference Notes:

325,851 gal = 1 acre-foot Average aquifer recharge per year = 2" Evaporation = 33"/acre for full calendar year

To get more water available at the golf course the following considerations are under evaluation:

1. Take all necessary actions to fully utilize all the water rights we currently have where possible.
2. Make application to increase our water rights on the existing resources we currently have.
3. Evaluate additional storage tank options.
4. Drill a new well on city property and make application for additional water rights.
5. Purchase land (or obtain Access Agreements) that has an existing well (or drill a new one) and make application for additional water rights. Includes Bluff Creek Well Development.
6. Connect to city water system.

The following is a process level look at the aforementioned options for the purposes of progress updating, not a professional evaluation. Please also be aware that this research is not complete as of this date and some data is either not fully confirmed or incomplete.

1. **Make necessary repairs to existing equipment and utilize existing water resources efficiently.**

Utilizing your existing resources to its max benefit is one of the least costly ways to add to our needed water goal, and one of the most responsible in being stewards of our existing rights. We have utilized the following:

2018: wells - 464,000	lake- 9,555,000	Overused lake 2,061,000, underused wells but exceeded total
2019: wells- 7,000	lake- 7,417,000	Underused wells 1,373,000
2020: wells- 0	lake- 8,099,000	Overused lake 605,000, underused wells 698,000 (93,000 av)
2021: wells- 164,834 ?	lake- 6,686,000	Underused lake 808,000, underused wells 1,946,166

2022: wells- 728,811 lake- ?

We are all aware that the wells are not producing their water right capacity. Instituting repairs on the system to prevent loss and focusing efforts to rehab the existing wells was an excellent first step in correcting this. Additional items to consider to ensure we are efficiently utilizing existing water rights could include:

1. Implementing Best Management Practices for conservation where possible, such as:
    a. Was the golf board able to secure weather station and moisture metering equipment to enhance irrigation determination schedule?
    b. Implement Water Monitoring Program. Monitoring water usage data against run time calculations should be a critical step in regular maintenance as well in order to help monitor potential water loss. I'm sure the golf course already does this, but the city and the golf course could work together on a program that ensures the proper monitoring of these levels. A log could be utilized, categorized per zone, recording the start and end-run times daily. This should be calculated and verified against metering numbers from lake and wells each year to attempt to verify loss and or use.
2. Hydrogeologic Review of the Existing Wells. There may be benefit to reviewing any available data on the wells to determine if new wells in the same location or any other efforts could be completed on the existing wells for more production. This could be a waste of time, but a simple review of the existing data should be considered since more utilization of the existing resources tends to appear the most cost-effective effort.

2. <u>Make application to increase our water rights on the existing resources we currently have.</u>

It could be possible to increase our existing water rights on our existing resources BUT ONLY IF:

1. The wells could be rehabilitated to physically produce more volume or new wells drilled nearby.
2. The Commission is willing to take more water out of the lake.
3. There is additional water right available to obtain. This would be based upon MANY factors which include other usage within 2 miles, and upstream drainage if we are increase the lake.

As for taking more water out of the lake, the total depth taken off the lake when the golf board utilizes their full existing water right is 2.379 inches per year. So, when we pull 7,494,000 gallons out of the lake it only drops the water level by just over two and 3/8 inch. This does mean, you could apply to take more from this resource however, we know it is a large concern publicly when the lake level is low. Which it is severely right now. We need to also remember; the cause of the low water level is really evaporation and loss of precipitation. Initial calculations by myself and DWR indicated that at the current depth and pulling large volumes it could drop as much as 4" per day but both of us agreed this number cannot be correct so we are calculating further and monitoring the levels.

NOTE: Interesting point, when the city applied for the water rights to pull water out of the lake to irrigate the golf course, it was approved for 75 acre-feet of water. However, over the permit perfection period (1996-2009) the course never took more than 23 acre-feet in any one year so it was reduced.

NOTE: There has been discussion in the past of utilizing Bluff Creek to possibly recharge the lake. I did contact DWR about this to see if it was permissible. I was told it is however, I was also told it is not common due to the size of the water body. They receive water right requests to recharge ponds in this fashion but the person I had spoken with in the KDHE field had never had one for a lake. It would take a well and or wells that could produce 167.79 gpm running 24/7/365 (88,190,984 gallons) per year just to replace the 28" of water in the lake. Again however, I was not told no.

3. **Evaluate Additional Storage Tanks.**

   Understanding that this doesn't sound like it makes much sense, as part of this research I am trying to leave no stone unturned. The discussion should include a review as to whether additional storage could provide some aid since again, though not cheap, it is still among the cheaper options for solutions which makes it possibly more feasible.

4. **Drill a new well on city property and make application for more water rights**.

   Depending on what is determined above about increasing the rights on our existing resources, if we can increase the well water rights significantly in the area but just cannot produce it with existing well production, we could evaluate drilling new wells on existing city property. This would eliminate the cost of purchasing land and or piping water great distances. To determine this, I am currently reviewing any existing pump test data in the area. If this becomes a serious topic of discussion we would want to drill a test hole to determine water availability. The cost of drilling a test hole and possibly completing a well would need to be weighed against the cost of purchasing land and piping.

5. **Purchase land (or obtain Access Agreements) that has an existing well (or drill a new one) and make application for additional water rights.**

   The city has historically evaluated a combination of developing new and securing existing wells located in the Bluff Creek area and piping it to the golf course. A study was completed in 2014 for this purpose. Three well locations were chosen (Well #6 south of the highway, Seipel 10' well, and west airport well) and an opinion of cost was prepared to determine how much it would take to get the water to the golf course. The cost at that time was $496,591.65. I would need to research a little further to determine how much or if the total volume they could produce based on the conclusion of the report (240-320-acre feet per year) is the combination of putting all the wells into production. At present though, due to the expected increase in cost due to inflation and lack of funds, I am researching grant options to see if I can find funding for this purpose.

6. **Connect to City Water System**

In order to evaluate whether or not the city could supply the needs of the additional irrigation, the city's current water source supply is being evaluated to verify sustainability for potable water needs for the City of Anthony and Rural Water District #2. I am currently crunching a lot of numbers and reviewing well logs and usage data to compile some initial findings to determine if we have sufficient availability for this purpose without jeopardizing human needs first.

In summary:

1. I would like to get a look at any information on the existing wells, well logs, water driller historical experiences, and any other existing data to rule out the possibility of reconstruction or drilling closer to the golf course.
    a. Can I get any information you received from Mitch or permission from you all to contact Mitch and request it?
2. I am researching grant possibilities to fund a connection to Bluff Creek.
3. I am researching the sustainability of connecting to the city's existing supply.

Thoughts and Points to Review:

1. Every year Bluff Creek stopped flowing which caused water level and yields to decline. Further review is needed to verify what impact that might have on the Bluff Creek wells Since the golf course would need the water in the summer months and this would be an impact to this supply during the same time of year. Perhaps even testing the test wells they drilled this summer could help provide more info. Just trying to verify before we try to fund over a million dollars in funding that we have reviewed issues that were raised.
2. How much could the lake sustain if we get more water rights and take more water? Monitoring the levels now will help us produce some of these realistic numbers.
3. Did the golf board water samples of the lake and wells in for testing as recommended by USGA? IF so, was that sent to Paul and could I get his comments on it?
4. Could I get an analysis of water quality standards acceptable for golf course irrigation? I could just call USGA but wanted to make sure you didn't have a specific standard you were trying to meet.