

## **Heritage Park Well Energy Use:**

(Written by Chair R. Marley – 7/19/13)

Since the Community Association is unwilling to divulge water pump rates and electrical usage for Heritage Park, the Water District decided last spring to answer the questions themselves. The Chair began taking monthly meter readings at Heritage Park and continues to do so. With the aid of management, he developed an engineering method to extrapolate Heritage Park monthly water pumping from our pumping vs. electrical power use. Their monthly billing estimates were to be made from our billings for 10 APS connections.

With four months of data for kilowatt hours used at Heritage Park, the District has been able to arrive at some estimates of monthly billings paid by the Community Association and a range of water pumped. Monthly electric billings should be approximately \$175.00 based on the kilowatt hours for their two pumping sites but have increased substantially in the past month to approximately \$230.00 (summer's here).

Most shocking was the pumping level estimates. It appears the Park could be pumping water from the aquifer at close to the same level as the Water District. This does not agree with the level suggested by our previous pond evaporation and plant cover transpiration calculations, less than a million gallons. The Chair and Management have concluded millions of gallons are being unnecessarily pumped and recharged into the aquifer each month by the Heritage Park leaky pond and stream. This is occurring even with the Heritage Park management keeping the pond at what appears to be severely reduced levels from the original design.

The Board and Management are very concerned that this recharging has contributed to rising nitrate levels in the District's water. If this were to continue District property owners could be faced with installing a very expensive nitrate removal system to meet federal and state mandated water standards. This recharging could also be a threat to the town's water if someone were to throw a toxic substance into it as part of a terrorist threat. While the District is required by Homeland Security to have a plan for protecting its various sites against terrorism, there is no way the District can protect against groundwater contamination caused by this high-level, leaky-pond's aquifer recharging.

Since the Community Association has been less than cooperative, the Water District may be forced to seek remedies by filing complaints with the Yavapai Board of Supervisors, ADEQ, the agencies who funded the project with \$700,000.00, and even letters to the District's users to bring community pressure to bear on the Community Association. At the June Board meeting, the Board recommended again approaching the Community Association (Bob Cothorn president) with this information before doing so. The hope being that the so-called Community Association would now act to protect rather than endanger our community.

Date of Utility Reading	Well by Old Black Canyon Western Drilling (Laurie) 623-327-1200	Older Well closer to Pond Drilled 1930's ? (Phil Albin 60' well)
3/9/13 (recorded)	65375 Kw Hrs	45204 Kw Hrs
4/9/13 (recorded)	66190 Kw Hrs (815 Kw Hrs)	45353 Kw Hrs (149 Kw Hrs)
5/9/13 (calculated)	67156 Kw Hrs (966 Kw Hrs)	45549 Kw Hrs (196 Kw Hrs)
5/17/13 (recorded)	67414 Kw Hrs	45602 Kw Hrs
6/9/13 (calculated)	67981 Kw Hrs (825 Kw Hrs)	45739 Kw Hrs (137 Kw Hrs)
6/12/13 (recorded)	68322 Kw Hrs	45753 Kw Hrs
7/9/13 (calculated)	69385 Kw Hrs (1404 Kw Hrs)	45910 Kw Hrs (171 Kw Hrs)
7/11/13 (recorded)	69461 Kw Hrs	45921 Kw Hrs

Reading Date	Old Black Canyon Well	Old Well close to Pond	Total Kw Hrs	Billing Estimate	Estimated Gallons Pumped (millions)
3/9/13	-	-			
4/9/13	815 Kw Hrs	149 Kw Hrs	964 Kw Hrs	\$175.00	2.3 – 4.3
5/9/13	966 Kw Hrs	196 Kw Hrs	1162 Kw Hrs	\$190.00	2.8 – 5.2
6/9/13	825 Kw Hrs	137 Kw Hrs	962 Kw Hrs	\$165.00	2.3 – 4.3
7/9/13	1404 Kw Hrs	171 Kw Hrs	1575 Kw Hrs	\$230.00	3.8 – 7.0

- 1) Measurement referenced to 9<sup>th</sup> of month. Meter may be read on a different date by APS
- 2) BCCWID pumps into a 90 psi head while Park pumps onto surface. They will pump 6-11 times as much water per KwHr used.
- 3) BCCWID April gallons pumped was approximately 4 million gallons and needed 9882 kwHrs to pump it.

### Calculation of Park Gallons pumped:

Pumping at Park = (Park KwHrs) x (6-11) x 4 million gallons /9882 KwHrs

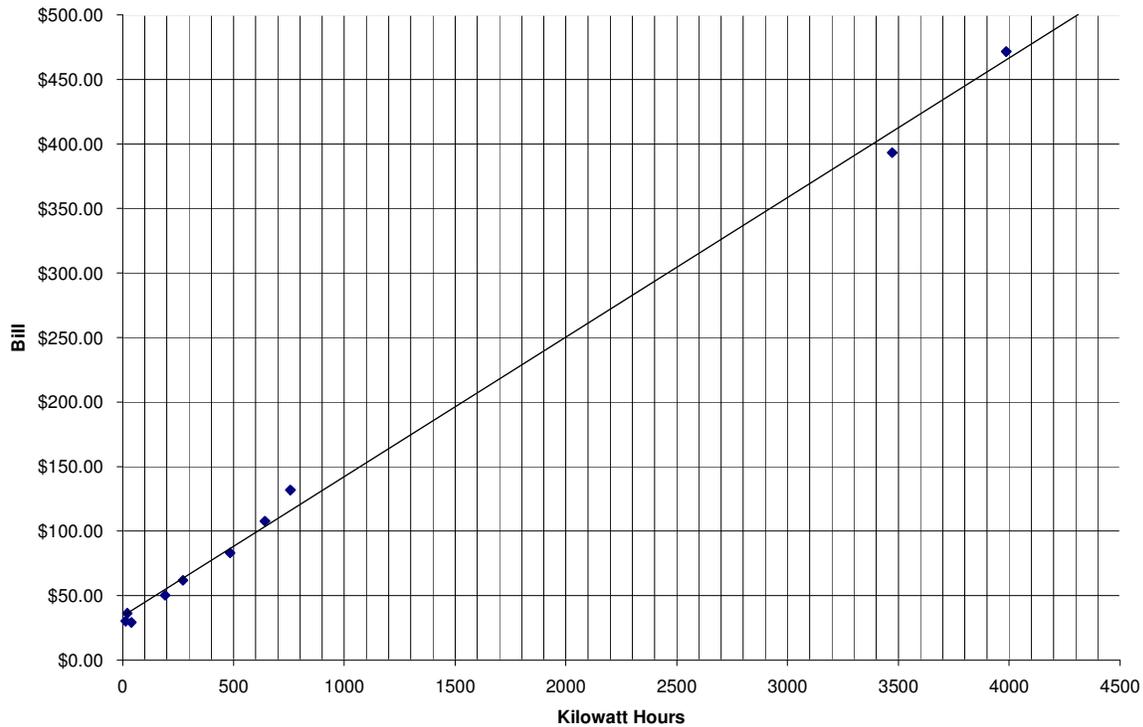
Conclusion: While they may only be spending a couple of thousand per year to keep the pond and stream full at the current levels (well below the design levels), they are pumping as much water as the district is from the aquifer. Previous calculations for evaporation and transpiration seemed to indicate less than a million gallons would be needed for that even in the summer. It appears the management of the park is cycling millions of gallons per month to the surface and then recharging it into the aquifer due to poor construction of both pond and artificial creek. It also seems they are aware of that because they are not maintaining either at the design levels.

This leaves the District with two problems: Nitrate contamination by wildlife and terrorist threat as the pond is readily accessible, not even fenced.

## APS Billings for BCCWID in April

Billing Address	KwHrs	Bill
3710 Pinnacle Pl.	39	\$29.14
18840 E Jacie Ln	642	\$107.73
35393 S. Pinnacle Pl	14	\$30.22
32253 S. Happy Jack Rd.	21	\$36.27
19020 E. Palm Lane	3473	\$393.13
33330 S. Tank Rd.	272	\$61.78
19630 E. School Loop Rd.	192	\$50.15
34500 S. Chapperal Rd	485	\$83.04
19420 E. Todd Evans Rd	757	\$131.68
19402 E. Todd Evans Rd	3987	\$471.48
Total -=	9882	\$1394.62

April 2013 BCCWID Electric Billing



# Electric Power Usage for Pumping Water

Kilowatt-Hours ~ Dynamic head x gallons/min x pumping time x system efficiency.  
~ Dynamic head x Total Gallons pumped x system efficiency

Therefore for the same Kilowatt hours:

$D1 \times G1 = D2 \times G2$  if we assume pumping efficiencies are the same.

## **Best Case: No pipe friction losses, and minimum pumping depth**

D of our system is 20 feet lift into 90 psi system (head conversion is 2.31)

D of Heritage Park is 20 feet lift to open pond

Heritage gallons = DH of BCCWID x our total gallons / DH of Heritage Park  
=  $(20 + 90 \times 2.3)$  x our gallons / 20  
~ 11 times the gallons that we pump for the same bill

## **Worst Case: Assuming high pipe friction losses and maximum pumping depth**

Losses increase the effective pumping head for both systems. If we assume the pipe friction loss is 1/3 of the ideal pumping head of a maximum depth of 30 feet that would be approximately 10 feet.

Heritage Gallons = DH of BCCWID x our total gallons / DH of Heritage Park  
=  $(40 + 90 \times 2.3)$  x our gallons / 40  
~ 6 times the gallons that we pump for the same bill

Conclusion:

Since we pump into a highly pressurized system and they pump to surface irrigation, they should pump 6-11x as much water as we do for the same total kilowatt hours (assuming both systems are equally efficient).