Project Name	Groundwater Elevations	**Date**	10/30/2017
To / Contact info	BCWD Managers		
Cc / Contact info	Karen Kill, Camilla Correll		
From / Contact info	Stu Grubb, PG		
Regarding	2017 Groundwater Elevation and Trends		

Background

EOR has measured groundwater elevations in wells in the BCWD since 2012. DNR also measures groundwater elevations in three observation wells. The measurements help identify trends in groundwater elevations that relate to groundwater/surface water interactions in Brown's Creek and other groundwater-dependant natural resources.

Analysis

Residential Wells

Groundwater elevation data from the residential wells (and DNR observation wells) are shown on Table 1 and Figure 1. Groundwater elevations generally increased from 2016 to 2017 by an average of about 1.3 feet. This rise was related to the above average rainfall during the summer months.

One new well was added to the network. The Boughten residence well near Lynch Lake was added to provide data in the area where wetland water levels have been a concern. The Hillquist residence well could not be measured this year because the owners were not home during a site visit and did not respond to several phone calls and emails. Hopefully, we will be able to resume measurements of this well next year.

DNR Observation Wells

DNR measures water elevations monthly in three observation wells:

- Brown's Creek Park – Deep well completed in the Jordan aquifer
- Brown's Creek Park – Shallow well completed in the Quaternary (glacial) aquifer
- Withrow School – Well completed in the Prairie du Chien aquifer

Groundwater elevation data from the DNR observation wells are shown on Figure 2. The data show a generally increasing trend since June 2010. The DNR repaired the Brown's Creek Park – Deep well in 2016. Data collected from September 2007 – June 2016 may not have been representative of water levels in the aquifer due to sand and other debris clogging the well. The data collected since June 2016 seems to follow a similar, somewhat erratic pattern as the data collected before 2007. The pattern could be related to pumping from nearby wells or surface water getting into the well due to well construction problems.

Golf Course Wells

The golf course wells showed similar trends to the other wells. Irrigation well #4 at Stillwater Oaks Golf Course had artesian conditions where the water level was above the ground surface and was controlled by the outflow elevation of the well pipe. The irrigation well at the Stillwater Country Club is difficult to measure because it is deep and has several obstructions in the well pipe. We will continue to look for reliable ways to measure the water level in this well.

Recommendations

BCWD should continue to collect groundwater elevation data on an annual basis. The long-term data and analyses are important for understanding conditions throughout the District, particularly the

thermal impairment of Brown's Creek. The data will also be useful for calibrating and refining the groundwater model of the North and East Metropolitan Area currently being developed by the DNR.

Table 1. Groundwater Elevations

Unique Number	Name	March 2012 Water Elevation	August 2012 Water Elevation	2013 Water Elevation	2014 Water Elevation	2015 Water Elevation	2016 Water Elevation	2017 Water Elevation		Change since last measure
Approximate Date		Mar-12	Aug-12	Aug-13	Aug-14	Sep-15	Oct-16	Oct-17		
Golf Course Wells										
515171	Applewood Hills	889.55	887.97	887.34			891.84	895.42		3.58
151580	Oak Glen Country Club	825.12	819.62				825.50	825.88		0.38
151581	Oak Glen Country Club	827.51					829.71	830.12		0.41
208038	Stillwater Country Club	756.91	749.66				769.17	>200		
Stillwater (	Stillwater Oaks Golf Club	906.75	904.38				910.31	913.42		3.11
Stillwater (	Stillwater Oaks Golf Club	905.55	898.50				908.89	910.27		1.38
Stillwater (	Stillwater Oaks Golf Club	906.38	903.59	906.36			910.27	911.26		0.99
Stillwater (	Stillwater Oaks Golf Club						963.06	Artesian		
566145	Logger's Trail Golf Course		898.91	900.21			904.41	905.62		1.21
667998	Logger's Trail Golf Course						911.29	906.28		-5.01
761112	Logger's Trail Golf Course						900.53	901.16		0.63
Domestic Wells										
428563	Ed and Laurie Francis	897.43	893.03	896.14	898.01	897.56	900.51	902.53		2.02
410987	Dan and Lori Gunderson	901.56	899.90	900.01	900.99	901.89	904.96	906.98		2.02
196839	Louis J. Bruno	862.84	857.03	860.70			862.92	867.75		4.83
Leiser	Craig Leiser	929.57	929.36	929.84	932.13	931.27	932.63	935.11		2.48
James	Alan and Molly James	936.71	936.47		939.00	937.59	939.62	941.71		2.09
184049	Kirk and Tracy Hillquist	938.57	938.25	940.29	940.86	939.20	942.27			
Thatcher	Jyneen Thatcher	949.35	948.94	947.88	951.97	950.55	953.76	955.68		1.92
138188	Rick Vanzwol	934.14	930.59	927.24	935.48	934.74	937.89	940.02		2.13
479665	John and Michelle Weaver	904.16		900.99		899.73	907.27	907.41		0.14
493250	Mark and Sharon Olien	720.30	716.97	713.74	720.64		721.88	719.97		-1.91
525197	James and Marilyn Opp			907.93	909.80	910.04	912.08	913.88		1.80
505390	Larry J and Pamela J Larson		924.70		925.98		928.67	930.48		1.81
153485	John P and Carolyn A Rydel		893.58	893.98	896.20	895.51	897.42	899.51		2.09
138904	Duane and Margaret Burmeister				828.79	827.21	829.25	829.91		0.66
406204	Michael and Rita Wiersma			938.96	939.12	939.00	941.10	941.38		0.28
Boughten	Larry Boughten							953.73		
DNR Observation Wells										
595649	Brown's Creek Park - Deep	861.86	861.56	861.74	862.15	862.51	866.32	864.77		-1.55
623066	Brown's Creek Park - Shallow	876.40	874.48	875.43	874.91	874.03	875.53	875.77		0.24
551565	Withrow Elementary School	947.68	949.39	947.80	949.40	951.27	954.28	956.88		2.60
								Average		*1.18*

Figure 1. Groundwater Elevations – BCWD Wells

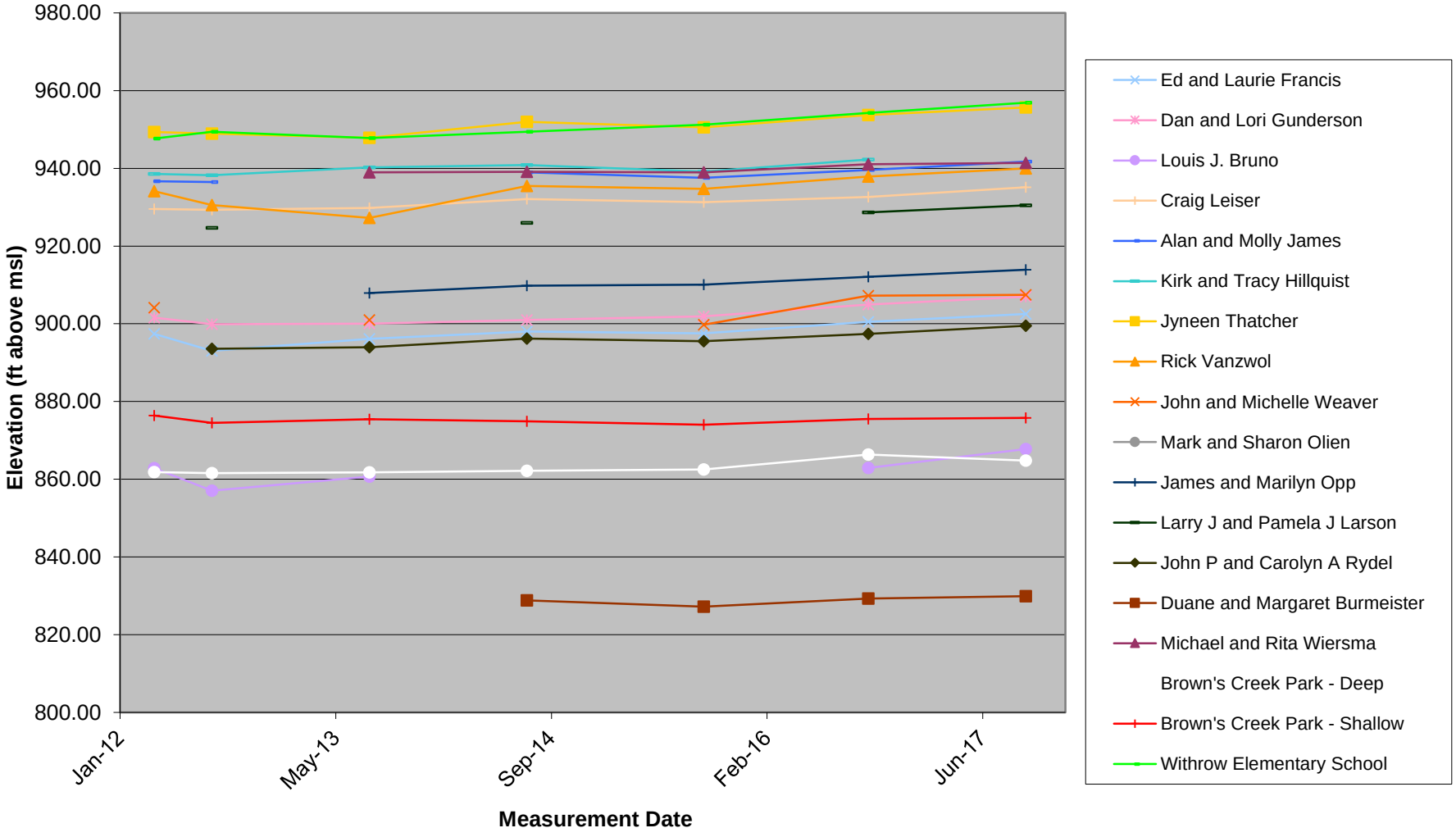
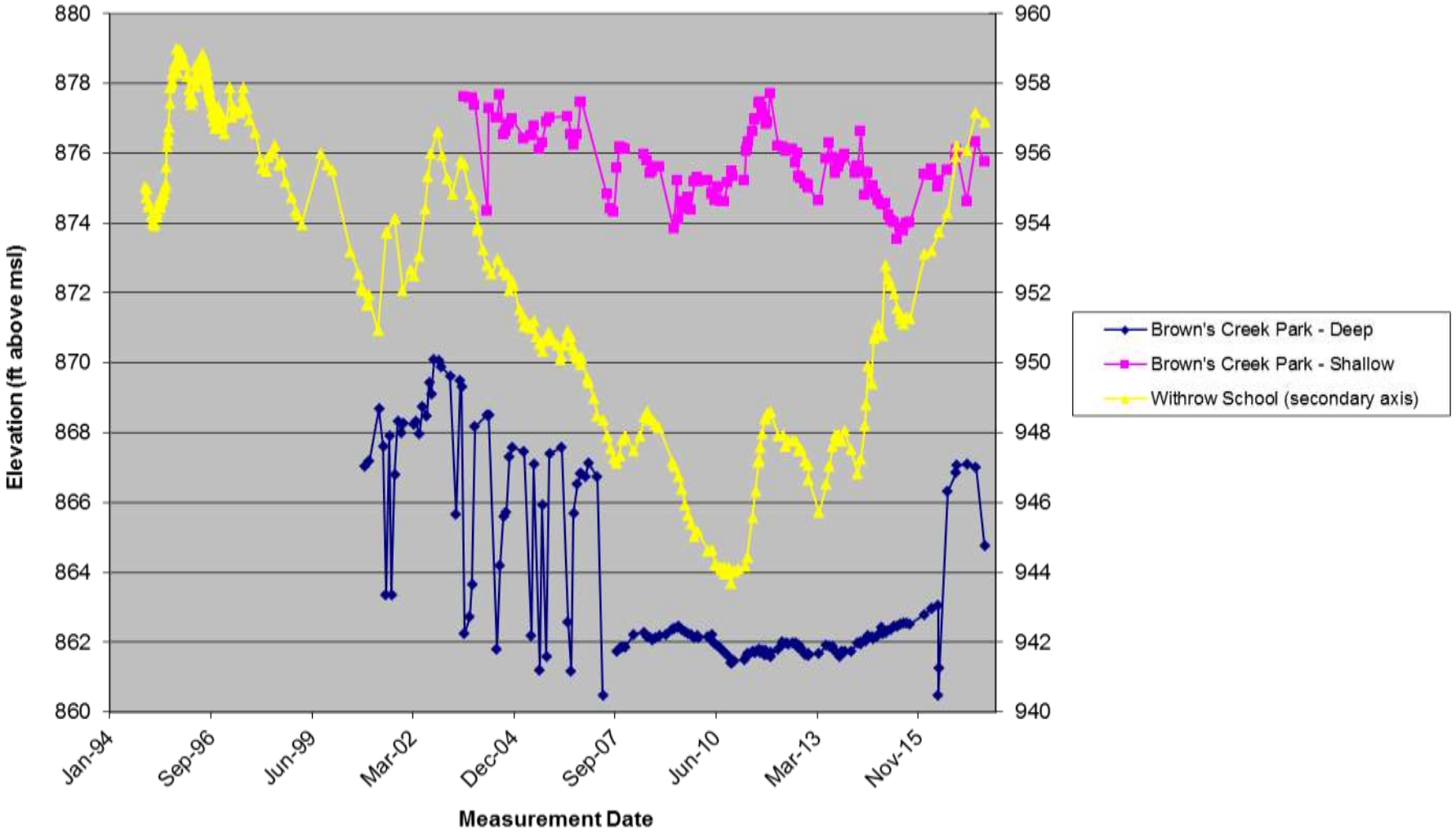
Figure 2. Groundwater Elevations – DNR Observation Wells (through 2017)