

**PEMBERTON TOWNSHIP  
WATER SUPPLY EVALUATION REPORT**

October 6, 2015

ARH has reviewed the status of the Pemberton Township water supply wells. This investigation was undertaken initially in order to assess any impacts of bringing Well #11 online and possibly decommissioning Well #4. We reached out to the NJDEP Bureau of Water Allocation (BWA) and Safe Drinking Water (SDW), reviewed the pumpage data from 2010-2014, and have updated an earlier system evaluation prepared in 2009.

**Current Well Status** (all values in gpm)

Pemberton Township currently has six (6) operational wells: Wells #4, 6, 7, and 8A in the Wenonah-Mt. Laurel formation, and Wells #12 and 13 in the Englishtown formation (see Map attached to the end of this report). Well #4 is currently inoperable. Well #11 is to be brought back online with full radium treatment. The following table summarizes the recorded well pumpages in gallons per minute (gpm) as well as their statuses:

Well #	Present Yield <sup>1</sup>	SDW Yield <sup>2</sup>	BWA Pump Capacity <sup>3</sup>	Status
<b>Wenonah-Mt. Laurel Aquifer Formation</b>				
4	0	50	500	Well #4 is not used due to corrosion of pipes in the well itself. This well was redrilled and rehabilitated in 2005 with no improvement in its prior poor performance.
6	180	180	500	Well #6 was rehabilitated in 2004, including the installation of new pumping equipment. No improvement was gained. It was rehabilitated more recently to yield 225-240 gpm, but air issues preclude continued pumping at that rate.
7	175	175	500	Recent well redevelopment of Well #7 yielded 225-240 gpm, but like Well 6, air issues currently preclude pumping at that rate.
8A	100	100	105	Well running at capacity.
<b>Englishtown Aquifer Formation</b>				
11	400	0	400	Well rehabilitated in 2009, radium treatment currently being added. Well yield is historically high.
12	225	400	400	Running Well #12 at higher pumping rates has caused air issues in the past.
13	450	450	450	Well running at capacity.
<b>Total</b>	<b>1,530</b>	<b>1,355</b>	<b>2,855</b>	

<sup>1</sup> Present yield values from Water Supervisor Toby Peacock, assuming Well #11 online.

<sup>2</sup> SDW yields currently on record with Safe Drinking Water.

<sup>3</sup> Denotes rated pump capacities as listed in Bureau of Water Allocation Permit.

**Safe Drinking Water Concerns/Firm Source Capacity**

In the past Kristin Tedesco of SDW has worked with the Township on Firm Source Capacity issues, but we will be dealing Nasir Butt going forward. The information here was provided by Ms. Tedesco on July 14, 2015. She had indicated that, “These are the numbers based on the last permit that was submitted by Pemberton *so if anything has changed in the past year I’d have to verify and update the chart.*” Therefore, it appears that Well #4 would be contributing 0 supply in any revised Firm Source Capacity Analysis.

**Values Currently on File with Safe Drinking Water**

Treatment Plant		Well No.	Recorded SDW Yield	
			GPM	MGD
Lester Street WTP(TP001001)		4	50	0.072
Ridge Road WTP	(TP003006)	6	180	0.259
	(TP011021)	13	450	0.648
Ridge Road WTP (TP004008)		7	175	0.252
Beech Street WTP	(TP012023)	12	400	0.576
	(TP010012)	8A	100	0.144
Trenton Road WTP (TP005019)		11	0	0
<b>Total</b>			<b>1,355</b>	<b>1.951</b>

Ms. Tedesco stated, “That means the total from all wells is 1.951 MGD. If you subtract the Largest Well (#13) then the firm source capacity is 1.303 MGD.”

Note that

1. The SDW totals do not include Well #11,
2. Actual pumping capacities for Wells #4 and #12 need to be updated, and
3. We still need to take into consideration Current Peak and Committed Peak Demands.

If we update the yields of Wells #4, #11 and #12,

**Corrected Pumping Yields for 2015**

Treatment Plant		Well No.	Actual Yield	
			GPM	MGD
Lester Street WTP(TP001001)		4	0	0.000
Ridge Road WTP	(TP003006)	6	180	0.259
	(TP011021)	13	450	0.648
Ridge Road WTP (TP004008)		7	175	0.252
Beech Street WTP	(TP012023)	12	225	0.324
	(TP010012)	8A	100	0.144
Trenton Road WTP (TP005019)		11	400	0.576
<b>Total</b>			<b>1,530</b>	<b>2.203</b>

Therefore, with Well #11 online at 400 gpm, and Wells #4 and 12 corrected for current yield, the total from all wells is **2.203 MGD**.

Firm Source Capacity is determined by first subtracting the capacity of the largest well (#13 at 0.648 MGD), giving **1.555 MGD**.

Next we need to determine the Current Peak Demand (based on the past 5 years). Based on reported pumpages from 2010-2014, the following statistics were determined (excluding Lake Valley):

	<b>All Wells (excluding Lake Valley)</b>		
	avg	peak	WAP Limits
MGD	0.774	<b>1.131</b>	
MGM	23.54	35.06	49.64
MGY	282.45	291.16	544

Therefore, the Current Peak Demand is **1.131 MGD**.

Next we need to determine the Committed Peak Demand, for any projects which have been approved for connection to the system but have not yet been constructed.

The only pending development that we know of at this point is the residential development on Bobolink Boulevard. 53 SF homes, assuming 4-bedroom, average 395 GPD each. Using a peaking factor of 3, this equates to 1,185 GPD per home for a total of **0.0628 MGD** that would be counted in the Firm Source calculation for this development.

Finally, we can calculate the Firm Source Surplus for Pemberton Township (excluding Lake Valley) as:

System Capacity with largest well offline – Current Peak Demand – Committed Peak Demand, or

$$1.555 - 1.131 - 0.0628 = \mathbf{+0.361 \text{ MGD}}$$

Note that 0.361 MGD surplus / 0.001185 MGD peak demand per 4-bedroom single family homes is equivalent to the potential development of 304 homes.

***Conclusion***

Because Well #4 is presently unusable, it will be counted as a zero yield source in any updated Firm Source Capacity calculation. Therefore, unless it is rehabilitated and brought back online with some pumping capacity, its decommissioning would have no effect on Firm Source Capacity calculations.

The Firm Source Capacity calculation presented here indicates a surplus of 0.361 MGD or 304 single family homes, taking into consideration only the pending Bobolink Boulevard housing development. The Township should quantify any existing connections which are going unused but could once again draw upon the system, in addition to any other potential future development or interconnection to existing, unserved areas. Such demand could easily erase the surplus now available to the Township.

## Water Allocation Concerns

The current Water Allocation Permit (with an expiration date of 11/30/2021) sets the following limits:

		gpm	MGM	MGY
A	All Sources(Pemberton & Lake Valley)	3,030	60.49	562.5
B	Pemberton Englishtown (11, 12, 13)	-	31	335
C	Pemberton Mt Laurel-Wenonah (4,6,7,8A)	-	25	269
D	Pemberton All Sources (4,6,7,8A,11,12,13)	2,455	49.64	544
E	Lake Valley Mt Laurel-Wenonah (1,2)	575	10.85	80.5

Akinsanya Ode of BWA has indicated that,

*Activating Well #11 at 400 gpm and removing Well #4 at 500 gpm (as a result of the proposed decommissioning) will bring the total overall monthly limit/diversion rate to 2930 GPM (100 gpm less than the current 3030 gpm (100 gpm difference as a result of the 100 gpm difference between Well #4 @500 gpm and Well #11 @400 gpm)...The current monthly and annual limits will remain intact without any reduction.*

*The other way this can be approached is to construct a replacement well to similar specifications such as depth, pump capacity and aquifer for Well 4 so that diversion limits associated with Well 4 could be transferred to the replacement well.*

Because Well #11 did not have permanent radium treatment in place at the time of permit issuance in 2011, it was to be operated on a last on, first off basis and was not included in the instantaneous pumping rate limit (note in Table 1, that the total for all Pemberton Township (non Lake Valley) wells including Well #11 is 2,855 gpm, while the permitted limit D for Pemberton All Wells is only 2,455 gpm).

It should be noted that a proposed replacement well for Well #4 (“Well 14”) was investigated a few years ago, but had decided (with input from the Township Water Department) that it was better to pursue the existing Englishtown formation wells which have a much higher yield. Well 4 had been rehabilitated, redrilled, etc., all with little to no measurable increase in production.

Statistics based on the data submitted by the Township to BWA is summarized below for the past 5 years (2010-2014) and is presented in Attachment A. This data indicates that both Pemberton Township and Lake Valley are well within their monthly and annual allocation limits for all subgroupings.

### **2010-2014 Withdrawal Statistics**

<b>A. All Sources (Pemberton &amp; Lake Valley)</b>				<b>B. Pemberton Englishtown Wells (11,12,13)</b>			
	avg	peak	WAP Limits		avg	peak	WAP Limits
MGD	0.938	1.316	-	MGD	0.399	0.787	-
MGM	28.55	40.81	60.49	MGM	12.15	24.40	31
MGY	342.55	349.47	562.5	MGY	145.78	182.79	335

C. Pemberton Wenonah-Mt. Laurel Wells (4,6,7,8A)				D. Pemberton All Sources (4,6,7,8A,11,12,13)			
	avg	peak	WAP Limits		avg	peak	WAP Limits
MGD	0.374	0.567	-	MGD	0.774	1.131	-
MGM	11.389	17.58	25	MGM	23.54	35.06	49.64
MGY	136.663	164.49	269	MGY	282.45	291.16	544
E. Lake Valley Wells (LV1,LV2)							
	avg	peak	WAP Limits				
MGD	0.165	0.192	-				
MGM	5.01	5.94	10.85				
MGY	60.10	62.98	80.5				

A more detailed look at the Pemberton Township wells (see below) indicates that Wells #6, 7, 12 and 13 are presently sharing an almost equal distribution of the Township demand.

**2010-2014 Withdrawal Statistics per Pemberton Well**

Well #	Monthly (MGM)		Annual (MGY)	
	Average	Peak	Average	Peak
4	0	0	0	0
6	6.69	8.98	80.23	92.90
7	4.39	8.45	52.68	90.00
8A <sup>1</sup>	0.31	3.99	3.75	14.55
11 <sup>2</sup>	0.12	2.52	1.44	7.21
12 <sup>3</sup>	7.49	16.19	87.96	119.10
13	6.27	19.11	73.98	99.07

<sup>1</sup> Not used since 2012

<sup>2</sup> Offline due to Ra contamination since Sept, 2010

<sup>3</sup> Brought online in 2011

If Wells #6, 7, 12 and 13 were all running at the same time to theoretically discharge 1,850 gpm under peak demand conditions, and the Lake Valley system was yielding 575 gpm at the same time, the total is 2,425 gpm. If Well #11 were brought online and operated at the same time as well, the new theoretical total would be 2,825 gpm. Therefore, if BWA were to decrease the current instantaneous diversion rate from 3,030 gpm to 2,930 gpm, it appears that Pemberton Township would still be within its limits.

**Conclusion**

The Bureau of Water Allocation has indicated that the only change in the Pemberton Water Allocation Permit as a result of bringing Well #11 online and decommissioning Well #4 would be a net decrease in the overall Township allocation limit from 3,030 gpm to 2,930 gpm. Well #11 had not been counted in this value when the permit was issued in 2011 because permanent radium treatment facilities were not yet in place. Based on the pumping history from 2010-2014, this revised limit would not adversely affect Township water supply operations.

## **Recommendations**

It is our opinion that it would be in Pemberton Township's best interest to bring Well #11 online, decommission Well #4, and to either

- Increase production in existing wells,
- Construct replacement well(s) for those that are performing poorly,
- Construct new well(s), or
- Tie into other water supply systems and/or supply wells.

A similar alternatives analysis was conducted by ARH for the Township in 2009, which is summarized and updated and is included here as Attachment B. Attachment C summarizes the status/performance of each well at that time. Based upon our review of historical and current information, wells in the Wenonah-Mt Laurel formation are not worth investing in due to poor yield. Any new sources or rehabilitation funds should be invested in the higher yielding Englishtown formation. Although consideration for radium treatment would be required, yield considerations preclude further investment in the shallower wells.

We therefore recommend that the Township take the following steps in ensuring a safe, plentiful water supply for its constituency:

1. Bring Well #11 online.
2. Decommission Well #4.
3. Update Firm Source Capacity Analysis. Provide ARH with more detailed data on potential future connections as well as existing connections which currently have zero demand but may be targeted for redevelopment.
4. Repair Well #12. Further investigate the air entrainment issue in Well #12. As the other Englishtown wells are yielding on the order of 400 gpm, increasing Well #12 yield from 225 gpm to 400 gpm would be equivalent to adding another Wenonah-Mt Laurel well.
5. Investigate possible new Englishtown well sites. The Township could potentially install deeper, Englishtown wells on the site of Well #4. The close proximity of Well #7 to Well #13 suggests that that the Well #7 site is less amenable to another deep formation well. Consideration should be made of the condition of existing on-site infrastructure, and other potential new well sites investigated.

As detailed in Attachment B, Pemberton Township currently connects to two (2) public community water supply systems in order to provide emergency supply: Pineview Terrace and Hilltop Mobile Village. In general, other PCWS wells within the Township are of low capacity and were probably not constructed to the same rigorous standards as municipal water supply wells. Given the history of problems with wells in the Pemberton Township area, we would not recommend acquiring any existing wells for conversion for municipal water supply. It may be possible to investigate a connection to the New Jersey American Sunbury system, but given its location and the anticipated costs, this is not a viable option at this time.

Finally, in previous reports, ARH has evaluated other areas of the Township water system. The Township should therefore bear in mind the following additional components of the water system which require attention and which would, in most cases, greatly improve system efficiency and operation:

1. Tanks should be inspected and maintenance scheduled as needed.
2. The cost of implementing a remote meter reading system should be investigated.
3. A Geographic Information System database of the entire water system should be developed.
4. A SCADA system should be implemented (see Attachment D).

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