March 28, 2013

STAFF REPORT

In the matter of :	Application No. 5240 to modify the permit to divert water from five existing wells and one new well screened in the
Lower Township MUA	Cohansey aquifer in Lower Township, Cape May County.

In compliance with the provisions of N.J.S.A. 58:1A-1 et seq., Lower Township Municipal Utilities Authority (LTMUA), 2900.Bayshore Road, Villas, New Jersey 08251, filed an application with the Department of Environmental Protection on June 14, 2011 and revised on April 20, 2012 to divert a maximum of 143 million gallons of water during any month (MGM) and a maximum of 1,330 million gallons of water during any year (MGY) at a maximum rate of 4,250 gallons per minute (GPM) from five existing Well Nos. 1, 2, 6, 7, and 9; 262, 247, 280, 306, and 280 feet deep respectively, and one new Well No. 8, 269 feet deep. All wells are screened in the Cohansey aquifer.

This request represents an increase of 50 MGM and 462 MGY above the existing overall allocation of 93 MGM and 868 MGY, an increase in the overall pumping rate from 3,000 GPM to 4,250 GPM, and the addition of one new source. The maximum pumping rate for Well 7 is proposed to be increased from 600 GPM to 800 GPM, the maximum pumping rate for Well 9 is proposed to be increased from 500 GPM to 600 GPM, the maximum diversion rate for Well 1 is proposed to be decreased from 850 GPM to 800 GPM, and the maximum diversion rate for the new Well 8 is to be established at 1,000 GPM.

Diversion is for the purpose of public supply and serves the community of Lower Township, Cape May County.

Public notice was required due to the requested increase in allocation and pumping capacity of two wells, and the addition of a new diversion source, Well No. 8.

A hearing was required pursuant to public comments received by the NJDEP in response to the Public Notice published on September 28, 2012 in the Press of Atlantic City. A public hearing was scheduled for October 30, 2012 at the Cape May County Administration Building in Cape May Court House, Cape May County. This hearing had to be postponed due to weather conditions. A combined public hearing for both LTMUA's application and New Jersey American Water - Cape May System application (5054) was scheduled for December 19, 2012 at 4 P.M. at the Cape May County Administration Building, 4 Moore Road, Cape May Court House, New Jersey 08210, and published on November 19, 2012 in the Press of Atlantic City. At the end of the hearing, the Hearing Officer held the public comment period open until January 3, 2013. Written and/or oral comments were provided by LTMUA, the City of Cape May Water Department (CMCWD), Wildwood Water Utility (WWU), American Littoral Society (ALS), Association of New Jersey Environmental Commissions (ANJEC), Carl M. DeMarcantonio, Dr. Lynette Goodstine, Robert S. Guzek, Jr. of Parker McCay on behalf of the Delaware River and Bay Authority (DRBA), Robert Kecskes, William LaSalle, Larry Newbold, Bette and Mike McGurk, Emily Oberkofler, and Stephan W. Sheftz in addition to numerous concerned citizens during the public comment period.

Background/Findings of Fact

1. Water is requested to be diverted under this modified permit for public community supply from the following sources at the maximum rates specified below:
Groundwater

Well Name or Designation	Well Permit No.	Pump Capacity (GPM)	Depth (feet)	Aquifer
1	3700000113	800	262	Cohansey
2	3700008728	550	247	Cohansey
6	3700008232	500	280	Cohansey
7	3700009043	800	306	Cohansey
9	3700009403	600	280	Cohansey
8	P201100104	1,000	269	Cohansey

2. This application request is for a modification of an allocation granted by the following:

Permit No.	Date Issued	Source of Water	Diversion Amount
5240	10/21/2009	Well Nos. 1,2,3,6,7 and 9	93 MGM/868 MGY
5240	1/20/2009	Well Nos. 1,2,6,7 and 9	93 MGM/868 MGY
5240	3/01/2007	Well Nos. 1,2,6,7, and AP-1	93 MGM/868 MGY
5240	8/01/2005	Well Nos. 1,2,6, and AP-1	93 MGM/868 MGY
5240	7/01/2004	Well Nos. 1,2,3,6 and AP-1	93 MGM/868 MGY
5240	3/08/1994	Well Nos. 1,2,3,AP-1 & AP-2	93 MGM/868 MGY
2349P	8/18/1992	Well Nos. AP-1 and AP-2	42 MGM
5240	6/21/1989	Well Nos. 1, 2 and 3	50 MGM
5240	2/27/1986	Well Nos. 1, 2 and 3	50 MGM
5240	3/21/1984	Well Nos. 1, 2 and 3	50 MGM
1678	11/18/1974	Cohansey Aquifer	50 MGM
1489	11/25/1970	2 Wells	30 MGM

3. The following information is available for the applicant's diversion sources:

Well No.:	1	2	6
Well Permit No.:	3700000113	3700008728	3700008232
Date Constructed:	3/07/1956	12/14/1962	8/29/2003
Depth (feet):	262	247	280

Well No.:	1	2	6
Pump Capacity (GPM):	800	550	500
Site Elevation:	15	10	22
Static Water Level:			
Date (when constructed):	3/1956	12/1962	9/22/2003
Level (feet):	24	24.2	44.6
Date (recent):	06/28/2012	06/28/2012	06/28/2012
Level (feet):	35.0	37.0	49.1
Sodium Data:			
Date (historic):	1/11/57	N/A	N/A
Concentration (mg/l):	42	N/A	N/A
Date (recent):	06/26/2012	06/26/2012	06/26/2012
Concentration (mg/l):	33.3	29.9	31.8
Chloride Data:			
Date (historic):	1/11/1957*	8/1984	N/A
Concentration (mg/l):	20*	10	N/A
Date (recent):	06/26/2012	06/26/2012	06/26/2012
Concentration (mg/l):	13.1	18.4	20.7
Well Test Data: (from well records)			
Test Date:	3/28/1956	12/12/1962	9/22/2003
Yield (GPM):	500	554	602
Drawdown (feet):	9	29.6	79.8
Static Level (feet):	24	24.2	44.6
Pumping Time (hours):	4	8	24
Specific Capacity: (GPM/ft drawdown)	56	19	7.5

* Gill, 1962

Well No.:	7	9	8
Well Permit No.:	3700009043	3700009403	P201100104
Date Constructed:	4/15/2005	10/15/2007	4/8/2011
Depth (feet):	306	280	269
Pump Capacity (GPM):	800	600	1,000
Site Elevation:	19	20	25
Static Water Level:			
Date (when constructed):	4/11/2005	10/29/2007	4/18/2011
Level (feet):	71	49	36.9
Date (recent):	06/28/2012	06/28/2012	4/18/2011

Well No.:	7	9	8
Level (feet):	45.2	48.7	36.9
Sodium Data:			
Date (historic):	3/12/2007	3/9/2009	N/A
Concentration (mg/l):	14.1	10.6	N/A
Date (recent):	06/26/2012	06/26/2012	N/A
Concentration (mg/l):	20.5	16.5	N/A
Chloride Data:			
Date (historic):	3/12/2007	3/9/2009	N/A
Concentration (mg/l):	9.4	9.68	N/A
Date (recent):	06/26/2012	06/26/2012	N/A
Concentration (mg/l):	12.2	11.4	N/A
Well Test Data: (from well records)			
Test Date:	4/11/2005	10/29/2007	4/18/2011
Yield (GPM):	600	610	1252
Drawdown (feet):	36	30	68
Static Level (feet):	35	49	36.9
Pumping Time (hours):	24	24	72
Specific Capacity: (GPM/ft drawdown)	16.7	20.3	18.4

4. A review of quarterly diversion reports indicates the following water use:

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Overall/Primary Customer Group Allocation (MGM) (MGY)
2012	470.39	62.724 (July)	39.199	93/67.44* 868/605*
2011	457.986	65.891 (July)	38.166	93/67.44* 868/605*
2010	452.428	59.462 (July)	37.702	93/67.44* 868/605*
2009	393.573	51.652 (July)	32.798	93/67.44* 868/605*
2008	396.298	51.337 (Aug.)	33.025	93/58.6** 868/514**
2007	440.455	57.985 (July)	36.705	93/58.6** 868/514**

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Overall/Primary Customer Group Allocation (MGM) (MGY)
2006	419.467	52.588 (July)	34.956	93/58.6** 868/514**
2005	457.461	53.586 (Aug.)	38.122	93/58.6** 868/514**
2004	469.178	50.119 (May)	39.098	93 868

* Primary Customer group limits effective November 1, 2009.
** Primary Customer group limits effective July 1, 2004.
All water use is reported under the Primary Customer group.

5. According to the applicant, the population served is approximately 17,150 year round which represents an average monthly consumption of 72.8 gpcd (gallons per capita per day), and a peak monthly consumption of 114.3 gpcd based upon 2012 water use data, with a 96.9 percent residential use component. The summer population served is approximately 34,300 which represents a peak monthly consumption of 57.2 gpcd based upon July 2012 water use data, with a 96.9 percent residential use component.

6. The applicant's diversion sources are located within: Planning Area No. 23, Cape May Coastal as designated by the New Jersey Water Supply Master Plan; the Coastal South Drought Region; and Watershed Management Area No. 16, Cape May.

   All diversion sources except Well 7 are in the Delaware River Basin. The applicant has obtained approval from the Delaware River Basin Commission (DRBC) under Docket Nos. D-69-200-CP and D-70-103-CP. However, in December 2009, the Department and DRBC entered into an administrative agreement whereby the issuance of a DRBC Docket may not be required for approval of this major modification application.

7. The last site inspection was conducted on November 24, 2009. The following information was obtained during this inspection:

Source	Condition	Pump House Condition	Pump Type/ Horse Power	Air Line and Gage	Able to Measure Static Water Level By Tape	Meter Type	Meter Reading
Well 1	Good	Good	VT/50	Yes	Yes	Starling	44207600
Well 2	Good	Good	VT/30	Yes	Yes	Starling	88659700
Well 6	Good	Good	VT/60	Yes	Yes	Starling	45561700

Source	Condition	Pump House Condition	Pump Type/ Horse Power	Air Line and Gage	Able to Measure Static Water Level By Tape	Meter Type	Meter Reading
Well 7	Good	Good	VT/75	Yes	Yes	Starling	61705400
Well 9	Good	Good	VT/60	Yes	Yes	Starling	41539100
Well 8	New	Well 8 was not constructed at the time of inspection					

The sources are located as follows:

Source	X Easting – New Jersey State Plane (feet)	Y Northing – New Jersey State Plane (feet)	Location
Well 1	363344.546	54327.907	Scott Avenue
Well 2	367238.151	55564.532	Fire Lane
Well 6	375005.73	61453.84	Saratoga Road
Well 7	372192.97	56549.02	Fishing Creek Road
Well 9	375488.158	62445.491	Lexington Road
Well 8	376127*	60845*	Breakwater Road (CR # 613)

* Based on field work conducted by NJGWS in 2012 as well 8 was not constructed at time of most recent inspection.

7. Flow meters for all diversion sources have been calibrated within the past 5 years. The most recent date of calibration is January 11, 2010. The permittee shall install a calibrated totalizing flow meter on Well 8. Proof of flow meter calibration for Well 8 shall be submitted with 60 days of the effective date of this permit.

8. The following wells have been decommissioned:

Well No.	Well Permit No.	Depth (feet)	Status
Chlorine Injector	3700001498	55	Sealed 8/08/1989
Well B-1	3700002911	4	Sealed 3/04/1988
Well B-1A	3700002912	30	Sealed 3/04/1999
Well B-2A	3700002913	38	Sealed 3/04/1988
11 Borings	3700002509	10	Sealed 6/18/1987
Well H	Unknown	23	Sealed 6/01/1991
Well J	Unknown	26	Sealed 6/01/1991
#1998W	3700000546	20	Sealed 12/01/1993

Well No.	Well Permit No.	Depth (feet)	Status
MWA-43	3700002514	27	Sealed 12/01/1993
AP-2	5700000013	283	Sealed 06/23/2004
Well 3	3700000293	308	Sealed 07/27/2005
Well 4 (AP-1)	5700000012	279	Sealed 08/16/2007
MW-8 (OBS-1)	P201100105	270	Sealed 05/18/2011

The following sentinel wells have been installed and are monitored by LTMUA:

Well No.	Well Permit No.	Depth (feet)	Aquifer
Roslyn Avenue Well 1	3700004871	277	Cohansey
Roslyn Avenue Well 2	3700004872	185	Cohansey
Drumbed Road Well 1	E201215462	140	Cohansey
Drumbed Road Well 2	E201215463	230	Estuarine Sands
Fay Avenue Well 1	E201215464	260	Cohansey
Mallow Road/Cox Creek Well 1	E201300367	300	Cohansey
Caroline Avenue Well 1	E201300370	150	Estuarine Sands
Caroline Avenue Well 2	E201300369	300	Cohansey
Rosewood Avenue Well 1	E201301310	300	Cohansey

9. The applicant is currently in compliance with all permit conditions.

10. Water, after use, will be discharged to Lower Township MUA Wastewater Treatment Plant for treatment and discharge to the Atlantic Ocean under Permit No. NJ0023809. The treatment works are not under a sewer connection ban or other restriction imposed by NJDEP.

11. The system has the following interconnection with an adjacent system:

Name of System	Size of Interconnection	Use
Cape May City Water Utility	12"	Emergency

12. In 1992 Lower Township MUA acquired the allocation associated with the County of Cape May's Water Allocation Permit No. 2349P and entered into a contract with the County which stipulated that the acquired diversion would serve the City of Cape May, West Cape May, Cape May Point, the U.S. Coast Guard, Cape May County Airport and Bumble Bee Foods, Inc. (formerly Snow's/Doxsee Inc. and Borden Company) in addition to Lower Township. The contract contains a Water Allocation Formula that distributes the amount of water from the County's old permit in percentages and guarantees specific recipients the water. This formula guarantees 20% of the County's previously held allocation (43 MGM) as reserve for the

County/Delaware River and Bay Authority (DRBA) (8.6 MGM) and divides the remainder (34.4 MGM) as follows: 3.5% to the County Airport (1.2 MGM), 50% to Cape May City Water Utility (17.2 MGM), 26.5% to Bumble Bee Foods, Inc. (9.1 MGM), and 20% to Lower Township MUA (6.9 MGM). However, this contract is outdated and has been misinterpreted in the past but the figures provided above are an accurate representation of the contract apportions. The County transferred control of its reserved allocation to the DRBA in 1998. The City of Cape May has constructed and is now operating a desalination facility. Water from the desalination plant serves the City of Cape May, West Cape May and Cape May Point. Bumble Bee Foods, Inc. transferred 8.84 MGM and 91 MGY from its contracted allotment to Lower Township MUA in 2009.

13. The system is 100 percent metered.

14. The applicant has indicated that their unaccounted-for-water is 2.67 percent for 2010.

15. The water system has storage capacity of 2.66 MG, as compared with a daily average water demand of 1.24 MGD. However, the requested allocation for the Primary Customer Group equates to 2.87 mdg (average) and 3.73 mgd (peak).

16. The applicant has submitted a Water Conservation Plan on January 14, 2011. A review of the Water Conservation Plan was conducted by the Department and forwarded to LTMUA on September 26, 2011. An enhanced plan in conformance with the Department's Water Supply Management Strategy as a result of P.L. 2001, Chapter 165 shall be developed and submitted to the Bureau by June 30, 2013. Areas for improvement identified by the Department's review include management of peaks, unaccounted for water, water rate structure, and public education/awareness.

17. Sub-surface diversions in the same aquifer within the radius of influence (12,100 feet*) include the following:

Well Owner	Well Permit No.	Depth (feet)	Capacity (GPM)	Distance (feet)
Cape May National Golf Club	3500011432	281	35	6,592
Cape May National Golf Club	3700004368	275	40	6,600
Lower Cape May HS & Richard M Teiteiman School	3700008523	274	350	8,151
Wildwood City Water Department Well 34	3700000235	241.58	1,500	9,924
Wildwood City Water Department Well 28	5700000006	250	1,030	10,102
Wildwood City Water Department Well 33	3700000234	260	1,050	10,412
Wildwood City Water Department Well 29	5700000007	251	830	10,662
Wildwood City Water Department Well 30	3700000002	251	1,100	11,535

* 12,100 foot radius of influence calculated by NJGWS

18. Public water supply wells regulated by the Water Allocation Permit program, within a 5-mile radius include the following:

Well Owner (PI ID)	No. Of Wells	Depth (feet)	Aquifer	Capacity (GPM)	Distance (feet)
Cape May City Water Utility (5210)	5	276-830	2-AC 800 foot sand 3- Cohansey	2000 2330	16,200
Cape May Mobile Estates (11357W)	2	285	Cohansey	100	11,860
Lower Township MUA (5240)	7	247-306	Cohansey	3,000	0
NJ American Water Cape May Court House System (5054)	2	257-260	Cohansey	700	22,230
Wildwood City Water Dept. (5057)	17	60-664	2 Holly Beach 1 Estuarine Sand 4 Cohansey 4-ASR (Cohansey) 2 Rio Grande (1 existing, 1 proposed) 2 Atlantic City 800 foot sand	450 360 7510 4000 2050 2000	10,660 10,610 9,924 9,770 9,770 9,770
Grande Woods South MHP (10676W)	1	190	1 Estuarine Sand	300	13,170
Soco Enterprises (Delsea Woods MHP) (10751W)	2	100-185	1 Estuarine Sand 1 Cohansey	65 72	24,015

19. According to the DEP-GIS-Feb. 2012 Known Contaminated Sites list, and OPRA On-line Report web page information, potential pollution sites within one mile of the diversion include:

Name of Source	Distance (feet)	(Formation) Aquifer Affected	Lead Agency
Cape May County Airport	1,651	Holly Beach Water Bearing Zone	BCM
Cape May County Road Department	1,222	Holly Beach Water Bearing Zone	BUST

Name of Source	Distance (feet)	(Formation) Aquifer Affected	Lead Agency
Everlon Inc.	1,914	Holly Beach Water Bearing Zone	BUST
Southern New Jersey Airways	1,774	Holly Beach Water Bearing Zone	BUST

20. The applicant has indicated that the new diversion source is located near freshwater wetlands or transition area per N.J.A.C. 7:19-2.2(f)6.

21. The estimated consumptive use of water is 100 percent, which is equivalent to 1.25 mgd based on current average demand since the applicant's diversion is from the confined Cohansey aquifer and all the water after use is discharged into the Atlantic Ocean via LTMUA's Wastewater Treatment Plant. This is equivalent to 3.0 mgd based on the current monthly allocation of 93 MGM, 3.73 mgd based on the proposed Primary Customer Group monthly limit of 115.74 MGM, and 4.6 mgd based on the requested monthly allocation of 143 MGM.

Staff Analysis and Conclusions

1. The applicant has complied with all previous permit conditions.

2. An aquifer test was conducted on behalf of the applicant by Remington, Vernick & Walberg Engineers on April 15-25, 2011, using Test Well 8 as a pumping well and Wells 8, 6, and 9 serving as observation wells to provide data necessary for evaluating the anisotropic characteristics of the Cohansey aquifer. The test consisted of a step-drawdown background monitoring, a 72-hour pumping phase and a 72-hour recovery phase. Well 8 was operated at approximately 1,240 GPM.

   Results of the aquifer test are as follows:

Well No.	Q (GPM)	Depth (feet)	Distance (Radial) (feet)	Direction	Drawdown (feet)
Well 8	1,240	269	0	-	79.33
MW-8	-	269	200	NW	28.20
MW-8 (NJGWS recording)	-	269	200	NW	26.45
Well 6	-	280	1,400	NW	12.35
Well 9	-	280	1,850	NW	12.72

   The applicant's consultant used the average of the results from the Jacob, Theis, and Residiual Drawdown methods of aquifer analysis to determine that the aquifer exhibited confined characteristics. Transmissivity was determined to be 6,163 gpd/ft, with a Storativity of 1.95E-04, while a Radius of Influence of 13,432 feet, or 2.5 miles for a one foot drawdown was calculated.

   In re-evaluating the aquifer test data with the Hantush-Jacob (leaky aquifer) method of aquifer analysis the New Jersey Geological and Water Survey (NJGWS) determined that the values obtained are consistent with NJGS hydroparameters database values for this aquifer. The following values

were calculated by NJGWS: Transmissivity of 4,980 ft^2/day, Storativity of 2.710E-04, and Radius of Influence for a one foot drawdown of 12,100 feet (steady state conditions).

3. The applicant's current water use is reasonable.

4. Demand projections provided by the applicant indicate that their ten year demands will be 142.97 MGM, and 1063.521 MGY. These projections were determined by considering the additional service connections to property owners in Villas and Townbank which have experienced contamination in their private wells and are being connected to LTMUA. Service to Lake Laurie Campground is also planned. Analysis of this in conjunction with historical use and supporting documentation provided with the application shows that a recommended allocation of 143 MGM based on calculations below (65.891 MGM (July 2011 peak use) + 49.02 MGM (10 year projected demand for projects) + 27.26 MGM (County/DRBA contractual obligations) = 143.771 MGM) should be sufficient to meet the applicant's needs.

   In order to calculate the monthly allocation needed by the applicant for the next 10 years, the existing peak monthly demand reported by the applicant in the last five years from 2007 to 2012 of 65.891 MGM in July 2011 was added to the 10-year projected monthly demands of 76.28 MGM associated with the projects listed in the table below submitted with the application and LTMUA's contractual obligations. Details about the 10-year water demand projections for additional projects as requested by the Bureau and also those values interpreted by the Bureau from the 1992 contract are presented in the following tables:

Project Name	Peak Monthly Demand (MGM)	Projected Annual Demand (MGY)
Townbank	25.298	198.578
Villas	22.222	174.434
Lake Laurie	1.5	11.775
Total	49.02	384.787

1992 Agreement	Peak Monthly Demand (MGM)	Projected Annual Demand (MGY)
County/DRBA	8.6	67.51
Cape May City	17.2	135.02
Airport	1.2	9.42
Bumble Bee	0.26	2.041
Total	27.26	213.991

Potable water demands for Cape May townships estimated for year 2000-2050 by NJDEP based on projected population and composite zoning developed by New Jersey Division of Community Affairs show that full build-out demands in Lower Township would be reached by year 2100. According to United States Geological Survey (USGS) Scientific Investigations Report 2009-5187 titled "Future water-supply scenarios, Cape May County, New Jersey, 2003-2005"; full build-out simulated for Lower Township in Cape May County was 1,535 million gallons of water by year 2100.

Per the contract, 8.6 MGM is held in reserve for the County/DRBA, an additional 1.2 MGM is held for the Airport guarantee, 17.2 MGM is held for Cape May City guarantee, and 0.26 MGM remainder guarantee for Bumble Bee Foods, Inc. (formerly Snow's/Doxsee Inc. and Borden Company, 8.84 MGM of Bumble Bee's 9.1 MGM guarantee was transferred to LTMUA in 2009) totaling 27.26 MGM. After contractual obligations are satisfied, LTMUA would have a new Primary Customer Group allocation of 115.74 MGM based on approval of the entire requested monthly allocation of 143 mg. The overall requested annual allocation of 1,330 MGY appears excessive based upon 15-year demand numbers submitted by the applicant of 1,063.521 MGY. However, as the contract

was misinterpreted, the applicants demand projections do not reflect their full obligations under the agreement. Therefore, an overall annual allocation of 1,034.608 mg [435.830 MGY (average use) + 384.787 MGY (15 year projected demand for projects) + 213.991 MGY (County/DRBA contractual obligations)] would be appropriate. Taking this into consideration and allowing for the County/DRBA contractual obligations of 213.991 MGY provides the Primary Customer Group with an allocation of 820.617 MGY.

5. Public community water supply systems are in the public interest because they are generally safer and more reliable than individual domestic wells that are not subject to the same testing, monitoring and standards as a public community supply system. Many private wells in LTMUA's service area are experiencing water quality issues. Historically the Department has viewed local governmental approval of a project as signifying that it is in the public interest. Therefore the proposed diversion is considered to be in the public interest in accordance with N.J.A.C. 7:19-2.2(f)1.

6. The landward encroachment of the saltwater/freshwater interface has occurred in the Cohansey aquifer in Southern Cape May County as observed in water withdrawal wells in Cape May City and in an observation well at the mouth of Fishing Creek in the Villas section of Lower Township based on both historical and recent data. Chloride concentrations which exceed the secondary drinking water standard of 250 mg/L have been observed in the referenced wells. The results of 2009 USGS ground water modeling efforts depict salt water intrusion at the aforementioned locations and also indicate that Lower Township's Well No. 1 is vulnerable to saltwater contamination. Supplemental USGS preliminary findings (2012 Draft) predict saltwater encroachment 2,100 feet further inland, closer to the airport wells, associated with the requested increased demands than modeling efforts of 2009 which were based on LTMUA's current allocation. Extensive cones of depression have been delineated in the Cohansey aquifer which can be correlated to increased pumpage throughout time. This water is ultimately discharged after use to the Atlantic Ocean.

   Although the results of local monitoring from the LTMUA wells and nearby USGS observation wells show that current chloride levels are not currently indicative of salt water intrusion conditions this diversion has the potential to contribute to the regional movement of salt water. Modeling results predict saltwater contamination in Lower Township Well No. 1 by the year 2050 or possibly sooner which "is a reasonable conclusion given the proximity of the well to the shoreline and the current high rate of withdrawal" (Lacombe, P.J., Carleton, G.B., Pope, D.A., and Rice, D.E., 2009, p. 2). Chloride concentrations should continue to be monitored so that significant changes can be identified and corrective action initiated if necessary. In order to monitor the ambient conditions of the Cohansey aquifer and to provide advance indications of encroaching salt, LTMUA has installed seven permanent sentinel wells, five completed in the Cohansey aquifer and two in Estuarine sand as discussed at the August 22, 2012 meeting between representatives of the Bureau, NJGWS and LTMUA. Well records for all sentinel wells shall be submitted to the Bureau of Water Allocation and Well Permitting. The permittee shall be responsible for maintenance, and if necessary, eventual decommissioning of the sentinel wells. LTMUA should be required to monitor chloride and sodium concentrations in all of its production and sentinel wells on a quarterly basis. All groundwater samples are required to be collected in accordance with NJDEP's Field Sampling Procedures Manual, August 2005, Chapter 6.9 Groundwater Sampling Procedures. Representative samples of the groundwater shall be obtained by ensuring standing or stagnant water in the well is purged, in accordance with the manual prior to sample collection. Purging of standing or stagnant water within the sentinel well must be done by pumping several volumes of water until the sampling water is stabilized.

7. The permittee shall sample, analyze and compile the results of the chloride samples obtained from each well in the monitoring requirements in the permit including the seven sentinel wells. The permittee shall calculate for each well, the annual average as a rolling calculation of the previous quarterly samples collected during the months of March, June, September and December. The annual average for each well shall be recalculated upon receipt of the next quarterly sample result. The calculated annual average and trend analysis for each well shall be reported to the Department within thirty (30) days of LTMUA's receipt of the sample results. Should the result of the rolling annual average for any of the permittee's Cohansey wells equal or exceed 100 mg/l, or if any one well sample equals or exceeds 250 mg/l the permittee shall implement the provisions of the Alternate Water Supply Plan (AWSP) required to be submitted in accordance with the Submittal/Action Requirements, and provide written notification to the Bureau of Water Allocation and Well Permitting detailing the sampling results, actions taken including the timeframe of such actions.

   Should the result of the rolling annual average for any Cohansey well equal or exceed 100 mg/l, or if any one sample equals or exceeds 250 mg/l the permittee shall implement the provisions of the Alternate Water Supply Plan (AWSP) required to be submitted in accordance with the 3rd Submittal Action Requirement, "Submit Proposal/Plan" on Page 7 of 10 of the permit and as outlined below. Considering the potential for salt water intrusion in the Cohansey aquifer, as identified in item #6 above, the LTMUA shall prepare and submit to the Department for approval an AWSP to address the potential future reduction of water allocated due to salt water intrusion in the Cohansey aquifer. The AWSP shall evaluate and propose the development and implementation of alternate water supplies along with the reduction in the amount of water allocated from specific Cohansey aquifer sources. The AWSP shall evaluate alternate water supplies including but not limited to: purchasing water from other systems, water reuse, desalination, the addition of new sources constructed inland along the spine of the peninsula and/or new sources constructed in different aquifers (Atlantic City 800-foot sand, Rio Grande Water Bearing Zone).

   The AWSP shall include a compliance schedule for each proposed water supply alternative, which includes interim milestones and timeframes for final implementation. Final implementation of water supply alternatives shall be within 5 years of exceedance of the chloride action levels outlined in the 3rd Submittal Action Requirement, "Submit Proposal/Plan" on Page 7 of 10 of the permit. The AWSP shall be submitted for approval within one year of the effective date of the permit.

8. The water levels of the applicant's wells and regional water levels in the Cohansey aquifer have exhibited a decreasing trend since pumping began in this confined aquifer in the 1890's. Reporting the length of time between pump stoppage and static water level measurements should be required. Monitoring of static water levels should continue.

   The applicant has indicated that approval of the use of Well 8 and the increased allocations and pumping rate would not exceed the natural replenishment or safe yield (water available continuously during projected future conditions, without creating undesirable effects) of the water resource or threaten to exhaust such waters, or render them unfit for use. The Bureau's analysis of the application in conjunction with the NJGWS review of the aquifer test indicates that continued and increased pumpage from the Cohansey aquifer in this region could exacerbate saltwater intrusion. Pumping at the requested rates could cause up to 7 feet of additional drawdown south of the Cape May Canal, 22 feet at the Airport, and 5 feet at Wildwood Rio Grande well field. By reducing the requested rates to rates in line with justified demands, interference and drawdown in the Cohansey will be lessened thereby reducing the advancement of the rate of salt water intrusion. In addition, the applicant would be required to further reduce the diversion from the Cohansey aquifer if the

chloride concentration reaches action levels as indicated in item 7 above. Monitoring of water levels in all of the applicant's production wells will continue to be required on a monthly basis.

Therefore, approval of this application at the recommended rates is in accordance with N.J.A.C. 7:19-2.2(f)2.

9. Between 1,330 and 31,680 feet away from the proposed diversion there are 77 large capacity wells. Of these wells 40 are completed in the Cohansey Aquifer. The NJGWS analysis of the aquifer test anticipated a long term drawdown of one foot at a distance of 12,100 feet based upon Well 8 operating at 1,000 GPM. Although there may be some additional drawdown in wells located within the radius of influence, they should have sufficient water above their pumps under normal conditions so that interference experienced should not adversely impact their ability to pump their allocations.

Therefore, the proposed diversion is just and equitable to the other water users within the radius of influence as it does not adversely affect other existing withdrawals, in accordance with N.J.A.C. 7:19-2.2(f)3.

10. Analysis of applicant's chloride data indicates that chloride concentrations range from 9.39 to 28.9 (mg/l) in the Cohansey aquifer at this location during 2011 and 2012.

According to United States Geological Survey (USGS) Scientific Investigations Report 2009-5187 titled "Future water-supply scenarios, Cape May County, New Jersey, 2003-2005", salt water intrusion may occur because continued and increased pumping regionally in the Cohansey aquifer is expected to accelerate inland towards the LTMUA and City of Wildwood wells by 2050 or sooner.

The results of LTMUA's monitoring show that current chloride concentrations are not indicative of salt water intrusion. However, if the chloride concentration in the Cohansey aquifer equals or exceeds specified action levels, the applicant would be required to reduce its allocation from the Cohansey aquifer, so the potential for salt water intrusion is minimized.

Therefore, approval of this application at the recommended rates is in accordance with N.J.A.C. 7:19-2.2(f)4.

Due to the potential for elevated chloride and sodium concentrations in the Cohansey aquifer in the region the applicant should be required to submit data on chloride and sodium concentrations on a quarterly basis from existing and proposed production and sentinel wells so that significant groundwater quality changes can be identified and corrective action initiated, if necessary.

11. Based upon the information provided by the applicant, the diversion is not expected to contribute to the spread of groundwater pollution. According to the applicant's consultant, the diversion is not expected to contribute to the spread of groundwater pollution because the four identified sites near the Airport are mainly leaking underground storage tanks and are likely limited to the unconfined Holly Beach aquifer. It is not expected the contamination will migrate vertically into the confined Cohansey aquifer. The NJGWS analysis of the diversion confirms this.

Therefore, approval of this application at the recommended rates will not spread ground water contamination nor interfere with any groundwater remediation in accordance with N.J.A.C. 7:19-2.2(f)4.

12. The Bureau of Freshwater Wetlands has been notified of the proposed diversion since the new diversion source is located near a freshwater wetlands or transition area.

13. The proposed diversion is located within Planning Area 23 – Cape May Coastal of the New Jersey Statewide Water Supply Plan, August 1996 (NJSWSP). According to the NJSWSP, Area 23 is threatened with salt water intrusion due to its location, and aquifers are under stress due to increasing population and increasing groundwater withdrawals. The NJSWSP ground-water supply management recommendations state developing an enhanced water conservation plan, and the investigation of alternative water supply strategies including desalination, ASR, and building water supply interconnections to the north. If saltwater is shown to be advancing toward supply wells through sentinel well monitoring, alternative supplies will need to be developed and implemented. Also, enhanced water conservation is a requirement for all allocations regionally.

    Therefore, this application is in accordance with N.J.A.C. 7:19-2.2(h).

14. The applicant has no alternate source of water at this time except through its interconnection with Cape May City.

    The applicant should prepare an AWSP as discussed in item 7 above to find an alternate source of water including but not limited to: interconnections, reuse, desalination, movement of wells closer to the spine of the peninsula, and/or creating a hydraulic barrier to the saltwater in the event of salt water intrusion towards LTMUA wells. Sentinel wells will be required as part of this permit. Should the result of the rolling annual average for any Cohansey well equal or exceed 100 mg/l, or if any one sample equals or exceeds 250 mg/l the permittee shall fully implement the provisions of the approved AWSP within 5 years of the exceedance.

15. Due to the Department's proposed Water Supply Management Strategy as a result of the enactment of P.L. 2001, Chapter 165 by the New Jersey Legislature, all applicants in Cape May County for new or increased diversions are required to implement enhanced conservation measures. LTMUA's conservation measures are discussed in Background/Findings of Fact No. 16 above.

    Therefore, the requirements of P.L. 2001, Chapter 165, have been satisfied and approval of this application at the recommended rates is in accordance with N.J.A.C. 7:19-2.2(f)4.

Summary

The Department has completed its review of this application pursuant to N.J.A.C. 7:19-1 et. seq. The review of this application reveals that it does not have any adverse impacts and meets, based upon the information certified to in the application, the statutory requirements of N.J.S.A. 58:1A-1 et. seq.

Therefore, based upon a review of the information submitted with the application, existing water allocation files, United States Geological Survey Studies, and the attached New Jersey Geological & Water Survey review of the application, the following conclusions have been reached regarding this application:

- Allocation limits should be established at 143 MGM, 1,034.608 MGY, and 4,250 GPM. The Primary Customer Distribution limits should be increased to 115.74 MGM and 820.617 MGY.

- LTMUA shall prepare an AWSP to address the possible future reduction in the water allocated due to salt water intrusion in the Cohansey aquifer. The AWSP shall stipulate a reduction in the amount of water diverted from the Cohansey aquifer sources and shall propose the development of alternative/additional water supply and include the timeframe for development with milestone deadlines to achieve full implementation of the alternative/additional water supply. The AWSP shall be submitted for approval to the Bureau within one year from the effective date of the permit. The AWSP shall be implemented within 5 years of the exceedance of the chloride action level as defined herein.

- The permittee shall sample, analyze and compile the results of the chloride samples obtained from each well in the monitoring requirements in the permit including the seven sentinel wells. The permittee shall calculate for each well, the annual average as a rolling calculation of the previous quarterly samples collected during the months of March, June, September and December. The annual average for each well shall be recalculated upon receipt of the next quarterly sample result. The calculated annual average and trend analysis for each well shall be reported to the Department within thirty (30) days of LTMUA's receipt of the sample results. Should the result of the rolling annual average for any of the permittee's Cohansey wells equal or exceed 100 mg/l, or if any one well sample equals or exceeds 250 mg/l the permittee shall implement the provisions of the Alternate Water Supply Plan (AWSP) required to be submitted in accordance with the Submittal/Action Requirements, and provide written notification to the Bureau of Water Allocation and Well Permitting detailing the sampling results, actions taken including the timeframe of such actions.

- In order to monitor the ambient conditions of the Cohansey aquifer and to provide advance indications of encroaching salt, LTMUA has installed seven permanent sentinel wells, five completed in the Cohansey aquifer and two in Estuarine sand as discussed at the August 22, 2012 meeting between representatives of the Bureau, NJGWS and LTMUA. Well records for all sentinel wells shall be submitted to the Bureau of Water Allocation and Well Permitting. The permittee shall be responsible for maintenance, and if necessary, eventual decommissioning of the sentinel wells.

- LTMUA should be required to monitor chloride and sodium concentrations in all of its production and sentinel wells on a quarterly basis. All groundwater samples are required to be collected in accordance with NJDEP's Field Sampling Procedures Manual, August 2005, Chapter 6.9 Groundwater Sampling Procedures. Representative samples of the groundwater shall be obtained by ensuring standing or stagnant water in the well is purged, in accordance with the manual prior to sample collection. Purging of standing or stagnant water within the sentinel well must be done by pumping several volumes of water until the sampling water is stabilized.

- Well 8 (P201100104) should be added to the permit. Prior to use Well 8 must be re-permitted as a public community supply well and receive approval to operate from the Bureau of Water Systems Engineering.

- Monthly static water level readings should be required to be taken on all production wells. The amount of time between shutting the well down and the reading must be recorded.

- An enhanced Drought Management and Water Conservation Plan should be required to be developed and submitted to the Bureau by June 30, 2013 and every other year thereafter.

Therefore this application should be approved in accordance with the following recommendations as the applicant has satisfied the requirements of N.J.A.C. 7:19-2.2 et seq.

References

In addition to the historical information on file at the Bureau of Water Allocation & Well Permitting and the application submitted, the following information sources were also utilized to establish the recommendations contained within this Staff Report:

LaCombe, Pierre J., Rosman, Robert 2001. Water Levels in, Extent of Freshwater In, and Water Withdrawal from Ten Confined Aquifers, New Jersey and Delaware Coastal Plain, 1998. Water-Resources Investigations Report 00-4143. Washington, D.C. United States Government Printing Office.

Lacombe, P.J., Carleton, G.B., Pope, D.A., and Rice, D.E., 2009, Future water-supply scenarios, Cape May County, New Jersey, 2003–2050: U.S. Geological Survey Scientific Investigations Report 2009–5187, 158 p.

dePaul, Vincent T., and Rosman, Robert, 2011. Water-level conditions in selected confined aquifers of the New Jersey Coastal Plain, 2008.

Schaefer, F.L. 1983. Distribution of Chloride Concentrations in the Principal Aquifers in the New Jersey Coastal Plain, 1977-81. Water Resources Investigation Report 83-4061. Washington, D.C. United States Government Printing Office.

Zapecza, Otto S. 1989. The Hydrogeologic Framework of the New Jersey Coastal Plain. U.S. Geological Survey Professional Paper 1404-B. Washington, D.C. United States Government Printing Office.

LaCombe, Pierre J., Carleton, Glen B. 2002. Hydrogeologic Framework, Availability of Water Supplies, and Saltwater Intrusion, Cape May County, New Jersey. Water Resources Investigations Report 01-4246. Washington, D.C. United States Government Printing Office.

March 1, 2001. The New Jersey State Development and Redevelopment Plan. New Jersey State Planning Commission, Trenton, New Jersey.

August 1996. Water for the 21st Century: Vital Resource, New Jersey Statewide Water Supply Plan. New Jersey Department of Environmental Protection – Office of Environmental Planning, Trenton, New Jersey.

Recommendations

Issuance of the permit is recommended with an expiration date of 10 years from the effective date and is subject to the attached specific conditions:

JEM 3/28/13
JEM for YDP 3/28/13

Date: March 28, 2013

Barbara Ware
Bureau of Water Allocation & Well Permitting