DOCKET NO. D-2002-034 CP-4

DELAWARE RIVER BASIN COMMISSION

Artesian Water Company, Inc.
Groundwater Withdrawal and Importation Project
New Castle County, Delaware
New Garden Township, Chester County, Pennsylvania

PROCEEDINGS

This docket is issued in response to an Application submitted by Ground Water Associates, LLC on behalf of Artesian Water Company, Inc. (AWC) to the Delaware River Basin Commission (DRBC or Commission) on September 5, 2014 for renewal of an allocation of groundwater and review of a groundwater withdrawal project and importation project (Application). All of the project wells located within the State of Delaware were approved by the Delaware Department of Natural Resources and Environmental Control (DNREC) as follows:

WELL FIELD	DNREC PERMIT NO.	DNREC EFFECTIVE DATE
Airport Industrial Park	89-0010R	September 1, 1989
Artisans Village	94-0010M2	August 10, 1995
Caravel Farms	94-0011	August 8, 1994
Castle Hills	90-0015M1	February 25, 1994
Collins Park	94-0012	August 1, 1994
Fairwinds	95-0005M	April 20, 1995
Glendale (Potomac)	94-0013B	January 20, 1995
Glendale (Columbia)	94-0013A	January 20, 1995
Hockessin	75-WS-1	October 8, 1975
Jefferson Farms	90-0016	February 25, 1994
Llangollen	95-0004M	October 15, 1998
Middle Run	01-0006M	April 3, 2001
Midvale	90-0017	February 25, 1994
Wilmington Manor Gardens	90-0018M	February 25, 1994
Wilmington Airport	94-0014M	August 15, 1994
Chesapeake City Road	05-0010	December 30, 2005
Brennan Farm	05-0009	December 30, 2005
Eastern States	89-0011R	February 25, 1994
Old County Road	95-0011M2	May 4, 2012

One additional groundwater well, the Broad Run PA well is located in Chester County, Pennsylvania. This well does not require a public water supply permit from the Pennsylvania

Department of Environmental Protection (PADEP). The Application was reviewed for continuation in the Comprehensive Plan and for approval under Section 3.8 of the *Delaware River Basin Compact*. The New Castle County Planning Department and the Chester County Planning Commission have been notified of pending action on this docket. Public hearings on this project were held by the DRBC on September 15, 2015 and on November 10, 2015.

A. DESCRIPTION

1. Purpose. The purpose of this project is to renew the approval of an existing import project of up to 3.0 million gallons per day (mgd) from the Chesapeake Bay Basin (CBB) from the Old County Road, Chesapeake City Road/Brennan Estates and Eastern States well fields, and up to 3.0 mgd from the Susquehanna River Basin (SRB) from an interconnection with Chester Water Authority (CWA) to augment water supply to the docket holder's public water supply system in the Delaware River Basin (DRB). This project will also approve the use of the existing Broad Run PA well located in Pennsylvania for inclusion in the AWC public water supply system and to renew the approval of up to 612.83 mgm to the docket holder's public water supply distribution system. AWC is not requesting an increase in its system groundwater withdrawal allocation.

2. Location. The project wells are located as follows:

WELL NO.	TOWNSHIP, STATE	WATERSHED	GEOLOGIC FORMATION
Airport Industrial Park Well No. 1	New Castle County, Delaware	Army Creek – Delaware River	Potomac
Airport Industrial Park Well No. 2	New Castle County, Delaware	Army Creek – Delaware River	Potomac
Artisan's Village Well No. 1	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Artisan's Village Well No. 2	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Artisan's Village Well No. 3	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Artisan's Village Well No. 4	New Castle County, Delaware	Red Lion Creek – Delaware River	Upper Potomac
Caravel Farms Well No. 1	New Castle County, Delaware	Muddy Run	Upper Potomac
Castle Hills Well No. 2	New Castle County, Delaware	Broad Duke Canal- Delaware River	Columbia - Potomac
Castle Hills Well No. 4	New Castle County, Delaware	Broad Duke Canal – Delaware River	Upper Potomac
Castle Hills Well No. 5	New Castle County, Delaware	Broad Duke Canal – Delaware River	Columbia
Collins Park Well No. 1	New Castle County, Delaware	Lower Christina River	Potomac

WELL NO.	TOWNSHIP, STATE	WATERSHED	GEOLOGIC FORMATION
Fairwinds Well No. 2	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Fairwinds Well No. 4R	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Fairwinds Well No. 5	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Fairwinds Well No. 6	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Fairwinds Well ASR	New Castle County, Delaware	Army Creek – Delaware River	Lower Potomac
Glendale Well No. 2	New Castle County, Delaware	Red Lion Creek – Delaware River	Columbia
Glendale Well No. 4R	New Castle County, Delaware	Red Lion Creek – Delaware River	Columbia
Glendale Well No. 5	New Castle County, Delaware	Middle Christina River	Potomac
Glendale Well No. 6	New Castle County, Delaware	Middle Christina River	Potomac
Glendale Well No. 7	New Castle County, Delaware	Red Lion Creek – Delaware River	Potomac
Hockessin Well No. 1	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Hockessin Well No. 2	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Hockessin Well No. 3	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Hockessin Well No. 4	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Hockessin Well No. G-1	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Hockessin Well No. G-3	New Castle County, Delaware	Lower White Clay Creek	Cockeysville
Brennan Estates Well No. 1R (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Lower Potomac
Brennan Estates Well No. 2R (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Lower Potomac
Eastern States Well No. 1	New Castle County, Delaware	Upper Elk River	Potomac

WELL NO.	TOWNSHIP, STATE	WATERSHED	GEOLOGIC FORMATION
(Out of Basin)			
Eastern States Well No. 2 (Out of Basin)	New Castle County, Delaware	Upper Elk River	Potomac
Old County Road Well No. 1 (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Lower Potomac
Old County Road Well No. 2 (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Lower Potomac
Chesapeake City Road Well No. 1 (Out of Basin)	New Castle County, Delaware	Buck Run	Magothy
Chesapeake City Road Well No. 2 (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Upper Potomac
Chesapeake City Road Well No. 3 (Out of Basin)	New Castle County, Delaware	C&D Canal West – Back Creek	Lower Potomac
Llangollen Well No. 2	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Llangollen Well No. 6	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Llangollen Well No. 7	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Llangollen Well No. G-3R	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Llangollen Well No. ASR	New Castle County, Delaware	Army Creek – Delaware River	Upper Potomac
Middle Run Well No. 1	New Castle County, Delaware	Upper White Clay Creek	Cockeysville
Middle Run Well No. 2	New Castle County, Delaware	Upper White Clay Creek	Cockeysville
Midvale Well No. 1	New Castle County, Delaware	Army Creek – Delaware River	Columbia
Midvale Well No. 2	New Castle County, Delaware	Army Creek – Delaware River	Columbia
Wilmington Manor Gardens Well No. 1	New Castle County, Delaware	Broad Duke Canal – Delaware River	Columbia
Wilmington Manor Gardens Well No. 3	New Castle County, Delaware	Broad Duke Canal – Delaware River	Columbia

WELL NO.	TOWNSHIP, STATE	WATERSHED	GEOLOGIC FORMATION
Wilmington Airport Well No. 1	New Castle County, Delaware	Lower Christina River	Potomac
Wilmington Airport Well No. 2	New Castle County, Delaware	Lower Christina River	Potomac
Wilmington Airport Well No. 3	New Castle County, Delaware	Lower Christina River	Potomac
Jefferson Farms Well No. 1R	New Castle County, Delaware	Broad Duke Canal – Delaware River	Potomac
Jefferson Farms Well No. 2R	New Castle County, Delaware	Broad Duke Canal – Delaware River	Potomac
Broad Run PA	New Garden Township, Chester County, Pennsylvania	Broad Run	Cockeysville

Specific location information has been withheld for security reasons.

3. Area Served. The docket holder's water distribution system serves most of northern New Castle County, Delaware. Additionally, AWC currently provides water to 38 customers in New Garden Township, Pennsylvania. AWC submitted an application to the Pennsylvania Public Utility Commission (PA PUC) on November 3, 2014 to expand their service area in New Garden Township, Pennsylvania. The application to the PA PUC projects that an estimated 200 additional customers on 14 land parcels be included in the expanded service area. The expanded service area has been included herein (A.3. Area Served) contingent upon approval of the expanded service area by the PA PUC and the issuance of any required zoning approvals. The service area is outlined on a map entitled "Sources of Supply and Interconnections in Exhibit B" submitted with the Application. For the purpose of defining Area Served, the Application is incorporated herein by reference consistent with conditions contained in the DECISION section of this docket.

4. Physical features.

a. Design criteria. The AWC system currently serves an estimated population of 171,810 through 66,081 service connections, 2,441 commercial, 11 industrial, 50 irrigation connections with an average and maximum water demand of 14.349 million gallons per day (mgd) and 18.1 mgd, respectively. The docket holder projects an average and maximum water demand of 15.284 mgd and 19.77 mgd, respectively, by the year 2025.

b. Facilities. The project wells have the following characteristics:

WELL NO.	DEPTH (FEET)	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY (GPM)	YEAR DRILLED

WELL NO.	DEPTH (FEET)	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY (GPM)	YEAR DRILLED
Airport Industrial Park Well No. 1	126	100'/10"	250	1982
Airport Industrial Park Well No. 2	130	103'/10"	250	1983
Artisan's Village Well No. 1	215	155'/12"	1,100	1979
Artisan's Village Well No. 2	225	125'/12"	300	1980
Artisan's Village Well No. 3	189	129'/12"	700	1995
Artisan's Village Well No. 4	161	117'/10"	150	2001
Caravel Farms Well No. 1	117	65'/10"	250	1977
Castle Hills Well No. 2	106	56'/ 17"	250	1958
Castle Hills Well No. 4	109	99.5'/12"	600	2011
Castle Hills Well No. 5	78	58'/12"	450	2011
Collins Park Well No. 1	135	108'/10"	400	1978
Fairwinds Well No. 2	145	124'/10"	370	1964
Fairwinds Well No. 4R	148	100'/10"	350	1979
Fairwinds Well No. 5	164	80'/10"	400	1965
Fairwinds Well No. 6	146	100'/10"	225	1965
Fairwinds Well ASR	528	477'/14"	125	1998
Glendale Well No. 2	80	52'/17"	350	1960
Glendale Well No. 4R	95	68'/10"	100	1979
Glendale Well No. 5	140	108'/12"	275	1973
Glendale Well No. 6	140	100'/12"	225	1974
Glendale Well No. 7	73	43'/10"	400	1976

WELL NO.	DEPTH (FEET)	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY (GPM)	YEAR DRILLED
Hockessin Well No. 1	325	29'/18"	425	1964
Hockessin Well No. 2	332	65'/16"	425	1965
Hockessin Well No. 3	312	54'/16"	425	1967
Hockessin Well No. 4	292	55'/16"	700	1975
Hockessin Well No. G-1	200	127'/14"	400	1972
Hockessin Well No. G-3	305	84'/8"	300	1974
Brennan Estates Well No. 1R (Out of Basin)	460	322'/12"	900	2004
Brennan Estates Well No. 2R (Out of Basin)	567	507'/12"	750	2004
Eastern States Well No. 1 (Out of Basin)	235	160'/10"	600	1981
Eastern States Well No. 2 (Out of Basin)	265	222'/10"	300	1981
Old County Road Well No. 1 (Out of Basin)	393	320'/12"	700	1994
Old County Road Well No. 2 (Out of Basin)	475	413'/12"	1,000	1995
Chesapeake City Road Well No. 1 (Out of Basin)	152	100'/6"	50	2000
Chesapeake City Road Well No. 2 (Out of Basin)	163	150'/8"	225	1994
Chesapeake City Road Well No. 3 (Out of Basin)	640	562'/8"	550	2003
Llangollen Well No. 2	164	131'/10"	320	1976

WELL NO.	DEPTH (FEET)	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY (GPM)	YEAR DRILLED
Llangollen Well No. 6	165	108'/17"	600	1964
Llangollen Well No. 7	180	115'/12"	600	1968
Llangollen Well No. G-3R	157	98'/12"	1,220	2012
Llangollen Well No. ASR	167	129'/17"	1,000	1998
Middle Run Well No. 1	419	105'/10"	300	1999
Middle Run Well No. 2	403	107'/10"	450	2002
Midvale Well No. 1	86	59'/17"	200	1950
Midvale Well No. 2	77	54'/12"	200	1951
Wilmington Manor Gardens Well No. 1	84	38'/17"	200	1949
Wilmington Manor Gardens Well No. 3	72	48'/17"	350	1956
Wilmington Airport Well No. 1	198	187'/8"	200	1942
Wilmington Airport Well No. 2	222	211'/8"	200	1942
Wilmington Airport Well No. 3	160	132'/18"	200	1996
Jefferson Farms Well No. 1R	140	90'/12"	600	2012
Jefferson Farms Well No. 2R	102	88'/12"	600	2013
Broad Run PA	205	75'/6"	200	1984 (Deepened in 2014)

All water service connections are metered. All future water service connections will be metered.

All wells are metered. The Broad Run PA Well is required to be metered prior to the initiation of water withdrawals from the well.

Prior to entering the distribution system, the water is treated by aeration, chlorination, phosphate, pH adjustment and fluoridation. Filtration, Ultraviolet Advanced Oxidation Process (UVAOP) and carbon absorption are also used at several of AWC's treatment facilities.

The project facilities are above the 100-year flood elevation.

The AWC storage facilities total 35 mg, which is approximately 2 days of supply.

The water system is presently interconnected with the following:

WATER COMPANY	INTERCONNECTION CAPACITY (MGD)	STATUS
Chester Water Authority	6.0	Regular
City of Wilmington – Taft and Cleveland	0.7	Regular
City of New Castle – School Lane	0.7	Emergency
City of New Castle – Lukens Drive	2.16	Emergency
City of Newark – Polly Drummond Hill Road	0.4	Emergency
City of Wilmington – Moorehouse Lane	0.5	Emergency
City of Wilmington – South Heald Street	1.5	Emergency
City of Wilmington – Maryland Avenue	5.0	Emergency
United Water – Red Lion Road	1.0	Emergency
United Water – First State Boulevard	1.0	Emergency
United Water – Pleasant Valley	1.0	Emergency
United Water – Newport Heights	1.0	Emergency
United Water – Churchmans Road	1.0	Emergency

c. **Other.** Wastewater is conveyed to the City of Wilmington and New Castle County – Delaware City sewage treatment facilities most recently approved by DRBC Dockets Nos. D-1998-026 CP on November 15, 2000 and D-1972-210 CP on June 6, 1975, respectively. DNREC issued its most recent NPDES Permits Nos. DE0020320 and DE0021555 on September 17, 2014 and January 1, 2009, respectively for these treatment facilities. The New Castle – Delaware City facility has submitted an application and it is currently being reviewed by Commission staff.

d. **Cost.** The overall cost of the Broad Run PA well is estimated to be $585,000.

e. **Relationship to the Comprehensive Plan.** The AWC's project wells were previously included in the Comprehensive Plan by the Commission in Docket Nos. D-1965-027 CP approved on April 28, 1965, D-1968-069 CP approved on May 22, 1968, D-1969-045 CP approved on May 28, 1969, D-1974-049 CP approved on September 25, 1974, D-1974-078 CP approved on September 25, 1974, D-1974-097 CP approved on June 17, 1975, D-1974-110 CP

approved on September 25, 1974, D-1974-110 CP approved on September 25, 1974, D-1974-195 CP approved on December 17, 1975, D-1975-008 CP approved on April 23, 1975, D-1976-044 CP approved on June 2, 1976, D-1976-092 CP approved on September 28, 1977, D-1978-030 CP approved on May 24, 1978, D-1979-058 CP approved on April 27, 1982, D-1982-043 CP approved on November 30, 1983, D-1982-053 CP approved on April 20, 1983, D-1996-033 CP approved on December 11, 1996, D-1997-048 CP approved on August 18, 1999, D-2001-024 CP approved on September 13, 2001, D-2002-034 CP approved on September 3, 2003, D-1985-027 CP approved on May 28, 1986, D-1985-027 CP RENEWAL approved on June 19, 1991, D-1985-027 CP RENEWAL 2 approved on September 19, 1996, D-2002-034 CP-2 approved on May 18, 2005 and D-2002-034 CP-3 approved on March 11, 2015. Issuance of this docket will continue the public water supply distribution system in the Comprehensive Plan.

B. FINDINGS

The Broad Run PA well (formerly known as Well No. W-3) was previously included in the Comprehensive Plan in Docket No. D-1985-027 CP approved by the Commission on May 28, 1986. The approval of Well Broad Run PA was continued in Dockets Nos. D-1985-027 CP RENEWAL and D-1985-027 CP RENEWAL 2, approved on June 19, 1991 and September 19, 1996, respectively. The project well was approved to provide a source of water to supply the Wilkinson Farm Water Supply Project to serve an existing farm operation and 120 existing and proposed residential dwellings. The Broad Run PA well had an approved allocation of 24.0 million gallons per 30 days in its previous approvals.

The Broad Run PA well was previously approved by the Pennsylvania Department of Environmental Resources (PADER) on March 18, 1986 (Permit No. 1585502).

Groundwater and Surface Water Importation

The AWC water system is presently interconnected with the Chester Water Authority system which provides up to 3.0 mgd of water to the AWC system in New Castle County, Delaware from two surface water intakes in the SRB. CWA has a surface water intake on the Susquehanna River and on a reservoir on Octoraro Creek. The withdrawal and exportation of surface water from the SRB to the Chester Water Authority was approved by the Susquehanna River Basin Commission (SRBC) in Docket No. 19961104 on November 26, 1996. DRBC approved the importation of the water from the SRB into the DRBC via dockets issued to Chester Water Authority (Nos. D-1969-060 as amended by Docket 1984-55 CP). Groundwater is also imported into the DRB from three AWC well fields (Old County Road, Chesapeake City Road/Brennan Estates and Eastern States) in the CBB which provide up to 3.0 mgd. The continued importation of water to the DRB from sources outside of the DRB reduces reliance on in-basin sources. No other significant benefit or impairment has incurred to the basin from the ongoing importation of water from the CWA surface water intakes or the AWC wells located in the SRB and CBB, respectively.

72-Hour Pumping Test of the Broad Run PA Well

On April 1 through April 4, 2014, a 72-hour continuous-rate pumping test was conducted to assess withdrawal capabilities of the Broad Run PA well. The constant rate pumping test was also conducted to assess the underlying aquifer characteristics and potential impacts to the local hydrologic system. The average pumping rate of the test on the Broad Run PA well was approximately 200 gallons per minute (gpm). Discharge from the pumping well was directed to Broad Run approximately 280 feet downstream of the Broad Run stilling gauge, outside of the estimated area where recharge effects might be expected. The Broad Run PA well was pumped for a total period of 4,350 minutes.

Groundwater response monitoring was conducted in the pumping well (Broad Run PA well), seven (7) monitoring wells (monitored with continuous dataloggers), two (2) piezometers (monitored with continuous dataloggers) and the Broad Run stilling gauge (monitored with a continuous datalogger). Monitoring wells ranged in distance to the pumping well from approximately 325 feet (976 Broad Run Road) to approximately 1,635 feet (12 White Creek Drive). Piezometers PZ-1 and PZ-2 were located approximately 258 feet and 278 feet, respectively, from the pumping well and the Broad Run stilling gauge was located 310 feet from the pumping well.

Prior to the start of the 72-hour continuous-rate pumping test, the Broad Run PA well had a static water level of 11.97 feet below top of casing (btoc). Maximum drawdown observed at the pumping well, after approximately 72.5 hours of pumping at a rate of 200 gpm, was 6.78 feet (water level of 18.75 feet btoc). Drawdown as a result of pumping was observed in one (1) monitoring well, Well 976 Broad Run Road which had a drawdown of 0.3 feet. Piezometers PZ-1 and PZ-2 also were affected by the pumping at the pumping well; they exhibited 1.4 feet and 1.55 feet of drawdown, respectively. Drawdown as a result of the withdrawals from the Broad Run PA well were not discernable in the other monitoring wells or the Broad Run stilling gauge.

The observed drawdown was used to calculate aquifer parameters to characterize the underlying aquifer. The transmissivity values for the Broad Run PA well test data was 12,600 ft^2/day (Aqtesolve Cooper-Jacob time versus drawdown), 11,200 ft^2/day (Aqtesolve Theis log-log time versus drawdown), 11,760 ft^2/day (distance versus drawdown) and 10,800 ft^2/day (recovery data) at the test rate of 200 gpm. A Storativity of 7.9×10^{-4} was calculated from the drawdown data observed at monitoring well 976 Broad Run Road monitored during the pumping test. The storage coefficient is indicative of confined conditions.

The DRBC has reviewed the hydrogeological report for the Broad Run PA well pumping test. No adverse impacts are expected to occur to the local hydrologic system due to pumping from the Broad Run PA well.

A pumping test (96 hours in duration) was previously conducted on the Broad Run PA well on December 6 through 11, 1984 at a rate up to 690 gpm. Ten (10) feet of drawdown occurred in the well as a result of pumping. The initial pumping rate was 270 gpm; the rate was systematically stepped up until a final withdrawal rate of 690 gpm was achieved 45 hours into the test. The pumping rate was held constant at 690 gpm for the remaining 51 hours of the

pumping test. Four (4) observation wells (Wells WW-3, W-1, W-6 and W-8) were monitored during the pumping test. Observation Wells WW-3 and W-8 were located northeast and Wells W-1 and W-6 were located to the southwest of the pumping well. No discernable drawdown was observed in the four (4) wells which were monitored during the 96 hour pumping test. This pumping test was conducted for the previous Broad Run PA well Commission approval (D-1985-027 CP on May 28, 1986).

Public Comment

Prior to and after the posting of the initial draft docket for Docket No. D-2002-034 CP-3 on February 27, 2015, Commission staff reviewed comments on the project submitted by the Chester County Water Resources Authority (CCWRA), the National Park Service (NPS), the White Clay Creek Wild and Scenic River Program (WCCWSRP), J. Denis Newbold, Ph.D, and Save Our Water, including a response report from their consultant, Brickhouse Environmental. AWC and their consultant, Ground Water Associates, LLC, consultants to AWC, also provided a response to concerns expressed in the Brickhouse Environmental report which staff also reviewed. The commenters expressed concerns regarding unresolved zoning and ordinance issues in New Garden Township, Chester County, Pennsylvania, a pending Public Utilities Commission service area expansion application, water need justification, the rate of withdrawal AWC is requesting from the Broad Run PA well and whether pumping of the well would affect low flow in Broad Run a tributary within the White Clay Creek Watershed, a Federally designated Wild and Scenic River, and groundwater leaving Pennsylvania to be used to supply water in the State of Delaware. Additional concerns were expressed regarding interpretation of the data presented in the hydrogeologic report for the pumping test of the Broad Run PA well, including whether the well was completed in a confined or unconfined aquifer and impacts of the withdrawal on Broad Run's in-stream biota.

At the March 10, 2015 public hearing, Commission staff presented revised draft Docket No. D-2002-034 CP-3 that renewed the approval of the existing groundwater withdrawal system allocation of 612.83 million gallons per month from forty-two (42) wells in the DRB and required the docket holder to submit to Commission by June 11, 2015 a long-term groundwater/surface water monitoring program to monitor the water resources in the vicinity of the Broad Run PA well. Additionally, the Findings section of the docket indicated that at a future Commission hearing and meeting as described in docket condition C.II.l., the Commission would consider the approval of the Broad Run PA well and the groundwater/surface water monitoring program. The docket was approved by the Commission on March 11, 2015.

From May 23, 2015 through June 9, 2015 comments were received on draft Docket No. D-2002-034 CP-4. The revised docket included the Commission staff recommendation for the approval of the Broad Run PA well and the requested groundwater/surface water monitoring program plan. During the public comment period the draft docket was withdrawn from comment in response to the public's requests for additional time to review and comment on the project. Between August 31, 2015 and September 16, 2015 revised draft Docket No. D-2002-034 CP-4 was re-noticed for public comment. On September 8, 2015, Commission staff also attended a public information meeting attended by over 200 citizens and elected officials at the Avondale Fire Company in Avondale, PA. A significant number of written and oral comments were received on the draft docket during the comment period and at the September 16, 2015 public

hearing. At the September 17, 2015 Commission Business Meeting, the Commissioners voted to defer action on the draft docket and extended the public comment period to the close of business September 30, 2015.

A Comment & Response (C&R) document was prepared to address concerns and questions about the project that have been received by the Commission since the project was first noticed on September 5, 2014. The C&R document includes responses to the comments received through the close of the public comment period on November 12, 2015. The C&R document is available from the Commission and is also posted on the Commission's website.

Docket Modification from the September 5, 2015 Draft Docket

This docket includes the modifications that were made in response to the concerns that were raised during the public comment period which closed on September 30, 2015. The following summarizes the basic modifications:

Service Area Expansion

The inclusion of the expanded service area into Pennsylvania (200 additional service connections) described in the Area Served of the docket is contingent upon Artesian receiving Pennsylvania Public Utilities Commission approval for the expansion. (Docket Conditions C.II.o. and p.)

Phase-in and Monitoring and Reporting Program

Docket No. D-2002-034 CP-3 required the docket holder to prepare and submit a Groundwater and Surface Water Monitoring Plan (Plan) to confirm that pumping at the Broad Run PA well will not adversely impact the local Broad Run hydrologic system including Broad Run. AWC submitted the Plan to the Commission on March 19, 2015. After consideration by Commission staff, the Plan has been modified by Commission staff in response to the concerns of staff, local residents, and other interested parties as discussed in the C&R Document for the docket. The revised Broad Run PA Well Monitoring and Reporting Program (Program) is attached to this docket. The basic requirements for this Program include:

1. Prior to the initiation of water withdrawal from the Broad Run PA Well the docket holder will conduct a 9 month monitoring program in accordance Condition No. C.II.1. of the docket and the attached Broad Run PA Well Monitoring and Reporting Program. Water withdrawal from the Broad Well Run PA Well will only be initiated after 9 months of baseline data collection and the written approval of the Executive Director. The basic purpose of the 9 month program is to establish a baseline of the existing conditions in Broad Run and any selected monitoring wells. (Docket Condition C.II.l.)

2. Monitoring and reporting in accordance with the attached Monitoring and Reporting Plan will continue for a minimum of 5 years. After 5 years from the initiation of the initial monitoring, the docket holder may submit a written request to the Executive Director for

modifications and or cessation of the monitoring and reporting as required in the attached Program. The docket holder shall continue to comply with the attached Program until it has received written approval of Program modifications from the Executive Director.

3. The inclusion of a downstream stream gage on Broad Run in addition to the upstream gage (for which the company has already sent us a modification);

4. During this period the docket holder may apply for an increase in the withdrawal rate from the well in 50 gpm increments from 100 gpm to 150 gpm, and from 150 gpm to and 200 gpm on an annual basis. The requests shall be in writing and include the demonstration required in the Plan. The Executive Director may approve phased water withdrawal increases up to the Broad Run PA Well allocation provided in this docket. Phased increases in water withdrawal amounts will occur only upon demonstration that the monitoring program does not indicate significant impacts to the stream or existing groundwater wells. The Executive Director may also deny requested increases or reduce the allowable withdrawal rate based on the results of the monitoring program or any other information that demonstrates that reductions are required to protect neighboring wells from adverse impacts or surface water flow in Broad Run.

5. The docket holder shall submit written (or electronic) reports to the Executive Director. The docket holder shall also send copies of the Program reports to the PADEP, DNREC, New Garden Township and the CCWRA at the same time they are submitted to the DRBC. The Commission will publish these reports on its website or otherwise make it available to the public.

Water Audits for Public Water Supply Systems Serving Greater than 100,000 gpd

Section 2.1.8 of the Water Code states that it is the policy of the Commission to establish a standardized water audit methodology for owners of water supply systems serving the public to ensure accountability in the management of water resources. Voluntary Water Audits were encouraged for public water supply systems through December 31, 2011 (Section 2.1.8.B.). Effective January 1, 2012, the owners of each public water supply system are required to implement an annual calendar year water audit program conforming to IWA/AWWA Water Audit Methodology (AWWA Water Loss Control Committee (WLCC) Water Audit Software) and corresponding AWWA guidance (Section 2.1.8.C). Water audits shall be submitted annually to the Commission by March 31. AWC submitted their most recent Water Audit on April 1, 2014.

The DRBC estimates that the project withdrawals, used for the purpose of public water supply, result in a consumptive use of 10 percent of the total water use. The DRBC definition of consumptive use is defined in Article 5.5.1.D of the *Administrative Manual – Part III – Basin Regulations – Water Supply Charges*.

The project does not conflict with the Comprehensive Plan and is designed to prevent substantial adverse impact on the water resources related environment, while sustaining the current and future water uses and development of the water resources of the Basin.

C. DECISION

I. Effective on the approval date for Docket No. D-2002-034 CP-4 below:

a. The project described in Docket No. D-2002-034 CP-3 is removed from the Comprehensive Plan to the extent that it is not included in Docket No. D-2002-034 CP-4 ; and

b. Docket No. D-2002-034 CP-3 is rescinded and replaced by Docket No. D-2002-034 CP-4; and

c. The project and the appurtenant facilities described in the Section A "Physical Features" of this docket shall be added to the Comprehensive Plan.

II. The project as described in the Section A "Physical features" is approved pursuant to Section 3.8 of the *Compact*, subject to the following conditions:

a. Docket approval is subject to all conditions, requirements, and limitations imposed by DNREC, PADEP and the PA PUC, where applicable and such conditions, requirements, and limitations are incorporated herein, unless they are less stringent than the Commission's. The wells and operational records shall be available at all times for inspection by the DRBC.

b. The wells shall be operated at all times to comply with the requirements of the *Water Code* and *Water Quality Regulations* of the DRBC.

c. During any month, the combined withdrawal from all well sources shall not exceed 612.83 mgm. No well shall be pumped above the maximum instantaneous rate and monthly allocation as indicated below:

WELL NO.	INSTANTANEOUS RATE (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
Airport Industrial Park Well No. 1	250	11.16
Airport Industrial Park Well No. 2	250	11.16
Artisan's Village Well No. 1	1,100	49.1
Artisan's Village Well No. 2	300	13.39

WELL NO.	INSTANTANEOUS RATE (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
Artisan's Village Well No. 3	700	31.25
Artisan's Village Well No. 4	150	6.696
Caravel Farms Well No. 1	250	11.16
Castle Hills Well No. 2	250	11.16
Castle Hills Well No. 4	600	26.78
Castle Hills Well No. 5	450	20.088
Collins Park Well No. 1	400	17.856
Fairwinds Well No. 2	370	16.517
Fairwinds Well No. 4	350	15.624
Fairwinds Well No. 5	400	17.856
Fairwinds Well No. 6	225	10.044
Fairwinds Well ASR	125	5.58
Glendale Well No. 2	350	15.624
Glendale Well No. 4R	100	4.464
Glendale Well No. 5	275	12.28
Glendale Well No. 6	225	10.044
Glendale Well No. 7	400	17.856
Hockessin Well No. 1	425	18.972
Hockessin Well No. 2	425	18.972
Hockessin Well No. 3	425	18.972

WELL NO.	INSTANTANEOUS RATE (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
Hockessin Well No. 4	700	31.248
Hockessin Well No. G-1	400	17.856
Hockessin Well No. G-3	300	13.39
Llangollen Well No. 2	320	14.285
Llangollen Well No. 6	600	26.78
Llangollen Well No. 7	600	26.78
Llangollen Well No. G-3R	1,220	54.493
Llangollen Well No. ASR	1,000	44.64
Middle Run Well No. 1	300	13.39
Middle Run Well No. 2	450	20.088
Midvale Well No. 1	200	8.928
Midvale Well No. 2	200	8.928
Wilmington Manor Gardens Well No. 1	200	8.928
Wilmington Manor Gardens Well No. 3	350	13.39
Wilmington Airport Well No. 1	200	8.928
Wilmington Airport Well No. 2	200	8.928
Wilmington Airport Well No. 3	200	8.928
Jefferson Farms Well No. 1R	600	26.78
Jefferson Farms Well No. 2R	600	26.78
Broad Run PA	Up to 200 gpm in accordance with Condition C.II.1 and attached monitoring program	Up to 8.928 mgm in accordance with Condition C.II.1 and attached monitoring program

d. The wells shall be equipped with readily accessible capped ports and drop pipes so that water levels may be measured under all conditions. Existing wells are to be similarly equipped, where possible, with readily accessible ports and drop pipes as repairs or modifications are made at each existing well.

e. The project withdrawals shall be metered with an automatic continuous recording device that measures to within 5 percent of actual flow. An exception to the 5 percent performance standard, but no greater than 10 percent, may be granted if maintenance of the 5 percent performance is not technically feasible or economically practicable. A record of daily withdrawals shall be maintained, and monthly totals shall be reported annually by March 31 to DNREC. A record of daily withdrawals from the Broad Run PA well shall be maintained, and monthly totals shall be reported annually by March 31 to the Pennsylvania Department of Environmental Protection (PADEP). Withdrawal records shall be available at any time to the Commission if requested by the Executive Director.

f. Each new water service connection shall include a water meter in accordance with the DRBC's Resolution No. 87-7 (Revised).

g. The docket holder shall continue to implement its Water Conservation Plan as approved by DNREC and shall report to DNREC on the actions taken pursuant to this program and the impact of those actions as requested by DNREC.

h. No water service connections shall be made to newly constructed premises with plumbing fixtures and fittings that do not comply with water conservation performance standards contained in Resolution No. 88-2 (Revision 2).

i. The docket holder shall implement to the satisfaction of DNREC, a drought or other water supply emergency plan.

j. In accordance with DRBC Resolutions No. 87-6 (Revised) and No. 2009-1, the docket holder shall continue to implement to the satisfaction of DNREC, the systematic program to monitor and control leakage within the water supply system. The program shall at a minimum include: periodic surveys to monitor leakage, enumerate non-revenue water and determine the current status of system infrastructure; recommendations to monitor and control leakage; and a schedule for the implementation of such recommendations. The docket holder shall proceed expeditiously to correct leakages and unnecessary usage identified by the program.

k. In accordance with DRBC Resolution No. 2009-1 and Section 2.1.8 of the Water Code, the docket holder shall implement an annual calendar year water audit program conforming to IWA/AWWA Water Audit Methodology (AWWA Water Loss Control Committee (WLCC) Water Audit Software) and corresponding guidance. Water audits shall be submitted annually to the Commission by March 31.

l. A Broad Run PA Well Monitoring and Reporting Program (Program) is required to obtain data on hydrologic conditions in the project area. Groundwater and surface water monitoring shall be conducted in accordance with the attached Program to confirm that pumping at the Broad Run PA well will not adversely impact the local Broad Run hydrologic

system. The docket holder shall implement the monitoring program attached to this docket and shall abide by all conditions contained herein and in the attached Program.

i. Prior to the initiation of water withdrawal from the Broad Run PA Well the docket holder shall conduct a 9-month monitoring program in accordance attached Program. Water withdrawal from the Broad Run PA Well will only be initiated after the docket holder has collected 9 months of baseline data and received the written approval of the Executive Director.

ii. Monitoring and reporting in accordance with the attached Program shall continue for a minimum of 5 years. After 5 years from the initiation of the initial monitoring, the docket holder may submit a written request to the Executive Director for modifications and or cessation of the monitoring and reporting as required in the attached Program. The docket holder shall continue to comply with the attached Program unless and until it has received written approval of Program modifications from the Executive Director.

iii. Following the completion of the pre-pumping phase of the monitoring program required in Condition C.II.l.i. above, the docket holder may annually apply for an increase in the withdrawal rate from the well in 50 gpm increments from 100 gpm to 150 gpm, and from 150 gpm to 200 gpm. The requests shall be in writing and shall include the demonstration required in the Plan. The Executive Director may approve phased water withdrawal increases up to the Broad Run PA Well allocation provided in this docket. Phased increases in water withdrawal amounts will occur only upon demonstration by the docket holder that the monitoring program does not indicate significant impacts to the stream or existing groundwater wells. The Executive Director may also deny requested increases or reduce the allowable withdrawal rate based on the results of the monitoring program or any other information that demonstrates that reductions are required to protect neighboring wells or surface water flow in Broad Run from adverse impacts. The docket holder shall not increase the rate of water withdrawal until it receives the approval of the Executive Director authorizing such increase.

iv. The docket holder shall submit the written (or electronic) reports required by the Program to the Executive Director. The docket holder shall also send copies of the Program reports to the PADEP, DNREC, New Garden Township and the CCWRA at the same time they are submitted to the DRBC. The Commission will publish these reports on its website or otherwise make it available to the public.

m. No new water service connections shall be made to premises connected to sewerage systems which are not in compliance with all applicable effluent limits contained in State permits and the *Water Quality Regulations* of the Commission.

n. The docket holder shall implement to the satisfaction of the DNREC, a continuous program to encourage water conservation in all types of use within the facilities served by this docket approval. The docket holder will report to the DNREC, on the actions taken pursuant to this program and the impact of those actions as requested by the DNREC.

o. Nothing herein shall be construed to exempt the docket holder from obtaining all necessary permits and/or approvals from other State, Federal or local government agencies having jurisdiction over this project including, but not limited to, the Pennsylvania Public Utilities Commission, Pennsylvania Department of Environmental Protection, Delaware Department of Natural Resources and Environmental Control, Chester County, and New Garden Township.

p. The area served by this project is limited to the service area as described above. Any expansion beyond this area is subject to review in accordance with Section 3.8 of the *Compact.* The expanded service area described in A.3. Area Served is contingent upon the docket holder receiving approval from the Pennsylvania Public Utilities Commission to serve such area.

q. Unless an extension is requested and approved by the Commission in advance, in accordance with paragraph 11 of the Commission's Project Review Fee schedule (Resolution No. 2009-2), the docket holder is responsible for timely submittal of a docket renewal application on the appropriate DRBC application form in advance of the docket expiration date set forth below. This docket hereby specifies a period of at least 12 months in advance of the docket expiration date for such advance notice. The docket holder will be subject to late charges in the event of untimely submittal of its renewal application, whether or not DRBC issues a reminder notice in advance of the deadline or the docket holder receives such notice. In the event that a timely and complete application for renewal has been submitted and the DRBC is unable, through no fault of the docket holder, to reissue the docket before the expiration date below (or the later date established by an extension that has been timely requested and approved), the terms and conditions of the current docket will remain fully effective and enforceable against the docket holder pending the grant or denial of the application for docket approval.

r. The issuance of this docket approval shall not create any private or proprietary rights in the water of the Basin, and the Commission reserves the right to amend, alter or rescind any actions taken hereunder in order to insure the proper control, use and management of the water resources of the Basin.

s. If the monitoring required herein or any other relevant data or information demonstrates that the operation of this project is interfering with or otherwise impairing groundwater or surface water or existing uses of groundwater or surface water, or if the docket holder receives a complaint from an existing groundwater or surface water user alleging such interference or impairment, the docket holder shall immediately notify the Executive Director,

and unless excused by the Executive Director, shall investigate the demonstrated or alleged impacts. For purposes of this condition, notification shall mean either (a) etransmittal of written notice to the Executive Director via certified mail with a copy of such notice sent via email (using addresses posted on the DRBC website); or (b) written notice to the Executive Director via certified mail and a telephone call to the Project Review Section at 609-883-9500, ext. 216. (Oral notification must always be accompanied by immediate written notification directed to the Executive Director.) In addition, the docket holder shall provide written notice to all potentially affected water users of the docket holder's responsibilities under this condition. **Any well or surface water supply that is impaired as a result of the docket holder's project withdrawal shall be repaired, replaced or mitigated at the docket holder's expense**. The scope of the options to consider for repair, replacement and/or mitigation shall not be limited solely to those that are owned, operated, or controlled by the project sponsor. An investigation report and/or mitigation plan prepared and certified by a licensed professional engineer and/or a licensed professional geologist qualified in water resource engineering or hydrogeology shall be submitted to the Executive Director as soon as practicable following notice of the demonstrated or alleged impairment consistent with this paragraph. The Executive Director shall make the final determination regarding the scope and sufficiency of the investigation and the extent of any mitigation measures that may be required. Where groundwater and surface waters are rendered unavailable, unusable, or unsuitable for the pre-existing use, the Executive Director may direct the docket holder to take interim actions to mitigate such impacts, pending completion of the investigative report and any long-term repair, replacement or mitigation.

t. The Executive Director may modify or suspend this approval or any condition thereof, or require mitigating measures pending additional review, if in the Executive Director's judgment such modification or suspension is required to protect the water resources of the Basin.

u. For the duration of any drought emergency declared by Delaware, Pennsylvania or the Commission, water service or use by the docket holder pursuant to this approval shall be subject to the prohibition of those nonessential uses specified by the Governor of Pennsylvania, the Pennsylvania Emergency Management Council, DNREC or PADEP to the extent that they may be applicable, and to any other emergency resolutions or orders adopted hereafter by the Commission.

v. Any person who objects to a docket decision by the Commission may request a hearing in accordance with Article 6 of the Rules of Practice and Procedure. In accordance with Section 15.1(p) of the Delaware River Basin *Compact*, cases and controversies arising under the *Compact* are reviewable in the United States district courts.

BY THE COMMISSION

APPROVAL DATE: **December 9, 2015**

EXPIRATION DATE: **December 9, 2025**

Broad Run PA Well Monitoring and Reporting Program

DRBC Docket No. D-2002-034 CP-4

New Garden Township, Chester County, Pennsylvania

This Broad Run PA Well Monitoring and Reporting Program (the Program) has been developed by the Delaware River Basin Commission (DRBC or Commission) staff by modifying the Monitoring Plan submitted to the Commission by Artesian Water Company on March 19, 2015. Several of the modifications were the result of the public comments received during the public comment period that ended on November 12, 2015. The implementation of this Plan is a requirement of Docket No. D-2002-034 CP-4 (see Condition C.II.l. of the docket) and is required to establish a baseline prior to the initiation of operations of the new Broad Run PA well and to assess any interactions between the new Broad Run PA Well (the Well) during its operations as approved in Docket No. D-2002-034 CP-4, Broad Run and surrounding area domestic wells.

The Broad Run PA Well has a proposed maximum flow rate of 200 gallons per minute (gpm) and is completed within the Cockeysville Marble. The Well is located roughly 280 feet from Broad Run in New Garden Township, Chester County, Pennsylvania. A 72-hour aquifer pumping test was conducted on the Broad Run PA Well in March and April, 2014, before, during, and after which, two piezometers located near Broad Run and seven other private domestic wells located within one-half (½) mile of the Well were monitored.

This Program focuses on observing any interactions between the water level and water quality in the Well compared to Broad Run. In addition, water level pumping effects of the Well will be compared to the two existing and two proposed piezometers located near Broad Run. The private wells used in the aquifer test will also be used for water level monitoring if the owners agree to property access by Artesian Water Company. The proposed minimum duration of monitoring is five (5) years. Data collected from the program will be provided to DRBC, DNREC and PADEP on a quarterly interval. This data will also be provided to the CCWRA, and the New Garden Township. In addition the information will be publically available on the Commission's website. The quarterly reports will include hydrographs of stream flow, water levels in wells and piezometers, and metered pumpage from the Broad Run PA Well. Comparison of stream and well water levels and quality will be summarized in the report. Monthly Microscopic Particulate Analyses (MPA) will be provided with these quarterly reports for the first year of monitoring. The reports will be submitted within 30 days of the last data downloads for the quarter. Phased limitations on the pumping rate for the Broad Run PA well are included in this monitoring program. Demonstration Reports shall be submitted to the DRBC for approval by the Executive Director prior to any adjustments in the pumping rate.

1. Broad Run PA Well Monitoring

Water level and quality will be obtained from the Well. A water level and temperature transducer (In Situ Series 500 or equivalent) will be installed in the Well below the pumping level based on results of the 72-hour pumping test. Water quality monitoring of the Well discharge will include conductivity and turbidity monitoring recorded at 60 minute intervals. MPA samples will be obtained at monthly intervals for the first year of the monitoring plan.

2. Piezometers:

The two existing piezometers from the original aquifer test will be used for this Plan. These piezometers were installed beneath a clay layer from 5 to 9 feet below grade, 20 and 40 feet from the bank of Broad Run. Two new piezometers screened above the clay layer will be installed for additional monitoring points. In addition, the stream gauge used for the aquifer test will be reused or reinstalled for this program. Prior to selecting the location of the new piezometers, the elevation of the top of the clay will be evaluated by looking at the stream bank for the presence or absence the clay. In addition, hand borings will be installed approximately 20 feet from the stream bank to look at the depth to the clay. Variations in the elevation of the clay surface will affect the saturated thickness of the water table zone to be monitored. The location of the piezometers must be set in locations where the top of the clay is low relative to the average top of the clay. Otherwise, the shallow piezometers may dry up during the late summer months. It is estimated that 10 to 12 soil borings, 25 to 50 feet, apart will be installed to look for variations in the top of clay elevation. The boring locations will be centered on the existing piezometer locations. The soils boring separation distance will be based on the initial variations observed in the elevation of the clay layer; small variations in clay elevation will result in wider spacing of the soil borings. The final piezometers will be installed by a licensed driller. One and a half-inch PVC piezometers will be installed with 2 feet of screen set on top of the clay layer, an estimated depth of 5 to 7 feet. Gravel pack will be extended 3 to 6 inches over the top of the screen. A bentonite seal to grade will be included to prevent any surface water from entering the piezometers. A 4 or 6 inch diameter locking steel protective well cover will be installed to protect the piezometers and water level recorders set into the piezometers. Following completion of the piezometers, the 5 monitoring points (two deep and two shallow piezometers and the stream gauge) will be surveyed for location and top of casing elevations. An In Situ 200 series level-temperature-conductivity (LTC) transducer will be installed into each of the 5 monitoring points. The transducers will be set to record at 1 hour linear time schedule to monitor changes in the stream and piezometers. The transducers will be downloaded weekly during the first two months of monitoring. After the first two months, the transducers will be downloaded monthly. The weekly frequency for downloading the transducers is primarily to evaluate security of the piezometers

3. Stream Gauging:

Stream flow discharge rate will be monitored for Broad Run at two locations during the monitoring period. The location for flow gauging will be the Newark Road and Broad Run Road Bridges over Broad Run. The Newark Road Bridge is the location where flows were measured during the aquifer test. The width of the stream at both locations is controlled by the bridge abutments. A profile of the stream bottom will be made at 6 inch intervals across the streams on the downstream side of each bridge prior to the initiation of flow measurements. The depth of flow beneath the bridges will be recorded by In-Situ LTC transducers located (and hidden) beneath the bridge. The recorders will be set to measure depth of water on a one hour interval. Conductivity on these probes will provide redundancy on the downstream stream piezometer location. The velocity of flow will be recorded weekly at each stream gauging location for the first two months of monitoring to develop a relationship between depth of the stream and flow velocity. Velocity will be measured using an electronic calibrated velocity instrument (Marsh McBirney FloMate or equivalent) at six inch intervals across the stream profile. The approximate depth of monitoring the velocity will be at 60 percent of the total depth of the stream, below the water

surface (40% of total depth above the stream bottom). Multiple measurements should be made at each location along the transect and averaged to accommodate any variability in measuring at each location. If low flow conditions where 3 inches of water depth or less are encountered, a more sensitive velocity instrument shall be employed (e.g. SonTec FlowTracker Handheld ADV with a 2D/3D probe or equivalent) for stream flow velocity measurements. After two months of weekly velocity monitoring, the velocity monitoring frequency will be reduced to monthly when the transducers are downloaded. Weekly velocity measurements in Broad Run shall resume for the period of June 1 thru October 15 during the pre-pumping period to include observations of expected low flows in the rating curve. Monthly velocity measurements may continue thereafter. The stream base profile will be re-measured following any stream flooding event if deemed necessary by the docket holder. Flow velocity measurements in Broad Run shall not be made within 72-hours of a precipitation event to allow for stream flow recession and an accurate measurement of baseflow.

4. Domestic Well Monitoring

The owners of the domestic wells monitored during the testing will be contacted for permission to reuse their wells during this long-term monitoring program. Water level and temperature will be recorded hourly using In Situ 500 Series water level and temperature transducers or equivalent. To minimize impact to the owner, the well transducers will be downloaded on a monthly basis.

5. Broad Run PA Well Withdrawal Rate

Commission staff have determined that the long-term pumping test of Broad Run PA well did not indicate that adverse impacts will occur to the local hydrologic system as a result of pumping. This monitoring program and the controlled phase-in of withdrawal rates from the well over time will reveal any adverse impacts to the Broad Run hydrologic system over increasing pumping rates or confirm the absence of any such impacts. It will also provide the Commission with the information to make adjustments in operations if it is found necessary. Prior to the initiation of water withdrawal from the Broad Run PA Well the docket holder will conduct a 9-month monitoring program. Water withdrawal from the Broad Run PA Well will only be initiated after the docket holder has collected 9 months of baseline data and received the written approval of the Executive Director.

Following the completion of 9 months of baseline monitoring, the docket holder may submit a written request to the Executive Director seeking approval of the phased initiation of withdrawal operations at the Well. Annual increases in the withdrawal rate from the well in 50 gpm increments from an initial 100 gpm to 150 gpm, and from 150 gpm to 200 gpm are shown in the table below. These requests shall be in writing and shall include the demonstration required in this Program. The Executive Director may approve, deny, scale back or otherwise modify phased water withdrawal increases up to the Broad Run PA Well allocation provided in this docket D-2002-034 CP-4. Phased increases in water withdrawal amounts will occur only upon demonstration by the docket holder that the monitoring program does not indicate significant impacts to the stream or existing groundwater wells. The Executive Director may also deny requested increases or reduce the allowable withdrawal rate based on the results of the monitoring program or any other information that the Executive Director concludes demonstrates that

reductions are required to protect neighboring wells or surface water flow in Broad Run from adverse impacts or otherwise warrants such action. The docket holder shall not increase the rate of water withdrawal until it receives the approval of the Executive Director authorizing such increase.

The withdrawal rate of the Broad Run PA well will be phased in the following manner:

PHASE	PHASE LENGTH	WITHDRAWAL RATE (GPM)	NOTES
Pre-pumping	9 months beginning after docket approval date	0	This phase shall include monitoring over one seasonally low-flow period i.e. June 1 through October 15
1	Minimum 12 months of well operation	100	Phase 1 shall continue until Executive Director approves an increase in the pumping rate
2	Minimum 12 months of well operation after phase 2 operation is approved	150	Phase 2 shall continue until Executive Director approves an increase in the pumping rate
3	12+ months of well operation after phase 3 is approved	200	Phase 3 may continue unless otherwise modified by the Executive Director

6. Monitoring Term

Monitoring and reporting in accordance with the attached Program will continue for a minimum of 5 years. After 5 years from the initiation of the initial monitoring, the docket holder may submit a written request to the Executive Director for modifications and or cessation of the monitoring and reporting as required in this Program. The docket holder shall continue to comply with this Program until it has received written approval of Program modifications from the Executive Director.

7. Quarterly Data and Demonstration Reports

In addition to quarterly data reports described above, the docket holder shall submit demonstration reports to the DRBC for any increase in water withdrawal from the Well in excess of 100 gpm. These reports shall provide interpretation of the collected data and shall demonstrate that no adverse impacts are occurring to neighboring wells or surface water flow in Broad Run as a result of pumping in the well. The docket holder shall submit written (or electronic) reports to the Executive Director. The docket holder shall also send copies (or electronic copies) of the Program reports to the PADEP, DNREC, New Garden Township and the CCWRA at the same time they are submitted to the DRBC. The Commission will publish these reports on its website.