

DOCKET NO. D-1969-210 CP-15

DELAWARE RIVER BASIN COMMISSION

**Exelon Generation Company, LLC
Limerick Generating Station
Water Withdrawal and Process Wastewater Discharge
Montgomery, Bucks, Schuylkill, Berks and Chester Counties, Pennsylvania**

PROCEEDINGS

This docket is issued in response to an Application submitted to the Delaware River Basin Commission (DRBC or Commission) on March 31, 2017 by Exelon Generation Company, LLC (Exelon, or docket holder) for renewal of the docket holder's existing industrial wastewater discharge, allocation of groundwater and surface water, groundwater and surface water withdrawal, and consumptive use. National Pollutant Discharge Elimination System (NPDES) Permit No. PA0051926 for the facility discharge was issued by the Pennsylvania Department of Environmental Protection (PADEP) on December 1, 2014.

The Application was reviewed for continuation of the project in the Comprehensive Plan and approval under Section 3.8 of the *Delaware River Basin Compact (Compact)*. The Bucks, Montgomery, Berks, Schuylkill, Chester and Philadelphia County Planning Commissions have been notified of pending action. A public hearing on this project was held by the DRBC on May 15, 2019.

A. DESCRIPTION

1. Purpose. The purpose of this docket is to renew approval of the docket holder's wastewater discharge, groundwater withdrawal, surface water withdrawal and consumptive use associated with the Limerick Generating Station (LGS). The LGS discharge consists of up to 14.2 million gallons per day (mgd) of untreated and treated process wastewater, which is primarily blowdown from the LGS cooling towers. The LGS total groundwater withdrawal and allocation consists of up to 6.1 million gallons per month (mgm) for potable, non-potable, and emergency use water. The LGS surface water withdrawals are for up to 58.2 mgd and 1.7422 billion gallons per month (bgm) from the Schuylkill River, the Perkiomen Creek, the Delaware River, the Wadesville Mine Pool (WMP) and the Tamaqua Area Water Authority's (TAWA) Still Creek Reservoir and Owl Creek Reservoirs (Tamaqua Reservoirs) and are used for consumptive and non-consumptive cooling water. The peak consumptive use is restricted to 44 mgd when ambient air temperature is less than 87°F, and 47.3 mgd when ambient air temperature is 87°F or greater. The

docket approves the use of the various water sources subject to the conditions and requirements contained in the DECISION section of this docket. The docket also approves the LGS Water Supply Program Operation and Monitoring Plan (O&M Plan), as attached. No modifications to the facilities are proposed.

For the purpose of this docket, *augmentation water* refers to water supplied by Exelon from DRBC-approved sources to the Schuylkill River and Perkiomen Creek during periods of low natural stream flow to compensate for LGS surface water withdrawals for consumptive use. Schuylkill River *augmentation water* is supplied from the WMP and/or Still Creek Reservoir and Owl Creek Reservoirs, and Perkiomen Creek *augmentation water* is supplied from the Delaware River via the water diversion system. *Augmentation water* also may be used for LGS non-consumptive use only under limited circumstances set forth in this docket. Natural flow refers to the naturally-occurring flow in the source waterbody not augmented by releases from Commission sponsored reservoir storage projects (Blue Marsh).

2. Location and Physical Features. The overall project consists of multiple release, withdrawal, and discharge components in different locations. Section 5 of the LGS O&M Plan contains a system map that depicts the locations and interrelationship of these components. Specific coordinates of the withdrawal and intake points have not been provided in this docket for security purposes.

2.1 Limerick Generating Station (LGS): The project includes the continued operation of a nuclear power plant with two generating units each having a maximum Reactor Thermal Power of 3,515 megawatts (MW), with circulating cooling water for the steam turbine condensers to be furnished from cooling towers and surface water to be withdrawn from the Schuylkill River and/or Perkiomen Creek as described below. LGS is located on a 491-acre site adjoining the east bank of the Schuylkill River mostly in Limerick Township (a small portion extends into Lower Pottsgrove Township), Montgomery County, Pennsylvania, about 1.7 miles south of the nearest part of the Borough of Pottstown. The LGS site property also includes 154 acres adjoining the west bank of the Schuylkill River in East Coventry Township, Chester County, Pennsylvania. No plant features of LGS are situated in this area; it serves only as the western portion of the LGS exclusion area. Water intake structures and discharge structures associated with the facility and its operations are described below. The main facilities at the site include two reactor enclosures, two turbine enclosures, two hyperbolic cooling towers, administrative and service buildings, an Independent Spent Fuel Storage Installation, and a water treatment building.

2.2 LGS Schuylkill River Intake (Withdrawal Location): The primary LGS intake is located in Limerick Township, Montgomery County, Pennsylvania on the non-tidal portion of the Schuylkill River. The facility is located at River Mile 92.5 - 48.2 (Delaware River – Schuylkill River). Specific location information for this water withdrawal location has been withheld for security reasons.

Water withdrawn through the Schuylkill River intake (“Schuylkill Pumphouse”) is used for consumptive and non-consumptive applications at LGS. The water enters the front and

sides of the intake structure through trash bar racks, passes through intake bays and traveling screens, and then flows into the pump wells.

2.3 LGS Perkiomen Creek Intake (Withdrawal Location): The auxiliary LGS intake is located in Graterford Township, Montgomery County, Pennsylvania on the Perkiomen Creek. The facility is located at River Mile 92.5 – 32.4 – 8.5 (Delaware River – Schuylkill River – Perkiomen Creek). Specific location information for this water withdrawal location has been withheld for security reasons.

The Perkiomen Creek intake consists of a pumphouse (“Perkiomen Pumphouse”) and in-stream components that consist of a series of 15 submerged stationary wedge wire screens, located in the Perkiomen Creek and connected to three intake pipelines. The screens are cylindrical, each approximately 6 feet long and 2 feet in diameter, with a slot size of 2 mm. The water passes through the screens and the three intake pipelines connected to the onshore pumphouse. The pumphouse contains three 50% capacity intake pumps rated at 14,600 gpm and a small (approximately 390 gpm) auxiliary pump. Shallow weirs located in the creek just downstream of the Perkiomen intake maintain a pool level above the submerged screens. The intake and its associated discharge pipeline to LGS are used to supply water from the Perkiomen Creek to LGS. The water discharges into a storage tank located at the LGS plant site for subsequent use.

2.4 Wadesville Mine Pool (WMP) - Consumptive Use Augmentation Source: The Wadesville Mine Pool is located in the Townships of Norwegian and New Castle and the Borough of St. Clair, all within Schuylkill County, Pennsylvania. The pumping and conveyance system currently used to maintain the water level of the WMP, which is located on Reading Anthracite Company (RAC) property, is located at the border of New Castle and Norwegian Townships, just west of St. Clair Borough, all within Schuylkill County, Pennsylvania. The WMP and the dewatering pumps have been operational for more than 50 years. The WMP is approximately 700 feet deep, one mile wide and three miles long. An estimate of the amount of water stored in the mine pool (3.6 billion gallons) was determined in 1953.

The existing pump house, which is located at the Wadesville shaft approximately ¼-mile from the open pit, contains pumping equipment used for dewatering of the mine pool to support present-day operations. The top of the shaft is at elevation 782 feet above mean sea level (MSL) and its bottom elevation is at 46 feet above MSL. Two vertical turbine pumps operate, as available, to maintain the water level at approximately 450 feet below the surface (elevation 332 feet above MSL). The bottom of the casing of the lower pump is approximately 600 feet below the surface (elevation 182 feet above MSL). The pumps are capable of discharging at a rate in the range of up to 9,000 to 10,000 gpm total. The WMP facilities are found on the “Pottsville, PA” USGS Quad as follows in Table 1:

TABLE 1		
FACILITY	LATITUDE (N)	LONGITUDE (W)
Wadesville Pump House	40° 42' 55"	76° 12' 22"
Wadesville Outfall	40° 42' 52"	76° 12' 24"

The existing outfall is used to discharge mine pool water via a dry swale to the East Norwegian Creek in the Schuylkill River Watershed. East Norwegian Creek joins with West Norwegian Creek to form Norwegian Creek, which flows under the Borough of Pottsville, via a culvert, to join the Schuylkill River at River Mile 123.4. The WMP water is discharged at River Mile 92.5 - 123.4 - 2.4 - 0.5 (Delaware River – Schuylkill River – Norwegian Creek – East Norwegian Creek) in accordance with NPDES Permit No. PA0123293, issued by PADEP on June 28, 2017. The NPDES permit for the WMP discharge is issued to Reading Anthracite Company (Pottsville, PA). In accordance with the existing administrative agreement between PADEP and DRBC, PADEP is responsible for the issuance of permits for the discharge from the mine operations.

The PADEP submitted the *Total Maximum Daily Load (TMDL) Report for the Upper Schuylkill River Watershed* to the United States Environmental Protection Agency (USEPA) on March 28, 2007. The report included TMDLs for the three primary metals associated with acid mine drainage (AMD) (iron, manganese, and aluminum) and pH, and addressed three segments of the Schuylkill River on Pennsylvania's 1996 303(d) list of impaired waters. On April 7, 2007, the EPA approved the TMDL. Both NPDES permitted discharges from the Wadesville site are included in the TMDL.

2.5 Delaware River Diversion - Consumptive Use Augmentation Source: During periods when use of the Perkiomen Creek is allowed and the flow criteria for the Schuylkill River and the Perkiomen Creek are not met, the docket holder is approved to use an intrabasin transfer of water from the Delaware River to the Bradshaw Reservoir for subsequent release (augmentation) into the East Branch Perkiomen Creek (EBPC). The released water then flows into the Perkiomen Creek and reaches the point of withdrawal at the Perkiomen Creek intake, where it is pumped to LGS. DRBC Docket No. D-65-76 CP (8), approved on February 18, 1981, approves the diversion of Delaware River water into the Bradshaw Reservoir and DRBC Docket No. D-79-52 CP, also approved on February 18, 1981, approves the pumping of water from the Bradshaw Reservoir into the EBPC. Docket D-79-52 CP limits the maximum quantity pumped by the Bradshaw Reservoir Pumping Station to the EBPC for PECO (now Exelon) to 42 mgd plus a ten percent allowance for evaporative and leakage losses in the open channel of the connecting waterways or a total of 46.2 mgd. The attached O&M Plan provides that when water is pumped from the Bradshaw Pumping Station for the docket holder use as consumptive use at LGS an additional 3% of the amount pumped will be added for evaporative and leakage losses in the open channel of the connecting waterways. This water is restricted to the use, conditions and service area approved in Docket No. D-65-76 CP (8) and cannot be used for any other purposes unless approved by the Commission.

The diversion of water from the Delaware River for LGS consumptive cooling water needs is accomplished through a series of pumping stations, the Bradshaw Reservoir, transmission mains, the EBPC and Perkiomen Creek. The Point Pleasant Pumping Station is located at Delaware River Mile 157.3 in Plumstead Township, Bucks County, Pennsylvania, and is owned and operated by Forest Park Water Authority (FPWA). Specific location information for this water withdrawal location has been withheld for security reasons.

The portion of the FPWA diversion for the LGS is pumped from the Delaware River for discharge into the Bradshaw Reservoir. The Bradshaw Reservoir facility, which is owned and operated by the docket holder, includes a pumping (booster) station that is used to transfer water, when required, to the EBPC through a transmission main for the docket holder's use. The water is disinfected seasonally, as required by PADEP NPDES Permit No. PA0052221 (effective January 1, 2015), before it reaches the EBPC by mixing with ozone at the docket holder's water treatment plant (the "Bedminster Water Processing Facility" or BWPF), which is located along the transmission main route. The transmission main and BWPF also are owned and operated by the docket holder.

DECISION Condition II.P. of Docket No. D-79-52 CP reserves the right of the Commission to open Docket No. D-79-52 CP at any time, and to reconsider its decision and any and all conditions imposed hereunder in light of further information developed by, or decisions rendered in, pending or future proceedings conducted by other State and Federal agencies concerning the development and operation of LGS and related facilities. Condition II.P. also allowed the Commission to, at any time, modify existing conditions, or impose additional conditions, upon the construction and operation of this facility to reflect new or changed information or to conform to requirements imposed on the project by other agencies. By approval of Docket No. D-1969-210 CP-14, the Commission modified one of the DECISION Conditions of Docket No. D-79-52 CP as described in the next paragraph.

DECISION Condition II.C. of Docket No. D-79-52 CP required PECO (Exelon Generation's predecessor) to maintain 27 cfs in the EBPC while LGS was in operation and 10 cfs at all other times. By approval of D-1969-210 CP-14, the Commission modified DECISION Condition II.C. of Docket No. D-79-52 to require a minimum flow of 10 cfs (6.5 mgd) in the EBPC at all times, which is continued in this docket (D-1969-210 CP-15, See DECISION Condition C.35.).

The rate of release into the EBPC is equal to the LGS's consumptive cooling water demand plus an additional three percent (unless modified as discussed above to compensate for evaporative losses estimated to occur during the approximately 18-hour transit time). The flow in the EBPC enters into the main branch of Perkiomen Creek and flows downstream to a point in the Graterford area, where Exelon Generation's Perkiomen Creek intake structure and transfer pipeline are used to convey the water directly to LGS.

In accordance with Docket No. D-65-76 CP (8), the Point Pleasant Pumping Station may withdraw up to 95 mgd of water from the Delaware River. Up to 46.2 mgd (42 mgd consumptive use at LGS plus 4.2 mgd for transmission losses) may be routed to the EBPC for use by Exelon Generation to maintain minimum creek flows, provide for recreational event augmentation, and provide for water withdrawals at the Perkiomen Creek intake at Graterford, Pennsylvania. At Graterford, up to 42 mgd of water may be pumped to LGS for consumptive use.

2.6 Tamaqua Reservoirs – Consumptive Use Augmentation Source: During periods when the natural flow criteria for the Schuylkill River are not met, the docket holder is approved to use water from the Tamaqua Reservoirs as Schuylkill River *augmentation* water and

to withdraw an equivalent amount (minus evaporative losses) for consumptive use at LGS subject to the conditions in this docket. The docket holder has a contract with TAWA for compensatory releases of water from Still Creek Reservoir into Still Creek and a separate contract with Tamaqua Borough (TB) for releases from the Owl Creek Reservoirs into Owl Creek. Still Creek Reservoir is located in Rush Township, Schuylkill County, Pennsylvania, approximately 2.3 miles north of Hometown, Pennsylvania and 5,000 feet upstream from the confluence of Still Creek and the Little Schuylkill River at River Mile 92.5 - 102.1 - 30.2 - 1.0 (Delaware River – Schuylkill River – Little Schuylkill River – Still Creek). The Owl Creek Reservoirs are located in the Borough of Tamaqua, Schuylkill County, Pennsylvania. The existing dams are located at River Miles 92.5 – 102.1 – 22.1 – 1.7 and 92.47 – 102.1 – 22.1 – 2.3 (Delaware River – Schuylkill River – Little Schuylkill River – Owl Creek).

The Commission issued Docket No. D-2010-028 CP-1 on December 5, 2012 to TAWA and TB for the Tamaqua Reservoirs. Docket No. D-2010-028 CP-1 approved releases of up to 36 mgd from Still Creek Reservoir and up to 8 mgd from the Owl Creek Reservoirs, with a total not to exceed 43.3 mgd for use as consumptive water by the docket holder at the LGS.

2.7 LGS Outfall No. 001 (Discharge Location): LGS's Outfall No. 001 discharges up to 14.2 mgd of primarily cooling tower blowdown, with intermittent additions of wastewater from the spray pond, holding pond, and liquid radwaste treatment systems, including laundry drains.

Liquid radioactive wastes are handled by systems enclosed within the protected area of the plant. These systems comprise the LGS radioactive liquid waste management system, which collects, treats, stores, and disposes of radioactive liquid wastes. The wastes are collected in sumps and drain tanks at various locations throughout each Limerick Unit and then transferred to the appropriate collection tanks in the common radwaste enclosure according to their classification (i.e., equipment drain, floor drain, chemical drain, or laundry drain waste). The liquid wastes are processed through treatment units to reduce radionuclide concentrations and are then either returned to the condensate system for re-use in the plant, packaged for offsite shipment, or monitored and discharged from the plant into the cooling tower blowdown line on a batch basis. The mixing of the effluent with the blowdown flow maintains the radionuclide concentrations at the release point in the Schuylkill River below 10 CFR Part 20 limits. Radionuclide effluents are under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC).

The Commission is deferring to the effluent limitations as prescribed by the NRC and as included in the LGS NPDES Permit which specifies the effluent discharge requirements for each agency from Outfall No. 001.

The Outfall No. 001 discharge structure is a multi-port diffuser. Wastewater is returned to the Schuylkill River through the discharge diffuser, which is encased in the concrete channel stabilization structure on the east side of the river, about 700 feet downstream of the intake. The discharge diffuser consists of a 28-inch carbon steel pipe with a total of 283 nozzles (1.25 inch diameter) installed on 6-inch centers. The diffuser is supplied by a 36-inch carbon steel cooling tower blowdown pipe.

Effluent will continue to discharge to River Mile 92.5 – 48.0 (Delaware River – Schuylkill River) via Outfall No. 001, in Limerick Township, Montgomery County, in accordance with this docket and PADEP’s NPDES Permit No. PA0051926 as follows in Table 2:

TABLE 2		
FACILITY	LATITUDE (N)	LONGITUDE (W)
LGS Outfall No. 001	40° 13’ 13”	75° 35’ 22”

All existing facilities of the LGS project remain as previously approved. Intake water to the docket holder’s facilities and discharges from Outfall 001 are metered. No new facilities are proposed.

3. **Surface Water Withdrawal Design Criteria.** The docket holder is approved to withdraw water to meet its consumptive and non-consumptive needs at LGS in accordance with the Conditions in the DECISION Section of this docket and the O&M Plan approved by this docket. The following generally describes those conditions:

3.1 **Surface Water Withdrawals from the Schuylkill River:** Surface water withdrawals from the Schuylkill River shall not exceed 58.2 mgd and 1.7422 bgm to supply the consumptive and non-consumptive water needs of LGS. The monthly allocation of 1.7422 bgm is calculated based on a daily flow of 56.2 MGD for a period of 31 days, as carried forth from previous approvals. Daily needs may be slightly higher hence the daily allocation of 58.2 mgd.

Consumptive use and non-consumptive use allocations are based on the number of units in operation. Additionally, consumptive use allocations vary according to the ambient air temperature as shown on Table 3.

TABLE 3			
Units in Operation	Consumptive Use (air temperature less than 87°F)	Consumptive Use (air temperature 87°F or greater)	Non-Consumptive Use
1	24.0 mgd	25.5 mgd	14.2 mgd
2	44.0 mgd	47.3 mgd	14.2 mgd

With **one unit** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 530 cfs**, the **Schuylkill River** withdrawal shall not exceed 24 mgd for consumptive use and 14.2 mgd for non-consumptive use. However, on days when the ambient air temperature is 87°F or greater, the consumptive use shall not exceed 25.5 mgd. Consumptive use above 24 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs and/or water diverted from the Delaware River via the Perkiomen Creek when the 24-hour average flow

in the Schuylkill River, as measured at the Pottstown Gage is less than or equal to 532 cfs. Such releases must be made on a 1:1 gpd basis over the next 24-hour period beginning on the day after a consumptive use in excess of 24 mgd.

With **two units** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 560 cfs**, the **Schuylkill River** withdrawal shall not exceed 44 mgd for consumptive use and 14.2 mgd for non-consumptive use. However, on days when the ambient air temperature is 87°F or greater, the consumptive use shall not exceed 47.3 mgd. Consumptive use above 44 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs and/or water diverted from the Delaware River via the Perkiomen Creek when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gage is less than or equal to 564 cfs. Such releases must be made on a 1:1 gpd basis over the next 24-hour period beginning on the day after a consumptive use in excess of 44 mgd.

With **one unit** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 530 cfs**, all consumptive use is required to be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such releases must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

With **two units** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 560 cfs**, all consumptive use is required to be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

3.2 Schuylkill River Augmentation Water Sources: The docket holder may use up to 14.4 mgd (446.4 mgm) from the WMP and Up to 43.3 mgd (1.342 bgm) from the Tamaqua Reservoirs to provide *augmentation water* to the Schuylkill River to meet LGS's consumptive use demands as identified above at times when the 24-hour average flow in the Schuylkill River as measured at the Pottstown gaging station is less than or equal to 530 cfs with one unit in operation and 560 cfs with two units in operation. All consumptive use will be augmented on a 1:1 gpd basis. The docket holder is required to discontinue use of the WMP as an augmentation source when Schuylkill River TDS concentrations reach 500 mg/l as calculated from specific conductivity measured at the Landingville Gaging Station (USGS Gage No. 01468500) using a conversion factor (DECISION Condition C.43.).

3.3 Surface Water Withdrawals from Perkiomen Creek and Perkiomen Creek Augmentation Water Source (Water Diversion from the Delaware River to EBPC via Bradshaw Reservoir):

When use of the Schuylkill River is restricted, or when the Schuylkill River is unrestricted and under the specific circumstances listed in DECISION Condition C.33. in this

docket, the docket holder may withdraw up to 24 mgd of surface water from the unaugmented Perkiomen Creek for use at LGS when its natural flow as measured at the Graterford gaging station (USGS Gage No. 01473000) is at least 180 cfs (116 mgd) with one unit in operation. With two units in operation, up to 42 mgd (65 cfs) of surface water may be withdrawn from the Perkiomen Creek when its natural flow is at least 210 cfs (136 mgd). The total withdrawal is not to exceed 1.302 bgm.

When use of the Schuylkill River is restricted, or when the Schuylkill River is unrestricted and under the specific circumstances listed in DECISION Condition C.33. in this docket and the natural flow of the Perkiomen Creek is less than 180 cfs (with one unit in operation) or less than 210 cfs (with two units in operation), the docket holder may withdraw up to 42 mgd of water for the purpose of supplying the consumptive needs of LGS from the augmented Perkiomen Creek at Graterford, Pennsylvania. Perkiomen Creek *augmentation water* is diverted from the Delaware River via the Point Pleasant Pumping Station, routed through the Bradshaw Reservoir as part of the up to 46.2 mgd (71.5 cfs) pumped to the EBPC for conveyance to the Perkiomen Creek intake near Graterford.

3.4 Minimum Flow in the EBPC: The docket holder shall maintain a minimum flow of at least 10 cfs in the EBPC at all times in accordance with the O&M Plan. The docket holder is required to operate its recreational flow management plan to increase flows in the EBPC above 10 cfs to support specific short-term recreational events.

3.5 Critical Hydrologic Condition: For the duration of a critical hydrologic condition as announced by the Commission, on a daily basis the docket holder shall cause to be released from a replacement water source approved by the Commission an amount of water equal to the amount consumptively used by the docketed facility, multiplied by the applicable relative effect factor, if assigned. For the duration of such critical hydrologic condition, the docket holder shall operate its facility only at a level commensurate with the amount of replacement water it is capable of causing to be released. However, such releases from the Merrill Creek Reservoir are not required for any portion of the consumptive use augmentation released for LGS from the WMP, Still Creek Reservoir, and/or Owl Creek Reservoirs (See DECISION Condition C.36.).

3.6 Emergency Use of Surface Water: During an emergency, if normal constraints on withdrawals cannot be met, the docket holder may use surface water from the sources, designated herein as necessary, to address the emergency until it has been stabilized, in accordance with the O&M Plan and/or emergency shutdown procedures established by the NRC. Notification of and consultation with the Executive Director should occur as soon as possible but no later than 24 hours after the emergency is known by the docket holder.

In the event that conditions exist that require the water diversion system to be in service to supply water for LGS's consumptive use, but the system is unavailable or of diminished capacity, an equal volume of water, up to 43.3 mgd (peak daily withdrawal) and 1.342 bgm, may be released from the Tamaqua Reservoirs, subject to the Operating Rule Curves and allowing an additional three percent for in-transit evaporative losses, and withdrawn for consumptive use at LGS in accordance with the O&M Plan. Notification of such releases to the Commission should occur as soon as possible but no later than 48 hours after the event occurs.

4. **Wastewater Discharges.** The LGS Project is associated with three discharges; the LGS Discharge, the Bradshaw Reservoir/Pipeline Discharge, and the WMP Discharge.

4.1 **LGS Discharge:** Table 4 below contains effluent requirements for DRBC parameters that must be met as a condition of this approval (See DECISION Condition C.18.). NPDES Permit No. PA0051926 was approved by the PADEP on November 14, 2014 (effective December 1, 2014) and includes final effluent limitations for the project discharge of up to 14.2 mgd to surface waters classified by PADEP as warm water/migratory fisheries (WWF/MF). The following effluent limits are among those listed in the Permit and meet or are more stringent than the effluent requirements of the DRBC.

TABLE 4: DRBC Effluent Parameters Included in NPDES Permit		
OUTFALL 001 (Non-Contact cooling water and industrial waste)		
PARAMETER	LIMIT	MONITORING*
pH (Standard Units)	6 to 9	As required by NPDES Permit
Total Suspended Solids	Monitor & Report	As required by NPDES Permit
Temperature	110°F (Max)	As required by NPDES Permit
Total Dissolved Solids	Monitor & Report	As required by NPDES Permit **

* See Condition C.18 for submittal of monitoring results to DRBC

** See Condition C.19 for additional DRBC monitoring requirements

4.2 **Bradshaw Reservoir/Pipeline:** NPDES Permit No. PA0052221 was approved by the PADEP on December 8, 2014 (effective January 1, 2015) includes final effluent limitations for the project discharge of 46.2 mgd (42 mgd plus 10 %, or 4.2 mgd, allowance for losses) to the EBPC, classified by PADEP as a Trout Stocked Fishery (TSF). The Bradshaw Reservoir, pumping station, and transmission main were approved by the DRBC via Docket No. D-79-52 CP on February 18, 1981.

4.3 **WMP Discharge:** Reading Anthracite Company’s NPDES Permit No. PA0123293 includes final effluent limitations for the project discharges to surface waters (East Branch Norwegian Creek) classified by PADEP as a supporting Cold Water Fishes (CWF).

5. **Area Served.** The docket holder is the sole owner of LGS and the power developed at the plant will be transmitted and distributed throughout the service area via the Regional Transmission Organization, PJM Interconnection, LLC. For the purpose of defining the Area Served, the Application is incorporated herein by reference consistent with conditions contained in the DECISION Section of this docket.

6. **Relationship to the Comprehensive Plan and Prior Approvals.** The docket holder’s LGS facility was first included in the Comprehensive Plan on March 29, 1973 by Docket No. D-69-210 CP. Issuance of this docket (D-1969-210 CP-15) will continue approval of the LGS and its water resource components in the Comprehensive Plan. A detailed history of LGS’s DRBC approvals are contained in the terminated Dockets D-1969-210 CP-13 and CP-14. Prior facilities

and processes for the LGS have been described in previous DRBC Dockets and/or Resolutions as indicated in Table 5 below:

TABLE 5	
DRBC Docket No.	Approval Date
D-1969-210 CP-13	May 8, 2013
Resolution No. 2011-12	December 8, 2011
Resolution No. 2011-04	May 11, 2011
Resolution No. 2010-10	December 8, 2010
Resolution No. 2009-11	December 9, 2009
Resolution No. 2008-13	December 10, 2008
D-69-210 CP (Final) (Revision 12)	October 27, 2004
D-69-210 CP (Final) (Revision 11)	June 26, 2003
D-69-210 CP (Final) (Revision 10)	April 25, 1990
D-69-210 CP (Final) (Revision 9)	February 22, 1989
D-69-210 CP (Final) (Revision No. 8)	February 22, 1989
D-69-210 CP (Final) (Revision 6)	April 29, 1986
D-69-210 CP (Final) (Revision No. 5)	April 29, 1986
D-69-210 CP (Final) (Revision No. 4)	October 30, 1985
D-69-210 CP (Final) (Revision No. 2)	August 9, 1985
D-69-210 CP (Final) (Revised)	May 29, 1985
Resolution No. 76-18	1976
Resolution No. 76-13	1976
D-69-210 CP (Final)	November 5, 1975
D-69-210 CP	March 29, 1973

7. Potable and Backup Fire Water. The potable water supply to the facility is provided by one of two groundwater wells in use at the LGS. The two groundwater wells are located in the Southeastern Pennsylvania Groundwater Protected Area (GWPA).

Well 1 (the “Alley Well”) supplies water to a head tank for potable use at LGS. Well No. 3 (the “Batch Plant Well”) provides a backup source of LGS fire emergency and other emergency water. The Well 3 pump operates to replenish a fire emergency water storage tank during a fire emergency or other emergency, in the event the backup supply is needed, or during standby when the tank level is low.

WELL NO.	DEPTH	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY	YEAR DRILLED
Well 1 - Alley	310’	Unknown / 8”	75 gpm	Unknown
Well 3 – Batch Plant	585’	Unknown’ / 8”	65 gpm	1987

Wells Nos. 1 and 3 are located in the Schuylkill - Sprogels Run subbasin, where total net annual groundwater withdrawal [477 million gallons per year (mgy)] is less than the withdrawal limit set in Section 6.1 of the *GWPAR* (1,455 mgy). The total annual groundwater allocation from these two wells is 75.6 mgy (6.3 mgm), a fraction of which will be returned to groundwater. However, even if no water from these two project wells were returned to groundwater, the total net annual groundwater withdrawal from this subbasin would remain below the withdrawal limits set in Section 6.1 of the *GWPAR*. Therefore, the proposed withdrawals from the wells, in conjunction with other withdrawals in this subbasin, are in accordance with the requirements of Section 6.1 of the *GWPAR*.

8. Operation and Maintenance Plan. The docket holder has submitted the attached O&M Plan that includes withdrawals from the Schuylkill River, Perkiomen Creek, the Delaware River via the Perkiomen Creek, and *augmentation* of the Schuylkill River from the WMP and/or the Tamaqua Reservoirs (O&M Plan - Attachment No. 2). The O&M Plan is approved by this docket and provides for the collection of data and analysis to determine the project's compliance with the terms of this docket.

B. FINDINGS

1. Renewal Application. The docket holder submitted an Application requesting to renew approval of the docket holder's wastewater discharge, groundwater water withdrawal and allocation, and surface water withdrawal and consumptive use associated with the LGS. Although no changes to project facilities have occurred since the previous approval, the docket holder requested several modifications to the docket requirements including:

- Modification of temperature requirements to reflect PADEP temperature criteria.
- Elimination of compensation releases for consumptive use when temperature is above 87°F for unaugmented conditions
- Modification of TDS and point of compliance for Wadesville Mine Pool Augmentation Releases
- Modification of monitoring requirements for Upper Schuylkill River, East Norwegian Creek, Still Creek and Little Schuylkill River, and East Branch Perkiomen Creek
- Modify monitoring requirements for WMP discharge canal
- Reduce and simplify annual assessment reporting and conduct annual meeting only if requested by the DRBC
- Modification of additional specific language and descriptions from the previous docket.

2. Schuylkill River Augmentation Releases for Ambient Temperature 87°F or Greater. Docket D-1969-210 CP-14 approved increases in the consumptive use during extended periods of high ambient air temperature (87°F or greater). The increase in consumptive use was a result of repairs made to its cooling water system that resulted in greater cooling efficiency and in turn an increase in the evaporative water loss (consumptive use). This docket continues the approval to

withdraw up to 25.5 mgd and 47.3 mgd from the Schuylkill River with one and two units operating, respectively, for consumptive use at the LGS when the ambient air temperature is 87°F or higher. The previous docket required Exelon to augment the flow of the Schuylkill River with releases from its storage in either Wadesville Mine Pool or the Tamaqua reservoirs or from the Delaware River via the Perkiomen Creek on a 1:1 gpd basis for the net increase in consumptive water use above 24 mgd or 44 mgd (when one and two units are operating, respectively) even if the 24-hour average flow of the Schuylkill River as measured at the Pottstown Gaging Station (USGS Gage No. 01472000) is greater than 530 cfs (with one unit operating) or 560 cfs (with two units operating). The releases must be made over the 24-hour period beginning on the day after the consumptive use occurs. Augmentation must not occur, however, if there are flooding conditions or potential flooding conditions on the Schuylkill River.

This docket continues the approval of the additional consumptive use during periods of higher ambient air temperature, but no longer requires augmentation if the flows in the Schuylkill River are not restricted and the increased consumptive use does not result in the Schuylkill River becoming restricted. Under unrestricted conditions, consumptive use above 24 mgd (with one unit operating) and 44 mgd (with two units operating) must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek when flows in the Schuylkill River are less than or equal to 532 cfs or 564 cfs during one-unit and two-unit operation, respectively. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used. Compensation releases will continue to be required under restricted conditions, i.e. when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is less than or equal to 530 cfs (with one unit in operation); and when the 24-hour average flow in the Schuylkill River is less than or equal to 560 cfs (with two units in operation). All compensation releases must be made on a 1:1 basis.

3. Total Dissolved Solids (TDS) Outfall No. 001. Section 3.10.4.D.2. of the Commission's *Water Quality Regulations (WQR) Effluent Quality Requirements* state that TDS shall not exceed 1,000 mg/l, or a concentration established by the Commission which is compatible with designated water uses and stream quality objectives and recognizes the need for reserve capacity to serve future dischargers.

The Commission's Stream Quality Objective Limits for TDS are that as a result of discharges: 1) the receiving stream's resultant TDS concentration shall not exceed 133% of the background and 2) the receiving stream shall not contain substances in concentrations that preclude the specified water uses to be protected (WQR Section 3.10.3.B.1.). As TDS concentrations in excess of 500 mg/l may preclude use of the stream as a drinking water source, TDS concentrations should not exceed 500 mg/l. The 133% of the background TDS requirement is for the protection of aquatic life. The 500 mg/l TDS requirement is to protect the use of the receiving stream as a drinking water source. The EPA's Safe Drinking Water Act's secondary standard for TDS is 500 mg/l.

Outfall No. 001 discharge effluent contains greater than 1,000 mg/l due to the concentrative effect of cycling of water in the closed loop cooling system, as well as by the addition of certain treatment chemicals. However, the mass of the discharge effluent does not differ significantly from the mass of the intake water TDS mass; the concentration increase is mainly due to the recycling of water in the system.

Docket No. D-1969-210 CP-14 required the docket holder to sample TDS effluent and in-stream TDS in the Schuylkill River at the USGS Pottstown Gage (No. 01472000) and evaluate the discharge for compliance with the above criteria. The docket holder performed the sampling and submitted a TDS evaluation on June 30, 2016, which was updated on December 1, 2017 (TDS Report). The TDS Report included DRBC's "TDS Determination Questionnaire" with supplemental information and the "Outfall 001 Total Dissolved Solids Evaluation Report". The evaluation in the TDS Report indicated that the maximum TDS in the LGS effluent was 2,443 mg/l during the sampling period. Background TDS concentration in the Schuylkill River was estimated at 353 mg/l, and 7-day flow with a 10-year recurrence interval (Q7-10 flow) was estimated as 313 cfs (or 206 mgd). Using a mass balance approach, at the maximum design discharge rate of 14.2 mgd (or 22 cfs) and maximum effluent concentration of 2,443 mg/l (from the sampling data), the expected in-stream TDS concentration downstream of the LGS discharge point is 497 mg/l. 497 mg/l does not exceed the secondary drinking water standard of 500 mg/l; however, 497 mg/l is approximately 140% of the background in-stream TDS of 353 mg/l, which slightly exceeds the criteria of 133% of background.

The above evaluation indicates that at the maximum TDS effluent concentration, the maximum effluent flow and the minimum Schuylkill River in-stream flow, 133% of background is calculated to be exceeded. However, a review of the effluent sampling and instream sampling results (from May 2013 – May 2016) indicates that at no time did the discharge cause an exceedance of 133% of background. Using real time data, the maximum increase in TDS was 111% of background.

The docket holder is required to continue to sample effluent flow and TDS concentration and collect in-stream Schuylkill flow and TDS concentration data as detailed in the O&M Plan and to calculate the resultant percent of background in the Schuylkill River downstream of the discharge. The docket holder shall report this data and the results annually (See DECISION Condition C.19.).

4. Temperature Outfall No. 001. On November 5, 1975, the Commission approved Docket No. D-1969-210 CP (Final), which included a heat dissipation area (HDA) for the LGS discharge consisting of one-half the stream width (150 feet) and 3,500 feet downstream from Outfall 001. Docket No. D-1969-210 CP-13 required the docket holder to perform a thermal CORMIX analysis of their discharge, which was submitted and reviewed by Commission staff. Docket No. D-1969-210 CP-14 continued approval of the HDA, stating that the existing HDA will remain in effect until such time as the Commission makes a determination regarding a revised HDA for Outfall No. 001. This docket (D-1969-210 CP-15) does not revise the HDA and continues approval of the existing HDA for the LGS discharge consisting of one-half the stream width (150 feet) and 3,500 feet downstream from Outfall 001 as is allowable according to the WQR Section 4.30.6.F.3

(See DECISION Condition C.21.). The docket holder is required to continue to meet temperature requirements contained in the current and future NPDES permit (See DECISION Condition C.18.).

5. Perkiomen Creek Augmentation Source – Delaware River via the Water Diversion System. Water diverted from the Delaware River to the EBPC via Bradshaw Reservoir (up to 42 mgd to LGS) will remain an approved source of Perkiomen Creek *augmentation water* for consumptive use at LGS.

6. Schuylkill River Augmentation Source.

6.1 WMP: The Docket Holder provided the *Wadesville Mine Pool Total Dissolved Solids Monitoring Report (June 29, 2018)* to the Commission as required by Docket No. D-1969-210 CP-14 which includes statistical assessments of the TDS and specific conductivity data that has been collected in association with the WMP augmentation source during previous docket cycles. The report concluded that more data is required to be collected to establish background TDS concentrations at low flow conditions (only 61 of 86 samples collected at or below 110 cfs) and to develop an accurate relationship between TDS and specific conductivity. Accordingly, the docket holder did not request the DRBC to approve the substitution of specific conductivity monitoring in lieu of TDS monitoring at Landingville for compliance with DRBC water quality objectives. Furthermore, the docket holder requested that the compliance point for TDS be moved from the Landingville gage downstream to the nearest public water supply intake (Pottstown Water Authority) as the 500 mg/l water quality object described in their docket is imposed to protect the Schuylkill River as drinking water source.

Commission staff recommend the continued approval of the use of the WMP as an *augmentation water* source of up to 446.4 mgm (10,000 gpm, 14.4 mgd, 22.4 cfs) contingent upon the diversion being operated in accordance with the discharge limitations required by PADEP in NPDES Permit No. PA0123293. Staff also recommend that the point of compliance remain at the Landingville gage. Furthermore, while DRBC Staff agree that the statistical relationship between TDS and specific conductivity can be improved with additional data, the relationship as calculated in the *June 29, 2018* report; $TDS (mg/l) = 0.70 * conductivity (umhos/cm) - 21.1$, is adequate for use in determining approximate TDS concentrations at Landingville until the relationship can be better defined. This conservative approach is expected to reduce TDS loading to the Schuylkill River as a result of releases requested by Exelon from the WMP during periods of low flow as measured at the Landingville Gage.

6.2 Tamaqua Reservoirs: Commission staff recommend the continued approval of the use of Still Creek Reservoir as an *augmentation water* source of up to 1.116 bgm (36 mgd, 55.7 cfs). TB is required to operate the reservoir and associated systems in accordance with the limitations included in the Commonwealth of Pennsylvania Department of Forests and Waters, Water and Power Resources Board's Water Allocation No. WA54-626A and DRBC's Docket No. D-2010-028 CP-1.

Commission staff recommend the continued approval of the use of up to 8 mgd of water released from TB's Owl Creek Reservoirs in combination with TAWA's Still Creek

Reservoir not to exceed a total of 43.3 mgd in accordance with DRBC Docket No. D-2010-028 CP-1.

6.3 Travel Time: As part of Docket No. D-1969-210 CP-13, Commission staff evaluated the estimated travel time from the confluence of Norwegian Creek and the Schuylkill River to the Limerick Generating Station using *USGS Water Resources Investigation Report 01-4214: Prediction of Velocities for a Range of Streamflow Conditions in Pennsylvania*. The result was an estimated travel time of approximately 2.5 days. This travel time is in accordance with DECISION Conditions C.40. (Still Creek and Owl Creek) and C.49. (Wadesville) of this docket.

7. Monitoring.

Commission staff recommend the following monitoring requirements continue:

7.1 Upper Schuylkill River near Norwegian Creek: The docket holder shall continue to perform biological (macroinvertebrates, fish) and water quality sampling at Biological Stations 106 (Schuylkill River above the confluence of Norwegian Creek) and 109 (Schuylkill River below the confluence of Norwegian Creek). Water quality sampling will occur during releases from WMP at a minimum frequency of one sample per month; parameters for the water quality sampling will include TDS, alkalinity, total recoverable iron, dissolved iron, conductivity, pH, dissolved oxygen, and water temperature. Water quality sampling shall be reported annually. Fishery surveys will be conducted, when conditions permit, once per docket cycle (approximately 5 years) during summer low-flow periods as defined in the O&M Plan, using methods consistent with the prior sampling at these stations. Benthic macroinvertebrates will be sampled, when conditions permit, once per docket cycle (approximately 5 years) during summer low-flow periods as defined in the O&M Plan; methods for benthic macroinvertebrates will now follow the PADEP semi-quantitative method for wadeable streams (ICE methods; Instream Comprehensive Evaluation) in both the field and the laboratory. During both the fishery and macroinvertebrate surveys, *in situ* water chemistry (temperature, conductivity, pH, and dissolved oxygen) will be monitored and reported.

7.2 East Norwegian Creek: Water quality sampling of East Norwegian Creek upstream of the confluence with West Norwegian Creek shall continue to be conducted concurrently with the upper Schuylkill River sampling at Stations 106 and 109 for the same parameters (TDS, alkalinity, total recoverable iron, dissolved iron, conductivity, pH, dissolved oxygen, and water temperature) and at the same frequency (during releases from the WMP at a minimum frequency of one sample per month).

7.3 WMP Pumphouse Discharge Channel Leading to East Norwegian Creek: The docket holder shall continue to report on the maintenance inspection for erosion of the channel leading to East Norwegian Creek once per docket cycle (approximately 5 years). See DECISION Condition C.45.

7.4 East Branch Perkiomen Creek: The docket holder shall continue to perform biological (macroinvertebrates, fish) and water quality sampling at multiple stations on the EBPC. Fishery surveys will be conducted, when conditions permit, once per docket cycle (approximately

5 years) in mid- to late fall at two stations sampled during previous surveys (EEF 36235 above the Dublin USGS gage, and EEF 30700 below Callowhill Road). Fish survey methods will be consistent with the prior sampling surveys. Benthic macroinvertebrates will be sampled, when conditions permit, once per docket cycle (approximately 5 years) during summer low-flow periods at the two stations sampled during previous surveys (E36725 at Elephant Road, and E29910 at Callowhill Road). Methods for benthic macroinvertebrates will follow the PADEP semi-quantitative methods for wadeable streams (ICE methods; Instream Comprehensive Evaluation) in both the field and the laboratory. Water quality sampling will include *in situ* water chemistry (temperature, conductivity, pH, and dissolved oxygen) during both the fishery and macroinvertebrate surveys.

7.5 WMP Pumphouse Discharge Location: During the normal augmentation season of each year (typically July to October), the docket holder shall continue to monitor for TDS and conductivity monthly. Monthly NPDES sampling (for TSS, total Mn, total Fe, and pH) is performed by RAC. The docket holder is required to obtain the results of the monitoring and submit annually to the DRBC. In addition, daily withdrawals of WMP water released for the docket holder shall be monitored and reported in accordance with the O&M Plan.

7.6 Still Creek Reservoir Discharge: Daily releases of water from Still Creek Reservoir shall continue to be monitored and the docket holder will be responsible to report in accordance with the O&M Plan.

7.7 Landingville USGS Gage: The docket holder has had installed and has had maintained a real-time monitor for specific conductivity at the USGS Landingville gage (No. 01468500). The Landingville gage is located on the Schuylkill River approximately 10.5 miles below the WMP source and approximately 47 miles upstream of the first public water supply intake (Pottstown Water Authority). The docket holder shall continue to provide the annual cost-share to the Commission to operate and maintain the conductivity meter at the USGS gage within 60 days of invoice (See DECISION Condition C.22.). The docket holder established a relationship between TDS and specific conductivity in the “*Wadesville Mine Pool Total Dissolved Solids Monitoring Report, June 29, 2018*” as follows:

$$\text{TDS (mg/l)} = 0.70 * \text{conductivity (umhos/cm)} - 21.1$$

Using this relationship between TDS and specific conductivity, the docket holder shall discontinue use of the WMP as an augmentation source within three days of when the 24-hour average specific conductivity as measured at the Landingville USGS Gage exceeds the equivalent of 500 mg/l of TDS (See DECISION Condition C.43.). The docket holder may continue to collect monthly paired samples of TDS and conductivity at the Landingville USGS gage to validate the continued use of the TDS/specific conductivity relationship or to modify it.

The docket holder may also continue to conduct in-stream sampling of the Schuylkill River at the Landingville USGS gage to define background TDS concentrations and to refine the statistical relationship between TDS and conductivity. The docket holder may initiate sampling of the Schuylkill River at the Landingville USGS gage when 24-hour average flow at

that location is at or below 110 cfs. The docket holder will ensure that conditions during sampling for TDS and conductivity span the range of lower flows, with a particular emphasis on adequate sampling at flows when TDS is expected to approach or exceed 500 mg/l. The docket holder may submit the results of the in-stream sampling for TDS and conductivity in their annual report and may work with DRBC to revise the statistical relationship between these parameters as necessary. This analysis will include a determination of the conductivity at the Landingville USGS gage corresponding to a significant risk that TDS will exceed 500 mg/l. During the term of this docket, the docket holder may submit to the Executive Director a written request for an alternative relationship. Until such time as the Executive Director provides written approval of an alternate relationship, the docket holder will continue to comply with the requirements contained herein.

7.8 General Monitoring Data Conditions: The required monitoring data will be reported to the DRBC as detailed in the O&M Plan. Macroinvertebrate data will be analyzed using the appropriate Index of Biotic Integrity (IBI) established by PADEP.

7.9 Schuylkill River at LGS Intake and a Downstream Location: The docket holder shall continuously monitor (once every hour) temperature and conductivity at its intake (or suitable replacement) and also at the PAWC Royersford intake, located downstream of the LGS discharge, or a suitable replacement. (See DECISION Condition C.24.).

8. Restoration and Monitoring Fund.

The docket holder will continue to make contributions to the Restoration and Monitoring Fund (RMF) with an annual payment by March 31st of the following year. The amount will continue to be determined by multiplying the annual LGS consumptive use of water, as reported to DRBC, by a rate of \$0.015 per thousand gallons. The details and methodology of the docket holder's continued contributions to the RMF can be found in the O&M Plan.

9. Schuylkill River Pass-By Flow.

The estimated Q_{7-10} for the Schuylkill River at the LGS withdrawal location (as calculated at the Pottstown USGS gaging station (01472000)) is 313 cfs (202.3 mgd). The LGS's water withdrawal from the Schuylkill River shall not cause the natural streamflow of the Schuylkill River to be less than the estimated Q_{7-10} at the point where Outfall 001 discharges. Whenever the natural streamflow in the Schuylkill River immediately downstream of Outfall 001 is less than 313 cfs (202.3 mgd), the LGS withdrawal from the Schuylkill River shall be reduced accordingly to maintain a Schuylkill River flow of 313 cfs (202.3 mgd) (See DECISION Condition C.31.). This restriction does not preclude LGS from using available *augmentation* water or the Schuylkill River for non-consumptive use. If the docket holder exhausts its Schuylkill River *augmentation water* supplies, the docket holder must obtain its consumptive use supply from Perkiomen Creek in accordance with the provision in this docket.

The nearest surface water intake of record for public water supply downstream of LGS's cooling water discharge is Pennsylvania American Water Company's Royersford system, approximately 2.2 miles downstream.

The limits in the NPDES Permits are in compliance with Commission effluent quality requirements, where applicable.

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

Effective on the approval date for Docket No. D-1969-210 CP-15 below, the project described in Docket No. D-1969-210 CP-14 is removed from the Comprehensive Plan to the extent that it is not included in Docket No. D-1969-210 CP-15; and Docket No. D-1969-210 CP-14 is terminated and replaced by Docket No. D-1969-210 CP-15; and the project and the appurtenant facilities described in Section A “Location and Physical Features” shall be continued in the Comprehensive Plan.

The project and appurtenant facilities as described in the Section A “Location and Physical Features” of this docket are approved pursuant to Section 3.8 of the *Compact*, subject to the following conditions:

STANDARD CONDITIONS

- 1.** The facility and operational records shall be available at all times for inspection by the DRBC.
- 2.** The facility shall be operated at all times to comply with the requirements of the Commission’s *WQR*, *Water Code*, and Flood Plain Regulations (*FPR*).
- 3.** Except as otherwise authorized by this docket, if the docket holder seeks relief from any limitation based upon a DRBC water quality standard or minimum treatment requirement, the docket holder shall apply for approval from the Executive Director or for a docket revision in accordance with Section 3.8 of the *Compact* and the *Rules of Practice and Procedure*.
- 4.** 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.
- 5.** The docket holder is permitted to treat and discharge the categories of wastewaters defined in the “Area Served” section of this docket.
- 6.** The docket holder is permitted to provide the water approved in this docket to the areas included in Section A.5. Area Served of this docket. Any expansion beyond those included in Section A.5. Area Served is subject to DRBC review and approval in accordance with Section 3.8 of the *Compact*.

7. The docket holder shall pay for surface water use in accordance with *Administrative Manual – Part III Basin Regulations – Water Supply Charges*.
8. The docket holder shall discharge wastewater in such a manner as to avoid injury or damage to fish or wildlife and shall avoid any injury to public or private property.
9. The issuance of this docket approval shall not create any private or proprietary rights in the waters of the Basin, and the Commission reserves the right to amend, suspend or rescind the docket for cause, in order to ensure proper control, use and management of the water resources of the Basin.
10. The docket holder is responsible for timely submittal to the DRBC of a docket renewal application on the appropriate application form including the appropriate docket application filing fee (see 18 CFR 401.43) at least 6 months in advance of the docket expiration date set forth below. The docket holder will be subject to late filed renewal surcharges 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, 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.
11. The docket holder shall be subject to applicable DRBC regulatory program fees, in accordance with duly adopted DRBC resolutions and/or regulations (see 18 CFR 401.43).
12. This approval is transferable by request to the DRBC Executive Director provided that the project purpose and area served approved by the Commission in this docket will not be materially altered because of the change in project ownership. The request shall be submitted on the appropriate form and be accompanied by the appropriate fee (see 18 CFR 401.43).
13. The docket holder shall request a name change of the entity to which this approval is issued if the name of the entity to which this approval is issued changes its name. The request for name change shall be submitted on the appropriate form and be accompanied by the appropriate fee (see 18 CFR 401.43)
14. 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.
15. 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.
16. If the operation of this project significantly affects or interferes with any domestic or other existing wells or surface water supplies, or if the docket holder receives a complaint by any user

of wells or surface water supplies within the zone of influence of the withdrawal, the docket holder shall immediately notify the Executive Director of any complaints by users of wells or surface water supplies within the zone of influence of the withdrawal, and unless excused by the Executive Director, shall investigate such complaints. The docket holder should direct phone call notifications of potential well or surface water interference or complaints of interference to the DRBC Project Review Section at 609-883-9500, extension 216. Oral notification must always be followed up in writing directed to the Executive Director. In addition, the docket holder shall provide written notification to all potentially impacted users of wells or surface water supplies of the docket holder's responsibilities under this condition. Any well or surface water supply which is substantially adversely affected or rendered dry or otherwise unusable as a result of the docket holder's project withdrawal, shall be repaired, replaced or otherwise mitigated at the expense of the docket holder. A report of investigation and/or mitigation plan prepared by a hydrologist shall be submitted to the Executive Director as soon as practicable. The Executive Director shall make the final determination regarding the validity of such complaints, the scope or sufficiency of such investigations, and the extent of appropriate mitigation measures, if required.

17. For the duration of any drought emergency declared by either 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, PADEP, or the Commonwealth Drought Coordinator to the extent that they may be applicable, and to any other emergency resolutions or orders adopted hereafter by the Commission.

MONITORING CONDITIONS

18. The docket holder shall comply with the requirements contained in **TABLE 4: DRBC Effluent Parameters Included in NPDES Permit** in Section A.4.1. of this docket. The docket holder shall submit the required monitoring results electronically to the DRBC Project Review Section via email aemr@drbc.state.nj.us on the **Annual Effluent Monitoring Report Form** located at this web address: <http://www.state.nj.us/drbc/programs/project/pr/info.html>. The monitoring results shall be submitted annually, absent any observed limit violations, by January 31. If a DRBC effluent limit is violated, the docket holder shall submit the result(s) to the DRBC within 30 days of the violation(s) and provide a written explanation that states the action(s) the docket holder has taken to correct the violation(s) and protect against any future violations.

19. The docket holder shall monitor for TDS at Outfall 001 and from the Schuylkill River/LGS Intake as specified in the O&M Plan. The docket holder shall also continue to monitor Outfall 001 discharge flow and in-stream Schuylkill flow and TDS concentration data twice per month and calculate the resultant TDS percent of background in the Schuylkill River downstream of the discharge. The docket holder shall report this data and the results annually to the DRBC.

20. The docket holder may request of the Executive Director in writing the substitution of specific conductance for TDS. The request should include information that supports the effluent specific correlation between TDS and specific conductance. Upon review, the Executive Director may modify the docket to allow the substitution of specific conductance for TDS monitoring.

21. This docket continues approval of a heat dissipation area (HDA) for the LGS discharge consisting of one-half the stream width (150 feet) and 3,500 feet downstream from Outfall 001.

MONITORING CONDITIONS - OTHER

22. The docket holder shall continue to provide the annual cost-share to the Commission to operate and maintain the specific conductivity meter at the USGS Landingville Gage (No. 01468500) as was required by Docket No. D-1969-210 CP-14.

23. The docket holder shall continue to monitor TDS and its constituents in the Schuylkill River at a point above the confluence of Norwegian Creek, and the WMP water directed to be released by the docket holder, in accordance with the approved monitoring program. The monitoring program will continue to be conducted during the period when water from the WMP is being utilized by the docket holder.

24. The docket holder shall provide continuous (every hour) but not real time measurement data for temperature and conductivity at their Schuylkill River intake (or suitable replacement) and at a downstream location (such as the PAWC Royersford intake, or suitable replacement) The results shall be submitted annually to the Commission.

25. The docket holder shall continue to provide the local sponsor costs for the following USGS gages to the Commission for reimbursement to the USGS:

01472620: EBPC near Dublin, PA (Bucks Road)

01468500: Schuylkill River at Landingville, PA (conductivity probe costs only)

01472000: Schuylkill River at Pottstown, PA.

The docket holder shall submit such payment as prepared by the USGS to the Commission on an annual basis.

OPERATING CONDITIONS – WITHDRAWALS: SCHUYLKILL RIVER

26. Surface water withdrawals from the Schuylkill River shall not exceed 1.7422 bgm or 58.2 mgd (44 mgd consumptive plus 14.2 non-consumptive) to supply the consumptive and non-consumptive needs of the LGS; except that on days when the ambient air temperature is 87°F or greater, the consumptive use shall not exceed 47.3 mgd, with no increase in the maximum monthly (1.7422 bgm) or daily (58.2 mgd) total surface water withdrawals from the Schuylkill River and no increase in daily non-consumptive use (14.2 mgd).

27. With **one unit** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 530 cfs**, the **Schuylkill River** withdrawal for consumptive use is restricted to 24 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87°F or greater, the consumptive use is restricted to 25.5 mgd. As set forth in DECISION Condition C.26., total surface water withdrawals from the Schuylkill River may not

exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Consumptive use above 24 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs and/or water diverted from the Delaware River via the Perkiomen Creek when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gage is less than or equal to 532 cfs. Such releases must be made on a 1:1 gpd basis over the next 24-hour period beginning on the day after a consumptive use in excess of 24 mgd.

28. With **two units** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 560 cfs**, the **Schuylkill River** withdrawal for consumptive use is restricted to 44 mgd and 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87°F or greater, the consumptive use is restricted to 47.3 mgd. The total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Consumptive use above 44 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs and/or water diverted from the Delaware River via the Perkiomen Creek when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gage is less than or equal to 564 cfs. Such releases must be made on a 1:1 gpd basis over the next 24-hour period beginning on the day after a consumptive use in excess of 44 mgd.

29. With **one unit** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 530 cfs**, all consumptive use is required to be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such releases must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

30. With **two units** in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 560 cfs**, all consumptive use is required to be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such releases must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

31. LGS's Schuylkill River intake withdrawal must not cause the flow in the Schuylkill River to be less than 313 cfs (202.3 mgd) at the point where Outfall 001 discharges. Whenever the natural streamflow in the Schuylkill River immediately downstream of Outfall 001 is less than 313 cfs (202.3 mgd), the Schuylkill River consumptive withdrawal for LGS shall be reduced accordingly to maintain a Schuylkill River flow of 313 cfs (202.3 mgd).

OPERATING CONDITIONS – GROUNDWATER WITHDRAWALS: LGS

32. During any month, the withdrawals from the following wells shall not exceed (except during fire emergencies or other plant emergencies):

WELL NO.	INSTANTANEOUS ALLOCATION (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
Well 1 – Alley	75	3.2
Well 3 – Batch Plant	65	2.9

OPERATING CONDITIONS – WITHDRAWALS: PERKIOMEN CREEK

33. The docket holder may withdraw up to 24 mgd of water from the Perkiomen Creek for consumptive cooling water needs when the natural 24-hour average creek flow is at least 180 cfs /116 mgd (with one unit in operation) or up to 42 mgd when the natural 24-hour average creek flow is at least 210 cfs/136 mgd (with two units in operation) as measured at the USGS Graterford gaging station and the use of the Schuylkill River is limited or restricted.

The docket holder is also approved to use Perkiomen Creek water to supply the small auxiliary pump, which operates as needed to: (1) maintain system operability by keeping the discharge pipelines and storage tank sufficiently full to prevent water hammer when the intake pumps are started; (2) maintain level in the storage tank when the system is not in use; and (3) provide freeze protection by agitating the storage tank water during frigid weather conditions. The approval to withdraw water from the Perkiomen Creek (via natural flow or intrabasin transfer) for use at LGS also applies when the natural flow criteria for the Schuylkill River are met provided that (1) an abnormal condition exists that prevents withdrawal from the Schuylkill River (e.g., the Schuylkill Pumphouse is out of service, an ice jam on the river prevents withdrawal, or an upstream spill causes severe intake water quality impairment which could result in equipment damage); (2) a plant operational/maintenance condition exists that that could be mitigated by the selective use of Perkiomen Creek water (e.g., using Perkiomen Creek water having lower total dissolved solids than the Schuylkill River, when a condenser chemistry issue is detected until such issue can be resolved); (3) Perkiomen Creek water is required for confidence or maintenance testing activity; or (4) LGS has already switched over to using the Perkiomen Creek intake when use of the Schuylkill River is restricted, but the Schuylkill River then cycles between meeting and not meeting its flow criteria, which would otherwise require LGS to repeatedly start up and shut down both intake pump houses over a relatively short period of time. In order to withdraw from the Perkiomen Creek when the natural flow criteria for the Schuylkill River are met, Exelon shall notify the DRBC in accordance with the approved O&M Plan within 24 hours (or the next business day) after such use starts, which shall include an estimate of the duration of such use. Operation of the small auxiliary pump is exempt from this notification requirement. Exelon shall also provide notification to the DRBC in accordance with the approved O&M Plan when normal operations are back in effect. The DRBC Executive Director reserves the right to modify water supply operations under such conditions.

34. The docket holder shall maintain a minimum flow of at least 10 cfs in the EBPC at all times in accordance with the O&M Plan (Attachment No. 2). After consultation with the PFBC and PADEP, the Executive Director may approve requests by the docket holder to increase flows in the EBPC above 10 cfs from the Bradshaw Reservoir to support short-term recreational events.

Such approval will be granted only after the review and approval by the Executive Director of a written request by the docket holder. The docket holder shall submit its written request (along with a flow management plan) at least 60 days in advance of the proposed release date. Copies of such plans will be sent by the docket holder to the PFBC and PADEP.

35. Condition II. C. of Docket No. D-79-52 CP (approved February 18, 1981) required PECO (Exelon Generation's predecessor) to maintain 27 cfs in the EBPC while LGS was in operation and 10 cfs at all other times. Condition II. P. of Docket No. D-79-52 CP reserves the right of the Commission to open said docket at any time, and to reconsider its decision and any and all conditions imposed hereunder in light of further information developed by, or decisions rendered in, pending or future proceedings conducted by other State and Federal agencies concerning the development and operation of LGS and related facilities. Condition II.P. also allowed the Commission to, at any time, modify existing conditions, or impose additional conditions, upon the construction and operation of this facility to reflect new or changed information or to conform to requirements imposed on the project by other agencies. By approval of this docket, the Commission is modifying Condition II. C. of Docket No. D-79-52 to read as follows:

“C. Exelon Generation shall maintain a minimum of 10 cfs (6.5 mgd) in the East Branch Perkiomen Creek at the Bucks Road stream gage at all times except for times when a condition arises (e.g., loss of pumping capability at Bradshaw Reservoir) that prevents minimum flow maintenance as required. Such conditions and provisions for DRBC notification shall be outlined in the DRBC-approved O&M Plan applicable to LGS's Water Supply Program.”

36. For the duration of a critical hydrologic condition as announced by the Commission, on a daily basis the docket holder shall cause to be released from a replacement water source approved by the Commission an amount of water equal to the amount consumptively used by the docketed facility, multiplied by the applicable relative effect factor, if assigned. For the duration of such critical hydrologic condition, the docket holder shall operate its facility only at a level commensurate with the amount of replacement water it is capable of causing to be released. However, such releases from a replacement water source approved by the Commission are not required for any portion released for LGS from the WMP, Still Creek Reservoir, and Owl Creek Reservoirs.

37. Water diverted via the Point Pleasant Pumping Station is restricted to the use, conditions and service area set forth in Docket No. D-65-76 CP (8) and cannot be used for any other purposes unless approved by the Commission.

OPERATING CONDITIONS – WITHDRAWALS: STILL CREEK RESERVOIR

38. The docket holder may use up to 36 mgd from Still Creek Reservoir and up to 8 mgd from the Owl Creek Reservoirs, with a total not to exceed 43.3 mgd (1,342 mgm) of water from the Tamaqua Reservoirs as an *augmentation* source.

39. To assure reliability and to allow for operational flexibility, Schuylkill River flows may continue to be *augmented* by releases from the Tamaqua Reservoirs, increased by the quantity of water lost in route to LGS through evaporation (3%), for LGS consumptive cooling water needs in accordance with the approved O&M Plan. No release from the Tamaqua Reservoirs is allowed for LGS consumptive cooling water use whenever the water level in the reservoir pools are below the Operating Rule Curve shown in the O&M Plan or an updated Operating Rule Curve approved by the DRBC Executive Director.

40. During the term of this docket, in any period beginning three days after initiation of releases from the Tamaqua Reservoirs and ending two days after cessation of releases from the reservoirs, the docket holder is authorized to withdraw Schuylkill River water at its LGS intake in a quantity equal to 97% of the water released for Schuylkill River augmentation from the Tamaqua Reservoirs.

41. In the event that conditions exist that require the water diversion system to be in service to supply water for LGS's consumptive use, but the system is unavailable or of diminished capacity, an equal volume of water, up to 43.3 mgd (peak daily withdrawal) and 1.342 bgm, may be released from the Tamaqua Reservoirs, subject to the Operating Rule Curves (if applicable) and allowing an additional three percent for in-transit evaporative losses, and withdrawn for consumptive use at LGS. Notification of such releases to the Commission should occur as soon as possible but no later than 48 hours after the event occurs.

OPERATING CONDITIONS – WITHDRAWALS: WADESVILLE

42. The docket holder may use the WMP as an *augmentation* source to provide up to 446.4 mg/month (10,000 gpm, 14.4 mgd, 22.4 cfs) of water, as appropriate to augment the Schuylkill River to meet its LGS consumptive use demands as identified above at times when the 24-hour average flow in the Schuylkill River as measured at the gaging station at Pottstown is less than or equal to 530 cfs with one unit in operation and 560 cfs with two units in operation.

43. Using the relationship established between TDS and specific conductivity in the "*Wadesville Mine Pool Total Dissolved Solids Monitoring Report, June 29, 2018*", the docket holder shall discontinue use of the WMP as an augmentation source within three days of when the 24-hour average specific conductivity as measured at the Landingville USGS Gage exceeds the equivalent of 500 mg/l of TDS.

44. The docket holder may resume the use of WMP water when the specific conductivity as measured at the Landingville USGS gaging station (USGS Gage No. 01468500) is less than the equivalent of 500 mg/l of TDS for three consecutive days and the docket holder calculates that the quantity of the WMP water being utilized will not cause TDS or equivalent specific conductivity measurement at the Landingville USGS gaging station to exceed 500 mg/l of TDS.

45. The docket holder shall perform a maintenance inspection for erosion of the WMP pumphouse discharge channel leading to East Norwegian Creek once per docket cycle. The channel from the discharge point to approximately 50 feet downstream of the New Wadesville

Road shall be inspected and repaired if any erosion problems have occurred that inhibit the discharge or are as a result of the discharge.

46. The docket holder shall maintain detailed, accurate records of WMP water discharges when water is released on LGS's behalf. The docket holder shall notify DRBC of initiation and cessation of WMP water discharges each augmentation season in accordance with the approved O&M Plan (Attachment No. 2).

47. The Executive Director may modify or suspend WMP water discharges and/or reservoir releases if evidence indicates that either is causing violations of water quality standards and/or causing unacceptable impacts to the aquatic biota of the receiving waters.

48. There shall be no increase in the installed depth of the WMP pump casings greater than 600 feet on behalf of the docket holder for consumptive use *augmentation* without prior notification to DRBC and approval by the Executive Director. The docket holder shall not draw the mine pool down below 600 feet for consumptive use make-up without approval from the Executive Director. The docket holder may request and the Executive Director may approve changes to the O&M Plan.

49. During the term of this docket, in any period beginning three days after initiation of pumping from the WMP and ending two days after cessation of pumping from the WMP, the docket holder is authorized to withdraw Schuylkill River water at its LGS intake in an amount equal to 97% of its pumpage rate from the mine pool.

50. During an emergency, if normal constraints on withdrawals cannot be met, the docket holder may use surface water from the sources, designated herein as necessary, to address the emergency until it has been stabilized, in accordance with the O&M Plan and/or emergency shutdown procedures established by the NRC. Notification of and consultation with the Executive Director should occur as soon as possible but no later than 24 hours after the emergency is known by the docket holder.

OTHER CONDITIONS

51. The docket holder shall comply with O&M Plan (Attachment No. 2) approved by the Executive Director. The O&M Plan specifies monitoring parties and locations, monitoring parameters and frequencies, and reporting requirements for compliance by the docket holder and other designated parties during the term of this docket. The O&M Plan includes the following operating and monitoring requirements: 1) for releases from the WMP including East Norwegian Creek, Norwegian Creek and Schuylkill River; 2) for releases from Tamaqua Reservoirs including Still Creek and Owl Creek; 3) for the diversions from the Delaware River to the EBPC 4) for the calculation and reporting of the docket holder's contributions to the restoration and monitoring fund 5) notification, *augmentation/makeup* accounting, and contingency procedures and 6) roles and responsibilities for all involved parties.

52. The monitoring information required to be submitted to the DRBC annually shall be compiled and submitted along with the annual effluent monitoring report forms in an annual

assessment report by March 1st of each year. Reports due to be submitted once per docket cycle shall be submitted prior to or at the time of the docket renewal application submittal. If requested by the DRBC staff, the docket holder shall meet annually with DRBC staff to discuss the results of the monitoring required by this docket.

53. The Executive Director may modify the O&M Plan (Attachment No. 2) if the results indicate a change is required or appropriate. The docket holder may also request modifications to the O&M Plan. The docket holder has the right to request a hearing if it disagrees with a decision of the Executive Director with respect to the O&M Plan.

54. The Executive Director may also direct the docket holder to resume makeup water operations *via* the Delaware River diversion if the conditions warrant it. The docket holder will comply with the Executive Director written directive within 48 hours of its receipt. Under Article 6 of the Rules of Practice and Procedure, the docket holder has the right to request a hearing if it disagrees with a decision of the Executive Director but must comply with the directive during the period of the appeal process.

55. The docket holder shall record daily releases from the WMP, Still Creek Reservoir, and Owl Creek Reservoirs (as totalized and reported by RAC and Tamaqua) and Bradshaw Reservoir (as measured and recorded by the docket holder) and include the daily data for such releases in the annual report.

BY THE COMMISSION

DATE APPROVED: June 12, 2019

EXPIRATION DATE: June 12, 2024



EXELON GENERATION COMPANY, LLC

**Limerick Generating Station (LGS)
Water Supply Program
Operation and Monitoring Plan**

Prepared in accordance with:

Delaware River Basin Commission (DRBC) Docket No. D-1969-210 CP-15

Effective June 2019

This Operation and Monitoring Plan, upon DRBC's acceptance and docket approval, replaces the LGS Water Supply Program Operation and Monitoring Plan dated March 2015, in its entirety.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS.....III

1 INTRODUCTION 1

1.1 LGS WATER SUPPLY PROGRAM OPERATION AND MONITORING PLAN .. 1

1.2 LGS WATER SUPPLY PROGRAM DEFINITIONS AND DESCRIPTION 1

 1.2.1 *Definitions of Key Terms*..... 1

 1.2.2 *Water Supply Program Description*..... 2

1.3 ROLES AND RESPONSIBILITIES OF INVOLVED PARTIES 4

 1.3.1 *Forest Park Water Authority (FPWA)* 4

 1.3.2 *Reading Anthracite Company (RAC)*..... 4

 1.3.3 *Tamaqua Area Water Authority (TAWA)/Tamaqua Borough*..... 4

 1.3.4 *Exelon Generation* 4

 1.3.5 *United States Geological Survey (USGS)* 5

 1.3.6 *Merrill Creek Owner's Group (MCOG)* 5

 1.3.7 *Delaware River Basin Commission* 5

1.4 OPERATION OF MAJOR SYSTEM COMPONENTS 5

 1.4.1 *Schuylkill Pumphouse* 5

 1.4.2 *Perkiomen Pumphouse*..... 6

 1.4.3 *Still Creek/Owl Creek Reservoirs* 6

 1.4.4 *Wadesville Mine Pool* 6

 1.4.5 *East Branch Perkiomen Creek*..... 6

 1.4.6 *Bedminster Water Processing Facility* 7

 1.4.7 *Point Pleasant Pumping Station* 7

 1.4.8 *Bradshaw Reservoir and Pumping Station* 7

2 OPERATION AND MONITORING PLAN..... 7

2.1 OVERVIEW 7

2.2 OPERATING RULES 8

 2.2.1 *General Rule for Use of Sources*..... 8

 2.2.2 *Rules for Non-Consumptive Use* 8

 2.2.3 *Rules for Consumptive Use* 8

 2.2.4 *Rules for Minimum or Maximum Schuylkill River and EBPC Streamflow*..... 12

 2.2.5 *Rules for Accounting for the Flow* 13

2.3 REPORTING AND MONITORING REQUIREMENTS..... 15

 2.3.1 *Reports to DRBC*..... 15

	2.3.2 <i>Monitoring</i>	17
2.4	CONTINGENCY PLANS.....	18
	2.4.1 <i>Monitoring Systems</i>	18
2.5	FLOW AUGMENTATION FOR RECREATIONAL EVENTS.....	19
3	EXELON GENERATION RESTORATION AND MONITORING FUND CALCULATIONS	20
3.1	INTRODUCTION	20
3.2	RMF CONTRIBUTIONS.....	20
4	APPENDICES	21
4.1	SAMPLE WATER ACCOUNTING CALCULATIONS.....	21
4.2	MONITORING REQUIREMENTS	23
5	ATTACHMENTS.....	27
5.1	ATTACHMENT 1 - LGS SYSTEM MAP (WATER SUPPLY PROGRAM)	27
5.2	ATTACHMENT 2 – STILL CREEK RESERVOIR OPERATING RULE CURVE.....	28

LIST OF ABBREVIATIONS AND ACRONYMS

bgm	billion gallons per month
BWPF	Bedminster Water Processing Facility
cfs	cubic feet per second
DRBC or Commission	Delaware River Basin Commission
EBPC	East Branch Perkiomen Creek
EBTM	East Branch Transmission Main
Exelon Generation	Exelon Generation Company, LLC
FPWA	Forest Park Water Authority
gpm	gallons per minute
LGS	Limerick Generating Station
LSR	Little Schuylkill River
MCOG	Merrill Creek Owner's Group
mg	million gallons
mgd	million gallons per day
mg/l	milligrams per liter
mgm	million gallons per month
msl	above mean sea level
NPDES	National Pollutant Discharge Elimination System
O&M Plan	Operation & Monitoring Plan
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish & Boat Commission
RAC	Reading Anthracite Company
RMF	Restoration and Monitoring Fund
TAWA	Tamaqua Area Water Authority
TDS	total dissolved solids
USGS	United States Geological Survey
WMP	Wadesville Mine Pool

1 INTRODUCTION

1.1 LGS WATER SUPPLY PROGRAM OPERATION AND MONITORING PLAN

This Limerick Generating Station (LGS) Water Supply Program Operation and Monitoring Plan (O&M Plan) provides the rules and requirements that will govern Exelon Generation Company, LLC (Exelon Generation) use of approved surface water sources to supply makeup water for use at LGS, as well as associated monitoring/reporting requirements.

These rules and requirements are intended to implement applicable Delaware River Basin Commission (DRBC or Commission) docket decisions meant to protect regional water resources while providing LGS with a reliable makeup water supply and the flexibility to optimize the use of the available sources to suit its operational needs. Exelon Generation may request DRBC Executive Director approval of modifications to this O&M Plan.

The DRBC dockets listed below contain the decisions applicable to the LGS Water Supply Program that are implemented in this O&M Plan:

- D-1969-210 CP-13 (Limerick Generating Station and Surface Water Augmentation)
- D-65-76 CP (8) (Neshaminy Watershed Plan – Water Supply)
- Docket No. D-79-52 CP (Bradshaw Reservoir, Pumping Station, and Transmission Main)
- Docket D-1977-110 CP-19 (Merrill Creek Reservoir Project)
- Docket D-2010-028 CP-1 (Tamaqua Reservoirs)

1.2 LGS WATER SUPPLY PROGRAM DEFINITIONS AND DESCRIPTION

1.2.1 Definitions of Key Terms

Augmentation water: Water supplied by Exelon Generation from DRBC-approved sources to the Schuylkill River and Perkiomen Creek during periods of low natural stream flow to compensate for LGS's surface water withdrawals for consumptive use. The approved sources of augmentation water for the Schuylkill River are the Wadesville Mine Pool (WMP) and Still Creek Reservoir in combination with Owl Creek Reservoirs. The approved source of augmentation water for Perkiomen Creek is the Delaware River (via the water diversion system). Augmentation water also may be used for LGS non-consumptive use under limited circumstances set forth in Docket D-1969-210 CP-15 and this O&M Plan.

Makeup water: Surface water pumped from LGS's Schuylkill River intake and/or Perkiomen Creek intake for consumptive and non-consumptive use at LGS.

Natural flow: The naturally-occurring flow in the source waterbody not augmented by releases from Commission sponsored reservoir storage projects (Blue Marsh).

Travel time: The estimated time for water to travel via stream flow from the release location to the withdrawal location and then may be considered available for use. For this O&M Plan, Schuylkill River augmentation water is considered to be available for use at LGS three days after its release from the WMP and Still Creek/Owl Creek Reservoirs and for two days after stopping the releases at the end of the augmentation season. Travel time is not used during emergency and for consumptive use makeup water above 44 mgd during two-Unit operation or 24 mgd with one-Unit operation. The water travel time from Bradshaw Reservoir to the Perkiomen Creek intake is estimated to be 18 hours. To ease daily water accounting yet still account for water travel time, the quantity of water pumped from Bradshaw Reservoir yesterday will be considered the amount available for use at LGS today. This method is considered more conservative than applying an 18-hour travel time. Exelon Generation applies a 12-hour travel time for releases from Blue Marsh Reservoir after timely notification by DRBC of the release.

Unit operation: The restrictions on surface water withdrawals applicable to two-Unit operation will be followed whenever the total LGS reactor thermal output (as expressed in percent power) is greater than one Unit's reactor thermal output reading of 100 percent and/or the initiation of start-up procedures. The restrictions applicable to one-Unit operation will be followed whenever the total LGS reactor thermal output (as expressed in percent power) is equal to or less than one Unit's reactor thermal output reading of 100 percent and there has been no initiation of startup procedures.

Water diversion system: The system that diverts water from the Delaware River to the East Branch Perkiomen Creek (EBPC) for use at LGS or for maintaining a DRBC-prescribed minimum flow in the creek. The components of the system include the Delaware River intake screens and pipelines, the Point Pleasant Pumping Station, the Combined Transmission Main, the Bradshaw Reservoir, the Bradshaw Reservoir Pumping Station, the Bedminster Water Processing Facility (BWPF), and the East Branch Transmission Main (EBTM) ending at the outfall to the EBPC. System components from the Delaware River intake to Bradshaw Reservoir also are used for public water supplies, which are discharged by gravity from Bradshaw Reservoir into the North Branch Neshaminy Creek via the North Branch Transmission Main; this other use and the North Branch Transmission Main are excluded, however, from this definition.

1.2.2 Water Supply Program Description

Exelon Generation withdraws surface water from DRBC-approved sources within the Delaware River Basin to make up for non-consumptive and consumptive use at LGS. Non-consumptive use results from the return ("blowdown") of cooling and service/process water used at the facility to the Schuylkill River through Outfall 001. Cooling tower blowdown is needed in LGS's closed-cycle cooling system to maintain suitable circulating water chemistry. Consumptive use results primarily from cooling tower evaporative losses.

The primary source of LGS's makeup water is the Schuylkill River. Water from the Schuylkill River enters an intake (the "Schuylkill Pumphouse") located at the LGS plant site through bar racks and flows through traveling screens into a pump well. The auxiliary source of LGS's makeup water is Perkiomen Creek. Water from Perkiomen Creek enters a series of fixed screens located in the Perkiomen Creek and passes through pipelines into the Perkiomen Pumphouse. The Perkiomen Creek intake is located about eight miles east of the LGS plant site. The makeup water is pumped through a pipeline from each intake pumphouse to the LGS cooling tower area.

Normally, water for non-consumptive use at LGS is withdrawn from the Schuylkill River. Under limited circumstances, which are set forth in this O&M Plan, this water may be withdrawn from Perkiomen Creek.

Water for consumptive use at LGS is withdrawn from the Schuylkill River when its flow is greater than DRBC-prescribed amounts (typically from November to June of each year). For the other months (typically July to October), when the flows tend to be at or less than these amounts, the water is withdrawn from the Schuylkill River and/or the Perkiomen Creek, subject to flow augmentation requirements. In order to continue using the Schuylkill River consumptively during low flow periods, Exelon Generation must supply augmentation water to the Schuylkill River from the DRBC-approved augmentation sources upstream of LGS (i.e., from Still Creek Reservoir, Owl Creek Reservoirs, and/or the WMP) by an amount equivalent to the consumptive use (i.e., the LGS consumptive use amount plus a 3% allowance for water assumed lost in transit via in-stream evaporation from the release location to the withdrawal location). When Schuylkill River flows are low, consumptive use makeup water (and, under limited circumstances set forth later in this O&M Plan, non-consumptive use makeup water) may be withdrawn from Perkiomen Creek when its natural flow is at or greater than a DRBC-prescribed amount or, if not, when creek flow is augmented by water diverted from the Delaware River to the EBPC in an amount equivalent to the consumptive use (i.e., the consumptive use quantity plus a 3% allowance to account for possible in-stream (evaporative and leakage) losses during open channel transport). Because the amounts of available Schuylkill River augmentation water may not be sufficient to cover the entire LGS consumptive use, split source withdrawals (i.e., withdrawals from both intakes) are permitted, subject to the rules that apply to each individual source.

The availability of multiple water sources for LGS's withdrawals and use provides operational reliability and flexibility, particularly during low stream flow conditions; at the same time, the use of these sources are limited in a manner such that in-stream and downstream uses are protected.

Attachment 1 is a system map showing the locations and interrelationships of the water sources and major components included in the LGS Water Supply Program.

Water withdrawals from the Delaware River are made using an intake that consists of a series of fixed screens located in-stream and pipelines that convey water to the Point Pleasant Pumping Station located near the riverbank. The quantity of water that may be diverted to the EBPC for Exelon Generation's use is limited by DRBC to 46.2 mgd. The water is pumped through the Combined Transmission Main, as needed to maintain Bradshaw Reservoir water levels within a defined range. Water is pumped, when needed, from the Bradshaw Reservoir Pumping Station through the EBTM to the EBPC as augmentation water or to maintain a 10 cfs minimum creek flow. The water released to the EBPC flows downstream to Exelon Generation's Perkiomen Creek intake. The Forest Park Water Authority (FPWA) owns and operates the Delaware River intake, Point Pleasant Pumping Station, and the Combined Transmission Main as well as those components used to transfer water from Bradshaw Reservoir to the North Branch Neshaminy Creek, while Exelon Generation owns and operates Bradshaw Reservoir, the Bradshaw Reservoir Pumping Station, the BWPF, and the EBTM ending at the outfall to the EBPC.

Withdrawals and releases for LGS are subject to operating rules (see Section 2.2), which are designed to protect in-stream and downstream uses. The operating rules state, for each water

source, the maximum quantities (peak daily and monthly) that may be withdrawn for consumptive and non-consumptive use at LGS, and the stream flow thresholds for unaugmented and augmented withdrawals for one-Unit or two-Unit operation; the rules also state, for each augmentation source, the maximum quantities (peak daily and monthly) that may be released, allowances that must be applied to account for in-stream losses from the release location to the withdrawal location, and other conditions that allow or restrict releases of augmentation water.

During an emergency at LGS, unlimited use of Delaware River basin water may be made, as necessary, until the emergency has been stabilized.

1.3 ROLES AND RESPONSIBILITIES OF INVOLVED PARTIES

Because of the complexity of the system and the many involved parties, each party is identified, and its role in the supply of water for LGS is described.

1.3.1 Forest Park Water Authority (FPWA)

FPWA (or the current owner) is the owner and operator of the Point Pleasant Pumping Station (including the in-stream intake screens and pipelines) and Combined Transmission Main. FPWA has a contract with Exelon Generation to pump water from the Delaware River to the Bradshaw Reservoir via the pumping station and transmission main for use as makeup water at LGS. FPWA also supplies water for public use to the Bradshaw Reservoir for release to the North Branch Neshaminy Creek and subsequently to its water treatment plant in Chalfont. Exelon Generation allows this water to pass through the Bradshaw Reservoir to the North Branch Neshaminy Creek via the North Branch Transmission Main owned by FPWA.

1.3.2 Reading Anthracite Company (RAC)

RAC (or the current owner) is the owner of the property that includes the WMP. RAC is under contract with Exelon Generation to operate the mine pool pumping system when Exelon Generation requests pumping from the WMP for use as augmentation water. RAC also provides operation and maintenance services for the WMP pumping and conveyance system and performs discharge monitoring in accordance with its National Pollutant Discharge Elimination System (NPDES) permit.

1.3.3 Tamaqua Area Water Authority (TAWA)/Tamaqua Borough

TAWA (or the current entity) is the owner of Still Creek Reservoir. Tamaqua Borough (or the current entity) is the owner of the Owl Creek Reservoirs. Tamaqua Borough (TB) operates the Still Creek and Owl Creek Reservoirs (Tamaqua Reservoirs). DRBC Docket No. D-2010-028 CP-1 granted TAWA and TB approval to release water from the Tamaqua Reservoirs to be used as augmentation water by Exelon Generation at the LGS upon request of Exelon Generation.

1.3.4 Exelon Generation

Exelon Generation is the owner and operator of the Schuylkill Pumphouse, which supplies makeup water withdrawn from the Schuylkill River to LGS. Exelon Generation also owns and operates the Bradshaw Reservoir, the EBTM, the BWPF, the Perkiomen Creek intake (including the Perkiomen Pumphouse), and the Perkiomen Pumphouse-to-LGS pipeline. These components enable Exelon Generation to convey water stored in the Bradshaw Reservoir for use at LGS. The dividing point

between FPWA and Exelon Generation is where the Combined Transmission main enters Bradshaw Reservoir (except that FPWA also owns/operates the components associated with the public water supplies to the North Branch Neshaminy Creek). Exelon Generation is a customer of FPWA, TAWA, TB, and RAC, and has no direct control over operation of the Point Pleasant Pumping Station, Still Creek/Owl Creek Reservoirs, or the WMP. Exelon Generation makes annual contributions to the Restoration and Monitoring Fund (see Section 3) and selects a third party not-for-profit or non-profit organization (both herein referred to as NPO) to administer and manage the fund with DRBC Executive Director oversight.

1.3.5 United States Geological Survey (USGS)

The USGS is contracted by Exelon Generation through DRBC to operate river gaging stations on the Schuylkill River at Pottstown and on the EBPC at Bucks Road, near Dublin, PA, and to operate a conductivity monitor on the Schuylkill River at Landingville. Exelon Generation uses information from these gages and the monitor to support implementation of this O&M Plan.

1.3.6 Merrill Creek Owner's Group (MCOG)

The MCOG is a group of companies (including Exelon Generation) that have pooled their resources to construct, own, and operate the Merrill Creek Reservoir. The reservoir releases stored water directly or indirectly to the Delaware River to compensate for power station freshwater equivalent consumptive use during periods of drought and low Delaware River flow. Such releases compensate for LGS consumptive use of water withdrawn from the Schuylkill River intake (less the amount(s) released from the WMP and/or Tamaqua Reservoirs) and/or Perkiomen Creek intake.

1.3.7 Delaware River Basin Commission

The DRBC informs Exelon Generation when releases from Blue Marsh Reservoir start/stop and of the quantities that are being released. Exelon Generation applies a 12-hour travel time from when notified by DRBC for Blue Marsh releases when calculating Schuylkill River flows at the Pottstown Gaging Station (USGS Gage No. 01472000).

1.4 OPERATION OF MAJOR SYSTEM COMPONENTS

The following section describes each major component of the LGS water supply and intake system, including monitoring components.

1.4.1 Schuylkill Pumphouse

The Schuylkill Pumphouse serves as an intake to supply makeup water from the Schuylkill River to LGS. Makeup water pumps are operated to provide LGS with water for non-consumptive use and, when the prescribed river conditions for consumptive use withdrawals are met, for consumptive use. Any combination of pumps may be used to supply the total quantity needed. Control valves in the makeup water pipes are used to regulate flow of water to the cooling tower basins. Schuylkill River availability for LGS consumptive use is generally determined by the Schuylkill River flow rate data collected from the Pottstown Gaging Station (USGS Gage No. 01472000) and augmentation water source operations. 24-hour average flow data are used to determine the river's availability.

1.4.2 Perkiomen Pumphouse

The Perkiomen Pumphouse (along with in-stream submerged screens and pipelines connected to the pumphouse) serves as the auxiliary intake to supply makeup water from Perkiomen Creek to LGS. During periods when LGS is using Perkiomen Creek water, the discharge header pressure of the Perkiomen makeup water pumps is adjusted to maintain a relatively constant level in the Perkiomen makeup water storage tank (located at the LGS plant site). Water then flows by gravity from this tank through control valves to the cooling tower basins. These valves are remotely controlled from the LGS Main Control Room. Perkiomen Creek flow rate data is collected from the Graterford Gaging Station (USGS Gage No. 01473000). 24-hour average natural flow data are used to determine creek availability.

1.4.3 Tamaqua Reservoirs

TAWA's 2.7 billion-gallon Still Creek Reservoir supplies drinking water for Tamaqua Borough and surrounding communities. Additionally Still Creek Reservoir can be used to make releases of augmentation water on behalf of the LGS. Releases from the reservoir flow through Still Creek into the Little Schuylkill River (LSR). The LSR flows south and joins the Schuylkill River near Port Clinton, PA. LGS withdraws makeup water from the Schuylkill River approximately 54 miles downriver of Port Clinton. The Still Creek Reservoir is at full capacity when the water reaches its spillway elevation of 1,182 feet above mean sea level (msl). The Owl Creek Reservoirs have a 332 million-gallon combined capacity and are owned and operated by TB. When available, the reservoirs discharge through Owl Creek into the LSR approximately eight miles downstream from where Still Creek flows into the LSR.

1.4.4 Wadesville Mine Pool

A pumphouse at the Wadesville Mine shaft contains the equipment necessary for WMP dewatering for RAC's coal mining operations and, when requested by Exelon Generation, for pumping augmentation water on behalf of LGS. Capacity for two vertical pumps is provided in the shaft with the bottom of the casings at or below 600 feet below the surface. The pumps are manually controlled with a total pumping capacity of up to 10,000 gpm.

The discharge from the pumps flows through energy dissipation chambers and an open channel, and is released into an unnamed tributary of the East Norwegian Creek. The East and West Norwegian Creeks combine into Norwegian Creek, which runs to the northern end of Pottsville. An underground conduit conveys the water across Pottsville, emerging on the southern end of Pottsville, where it discharges into the Schuylkill River. LGS withdraws water from the Schuylkill River approximately 65 miles downriver of Pottsville.

1.4.5 East Branch Perkiomen Creek

The EBPC serves as a channel to transport the diverted Delaware River water from the outfall of the EBTM to Perkiomen Creek (main stem).

The Bucks Road Gaging Station (USGS Gage No. 01472620), located downstream of the EBTM outfall, monitors the flow for both minimum flow compliance as well as a maximum flow that restricts pumping from the Bradshaw Reservoir so as not to add more flow to the stream when it is at or close to flooding. Data from this station are collected, displayed, and alarmed in the LGS

Main Control Room via commercial telephone lines. As a backup to this system, Exelon Generation installed flood level instrumentation at the gage station to immediately alert the control room of flood conditions in the EBPC.

1.4.6 Bedminster Water Processing Facility

The BWPF, located along the EBTM, houses an ozone generator system, which supplies ozone into mixing chambers to disinfect the water prior to discharging into the EBPC from May 1 to September 30 each year, as needed to meet the conditions in the NPDES permit associated with the facility.

1.4.7 Point Pleasant Pumping Station

Pumping rates at the Point Pleasant Pumping Station are adjusted by FPWA based on water level (elevation) at Bradshaw Reservoir. The water level in Bradshaw Reservoir falls when releases are made to the North Branch Neshaminy Creek for public water supply needs, or when pumped to the EBPC for LGS makeup water requirements or minimum steam flow maintenance. A Forest Park operator operates pump(s) at the Point Pleasant Pumping Station, as necessary, to transfer water from the Delaware River to maintain Bradshaw Reservoir levels within a prescribed range.

1.4.8 Bradshaw Reservoir and Pumping Station

The Bradshaw Reservoir is designed to control the release and distribution of water diverted from the Delaware River into the Perkiomen and Neshaminy watersheds. Of the reservoir's total operating capacity of 23 million gallons (mg), approximately 14 mg is held in reserve for Exelon Generation's use if the Point Pleasant Pumping Station pumps are out of service.

LGS operators control pumping rates from the Bradshaw Reservoir to the EBPC. The Bradshaw Reservoir pumps have variable speed drives allowing the actual pumping rate to be closely matched with LGS water demands. The water from Bradshaw Reservoir that is distributed by FPWA to its Chalfont water treatment plant is released from Bradshaw Reservoir by gravity through a valve. The flow rate is measured using a venturi-type flow meter. The release rate set point for this valve is provided through a remote signal from the water treatment plant. Flow is automatically stopped if the water level in Bradshaw Reservoir drops below the normal range of operating levels. This is to conserve the 14 mg of reserve storage for Exelon Generation's use.

2 OPERATION AND MONITORING PLAN

The following sections provide an overview of the plan of operation of the LGS Water Supply Program, the specific operating rules, the monitoring and reporting requirements, the contingency plans, and the flow augmentation requirements for planned recreational events.

2.1 OVERVIEW

LGS is designed with the capability of pumping makeup water from either of two approved surface water sources: the Schuylkill River and Perkiomen Creek. Periodic low flow conditions in the Schuylkill River restrict its use as a source of consumptive use makeup water from approximately July to October in most years; however, water augmentation may be used to mitigate these low flow conditions. LGS currently has multiple approved sources of Schuylkill River flow augmentation available for use: Tamaqua Reservoirs and the WMP. Because Perkiomen Creek

flows tend to be low during the same periods as the Schuylkill River, the use of Perkiomen Creek also tends to be limited during the same yearly time period.

Each year in early summer as the stream flows start to decrease and then reach DRBC-prescribed low flow limits, consumptive use of the two sources becomes conditional upon flow augmentation. During these low flow periods, LGS operators must take actions to provide for consumptive use makeup water via augmentation of the Schuylkill River and/or Perkiomen Creek (augmented with water diverted from the Delaware River).

The operating rules and limits governing the use of the approved water sources are detailed in Section 2.2.

In conjunction with the operating rules, LGS is subject to monitoring and reporting requirements, contingency plans for unplanned events, and augmenting flow to support planned recreational events in Perkiomen Creek. The details of these requirements are contained in Sections 2.3, 2.4, and 2.5, respectively.

2.2 OPERATING RULES

2.2.1 General Rule for Use of Sources

In order to optimize LGS operating flexibility and the available water resources in the Delaware River Basin, LGS may utilize any of the approved sources (or combinations thereof) identified in Sections 2.2.2 and 2.2.3 for non-consumptive and consumptive use makeup water, while meeting certain constraints/restrictions governed by the operating rules presented in this section. No hierarchy of use is implied by the order of these operating rules.

2.2.2 Rules for Non-Consumptive Use

LGS normally uses the Schuylkill River as its source of non-consumptive use makeup water at a rate of up to 14.2 mgd. During limited circumstances (see 2.2.3.2. below) and subject to the prescribed withdrawal limits, LGS may withdraw water for such use from Perkiomen Creek.

2.2.3 Rules for Consumptive Use

Unless stated otherwise in this O&M Plan, numerical river flow and conductivity values (surrogate for TDS) are 24-hour averages.

1. Withdrawals of consumptive use makeup water from the Schuylkill River for one-Unit or two-Unit operation at LGS are allowed under the following circumstances:
 - a. When the Schuylkill River flow measured at the Pottstown Gaging Station (USGS Gage No. 01472000) is greater than 560 cubic feet per second (cfs) for two-Unit operation or 530 cfs for one-Unit operation, up to 44 mgd (peak daily) with two LGS Units in operation, or up to 24 mgd with one LGS Unit in operation may be withdrawn. However, on days when the ambient air temperature is 87°F. or greater, the consumptive use shall not exceed 47.3 mgd with two LGS units in operation and 25.5 mgd with one LGS unit in operation, and the total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm or 58.2 mgd. Non-consumptive use is restricted to 14.2 mgd. Consumptive use above 44 mgd (with two units operating) and

24 mgd (with one unit operating) must be replaced with commensurate augmentation releases from either WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek when the Schuylkill River is restricted or when the Schuylkill River flow is not restricted and flows as measured at the Pottstown Gage are less than or equal to 532 cfs (with one unit operating) or less than or equal to 564 cfs (with two units operating). Such releases must be made on a 1:1 gpd basis over the 24-hour period beginning on the day after consumptive use in excess of 24 mgd (one-unit operation) or 44 mgd (two-unit operation) in accordance with augmentation requirements specific to each of the sources used.

When the Schuylkill River flow is equal to or less than the threshold amounts set forth in this paragraph (560 cfs for two-unit operation and 530 cfs for one-unit operation), all consumptive use must be replaced with commensurate augmentation releases on a 1:1 basis in accordance with b, c, and d, immediately below.

- b. When augmentation water from the available volumes of the Tamaqua Reservoirs (up to 36 mgd from Still Creek Reservoir and up to 8 mgd from Owl Creek Reservoirs) is released on behalf of LGS with the release rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm; withdrawal rates associated with the reservoir releases are subject to a 3% reduction (the assumed quantity of water assumed lost in transit from the reservoirs to the point of withdrawal).
 - i. The Tamaqua Reservoirs' releases are subject to current Operating Rule Curve limitations established in this O&M Plan (See Attachment 2), whereby no release shall be permitted for consumptive use water if the reservoir level is below this curve. If the Still Creek Rule Curve changes at a future date, the new Rule Curve may be incorporated into the O&M Plan by notifying the Executive Director.
 - ii. Except as provided in Section 2.2.3.1.a. of this O&M Plan, the Tamaqua Reservoirs' releases are subject to a three-day travel time requirement before the released water is considered available for withdrawal; when releases are stopped at the end of the augmentation season, withdrawal of the released water may continue for two days.
- c. When augmentation water from the WMP is pumped and released on behalf of LGS (DRBC will be notified each augmentation season when the first WMP release is being initiated and again when the last WMP release ceases) with the pumping rate not to exceed 10,000 gpm (14.4 mgd peak daily), the mine pool drawdown not to exceed 600 feet below grade elevation, and a total augmentation volume limit of 446.4 mgm; withdrawal rates associated with the releases from the WMP are subject to a 3% reduction (the assumed quantity of water lost in transit from the release point to the withdrawal point).
 - i. The pumping rate, volume limit, drawdown limit, and/or installed depth of the pump casings may be increased by approval of the DRBC Executive Director to reflect a pump rebuild or replacement by RAC.

- ii. Except as provided in Section 2.2.3.1.a. of this O&M Plan, releases of the water pumped from the WMP are subject to a three-day travel time requirement before the released water is considered available for withdrawal; when pumping is stopped at the end of the augmentation season, withdrawal of the released water may continue for two days.
 - iii. If the 24-hour average TDS concentration in the Schuylkill River at the Landingville Gaging Station (USGS Gage No. 01469500) exceeds 500 mg/l (as calculated using the specific conductivity measured at the Landingville Gage with an applied conversion factor), WMP augmentation releases must be discontinued within three days of reaching this threshold for as long as the excessive TDS concentration at Landingville remains. The docket holder may resume the use of WMP water when the specific conductivity as measured at the Landingville USGS gaging station (USGS Gage No. 01468500) is less than the equivalent of 500 mg/l of TDS and the docket holder calculates that the quantity of the WMP water being utilized will not cause TDS or equivalent specific conductivity measurement at the Landingville USGS gaging station to exceed 500 mg/l of TDS.
- d. When augmentation water from the available volumes of the Tamaqua Reservoirs (up to 36 mgd from Still Creek Reservoir and up to 8 mgd from Owl Creek Reservoirs) is released on behalf of LGS with the release rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm, with associated withdrawals reduced by 3% (the assumed quantity of water assumed lost in transit from the reservoirs to the point of withdrawal), and with the augmentation water considered immediately available for consumptive use at LGS under the following circumstances: when (1) flows in both the Schuylkill River and Perkiomen Creek do not meet the DRBC thresholds for one-Unit or two-Unit operation and (2) sufficient water diversion system capacity is unavailable and expected to remain so for more than 24 hours.
 - i. At the start of such withdrawals, Exelon Generation will notify public water suppliers with intakes on the Schuylkill River between the LGS intake and the confluence of the Schuylkill River and Perkiomen Creek (i.e., PA American Water Company in Royersford and the Phoenixville Water Department).
 - ii. Exelon Generation will promptly notify DRBC of such use, but no later than 24 hours (or next business day), which shall include an estimate of the duration of such use. Exelon Generation will then provide prompt notification to DRBC, but within 24 hours, when normal operations are restored.
- e. In the event that the water diversion system is available and conditions are such that pumping from Bradshaw Reservoir to the EBPC is required, but the Perkiomen Pumphouse is unavailable (i.e., pumphouse outage or reduced pumping capability), Exelon Generation may withdraw water for consumptive use, as required, from the Schuylkill River, while continuing to pump from Bradshaw Reservoir. In this case, Bradshaw pumping will mitigate Schuylkill River consumptive use via augmentation downstream of LGS at the confluence of the Schuylkill River and Perkiomen Creek until operations at the Perkiomen Pumphouse are restored.

2. Withdrawals of consumptive use makeup water (and additionally, under limited circumstances defined in d and e below, makeup water for non-consumptive and auxiliary use) from Perkiomen Creek for one-Unit or two-Unit operation at LGS are allowed under the following circumstances:

- a. When natural flows of Perkiomen Creek, measured at the Graterford Gaging Station (USGS Gage No. 01473000), are equal to or greater than 210 cfs for two-Unit operation or 180 cfs for one-Unit operation, up to 42 mgd (peak daily) with two LGS Units in operation, or up to 24 mgd with one LGS Unit in operation may be withdrawn. When the flow is less than these threshold amounts, then b, immediately below, applies for such withdrawals.
- b. When augmentation water is pumped from Bradshaw Reservoir and released into the EBPC, with the pumping rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm; withdrawal rates associated with releases into the EBPC are subject to a 3% reduction (to account for possible instream losses during open channel transport). To account for the approximately 18-hour water travel time from Bradshaw Reservoir to the Perkiomen Creek intake, the quantity of water pumped from Bradshaw Reservoir yesterday is considered the amount available for use at LGS today.
- c. Subject to a and b above, when Schuylkill River flows meet DRBC-prescribed flow criteria, but:
 - i. The Schuylkill River intake is not available when an abnormal condition exists that prevents withdrawal (e.g., ice jam or heavy leafing on river, Schuylkill Pumphouse outage or operational restriction; upstream spill causes a severe water quality impairment); or
 - ii. A plant/operational condition exists that could be mitigated by the selective use of Perkiomen Creek water (e.g., the use of Perkiomen Creek water having lower TDS than Schuylkill River water when a condenser chemistry issue is detected and until such issue can be resolved, post-maintenance testing and confidence runs); or
 - iii. LGS has already switched over to using the Perkiomen Creek intake when use of the Schuylkill River is restricted, but the Schuylkill River flow then cycles between meeting and not meeting its flow criteria, which would otherwise require LGS to repeatedly start up and shut down both intake pumphouses over a relatively short period of time.

Exelon Generation will notify the DRBC within 24 hours of such use (or next business day), which shall include an estimate of the duration of such use. Operation of the Perkiomen Pumphouse auxiliary pump (see d below) is exempt from this notification requirement. Exelon shall also provide notification to the DRBC within 24 hours (or next business day) when normal operations are restored.

- d. For operation of the relatively small-capacity (approximately 390 gallons per minute or gpm) auxiliary pump located in the Perkiomen Pumphouse as needed to maintain

system operability by keeping the discharge pipeline full to avoid water hammer when the makeup pumps start, maintaining water level in the makeup water storage tank located at the LGS plant site, and providing freeze protection during frigid weather conditions.

- e. Minor non-consumptive use from the Perkiomen is acceptable (i.e., during periods of consumptive makeup from the Perkiomen Creek in order to avoid underpumping.)
 - f. Testing and maintenance.
3. During an emergency at LGS, unlimited use of Delaware River Basin waters, as necessary, until the emergency has been stabilized.
 4. Simultaneous withdrawals of makeup water for consumptive use from the Schuylkill River and Perkiomen Creek (i.e., split withdrawals) for one-Unit or two-Unit operation at LGS are allowed under the above circumstances applicable to each individual source.
 5. Water withdrawals from the Delaware River for consumptive water use at LGS are subject to specific conditions dictated within DRBC Docket No. D-1977-110 CP-18 and the Merrill Creek Operating Plan. Such withdrawals are allowed, when required, but are subject to DRBC-declared drought and low Delaware River flow conditions, when the withdrawals must be curtailed or compensated for by releases made from the Merrill Creek Reservoir. The DRBC and the MCOG have approved the operating plan for the reservoir, and the rules and conditions in that operating plan are used to control reservoir operations. Releases from the WMP and/or Tamaqua Reservoirs on behalf of LGS may be used to offset an equivalent amount of required releases from the Merrill Creek Reservoir.

2.2.4 Rules for Minimum or Maximum Schuylkill River and EBPC Streamflow

1. To avoid the natural streamflow immediately downstream of Outfall 001 from decreasing to less than the Q_{7-10} value measured at the Pottstown Gaging Station (313 cfs [202.3 mgd] or updated value), consumptive use withdrawals from the Schuylkill River must be reduced whenever Schuylkill River augmentation rates (factoring in travel times) are less than the consumptive use rates; in this case, Exelon Generation must obtain the balance of its consumptive use supply from Perkiomen Creek.
2. Conditions imposed by DRBC and the Pennsylvania Department of Environmental Protection (PADEP) require that, at all times of the year, Exelon Generation must pump water from Bradshaw Reservoir, as available, to maintain a minimum streamflow of no less than 10 cfs in the EBPC, measured at the Bucks Road Gaging Station (USGS Gage No. 01472620). When the natural streamflow at the gage is greater than 10 cfs, no pumping from Bradshaw Reservoir is required (other than that for augmentation water when allowed/required by this O&M Plan).
 - a. Exelon Generation will promptly notify DRBC during business hours (or next business day) when an event occurs (e.g., loss of pumping capability at Bradshaw Reservoir) that prevents minimum flow maintenance when required for more than 24 hours, along with an estimate of when normal operations will be restored.

Exelon Generation will then provide notification to DRBC promptly during business hours (or next business day) after normal operations are restored.

3. Exelon Generation must terminate pumping from Bradshaw Reservoir to the EBPC when EBPC flow, measured at the Bucks Road Gaging Station (USGS Gage No. 01472620), exceeds 125 cfs, the level which occurs naturally during flood periods. This is in order to avoid possible channel erosion associated with higher stream velocities generated by pumping. Pumping may be restarted when the flows have subsided to levels at which pumping will not cause the flow to exceed 125 cfs. In the unlikely event that Bradshaw Reservoir releases are terminated due to EBPC flows greater than 125 cfs at the Bucks Road Gaging Station, and the flow at the Graterford Gaging Station (USGS Gage No. 01473000) has not reached the limit for withdrawal from natural Perkiomen flow, withdrawals from Perkiomen Creek may continue. When flood flows subside, pumping to the EBPC may recommence.
4. Upon written request from Exelon Generation to DRBC at least 30 days in advance, the DRBC Executive Director may approve higher diversion flows during preplanned short-term recreational events in the EBPC. The request shall include a flow management plan; copies of the request and plan also shall be sent to PADEP and the Pennsylvania Fish & Boat Commission (PFBC).

2.2.5 Rules for Accounting for the Flow

From All Approved Sources

1. For accounting purposes, a day is considered to be a 24-hour period, starting at midnight (12:00 a.m.) to 11:59 p.m. The monthly period starts and ends at midnight on the first and last day of the calendar month. The augmentation season starts and ends when Exelon Generation provides notification to the DRBC to this effect. Typically, there will be one augmentation season from about July to October. However, unique environmental conditions could occur outside the typical period requiring more than one season in a year.
2. To the extent allowed/required by this O&M Plan, Exelon Generation must provide sufficient augmentation water to the Schuylkill River, sufficient makeup water from Perkiomen Creek (with flow augmentation, when required, from Bradshaw Reservoir), or a combination of both, for each monthly period such that no shortage of augmentation results at the end of each calendar month. Excesses of augmentation may be accrued and carried over as augmentation credit for the following monthly periods. Credit carryover may not exceed 250 mg (which is equivalent to approximately six days of consumptive use at the maximum allowed consumptive usage rate) and expires at the end of the augmentation season.
3. In order to compensate for assumed in-transit water losses, consumptive use by LGS is limited to 97% of releases from Still Creek/Owl Creek Reservoirs, the WMP, and/or Bradshaw Reservoir.
4. Exelon Generation must mobilize the appropriate alternate makeup water source(s) within 24 hours of reaching the applicable Schuylkill River low flow restriction. If the flow at the

Pottstown Gaging Station (USGS Gage No. 01472000) increases to greater than the low flow limit within the 24-hour period, the 24-hour clock to mobilize the appropriate alternate water source(s) may be reset. LGS may continue to consumptively use Schuylkill River flows within the 24-hour period following the Schuylkill River flow dropping below the prescribed limit while the appropriate water sources are being placed in service. The mobilization of augmentation water sources is subject to the same rules and, in addition, must also take into account travel time requirements (see below).

5. Once the augmentation season starts, should the Schuylkill River flow become unrestricted for any period of time (due to higher ambient river flow), Exelon Generation may withdraw all LGS's makeup water (subject to withdrawal limits) from the Schuylkill River instead of providing augmentation water to the river and/or makeup water through the Perkiomen Creek intake. However, Exelon Generation must continue to pump water from the Bradshaw Reservoir, as available, when needed to satisfy the EBPC minimum flow requirement of 10 cfs.

Augmentation from the WMP

6. Water pumped from the WMP as augmentation water on behalf of LGS may be considered to be available at LGS during a period beginning three days after initiation of those releases and ending two days after the releases are stopped at the end of the augmentation season.
7. Pumping from the WMP, when used as augmentation water on behalf of LGS, may be credited towards the total augmentation and is subject to the cumulative accounting method that is described in Rule 2, above.

Augmentation from the Tamaqua Reservoirs

8. Water released from the Tamaqua Reservoirs' combined available capacity as augmentation water on behalf of LGS may be considered to be available at LGS during a period beginning three days after initiation of those releases and ending two days after the releases are stopped at the end of the augmentation season.
9. In the case when sufficient water diversion system capacity is unavailable when needed, water released from the Tamaqua Reservoirs' combined available capacity as augmentation water may be considered immediately available at LGS (see 2.2.3.1.d).
10. Releases from the Tamaqua Reservoirs, when used as augmentation water on behalf of LGS, may be credited towards the total augmentation and are subject to the cumulative accounting method that is described in Rule 2, above.

Pumping from Bradshaw Reservoir with the Perkiomen Creek Intake Supplying Makeup Water to the Plant

The following four-day rolling average system is intended to (1) minimize the number of calls to the TAWA operators to request small amounts of releases of augmentation water from Still Creek/Owl Creek Reservoirs to compensate for under-pumping of water from Bradshaw

Reservoir; and (2) to allow for travel time requirements when the augmentation sources are used for this purpose.

11. Exelon Generation will use a four-day rolling average system (current day plus up to three additional days) to take credit either for over-pumping in previous days or additional water pumped in future days to make up for shortfalls. The four-day rolling averaging method will use excess water pumped from any combination of consecutive days immediately preceding or following the current day shortage. In the event of such an unexpected shortfall, increased pumping to make up for this shortfall will be made as soon as possible. If the shortfall cannot be made up within a four-day rolling average, TB operators will be notified to make the necessary releases from the Tamaqua Reservoirs over subsequent days to cover any shortfalls. To account for water travel time from Bradshaw Reservoir to the Perkiomen Creek intake, the quantity of water pumped from Bradshaw Reservoir yesterday is considered the amount available for use at LGS today.
12. Shortfalls in the water diversion system capacity per criterion 2.2.3.1.d will be handled as follows. Daily release quantities from the Tamaqua Reservoirs, WMP, and Schuylkill River water withdrawals will be made to match the daily shortages as closely as possible, based upon Docket limits, reservoir levels, and reservoir release system capabilities. Releases may continue past the end of the water diversion system under-pumping period for up to a maximum of ten days to ensure all of the shortage is made up. This extra period of release is not likely to be needed except for an extended period of total or near-total water diversion system unavailability.
13. As an operating practice, Exelon Generation will not intentionally under-pump based upon previous days' over-pumping. In no case will the daily pumping from Bradshaw Reservoir or released from the Tamaqua Reservoirs and WMP on behalf of LGS exceed the maximum amounts authorized by the Docket (see Section 2.2.3).

USGS Retroactive Revisions to Flow Data

14. In the event that the USGS retroactively revises flow measurement data at the Pottstown Gaging Station due to inaccuracy of the rating curve found during USGS's approximately monthly development/confirmation of the rating curve during the yearly period of July through October, Exelon Generation will apply such revised data to flow accounting going forward only (i.e., no revisions to past water and travel time accounting). If the Schuylkill River becomes restricted based on a change to the rating curve, augmentation releases from the WMP and the Tamaqua Reservoirs may be considered immediately available for use at LGS if flow accounting rule 2.2.5.2 cannot be used to mitigate the situation.

Appendix 4.1 provides sample water accounting calculations.

2.3 MONITORING AND REPORTING REQUIREMENTS

2.3.1 Reports to DRBC

Using data on stream flows, intake withdrawals, blowdown flow, and augmentation releases (see Items 1 through 4 below), Exelon Generation will record daily flow data (see Item 5 below) as

well as other recurring monitoring data (see Appendix 4.2). Exelon Generation also will submit quarterly and annual written reports to the DRBC (see Items 7 through 9 below), and reports for additional DRBC requirements (see Items 10 through 12 below).

1. Each day, the daily average flows are recorded in the LGS operating logs. These numbers are calculated by the plant computer from readings taken of the Schuylkill River at the Pottstown Gaging Station (USGS Gage No. 01472000), Perkiomen Creek at the Graterford Gaging Station (USGS Gage No. 01473000), and the EBPC at the Bucks Road Gaging Station (USGS Gage No. 01472620).
2. Withdrawals from the Schuylkill River and Perkiomen Creek, as well as the cooling tower blowdown to the Schuylkill River, are monitored using flow measurement devices. The monitored flows are totaled and daily quantities recorded in the LGS operating logs.
3. The totaled daily augmentation water pumped from the Bradshaw Reservoir to the EBPC is monitored and recorded in the LGS operating logs.
4. The totaled daily augmentation water released to the Schuylkill River from the WMP and Tamaqua Reservoirs for Exelon Generation is monitored and recorded in the LGS operating logs.
5. Using the information developed above, Exelon Generation records the following parameters each day (the maximum daily ambient air temperature is monitored using onsite or local ambient air temperature data):
 - a. Daily average flow - Schuylkill River (adjusted for Blue Marsh releases, when timely notification of such releases provided by DRBC)
 - b. Daily average flow - Perkiomen Creek
 - c. Daily average flow - EBPC
 - d. Daily Schuylkill River withdrawal
 - e. Daily discharge to the Schuylkill River
 - f. Daily Perkiomen Creek withdrawal
 - g. Daily quantity pumped from the Bradshaw Reservoir to the EBPC
 - h. Daily quantity pumped from the WMP for Exelon Generation
 - i. Daily quantity released from the Still Creek Reservoir for Exelon Generation
 - j. Daily quantity released from the Owl Creek Reservoirs for Exelon Generation
 - k. Daily quantity released from the Merrill Creek Reservoir
 - l. Daily maximum ambient air temperature
6. Exelon Generation will transmit a quarterly report to DRBC by 30 days after the end of each quarter indicating the payment calculation for water use at LGS in accordance with DRBC regulations and the docket, and the amount of contributions to be made to the

Restoration and Monitoring Fund based on consumptive water use at LGS (see Section 3.2).

7. Exelon Generation will submit to DRBC an annual report along with the annual effluent monitoring report form by January 31st of each year.
8. Exelon Generation will include in the above annual report monitoring data results for DRBC parameters included in the NPDES permit, as shown in Effluent Table A below.
 - a. If a DRBC effluent limit is violated, Exelon Generation will submit the results along with an explanation and corrective actions taken within 30 days of the violation.

EFFLUENT TABLE A: DRBC Parameters Included in the NPDES Permit

OUTFALL 001 (Non-Contact cooling water and industrial waste)		
PARAMETER	LIMIT	MONITORING
pH (Standard units)	6 (Min.) to 9 (Max.) at all times	As required by NPDES permit
Total Suspended Solids	Monitor & Report	As required by NPDES permit
Temperature	110°F (Max)	As required by NPDES permit
Total Dissolved Solids	Monitor & Report	As required by NPDES permit

9. Exelon Generation will provide all paired TDS and conductivity monitoring data collected for the Landingville USGS Gaging Station with corresponding flow in the annual report.

2.3.2 Monitoring

Exelon Generation will perform (or contract for performance) monitoring of parameters that are necessary for:

1. Routine system operation and reporting;
2. Docket compliance; and
3. Additional DRBC requirements.

Appendix 4.2 lists the frequency and location of parameters monitored and recorded as necessary for LGS water supply program operation and reporting.

The monitoring requirements derived from NPDES, dam safety, and encroachment permits applicable to activities associated with the LGS water supply program are provided in each of those permits and are not necessarily repeated in this O&M Plan.

2.4 Contingency Plans

2.4.1 Monitoring Systems

Various contingency plans have been developed to define Exelon Generation's actions in the event of the loss of equipment or instruments associated with the makeup water system. Below is a listing of relevant monitoring systems and contingency plans for each:

Stream Gages

Pottstown Gaging Station (USGS Gage No. 01472000) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup.

Graterford Gaging Station (USGS Gage No. 01473000) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup.

Bucks Road Gaging Station (USGS Gage No. 01472620) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup. Exelon Generation also has installed flood level instrumentation to transmit EBPC flooding alarms to LGS.

In the event of a loss of all of the above options at a particular gaging station, best estimates (from visual observations, nearby gage station data, weather conditions, etc.) will be used until USGS resolves the condition. Exelon Generation will notify DRBC if a station is out of service for longer than seven days.

Flow Monitoring from Bradshaw Reservoir

If the continuous monitoring and totaling of flow from Bradshaw Reservoir to the EBPC is out of service, flow will be estimated daily by use of a pump curve, the flow meter at the BWPF, or other methods.

Point Pleasant Pumping Station

In the event that the pumps at the Point Pleasant Pumping Station cannot pump to Bradshaw Reservoir, estimates will be made for the time to return the Point Pleasant Pumping Station to service. If the stored quantity of water in the Bradshaw Reservoir is sufficient to last throughout the outage, operations will continue normally. If the length of the outage is unknown or is greater than what the Bradshaw Reservoir can supply, the pumping rate from the Bradshaw Reservoir Pumphouse will be reduced to maintain a minimum flow of 10 cfs/6.5 mgd in the EBPC and releases to the North Branch Transmission Main (by FPWA) will be halted. This will minimize

the reservoir depletion rate and maximize the length of time some flow could be maintained in the EBPC to protect creek aquatic life.

In case of equipment problems or to support certain maintenance activities, the Point Pleasant pumps may be infrequently out of service. If such activities prevent Exelon from being able to discharge from the Bradshaw Reservoir and maintain minimum flow requirements in the EBPC for a period of more than 24 hours, the DRBC will be notified promptly within 24 hours (or the next business day).

Bradshaw Reservoir/Pumping Station

Exelon Generation can accommodate a required outage of the Bradshaw Reservoir (e.g., for silt removal) by passing the minimum conservation flows (10 cfs) for the EBPC as well as the flows for FPWA through the reservoir bypass pipe. The loss of the Bradshaw Pumping Station pumps will result in no pumping to the EBPC until a pump can be returned to service. In case of equipment problems or to support certain maintenance activities, the pumps may be infrequently out of service for up to 24 hours. The design of the pump station provides redundant power feeds and equipment such as pumps, transformers, and air compressors to ensure high reliability. The actions to be taken in the event of an embankment failure are described in the Bradshaw Reservoir Emergency Action Plan. For trips of the Bradshaw Pumping Station, the equipment will be restarted as soon as possible. If the EBPC minimum conservation flow requirement cannot be maintained, when required, for a period of more than 24 hours, the DRBC will be notified promptly within 24 hours (or the next business day).

Perkiomen Pumphouse

The Perkiomen Pumphouse has been designed with redundant components much like the Bradshaw Reservoir Pumping Station. In the event that the water diversion system can supply sufficient water to the Perkiomen Pumphouse, but equipment problems prevent the operation of sufficient Perkiomen Pumphouse pumps, the diverted water will be allowed to flow past the Perkiomen Pumphouse and the Schuylkill Pumphouse pumps will be operated. Due to the time factor urgency in the event of a loss of Perkiomen Pumphouse pumps, the Schuylkill Pumphouse pumps will be operated to avoid a plant operational transient. The DRBC will be notified promptly within 24 hours (or the next business day) when this action is taken.

WMP Discharge

To measure the rate of the WMP discharge flow and record total gallons pumped, a flow meter with flow totalizer is used. If the meter is out of service, RAC may document pump operating times and use the known pump capacities to compute total gallons pumped, which has provided the basis for past reporting of withdrawals.

2.5 FLOW AUGMENTATION FOR RECREATIONAL EVENTS

Planned releases from the Bradshaw Reservoir to support recreational events on the EBPC are made when requested by stakeholder groups and when conditions permit. Stakeholder groups must submit requests for recreational releases to Exelon Generation, which determines whether the requests for releases can be met operationally with respect to time, quantity, and length. Exelon Generation then requests from the DRBC, at least 30 days prior to the planned event, the authority

to implement each planned release. All recreational releases are pre-planned events and limited to a small number per year.

3 EXELON GENERATION RESTORATION AND MONITORING FUND CALCULATIONS

3.1 INTRODUCTION

Exelon Generation has established a Restoration and Monitoring Fund (RMF) that is intended for use in funding restoration and water quality monitoring projects of third party organizations. These projects are intended to provide long-lasting water quality improvements in the Schuylkill River watershed, consistent with Exelon Generation's interest in enhancing the watershed that it uses.

3.2 RMF CONTRIBUTIONS

Exelon Generation will continue contributions to the RMF. Payments will be made annually by March 31st of the following year, in an amount determined by multiplying LGS's annual surface water consumptive use, as reported to DRBC, by a rate of \$0.015 per thousand gallons.

For example, if LGS's consumptive use for each day of a given year, as reported to DRBC, adds up to a total of 12,775,000,000 gallons (this amount is equivalent to 35 mgd for 365 days), then the Exelon Generation payment to the RMF would be:

12,775,000,000 gallons per year x \$0.015 / 1,000 gallons = \$191,625 for that year payable by March 31st of the following year.

Exelon shall provide the RMF funds directly to a watershed-related NPO of Exelon Generation's choosing, with which it has entered into an agreement for management and administration of the RMF. Exelon Generation may be a member of the Board of the NPO, but it may not control the organization. The agreement between Exelon Generation and the NPO shall provide that RMF monies are to be used solely for the purpose of funding projects in the Schuylkill River watershed that are consistent with restoration and water management goals for the Schuylkill River. It shall further provide that consultation with and concurrence of the DRBC's Executive Director shall be required prior to commitment of RMF funds to any project. Exelon Generation may participate in the generation of a list of potential projects and may, if it chooses, participate in implementation of such projects.

4 APPENDICES

4.1 Sample Water Accounting Calculations

The assumed in-transit water losses have already been factored into these examples.

Example 1: Cumulative methodology, using augmentation sources subject to the 3-day travel time condition (WMP and Still Creek/Owl Creek Reservoirs) [Quantities are in mgd.]

	Monday	Tuesday	Wednesday (End of month)	Thursday	Friday
Pumped/released three days prior (WMP/Still Creek/Owl Creek Reservoirs)	32	32	32	32	34
Available today	32	32	32	32	34
LGS Consumptive Use	31.75	31.5	31.5	33.5**	32
Over(+)/under(-) for given day	+0.25	+0.5	+0.5	-1.5	+2
Allowable water balance	+0.25*	+0.75	+1.25 (carry over)	-0.25	+1.75

* Assumes cumulative zero balance from beginning of month.

** LGS consumptive use makeup rate greater than anticipated.

Example 2: Illustrations of the four-day averaging methodology for Bradshaw Reservoir pumping to support pumping from Perkiomen Creek to LGS [Quantities are in mgd.]

2a. Averaging using water already pumped

	Monday	Tuesday	Wednesday	Thursday	Friday
Bradshaw Reservoir pumped today	32	32	32	32	
Available today		32	32	32	32
Water pumped from Perkiomen Creek to LGS		31.75	31.5	31.5	33.25*
Over(+)/under(-) Pump		+0.25	+0.5	+0.5	-1.25
		=====➔			

* LGS consumptive use makeup rate greater than anticipated. Carry forward for Friday shortage.

2b. Averaging using water already pumped and water to be pumped

	Monday	Tuesday	Wednesday	Thursday	Friday
Bradshaw Reservoir pumped today	32	32	26*	36**	
Available today		32	32	26	36
Water pumped from Perkiomen Creek to LGS		31.5	31.5	31.5	31.5
Over(+)/under(-) Pump		+0.5	+0.5	-5.5	+4.5
		=====➔←=====			

* Under-pumping caused by equipment malfunction.

Apply forward and backward for Thursday shortage.

** Bradshaw Reservoir pumping increased to account for anticipated shortfall.

If the Bradshaw Reservoir pumping shortage cannot all be made up through the 4-day averaging methodology, then augmentation from one or both approved augmentation source (WMP and/or Still Creek/Owl Creek Reservoirs) must be made in sufficient quantities to cover any leftover shortfall.

Additional Water Accounting Example:

The following example show how the consumptive use makeup water accounting may be managed with various Schuylkill River and operational conditions. Depending on environmental conditions, water source conditions, plant equipment variables, economic considerations, and consumptive use requirements, the mix and combinations of the water sources will vary.

Example 3:

Daily Conditions (Two-Unit Operation)

When use of the Schuylkill River is restricted for consumptive use, typically, use of the Perkiomen Creek also is restricted.

Schuylkill River flow at Pottstown	<560 cfs
Perkiomen Creek natural flow at Graterford	<210 cfs
EBPC natural flow at Bucks Road	<10 cfs
Total LGS consumptive use for the day	38 mg
WMP/Still Creek/Owl Creek augmentation available* at LGS	25 mg
Bradshaw pumping available	20 mg
Pumped from Perkiomen Creek to LGS	18 mg

Use of Sources (Split sources used)

Unrestricted Schuylkill River water withdrawal	0 mg
Augmented Perkiomen Creek withdrawal	18 mg
Augmentation via the WMP and/or/Tamaqua Reservoirs	20 mg

Water Accounting (Total LGS consumptive use for the day minus sources used)

Net use 38 mg – 18 mg – 20 mg = 0 mg

*Water is available three days after pumping/release to allow for travel time to withdrawal point.

4.2 Monitoring Requirements

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Bradshaw Reservoir	Quantity of water pumped to the EBPC	Exelon Generation/EBTM	Continuous	Daily Total	Annually
EBPC	Average flow	Exelon Generation/USGS Bucks Road Gaging Station	Once every 15 minutes	Daily	Annually
EBPC	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/one station each in vicinity of two fishery stations and two benthos stations	Once per docket cycle	Once per docket cycle	Once per docket cycle, prior to or with renewal application submittal
EBPC	Fish	Exelon Generation/upper two fishery stations (EEF 36235 above Dublin USGS Gage and EEF 30700 below Callowhill Road)	Once per docket cycle (during mid- to late fall periods, conditions permitting)	Once per docket cycle	Once per docket cycle, prior to or with renewal application submittal
EBPC	Benthos	Exelon Generation/upper two fishery stations (E36725 at Elephant Road and E29910 at Callowhill Road)	Once per docket cycle during fish surveys (conditions permitting)	Once per docket cycle	Once per docket cycle, prior to or with renewal application submittal
Merrill Creek Reservoir	Quantity of water released to Delaware River	MCOG/Merrill Creek Reservoir	Daily*	Daily Total*	Annually
Perkiomen Creek	Average flow	Exelon Generation/USGS Graterford Gaging Station	Hourly	Daily	Annually

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Perkiomen Creek	Withdrawal for LGS use	Exelon Generation/Perkiomen Pumphouse-to-LGS pipeline	Continuous (makeup); Daily (auxiliary pump)	Daily Total	Annually
Schuylkill River	Average flow	USGS/Pottstown Gaging Station	Hourly	Daily	Annually
Schuylkill River	TDS and Conductivity	USGS/Pottstown Gaging Station	Weekly	Weekly	Annually
Schuylkill River	LGS withdrawal	Exelon Generation/LGS makeup water pipeline	Continuous (cooling tower makeup); Daily calculated (spray pond makeup) and metered (water treatment plant makeup)	Daily Total	Annually
Schuylkill River	LGS non-consumptive use	Exelon Generation/LGS blowdown pipeline	Continuous (cooling tower blowdown); Daily (hold pond, treated liquid radwaste releases, and spray pond discharges)	Daily Total	Annually
Schuylkill River	Conductivity, and Temperature	Exelon Generation/LGS intake	Hourly	Hourly	Annually
Schuylkill River	pH, Total Suspended Solids (TSS), Temperature, TDS, and Conductivity	Exelon Generation/LGS Outfall 001	As required by NPDES permit	As required by NPDES permit	Annually (within 30 days if violation of DRBC limit occurs)
Schuylkill River	Conductivity and Temperature	PA American Water Company intake in Royersford (or suitable replacement)	Hourly	Hourly	Annually

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Schuylkill River	pH, Conductivity, Dissolved Oxygen, Temperature, TDS, Alkalinity, Dissolved Iron, and Total Recoverable Iron	Exelon Generation/Upstream and downstream of Norwegian Creek (Stations 106 and 109)	Monthly*	Monthly*	Annually
East Norwegian Creek	pH, Conductivity, Dissolved Oxygen, Temperature, TDS, Alkalinity, Dissolved Iron, and Total Recoverable Iron	Exelon Generation/Upstream of confluence with West Norwegian Creek (sampled concurrently with sampling at Stations 106 and 109)	Monthly*	Monthly*	Annually
Upper Schuylkill River	Fish	Exelon Generation/Norwegian Creek upstream and downstream locations (Stations 106 and 109)	Once per docket cycle (during summer low-flow periods, conditions permitting)	Once per year docket cycle	Once per docket cycle, prior to or with renewal application submittal
Upper Schuylkill River	Benthos	Exelon Generation/Norwegian Creek upstream and downstream locations (Stations 106 and 109)	Once per year docket cycle (during summer low-flow periods, conditions permitting)	Once per year docket cycle	Once per docket cycle, prior to or with renewal application submittal
Still Creek/Owl Creek Reservoirs	Quantity of water released to LSR	TAWA/Still Creek & Owl Creek Reservoir Outlets	Continuous*	Daily Total*	Annually
WMP	Quantity of water pumped for LGS	RAC/Wadesville Pumphouse	Continuous/Daily*	Daily Total*	Annually

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
WMP	TDS and Conductivity	Exelon Generation/Wadesville Pumphouse	Monthly*	Monthly*	Annually*
WMP	TSS, Total Mn, Total Fe, and pH	RAC/ Wadesville Pumphouse	Monthly NPDES sampling **	Monthly*	Annually*
WMP	Erosion	Exelon Generation/Discharge channel leading to East Norwegian Creek, from the discharge point to approximately 50 feet downstream of the New Wadesville Road	Once per docket cycle	Once per docket cycle	Once per docket cycle, prior to or with renewal application submittal
	Ambient Temperature Daily Max.	On-site or local Pottstown ambient temperature monitor	Daily	Monthly	Annually

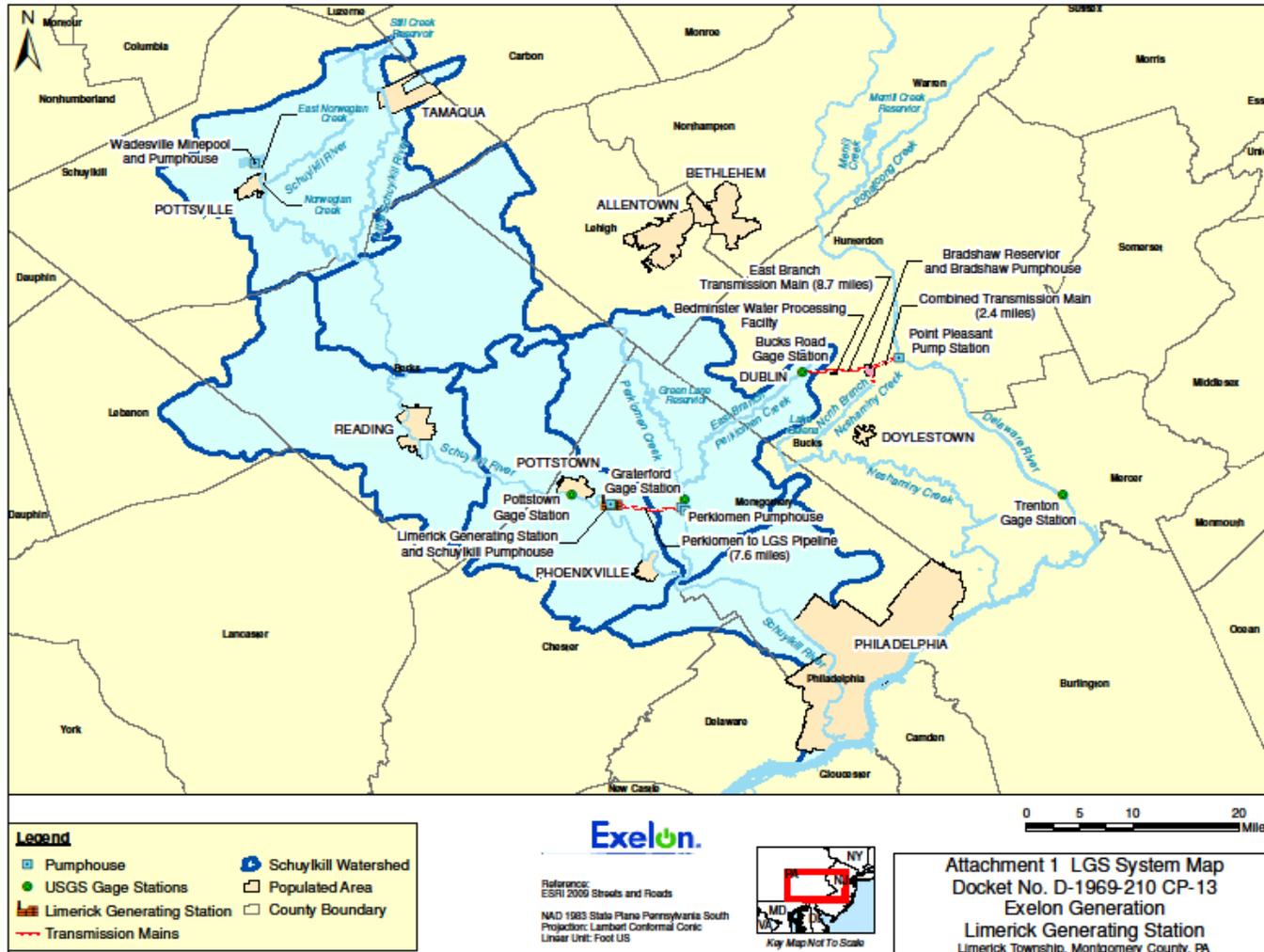
Note 1: Reporting Basis refers to how the monitoring data is reported to DRBC.

* Only during periods of releases for LGS.

** Owner of WMP (Reading Anthracite Company) performs monitoring per their NPDES Permit. Exelon includes the monitoring results in reports to the DRBC.

5 ATTACHMENTS

5.1 Attachment 1 - LGS System Map (Water Supply Program)



5.2 Attachment 2 – Still Creek Reservoir Operating Rule Curve

ATTACHMENT NO. 2 OPERATING RULE CURVE

MINIMUM STORAGE CURVE FOR
LIMERICK POWER RELEASES
AT STILL CREEK RESERVOIR

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