Exhibit 31

Exelon Generation.

March 19, 2018

MDE

MAR 19 2018

4:15 pm

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Matthew Stover
Water and Science Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Comments To Maryland's Draft 2018 Integrated Report of Surface Water Quality

Dear Mr. Stover,

Pursuant to the Maryland Department of the Environment's ("MDE") February 16, 2018 Maryland Register Public Hearing Announcement, Exelon Generation Company, LLC ("Exelon") hereby submits these comments (collectively "Comment") for the 2018 Draft Integrated Report of Surface Water Quality ("Integrated Report" or "IR" or "Report"). These comments address, among other things, water segments located on the Susquehanna River, specifically, segments listed in Category 3, Category 4c, and Category 5 of the Report. A list of additional documents being submitted with this comment is provided as Attachment 1.

I. EXECUTIVE SUMMARY

Exelon is the owner and operator of the Conowingo Hydroelectric Project ("Conowingo Project" or "Project"). The Project is a hydroelectric facility that utilizes a limited active storage reservoir to generate during peak electricity demand periods. It is located in Maryland connecting Cecil and Harford counties, as is the lowermost six miles of the Project reservoir, Conowingo Pond. The remaining eight miles of the Conowingo Pond are located in Pennsylvania, within York and Lancaster counties.

This comment letter addresses a number of deficiencies in MDE's Report. In turn the comments address: (1) the debris that collects upstream of the Conowingo Project that impacts the designated use of the Conowingo Reservoir; (2) the alleged effect flow alterations have on the downstream habitat; and (3) MDE's determination that PCB's and total phosphorus impair a water segment on the Susquehanna River.

A. Debris/floatables/trash

The Report lists a new Category 3 (insufficient data) listing for "debris/floatables/trash" in Conowingo Reservoir. However, the Report neglects to acknowledge that upstream sources and operations are the source of the debris/trash that reach the Conowingo Reservoir. Excessive debris that collects upstream of the Dam is presented as potentially impacting attainment of the water contact sports designated use of the Reservoir. Debris in the Reservoir is a well-recognized basin-wide problem. It has long been policy that river-borne debris in the Reservoir originates upriver and must be managed at its source.

Exelon conducted numerous assessments over the license – including 1982, 1999, and 2011 – of the source areas for debris in the Lower Susquehanna River and the hydrological conditions that control debris transport to the Dam. The quantity of debris reaching the Conowingo Dam is controlled largely by the flows through the three upstream hydro-electric dams and contributing watershed areas, source factors over which the Conowingo Project has no control.

On August 16, 1982, the Licensee submitted a Debris Management Study which was jointly prepared by the licensees for the Conowingo, Holtwood, Safe Harbor, and York Haven projects. It concludes that "a workable and economically feasible plan for debris removal at one of the licensed projects with participation only by the licensees is not obtainable and that any further attempt to develop that type of cooperative plan is unwarranted." This is because "the debris problem is caused by the vast debris contributing area upriver from the four hydroelectric projects" and "[f]acilities are not available at any of the four projects to collect and remove a significant quantity of debris." The licensees concluded that an effective debris management plan could only be developed under the direction and sponsorship of one of the governmental agencies, would need to involve many others (*e.g.*, county and township), and would have to emphasize debris removal throughout the entire watershed through enforcement of existing laws or other means.

The Conowingo Project employs a substantial debris management program which includes clamming (with three gantry cranes with grapple attachments) to remove submerged debris from the area upstream of the powerhouse intakes as well as floating surficial debris in front of the dam powerhouse intakes. In addition, Exelon sponsors community-based clean-ups in the pond and downstream of the dam. Exelon also acquired a new skimmer in 2011 that is also used to remove debris in front of the dam.

In summary, the source of debris/trash that reaches the Reservoir is upstream and the operations of upstream dams control the release of debris/trash to the Reservoir. Exelon does its part to intercept, trap, and remove debris and trash.

B. Flow alteration

The Report incorrectly categorizes the portion of the Susquehanna River downstream of the Conowingo Dam as impaired under Category 4c relying upon testimony and data that fails to consider the flows and operations of two influential hydroelectric projects upstream. The Report fails to acknowledge the fact that the current minimum flows at the Conowingo Project and all flow proposals, including Exelon's, in the FERC and associated Maryland 401 Water Quality Certificate proceedings are provided on an or-natural-inflow basis (as measured at the U.S. Geological Survey Marietta gage No. 0157600), whichever is less. The two plants located between Conowingo and the Marietta USGS gage (Safe Harbor and Holtwood) have minimal or no continuous flow release requirements at any point in the year, and frequently shut down Conowingo Pond inflow for extended periods under some conditions. The Safe Harbor Project (Safe Harbor) has no minimum flow requirement, and can generate at up to 110,000 cfs. Holtwood, located immediately downstream of Safe Harbor and immediately upstream of the Conowingo Project, must continuously release 800 cfs or net inflow if releases from Safe Harbor are less than 800 cfs. Therefore, due to the "or net inflow" component of Holtwood's minimum flow requirement, when Safe Harbor shuts down flow releases, Holtwood effectively also has no continuous flow requirement. Under the Conowingo Project's existing flow regime, and all of the currently proposed flow alternatives considered as part of the FERC licensing process, the Conowingo Project must pass the seasonal minimum flows (or Marietta inflow, if less) on an instantaneous basis regardless of actual inflow to Conowingo Pond, even if the upstream projects are releasing little or no water. As a result, the storage capacity of Conowingo Pond is depleted, and the ability of the Conowingo Project to provide higher minimum flows or even a run-of-river operation is greatly diminished due to the lack of minimum flows and flow manipulation at the upstream Projects.

Additionally, the Report exaggerates the effect the Conowingo Project's flow conditions have on downstream habitat. Exelon conducted substantial instream flow and habitat analysis below Conowingo Dam. Exelon has also conducted two-dimensional modeling of the reach downstream of the Conowingo Project which produced habitat maps under different flow regimes. While each species and lifestage has different preferences, Exelon found the maps showed that under various flow regimes:

1. Habitat would remain generally unchanged throughout the reach below Conowingo Dam for most species. This is primarily due to the predominantly bedrock substrate, as most of the species evaluated have a low preference for bedrock substrate.

2. Quality habitat would remain very limited for most species, and is usually confined to fairly small areas of the river, such as downstream of Rowland Island and around the complex of islands in the tidally-influenced area near Spencer Island.

With regard to fish migration, in May 2016, Exelon and the U.S. Department of the Interior (Interior) executed a Settlement Agreement that requires Exelon to make significant investments in fish passage measures during the term of the new license to address migratory fish passage issues at the Project. The cornerstones of the Settlement Agreement are a trap and transport program designed to jump start American shad population growth, a suite of improvements upon issuance of the new license, and an adjusted passage efficiency formula that informs the timing of additional capital investments in volitional fish passage facilities to accommodate the growth of the American shad population. In addition, as part of the Settlement Agreement, Exelon will construct and maintain structures to provide American shad and river herring a zone of passage below Conowingo Dam to enhance the ability of these species to access the fish lifts at the Project. Exelon also has committed to trap and transport American eels at the west side of Conowingo Dam, and consistent with the Eel Passage Plan established by the Muddy Run Pumped Storage Project (P-2355) license, evaluate potential trapping locations for American eel on the east side of Conowingo Dam including Octoraro Creek.

With regard to fish stranding, there is no evidence that stranding is having an adverse impact on migrating and resident fish populations. Exelon's surveys revealed that stranding affects very few migratory fish.

With regard to the Map Turtle, the literature MDE cites does not support the claims made regarding reduction of basking habitat. Predation and human disturbance were determined by

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studies funded by MDNR and Exelon in 2008 to be the primary risk to the turtles. Additionally, "high flow rates do not seem to be hindering movement" according to Richard-Dimitrie's 2011 Map Turtle study.

With regard to impacts to substrates, MDE asserts that coarser sediments are trapped above the dam effectively starving the downstream waters of habitat-forming bottom gravel and sediments. However, what must be considered is that data suggests that prior to construction of Conowingo Dam the river had great enough energy and stream power throughout the Project area to sustain a mobile bedload with little sediment deposition until the river mouth was reached. This indicates that the reach below Conowingo Dam has likely been a primarily bedrock channel since before Conowingo Dam was constructed.

With regard to the micro invertebrate population below the dam, the fishery below Conowingo Dam is robust, suggesting that the invertebrate populations provide an adequate food base. The fish also appear be in good condition. The invertebrate data collected during the later years of the tailrace studies showed observable increases in community density, after much of the current release schedule had become operational.

With regard to freshwater mussels, study results show that flow fluctuations below the Conowingo Dam provide little benefit to mussel populations and any impacts from shear stress would still occur during naturally occurring high-flow events.

C. Total Phosphorus and PCBs

Two Category 5 listings are included in the draft IR for Conowingo Reservoir: Total Phosphorus (TP) and PCBs in fish tissue. With regard to TP, Exelon finds the rationale and conclusions regarding TP impairment concerning the Conowingo Reservoir to be problematic and therefore it would be more appropriate for the Reservoir to be listed under Category 3. The Conowingo Reservoir is a rapidly flowing river, not a lake, and to apply metrics typically used for lakes with long hydraulic residence times to a flowing river, where residence time is long is inappropriate. In addition, the data MDE uses appears limited, and thus insufficient, for the conclusions it is drawing in the IR. The QAPP used for the data collected in support of the TP Category 5 listing should be made available. The data do not support the association of chlorophyll *a* and TP enrichment derived from sediment. Also, existing data on the biogeochemistry of phosphorus in Conowingo Reservoir contradicts the conditions put forth by MDE. Consequently, the appropriate categorization for Conowingo Reservoir is Category 3.

With regard to PCBs in fish tissue, the draft IR does not explain MDE's contention that PCBs in fish tissue are caused by PCBs in sediments from Conowingo Reservoir. It is not transparent as to how data are used to support the Category 5 listing for PCBs in Conowingo Reservoir and therefore should be listed as a Category 3.

D. Required cost/benefit analysis

The IR fails to comply with the requirements of Section 305(b) of the Clean Water Act and associated regulations by failing to conduct the necessary cost/benefit analysis of potential TMDL implementation.

II. CONOWINGO PROJECT MARYLAND WATER QUALITY STANDARDS

Maryland's water quality standards comprise three elements: (1) designated use or uses of a water body; (2) water quality criteria necessary to protect the use or uses of a water body; and (3) an antidegradation statement. Maryland's water quality criteria to protect designated use of a water body are expressed in terms of chemical-specific concentrations, toxicity levels, and narrative criteria. These criteria include standards to address bacteria, dissolved oxygen, temperature, pH, turbidity, and toxic substances. Maryland's antidegradation policy protects existing water quality where it exceeds minimum requirements specified by water quality standards.

A. Designated Uses

1. Generally

Section 303(c) of the Clean Water Act requires that each state designate uses for each water body or segment thereof within the state.[1] A designated use can be either an existing use or a higher quality use, even if such higher use does not currently exist in that water body.[2] Under Section 303, designated uses can be propagation of fish and wildlife, recreation, public water supply, agriculture, navigation, and industrial use.[3] As set forth in EPA's regulations:

> [W]ater quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.[4]

A state may designate several compatible uses for the same water body,[5] and can remove a designated use if the state can demonstrate that attaining the designated use is not feasible.[6]

Pursuant to these requirements, MDE has designated eight water use classes, including four applicable to the Project:[7]

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[1] 33 U.S.C. § 1313(c).
[2] *See* 40 C.F.R. § 131.3(f) (defining "designated uses" as "those uses specified in water quality standards for each water body or segment whether or not they are being attained").
[3] 33 U.S.C. § 1313(c)(2)(A).
[4] 40 C.F.R. § 131.2.
[5] *See* 33 U.S.C. § 1370.
[6] 40 C.F.R. § 131.10(g). A designated use can be removed if "[d]ams, diversions or other types of hydrologic modifications preclude the attainment of the use. . . ." *Id.* § 131.10(g)(4).
[7] *See* Md. Code Regs. § 26.08.02.02(B).

• *Use I*: "Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life."[8] Use I waters include those that are suitable for:

(a) Water contact sports;

(b) Play and leisure time activities where individuals may come in direct contact with the surface water;

(c) Fishing;

(d) The growth and propagation of fish (other than trout), other aquatic life, and wildlife;

(e) Agricultural water supply; and

(f) Industrial water supply.[9]

- *Use I-P*: "Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply."[10] Use I-P waters include all uses identified for Use I waters, as well as "[u]se as a public water supply."[11]

- *Use II*: "Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting."[12] Use II waters include all uses identified for Use I waters located in:

(a) All tidally influenced waters of the Chesapeake Bay and tributaries, the Coastal Bays, and the Atlantic Ocean to the 3-mile boundary; and

(b) Tidally influenced waters that are or have the potential for:

(i) Shellfish propagation and storage, or harvest for marketing purposes; and

(ii) Actual or potential areas for the harvesting of oysters, soft-shell clams, hard-shell clams, and brackish water clams.[13]

- *Use II-P*: "Tidal Fresh Water Estuary."[14] Use II-P waters include all uses identified for Use II waters, as well as "[u]se as a public water supply."[15]

2. Designated Uses at Conowingo

[8] *Id.* § 26.08.02.02(B)(1).
[9] *Id.* § 26.08.02.02(B)(1)(a)-(f).
[10] *Id.* § 26.08.02.02(B)(2).
[11] *Id.* § 26.08.02.02(B)(2)(a)-(b).
[12] *Id.* § 26.08.02.02(B)(3)
[13] *Id.* § 26.08.02.02(B)(3)(a)-(b).
[14] *Id.* § 26.08.02.02(B)(4).
[15] *Id.* § 26.08.02.02(B)(4)(a)-(b).

With regard to the specific segment of the Susquehanna Basin in which Conowingo Project is located, two of MDE's designated uses apply. The segment of the maintsem from the Conowingo Dam upstream to the Maryland-Pennsylvania border ("Conowingo Reservoir" or "Conowingo Pond") is designated Use I-P.[16]

The mainstem segment from Conowingo Dam downstream to the confluence with Chesapeake Bay is designated Use II-P,[17] with the following subcategories applicable:

- Migratory Spawning and Nursery: Applies from February 1 to May 31, inclusive.[18]
- Seasonal Shallow-Water Submerged Aquatic Vegetation (SAV): Applies from April 1 to October 30, inclusive, and to a depth of 2.0 meters. MDE's regulations note that "no grow zones" of SAV are present in this reach.[19]
- Open-Water Fish and Shellfish: Applies from January 1 to December 31, inclusive.[20]

III. MARYLAND'S DRAFT 2018 INTEGRATED REPORT

Sections 303(d), 305(b) and 314 of the federal Clean Water Act and the Environmental Protection Agency ("EPA") require Maryland to submit an Integrated Report to the EPA biennially.[21] The Report must describe the ongoing efforts in place to monitor, assess, track, and restore the chemical, physical and biological integrity of Maryland waters. Sections 303(d), 305(b), and 314 requires Maryland to list all impaired surface waters not attaining designated and existing uses even after appropriate and required water pollution control technologies have been applied. The list must include the reason for impairment and the pollutant causing the impairment. Maryland must also determine the conditions that would return impaired waters to a condition that meets the applicable water quality standards. As a follow-up to the listing, Maryland must develop an alternative restoration approach or a Total Maximum Daily Load ("TMDL") for each waterbody on the list to reduce pollutant loads to impaired waters and enable said waters to meet water quality standards. Further, section 305(b) requires that that the Report include a cost-benefit analysis of implementing the TMDLs.

The Report must utilize five reporting categories that not only include impaired waters requiring TMDLs, but also waters that are clean or need additional monitoring data to make an assessment.[22] Category 1 indicates that a water body is meeting all standards; Category 2 means it is meeting some but not all standards; Category 3 indicates that there is insufficient data to determine whether standards are being met; Category 4 means the water quality standards are not being met but a TMDL is not needed, either because one has already been completed, other more

[16] *Id.* § 26.08.02.08(B)(1).
[17] *Id.* § 26.08.02.02(B)(2)(a)
[18] *Id.*
[19] Id.
[20] *Id.*
[21] 33 U.S.C § 1313(d); §1315(b); § 1324.
[22] 40 C.F.R. § 130.7

immediate fixes are available, or the impairment is not load/pollutant related; and lastly, Category 5 indicates that a water body is impaired and a TMDL may be needed.

Our comments address the following listings:

- **Category 3:**
  - Conowingo Reservoir Assessment Unit ID MD-02120204. This assessment lists Debris/Floatables/Trash as a potential pollutant.
- **Category 4c:**
  - Lower Susquehanna Mainstem Assessment Unit ID MD-02120201. This assessment lists changes in depth and flow velocity below the Conowingo Dam as cause for listing in Category 4c.
- **Category 5:**
  - Conowingo Reservoir Assessment Unit MD-02120204. This assessment lists PCB in fish tissue as cause for listing in Category 5.
  - Conowingo Reservoir Assessment Unit MD-02120204. This assessment lists phosphorus totals as cause for listing in Category 5.

Further, we understand that Maryland has maintained a two-tiered approach to data sources when creating the Report. Tier 1 data is used to determine impaired Category 5 waters that may require a TMDL or other regulatory actions. Pursuant to the Report, waters subject to Tier 1 data quality standards, require a Quality Assurance Project Plan and the data collection be consistent with Maryland's Assessment Methodologies. However, as explained further below, Table 3 of the Report shows a lack of water quality data sources for PCB's and phosphorus totals to the Conowingo Pond. (pp. 20-24).

IV. CATEGORY 3 – DEBRIS/FLOATABLES/TRASH

A new Category 3 listing is included in the draft 2018 IR for debris/floatables/trash in Conowingo Reservoir. Excessive debris that collects upstream of the Dam is presented as potentially impacting attainment of the water contact sports designated use of the Reservoir. By definition, a Category 3 listing indicates that there are insufficient data to determine whether standards are being met, and the data in support of this listing in the IR are identified as "anecdotal" (p. 39).

Debris in the Reservoir is a basin-wide problem. River-borne debris in the Reservoir originates upriver and must be managed at its source. Conowingo Dam receives variable volumes of debris on an annual basis. Natural debris in the Reservoir is typically large woody accumulations along the river shoreline or behind the dam; isolated logs within the river or stranded on exposed substrates during lower flows; and accumulations of woody debris behind and within tributary culverts. Large tree limbs or entire trees often take a long time to degrade and may be floating but partially submerged. Artificial debris, derived from human activities, include tires, metal and plastic drums, bottles and containers, shoreline structures, boats, lumber, appliances, furniture, garbage, etc. The largest quantities of debris are delivered to the Lower Susquehanna River during high flow events from forested areas.

Exelon conducted an analysis of the source areas for debris in the Lower Susquehanna River and the hydrological conditions that control debris transport to the Dam.[23] The factors that determine the amount of debris in the Reservoir are: 1) river flow in relation to the project hydraulic capacity of each of the three upstream hydroelectric facilities (Holtwood, Safe Harbor, and York Haven) and 2) contributing drainage area. The attached table illustrates how the quantity of debris reaching Conowingo Dam is a combination of the varied hydraulic capacities of upstream facilities and changing contributing watershed areas[24]. Debris reaches the Reservoir from the upriver mainstem when hydraulic capacities of the upstream dams are exceeded, or from the Reservoir's adjacent 314 square mile watershed.

The York Haven project is run-of-river with a small hydraulic capacity of 16,000 cfs. Debris reaching York Haven from the upstream watershed passes over the facility or is sluiced downstream. Debris collection and removal at York Haven is limited. When the hydraulic capacity of York Haven is exceeded most of the debris is spilled over the project's two dams. Safe Harbor is a peaking facility with a maximum turbine hydraulic capacity of 110,000 cfs. Debris passes Safe Harbor when flows exceed its hydraulic capacity. Thus, until a river flow of 110,000 cfs is exceeded, the debris passing York Haven is trapped at Safe Harbor.

Holtwood is also a peaking facility with an approximate hydraulic capacity of 62,100 cfs. Thus, for debris originating upstream of Holtwood Dam to reach Conowingo Dam, river flows must exceed 62,100 cfs. Until Safe Harbor's hydraulic capacity of 110,000 cfs is exceeded, the material trapped at Holtwood originates from the watershed of its reservoir, Lake Aldred.

The maximum hydraulic capacity of the Conowingo powerhouse is 86,000 cfs. When this flow is exceeded water and debris are carried through dam gates, over the dam spillway and downstream. When river flows are below 62,100 cfs, the debris reaching and trapped at Conowingo comes from the immediate Conowingo Reservoir watershed. When river flow exceeds the Holtwood hydraulic capacity (62,100 cfs), yet remains below Conowingo's hydraulic capacity (86,000 cfs), debris from both the Lake Aldred and Conowingo Reservoir watersheds will be trapped at Conowingo. This same material will pass Conowingo only when 86,000 cfs is exceeded.

Maryland has two final TMDL's for debris and trash.[25] In both cases the TMDL target is 100% removal of a baseline load calculation. MDE's guidance for the implementation of debris/trash TMDLs encourages in-land/upstream source reduction measures by source

[23] URS Corporation and Gomez and Sullivan Engineers. 2012. Debris management study (RSP 3.14). Kennett Square, PA: Exelon Generation, LLC

[24] This table has been revised from Table 4.3-1 of RSP 3.14 to reflect the increase in the hydraulic capacity of Holtwood Dam to approximately 62,100 cfs.

[25] Total Maximum Daily Loads of Trash for the Anacostia River Watershed, Montgomery and Prince George's Counties, Maryland and the District of Columbia. Final. Maryland Department of the Environment. August 2010.

Total Maximum Daily Loads of Trash and Debris for the Middle Branch and Northwest Branch Portions of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Baltimore City and County, Maryland. Final. Maryland Department of the Environment. December 2014.

elimination and cleanup/removal activities, including in-stream interception controls to trap and remove trash.[26]

Conowingo Dam operations are affected by debris and Exelon has a program of debris management that includes in-stream interception controls to trap and remove debris/trash. Trash racks that protect intakes and generating units intercept and trap debris/trash. Debris/trash that collects on the trash racks are cleared and removed from the river. Similarly, debris/trash that collects in the forebay are collected and removed to maintain unrestricted flow to turbine units. In addition, Exelon removes debris from the lower sections of the Reservoir throughout the boating season to support safe recreation. Additionally, Exelon sponsors community-based clean-ups in the Reservoir and downstream of the dam, for example, the annual Susquehanna River Cleanup Day. For the annual Cleanup Day Exelon places dumpsters in nine areas around the Reservoir and typically pulls out nine 30-cubic yard dumpsters or more of debris.

Personnel at Conowingo clear debris by two general methods: (i) by operating one of the three gantry cranes stationed on the head works with a clamming attachment to remove debris blown against the dam; and (ii) by operating a new skimmer boat purchased in 2011, which is used to remove debris on the pond in the vicinity of the dam. All debris management activities must take place under safe low flow conditions. Debris is never intentionally diverted over the spillway at Conowingo.

The Susquehanna River Basin Commission ("SRBC") asserted floating debris passing down the Susquehanna River was an issue of concern during Conowingo's last relicensing.[27] In that proceeding, the Susquehanna Power Company ("Susquehanna Power") and the Philadelphia Electric Power Company ("PECO") (referred to jointly as "Licensee")[28] committed to cooperate in "an overall cooperative debris removal and management program among the licensees of the licensed projects on the Susquehanna River."[29]

FERC agreed, finding that "a cooperative debris removal and management program is required for the Susquehanna River licensed projects."[30] According to FERC:

> The removal of debris is the proper responsibility of a licensee in the interests of public safety and project operation. We cannot state, however, that regardless of the magnitude or source of the debris, a licensee must bear the complete expense and responsibility for the removal of all floating debris. Should the debris problem be of such a magnitude that substantial expense would be involved in its removal, that burden should be allocated among all concerned parties including the licensees and proper government agencies.[31]

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[26] Guidance for Developing Stormwater Wasteload Allocation Implementation Plans for Trash/Debris Total Maximum Daily Loads. Final. Maryland Department of the Environment. May 2014.
[27] *Susquehanna Power Co.*, 19 FERC ¶ 61,348, at p. 61,685 (1980).
[28] PECO was the prior owner of the Conowingo Dam prior to Exelon 2001 restructuring.
[29] *Id.*
[30] *Id.*
[31] *Id.*

As a result, Article 41 of the current license for Conowingo requires the Licensee to conduct a study to determine both the magnitude and an appropriate plan for disposition of river borne debris in consultation with the U.S. Army Corps of Engineers ("Corps") and the SRBC and in cooperation with the licensees for Holtwood, Safe Harbor, and York Haven. The results of that study were to be filed within two years of license issuance (*i.e.* by August 14, 1982).

On August 16, 1982, the Licensee submitted this Debris Management Study which was jointly prepared by the licensees for the Conowingo, Holtwood, Safe Harbor, and York Haven projects. It concludes that "a workable and economically feasible plan for debris removal at one of the licensed projects with participation only by the licensees is not obtainable and that any further attempt to develop that type of cooperative plan is unwarranted." Debris Management Study at 2-8. This is because "the debris problem is caused by the vast debris contributing area upriver from the four hydroelectric projects" and "[f]acilities are not available at any of the four projects to collect and remove a significant quantity of debris." The licensees concluded that an effective debris management plan could only be developed under the direction and sponsorship of one of the governmental agencies, would need to involve many others (*e.g.*, county and township), and would have to emphasize debris removal throughout the entire watershed through enforcement of existing laws or other means.

On February 26, 1999, FERC asked the Conowingo and Safe Harbor licensees to describe their then-current procedures for removing debris from the Susquehanna River. Based on an October 6, 1999 letter, described below, it appears that FERC's review of these projects' debris management programs was initiated at the request of Maryland because of the extensive amounts of river-borne debris that passed through those projects in January 1999.

On March 24, 1999, the Licensee submitted a letter describing its then-current practices regarding debris management at Conowingo. The licensee indicated that the Conowingo debris plan at that time consisted of removing debris that collected behind the dam in support of both recreation activities and electric generation.[32] At the time, PECO conducted debris removal beginning in late spring and continuing throughout the recreation and boating season.[33] Debris removal was performed by a self-propelled United Marine "Skimmer" that was purchased by Susquehanna Power in 1992.[34] PECO indicated that this program had been in effect since 1988.[35]

The March 24 letter cites the Debris Management Study as the last "comprehensive report" on Conowingo's debris management program, and notes that the Debris Management Study concluded that "the most effective method to reduce debris affecting the Lower Susquehanna River Basin and the Chesapeake Bay is at the source."[36] According to the letter, "[r]emoving debris at the source requires the design, implementation, and regulation of an

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[32] PECO Debris Management Letter, March 24, 1999.
[33] *Id.*
[34] *Id.*
[35] *Id.*
[36] *Id.* at 3.

effective land management program. This recommendation is in alignment with the [SRBC] public education brochure entitled 'Debris Management in the Susquehanna River Basin.'"[37]

In an October 6, 1999 letter to the Conowingo and Safe Harbor licensees, the Director of the Division of Licensing and Compliance of FERC provided a brief overview of the procedural history of the debris issue.[38] The October 6 letter notes that Congress included in the 1999 Water Resources and Development Act a provision authorizing the Corps to conduct a study of how to best control and manage debris in the Susquehanna River Basin and upper Chesapeake Bay.[39] According to the letter, the Corps was waiting for appropriations to begin its study.[40]

The October 6 letter recommends that the licensees consider updating their debris management plans to reflect their then-current practices.[41] However, FERC staff indicated that "any such revisions should wait until after the Corps completes its basin-wide study."[42] There is no indication that a basin-wide debris study by the Corps occurred following the October 6 letter.

In Exhibit E of Exelon's Final License Application to FERC it is stated that Exelon "employs a substantial debris management program which includes clamming (with three gantry cranes with grapple attachments) to remove submerged debris from the area upstream of the powerhouse intakes as well as floating surficial debris in front of the dam powerhouse intakes. In addition, Exelon sponsors community-based clean-ups in the pond and downstream of the dam." Exelon also noted that it "acquired a new skimmer in 2011" and that "when set-up is complete, it will also be used to remove debris in front of the dam."

The Shoreline Management Plan filed with the Conowingo Final License Application sets forth Exelon's plan for addressing woody debris, which the Shoreline Management Plan defines as "trees and woody material that extend from the shoreline into the impoundment."[43] The Shoreline Management Plan states that if the debris is determined, on a case by case basis, to be a navigational or safety hazard it will be removed.

In the 2015 (March) FEIS of the Conowingo Project (FERC/FEIS-0255F) FERC accepts Exelon's proposal to manage debris with some recommendations. Exelon's proposed debris management measures are clamming (with three gantry cranes with grapple attachments) to remove submerged debris from the area upstream of the powerhouse intakes and floating surficial debris in front of the powerhouse intakes, and sponsoring community-based clean-ups in the pond and downstream of the dam.

In summary, the source of debris/trash that reaches the Reservoir is upstream and the operations of upstream dams control the release of debris/trash to the Reservoir. Exelon does its part to intercept, trap, and remove debris and trash.

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[37] *Id.*
[38] Debris Management Letter from FERC to PECO, October 6, 1999.
[39] *Id.* at 2.
[40] *Id.*
[41] *Id.*
[42] *Id.*
[43] Shoreline Management Plan at 6-2

V. CATEGORY 4C – FLOW ALTERATION DOWNSTREAM

A. Changes from Natural Flow Regime

The Report incorrectly list the water segment downstream of the Conowingo Project in Category 4c and declines to take into account relevant data that contradicts the Reports determination. MDE invokes the testimony of Genevieve Larouche (USFWS) before the Senate Environment and Public Works Subcommittee on Water and Wildlife: "Currently at the Conowingo Dam, flow releases are lowest during the winter and spring months and highest in July and August. Daily maximum releases are equivalent to seasonal flood flows. There is no limit to the rate of rise or fall of water between minimum and maximum releases. These unnaturally rapid changes in water levels impact migratory fish by interrupting migratory cues, lengthening migration times, stranding fish, and reducing suitable habitat." An important point of context that the testimony fails to acknowledge is the existence of two peaking hydroelectric plants upstream of the Conowingo Project that can greatly influence inflow to Conowingo Pond.

The two plants located between Conowingo and the Marietta USGS gage (Safe Harbor and Holtwood) have minimal or no continuous flow release requirements at any point in the year, and frequently provide no Conowingo Pond inflow for extended periods under some conditions. The Safe Harbor Project (Safe Harbor) has no minimum flow requirement, and can generate at up to 110,000 cfs.[44] Holtwood, located immediately downstream of Safe Harbor and immediately upstream of the Conowingo Project, must continuously release 800 cfs or net inflow if releases from Safe Harbor are less than 800 cfs.[45] Therefore, due to the "or net inflow" component of Holtwood's minimum flow requirement, when Safe Harbor shuts down flow releases, Holtwood effectively also has no continuous flow requirement. Under the Conowingo Project's existing flow regime and the currently proposed flow alternatives considered as part of the FERC licensing process, the Conowingo Project must pass the seasonal minimum flows (or Marietta inflow, if less) on an instantaneous basis, regardless of actual inflow to Conowingo Pond, even if the upstream projects are releasing little or no water. As a result, the storage capacity of Conowingo Pond is depleted, and the ability of the Conowingo Project to provide higher minimum flows or even a run-of-river operation is greatly diminished due to the lack of minimum flows and flow manipulation at the upstream Projects.

The Report states that Conowingo Project's flow regime significantly impacts downstream habitat. Exelon conducted substantial instream flow and habitat analyses of the river reach below Conowingo Dam during the FERC licensing process. That information is being provided as part of this submittal to help support MDE in its development of the Integrated Report. Exelon has also conducted two-dimensional modeling of the reach downstream of the Conowingo Project[46]. As part of that effort detailed habitat maps for various species and

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[44] Safe Harbor's operating capacity of approximately 110,000 cfs is approximately 24,000 cfs greater than Conowingo Dam's maximum operating capacity of 86,000 cfs.

[45] Holtwood must also release, on a daily basis, 98.7 percent of the Conowingo Project's minimum flow requirement or net inflow if Safe Harbor releases are less than that.

[46] Gomez and Sullivan Engineers and Normandeau Associates. 2012. Instream Flow Habitat Assessment below Conowingo Dam (RSP 3.16). Kennett Square, PA: Exelon Generation, LLC.

lifestages were developed. These maps, along with the persistent habitat maps, visually show the location and quality of habitat downstream of the Conowingo Project, providing context that is not clear in strictly numerical total habitat analyses. This is important when analyzing flow issues, as the maps allow one to quickly assess how habitat changes in quality and location over a range of flows, thus assessing the total available (or potentially available) habitat in context. This is particularly important when considering persistent habitat.

While each species and lifestage has different preferences, Exelon determined the maps showed that under various flow regimes:

1. Habitat would remain generally unchanged throughout the reach below Conowingo Dam for most species due to the predominance of bedrock substrate.[47] This is primarily due to the predominantly bedrock substrate, as most of the species evaluated have a low preference for bedrock substrate.[48]

2. Quality habitat (combined suitability[49] ≥ 0.5) remains very limited for most species, and is usually confined to fairly small areas of the river, such as downstream of Rowland Island and around the complex of islands in the tidally-influenced area near Spencer Island.

As an example of this, Figures 1 through 3 on the following pages show habitat maps for the American shad spawning lifestage, shortnose sturgeon spawning lifestage and for caddisfly (a macroinvertebrate species). The maps show that there is a relatively limited amount of high-quality habitat in the entire river reach for these species/life stages over the operational flow range of the Conowingo Project.

[47] Striped bass appear to be the one exception to this, as they prefer bedrock substrates and thus have high quality habitat throughout the river at a range of flows.
[48] As noted in RSP 3.15 (Sediment Introduction and Transport Study), "Historical information and geological data suggest that prior to construction of Conowingo Dam the river had great enough energy and stream power throughout the Project area to sustain a mobile bedload with little sediment deposition until the river mouth was reached." This indicates that the reach below Conowingo Dam has likely been a primarily bedrock channel since before Conowingo Dam was constructed.
[49] Habitat is generally described for a given species/life stage using a 0 to 1 scale. A suitability index value of 0 indicates no habitat value, while a suitability index value of 1 indicates optimal habitat value.

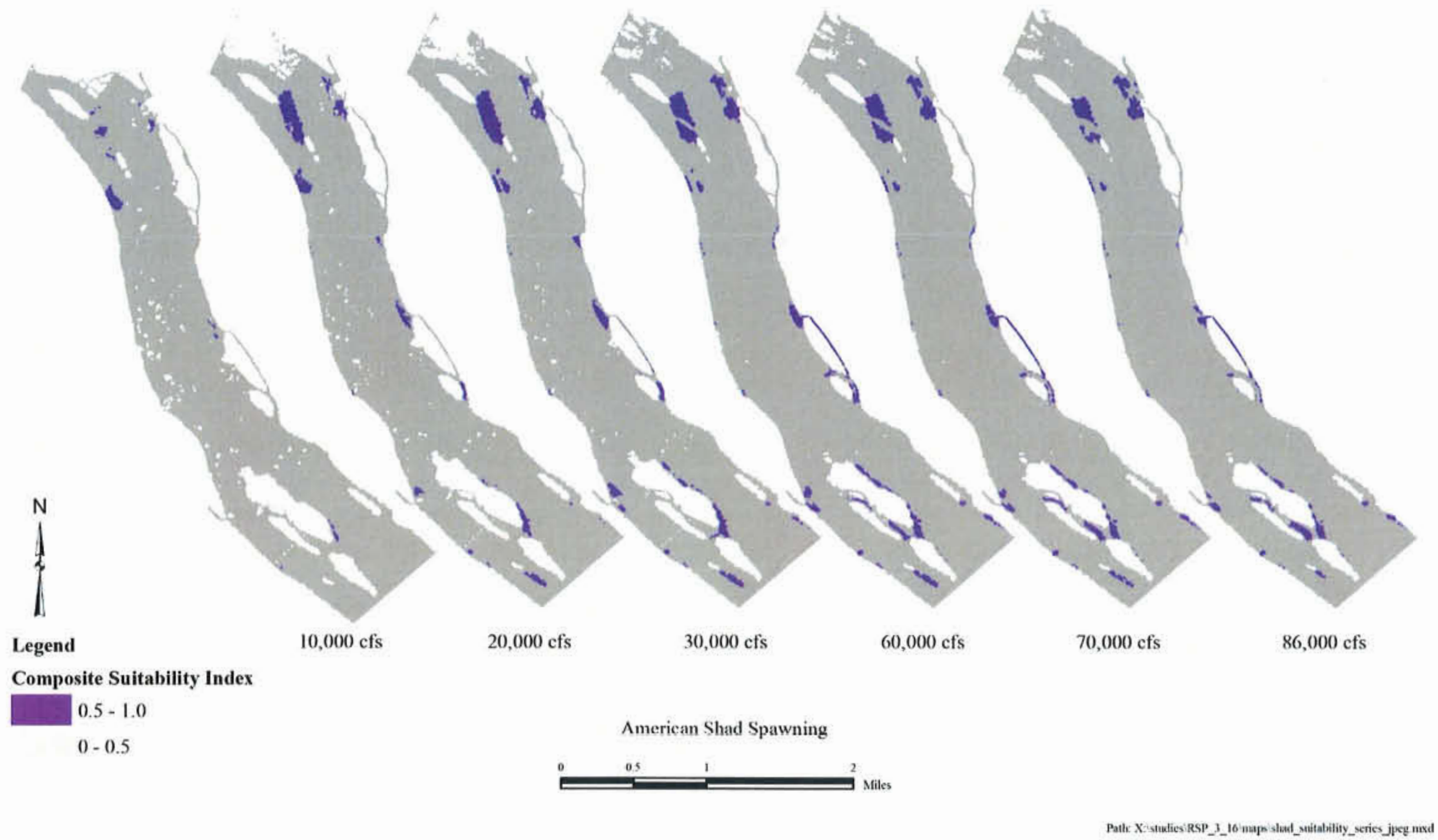

Figure 1: American Shad spawning lifestage habitat maps at various flows, a composite suitability index value between 0.5 and 1.0, indicates high quality habitat (i.e., magenta shaded areas).

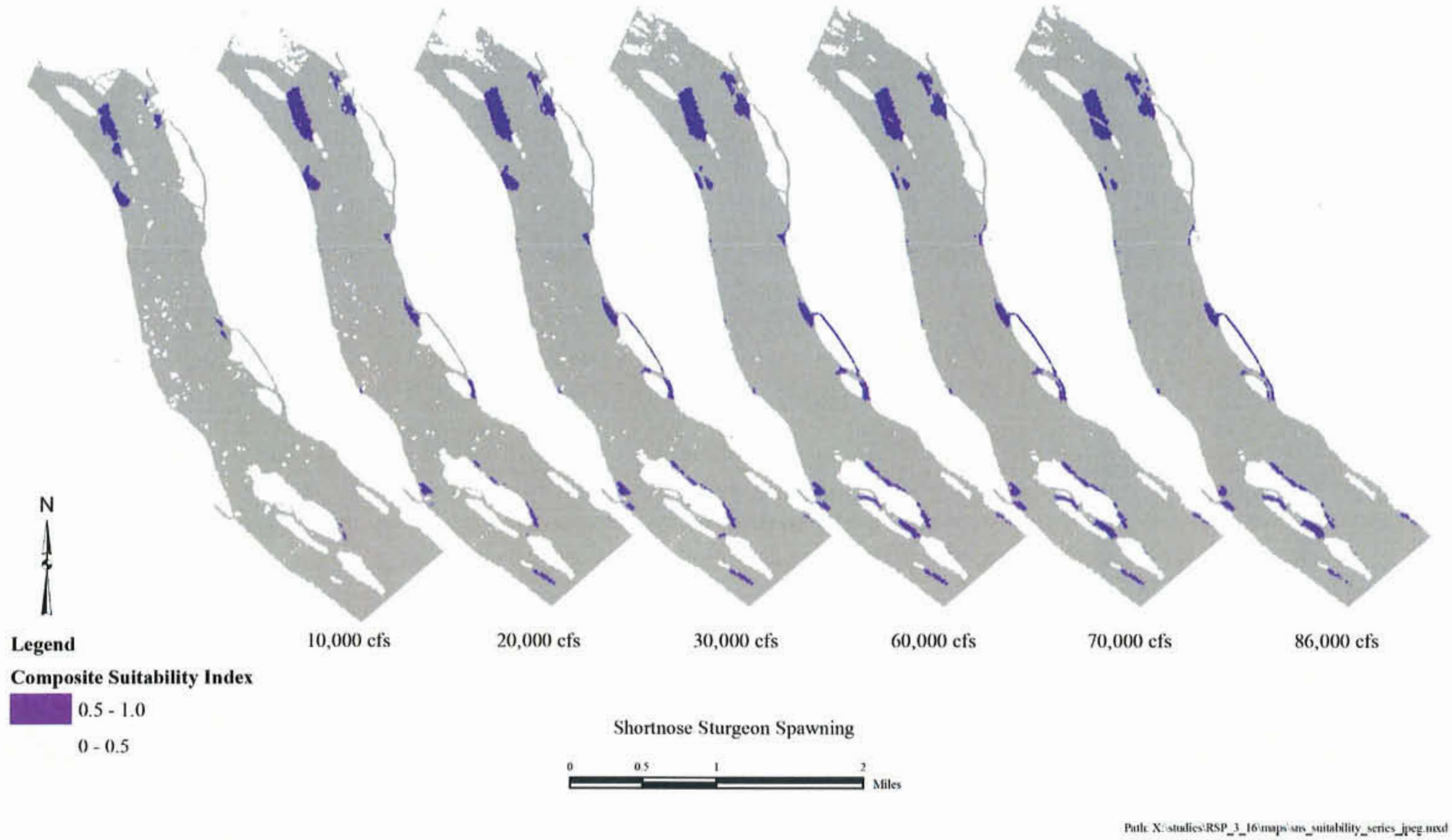

Figure 2: Shortnose Sturgeon spawning lifestage habitat maps at various flows, a composite suitability index value between 0.5 and 1.0, indicates high quality habitat (i.e., magenta shaded areas).

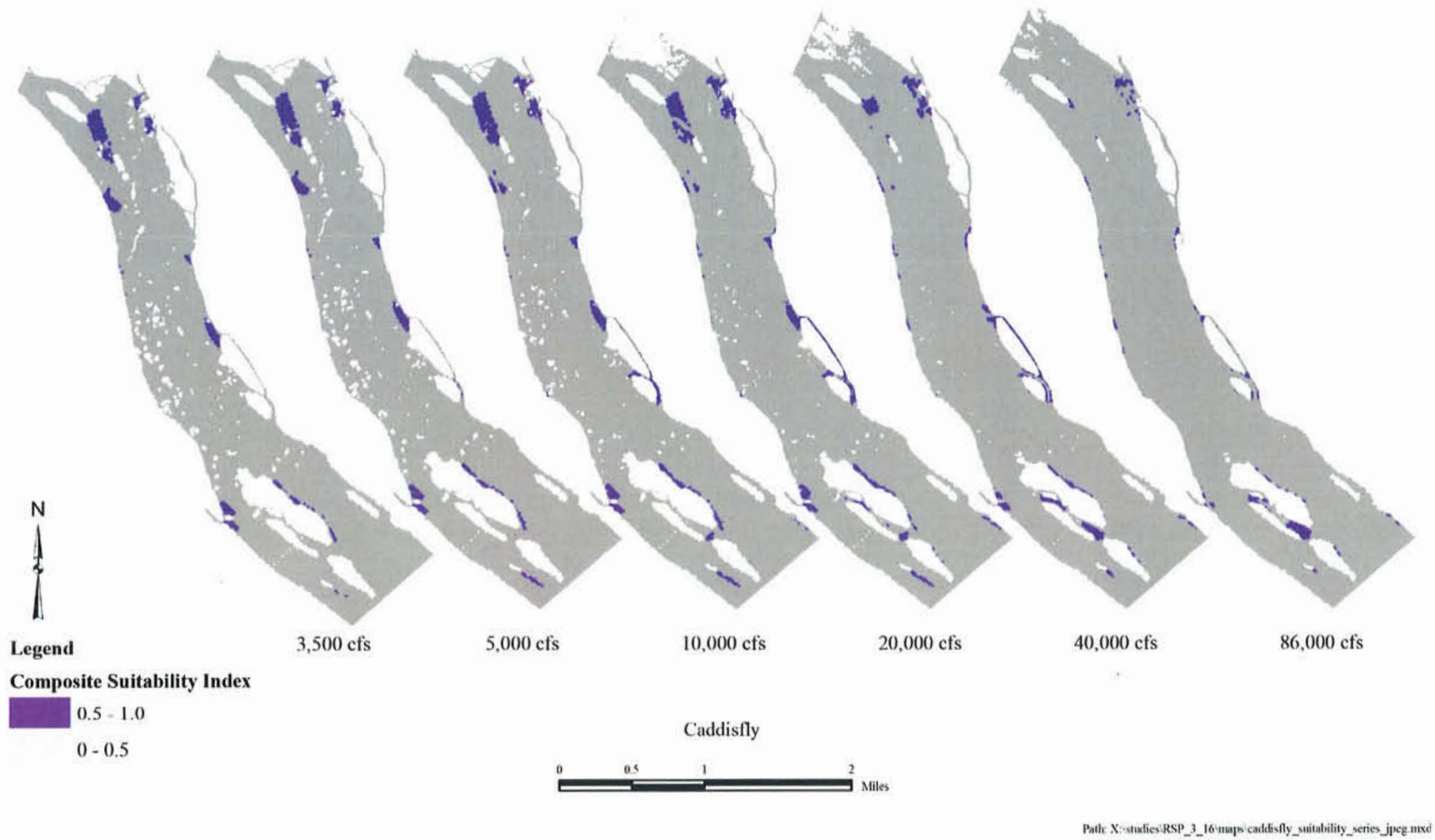

Figure 3: Caddisfly (Trichoptera) habitat maps at various flows, a composite suitability index value between 0.5 and 1.0, indicates high quality habitat (i.e., magenta shaded areas).

The current flow regime below Conowingo Dam meets the designated use categories for fishing as well as growth and propagation of fish as evidenced by Exelon's licensing studies, which show that both historic and current fish population data collected within Conowingo Pond and in the Susquehanna River below the Conowingo Project are indicative of a healthy and robust fishery. In addition, data from creel surveys of Conowingo Pond[50] and the Lower Susquehanna River[51] clearly indicate a strong and healthy year-round sport fishery.

B. Fish Migration

MDE discusses diadromous fish passage issues at Conowingo Dam and states that "Dam operations interrupt migratory cues and lengthen migratory times".

In May 2016, Exelon and the U.S. Department of the Interior (Interior) executed a Settlement Agreement that requires Exelon to make significant investments in fish passage measures during the term of the new license to address migratory fish passage issues at the Project. The cornerstones of the Settlement Agreement are a trap and transport program designed to jump start American shad population growth, a suite of improvements upon issuance of the new license, and an adjusted passage efficiency formula that informs the timing of additional capital investments in volitional fish passage facilities to accommodate the growth of the American shad population.

In addition to jump starting the recovery of the American shad population, the trap and transport program is designed to hedge the risk posed to the American shad population if upstream facilities fail to increase their passage efficiencies. Supplementing the Conowingo Project's volitional passage facilities with a trap and transport program allows for greater benefits for the American shad population than volitional passage alone. That is because a trap and transport program ensures that significant numbers of American shad will reach suitable spawning habitat, even if the fish passage facilities at Holtwood, Safe Harbor, and/or York Haven are underperforming or unexpectedly taken out-of-service.

The adjusted passage efficiency formula, which will be used to establish the Conowingo Project's upstream passage efficiency, begins with the passage efficiency of the volitional passage facilities at the Conowingo Project and adjusts that passage efficiency to reflect a credit that Exelon receives for its trap and transport program.[52] After Exelon completes the initial upgrades identified in the Settlement Agreement, if the calculated upstream passage efficiency for the Conowingo Project is below 85 percent, then the Settlement Agreement requires Exelon to invest in additional fish passage measures including the construction of a new volitional West Fish Lift facility and additional entrance galleries at the existing East Fish Lift. While the value of the "credit" is likely to be significant in the early years of the new license, the credit diminishes over time as the population increases.[53] Therefore, it is contemplated that Exelon will

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[50] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Conowingo Pond creel survey (RSP 3.25A).

[51] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Lower Susquehanna River creel survey (RSP 3.25B).

[52] Settlement Agreement, Attachment A (Modified Prescription for Fishways), at Appendix B.

[53] The trap and transport credit formula incorporates as an input the total population of American shad below Conowingo Dam. As the American shad population increases, the value of the trap and transport credit diminishes.

make additional investments in volitional passage facilities over the mid-to-latter part of the new license.

The adjusted passage efficiency ensures that additional improvements are commensurate with passage efficiency shortfalls and reflect anticipated growth in population levels through a diminishing trap and transport credit. Gradual increases in population will trigger incremental improvements over time, while significant population growth will trigger more substantial improvements. Said differently, the adjusted passage efficiency guarantees that additional volitional fish passage facilities are implemented when they are needed.

In addition, as part of the Settlement Agreement, Exelon will construct and maintain structures to provide American shad and river herring a zone of passage below Conowingo Dam to enhance the ability of these species to access the fish lifts at the Project.

Exelon also has committed to trap and transport American eels at the west side of Conowingo Dam, and consistent with the Eel Passage Plan established by the Muddy Run Pumped Storage Project (P-2355) license, evaluate potential trapping locations for American eel on the east side of Conowingo Dam including Octoraro Creek. Accordingly, Exelon constructed the Conowingo Eel Collection and Holding Facility and began its first year of operation in May 2017. A total of 122,300 juvenile eels were collected at the facility for eventual transport upstream during the 2017 season[54]. In addition, the temporary Octoraro Creek Eel Collection Facility, which was installed in 2015 for a three evaluation period, captured a total of 11,347 juvenile eels during the 2017 season[55]. At the conclusion of the three year (2015-17) evaluation period, Exelon determined the facility to be successful. In a March 1, 2018 issuance, FERC acknowledged Exelon's determination of a successful evaluation period, and ordered Exelon to consult with the Pennsylvania Department of Environmental Protection (PADEP) to determine a schedule to install and operate a permanent eel trapping facility at the Octoraro Creek location.

C. Fish Stranding

MDE asserts that "during the 2011 spawning migration, an estimated 1,400 American shad (about 6 % that passed that year) and more than 500 river herring were stranded as a result of hydropower operations" and MDE concludes "that an estimated 420,000 fish may have been stranded over the course of the year".

There is no evidence that stranding is having an adverse impact on migrating and resident fish populations. Exelon's surveys revealed that stranding affects very few migratory fish. In fact, during the four stranding studies within and just downstream of the spillway reach below Conowingo, only 108 stranded American shad were observed.[56] Of those American shad observed as stranded, only 46 were observed dead. In 2010, MDNR estimated that there were between 65,286 and 147,679 American shad in the tailrace below Conowingo; thus, the observed

[54] Normandeau Associates and Gomez and Sullivan Engineers. 2018. Conowingo Eel Collection Facility, Muddy Run Pumped Storage Project.
[55] Normandeau Associates and Gomez and Sullivan Engineers. 2018. Evaluation of Temporary American Eel Collection Facility in Octoraro Creek (Year 3), Muddy Run Pumped Storage Project.
[56] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Flow ramping and stranding study (RSP 3.8). Kennett Square, PA: Exelon Generation, LLC.

fatalities represent between 0.0007 percent and 0.000003 percent of the total American shad available for passage.

Moreover, both historic and current fish population data collected within Conowingo Pond and in the Susquehanna River below the Conowingo Project document the existence of a healthy and robust fishery. In addition, data from creel surveys of Conowingo Pond[57] and the Lower Susquehanna River[58] clearly indicate a strong and healthy year-round sport fishery.

Long-term fish collections at the Conowingo Project's East and West Fish Lifts are dominated by gizzard shad, channel catfish, common carp, and white perch, and are similar to those observed in electrofishing, gill net, and ichthyoplankton sampling conducted below the Conowingo Project during the 1980s.[59]

Since the 1970s, some changes to the fish species assemblage are evident. Specifically, gizzard shad have trended upward in abundance, while some other species have declined. White crappie catches at the West Fish Lift have declined substantially since the mid-1970s, and it has been noted that one of the primary mechanisms of low recruitment of white crappie is the competition for zooplankton with juvenile gizzard shad.[60]

In 1997, 1999, and 2001, significant catches of blueback herring were made at the Conowingo Project's East Fish Lift. Since 2002, however, very few blueback herring have been passed. This decline likely reflects recent population declines coast-wide due to a number of potential causes including habitat loss, targeted or bycatch in commercial fisheries, and increased numbers of striped bass and other predators.[61]

Aside from the aforementioned changes in the fish population segments, the fish species assemblage has remained diverse below the Conowingo Project with the same core group of species as was observed in the 1980s. The fish lift catches have ranged from 30 to 49 taxa annually at the West Fish Lift and 25 to 45 taxa annually at the East Fish Lift. The length/weight relationship of several species recently collected at the West Fish Lift was similar to those collected from 1982 to 1987. Both the 1980s fish collections and those collected in 2010 were comparable to those from other normal, natural populations and are indicative of relatively favorable conditions and habitats in the lower Susquehanna River.[62]

D. Northern Map Turtles

Since 2008, Exelon has funded several studies related to Northern Map Turtles in the Susquehanna River above and below the Conowingo Project. These studies were conducted by researchers from Towson University and addressed several aspects related to habitat use,

[57] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Conowingo Pond creel survey (RSP 3.25A).
[58] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Lower Susquehanna River creel survey (RSP 3.25B).
[59] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Characterization of Downstream Aquatic Communities (RSP 3.18).
[60] Normandeau Associates. 1994. Analysis of potential factors affecting the white crappie population in Conowingo Pond.
[61] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Characterization of Downstream Aquatic Communities (RSP 3.18).
[62] Normandeau Associates and Gomez and Sullivan Engineers. 2012. Characterization of Downstream Aquatic Communities (RSP 3.18).

population assessment, nesting and basking use, as well as pilot studies related to improving nesting (*i.e.*, brush clearing) and basking habitat (*i.e.*, artificial basking structures). Exelon does not believe that the Conowingo Project is adversely affecting the Northern Map Turtle population in the Susquehanna River.

According to MDE, "During peak generation flows, endangered map turtles are adversely impacted by the inundation of basking habitat which is critical to adult reproductive growth. Peaking flows have reduced basking activity by an estimated 50% and impairs short and long term map turtle movements". (Richards and Seigel 2009)

The literature MDE cites, however, does not appear to support these claims. While Richards and Seigel (2009) found that high flows drastically alter habitat, they did not conclude that basking habitat is reduced by "an estimated 50 percent.[63] And Richards-Dimitrie (2011) explicitly found that "high flow rates do not seem to be hindering movement . . ."[64] Moreover, studies funded by MDNR and Exelon from 2008 found that the greatest threats to the Maryland Northern Map Turtle are predation and human disturbance. Specifically, these studies determined that Northern Map Turtle nesting occurs along relatively open areas on both in-river islands, along the banks of Octoraro Creek and Deer Creek, and in the town of Port Deposit from May-July, but that nesting areas are heavily disturbed by humans and most nests (up to 100 percent in some years) are destroyed by predators.[65] Also, human recreation, such as jet-skies, slow-moving or moored fishing boats, fast-moving fishing boats, kayaks and canoes, and swimmers, and individuals floating on inner tubes, often disturb Northern Map Turtle basking activities.

E. General Impacts to Substrate

MDE asserts that "The Conowingo Dam traps a large portion of coarse sediments above the dam, effectively starving the downstream waters of habitat-forming bottom gravel and sediments. According to the TNC, lack of sediment along with peaking extreme high flows results in a loss of available habitat for organisms that require these habitats including mussels, SAV, EAV, etc. (TNC) Additionally, since excess sediment is stored upstream of the dam, high flow scouring events have the potential to deliver large pulses of sediment (and associated nutrients) downstream that can have significant negative impacts to biological resources."

As noted in RSP 3.15 (Sediment Introduction and Transport Study), "Historical information and geological data suggest that prior to construction of Conowingo Dam the river had great enough energy and stream power throughout the Project area to sustain a mobile bedload with little sediment deposition until the river mouth was reached." This indicates that the reach below Conowingo Dam has likely been a primarily bedrock channel since before Conowingo Dam was constructed.

F. Macroinvertebrates

[63] Richards and Seigel (2009)
[64] Richards (2011) at 30; *see also id.*at 2 ("high flows from the dam . . . may not heavily impact movement of turtles.")
[65] Seigel, Richards et al. Effectiveness of Nest Site Restoration for the Endangered Northern Map Turtle. (2016).

MDE states that "Below the Conowingo Dam, the macroinvertebrate community is characterized as hydrologically impaired (TNC) and is dominated by taxa tolerant of poor habitat".

During 1980 through 1991 a series of quantitative benthic studies were conducted in the Susquehanna River in the tailrace and non-tidal waters below Conowingo Dam to determine a flow release schedule sufficient to maintain healthy fish and macroinvertebrate communities. A cumulative total of 71 taxa was collected and identified. The 1988 through 1991 study years produced a total of 115 invertebrate taxa.

Community density estimates were near 2,000 individuals per m^2. Density estimates taken in deeper water were higher, near 13,000 individuals per m^2. These results were used as a basis to characterize the community as moderately dense. During the final two years of study density increased to near 18,000 and 20,000 per m^2 after the current flow schedule below the Project was instituted.

Most of the genera identified from the studies possess some adaptation to water level fluctuation and low dissolved oxygen concentrations. Review of the tolerance indices listed shows only 8 of 71 genera with values of 3 or less, the range used to denote sensitive (intolerant) taxa. Although tolerance indices are assigned to invertebrate taxa more according to their ability to adapt to chemical degradation than for habitat instability caused by changes in water levels.

The fishery below Conowingo Dam is robust, suggesting that the invertebrate populations provide an adequate food base. The fish also appear be in good condition. The invertebrate data collected during the later years of the tailrace studies showed observable increases in community density, after much of the current release schedule had become operational. However, it seems unlikely that the community composition has changed appreciably, given the overall basin-wide water quality and habitat constraints imposed upon.

G. Mussels

In the 2015 (March) FEIS of the Conowingo Project (FERC/FEIS-0255F) FERC analyzed Exelon's studies[66] conducted during the relicensing process and concluded that reducing flow fluctuations below Conowingo Dam would only provide a limited benefit to mussel populations, and impacts from high shear stress would still occur below Conowingo Dam during naturally occurring high-flow events.

VI. CATEGORY 5 – CONOWINGO POND TOTAL PHOSPHORUS AND PCBs IN FISH TISSUE

A. Total Phosphorus

A new Category 5 listing is included in the draft 2018 IR for Total Phosphorous (TP) in Conowingo Reservoir. Maryland does not have water quality criteria for nutrients, thus,

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[66] Gomez and Sullivan Engineers and Normandeau Associates. 2012. Instream Flow Habitat Assessment below Conowingo Dam (RSP 3.16). Kennett Square, PA: Exelon Generation, LLC.

surrogates are used as indicators of excess nutrient loading. Nutrients are managed indirectly by limiting the effects of excess nutrients as suggested by algal growth and low DO. In impoundments, chlorophyll *a* concentrations are used as the surrogate and Maryland has established chlorophyll *a* guidelines for water-supply reservoirs.[67] Chlorophyll *a* criteria applicable to public water supply reservoirs with a I-P designated use are specified in Appendix A.

The IR states "recent data collected by the Department has demonstrated exceedances of the chlorophyll *a* criteria in the Conowingo Reservoir, indicating that excess total phosphorus levels have accumulated in the Reservoir along with the sediment." (p. 39). This statement indicates that MDE believes phosphorus associated with bottom sediment in the Reservoir is released to the water column, is bioavailable, and is a nutrition source for algal growth.

Exelon questions the rationale and conclusions regarding TP impairment in Conowingo Reservoir for the following reasons.

1. Conowingo Reservoir is not a lake

The Susquehanna River Basin Commission (SRBC) conducted a focused water quality monitoring study of the three hydroelectric reservoirs in the Lower Susquehanna River in April-October 2012.[68] Water quality data included temperature, dissolved oxygen, and chlorophyll *a*. SRBC reports no vertical stratification of these parameters in the reservoirs. Because these reservoirs do not function strictly as lakes, the SRBC report concludes that the evaluation of nutrients in this system is not straightforward:

> There can be a discrepancy in how to evaluate nutrient impairment in these types of reservoirs that have relatively short residence times, are not stratified, and have a large variability in water level throughout the day, yet cannot be classified as run-of-the-river pools because of the presence of the large dams. (p.8)

While the Conowingo Dam slows river flow in this reach of the river, its residence time remains short. Residence time is a measure of the flushing capability of a waterbody and a short residence time indicates that nutrients in the water column can be quickly removed from the system. "A short hydraulic residence time can reduce the time available for plant growth and result in less accumulation of biomass."[69] The SRBC report notes that none of the reservoirs always meets the Pennsylvania water quality standards criterion for a lake, pond, or impoundment of a 14-day residence time.

2. Insufficient data

[67] Guidelines for Interpreting Dissolved Oxygen and Chlorophyll *a* Criteria in Maryland's Seasonally Stratified Water-Supply Reservoirs. Revised Appendix 11.3 of State of Maryland's Comprehensive Water Monitoring Strategy (December 2009). Revised February 2012.

[68] SRBC. 2013. A Water Quality and Biological Assessment of the Lower Reservoirs of the Susquehanna River. Lower Susquehanna River Subbasin Year-2 Focused Watershed Study. Publication 288. October 2013

[69] Ji, Zhen-Gang. 2017. Hydrodynamics and water quality: modeling rivers, lakes, and estuaries. 2nd edition. John Wiley and Sons, Inc. p. 336.

The data the IR uses to support its Category 5 determination for TP in Conowingo Reservoir are not sufficient. Under Maryland's two-tiered approach to data quality, Category 5 waters are subject to the highest data quality standard, Tier 1. Table 3 on page 22 of the IR indicates the water quality data used to assess Conowingo Reservoir are Tier I data.

It is stated on page 41 if the IR that Maryland's assessment methodologies "are designed to provide consistency and transparency in Integrated Reporting so that the public and other interested stakeholders understand how assessment decisions are made and can independently verify listing decisions." On p. 19 the IR states:

> "With the integration of sections 305(b) and 303(d) of the Clean Water Act and the adoption of a multi-category reporting structure, Maryland has maintained a two-tiered approach to data quality. Tier 1 data are those used to determine impaired waters (e.g., Category 5 waters or the traditional 303(d) List) and are subject to the highest data quality standards. Maryland waters identified as impaired using Tier 1 data may require a TMDL or other regulatory actions. These data should be accompanied by a Quality Assurance Project Plan (QAPP) consistent with EPA data guidance specified in Guidance for Quality Assurance Project Plans. Dec 2002. EPA /240/R-02/009 available at https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5. Tier 1 data analysis must also be consistent with Maryland's Assessment Methodologies."

Thus, Tier 1 data require a Quality Assurance Project Plan (QAPP) and are subject to Maryland's Assessment Methodologies. Maryland's Assessment Methodologies assess data generated by both long-term ongoing monitoring programs as well as short-term targeted monitoring efforts. Additionally, many assessments are based on data collected by state agencies, however, the state also uses Federal agencies, County governments, utility managers, and nongovernmental organizations and any other datasets from organizations to help fill in gaps.

In searching the Maryland's Water Quality Data Portal for monitoring data,[70] Exelon found chlorophyll *a* data collected from the Reservoir in 1999 but for no other years. Exelon is aware of SRBC data collected in 2012[71] and 2017 (pers. Comm. Matthew M. Stover. Chief - Water Quality Standards. March 5, 2018). Based on what appears to be a limited dataset (3 years over a 20-year time period) a larger and long-term dataset needs to be used to support MDE's Category 5 impairments.

Exelon has reviewed both the EPA QAPP data guidance document and Maryland's Assessment Methodologies document[72] but has been unable to find the QAPP for the Maryland Field Services Program which is responsible for collecting Tier I chlorophyll *a* data used to

[70] http://mde.maryland.gov/programs/Water/TMDL/MD-AWQMS/Pages/index.aspx
[71] SRBC. 2013. A Water Quality and Biological Assessment of the Lower Reservoirs of the Susquehanna River. Lower Susquehanna River Subbasin Year-2 Focused Watershed Study. Publication 288. October 2013
[72] State of Maryland's Comprehensive Water Monitoring Strategy (December 2009) and links the current methodologies MDE link at: http://mde.maryland.gov/programs/Water/TMDL/Integrated303dReports/Pages/ir_listing_methodologies.aspx.

assess the Reservoir (IR Table 3, page 22). Hence, we are unable to assess whether the data used to support the Category 5 listing for TP satisfy Tier I data quality requirements.

3. Data do not support the association of chlorophyll *a* and TP enrichment

As noted earlier, the IR statement that "exceedances of the chlorophyll *a* criteria in the Conowingo Reservoir, indicating that excess total phosphorus levels have accumulated in the Reservoir along with the sediment" implies MDE believes that nutrition source for algal growth in the Reservoir derives from internal loading. That is, phosphorus is released from bottom sediments in a bioavailable form which fuels algal growth. This is not supported by data.

The University of Maryland Center for Environmental Science conducted a state-of-the-science investigation of biogeochemical concentrations and rate processes in Conowingo Reservoir in 2015 and 2016[73]. Sediment-water exchange measurements of phosphorus were very low; and phosphorus concentrations in pore water were low. The study concluded there are low levels of phosphorus efflux from the bottom sediment. The presence of soluble reactive phosphorus (SRP) in the sediments is limited due to: 1) the presence of iron oxides to which phosphorus adsorbs and 2) the formation of iron phosphate minerals. The iron-rich sediments bind SRP. The concept that accumulated sediment in Conowingo Reservoir is an internal source of phosphorous which causes excessive algal growth to the extent that the water supply designated use is impaired is contradicted by the data.

Phosphorus known to be associated with suspended sediment delivered to Conowingo Reservoir from upstream and this should be investigated as a possible source if, indeed, it can be demonstrated that excess TP in the water column is leading to excess chlorophyll *a* (i.e., algal growth) that impacts the water supply.

In summary, Exelon believes: 1) existing data on the biogeochemistry of phosphorus in Conowingo Reservoir contradicts the conditions put forth by MDE; 2) the riverine nature of Conowingo Reservoir complicates any the assessment of nutrients in this waterbody that presumes it behaves as a lake; and 3) the data used to support the Category 5 impairment for TP is insufficient. For the following three reasons mentioned above, Exelon believes the Category 5 classification for the Conowingo Reservoir is incorrect and instead should be classified as a Category 3 within the Report.

B. PCBs in Fish Tissue

The draft 2018 IR maintains the Category 5 impairment to the fishing designated use of Conowingo Reservoir due to PCBs in fish tissue originally listed in 2008. The Category 5 waters list in F7 indicates contaminated sediment as the source of the PCBs causing the impairment. The IR indicates MDE is planning to develop a TMDL for the Reservoir in FY 2019.

[73] Cornwell, et al. 2017. The Impact of Conowingo Particulates on the Chesapeake Bay: Assessing the Biogeochemistry of Nitrogen and Phosphorous in Reservoirs and the Chesapeake Bay. UMCES Contribution TS-703-17. July 2017.

In searching the Maryland's Water Quality Data Portal for monitoring data,[74] Exelon identified datasets for PCBs in fish tissue for 2003. However, Maryland's Final 2016 Integrated Report of Surface Water Quality MDE (Part E.3 Comment-Response for the 2016 Integrated Report) states: " Since 2000, Conowingo Pool has had fish tissue monitoring data collected in 2000, 2003, 2004, 2009, 2014, and 2015." Thus, there is inconsistency between what data are available for public review and what data may have been used to support the Category 5 listing.

PCBs in fish tissue from Conowingo Reservoir are assessed in accordance with the Toxics Assessment Methodology.[75] For impoundments, this methodology dictates that assessment results are applied to the area of the impoundment surface only and fish tissue results are not to be applied to any parts of the upstream watershed. Additionally, resident species of the waterbody in question should be used to determine impairment. Hence, the sediment MDE identifies as the cause of PCB impairment appears to be the bottom sediment of the Reservoir. Available data on PCBs in Conowingo Reservoir sediment suggests that this sediment is not the causal factor for PCB levels measured in fish tissue in the Reservoir.

Addendum No. 5 to the Maryland Environmental Service's *Conowingo Capacity Recovery & Innovative Reuse & Beneficial Use Pilot Project Request for Proposal* (PROJECT ID No.1-18-3-21-8) includes chemical analyses of sediment samples at 12 sites collected in September 2017 in the Maryland portion of the Conowingo Reservoir. The data include seven PCB arochlors. The total PCB concentrations of the sediment at each of the 12 sites range 4.62 to 12.38 micrograms per kilogram (parts per billion [ppb]). The sediment screening value for total PCBs used by Maryland to screen sediments for levels of possible concern is 180 ppb.

The average concentration of total PCBs in sediments of the lower 6 kilometers of Conowingo Reservoir reported by SRBC is 44.8 ± 10.7 ppb.[76]Four of 21 locations have values over 100 ppb (less than 180 ppb) while the others generally had values of 50 ppb or less with a low value of about 10 ppb.

The draft IR does not explain MDE's contention that PCBs in fish tissue are caused by PCBs in Reservoir sediments. MDE's analysis does not establish how the data are used to support the Category 5 listing for PCBs in Conowingo Reservoir and therefore the Conowingo Reservoir appropriately categorized as Category 3.

VII. REQUIRED COST/BENEFIT ANALYSIS

Section 305(b) and associated regulations of the Clean Water Act requires Maryland to provide an estimate of the environmental, economic and social costs and benefits needed to

[74] http://mde.maryland.gov/programs/Water/TMDL/MD-AWQMS/Pages/index.aspx.
[75] Maryland's Final 2016 Integrated Report of Surface Water Quality (approved by the EPA on November 1, 2017); Methodology for Determining Impaired Waters by Chemical Contaminants for Maryland's Integrated Report for Surface Water Quality (last revised March 22, 2016; approved with the 2016 Integrated Report).
[76] SRBC Publication 239. Comprehensive Analysis of the Sediments Retained Behind Hydroelectric Dams of the Lower Susquehanna River. February 2006.

achieve the objectives of the Clean Water Act.[77] The EPA request that states provide within the Integrated Report information on investments, grants, and annual costs to the state and its local governments to administer water pollution control activities.

The Report includes Category 5 water segment listings that may result in TMDLs assigned to the Conowingo Reservoir due to PCBs and total phosphorus. These TMDLs will require costly monitoring and implementation requirements. These costs are in addition to the high cost of implementing the required Chesapeake Bay Program TMDL. The Report declines to give a detailed cost benefit analysis of such TMDL implementation.

VIII. DATA SOURCES/REFERENCES

Exelon has submitted nearly 14,000 pages of studies, reports, and other documentation in connection with its water quality certification in May, 2017 and supplemented it in January 2018. Attached is a complete list of all documents already filed with MDE as part of the 401water quality certification and January 2018 supplement.

IX. CONCLUSION

The water segments surrounding the Conowingo Project are consistent with current Maryland water quality standards. Further, the classifications of certain water segments into Category 3, 4c, and 5 are not supported by sufficient data and MDE neglects to take into account relevant reports, studies, and other documentation available to MDE. The lack of sufficient data supports Exelon's contention that the TP causing Conowingo Reservoir to be classified as a Category 5 should ultimately be classified as Category 3. Finally, the inability for a segment to meet water quality standards is often caused by upstream pollution sources. Therefore, any TMDL implemented by the state must consider how upstream discharges must be further regulated.

Exelon reserves the right to respond to any additional comments or information added to the administrative record after the filing of this letter and its attachments. Please do not hesitate to contact the undersigned if you have any questions or require additional information regarding this matter.

[77] 33 U.S.C. § 1315(b)(D).

Sincerely,

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ATTACHMENT 1

SUPPLEMENTAL DOCUMENTATION

Footnote numbers do not correspond with the document numbers as listed in Attachment 1.

1. RSP 3.5: Conowingo Upstream Fish Passage Effectiveness Study 2012.
2. Conowingo Instream Flow Habitat Study.
3. Conowingo Migratory Fish Study.
4. Shoreline Management Plan.
5. Conowingo Analysis of the 2010 American Shad Radio Telemetry Animations.
6. Conowingo Seasonal and Diurnal Water Quality Study.
7. Conowingo American Eel Study.
8. RSP 3.01: Seasonal and Diurnal Water Quality in Conowingo Pond and Below Conowingo Dam.
9. RSP 3.02: Estimation of Survival of Adult American Shad Passed Through Francis and Kaplan Turbines.
10. RSP 3.03: Biological and Engineering Studies of American Eel.
11. RSP 3.04: Susquehanna River American Shad Model Model Production Runs.
12. RSP 3.05: Analysis of the 2010 American Shad Radio Telemetry Animations.
13. RSP 3.06: Conowingo East Fish Lift Attraction Flows – Statistical Analysis of Turbine Operations and East Fish Lift Catch.
14. RSP 3.07: Fish Passage Impediments Study – Analysis of 2010 Radio Telemetry Data.
15. RSP 3.08: Downstream Flow Ramping and Stranding Study.
16. RSP 3.09: Biological and Engineering Studies of the East and West Fish Lifts.
17. RSP 3.10: Maryland Darter Survey.
18. RSP 3.11: Operations Modeling Baseline and Production Run Report Addendum.
19. RSP 3.12: Water Level Management Study.
20. RSP 3.13: Study to Assess Tributary Access in Conowingo Pond.
21. RSP 3.14: Debris Management Study.

22. RSP 3.15: Sediment Introduction and Transport Study.

23. RSP 3.16: Instream Flow Habitat Assessment Below Conowingo Dam.

24. RSP 3.17: Downstream EAV/SAV Study.

25. RSP 3.18: Characterization of Downstream Aquatic Communities.

26. RSP 3.19: Freshwater Mussel Characterization Study Below Conowingo Dam.

27. RSP 3.20: Salinity and Salt Wedge Encroachment Study.

28. RSP 3.21: Impact of Plant Operation on Migratory Fish Reproduction.

29. RSP 3.22: Shortnose and Atlantic Sturgeon Life History Studies.

30. RSP 3.23: Study to Identify Habitat Use Areas for Bald Eagle.

31. RSP 3.24: Dreissenid Mussel Monitoring Study.

32. RSP 3.25: Conowingo Pond Creel Survey.

33. RSP 3.28: Historic Structures Report – Harford and Cecil Counties, Maryland.

34. RSP 3.28: [Privileged] Harford and Cecil Counties, Maryland and Lancaster and York Counties, Pennsylvania – Phase IB Archaeological Survey of Nine High Priority Areas of Interest.

35. RSP 3.29: Effect of Project Operations on Downstream Flooding.

36. RSP 3.30: Osprey Nesting Survey.

37. RSP 3.31: Black-Crowned Night-Heron Nesting Survey.

38. RSP 3.32: [CEII] Re-Evaluate the Closing of the Catwalk to Recreational Fishing.

39. [CEII] Application For New License For Major Water Power Project-Existing Dam – Volume 2 of 4.

40. [Privileged] Application For New License For Major Water Power Project-Existing Dam – Volume 4 of 4.

41. RSP 3.5: Analysis of the 2012 American Shad Radio Telemetry Animations.

42. RSP 3.21: Impact of Plant Operations on Migratory Fish Reproduction – 2012 Ichthyoplankton Sampling.

43. Application For New License For Major Water Power Project-Existing Dam – Volume 1 of 4.

44. Application For New License For Major Water Power Project-Existing Dam – Volume 3 of 4, RMP.

45. Application For New License For Major Water Power Project-Existing Dam – Volume 3 of 4, SMP.

46. License Submittal Cover Letter.

47. Lower Susquehanna River Integrated Sediment and Nutrient Monitoring Program.

48. Final Environmental Impact Statement.

49. Settlement Agreement with U.S. Department of the Interior.

50. Supplemental Information Regarding Exelon Generation Company, LLC's Application for a New License, Docket No. P-405-106 (filed Apr. 21, 2017).

51. U.S. Environmental Protection Agency. Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorous and Sediment. December 2010.

52. Exelon Generation Company, LLC's Submittal of an Alternative Fishway Prescription for the Conowingo Hydroelectric Project (FERC Project No. 405), FERC Docket No. P-405-106 (filed Sept. 11, 2015).

53. USGS, *et. al.* Lower Susquehanna River Watershed Assessment, Maryland and Pennsylvania (May 2015)

54. Conowingo Pond Coring Study: Integrated Sediment and Nutrient Monitoring Program. AECOM. December 2015.

55. Hydrodynamic and Sediment Transport Analyses for Conowingo Pond. HDR. June 2017.

56. Addendum: Hydrodynamic and Sediment Transport Analyses for Conowingo Pond. HDR. June 2017.

57. Lower Susquehanna River Reservoir System High Flow Event (Scour Analysis Memo). Gomez and Sullivan Engineers. January 2017.

58. Conowingo Pond Mass Balance Model. HDR. June 2017.

59. Scott, Steve *et al.* Lower Susquehanna River Reservoir System Model Enhancements Peer Review. 2016.

60. Lake Clarke and Lake Aldred Sediment Transport Modeling: Final Report. West Consultants, Inc. May 2017.

61. Cornwell, J., Owens, M. Perez, H., and Vulgaropulos, Z. 2017. The Impact of Conowingo Particulates on the Chesapeake Bay: Assessing the Biogeochemistry of Nitrogen and Phosphorus in Resources and the Chesapeake Bay. UMCES Contribution TS-703-17. July

2017.

62. Testa, Jeremy. Modeling Sediment Nutrient and Oxygen Cycling in the Conowingo Reservoir and Upper Chesapeake Bay. University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory. UMCES CBL 2017-060. July 2017.

63. Lower Susquehanna River Integrated Sediment and Nutrient Monitoring Program - Lower Susquehanna River Suspended Sediment & Nutrient Sampling: Final Report. Gomez and Sullivan Engineers. July 2017.

64. Finding Cooperative Solutions to Environmental Concerns with the Conowingo Dam to Improve the Health of the Chesapeake Bay: Hearing Before the Senate Committee on Environment and Public Works, Subcommittee on Water and Wildlife, 113th Cong. 8 (2014) (Statement of Colonel J. Richard Jordan, III, Commander and District Engineer, U.S. Army Corps of Engineers, Baltimore District).

65. Exelon Sediment Study Funding Letter Agreement.

66. Proposal for Lower Susquehanna River Reservoir System Model Enhancements in Support of the 2017 Chesapeake Bay TMDL Midpoint Assessment. Exelon Generation Company, LLC. January 2016.

67. Conowingo Articles.

68. Quality Habitat Maps.

69. Conowingo Hydroelectric Project Draft Biological Assessment, FERC Docket No. P-405 (filed Jan. 5, 2018).

70. Endangered and Threatened Species; Designation of Critical Habitat for the Gulf of Maine, New York Bight, and Chesapeake Bay Distinct Population Segments of Atlantic Sturgeon, 81 Fed. Reg. 35,701 (Jun. 3, 2016).

71. Welsh, S.A., S.M. Eyler, M.F. Mangold, and A.J. Spells. 2002a. Capture Locations and Growth Rates of Atlantic Sturgeon in the Chesapeake Bay. American Fisheries Society Symposium 28: 183-194.

72. Fisher, M.T. 2009a. State of Delaware annual compliance report for Atlantic sturgeon. Delaware Division of Fish and Wildlife Department of Natural Resources and Environmental Control.

73. Atlantic States Marine Fisheries Commission Habitat Management Series #13, Habitat Bottlenecks and Fisheries Management. Winter 2016.

74. Bovee, K.D., Lamb, B.L., Bartholow, J.M., Stalnaker, C.B., Taylor, J., and Henriksen, J., 1998, Stream Habitat Analysis using the Instream Flow Incremental Methodology: U.S. Geological Survey, Information and Technology Report USGS/BRD-1998-0004, 131 p.

75. Bovee, K.D., Waddle, T.J., Bartholow, J., and Burris, L., 2007, A Decision Support Framework for Water Management in the Upper Delaware River: U.S. Geological Survey Open-File Report 2007–1172, 122 p.

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82. U.S. Environmental Protection Agency. Agency Interpretation on Applicability of Section 402 of the Clean Water Act to Water Transfers. August 2005.

83. Conowingo Hydroelectric Project Relicensing Offer of Settlement and Explanatory Statement (May 12, 2016).

84. Reply Comments of Exelon Generation Company, LLC, FERC Docket No. P-405-106 (Jun. 13, 2016).

85. Application to Amend Exhibit R to Reflect Changes in Access for Recreational Fishing, Project No. 405-071 (filed Jul. 28, 2006).

86. Letter from Chairman Jon Wellinghoff to U.S. Senator Robert P. Casey, Jr. at 1, Project No. 405-000 (issued May 20, 2009).

87. Seigel, Richards et al. Effectiveness of Nest Site Restoration for the Endangered Northern Map Turtle. (2016).

88. Northbridge Group Study: Review of E3 Analysis of Conowingo Revenues. January 8, 2018

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Delaware Division of Fish and Wildlife, Department of Natural Resources and Environmental Control.

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91. Impacts of Upstream Hydro Facilities on Debris Reaching Conowingo Dam at Varying River Flows.

92. Muddy Run Pumped Storage Project Evaluation of Temporary American Eel Collection Facility in Octoraro Creek, January 2018.

93. Muddy Run Pumped Storage Project Conowingo Eel Collection Facility, January 2018.

94. FERC 2017 Eel Trapping Reports Letter, March 1, 2018.

95. PECO Debris Management Letter, March, 24, 1999.

96. Debris Management Letter from FERC to PECO, October 6, 1999.

APPENDIX A

MARYLAND WATER QUALITY STANDARDS RELEVANT TO CONWOINGO PROJECT

A. Maryland Water Quality Standards

Maryland's water quality standards comprise three elements: (1) designated use or uses of a water body; (2) water quality criteria necessary to protect the use or uses; and (3) an antidegradation statement. Maryland's water quality criteria to protect this designated use are expressed in terms of chemical-specific concentrations, toxicity levels, and narrative criteria. These criteria include standards to address bacteria, dissolved oxygen, temperature, pH, turbidity, and toxic substances. Maryland's narrative criteria also prohibit pollution of State waters by sewage, industrial waste, or other waste, and the State's antidegradation policy protects existing water quality where it exceeds minimum requirements specified by water quality standards. For a more complete articulation of the Water Quality Standards please see Appendis A attached hereto.

B. Designated Uses

1. Generally

Section 303(c) of the Clean Water Act requires that each state designate uses for each water body or segment thereof within the state.[78] A designated use can be either an existing use or a higher quality use, even if such higher use does not currently exist in that water body.[79] Under Section 303, designated uses can be propagation of fish and wildlife, recreation, public water supply, agriculture, navigation, and industrial use.[80] As set forth in EPA's regulations:

> [W]ater quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.[81]

A state may designate several compatible uses for the same water body,[82] and can remove a designated use—as long as it is higher than an existing use -if the state can demonstrate that attaining the designated use is not feasible.[83]

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[78] 33 U.S.C. § 1313(c).

[79] *See* 40 C.F.R. § 131.3(f) (defining "designated uses" as "those uses specified in water quality standards for each water body or segment whether or not they are being attained").

[80] 33 U.S.C. § 1313(c)(2)(A).

[81] 40 C.F.R. § 131.2.

[82] *See* 33 U.S.C. § 1370.

[83] 40 C.F.R. § 131.10(g). A designated use can be removed if "[d]ams, diversions or other types of hydrologic modifications preclude the attainment of the use. . . ." *Id.* § 131.10(g)(4).

Pursuant to these requirements, MDE has designated eight water use classes, including four applicable to the Project:[84]

- *Use I*: "Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life."[85] Use I waters include those that are suitable for:

  (a) Water contact sports;

  (b) Play and leisure time activities where individuals may come in direct contact with the surface water;

  (c) Fishing;

  (d) The growth and propagation of fish (other than trout), other aquatic life, and wildlife;

  (e) Agricultural water supply; and

  (f) Industrial water supply.[86]

- *Use I-P*: "Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply."[87] Use I-P waters include all uses identified for Use I waters, as well as "[u]se as a public water supply."[88]

- *Use II*: "Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting."[89] Use II waters include all uses identified for Use I waters located in:

  (a) All tidally influenced waters of the Chesapeake Bay and tributaries, the Coastal Bays, and the Atlantic Ocean to the 3-mile boundary; and

  (b) Tidally influenced waters that are or have the potential for:

    (i) Shellfish propagation and storage, or harvest for marketing purposes; and

    (ii) Actual or potential areas for the harvesting of oysters, soft-shell clams, hard-shell clams, and brackish water clams.[90]

- *Use II-P*: "Tidal Fresh Water Estuary."[91] Use II-P waters include all uses identified for

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[84] *See* Md. Code Regs. § 26.08.02.02(B).
[85] *Id.* § 26.08.02.02(B)(1).
[86] *Id.* § 26.08.02.02(B)(1)(a)-(f).
[87] *Id.* § 26.08.02.02(B)(2).
[88] *Id.* § 26.08.02.02(B)(2)(a)-(b).
[89] *Id.* § 26.08.02.02(B)(3)
[90] *Id.* § 26.08.02.02(B)(3)(a)-(b).
[91] *Id.* § 26.08.02.02(B)(4).

Use II waters, as well as "[u]se as a public water supply."[92]

2. Designated Uses at Conowingo

With regard to the specific segment of the Susquehanna Basin in which Conowingo Project is located, two of MDE's designated uses apply. The segment of the maintsem from the Conowingo Dam upstream to the Maryland-Pennsylvania border ("Conowingo Reservoir" or "Conowingo Pond") is designated Use I-P.[93]

The mainstem segment from Conowingo Dam downstream to the confluence with Chesapeake Bay is designated Use II-P,[94] with the following subcategories applicable:

- Migratory Spawning and Nursery: Applies from February 1 to May 31, inclusive.[95]

- Seasonal Shallow-Water Submerged Aquatic Vegetation (SAV): Applies from April 1 to October 30, inclusive, and to a depth of 2.0 meters. MDE's regulations note that "no grow zones" of SAV are present in this reach.[96]

- Open-Water Fish and Shellfish: Applies from January 1 to December 31, inclusive.[97]

C. Water Quality Criteria

Water quality criteria "are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use."[98] Upon adoption by a state, these "ambient criteria" become the applicable regulatory requirements for the protection of designated waters to which they apply.[99]

As set forth in MDE's regulations, Maryland's water quality criteria to protect the above-described designated uses are expressed in terms of chemical-specific concentrations, toxicity levels, and narrative criteria. The water quality criteria applicable to the stream segments in which Conowingo is located are described below.

1. Chemical-Specific Concentrations

(a) Criteria for Use I-P Waters

[92] *Id.* § 26.08.02.02(B)(4)(a)-(b).
[93] *Id.* § 26.08.02.08(B)(1).
[94] *Id.* § 26.08.02.02(B)(2)(a)
[95] *Id.*
[96] Id.
[97] *Id.*
[98] 40 C.F.R. § 131.3(b).
[99] "For waters with multiple use designations, the criteria shall support the most sensitive use." 40 C.F.R. § 131.11(a).

As noted above, the segment that contains the Conowingo Reservoir has been designated as Use I-P. Under MDE's regulations, therefore, the following criteria apply:

- *Bacteriological*: MDE's regulations establish criteria for E. coli, freshwater enterococci, and marine water enterococci.[100] For each bacterial indicator, the regulations establish: (1) a steady state geometric mean indicator density for all areas; and (2) a range of single-sample maximum allowable densities – depending upon whether the full-body contact recreation in given location is "frequent," "moderately frequent," "occasional," or "infrequent."[101] For freshwater enterococci, the steady state geometric mean density is 33 counts per 100 milliliters (ml), with a maximum allowable density ranging from 61 to 151 counts per 100 ml. For E. coli, the steady state geometric mean density is 126 counts per 100 ml, with a maximum allowable density ranging from 235 to 576 counts per 100 ml. For marine water enterococci, the steady state geometric mean density is 35 counts per 100 ml, with a maximum allowable density ranging from 104 to 500 counts per 100 ml.[102]

- *Dissolved Oxygen (DO):* MDE's regulations provide that for Use I-P waters, "the [DO] concentration may not be less than 5 miligrams/liter at any time."[103]

- *Temperature:* For Use I-P waters, MDE's regulations establish a maximum temperature of 90°F "or the ambient temperature of the surface . . . waters, whichever is greater."[104]

- *pH:* "Normal pH values may not be less than 6.5 or greater than 8.5."[105]

- *Turbidity*: "Turbidity may not exceed levels detrimental to aquatic life."[106] With regard to turbidity resulting from any discharge, such turbidity "may not exceed 150 units at any time or 50 units as a monthly average," measured in Nephelometer Turbidity Units.[107]

- *Toxic Substance Criteria:* Use I-P waters are subject to MDE's toxic substances criteria established: "(a) For protection of fresh water aquatic organisms"; and "(b) To protect public water supplies and the wholesomeness of fish for human consumption . . . ."[108] MDE's regulations set forth criteria for some 112 toxic substances, including inorganic substances, organic compounds, polycyclic aromatic hydrocarbons and phthalates, and pesticides and chlorinated compounds.[109]

- *Criteria for Water Supply Reservoirs:* MDE's regulations provide that freshwater reservoirs designated in Use I-P waters require that "arithmetic mean of a representative

[100] *See* Md. Code Regs. §§ 26.08.02.03-3(A)(1)(a), 26.08.02.03-3(B).
[101] *Id.* § 26.08.02.03-3(A)(1)(a).
[102] *See id.*
[103] *Id.* § 26.08.02.03-3(A)(2).
[104] *Id.* § 26.08.02.03-3(A)(3)(a).
[105] *Id.* § 26.08.02.03-3(a)(4).
[106] *Id.* § 26.08.02.03-3(A)(5)(a).
[107] *Id.* § 26.08.02.03-3(A)(5)(b).
[108] *Id.* § 26.08.02.03-3(B)(2)(a)-(b).
[109] *See id.* § 26.08.02.03-2(G).

number of samples of chlorophyll a concentrations, measured during the growing season (May 1 to September 30) as a 30-day moving average may not exceed 10 micrograms per liter; and the 90th-percentile of measurement taken during the growing season may not exceed 30 micrograms per liter."[110]

(b) Criteria for Use II-P waters

The segment of the mainstem Susquehanna River from Conowingo Dam to the confluence with Chesapeake Bay has been designated as Use II-P, with the following applicable subcategory uses present in this segment: Migratory Spawning and Nursery, Seasonal Shallow-Water SAV, and Open-Water Fish and Shellfish. Under MDE's regulations, therefore, the following criteria apply:

- *Bacteriological*: MDE's bacteriological criteria for Use II-P waters are the same as Use-I-P waters. These criteria address E. coli, freshwater enterococci, and marine water enterococci,[111] For each bacterial indicator, the regulations establish: (1) a steady state geometric mean indicator density for all areas; and (2) a range of single-sample maximum allowable densities, depending upon whether the full-body contact recreation in a given location is "frequent," "moderately frequent," "occasional," or "infrequent."[112] For freshwater enterococci, the steady state geometric mean density is 33 counts per 100 milliliters (ml), with a maximum allowable density ranging from 61 to 151 counts per 100 ml. For E. coli, the steady state geometric mean density is 126 counts per 100 ml, with a maximum allowable density ranging from 235 to 576 counts per 100 ml. For marine water enterococci, the steady state geometric mean density is 35 counts per 100 ml, with a maximum allowable density ranging from 104 to 500 counts per 100 ml.[113] There also is an added requirement that, in Shellfish Harvest waters, "there may not be any pathogenic or harmful organisms in sufficient quantities to constitute a public health hazard in the use of waters for shellfish harvesting."[114]

- *Dissolved Oxygen (DO)*: DO criteria for Use II-P waters are the same as Use I-P waters ("the [DO] concentration may not be less than 5 milligrams/liter at any time"[115]), except for the following subcategories applicable in the reach downstream of Conowingo Dam:

    - Seasonal and Migratory Fish Spawning and Nursery: From February 1 through May 31, the DO level must be greater than or equal to 6 milligrams/liter (mg/l) for a 7-day averaging period, with an instantaneous minimum requirement of greater than or equal to 5 mg/l. For all other times during the year, the DO levels are as follows:

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[110] *See id.* § 26.08.02.03-3(H).
[111] *See* Md. Code Regs. §§ 26.08.02.03-3(A)(1)(a), 26.08.02.03-3(B).
[112] *Id.* 26.08.02.03-3(A)(1)(a).
[113] *Id.*
[114] *Id.* § 26.08.02.03-3(C)(1); see *also id.* § 26.08.02.03-3(C-1)(1).
[115] *Id.* § 26.08.02-03-3(A)(2).

(i) Greater than or equal to 5.5 [mg/l] for a 30-day averaging period . . . in tidal fresh waters (salinity less than or equal to 0.5 parts per thousand);

(ii) Greater than or equal to 5 [mg/l] for a 30-day averaging period . . . (salinity greater than 0.5 parts per thousand);

(iii) Greater than or equal to 4.0 [mg/l] for a 7-day averaging period . . .;

(iv) Greater than or equal to 3.2 [mg/l] as an instantaneous minimum . . .; and

(v) For protection of the endangered shortnose sturgeon, greater than or equal to 4.3 [mg/l] as an instantaneous minimum at water column temperatures greater than 29°C (77°F).[116]

- Seasonal Shallow-Water SAV: Same as items (i) through (v), above, year- round.[117]

- Open-Water Fish and Shellfish: Same as items (i) through (v), above, year- round.[118]

- *Temperature*: Temperature criteria for Use II-P waters are the same as Use I-P waters.[119] For Use I-P waters, MDE's regulations establish a maximum temperature of 90°F "or the ambient temperature of the surface . . . waters, whichever is greater."[120] This criterion applies in areas "outside the mixing zone."[121]

- pH: Criteria for pH in Use II-P waters are the same as those in Use I-P waters.[122] "Normal pH values may not be less than 6.5 or greater than 8.5."[123]

- Turbidity: Turbidity criteria for Use II-P waters are the same as Use I-P waters.[124] "Turbidity may not exceed levels detrimental to aquatic life."[125] With regard to turbidity resulting from any discharge, such turbidity "may not exceed 150 units at any time or 50 units as a monthly average," measured in Nephelometer Turbidity Units.[126]

- Color: "Color in the surface water may not exceed 75 units as a monthly average. Units shall be measured in Platinum Cobalt Units."[127]

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[116] *Id.* § 26.08.02.03-3(C)(8)(d)(i)-(v); see *also id.* § 26.08.02.03-3(C)(8)(b)(iii).
[117] *Id.* § 26.08.02.03-3(C)(8)(c).
[118] *Id.* § 26.08.02.03-3(C)(8)(d).
[119] *Id.* § 26.08.02.03-3(C)(3).
[120] *Id.* § 26.08.02.03(A)(3)(a).
[121] *Id.* "Mixing zones" are established pursuant to MDE regulations. *See id.* § 26.08.02.05.
[122] *Id.* § 26.08.02.03-3(C)(4).
[123] *Id.* § 26.08.02.03-3(A)(4).
[124] *Id.* § 26.08.02.03-3(C)(5).
[125] *Id.* § 26.08.02.03-3(A)(5)(a).
[126] *Id.* § 26.08.02.03-3(A)(5)(b).
[127] *Id.* § 26.08.02.03-3(A)(6); see *id.* §§ 26.08.02.03-3(C)(6), 26.08.02.03-3(C-1)(1).

- Water Clarity Criteria for Seasonal Shallow-Water SAV: MDE's regulations establish three ways in which a segment can achieve attainment with the water clarity criteria:

  (1) SAV occupies at least 12,149 acres - the acreage restoration goal for this segment of the Susquehanna River.[128]

  (2) The shallow-water acreage that meets or exceeds the water clarity criterion is 2.5 times greater than the acreage restoration goal of 12,149 acres. For this segment, the water clarity criteria application depth is 2.0 meters,[129] so the Secchi depth equivalence criteria are 1.4 meters for tidal fresh waters, 1.4 meters for oligohaline waters, and 1.9 meters for mesohaline waters.[130] These criteria apply from April 1 to October 1 of each year.[131]

  (3) A combination of the actual SAV acreage attained and meeting the applicable water clarity criteria in an additional, unvegetated shallow water surface area equals 2.5 times the remaining SAV acreage necessary to meet the segment's restoration goal.[132]

- Chlorophyll a: "Concentrations of chlorophyll a in free-floating microscopic aquatic plants (algae) may not exceed levels that result in ecologically undesirable consequences that would render tidal waters unsuitable for designated uses."[133]

- *Toxic Substance Criteria*: Use II-P waters are subject to MDE's toxic substances criteria established: "(a) For protection of fresh water and freshwater-adapted estuarine aquatic organisms"; and "(b) To protect public water supplies and the wholesomeness of fish and shellfish for human consumption."[134] MDE's regulations set forth criteria for some 112 toxic substances, including inorganic substances, organic compounds, polycyclic aromatic hydrocarbons and phthalates, and pesticides and chlorinated compounds.[135]

2. Narrative criteria

MDE has adopted the following "general" narrative criteria that apply to all surface waters throughout Maryland:

> The waters of this State may not be polluted by:

[128] *Id.* § 26.08.02.03-3(C)(9)(a)(i); see *also* id. § 26.08.02.03(C)(9)(c).
[129] *See id.* § 26.08.02.08(B)(2)(a).
[130] *Id.* § 26.08.02.03-3(C)(9)(b).
[131] *Id.*
[132] *Id.* § 26.08.02.03-3(C)(9)(a)(iii).
[133] *Id.* § 26.08.02.03-3(C)(10).
[134] *Id.* § 26.08.02.03-3(C-1)(2).
[135] *See id.* § 26.08.02.03-2(G).

(1) Substances attributable to sewage, industrial waste, or other waste that will settle to form sludge deposits that (a) are unsightly, putrescent, or odorous, and create a nuisance, or (b) interfere directly or indirectly with designated uses;

(2) Any material, including floating debris, oil, grease, scum, sludge, and other floating materials attributable to sewage, industrial waste, or other waste in amounts sufficient to:

(a) Be unsightly;

(b) Produce taste or odor;

(c) Change the existing color to produce objectionable color for aesthetic purposes;

(d) Create a nuisance; or

(e) Interfere directly or indirectly with designated uses;

(3) High temperature or corrosive substances attributable to sewage, industrial waste, or other waste in concentrations or combinations which (a) interfere directly or indirectly with designated uses, or (b) are harmful to human, animal, plant, or aquatic life;

(4) Acute toxicity from any discharge outside the mixing zone established under Regulation [26.08.02.05] for the application of acute criteria for protection of aquatic life; and

(5) Toxic substances attributable to sewage, industrial wastes, or other wastes in concentrations outside designated mixing zones, which (a) interfere directly or indirectly with designated uses, or (b) are harmful to human, plant, or aquatic life.[136]

3. <u>Antidegradation</u>

MDE has established an antidegradation policy applicable to surface waters within Maryland, which provides: "Where water quality is better than the minimum requirements specified by the water quality standards, that water quality shall be maintained."[137] MDE regulations meet this requirement by establishing and maintaining a list of waters designated as "Tier II" waters where the water quality exceeds minimum water quality standards.[138]

[136] *Id.* § 26.08.02.03(B).
[137] *Id.* § 26.08.02.04-1(A).
[138] *Id.* § 26.08.02.04-1(O).