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Re: Conowingo Hydroelectric Plant Relicensing – FERC Docket No.: P-405-106
Exelon Generation Company, LLC Application # 17-WQC-02
Lower Susquehanna River and Upper Chesapeake Bay – Use 1 & 2 Waters

Dear Deputy Administrator Ghigiarelli:

On behalf of the Clean Chesapeake Coalition ("Coalition"), we respectfully submit the following comments and recommendations regarding the application of Exelon Generation Company, LLC ("Exelon") to the Maryland Department of the Environment ("MDE") for a Clean Water Act Section 401 water quality certification ("WQC") for the relicensing of Exelon's Conowingo Hydroelectric Project by the Federal Energy Regulatory Commission ("FERC") (FERC Project No. 405).

The Section 401 WQC for the Conowingo Dam is an historic and powerful opportunity for the State of Maryland to meaningfully address and mitigate the harmful impacts downstream on the Chesapeake Bay and Bay restoration efforts attributable to the loss of trapping capacity above Conowingo Dam and the operation and maintenance of the Dam and reservoir system. The Coalition counties are deeply concerned that this most import lever in the federal relicensing process may be squandered by not demanding sufficient reliable data and by not taking a reasonable amount of time to fully address the full range of issues. We are looking for assurances to turn such concerns into confidence and we are prepared to do our part in the spirit of intergovernmental cooperation to assist the Hogan Administration in taking full advantage of this once-in-a-generation opportunity to measurably and cost-effectively improve the chances for Bay restoration and lasting water quality improvement.

Since our inception 5 years ago, the Coalition counties[1] have been raising awareness while in pursuit of improvement to the water quality of the Bay in the most prudent and fiscally responsible manner possible – through research, coordination and advocacy. Since June 2013, the Coalition has been an Intervenor party in the pending FERC relicensing for Conowingo Dam.

[1] Current FY2018 members: Caroline County, Carroll County, Cecil County, Dorchester County, Kent County and Queen Anne's County. Previously involved members: Allegany, Frederick, Harford and Wicomico Counties.

<u>Exelon's WQC Application is Again Premature</u>

According to MDE's July 10, 2017 Public Notice inviting these comments, after withdrawing prior WQC applications to MDE for Conowingo Dam relicensing due to insufficient information, Exelon agreed to provide up to $3.5 million "to further study the effects of sediment and associated nutrients on the water quality of the lower Susquehanna River and Chesapeake Bay." This multi-agency study is known as the Lower Susquehanna River Integrated Sediment and Nutrient Monitoring Program ("Sediment Study"). Given the shortcomings of Exelon's final license application to FERC for Conowingo Dam and deficiencies in the Lower Susquehanna River Watershed Assessment ("LSRWA"), the arrangement between the State and Exelon for the additional Sediment Study data and analysis is essential for due consideration of the WQC application. In accordance with FERC requirements, Exelon agreed to withdraw and resubmit its WQC application to Maryland until the Sediment Study was complete. As of the filing of these comments, neither a draft nor a completed Sediment Study has been released to the public for review; therefore, Exelon's application for WQC is *again* premature. Likewise, MDE's solicitation for public comment on Exelon's WQC application is premature as information is lacking to measure the impacts that sediment and associated nutrient loading from Conowingo reservoir (aka "Conowingo Pond") scour have on the water quality of the lower Susquehanna River and Chesapeake Bay.

Also missing from the Conowingo Dam WQC equation is the pending recalibration of the Bay TMDL (as part of the 2017 midpoint reassessment) and the pollution reduction allocations among the Bay states. For example, if the additional pollution loading to the Maryland portion of the Bay due to the loss of trapping capacity in the Conowingo Dam reservoir (via scour or otherwise) results in additional pollution reduction mandates on Maryland (which would be grossly unfair to Maryland taxpayers and should be resisted), then even more attention must be focused on the conditions imposed by Maryland on any WQC approval for relicensing (i.e., sediment management, reservoir dredging and maintenance). In terms of adaptive management and the larger Bay restoration picture, Maryland's WQC for Conowingo Dam and the recalibration of the Bay TMDL are not mutually exclusive. Indeed, we have been advised on numerous occasions by State agencies and officials that the Sediment Study would be used to inform the WQC review and the Bay TMDL reset. In order to grant WQC approval, MDE must certify that the operation and maintenance of Conowingo Dam and reservoir system will not violate State water quality standards and limitations, which necessarily include the Bay TMDL pollution reduction mandates imposed on Maryland by the U.S. Environmental Protection Agency ("EPA"). The Bay TMDL is a federally imposed pollution reduction mandate that has been incorporated into Maryland's water quality standards and limitations.

Accordingly, we request that MDE reconsider the timeframe for consideration of Exelon's WQC application to ensure ample time for the Coalition and other stakeholders to review the scientific findings of the Sediment Study once released to the public and to considered the implications of a recalibrated Bay TMDL on Maryland's water quality standards and limitations. At a minimum, MDE should allow for supplemental local government and stakeholder comments, both written and by testimony at public hearing(s), throughout the WQC application review process; as new relevant information becomes available (*i.e.*, findings of the Sediment Study; Bay TMDL recalibration; public hearing testimony; supplemental WQC application filings by Exelon).

<u>State "Water Quality Standards and Limitations" Include Local Plans and Bay TMDL</u>

The State's "water quality standards and limitations" include, by law, implication and necessity, the water quality standards and limitations embodied in the local plans and policies of Maryland county and municipal governments, particularly those jurisdictions directly and indirectly impacted by the adverse environmental impacts attributable to the operation and maintenance of Conowingo Dam and reservoir system. Pursuant to the Land Use Article of the Maryland Annotated Code, Section 1-201, included among the "visions" that *shall be* implemented by each county through their Comprehensive Plan are:

> "(1) quality of life and sustainability: a high quality of life is achieved through universal stewardship of the land, water, and air resulting in sustainable communities and protection of the environment; …
>
> (9) environmental protection: land and water resources, including the Chesapeake and coastal bays, are carefully managed to restore and maintain healthy air and water, natural systems, and living resources; …"

The local Comprehensive Plans of each Coalition county incorporate these visions, and provide the framework for local land and resources management policies and practices to achieve those visions. The counties' Comprehensive Plans are complimented and supplemented by local Water and Sewerage Plans, Watershed Implementation Plans, Solid Waste Management Plans, Resource Conservation Plans and the like, all of which are mandated by the State and part and parcel of our collective efforts to ensure that Maryland's "water quality standards and limitations" are not ignored or violated.

Likewise, EPA's 2010 Chesapeake Bay TMDL (as recalibrated in the near future per the 2017 midpoint reassessment) and the federally mandated pollution reduction goals imposed on Maryland pursuant to the TMDL allocations, as implemented by State's Watershed Implementation Plan are cornerstone elements of the State's "water quality standards and limitations" to be upheld and guarded throughout the WQC application review and conditions of any approval.

In reviewing Exelon's WQC application in order to certify that the operation and maintenance of Conowingo Dam and reservoir system will not violate State water quality standards and limitations throughout the 46-year relicensing term sought by Exelon, MDE and other reviewing agencies are obligated to consider Resolution No. 549 of the Dorchester County Council, adopted in January 2014, enclosed and incorporated herein as <u>Exhibit A</u>, and the

January 2014 Resolution of the County Commissioners of Kent County, enclosed and incorporated herein as Exhibit B. These local policies of two Coalition counties, situated on the Bay, exemplify how inextricably linked the human environment (including the natural/ physical environment, cultural environment, economic environment and social environment) is to the water quality of the Chesapeake Bay – particularly the upper Bay where the brunt of adverse environmental impacts attributable to Conowingo Pond scour are clear and present.

Exelon's WQC Application and FERC FLA are Deficient

Exelon's WQC application relies heavily on two Studies: (1) Final Study Report Sediment Introduction and Transport Study RSP 3.15, August 2012, conducted by Gomez and Sullivan Engineers, P.C. ("Sediment Transport Study"), and (2) the LSRWA. Explained below are the shortcomings of these studies and by extension Exelon's current WQC application.

Sediment Transport Study

The Sediment Transport Study underpinning Exelon's final license application ("FLA") to FERC involved three tasks: (i) a review and compilation of existing information; (ii) a quantitative assessment of sediment-related impacts of the Conowingo Dam system on downstream habitat; and (iii) an evaluation of options to manage sediment at the Conowingo Dam system. It is important to note that in conducting the tasks associated with this study, Exelon utilized a one-dimensional model: HEC-RAS. The Coalition is on record with its concerns about this approach by observing that a one-dimensional model cannot account for scour since there is no lateral variable to account for sediment load on the river basin. One dimensional models have limitations for sediment transport since lateral sediment transport conditions are not considered.

In 2014, as part of Exelon's pending application for relicensing of Conowingo Dam before FERC, the State submitted comments concerning the Draft Environmental Impact Statement ("DEIS"). The State's comments were filed by the Power Plant Research Program ("PPRP") of the Maryland Department of Natural Resources[2] and said this about water quality issues:

> "…the State's position is that the DEIS fails to adequately address all the environmental impacts associated with the Conowingo Project. As set forth in the State's January 31, 2014 comments, Exelon's Final License Application (FLA) is deficient with respect to several important environmental impacts, including sediment and nutrient impacts on water quality and living resources related

[2] Then Program Manager Shawn A. Seaman submitted comments on behalf of DNR/PPRP.

> to the Conowingo Project. Because FERC's DEIS is largely based on the Applicant's FLA, the DEIS is also deficient."

That observation remains true today; as well as the undeniable adverse impacts that the Conowingo Dam and reservoir system, and the operation and maintenance of the Dam and reservoir, have on downstream water quality and how those impacts have:

1. Decimated oyster habitat in the Bay from the Choptank River north and impacted oyster habitat throughout the Maryland portion of the Bay;

2. Destroyed SAV in the Bay to the north of Dorchester County and with the destruction of SAV have destroyed habitat critical to the survival of most juvenile fisheries;

3. Buried and suffocated crabs from the Choptank River north after several high-flow events, causing the cyclic decimation of the blue crab population in the northern and middle regions of the Bay; and

4. Adversely impacted the economic, social and cultural environments of the Coalition counties.

The deficiencies of the Environmental Impact Statement ("EIS") approved by FERC for Conowingo relicensing are further explained and documented in the Coalition's Preliminary Comments to the DEIS for Conowingo Dam relicensing filed with FERC in September 2014; which are part of the FERC Project No. P-405-106 docket and incorporated herein by reference. The Coalition's DEIS comment filing to FERC, minus the exhibits, is enclosed as Exhibit C.

The Coalition further evidenced FERC's failure to properly scope, compile and analyze the cumulative impacts of the multiple hydroelectric power plants in the lower Susquehanna River as part of the DEIS for Conowingo Dam in a February 24, 2015 letter filing to FERC, enclosed herein and incorporated as Exhibit D. In the letter (Ex. D), filed before FERC's issuance of the final EIS, the Coalition highlighted a 2014 U.S. Geological Survey ("USGS") Report 2014-1235 titled *Sediment Transport and Capacity Change in Three Reservoirs, Lower Susquehanna River Basin, Pennsylvania and Maryland 1900-2012*; which USGS Report we commend to MDE to consider as part of the WQC review and to support the terms and conditions recommended in these comments.

The once-in-a-generation significance of Maryland's WQC review for Conowingo Dam relicensing is magnified by the lackluster environmental impact review undertaken thus far by FERC, the incompleteness of Exelon's WQC application and FERC FLA, and the shortcomings of the LSRWA.

Lower Susquehanna River Watershed Assessment (LSRWA)

Among the concerns regarding the LSRWA, insufficient data is paramount. As Peter Moskos, a Harvard educated criminologist, author and professor, once commented: "if you have bad data, it doesn't matter what fancy quantitative methods you use. It's putting lipstick on the damn pig of correlation." In short, a modelling conclusion is only as good as the data underpinning the modelling effort. When the data needed to generate a predictive model does not exist, the predictive conclusions generated from a cluster of other models used to generate data for use in the predictive model are meaningless.

To the extent that Exelon and/or MDE are relying on the LSRWA in consideration of the latest WQC application, these comments include and incorporate by reference the January 2015 comments filed by the Coalition with the U.S. Army Corps of Engineers ("USACE") concerning the draft LSRWA, which are enclosed and incorporated herein as Exhibit E. We note that the State, in correspondence to FERC dated January 31, 2014, said this about the LSRWA:

> "Although the USACE study will advance scientific knowledge with respect to sediment and nutrient dynamics and impacts in the Lower Susquehanna River and Chesapeake Bay, **the [LSRWA] was never intended to be part of FERC's licensing process**, ..." (Emphasis added)

As detailed in the enclosed comments, the LSRWA deficiencies include insufficient core sampling data (too few and too shallow)[3], inadequate modelling, arbitrarily capped flow rates[4], and non-compliance with the Federal Advisory Committee Act and the National Environmental Policy Act, including a failure to consider the human environment (*e.g.*, the economic, social and cultural, and natural environments) of the Coalition counties and to coordinate with impacted Coalition counties.

The LSRWA relied on a two-dimensional adaptive hydrodynamics model ("ADH"), which was used for estimating sediment erosion in the Conowingo reservoir based on projected data derived from other models and was used to compute detailed hydrodynamics and sediment transport in and out of Conowingo reservoir, and the response of the reservoir and downstream flats area to various sediment management scenarios and flows. According to the LSRWA, the ADH simulates hydrodynamics and sediment transport. Unconvincingly, the ADH two-dimensional model relied on data generated from a one-dimensional model (HEC-RAS). The

[3] The Conowingo reservoir is approximately 9,000 acres. According to LSRWA meeting notes, the original number of 16 core samples to be taken was reduced to 8, due to cost concerns; and the core samples taken were not deeper than 1-2 feet.

[4] *See* Exhibit K for summary of major storm and flow events; then anticipate the number of major storm and flow events that are likely to occur during the 46-year relicense period sought by Exelon.

Coalition does not believe that the ADH model was capable of simulating sediment passing through the flood gates of Conowingo Dam, especially since dam operations were not simulated in detail in the model. For the LSRWA, the Conowingo Dam was modeled as an open boundary with downstream control represented by the water surface elevation at the dam. This modelling limitation impacted how sediment was spatially distributed in the lower reach of Conowingo reservoir near the dam. The sediment bed in the ADH model was approximately 3 feet deep. Given the one-foot depth limitation of core samples, the lower 2 feet were determined from literature values.

Inescapable Realities Threatening Maryland's Bay Restoration Efforts

Concerns with the design of the LSRWA notwithstanding, the following inescapable realities have been acknowledged by the federal and State agencies responsible for the LSRWA report and are indeed relevant in MDE's consideration of the WQC application:

1. The reservoirs (Lake Clarke, Lake Aldred and Conowingo Pond) behind the three hydroelectric dams (Safe Harbor, Holtwood and Conowingo) in the lower Susquehanna River are full and no longer serve as net traps of sediments and nutrients.

2. U.S. EPA's 2010 TMDL, upon which Maryland's $14.5 billion Phase II WIP was premised, incorrectly assumed that the dams acted to trap 50% of the sediments in the Susquehanna River. As a consequence, the Bay TMDL will have to be recalibrated to account for this fact, which will result in a determination that tens of thousands of tons of additional sediments, millions of pounds of additional nitrogen and hundreds of thousands of pounds of additional phosphorus need to be removed upstream from the Susquehanna River annually if the water quality of the Chesapeake Bay is to be improved.

3. Scour of nutrient-laden sediments that have accumulated in the reservoirs behind the dams in the lower Susquehanna River occurs several times a year during major storm events; which are becoming more frequent and intense because of climate change.

4. The nutrients that attach to the sediments that are scoured from the reservoirs behind the dams in the lower Susquehanna River are a bigger threat to the health of the Bay than the sediments themselves because those nutrients are released in the more saline, warmer, less oxygenated environment of the Bay estuary.

5. The loss of long-term sediment trapping capacity at Conowingo Dam is causing impacts to the health of the Chesapeake Bay ecosystem. According to MDE, the additional nutrient pollution associated with the conditions in the lower Susquehanna River system could result in Maryland not being able to meet Chesapeake Bay water quality standards, even with full implementation of WIPs by 2025.

The Plumes Don't Lie – a (satellite) picture is worth a thousand words

Be it a storm that befalls the Chesapeake Bay watershed or the spring melt after a snowy winter, the evidence of adverse impacts on flora, fauna and the ecology of the Bay downstream from Conowingo Dam are undeniable:

Exhibit F: NASA photograph of the Chesapeake Bay, September 13, 2011, a few days after Tropical Storm Lee showing the sediment plume emanating from Conowingo Dam and extending about 100 miles south to the mouth of the Potomac River

Exhibit G: Coalition memorandum dated April 24, 2015 about the Spring Melt 2015 and Conowingo Dam scour (April 9-16, 2015)

Exhibit H: Conowingo Dam Sediment Plume (April 8-11, 2017)

Included with these comments are the following Coalition publications and research, which should be considered in the evaluation of justifiable conditions on any WQC approval for Conowingo Dam relicensing:

Exhibit I: Conowingo Matters

Exhibit J: Toxins in Conowingo Pond Sediments

Exhibit K: Conowingo Dredging – Storm Events, Sediment Loading and Scour

WQC Conditions

When FERC issues a new or relicense for Conowingo Dam it must include in the license all those terms and conditions contained in the related WQC approval, if any, by the State.[5] After a license has been issued by FERC, however, opportunities for public participation in compliance matters are more limited.[6] In a 2002 9th Circuit case, *Friends of Cowlitz v. FERC*, 253 F. 3d 1161, 1162 (the Cir. 2001), *review denied and amended by* 282 F.3d 609 (9th Cir. 2002), the Plaintiffs alleged that the City of Tacoma was in noncompliance with terms of its hydroelectric license on the Cowlitz River. The Court supported FERC's decision not to hold a formal evidentiary hearing since FERC had an unreviewable exercise of discretion. In *Friends*

[5] *Am. Rivers, Inc. v. FERC,* 129 F.3d 99, 111-12 (2d Cir. 1997), *remanded sub nom. Turnbridge Mill Corp*., 82 FERC ¶ 61,265 (1998)

[6] https://www.ferc.gov/whats-new/comm-meet/121504/H-4.pdf, page 3.

of Cowlitz, FERC cited the extensive public participation in hydroelectric licensing proceedings as being the opportunity for public participation.

The limits on opportunities for post-licensing intervention at FERC for purposes of WQC conditions enforcement and/or adaptive management considerations is disconcerting to the Coalition counties. The State of Maryland as well should be concerned with the extent to which WQC terms and conditions incorporated in the relicense for Conowingo Dam will be enforced throughout the term of the license.

FERC has, in some cases, allowed agencies required to be consulted in licensing proceedings to modify terms and conditions of a license by invoking a reopener provision.[7] MDE's WQC for Conowingo Dam should include reopener provisions with specified triggers for the enforcement of such provisions. In doing so, we request that the State specifically reference the Coalition county governments as consultants in the WQC review with respect to conditions that are designed to mitigate damages associated with the harm from nutrient laden sediments scoured from Conowingo reservoir into the Bay. Having a condition that mitigates environmental harm and references the Coalition counties will help pave the way for the Coalition counties to participate in post-license proceedings with FERC regarding matters that may impact State waters and the Chesapeake Bay. Furthermore, this approach may provide the Coalition county governments with an opportunity to challenge license conditions and agreements that FERC may ultimately deny or refuse to enforce.

Adaptive Management Conditions

Sediment Management Plan

For years the Coalition has been focused on the issue on how to protect State waters and the Chesapeake Bay from the enormous volume of nutrient-laden sediments accumulated behind the Conowingo Dam. MDE should focus on adaptive management conditions that ensure water quality goals are met with changing conditions such as increased flow rates. Exelon should be required to develop a sediment management plan that will be reviewed and approved by the State prior to dredging operations. Such a plan would necessarily include staging areas, risk-based screening criteria for the sampling and testing of dredged material, and a framework for the long-term management and how dredged material can be put to beneficial use or innovative reuse rather than discarded. During the 2nd Conowingo Dam Summit hosted by Maryland Governor Larry Hogan on August 8, 2017, it was announced that the Maryland Environmental Service ("MES") will be issuing a Request for Proposals at the end of August to solicit proposals for a pilot dredging and sediment testing program ("MES RFP"). The MES RFP process will help to

[7] *See, e.g., Puget Sound Energy*, 130 FERC ¶ 62,220, P 7 (2010) (FERC accepted a license amendment from the Washington Department of Ecology and incorporated it as part of the project license reasoning that the water quality certification reserves the authority for the Washington Department of Ecology to amend the water quality certification).

inform potential innovative and beneficial reuses of the sediment accumulated in Conowingo reservoir, the degree of contamination in the accumulated sediments and the feasibility of larger scale dredging and sediment management as a means to reduce pollution loading to the Bay. Such information is critical to the State's WQC review and final determination, as it will provide justification for conditions related to the sediment management throughout the license term.

Another important consideration to any sediment management condition is that the dredge material should not be deemed a hazardous waste. There are provisions in the Code of Maryland Regulations (COMAR) that address this issue. For example, pursuant to COMAR 26.13.02.04-6, dredged material is not a "hazardous waste" if it (1) is subject to the requirements of a permit issued by (a) the USACE or an approved state under Section 404 of the Federal Water Pollution Control Act (33 U.S.C. 1344); or (b) the USACE under Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413); or (2) is "generated in connection with a USACE civil work project" and is subject to the requirements of a USACE issued permit under Section 404 of the Federal Water Pollution Control Act or under Section 103 of Marine Protection, Research and Sanctuaries Act of 1972, or "subject to the administrative equivalent" of the above referenced permits, as provided for in the regulations of the USACE, such as 33 Code of Federal Regulation (CFR) §336.1, 33 CFR §336.2 and 33 CFR §337.6.

Innovative Reuse and Beneficial Use of Dredged Material

"Innovative reuse" is defined in the Environment Article of the Annotated Code of Maryland, Section 5-1101(a)(6), as "the use of dredged material in the development or manufacturing of commercial, industrial, horticultural, agricultural, or other products." According to MDE's proposed guidance on the Innovative Reuse and Beneficial Use of Dredged Material (March 2017)[8], innovative reuse includes alternative daily, intermediate, or final cover to traditional earthen material that is currently used at active landfills, as well as soil and fill materials in the reclamation of brownfields, engineered fill for roadway bed material, parking lot foundations, or embankments and manufactured soil or soil amendments. If a beneficial use or innovative reuse of dredge material requires Maryland air permits to construct and/or operate, the Coalition suggests that MDE address this issue with USACE and EPA by obtaining a pre-approved permit for a research and development project under the General Conformity Rule, established under Clean Air Act Section 176(c)(4) so that a demonstration can be made to show that there will not be interference with a state's plans to attain and maintain national standards for air quality. According to MDE's proposed guidance, general conformity always applies to dredging projects that increase the depth or width of a channel as well as any other dredging activity that is not a part of routine maintenance. It must be demonstrated that direct and indirect emissions from the dredging project are below the *de minimis* levels established in the Clean Air Act, as we do not want to exacerbate one environmental concern while addressing another.

[8] Innovative Reuse and Beneficial Use of Dredged Material Draft Guidance Document http://mde.maryland.gov/programs/Marylander/Documents/Dredging/DRAFT_IRBU_GUIDANCE%203.16.2017.pdf.

Dedicated Mitigation Fund

As a condition of any WQC approval for Conowingo Dam, the Coalition recommends the establishment of a dedicated fund, financed by Exelon, to mitigate the undeniable environmental and economic damages caused by the nutrients and sediments trapped behind Conowingo Dam that are scoured into the Maryland portion of the Bay in shock-loading proportions during storm events. Such a dedicated fund would assist the State and Coalition counties in meeting pollution reduction targets and achieving Chesapeake Bay water quality improvement goals as federally mandated by the Bay TMDL. The dedicated fund should remain forever green and be held in trust by the State for the benefit of local governments impacted by the operation and maintenance (or lack thereof) of Conowingo Dam and reservoir system. Exelon should be required to contribute to the mitigation fund annually. The fund could be used by local governments to offset the environmental damage to the Bay and local waters and the concomitant adverse impact on local economies caused by the inevitable and enormous loading of sediments laden with nutrients and other contaminants due to scour that emanates from Conowingo Pond. Use of the fund would be consistent with local government plans, policies and programs intended to improve the water quality of the State's waters. The fund could be used for cost-effective oyster restoration programs and projects supported by sponsoring local governments and the seafood industry. The fund could also be used to offset costs incurred by the State and local governments related to the dredging and maintenance of ports, landings, marinas, boating channels and other Bay access facilities for the benefit of the public.

Exelon's annual contribution to the mitigation fund should be multiplied in any year during which an episodic storm event occurs to help offset the intensified adverse impacts of Conowingo reservoir scour on downstream Bay restoration efforts and expenditures. Given the term of relicense requested by Exelon, the fund should be regularly replenished and supplemented upon the occurrence of certain trigger events, as follows:

a. A $10 million annual contribution to the fund, which represents a level of financial commitment consistent with the plans and goals of Maryland local governments to achieve Bay TMDL goals.

b. Supplemental payments to the fund should be based on the occurrence of episodic storm events resulting in Susquehanna River flow at Conowingo greater than 200,000 cubic feet per second ("cfs"). Each episodic storm event supplemental payment to the fund would be determined by the peak streamflow of the event as reported by USGS.

c. For every 100,000 cfs of reported peak streamflow above 200,000 cfs, Exelon should be required to contribute an additional $5 million to the fund in the year during which the storm event occurs. For example, a reported peak streamflow at Conowingo between 400,000 and 500,000 cfs would trigger an additional $10 million contribution to the fund by Exelon. A reported peak streamflow between 700,000 and 800,000 cfs (on the magnitude of Tropical Storm Lee in 2011; *see* Exhibit F) would trigger an additional $25 million[9] contribution to the fund by Exelon.

d. Exelon's obligation to contribute to the fund would terminate when the long-term trapping capacity of Conowingo reservoir is at 55 percent, according to USGS.[10]

As an alternative to using peak streamflow as the trigger for supplemental contributions to the fund, consider the opening of flood gates at Conowingo as an indicator of increased pollution loading (scour) to the Bay and thus the need for mitigation resources. According to the LSRWA, there are 52 gates in the upper portion of Conowingo Dam and each flood gate generally has the capability to pass up to about 15,000 cfs. A supplemental contribution value to the fund can be assigned per opened flood gate during an episodic storm event.

Reopeners

FERC cannot alter a Section 401 WQC condition when issuing a final license, but it has the authority to restrict the exercise of a reopener included in the WQC or simply not enforce such a condition. FERC has denied reopeners when used to amend the license that did not have prior Commission authorization. *See, e.g.*, *Duke Energy Progress, Inc.*, 153 FERC ¶ 61,056, P 61 (2015) (possible modification of flow requirements after five years may not be implemented without prior Commission authorization), *petition for review filed sub nom. City of Rockingham v. FERC*, No. 15-2535 (4th Cir. docketed Dec. 11, 2015). FERC has not explicitly stated whether it has discretion to deny such a request to reopen and modify the license.[11]

Importantly, it has been FERC's position that once a license is issued, its terms and conditions cannot be changed without FERC's express approval, and FERC regularly places caveats on certain types of reopener provisions from state water quality certifying agencies and from other federal agencies with mandatory conditioning authority under FPA Section 4(e).[12] According to FERC, reopener provisions that contemplate "unspecified long-term changes to

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[9] Incidentally, according to the Maryland Port Administration, after Hurricane Irene and Tropical Storm Lee the 2011/12 winter dredging in the upper Bay included $25.6 million for the removal of 1.01 million cubic yards of sediment to maintain shipping channels.

[10] Fifty-five percent is the same level of long-term trapping efficiency estimated by U.S. EPA in its 2010 Bay TMDL, Appendix T for Conowingo Dam's long-term trapping efficiency.

[11] *Hydropower: The New Preemption Frontier*, 06/01/2017; William Huang and Katharine Mapes are partners and Jeffrey Bayne is an associate in the Washington, D.C. law firm of Spiegel & McDiarmid, LLP.

[12] *Ibid*, citing 16 U.S.C. § 797(e).

project facilities and operations...may not be implemented without prior Commission authorization granted after the filing of an application to amend the license."[13]

FERC does not grant blanket interventions in all post-licensing proceedings, because it cannot determine in advance what proceedings may be commenced or whether compliance or other filings will fall within one of the categories for which intervention in FERC proceedings is permitted.[14] This presents a challenge with respect to WQC conditions that rely on reopeners. While we fully understand the importance of having reopeners, particularly given the paucity of good data associated with accumulated sediment material in Conowingo Pond, it is important that FERC recognize the insufficiency of data as well. A clear understanding regarding the need for additional data and how it will impact operations and maintenance at the Conowingo Dam and reservoir system will need to be memorialized in the State's WQC requirements. It is advisable that any reopener conditions receive prior FERC approval given the uncertainties on how FERC may address reopeners in the future.

Potential Reopeners/Triggers

- Dredging/sediment management plan requires a simple modification such as relocating the staging area (reopener lite).
- Dredging/sediment management plan requires adjustment based on new scientific findings associated with the quality (contamination) of sediment material.
- A water quality trading program is developed whereby credits are given to the responsible parties involved the dredging activity.
- A weather event resulting in a significant release of scoured sediments, whether or not a supplemental contribution is triggered to the recommended mitigation fund.
- An episodic storm event on the magnitude of Hurricane Agnes in 1972 or Tropical Storm Lee in 2011, given the recommended mitigation fund will be insufficient to address the consequential environmental and economic damages to the Bay region.
- The discovery of high concentrations of hazardous waste.
- New information learned from the pilot dredging and sediment testing program resulting from the recently announced MES RFP.

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[13] *See, e.g., Duke Energy Progress, Inc.,* 153 FERC ¶ 61,056, P 61 (2015) (possible modification of flow requirements after five years may not be implemented without prior Commission authorization), *petition for review filed sub nom. City of Rockingham v. FERC,* No. 15-2535 (4th Cir. docketed Dec. 11, 2015).

[14] *See City of Tacoma*, 89 FERC ¶ 61,058 at 61,194-95 (1999).

Conclusion

Given the magnitude of the impact of the Conowingo Dam and the other lower Susquehanna River energy projects on Marylanders and on the water quality of the Bay, we further encourage MDE to request an adversarial hearing to compel the FERC hearing officers to engage in an appropriate fact finding process to ensure that the future operation and maintenance by Exelon with not violate State water quality standards and limitations. Such a proactive approach in the FERC arena would help leverage Maryland's Section 401 WQC review authority and proposed conditions.

Additionally, we submit the following recommendations to ensure that the safeguards for the Bay and for downstream restoration efforts provided by the Section 401 WQC requirements are maximized:

> MDE should review DNR's oyster survey data for the years preceding 1972 and the years following 1972 to determine the impact that scour has had on oysters in the northern and middle portions of the Chesapeake Bay. Millions of bushels of oysters were harvested in Maryland before Hurricane Agnes. Oysters have never recovered to anywhere near that level of harvest following Hurricane Agnes. The sediments dumped on the Bay in the aftermath of the hurricane, close to 60% of which were from scour, buried the oyster beds beneath a foot or more of sediments from which they still have not recovered. Scour was the major contributor to the death of the seafood industry in Maryland north of the Little Choptank River for decades following the hurricane. What is Exelon going to be required to do so that history does not repeat itself?
>
> How is MDE going to ensure that Exelon makes reparations for past scour events? Is MDE going to ensure that Exelon addresses damage caused to the Bay by future scour events, which are all but guaranteed given climate change predictions and the fact that Conowingo Pond is full?
>
> We note that the dam owners and those state and local governments north of Maryland in the Susquehanna River watershed must be required to assume full responsibility for all of the additional nutrient and sediment reduction associated with the fact that the ponds and lakes in the lower Susquehanna River watershed are full (and therefore at dynamic equilibrium). Exelon has thoroughly documented that all of the sediments and nutrients stockpiled in the reservoirs in the lower Susquehanna River come from lands in New York and Pennsylvania. Maryland taxpayers should not bear responsibility for accounting for and addressing additional reductions in sediment and nutrient loading resulting from scour in the ponds, lakes and reservoirs upstream of the Conowingo Dam.
>
> We note that local agencies in Pennsylvania are receiving payments from Exelon related to reducing sediment accumulation in Conowingo Pond as a condition of water quality certifications issued by the Commonwealth. For example, we know from filings at FERC

that Exelon is making a combined $500,000 payment each year (from 2014 through 2030) to the Lancaster County and York County Conservation Districts and the PA Fish and Boat Commission for BMPs. This is a drop in the bucket - given the work to be done upstream in Pennsylvania to meaningfully curb the amount of pollution loading to the Susquehanna River. Exelon has operating revenues in excess of $25 billion per year, has received over a billion dollars in federal and State grants and low interest loans for the development of energy projects and spends tens of millions of dollars annually directly and through officers and employees on political campaigns, trade association dues (which are then used to fund PACs and political initiatives) and on environmental organizations to influence public policy favorable to Exelon and the hydropower industry. What funding has the State of Maryland or any Maryland local government received from the owner/operator of Conowingo Dam to address the downstream devastation caused by scour from the Conowingo Pond in 1972 (Hurricane Agnes) and 2011 (Tropical Storm Lee)?

There is no denying that the Conowingo Dam and other hydroelectric power dams in the lower Susquehanna River have profoundly altered the lower Susquehanna River estuary and the Chesapeake Bay estuary. If the ongoing impacts from the operation and maintenance (or lack thereof) of Conowingo and the other power projects in the lower Susquehanna River are not addressed, the downstream efforts and expenditures undertaken by Marylanders will not achieve meaningful and lasting improvement to the upper Bay or overall Bay water quality.

We understand, pursuant to COMAR 26.08.02.10D, that MDE will be holding a public hearing in the fall of this year - before a final decision on the WQC. We look forward to that opportunity to provide further comment and recommendations.

Thank you for your attention and consideration of these comments; which we intend to supplement throughout the WQC review and conditioning process.

Sincerely,

Ronald H. Fithian, *Chairman*
and Kent County Commissioner

Enclosures

cc: Clean Chesapeake Coalition
Distribution List

RESOLUTION NO. 549

RESOLUTION OF DORCHESTER COUNTY MARYLAND INVOKING ITS AUTHORITY TO ENGAGE FEDERAL AND STATE AGENCIES IN THE COORDINATION PROCESS ESTABLISHED AND MANDATED BY FEDERAL AND STATE STATUTES.

The Dorchester County Council (the "Council"), which is the governing body of Dorchester County, Maryland (the "County"), does hereby Resolve to initiate the process of coordination by which it will engage federal and state agencies to coordinate with the County, government to government within the definition of coordination mandated by the Congress of the United States, and in support of the Resolution states as follows:

I. <u>FINDINGS</u>

The Council makes the following findings in support of and as the base for this Resolution:

A. Introduction

1. State of Maryland departments such as the Department of Natural Resources ("DNR"), the Maryland Department of the Environment ("MDE"), and the Maryland Department of Agriculture ("MDA") receive and heavily rely on federal funds; as a result when they initiate and implement the development of rules, regulations, plans, policies or management actions that mirror or assist in the implementation of federal statutes, rules and regulations, federal programs or policies or management actions, they are subject to the National Environmental Policy Act ("NEPA"), which includes coordination with local governments.

2. When a State department initiates development and implementation of a NEPA project, it is bound not only by NEPA itself but by the regulations issued by the Council on Environmental Quality ("CEQ"), the federal agency created by NEPA to oversee its implementation.

3. NEPA provides that human interests must be considered in making a balanced decision as to the advisability of development of a plan, policy, rule or regulation or management action so that the action is taken only after coordination in order to assure that the action results in:

> [C]onditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans. In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consist with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources.

42 USC § 4331.

EXHIBIT

A

4. The CEQ regulations include 40 CFR §§ 1508.14 and 1508.8 which define and insist that agencies protect the "human environment." 40 CFR 1508.14 provides:

> *Human environment* shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (§1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

40 CFR 1508.8, which is the lynchpin of 40 CFR 1508.14 provides:

> Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

5. The DNR, MDA and MDE have not engaged in the coordination of policy with Dorchester County regarding projects requiring compliance with NEPA. Those agencies are required to coordinate because they have been funded at least partially with federal dollars. Particularly hard hit by the failure to coordinate have been the commercial fishing industry and the farming industry of Dorchester County. Also adversely impacted are persons without access to publicly available wastewater treatment works.

6. Economic development generally within the County has been significantly adversely impacted by new stormwater management and septic requirements and will be even more detrimentally impacted by proposed "accounting for growth" regulations.

B. Commercial fishing economic disadvantage and harm to the County and its citizens

1. The history and culture of Dorchester County is founded on the practice of economically viable farming and commercial fishing use of the Chesapeake Bay and tributaries feeding the Bay.

2. For many generations, families have run the family fishing business from docks in the County, and said businesses have provided fresh fish, crabs and oysters for Maryland and the world.

3. Dorchester County at one time was the home to numerous seafood processing businesses, seafood wholesale and seafood retail businesses which are an essential component of the County's social, cultural and economic fiber.

4. Chapter 126 of the Dorchester County Code is titled "Right to Work – Seafood Industry" and declares the "policy of Dorchester County to preserve, protect and encourage development and improvement of its waterways for the harvesting of seafood ... [and] to reduce the loss to the County of its commercial seafood and fishing industry by limiting the circumstances under which commercial seafood and fishing industries may be deemed to constitute a nuisance, trespass or other interference with reasonable practices associated with the preparation and activity of [seafood harvesting and processing]."

5. The market for Atlantic menhaden historically has been and remains economically viable. Menhaden is a fish that is used for many purposes and a fish that has been caught for years by commercial watermen working out of Dorchester County and stored, transported and resold by seafood businesses in the County.

6. The market for oysters, crabs, rockfish (aka striped bass), bluefish, red drum, perch and other species historically found in the Chesapeake Bay historically has been and remains viable, and visitors and seasonal residents of the County, as well as permanent residents of the County, patronize venues and establishments that provide seafood.

7. DNR has restricted the poundage of menhaden caught by County watermen in direct contravention of the Right to Work – Seafood Industry policy of the County. DNR has issued the restrictions purportedly in accordance with, and being driven by the fear of enforcement by the United States Secretary of Commerce of, a menhaden catch limit established by a compact agency that limits the pounds of menhaden that may be caught in Maryland waters.

8. The DNR restrictions on allowable menhaden catch and by-catch were not coordinated with the Council and, therefore, cannot lawfully be applied because of non-compliance with NEPA and CEQ §§1508.8 and 1508.14; and the

restrictions are not justified under the federal Regulatory Flexibility Act (5 U.S.C. 601-612). DNR's failure to coordinate the development of the restrictions with the County violates NEPA and CEQ requirements.

9. As of January 1, 2014, DNR will implement regulations that establish individual catch shares (aka "individual transferable quotas" or "ITQs") on County watermen that will restrict the poundage of rockfish a County waterman is permitted to catch in direct contravention of the Right to Work – Seafood Industry policy of the County.

10. In other jurisdictions where individual catch shares similar to the individual catch share system being implemented by DNR have been established, the commercial seafood industry has suffered significant economic detriment which is compounded by cultural and social detriment.

11. The Bay is teeming with rockfish. Dorchester County watermen have had to release large quantities of rockfish caught in the pounds nets that they maintain in the Bay. Other watermen and charter boat captains report reaching their catch allotments for rockfish within a couple of hours of leaving their docks. Dorchester County watermen report and verify that the quantity of rockfish in the Bay is upsetting the Bay's biomass balance. County watermen report and verify that upwards to two dozen crabs regularly have been counted in the bellies of 20+ pound rockfish that have been caught in the Bay during the 2013 season.

12. DNR has regulated Maryland watermen in a disparate and discriminatory manner by imposing restrictive and expensive harvesting methods and catch shares on the harvesting of menhaden, oysters, crabs and rockfish that are not imposed by Virginia, which shares the Bay and Atlantic coastal waters with Maryland, in direct contravention of the Right to Work – Seafood Industry policy of the County and in a manner that violates equal protection of the law guaranteed by the Maryland Declaration of Rights.

13. Recently, DNR personnel have explained to the media that Maryland fishermen have over caught menhaden according to federal guidelines, but that perhaps the federal authorities will not "fine" the State. There are no binding federal guidelines that require Maryland to impose the menhaden limitations and there are no such federal mandates, and so there can be no fines.

14. The State of Maryland has voluntarily placed rigid restrictions on fishing in Maryland to the detriment of its own citizens who reside, fish and live in Maryland and who contribute to the revenue from which vital County public health and safety services and vital County social, cultural and economic development services are funded.

C. Agricultural economic disadvantage and harm to the County and its citizens

1. Dorchester County is also blessed with a strong, rich farming tradition, which in the past has enjoyed economic success and has proven to be a reliable part of the tax base for the County.

2. Chapter 127 of the Dorchester County Code is titled "Right to Farm" and protects a person's right to farm and to engage in agricultural or forestry operation in the County. In Chapter 127 the County declares its policy "to preserve, protect and encourage the development and improvement of its agricultural land for the production of food and other agricultural products ... [and] to reduce the loss to the county of its agricultural resources."

3. MDE and MDA, driven by the federal Environmental Protection Agency's 2010 Chesapeake Bay Total Maximum Daily Load ("TMDL"), have promulgated and proposed regulations regarding phosphorous used on farm fields and found on agricultural property that will threaten the economic viability of the County's agricultural businesses.

4. The regulatory agencies have created an asserted phosphorous problem in the farm fields in Dorchester County through past regulations and agency action that the agencies seek to address through the recently proposed phosphorus regulations.

5. Phosphorus in manures or fertilizers that is not absorbed by crops bonds with the ferric (iron) ions in the soil. Such bonding reduces the release of phosphorus into stormwater before it can be absorbed by agricultural crops.

6. MDA has discouraged such ionic bonding through the no-till practices that it has directed farmers to implement as a best management practice. When the earth is not turned by tilling, excess phosphorus cannot bind to the ferric ions in the soil because the bonding capacity of the top layer of the soil has been exhausted and the soil is not turned to recruit subsurface ferric ions for bonding. No-till farming has resulted in the saturation of the top layer of farm field soil with phosphorous.

7. Chicken farming is a component of the agricultural economy of the County. Chicken manure generally is higher in phosphorus concentration than nitrogen concentration. Farmers have been encouraged to use chicken manure to fertilize their fields so the manure is spread on fields where, theoretically, the nutrients in the manure will be absorbed. Composting of manure has been discouraged. Nutrient management plans ("NMPs") are based solely on nitrogen content without regard to phosphorus content. Farmers have been encouraged, to the point of intimidation, to apply significant quantities of chicken manure to the land so that such manure is "beneficially used" and disposed based only on the

nitrogen content of the manure and other soil additives. Through such best management practices, MDA and MDE encouraged the build-up of phosphorus in the farm fields by developing a NMP process that accounts only for nitrogen.

8. Such allegedly beneficial agricultural and environmental best management practices, which have been encouraged and required by MDA and MDE, have led to the build-up of the level of phosphorus in the fields of County farmers.

9. The combination of nitrogen run-off controls and the requirement of no-till farming by the State has put the farmers of Dorchester County in a direct catch-22 situation: Because nitrogen is severely restricted, farmers use more manures such as chicken manure which has a high phosphorous content and a lower nitrogen content; thus, there is less chance of nitrogen run-off when chicken manure is used. But, when the farmer is not allowed to till the soil, the higher free phosphorous content in the soil leads to more phosphorus stormwater runoff.

10. The beef, dairy and chicken commodities and products produced by farmers in Dorchester County feed the county, Maryland and the United States and provide essential sustenance to the nation. The businesses related to the production and refinement of such commodities and products are essential to sustaining a robust human environment in the County and beyond.

11. If left to develop and implement their own best management practices, farmers would avoid the imbalance created by government regulations as they have traditionally and historically done so throughout our history.

12. None of the states neighboring Maryland apply such a convoluted regulatory scheme to hamper farming viability; this results in an uneven, non-viable competitive disadvantage for the farmers of our County who suffer much higher costs of production than farmers in the less severely regulated neighboring states. It results in a regulatory imbalance that deprives Dorchester County farmers of equal protection of the law and due process of law.

13. The proposed phosphorus regulations being pushed by MDA pursuant to the State's Watershed Implementation Plan developed in conjunction with the Bay TMDL implementation program are in direct contravention of the Right to Farm policy of the County. The Right to Farm Act guarantees to Dorchester County farmers the right to use their land in a manner engaging sound land management practices for agricultural production, and is a stated guarantee that has a nexus to sound public policy in a field of land use law that traditionally has been with the purview of the state and local authority guaranteed by the Tenth Amendment to the U.S. Constitution.

14. There are no lawfully, constitutionally binding federal requirements that require MDA and MDE to impose the new phosphorus limitations that they are considering adopting in the County. The State of Maryland has voluntarily

undertaken to place such rigid restrictions on farming to the detriment of its own citizens who reside, farm and live in and contribute to the revenue base of the County from which vital local police power protecting public health and safety services and vital social and cultural services are funded, contribute vital resources to the County's human environment and lead to the preservation of rural and agricultural lands.

15. County history and investment in agriculture: Farming, including the production of dairy products, livestock grazing, poultry production, swine production, and crop harvesting, have constituted an integral part of Dorchester County's agricultural heritage. Dorchester County has invested millions of dollars during the past thirty-five (35) years to preserve more than 13,778 acres of land in agricultural preservation programs. To protect this heritage and mainstay of Dorchester County's cultural, social and economic environment, the County seeks to preserve such investment and such farming/agricultural resources by precluding regulations and restrictions that jeopardize the ability to local farmers to economically and productively make use of their agricultural lands and farming/food production operations.

D. Disparate and discriminatory impact on the human environment

1. For over three decades, the State and Maryland local governments have adopted more stringent environmental standards to improve the water quality of the Chesapeake Bay and the State and Maryland local governments have spent more money to improve the water quality of the Bay than the other States in the Chesapeake Bay watershed.

2. The allowable limits of total nitrogen, phosphorus and total suspended solids (sediment) that MDE requires in Natural Pollution Discharge Elimination System ("NPDES") permits that it issues to Maryland wastewater treatment plants in administration of the Federal Clean Water Act program for which MDE receives federal funding are much more stringent and substantially more expensive for Maryland local governments to fund and to implement than the limits required of local governments under the same Federal NPDES Clean Water Act programs being implemented in all of the other Bay watershed states.

3. The stormwater management requirements imposed by MDE under the Municipal Separate Storm Sewer System ("MS4") permits that it issues in administration of the MS4 Federal Clean Water Act program are more onerous and substantially more expensive to fulfil than the MS4 permits required by parallel MS4 programs being implemented in the other Bay watershed states.

4. The stormwater management practices that MDE requires persons engaged in development and redevelopment in this State under the Federal Clean Water Act programs that are funded in part by the Federal government and

implemented by MDE are much more stringent, restrictive and expensive to comply with than the stormwater management requirements imposed under the Clean Water Act program in other Bay watershed states.

5. The septic requirements and limitations that Maryland has imposed in its implementation of the 2010 Chesapeake Bay TMDL prepared by EPA are more onerous than the septic requirements of other Bay watershed states subject to the 2010 Chesapeake Bay TMDL.

6. MDE and EPA have declared Bay tributaries in the State of Maryland to be impaired that have significantly lower levels of total nitrogen, phosphorus and total suspended solids than the level of nitrogen, phosphorus and total suspended solids found in tributaries in other Bay watershed states that have not been declared to be impaired by EPA or the state environmental agency that implements the Federal Clean Water Act programs in those Bay watershed states. The "impaired" status subjects Maryland local governments to more onerous and more expensive program implementation requirements than are imposed and funded in other Bay watershed states.

7. The disparate and discriminatorily applied Clean Water Act/2010 Chesapeake Bay TMDL requirements applicable in Maryland in comparison to the other Bay watershed states has precluded the County from successfully competing for economic development with such neighboring Bay watershed states. This inability to compete caused by the disparate and discriminatorily more severe and expensive requirements imposed on Maryland citizens has had a detrimental impact to the aesthetic, social, cultural and economic environment of the County.

8. The Conowingo Dam (the "Dam") converted the lower Susquehanna River into a large stormwater management pond that Exelon Corporation, the Dam's owner, calls the "Conowingo Pond." The Dam widened the natural course of the river and increased the depth of the river. Widening and deepening the river slowed the rate of flow of water in the river, which allowed suspended solids in the river to settle (fall out of suspension) on the bottom of the reservoir and become "trapped" in the same manner that a stormwater management pond "traps" sediments.

9. Like all stormwater management ponds, the Dam has altered the otherwise normal or natural flow of water in the Susquehanna River. Like all stormwater management ponds that have not been maintained (i.e., periodically dredged of the sediments that accumulate in the artificially created reservoir), during significant storm events, accumulated sediments, laden with nutrients and other contaminants, have been scoured from the bottom of the Conowingo Pond and dumped in mass below the Dam, shocking the Maryland portion of the Chesapeake Bay with a blanket of deadly sediments.

Sediment Scoured from the Conowingo Pond During Significant Storm Events[1]				
Storm	Year	Month	Peak Flow Cu^3/sec	Volume of Sediment Scoured into Bay (Million Tons)
Hurricane Agnes	1972	June	1,130,000	20
Hurricane Eloise	1975	September	710,000	5
Unnamed	1993	April	442,000	2
Unnamed	1996	January	909,000	12
Hurricane Ivan	2004	September	620,000	3
Unnamed	2011	March	487,000	2
Hurricane Irene	2011	July	Unmeasured	Unmeasured
Tropical Storm Lee	2011	September	778,000	4
Hurricane Sandy	2012	October	Unreported	Unreported

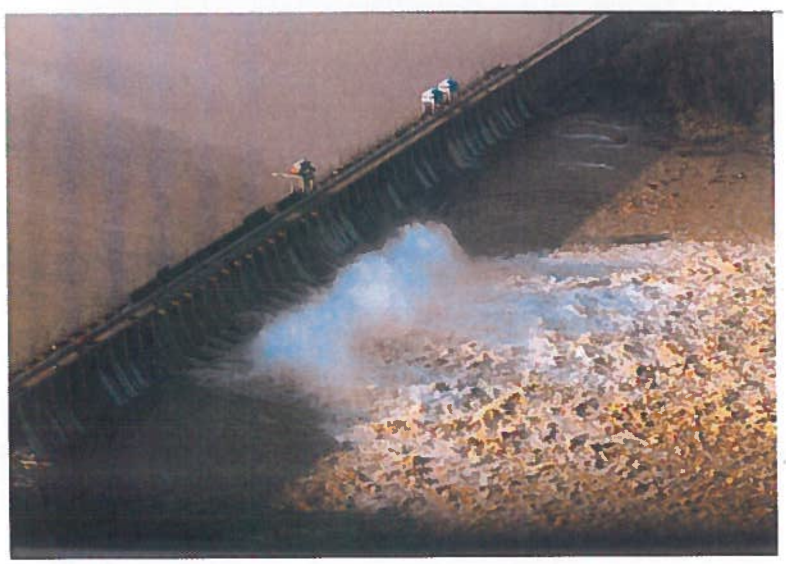
10. Billions of taxpayer dollars have been spent to dredge the navigable shipping channels in the upper Bay and the channels into local marinas that have been clogged with sediments. The largest source, if not the sole source, of those sediments is the Susquehanna River, including scour from the bottom of the Conowingo Pond. Economically and environmentally, those sediments should be dredged from the reservoir behind the Dam where they have accumulated (approximately 9,000 acres or 3,600 hectares), not after they are dumped into the Bay and spread across approximately 4,479 square miles.

11. Exelon, a company with over $30 billion in annual revenues, receives at least two benefits from the Dam: (1) it produces 572 megawatts of electricity, which is enough electricity to power an average of 572,000 or more homes; and (2) it receives renewable energy credits that may be used or sold to offset air emissions from power plants that burn fossil fuels.

[1] Jeffrey Brainard, *Big Year for Bay Storms, Bad Year for Bay Sediment?*, Chesapeake Quarterly Vol. 10 No. 4, Dec. 2011. See link: http://www.mdsg.umd.edu/CQ/V10N4/main1/. *See also The Impact of Sediment on the Chesapeake Bay and its Watershed*: U.S. Geological Survey, June 3, 2005. See link: http://chesapeake.usgs.gov/SedimentBay605.pdf.

Sediment Loading from Storm Event Scour in Comparison to Average Annual Sediment Loading from Susquehanna River				
Storm	Year	Avg. Annual Sed. Load from Susquehanna River (Million Tons)	Sed. Load From Scour (Million Tons)	% of Avg. Annual Load from Scour
Hurricane Agnes	1972	1.5	20	1,333%
Hurricane Eloise	1975	1.5	5	333%
Unnamed	1993	1.5	2	133%
Unnamed	1996	1.5	12	800%
Hurricane Ivan	2004	1.5	3	200%
Unnamed	2011	1.5	2	133%
Tropical Storm Lee	2011	1.5	4	266%
Hurricane Sandy	2012	1.5	Undetermined	Undetermined

12. The photographs below were taken within 2-4 days after Tropical Storm Lee in September 2011.



13. Scour during significant storm events occurs in less than one week. Thus, in a matter of days, scour from the Conowingo Pond during a significant storm has added anywhere from 133% to 1,333% more than the average annual sediment loading from the Susquehanna River. Such loading results in a big die-off of oysters and underwater grasses in the Bay north of the Choptank River. In 1972, up to a meter of sediments was added to the floor of the upper Bay; two-thirds of that sediment was attributed to scour from the floor of the lakes and reservoirs behind the three dams in the lower Susquehanna River. During Tropical Storm Lee, over two inches of sediments were deposited on the floor of the upper Bay. In short, the shock effect of this rapid loading of scoured sediments is devastating to all fauna that cannot flee (swim) to the lower Bay and to all Submerged Aquatic Vegetation ("SAV") in the upper Bay. The oysters and SAV in the upper Bay and the upper Bay tributaries have never recovered from the devastation caused by the scour from Hurricane Agnes. SAV in the Susquehanna Flats was killed to pre-1985 levels (thousands of acres of SAV were killed) as a result of the two storm events in 2011.

14. The Dam traps the best sediment - sand - and releases the most damaging sediments - clay and silt - into the Bay. The Bay has thus been deprived of sand that is necessary: (1) to hold the roots of SAV during storm events; (2) to support the shell beds of oysters; (3) to fortify shorelines and thus reduce erosion; and (4) to cover and suppress the clays and silts that are washed into the Bay so that those clays and silts (a) do not continue to emit phosphorus and nitrogen bound to them in the Susquehanna estuary, (b) do not continue to agitate into suspension and cloud the Bay waters; and (c) do not deprive Bay flora and fauna of needed sunlight and habitat.

15. If the Conowingo Pond is not dredged and maintained, the Bay will never recover, and certain Bay restoration efforts and expenditures below the Dam will be in vain. The County, as a member of the Clean Chesapeake Coalition, has intervened in the relicensing of the Dam to urge the Federal Energy Regulatory Commission (FERC) to place conditions on the license to be issued that will require Exelon to dredge and maintain the stormwater management pond created by the Dam so that a blanket of deadly sediments cannot be scoured from the bottom of the reservoir and deposited in the Bay now with regularity and in devastating proportions during significant storm events.

16. The sediments that are scoured contain phosphorus that is bound to the sediments in the colder oxygenated, non-saline more pH neutral waters of the Susquehanna River but is released into the water in the Bay estuarine that is warmer, more saline, more acidic and less oxygenated. The nutrient and sediment loading from such scour events is substantially greater than the nutrient and sediment loading from activities in the County, including the agricultural activities in the County. Yet Exelon and the predecessor companies that have owned and operated the hydroelectric dams in the lower Susquehanna River have not been required to spend one penny to reduce the nutrient and sediment loading

and the damage to the Bay caused by scour and the lost trapping capacity of those dams. It is discriminatory to require home owners, farmers and small businesses in the County to expend proportionally much larger and more significant funds to remove a much smaller percentage of nutrient and sediment pollution to the Bay while allowing nutrient and sediment pollution to the Bay caused by Exelon's operation of the Dam to continue unabated.

17. Even though federal funds are heavily relied on MDA, MDE and DNR, those agencies have not applied a Regulatory Flexibility Act inquiry and analysis as to whether the Data Quality Act has been complied with as to verification of the data and information used by those agencies prior to imposing the regulations and requirements. Those agencies have not coordinated with Dorchester County during the development of the regulations or requirements as is required under NEPA for regulations promulgated with use of federal funds.

18. Rules and regulations of MDA, MDE and the Maryland Department of Planning (MDP) implementing the 2010 Chesapeake Bay TMDL are adversely impacting the human environment of the County.

19. The rules and regulations of DNR with respect to oyster bed reclamation, restoration and harvesting are precluding the County and its watermen from engaging in activity that would improve the water quality of the Bay while at the same time promoting the Right to Work – Seafood Industry policy of the County.

20. The "accounting for growth" regulations being promulgated by MDE and MDP will further disparately and discriminatorily impact the County and impede the County's ability to encourage economic development and compete with neighboring Bay states for economic development as those states do not have any similar requirements and EPA had not imposed any similar requirements under the 2010 Chesapeake Bay TMDL on such states. Ultimately, the County's human environment will be adversely, significantly and detrimentally impacted by such accounting for growth requirements.

II. THE RESOLUTION

A. WHEREFORE, based upon the above Findings, the Dorchester County Council does hereby resolve as follows:

1. BE IT RESOLVED THAT Dorchester County does formally establish the policy that all reasonable efforts be made by the County to protect the economic viability of commercial fishing and seafood harvesting for citizens of the County, and that regulations and restrictions on such fishing and harvesting be developed and implemented only after all data used for their development has been subjected

to peer review under the standards set by the Data Quality Act and by this County policy.

2. LIKEWISE BE IT RESOLVED THAT Dorchester County does formally establish a policy that all reasonable efforts be made to protect the economic viability of agriculture engaged in by citizens of the County, and that regulations and restrictions on farming and farm practices be developed and implemented only after all data used for their development has been subjected to peer review under the standards set by the Data Quality Act, by this County policy, and after comparison of and analysis of disparate impact on Maryland commerce as compared with the practices of surrounding and competitive states.

3. LIKEWISE BE IT RESOLVED THAT Dorchester County does formerly establish a policy that all regulations and programs undertaken to implement the State's Watershed Implementation Plan and/or the 2010 Chesapeake Bay TMDL be developed and implemented only after all data used for their development has been subjected to peer review under the standards set by the Data Quality Act, by this County policy, and after comparison of and analysis of disparate impact on Maryland commerce as compared with the practices of surrounding and competitive states.

IT IS RECOGNIZED BY the Dorchester County Council that these policies are age-old as far as reasonable protection of, and understanding the importance of, these two traditional economic and social mainstays of the Eastern Shore of Maryland and Dorchester County in particular. We should all be mindful of the fact that the Great Seal of the State of Maryland portrays a waterman and an agricultural harvester.

4. LIKEWISE BE IT RESOLVED that Dorchester County invokes the coordination authority provided for it by Maryland law and federal statutes beginning with the National Environmental Policy Act and including the Clean Water Act and the Magnuson-Stevens Act under which the above regulations are "justified". In enacting this Resolution, the Dorchester County Council is mindful of the fact that no federal or State agency coordinated with the governing body of this County during the initiation of, development of or implementation of these regulations on natural resource industries. No attempt was made by any state or federal agency to work with Dorchester County to determine whether there was a better management practice available to affect the natural environment while protecting the human environment as required by the NEPA regulations of the Council on Environmental Quality or to seek consistency.

5. LIKEWISE BE IT FURTHER RESOLVED that Dorchester County hereby engages the Maryland Department of the Environment, the Maryland Department of Natural Resources, the Maryland Department of Agriculture and the Maryland Department of Planning to coordinate with the Dorchester County Council in an attempt to reach some consistency with the policies of the County enacted by this Resolution and previously adopted by the County, including but

of the County, the County Master Plan, and the County Watershed Implementation Plan.

6. BE IT FINALLY RESOLVED THAT the Dorchester County Clerk serve on management of the Maryland Department of Environment, the Maryland Department of Natural Resources, the Maryland Department of Agriculture and the Maryland Department of Planning a copy of this Resolution, certified, and the letter of the local governing body inviting such department management to meet with the County Council to begin the process of Coordination.

Adopted this 7th day of January, 2014

ATTESTED BY:

~~Jane Baynard~~ Donna F Lane
~~County Manager~~
Executive Administrative Specialist

THE COUNTY COUNCIL
OF DORCHESTER COUNTY

Jay L. Newcomb, President

William V. Nichols, Vice President

Tom C. Bradshaw

Rick M. Price

Ricky C. Travers

58599.007:158792v6

Resolution 549

RESOLUTION OF THE COUNTY COMMISSIONERS OF KENT COUNTY INVOKING ITS AUTHORITY TO ENGAGE FEDERAL AND STATE AGENCIES IN THE COORDINATION PROCESS ESTABLISHED AND MANDATED BY FEDERAL AND STATE STATUTES.

The County Commissioners of Kent County (the "Commissioners"), which is the governing body of Kent County, Maryland (the "County"), does hereby Resolve to initiate the process of coordination by which it will engage federal and state agencies to coordinate with the County, government to government within the definition of coordination mandated by the Congress of the United States, and in support of the Resolution states as follows:

I. FINDINGS

The County Commissioners make the following findings in support of and as the base for this Resolution:

A. Introduction

1. State of Maryland departments such as the Department of Natural Resources ("DNR"), the Maryland Department of the Environment ("MDE"), and the Maryland Department of Agriculture ("MDA") receive and heavily rely on federal funds; as a result when they initiate and implement the development of rules, regulations, plans, policies or management actions that mirror or assist in the implementation of federal statutes, rules and regulations, federal programs or policies or management actions, they are subject to the National Environmental Policy Act ("NEPA"), which includes coordination with local governments.

2. When a State department initiates development and implementation of a NEPA project, it is bound not only by NEPA itself but by the regulations issued by the Council on Environmental Quality ("CEQ"), the federal agency created by NEPA to oversee its implementation.

3. NEPA provides that human interests must be considered in making a balanced decision as to the advisability of the development of a plan, policy, rule or regulation or management action so that the action is taken only after coordination in order to assure that the action results in:

> [C]onditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans. In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consist with other essential considerations of national policy, to improve and

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> coordinate Federal plans, functions, programs and resources.

42 USC § 4331.

4. The CEQ regulations include 40 CFR §§ 1508.14 and 1508.8 which define and insist that agencies protect the "human environment." 40 CFR 1508.14 provides:

> *Human environment* shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of "effects" (§1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

40 CFR 1508.8, which is the lynchpin of 40 CFR 1508.14 provides:

> Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

5. The DNR, MDA and MDE have not engaged in the coordination of policy with Kent County regarding projects requiring compliance with NEPA. Those agencies are required to coordinate because they have been funded at least partially with federal dollars. Particularly hard hit by the failure to coordinate have been the commercial fishing industry and the farming industry of Kent County. Also adversely impacted are persons without access to publicly operated wastewater treatment works.

6. Economic development generally within the County has been significantly adversely impacted by new stormwater management and septic requirements and will be even more detrimentally impacted by proposed "accounting for growth" regulations.

B. Commercial fishing economic disadvantage and harm to the County and its citizens

1. The history and culture of Kent County is founded on the practice of economically viable farming and commercial fishing use of the Chesapeake Bay and tributaries feeding the Bay.

2. For many generations, families have run the family fishing business from docks in the County, and said businesses have provided fresh fish, crabs and oysters for Maryland and the world.

3. Kent County at one time was the home to numerous seafood processing businesses, seafood wholesale and seafood retail businesses which are an essential component of the County's social, cultural and economic fiber.

4. The Kent County Comprehensive Plan (the "Comprehensive Plan"), Section A "Economy" establishes the goal of maintaining and strengthening natural resource-based industries, including fishing. The Comprehensive Plan observes that the commercial fishing industry is "deeply rooted in the County's economy, history and culture." The Comprehensive Plan discusses strategies for promoting and strengthening the County's seafood industry including but not limited to the adoption of "right-to-fish" regulations. Adoption of a "right-to-fish" law is listed within the Comprehensive Plan as being of the "Highest Priority" within the County's "New Initiatives". Kent County Comprehensive Plan, Section V. "Implementation Strategies – Putting the Plan into Action".

5. The County adopted a fishing and seafood operations ordinance to implement the policy of its Comprehensive Plan. See Chapter 89 of the Kent County Code. The County Commissioners have declared: "It is the policy of Kent County to conserve, protect, and encourage the development of seafood operations. It is in the public interest to promote a clearer understanding between seafood and fishing industry and the general public … [and] it is also the policy to reduce the loss of the County's fishing and seafood operations …." Kent County Code §§ 89-1A & 89-1B.

6. The market for oysters, crabs, rockfish (aka striped bass), bluefish, red drum, perch and other species historically found in the Chesapeake Bay remains viable, and visitors and seasonal residents of the County, as well as year-round residents of the County patronize venues and establishments that provide seafood.

7. As of January 1, 2014, DNR will implement regulations that establish individual catch shares (aka "individual transferable quotas" or "ITQs") on County watermen that will restrict the poundage of rockfish a County waterman is permitted to catch.

8. In other jurisdictions where individual catch shares similar to the individual catch share system being implemented by DNR have been established, the commercial seafood industry has suffered significant economic detriment which is compounded by cultural and social detriment.

9. The Bay is teeming with rockfish. Kent County watermen have had to release large quantities of rockfish caught in the pounds nets that they maintain in the Bay. Other watermen and charter captains report reaching their catch allotments for rockfish within a couple hours of leaving the marina or harbor. Kent County watermen report and verify that the quantity of rockfish in the Bay is upsetting the Bay's biomass balance. County watermen report and verify that upwards to two dozen crabs regularly have been counted in the bellies of 20+ pound rockfish that have been caught in the Bay during the 2013 season.

10. DNR has regulated Maryland watermen in a disparate and discriminatory manner by imposing restrictive and expensive harvesting methods and catch shares on the harvesting of menhaden, oysters, crabs and rockfish that are not imposed by Virginia, which shares the Bay and Atlantic coastal waters with Maryland, in a manner that violates equal protection of the law guaranteed by the Maryland Declaration of Rights.

11. The State of Maryland has voluntarily placed rigid restrictions on fishing in Maryland to the detriment of its own citizens who reside, fish and live in Maryland and who contribute to the revenue from which vital County public health and safety services and vital County social, cultural and economic development services are funded.

C. Agricultural economic disadvantage and harm to the County and its citizens

1. Kent County is also blessed with a strong, rich farming tradition, which has brought economic prosperity to the County and has proven to be a reliable part of the tax base for the County.

2. The Agricultural Priority Preservation Area Element, Appendix D to the Comprehensive Plan, establishes goals to: maintain and strengthen natural resource-based industries, support agriculture as a permanent and preferred land use, maintain agriculture, and promote voluntary programs to permanently preserve agricultural lands.

3. The Comprehensive Plan establishes the County's commitment to support agriculture and promote working landscapes. The Comprehensive Plan recognizes that agriculture businesses within the County are economically viable and that maintaining the economic viability of agricultural businesses is important in the County's economic, social and cultural well-being. Section C of the Comprehensive Plan provides that "[a]griculture is the thread which runs through our economy, our culture, our history, and our everyday experiences. We cannot afford to have this thread unravel...In Kent County...we view agriculture as a permanent and preferred land use. In order to preserve farmland, we must enhance the economic viability of agriculture in the County and discourage non-agriculturally related uses of rural land...."

4. The County has a "Right to Farm" ordinance, the purpose of which "is to protect the right to farm or engage in agricultural interests within Kent County ... and to assist in the resolution of disputes between agricultural landowners and/or farmers and their neighbors ... by promoting a clearer understanding between agricultural operations and nonagricultural neighbors concerning the normal inconveniences of agricultural operations that follow standard and generally accepted agricultural practices ...." Kent County Code § 84-1A & 84-1C.

5. MDE and MDA, driven by the federal Environmental Protection Agency's 2010 Chesapeake Bay Total Maximum Daily Load ("TMDL"), have promulgated and proposed regulations regarding phosphorous used on farm fields and found on agricultural property that will threaten the economic viability of County agricultural businesses.

6. The regulatory agencies have created an asserted phosphorous problem in the farm fields in Kent County through past regulations and agency action that the agencies seek to address through the newly proposed phosphorus regulations.

7. Phosphorus in manures or fertilizers that is not absorbed by crops bonds with the ferric (iron) ions in the soil. Such bonding reduces the release of phosphorus into stormwater before it can be absorbed by agricultural crops.

8. MDA has discouraged such ionic bonding through the no-till practices that it has directed farmers to implement as a best management practice. When the earth is not turned by tilling, excess phosphorus cannot bind to the ferric ions in the soil because the bonding capacity of the top layer of the soil has been exhausted and the soil is not turned to recruit subsurface ferric ions for bonding. No-till farming has resulted in the saturation of the top layer of farm field soil with phosphorous.

9. Chicken farming is a component of the agricultural economy of the County. Chicken manure generally is higher in phosphorus concentration than nitrogen concentration. Farmers have been encouraged to use chicken manure to

fertilize their fields so the manure is spread on fields where, theoretically, the nutrients in the manure will be absorbed. Composting of manure has been discouraged. Nutrient management plans ("NMPs") are based solely on nitrogen content without regard to phosphorus content. Farmers have been encouraged, to the point of intimidation, to apply significant quantities of chicken manure to the land so that such manure is "beneficially used" and disposed based only on the nitrogen content of manure and other soil additives. Through such best management practices, MDA and MDE encouraged the build-up of phosphorus in the farm fields by developing a NMP process that accounts only for nitrogen.

10. Such allegedly beneficial agricultural and environmental best management practices, which have been encouraged and required by MDA and MDE, have led to the build-up of the level of phosphorus in the fields of County farmers.

11. The combination of nitrogen run-off controls and the requirement of no-till farming by the State has put the farmers of Kent County in a direct catch-22 situation: Because nitrogen is severely restricted, farmers use more manures such as chicken manure which has a high phosphorous content and a lower nitrogen content; thus, there is less chance of nitrogen run-off when chicken manure is used. But, when the farmer is not allowed to till the soil, the higher free phosphorous content in the soil leads to more phosphorus stormwater runoff.

12. The beef, dairy and chicken commodities and products produced by farmers in Kent County feed the county, Maryland and the United States and provide essential sustenance to the nation. The businesses related to the production and refinement of such commodities and products are essential to sustaining a robust human environment in the County and beyond.

13. If left to develop their own best management practices, farmers would avoid the imbalance created by government regulations as they have traditionally and historically done so throughout our history.

14. None of the states neighboring Maryland apply such a convoluted regulatory scheme to hamper farming viability; this results in an uneven, non-viable competitive disadvantage for the farmers of our County who suffer much higher costs of production than farmers in the less severely regulated neighboring states. It results in a regulatory imbalance that deprives Kent County farmers of equal protection of the law and due process of law.

15. The proposed phosphorus regulations being pushed pursuant to the State WIP developed in conjunction with the Chesapeake Bay TMDL implementation program are in direct contravention of the Right to Farm policy of the County. County Code Chapter 84 guarantees to Kent County farmers the right to use their land in a manner engaging sound land management practices for agricultural production, and is a stated guarantee that has a nexus to sound public policy in a

field of land use law that traditionally has been with the purview of the state and local authority guaranteed by the Tenth Amendment to the U.S. Constitution.

16. There are no lawfully, constitutionally binding federal requirements that require MDA and MDE to impose the new phosphorus limitations that they are considering adopting in the County. The State of Maryland has voluntarily undertaken to place such rigid restrictions on farming to the detriment of its own citizens who reside, farm and live in and contribute to the revenue base of the County from which vital local police power protecting public health and safety services and vital social and cultural services are funded, contribute vital human resources to the County's human environment and lead to the preservation of rural and agricultural lands.

17. County history and investment in agriculture: Farming, including the production of dairy products, livestock grazing, poultry production, swine production and crop harvesting, has constituted an integral part of Kent County's agricultural heritage. From FY1985 through FY2014, Kent County has invested $1,057,141.23 in local matching funds towards Maryland Agricultural Land Preservation Foundation (MALPF) easements, using the County's retained share of the Agricultural Transfer Tax. Since 1998, the County has included additional funds towards MALPF easements as a result of having a certified agriculture preservation program. The State has spent over $31 million in the County, using federal funds from the Farmland and Ranchlands Protection Program, towards MALPF easements. For the lands dedicated under Maryland's Rural Legacy Program, approximately $5.16 million of State and federal funds have been spent, with the federal portion coming from the Farmland and Ranchlands Protection Program. For the County lands protected under the Chesapeake Country National Scenic Byways Protection Program, more than $1.5 million of federal funds (from an earmark in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users transportation bill) have been invested. Overall, the County has preserved more than 35,313 acres of its land in agricultural preservation programs, including: 16,734 acres through MALPF; 12,651 acres with the Maryland Environmental Trust and/or the Eastern Shore Land Conservancy; 3,300 acres with the Conservation Fund/American Farmland Trust; 2,046 acres with the Maryland's Rural Legacy Program; and 582 acres with the Chesapeake Country National Scenic Byway Protection Program. To protect this heritage and mainstay of Kent County's cultural, social and economic environment, the County seeks to preserve such investments and such farming/agricultural resources by precluding regulations and restrictions that jeopardize the ability of local farmers to economically and productively make use of their agricultural lands and farming/food production operations.

D. Disparate and discriminatory impact on the human environment

1. For over three decades, the State and Maryland local governments have adopted more stringent environmental standards to improve the water quality of the Chesapeake Bay and the State and Maryland local governments have spent more money to improve the water quality of the Bay than the other States in the Chesapeake Bay watershed.

2. The allowable limits of total nitrogen, phosphorus and total suspended solids (sediment) that MDE requires in Natural Pollution Discharge Elimination System ("NPDES") permits that it issues to Maryland wastewater treatment plants in administration of the Federal Clean Water Act program for which MDE receives federal funding are much more stringent and substantially more expensive for Maryland local governments to fund and to implement than the limits required of local governments under the same Federal NPDES Clean Water Act programs being implemented in all of the other Bay watershed states.

3. The stormwater management requirements imposed by MDE under the Municipal Separate Storm Sewer System ("MS4") permits that it issues in administration of the MS4 Federal Clean Water Act program are more onerous and substantially more expensive to fulfil than the MS4 permits required by parallel MS4 programs being implemented in the other Bay watershed states.

4. The stormwater management practices that MDE requires persons engaged in development and redevelopment in this State under the Federal Clean Water Act programs that are funded in part by the Federal government and implemented by MDE are much more stringent, restrictive and expensive to comply with than the stormwater management requirements imposed under the Clean Water Act program in other Bay watershed states.

5. The septic requirements and limitations that Maryland has imposed in its implementation of the 2010 Chesapeake Bay TMDL prepared by EPA are more onerous than the septic requirements of other Bay watershed states subject to the 2010 Chesapeake Bay TMDL.

6. MDE and EPA have declared Bay tributaries in the State of Maryland to be impaired that have significantly lower levels of total nitrogen, phosphorus and total suspended solids than the levels of nitrogen, phosphorus and total suspended solids found in tributaries in other Bay watershed states that have not been declared to be impaired by EPA or the state environmental agency that implements the Federal Clean Water Act programs in those Bay watershed states. The "impaired" status subjects Maryland local governments to more onerous and more expensive program implementation requirements than are imposed and funded in other Bay watershed states.

7. The disparate and discriminatorily applied Clean Water Act/2010 Chesapeake Bay TMDL requirements applicable in Maryland in comparison to the other Bay watershed states has precluded the County from successfully competing for economic development with such neighboring Bay watershed states. This inability to compete caused by the disparate and discriminatorily more severe and expensive requirements imposed on Maryland citizens has had a detrimental impact to the aesthetic, social, cultural, and economic environment of the County.

8. The Conowingo Dam (the "Dam") converted the lower Susquehanna River into a large stormwater management pond that Exelon Corporation, the Dam's owner, calls the "Conowingo Pond." The Dam widened the natural course of the river and increased the depth of the river. Widening and deepening the river slowed the rate of flow of water in the river, which allowed suspended solids in the river to settle (fall out of suspension) on the bottom of the reservoir and become "trapped" in the same manner that a stormwater management pond "traps" sediments.

9. Like all stormwater management ponds, the Dam has altered the otherwise normal or natural flow of water in the Susquehanna River. Like all stormwater management ponds that have not been maintained (i.e., periodically dredged of the sediments that accumulate in the artificially created reservoir), during significant storm events, accumulated sediments, laden with nutrients and other contaminants, have been scoured from the bottom of the Conowingo Pond and dumped in mass below the Dam, shocking the Maryland portion of the Chesapeake Bay with a blanket of deadly sediments.

Sediment Scoured from the Conowingo Pond During Significant Storm Events[1]				
Storm	Year	Month	Peak Flow Cu^3/sec	Volume of Sediment Scoured into Bay (Million Tons)
Hurricane Agnes	1972	June	1,130,000	20
Hurricane Eloise	1975	September	710,000	5
Unnamed	1993	April	442,000	2
Unnamed	1996	January	909,000	12
Hurricane Ivan	2004	September	620,000	3
Unnamed	2011	March	487,000	2
Hurricane Irene	2011	July	Unmeasured	Unmeasured
Tropical Storm Lee	2011	September	778,000	4
Hurricane Sandy	2012	October	Unreported	Unreported

10. Billions of taxpayer dollars have been spent to dredge the navigable shipping channels in the upper Bay and the channels into local marinas that have been clogged with sediments. The largest source, if not the sole source, of those sediments is the Susquehanna River, including scour from the bottom of the Conowingo Pond. Economically and environmentally, those sediments should be dredged from the reservoir behind the Dam where they have accumulated (approximately 9,000 acres or 3,600 hectares), not after they are dumped into the Bay and spread across approximately 4,479 square miles.

11. Exelon, a company with over $30 billion in annual revenues, receives at least two benefits from the Dam: (1) it produces 572 megawatts of electricity, which is enough electricity to power an average of 572,000 or more homes; and (2) it receives renewable energy credits that may be used or sold to offset air emissions from power plants that burn fossil fuels.

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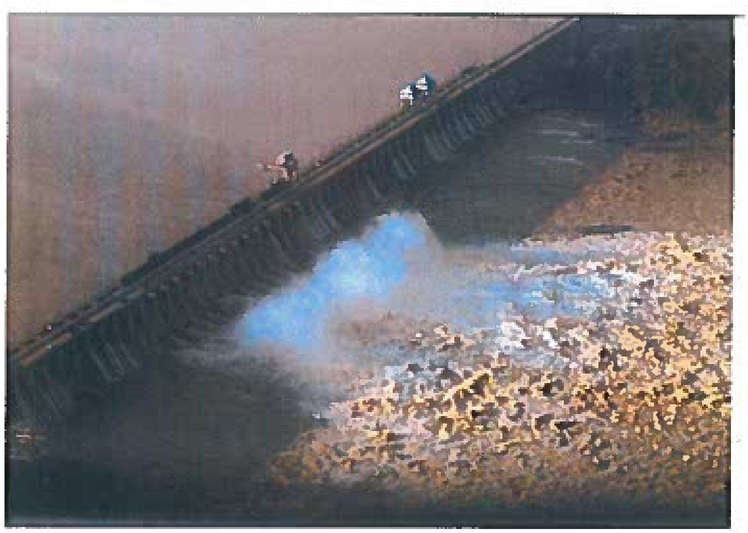
[1] Jeffrey Brainard, *Big Year for Bay Storms, Bad Year for Bay Sediment?*, Chesapeake Quarterly Vol. 10 No. 4, Dec. 2011. See link: http://www.mdsg.umd.edu/CQ/V10N4/main1/. *See also The Impact of Sediment on the Chesapeake Bay and its Watershed*: U.S. Geological Survey, June 3, 2005. See link: http://chesapeake.usgs.gov/SedimentBay605.pdf.

Sediment Loading from Storm Event Scour in Comparison to Average Annual Sediment Loading from Susquehanna River				
Storm	Year	Avg. Annual Sed. Load from Susquehanna River (Million Tons)	Sed. Load From Scour (Million Tons)	% of Avg. Annual Load from Scour
Hurricane Agnes	1972	1.5	20	1,333%
Hurricane Eloise	1975	1.5	5	333%
Unnamed	1993	1.5	2	133%
Unnamed	1996	1.5	12	800%
Hurricane Ivan	2004	1.5	3	200%
Unnamed	2011	1.5	2	133%
Tropical Storm Lee	2011	1.5	4	266%
Hurricane Sandy	2012	1.5	Undetermined	Undetermined

12. The photographs below were taken within 2-4 days after Tropical Storm Lee in September 2011.



13. Scour during significant storm events occurs in less than one week. Thus, in a matter of days, scour from the Conowingo Pond during a significant storm has added anywhere from 133% to 1,333% more than the average annual sediment loading from the Susquehanna River. Such loading results in a big die-off of oysters and underwater grasses in the Bay north of the Choptank River. In 1972, up to a meter of sediments was added to the floor of the upper Bay; two-thirds of that sediment was attributed to scour from the floor of the lakes and reservoirs behind the three dams in the lower Susquehanna River. During Tropical Storm Lee, over two inches of sediments were deposited on the floor of the upper Bay. In short, the shock effect of this rapid loading of scoured sediments is devastating to all fauna that cannot flee (swim) to the lower Bay and to all Submerged Aquatic Vegetation ("SAV") in the upper Bay. The oysters and SAV in the upper Bay and the upper Bay tributaries have never recovered from the devastation caused by the scour from Hurricane Agnes. SAV in the Susquehanna Flats was killed to pre-1985 levels (thousands of acres of SAV were killed) as a result of the two storm events in 2011.

14. The Dam traps the best sediment - sand - and releases the most damaging sediments - clay and silt - into the Bay. The Bay has thus been deprived of sand that is necessary: (1) to hold the roots of SAV during storm events; (2) to support the shell beds of oysters; (3) to fortify shorelines and thus reduce erosion; and (4) to cover and suppress the clays and silts that are washed into the Bay so that those clays and silts (a) do not continue to emit phosphorus and nitrogen bound to them in the Susquehanna estuary, (b) do not continue to agitate into suspension and cloud the Bay waters; and (c) do not deprive Bay flora and fauna of needed sunlight and habitat.

15. If the Conowingo Pond is not dredged and maintained, the Bay will never recover, and certain Bay restoration efforts and expenditures below the Dam will be in vain. The County, as a member of the Clean Chesapeake Coalition, has intervened in the relicensing of the Dam to urge the Federal Energy Regulatory Commission (FERC) to place conditions on the license to be issued that will require Exelon to dredge and maintain the stormwater management pond created by the Dam so that a blanket of deadly sediments cannot be scoured from the bottom of the reservoir and deposited in the Bay now with regularity and in devastating proportions during significant storm events.

16. The sediments that are scoured contain phosphorus that is bound to the sediments in the colder oxygenated, non-saline more pH neutral waters of the Susquehanna River but is released into the water in the Bay estuarine that is warmer, more saline, more acidic and less oxygenated. The nutrient and sediment loading from such scour events is substantially greater than the nutrient and sediment loading from activities in the County, including the agricultural activities in the County. Yet Exelon and the predecessor companies that have owned and operated the hydroelectric dams in the lower Susquehanna River have

not been required to spend one penny to reduce the nutrient and sediment loading and the damage to the Bay caused by scour and the lost trapping capacity of those dams. It is discriminatory to require home owners, farmers and small businesses in the County to expend proportionally much larger and more significant funds to remove a much smaller percentage of nutrient and/or sediment pollution to the Bay while allowing nutrient and sediment pollution to the Bay caused by Exelon's operation of the Dam to continue unabated.

17. Even though federal funds are heavily relied on by MDA, MDE and DNR, those agencies have not applied a Regulatory Flexibility Act inquiry and analysis as to whether the Data Quality Act has been complied with as to verification of the data and information used by those agencies prior to imposing the regulations and requirements. Those agencies have not coordinated with Kent County during the development of the regulations or requirements as is required under NEPA for regulations promulgated with use of federal funds.

18. Rules and regulations of MDA, MDE and the Maryland Department of Planning (MDP) implementing the 2010 Chesapeake Bay TMDL are adversely impacting the human environment of the County.

19. The rules and regulations of DNR with respect to oyster bed reclamation, restoration and harvesting are precluding the County and its watermen from engaging in activity that would improve the water quality of the Bay.

20. The "accounting for growth" regulations being promulgated by MDE and MDP will further disparately and discriminatorily impact the County and impede the County's ability to encourage economic development and compete with neighboring Bay states for economic development as those states do not have any similar requirements and EPA had not imposed any similar requirements under the 2010 Chesapeake Bay TMDL on such states. Ultimately, the County's human environment will be adversely, significantly and detrimentally impacted by such accounting for growth requirements.

II. THE RESOLUTION

A. WHEREFORE, based upon the above Findings, the County Commissioners of Kent County do hereby resolve as follows:

1. BE IT RESOLVED THAT Kent County does formally establish the policy that all reasonable efforts be made by the County to protect the economic viability of commercial fishing and seafood operations for citizens of the County, and that regulations and restrictions on such fishing and seafood operations be developed and implemented only after all data used for their development has been subjected

to peer review under the standards set by the Data Quality Act and by this County policy.

2. LIKEWISE BE IT RESOLVED THAT Kent County does formally establish a policy that all reasonable efforts be made to protect the economic viability of agriculture engaged in by citizens of the County, and that regulations and restrictions on farming and farm practices be developed and implemented only after all data used for their development has been subjected to peer review under the standards set by the Data Quality Act, by this County policy, and after comparison of and analysis of disparate impact on Maryland commerce as compared with the practices of surrounding and competitive states.

3. LIKEWISE BE IT RESOLVED THAT Kent County does formerly establish a policy that all regulations and programs undertaken to implement the State's Watershed Implementation Plan and/or the 2010 Chesapeake Bay TMDL be developed and implemented only after all data used for their development has been subjected to peer review under the standards set by the Data Quality Act, by this County policy, and after comparison of and analysis of disparate impact on Maryland commerce as compared with the practices of surrounding and competitive states.

IT IS RECOGNIZED BY the County Commissioners of Kent County that these policies are age-old as far as reasonable protection of, and understanding the importance of, these two traditional economic and social mainstays of the Eastern Shore of Maryland and Kent County in particular. We should all be mindful of the fact that the Great Seal of the State of Maryland portrays a waterman and an agricultural harvester.

4. LIKEWISE BE IT RESOLVED that Kent County invokes the coordination authority provided for it by Maryland law and federal statutes beginning with the National Environmental Policy Act and including the Clean Water Act and the Magnuson-Stevens Act under which the above regulations are "justified." In enacting this Resolution, the County Commissioners of Kent County are mindful of the fact that no federal or State agency coordinated with the governing body of this County during the initiation of, development of or implementation of these regulations on natural resource industries. No attempt was made by any State or federal agency to work with Kent County to determine whether there was a better management practice available to affect the natural environment while protecting the human environment as required by the NEPA regulations of the Council on Environmental Quality or to seek consistency.

5. LIKEWISE BE IT FURTHER RESOLVED that Kent County hereby engages the Maryland Department of the Environment, the Maryland Department of Natural Resources, the Maryland Department of Agriculture and the Maryland Department of Planning to coordinate with the County Commissioners in an attempt to reach some consistency with the policies of the County enacted by this

Resolution and previously adopted by the County, including but not limited to the Right to Farm policy of the County, the Fishing and Seafood Operations policy of the County, the County Comprehensive Plan and the County Watershed Implementation Plan.

6. BE IT FINALLY RESOLVED THAT the Clerk to the County Commissioners serve on management of the Maryland Department of Environment, the Maryland Department of Natural Resources, the Maryland Department of Agriculture and the Maryland Department of Planning a copy of this Resolution, certified, and a letter from the local governing body inviting such departmental management to meet with the County Commissioners of Kent County to begin the process of coordination.

Adopted this 7th day of January, 2014

THE BOARD OF COUNTY COMMISSIONERS OF KENT COUNTY

ATTESTED BY:

Sondra Blackiston
Clerk

Ronald H. Fithian, President

William W. Pickrum, Member

William A. Short, Member

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Exelon Generation Company, LLC — Project No.: P-405-106

Preliminary Comments
of the
Clean Chesapeake Coalition
to the
Draft Multi-Project Environmental Impact Statement
For Hyrdopower Licenses
Susquehanna River Hydroelectric Projects
York Haven Project – FERC Project No. 188-030
Muddy Run Project – FERC Project No. 23555-018
Conowingo Project – FERC Project No. 405-106
Office of Energy Projects – FERC/DEIS-0255D

Respectfully submitted,

/s/
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Attorneys for the counties of the Clean Chesapeake Coalition

Dated: September 29, 2014

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Exelon Generation Company, LLC Project No.: P-405-106

Preliminary Comments
of the
Clean Chesapeake Coalition
to the
Draft Multi-Project Environmental Impact Statement
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Office of Energy Projects – FERC/DEIS-0255D

The Federal Energy Regulatory Commission (FERC) prepared what it labeled as a Draft Multi-Project Environmental Impact Statement (Draft EIS). The suggestion that this document even begins to comply with the requirements of the Council on Environmental Quality (CEQ) for an environmental impact statement (EIS), which are set forth in the regulations that it developed to implement the National Environmental Policy Act (NEPA) is, unfortunately, either laughable or tragic, depending on one's frame of reference. *See e.g.*, 40 C.F.R. §§ 1500.1(b), 1500.2; 1500.4(a)–(h), 1502.2. The document:

Is not concise,

Is not analytic,

Does not discuss impacts in proportion to their significance,

Does not identify and assess reasonable alternatives, and

Does not contain accurate scientific analysis.

To suggest that the study satisfies the requirement to consider the cumulative impact of the energy projects in the lower Susquehanna River also would be a misnomer. The study does not consider all of the hydroelectric projects, let alone the nuclear power plant at Three Mile Island and other power projects that withdraw water for cooling purposes and process purposes, causing the alteration and reduction in flows and the warming of the water in the river.

A clear and concise statement of the issue would be as follows:

> Power projects in the lower Susquehanna River have significantly altered the ecology of the river and the Chesapeake Bay north of the southern boundary of the Choptank River. Prior to the development of the projects, the lower Susquehanna River was a much narrower and more rapidly flowing river that had rapids and falls.
>
> A series of hydroelectric projects developed from 1900 to 1930 established a series of dams on the river that materially altered the ecology of the river. The dams widened the river, initially slowed the flow of water in the river, and initially increased the depth of the river behind the dams. What were once rapids and falls turned into lakes and ponds. As sediments accumulated over time behind the dams and filled the lakes and ponds, the ecology of the river changed again.
>
> For decades, the dams prevented the migration of migratory fish such as American Shad and the American eel from returning to their historic spawning grounds to reproduce. The population of American Shad and the American eel have been so diminished that the once thriving commercial fisheries for such species have been closed. Fish lifts have been employed at the Conowingo Dam for the past 23 years with the intent of mitigating that impact of the dams. Affected species still have not recovered and there is ongoing debate as to the effectiveness of the fish lifts to overcome the changes to the rivers ecology caused by the dams and other power projects in the lower Susquehanna River.
>
> Additional power projects licensed by FERC also have impacted the ecology of the lower Susquehanna River, such as the Three Mile Island nuclear power plant and the Old Dominion Electric Wildcat Project.
>
> The cumulative impact of all of these projects on the Susquehanna River and the Chesapeake Bay has never been assessed.

Similar clear and concise statements should be developed to explain how the other power projects in the lower Susquehanna River have impacted the river, such as the Three Mile Island nuclear power plant, the Muddy Run power plant, and the proposed Old Dominion Electric Wildcat Project.

With respect to the Three Mile Island Project, how much water from the Susquehanna River is used on a daily, weekly and/or monthly basis for processes associated with the operation and maintenance of that nuclear power plant? Is water from the Susquehanna River permanently used and not returned to the river by any operations or processes associated with the nuclear power plant? If so, what volume is removed and forever lost from the flow of the river on a daily/weekly/monthly basis and what percentage of average flow and drought flow does the volume constitute? What volume of water is used for cooling processes? What is the average temperature of the water withdrawn for cooling purposes? What is the average temperature of water returned to the river that was used for cooling purposes? What is the chemistry of the water withdrawn versus the chemistry of the water returned? What is the dissolved oxygen content of the water in the river upstream of project intake? What is the dissolved oxygen content in any process water returned to the river?

Similar questions should be asked relative to the proposed Old Dominion Electric Wildcat Project. How much water will be removed from the Susquehanna River on a daily basis for process water and cooling water? How much if any water is being returned to the river? What is the temperature and of water withdrawn versus what is the temperature of water returned? What is the chemistry of the water withdrawn versus the chemistry of the water returned? What is the dissolved oxygen content of the water in the river upstream of project intake? What is the dissolved oxygen content in any process water returned to the river?

A cumulative EIS must consider the impact of all of the projects reliant upon any aspect of the waters in the Susquehanna River watershed. The Draft EIS fails to identify significant power projects in the watershed, let alone all of the projects.

There are similar simple questions which should have been asked and answered with respect to the Muddy Run project. What volume of water is pumped out of the Conowingo Pond at night and how if at all does it vary based on the flow or volume of water in the Conowingo Pond? What is the quantity of total suspended solids in the water pumped out of the Conowingo Pond? What is the quantity of total suspended solids in the water drained back into the Conowingo Pond? Are sediments accumulating in the Muddy Run reservoir? What, if anything, causes such accumulated sediments in the Muddy Run reservoir to become agitated and go into suspension? Is the Muddy Run reservoir loosing capacity as sediments accumulate on the floor of the reservoir? Is Exelon allowed to agitate sediments that build-up on the floor of the reservoir and flush them into the Conowingo Pond? How, if at all, does the withdrawal of water from the Conowingo Pond and the discharge of water back into the Conowingo Pond impact the rate of flow of water through the Conowingo Dam? Whether scour from the floor of the Conowingo Pond occurs as water from the Muddy Run reservoir is discharged into the Conowingo Pond during the process of generating electricity – is there scour at the outfall that increases the quantity of suspended solids/sediments that flow through the Conowingo Dam on a regular basis?

With respect to each dam and hydroelectric project, how much flow is required to operate the plant at maximum capacity and at various other capacities? How is the flow through the dam regulated and altered for purposes of generating electricity (*e.g.,* is flow slowed during off-peak electric times to increase the volume of water in the reservoir and ensure that there is sufficient process water for the Muddy Run Project, the Old

Dominion Project, and other power and non-power related withdrawals)? Does the rate of flow at night (off-peak electricity demand times) vary from the rate of flow during the day (peak electricity demand times)? How is the rate of flow varied depending on the weather, *i.e.*, drought conditions versus average rainfall conditions versus thaw and high rainfall conditions? What is the scour threshold flow rate behind each dam?

The foregoing simple questions have simple answers, which, if concisely presented, would provide meaningful information to consider in accessing the individual and cumulative impacts of each power project on the natural or physical environment and possible operational alternatives or mitigating conditions relative to such impacts. If the drafters of the EIS believe such questions are asked and answered, they have not been concisely asked and the answers have not been concisely presented such that local government officials and citizens can assess and understand the operational impacts to the natural or physical environment. The failure of FERC to recognize and investigate such basic information coupled with FERC's unsupported assertion that the lower Susquehanna River power projects do not have any impact beyond the mouth of the Susquehanna River (*i.e.*, four (4) miles below the Conowingo Dam) creates the appearance that FERC's sole objective is to provide rubber-stamp approval of whatever the power companies are doing, without any investigation or consideration of readily apparent potential impacts to the human environment, including the natural, economic, social and cultural environment of the Bay and of Coalition counties, and without any scientific integrity. Does any agency with any environmental expertise, *e.g.*, U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA), United States Army Corps of Engineers (USACE), United States Fish and Wildlife Services (USFWS) or National Ocean and Atmospheric Administration (NOAA) agree that the impact from scour and other impacts from the subject power projects extend only to the mouth of the Susquehanna River? Upon what science is that assertion predicated? Where is the peer review and data quality assurance of such "science?"

A single NASA satellite photograph of the Chesapeake Bay watershed taken September 13, 2011, a few days after Tropical Storm Lee, showing a sediment plume emanating from the Conowingo Dam and extending approximately 100 miles to the mouth of the Potomac River evidences the extensive reach of the harmful impacts – well downstream from the mouth of the Susquehanna. *See* Figure 1 from Coalition's Motion to Intervene, Submittal 20130625-5007, June 24, 2013.

There are at least two well established and significant impacts to the natural environment from the dams built in conjunction with the hydroelectric projects:

1. **The dams alter natural river flows, accumulate nutrient and toxic laden sediments behind the dams, and discharge accumulated sediments in massive bulk slugs during high flow conditions as the result of scour.**

The scientific reports that the Coalition cited in its original Motion to Intervene unequivocally establish the quantity of sediments scoured from the floor of the

Conowingo Pond during high-flow events and the impact from the scour of sediments unnaturally accumulated behind the dams. Yet the Draft EIS ignores the issue of scour. A review of the Literature Cited (which is a misnomer since the Draft EIS fails to cite to any report for the observations and assessments made by FERC) in Section 6.0 of the Draft EIS reveals that FERC references some of the studies and reports that discuss scour. FERC, in the EIS for the Conowingo Project, and the cumulative EIS, is required to make findings relative to scour and it must cite to the authorities upon which it relies for such findings. FERC fails to even consider much of the literature that discusses the scour phenomenon and its impact.[1] If FERC concludes that there is no scour during

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[1] FERC did not even consider the following reports:

Jeffrey Brainard, *Big Year for Bay Storms, Bad Year for Bay Sediment?*, Chesapeake Quarterly Vol. 10 No. 4, Dec. 2011. *See* link: http://www.mdsg.umd.edu/CQ/V10N4/main1/.

The Impact of Sediment on the Chesapeake Bay and its Watershed: U.S. Geological Survey, June 3, 2005. *See* link: http://chesapeake.usgs.gov/SedimentBay605.pdf.

Hirsch, R.M., 2012, Frequently Asked Questions: Flux of nitrogen, phosphorus, and suspended sediment from the Susquehanna River Basin to the Chesapeake Bay during Tropical Storm Lee, September 2011, as an indicator of the effects of reservoir sedimentation on water quality U.S. Geological Survey Scientific Investigations Report 2012-5185, 17 p.

Langland, M.J., *Lower Susquehanna River Reservoir System PowerPoint Presentation*, Dec. 3, 2012, and Hirsch, R.M., *Susquehanna River Inputs of Phosphorus, Sediment and Nitrogen to Chesapeake Bay - New Understanding since Tropical Storm Lee, September 2011 PowerPoint Presentation*, Dec. 3, 2012.

Dennison, W.C., T. Saxby, B.M. Walsh (eds.). 2012. *Responding to major storm impact: Chesapeake Bay and the Delmarva Coastal Bays*, 6, estimate that scour occurs in the Conowingo reservoir at flows rates of 175,000-300,000 cu.ft./sec.

U.S. Army Corps of Engineers, Baltimore District, *Susquehanna River Basin Ecological Flow Management Study Phase I*, (April 2012).

Langland, M. and Hainly, R., 1997, *Changes in Bottom Surface Elevations in Three Reservoirs on the Lower Susquehanna River, Pennsylvania and Maryland, Following the January 1996 Flood - Implications for Nutrient and Sediment Loads to Chesapeake Bay*: U.S. Geological Survey Scientific Investigations Report 97-4138, 33 p.

The Effects of Tropical Storm Agnes on the Chesapeake Bay Estuary System, Johns Hopkins Press (1977). More particularly, *see* Appendix B, Schubel, J.R., *Effects of Agnes on the Suspended Sediment of the Chesapeake Bay and Contiguous Shelf Waters*, 179-200.

Laura Legere, *Chesapeake Bay Battered by Susquehanna Flooding*, Times Shamrock Oct. 2, 2011 (Tom Parham with the MDNR reported that after the 1972 flooding caused by Hurricane Agnes, it took years and years and years for SAV uprooted during storm surges to return, and he reported observing fresh water species of SAV forming floating islands of SAV mixed with trash in the lower Bay that were blasted down after the storm surges caused by Tropical Storm Lee in September 2011).

Karl Blankenship, *Storm Leaves Trail of Debris, Sediments in Her Wake*, Chesapeake Bay Journal, Oct. 2011.

The Impact of the Susquehanna Sediments on the Chesapeake Bay, Chesapeake Bay Program Scientific and Technical Advisory Committee Workshop Report, May, 2000, 7.

high-flow events, the studies on which it relies must satisfy the requirements of the Data Quality Act.

The Draft EIS ignores an inconvenient truth – that scour from the floors of the reservoirs behind the dams releases nutrient and toxic laden sediments into the Chesapeake Bay. Even the USACE admits that at least 20% of the sediments flushed from the Susquehanna River into the Bay come from sediments scoured from the floor of the Conowingo Pond. What no one addresses is the impact when that 20% (which is time averaged) is released as a massive bulk slug discharge over four (4) to seven (7) days. What no one discusses is the percentage of suspended sediments/solids in the river during high flow events come from sediments scoured from the floors of Lake Aldred, Lake Clarke, and the reservoirs behind other hydroelectric project dams.

Again, what the scientific studies conducted shortly after Hurricane Agnes and published by the Johns Hopkins Press established is that 20 million metric tons of the 36 million metric tons of sediments that washed down the Susquehanna River into the Bay in the week after Hurricane Agnes in 1972 was from scour from the floor of the dams/reservoirs behind the hydroelectric power dams. Thus, in that high flow event, 56% of the sediments flushed into the Bay in a seven day period were from scour, which is the un-time-weighted impact of scour during a significant high-flow event.

Maryland Department of Natural Resources (MDNR) oyster surveys and blue crab surveys detail the impact of Hurricane Agnes sedimentation on the blue crab and oyster populations in the upper Bay. A comparison of the harvest reports from the five years preceding the hurricane and the five years after the hurricane establishes that oysters and blue crabs where wiped out by the sediments that smothered both populations, as neither could flee the devastating flush of sediments into the Bay to the same extent as the fish species residing in the upper Bay. Again, 56% of this devastation was attributable to scour from the floor of the reservoirs behind the hydroelectric power dams licensed by FERC in the lower Susquehanna River. As climate change increases the likelihood and frequency of high flow events, the frequency of scour and the quantity of sediments that will come from scour is predicted to increase. *See* Executive Order 13653.

If FERC had coordinated with the Coalition counties before scoping and preparing the EIS those Maryland local governments would have provided information about the economic, social and cultural impact that the loss of oysters and crabs due to Susquehanna sedimentation has had on the counties. The USACE, in its reports on oysters *see* (USACE Final Environmental Assessment and Finding of No Significant Impact, Chesapeake Bay Oyster Restoration Using Alternative Substrate dated May 2009 (2009 EA); & Chesapeake Bay Oyster Recovery: Native Oyster Restoration Master Plan, Maryland and Virginia dated September 2012 (2012 MP)), details the impact of Susquehanna sediments on the Bay's oyster population and the benefits that oysters provide not only to the natural environment, but also the economic, social and cultural environments of Coalition counties.[2] The Draft EIS completely fails to fulfill the mandate of the CEQ regulations that full consideration be given to the impacts to the entire human environment.

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[2] Oysters filter and remove sediments, nitrogen and phosphorus from the waters in which they live. (USACE Final Environmental Assessment and Finding of No Significant Impact, Chesapeake Bay Oyster Restoration Using Alternative Substrate dated May 2009 (2009 EA), § 3.4.7 at 22 (oysters remove suspended sediments from the water and deposit them as pseudo feces), § 5.3.1 at 34 (oysters feed on phytoplankton – nitrogen removal); Chesapeake Bay Oyster Recovery: Native Oyster Restoration Master Plan, Maryland and Virginia dated September 2012 (2012 MP) § 4.4 at 69 (oysters filter water while feeding and remove sediments and other solids depositing what they do not ingest as pseudo feces), § 4.4.2 (oysters eat phytoplankton), § 5.7.1 at 168-69.)

Oysters also remove carbon dioxide from the water, which is converted into the calcium carbonate ($CaCO_3$) that forms the oyster's shell. (2012 MP § 5.7.1 at 168-69.) USACE estimated that if oyster density in the Choptank River was increased to 10 per square meter over approximately 5,000 acres, 50% of the summer input of nitrates and 350% of the summer inputs of phosphates entering the Choptank River from stormwater runoff would be removed from the river. (*Id.*)

EPA estimates that 1,000,000 market sized oysters (3" oysters) remove between 700 and 5,500 pounds of nitrogen from the Bay/Bay tributaries annually. (Chesapeake Bay Total Maximum Daily Load of Nitrogen, Phosphorus and Sediment December 29, 2010 (2010 TMDL) Apx. U at U-2.) EPA set goals in the 2010 TMDL for oyster restoration. Specifically, EPA stated:

> Filter feeders play an important role in the uptake of nutrients from the Chesapeake Bay and have the potential to significantly improve water quality if present in large numbers. The current goal for the Chesapeake Bay is to increase the native Eastern oyster, Crassostrea Virginia, population tenfold. A population increase of that magnitude could remove 10 million pounds of nitrogen annually (Cerco and Noel 2005).
>
> ...
>
> Stephenson (2009) estimates that the cost of total nitrogen reduction from oyster assimilation at $0-$100 per pound. In comparison, agricultural best management practices (BMPs) costs in Virginia [in 2009] range from $4 to $200 per pound and urban stormwater BMPs can be $25 to more than $1,000 per pound or more (Stephenson 2009).

(*Id.*, Apx. U at U-1, U-2.) EPA contemplated and discussed Bay restoration programs that would give credits to jurisdictions undertaking the restoration of oyster beds in the Bay. (*Id.* at U-3 - U-4.) Oyster bed reclamation and restoration, therefore, is a viable and preferred method for restoring the water quality of the Bay and Maryland Bay tributaries.

The sediments deposited in the Bay during and in the aftermath of Hurricane Agnes in 1972 destroyed the oyster beds north of the Bay Bridge. (2012 MP § 4.6.3 at 83-84.) Sediments smother and kill oysters and prevent oyster spat from seeding because spat require hard clean shell on which to attach in order to grow new oysters. (2009 EA § 3.3.1 at 13 (sediments now cover most historic oyster beds and planted shell becomes covered in an average of 5.5 years); 2012 MP § 2.1.1 at 17 ("Shell is being lost due to burial by sediments. Larval oysters require hard substrate on which to settle to grow."), § 4.1.1 at 49 (sediments eliminate oyster habitat), § 4.1.1.4 at 56 (sediment smothers oysters), § 5.5.4.5 at 150 (oyster growth must exceed sedimentation rates in order for oysters to survive).)

FERC's Draft EIS totally ignores Hurricane Agnes (1972) and her long-lasting devastation; one who reads the Draft EIS would have not a clue that the destruction of oysters by sediment began in earnest the year after Agnes smothered the floor of the Bay.

The USACE has repeatedly recognized the significant economic, cultural and social importance that the commercial harvesting of oysters has on the human environment in Maryland counties such as Dorchester and other Coalition counties. More specifically, USACE has observed and concluded:

> The Eastern oyster is highly valued as a source of food, a symbol of heritage, an economic resource supporting families and businesses, and a contributor to the health of the Chesapeake Bay ecosystem. Harvesting, selling and eating oysters has historically been a central component and driver of social and economic development in the region. From the colonial period to the 20th century, oyster harvests supported a vibrant regional industry, which in turn supported secondary industries, fishing communities, and a culinary culture centered in the bivalve.
>
> Oysters are an economic resource that supports unique communities and an industry that is an important component of the region's heritage and identity. Within these communities, oysters are a source of income for families of watermen and those employed in the processing of oysters (*e.g.*, shuckers); they support multigenerational businesses and contribute to a regional economy.
>
> The seafood industry contributes approximately $400 million each year (State of MD 2006) to Maryland's total gross domestic product of $257.8 billion (http://www.bea.gov/regional/gsp/). In 2005, commercial fisheries landings (*i.e.*, the weight, number and/or value of a species of seafood caught and delivered to port) alone earned $63,699,831 million in the State of Maryland (NMFS, 2006). Direct users include watermen, oyster growers, and oyster processors, packagers, shippers and retailers.
>
> More than 6,600 watermen work Chesapeake Bay, providing seafood to 74 seafood processing plants in Maryland; these plants employ more than 1,300 people (Md. Seafood 2005). These jobs represent an assortment of positions, including day laborers, sales representatives, managers, maintenance workers, delivery personnel, and others.

(2009 EA § 3.4.5 at 20-21.)

> The historic watermen's communities along the Chesapeake's western and eastern shores offer an aesthetic charm and have contributed greatly to tourist-based industries in these areas. Traditional workboats operating in these areas bring aesthetic appeal to the region as well as cultural value.

(2009 EA § 3.4.7 at 22.)

> Oysters give people the opportunity to interact with the marine environment in the most salient way possible – through work. These communities have helped to shape the character of the Chesapeake Bay region. Oysters are also a natural resource that carries cultural meaning as one symbol of a productive, healthy, beautiful Chesapeake Bay. ... To incorporate cultural meaning into policy, all groups' knowledge and values (implicit and explicit) must be recognized and evaluated based on an understanding of (1) how each group understands and uses

The Draft EIS cites to the outdated reports of Langland and EPA predicting when the Conowingo Pond will be full and no longer trap sediments during normal or low-flow days. The more recent Langland/Hirsch/USGS reports cited by the Coalition establish that those scientists have determined that the Conowingo Pond is so full that the revised multi-dimensional models predict that it no longer has any or any significant trapping capacity. This means that scour will occur at lower flow rates and that the scour at higher flow rates will be more severe.

So full indeed is the Conowingo Pond that the Susquehanna River Boater's Association has intervened in the Conowingo Dam relicensing to insist that Exelon add new channel markers, update navigational charts and dredge marinas/public landings in the Pond to enable boater accessibility. *See* Comment of Susquehanna River Anadromous Fish Restoration Cooperative, Submittal 20140929-5070, September 29, 2014.

Another inconvenient truth ignored by the Draft EIS is the toxicity of the sediments that are released during scour events. Brenda Davis, the Program Director of the MDNR Blue Crab Program, is on record as stating that possible toxic sediments from the Conowingo Dam is one reason for the declining population of blue crabs in the Chesapeake Bay, along with the loss of SAV due to the massive bulk release of sediments, including scoured sediments, in conjunction with Hurricane Irene and Tropical Storm Lee. Henley Moore, *Panel discusses blue crab's decline*, The Star Democrat, September 23, 2014. *See* link: http://www.stardem.com/news/local_news/article_bc637668-4693-51b1-b25c-2442f99c6450.html.[3]

Again, FERC failed to coordinate with the Coalition counties when the Draft EIS was scoped. It did not visit the Coalition counties, explain the significant decisions it was making and ask for their input. FERC has ignored the invitation of the Coalition counties to come and meet with them and discuss the problems associated with scour during high-flow events. Had FERC done so, the counties would have directed FERC to old-timers and former dam employees familiar with the veins of coal and sulfur that constitute a portion of the Conowingo Pond sediments and would have suggested the taking of core samples of the sediments to determine toxicity. USACE dredging in the upper Bay to maintain shipping channels has revealed a host of toxins in the dredged sediments. It is inconceivable that a portion of such toxins is not from the scoured sediments given historic mining operations and industrial enterprises in the Susquehanna watershed.

> oysters, and (2) how each group's perception of oysters affects its understanding of, support for, or resistance to policies and programs designed to manage and sustain the Bay's natural resources.

(2012 MP § 4.7, Cultural and Socioeconomic Conditions at 85-87.)

[3] Attached as Ex. 65.

The USACE documented one significant difference in the sediments from the Susquehanna River and the sediments in the rest of the Maryland portion of the Bay. More specifically, USACE observed:

> ***1.5.1.3 Sediment Characterization***
>
> **Chemical Characteristics** The Susquehanna River is the major contributing factor for the sediments in the upper bay and these sediments have been found to contain a higher total organic carbon (TOC) concentration (13.4%) when compared to sediments in the remainder of the Bay (CENAB, 2001a)."

Baltimore Harbor Channels (MD and VA) Dredged Material Management Plan and Final Tiered Environmental Impact Statement, December 2005 at 1-8. This USACE report confirms that sediments from the Susquehanna River have a unique characteristic and calling card. It also evidences that such sediments travel well beyond the mouth of the Susquehanna River and into the Bay.

FERC has not cited to any study establishing that the sediments are toxin free. Such information is critical before consideration is given as to what to do with the sediments and what constitutes the best alternative for addressing scour from behind all of the dams during high-flow events.

The dams themselves may not generate much of the sediments, but they significantly and materially alter the manner in which the sediments are discharged into the Bay. If the dams did not exist, the sediments would flow in a much more consistent rate into the Bay and the Bay's ecosystems would be more able to naturally attenuate the impacts of the sediments and the nutrients and toxins that are bound to the sediments. The dams slow the flow of sediments into the Bay during normal and low flow periods because of the trapping capacity and characteristics of the ponds and lakes behind the dams, and then discharge massive bulk quantities of sediments during high flow events where the flow through the dams is 8 to 20 times greater than the normal average flow through the dam. During such high flow events, in a period of 4 to 7 days the quantity of sediments that normally flows through the dam in a one to five year period of time is scoured from the floor of the lakes and ponds behind the dams and deposited in the Maryland portion of the Chesapeake Bay. 1 to 5 years of damage is done in 4 to 7 days.

By one account, the volume of suspended sediments discharged into the Bay by Tropical Storm Lee in 2011 (6.7 million tons) equaled the sediment loading of 6 average years, and that the same flood delivered 9 months of particulate nitrogen and over 1 year of particulate phosphorus supplies to the estuary. The flood-carried sediment produced a large sediment plume that covered one half of the Chesapeake Bay with the maximum suspended sediment concentration exceeding 2500 mg/L. *See* Cheng, P., M. Li, and Y. Li (2013), Generation of an estuarine sediment plume by a tropical storm, *J. Geophys. Res. Oceans*, 118, 856-868, doi: 10.1002/jgrc.20070. Well over fifty percent (50%) of such sediments (approximately four (4) million tons) were scoured from the floor of the lakes and pond behind the hydroelectric dams in the lower Susquehanna River. Jeffrey Brainard, *Big Year for Bay Storms, Bad Year for Bay Sediment?*, Chesapeake Quarterly Vol. 10 No. 4, Dec. 2011. *See* Coalition's Motion to Intervene Ex. 2, Submittal 20130625-5007, June 24, 2013.

A cumulative EIS should determine what constitutes a high flow event sufficient to scour sediments that have accumulated behind a dam for each hydroelectric dam in the lower Susquehanna River. A cumulative EIS should determine how many high flow events there have been in the last 50 years. A cumulative EIS should estimate, based on the predominant soil types in the watershed the nature of the sediments that would have deposited behind the dam during drought or normal flow conditions and how far such sediments would travel once suspended and in turbulent high flow events on record. Local governments should be contacted to elicit support in reviewing historic records and locating "old-timers" with personal knowledge of the impacts of such storm/high-flow events to those reservoirs and the river. Such research likely would disclose that the impact from scour is even greater than originally predicted, because there were high flows through/over the dams that have created Lake Aldred and Lake Clarke during the high flow events outlined in the Tables on pages 3 and 9 of the Coalition's Motion to Intervene and the reservoirs behind those dams were full before World War II, as documented in the Langland and Hirsch USGS reports.

The expertise required to assess the impacts of dams to the natural environment is not the type of expertise possessed by FERC employees, which is presumably why FERC has engaged consultants to assist in the EIS preparation. FERC has wholly failed to identify the persons who engaged in making the determinations and conclusions and the limited "analysis" set forth in the various "Our Analysis" portions of the Draft EIS. Such individuals are not identified and the Curriculum Vitae or qualifications of such individuals are not documented. The Coalition has introduced into the record and cited to the scientific studies and factual evidence that supported its observations.

The only study referenced by FERC is the Lower Susquehanna River Watershed Assessment, which is referenced as "LSRWA 2014a," the "LSRWA study," the "Corp's study," and "the Corps' LSRWA study" all on one page. (*See* Draft EIS at 66 – so much for making a concise and easily understandable report.) As testified to by the Coalition during the FERC public hearing on the Draft EIS in Darlington, Maryland on September 16, 2014, any reliance on the Lower Susquehanna River Watershed Assessment (LSRWA) in the Conowingo Dam relicensing is overstated and premature. The State of Maryland, in its January 31, 2014 correspondence to FERC regarding "Comments on Final License Application and Objection to Findings for Environmental Analysis" stated:

> "Since 2009, the State Agencies have repeatedly requested that FERC require Exelon to conduct appropriate sediment and nutrient studies to determine the Project's impacts on water quality and living resources of the Lower Susquehanna River **and Chesapeake Bay**. The State Agencies expressed concern that failure to fully conduct appropriate studies could

> impede timely, appropriate consideration of the Project's impacts during the State's Water Quality Certification review and Coastal Zone Management Act Consistency evaluation. Although FERC eventually required Exelon to conduct a sediment and nutrient study, the fundamental design of this study and Exelon's implementation of it were inadequate to reasonably determine the Project's impacts on water quality and living resources.
>
> Exelon and FERC have attempted to remedy this deficiency by referring to an ongoing sediment and nutrient study led by USACE. Although the USACE study will advance scientific knowledge with respect to sediment and nutrient dynamics and impacts in the Lower Susquehanna River and Chesapeake Bay **the [LSRWA] was never intended to be part of FERC's licensing process**, and it is not yet complete.
>
> (Emphasis added) *See* Comment of Power Plant Research Program, Submittal 20140131-5458, January 31, 2014.

The study being conducted by the workgroup cobbled together to generate the (LSRWA) is not neutral and unbiased, or devoid of an agenda. The LSRWA has not been published, is incomplete and has not been subjected to peer review. The public was not allowed to participate in the scoping of the LSWRA or to offer input and information to inform the study. The Coalition tried to do so and was told by USACE representatives that it could not do so.

Meanwhile, Gomez and Sullivan, Exelon's paid consultant, and the Chesapeake Bay Foundation (CBF), were allowed to insert representatives of unknown qualifications and expertise into the decision making process underpinning critical decisions that inform the results of the LSRWA. When Exelon paid for a significant portion of the study (*See* Letter from John R. Griffin, Secretary, Maryland Department of Natural Resources, to Maryland Senator E.J. Pipkin (MD 36th Legislative District – Caroline, Cecil, Kent and Queen Anne's Counties), (January 17, 2013)), it took control of the decision making processes guiding the study and informing its conclusions through its consultant, Gomez and Sullivan.[4]

The hand-picked "stakeholders" driving the LSRWA, often ignoring the lack of meaningful data or ignoring meaningful data, made ad hoc decisions about the study scope and data including but not limited to:

a. What model to use in running the simulations upon which analysis and conclusions are based;

b. What data to include and more significantly what data to exclude in running model simulations (significantly, no data from Hurricane Agnes,

[4] DNR letter attached as Ex. 66.

Hurricane Eloise, Hurricane Ivan, Hurricane Irene of Tropical Storm Lee was used in any of the simulations or analysis underpinning the LSRWA);

c. Salinity data and tidal data where not compiled and utilized;

d. No scientific studies about the bonding properties of nitrates and phosphates in the Bay estuarine where determined; and

e. No local government officials with personal knowledge of the impacts of the significant storm events included and ignored in the assessment were consulted and none of their knowledge and information was utilized.

In testimony at the May 5, 2014 hearing titled "Finding Cooperative Solutions to Environmental Concerns with the Conowingo Dam to Improve the Health of Chesapeake Bay" before the U.S. Senate Subcommittee on Water and Wildlife and the Committee on Environmental Public Works chaired by the Honorable Benjamin L. Cardin ("Senate Field Hearing") USACE and other panelists downplayed the Susquehanna River flow rate and sediment volume data to establish a 20% scour load percentage.[5] Afterwards, in an effort to understand how this 20% number was derived, the Coalition reviewed the available LSRWA study meeting notes. Since there is a lack of full transparency in the LSRWA process (in terms of data used and model runs) the Coalition discussed their concerns with an active LSRWA workgroup member and was informed that the LSRWA's transport model run included a very low estimate associated with the volume of deposited sediment trapped behind the Conowingo Dam as compared to the 2009USGS data estimate of 174 million tons of sediment trapped in the reservoir behind the Conowingo Dam.[6] Based on the limited data available to the public and the reasonable belief that model runs are being conducted with questionable data, the LSRWA's methodology and findings are suspect and must be peer reviewed. The current data lacks public and scientific peer review and underestimates the impacts of sediment and scour, and their subsequent impacts on Maryland waters/the Chesapeake Bay. In order to properly ensure technical oversight of LSRWA's findings, data and model runs, all LSRWA work products need to be shared with all interested parties and further evaluated before conclusory statements are put forth to the public and before being considered by FERC.

The Coalition understands that the 20% number cited by USACE was a decreased number derived from a PowerPoint presentation by Michael Langland of the USGS presented on August 15, 2013. Langland's PowerPoint presentation showed that an episodic event with a flow rate of 1,000,000 cubic feet per second has a recurrence interval of occurring once every 80 years and would result in a 43% scour load. Considering that the last 1,000,0000 cubic feet per second flow rate occurred in 1972

[5] *See generally* Clean Chesapeake Coalition's Written Testimony in Conjunction with the Conowingo Dam Congressional Field Hearing attached as Ex. 67.

[6] *See* Langland, M.J., 2009, Bathymetry and sediment-storage capacity change in three reservoirs on the Lower Susquehanna River, 1996-2008: U.S. Geological Survey Scientific Investigations Report 2009-5110, 21p. *See* Coalition MTI Ex. 38, Submitted 20130625-5007, June 24, 2013

with Hurricane Agnes, there is a high probability that such an event will occur sometime during the new 46 year relicensing term sought by Exelon. Regardless, the models referenced by the panelists at the Field Hearing were capped at a flow rate slightly below 700,000 cubic feet per second, resulting in a 24% scour to load ratio that was rounded down to 20% for the Field Hearing. Furthermore, an episodic event, which is less severe than the flow rate of 1,000,000 cubic feet per second (*e.g.*, Tropical Storm Lee), is likely to occur once every 25 years with a 32% scour to total load estimate. Again, this is expected to occur at least once during Exelon's relicense. Clearly these figures well exceed the diminished 20% number put forth by USACE and echoed by the panelists at the Field Hearing.

This "pick and choose" approach seems to be a common theme of the LSRWA, beginning with the workgroup member selection process to the current release/manipulation of the LSRWA's data. Reputable scientists from USGS have conducted significant studies worthy of consideration in the relicensing application. The LSRWA's *ad hoc* approach to selecting data upon which to base its conclusions is unscientific and nothing more than the manipulation of data to achieve a desired outcome. Some LSRWA "stakeholders" have simply ignored data presented by USGS scientists about what is more than likely to occur during the renewed license period. Such data manipulation will undermine necessary actions to restore the water quality of the Bay by diminishing the impact of scour from the reservoir created by the dams built to support the hydroelectric projects.

Why, when it comes to the impacts from the loss of trapping capacity in Conowingo Pond, are key Federal and state government agencies through their contractual representatives and the private stakeholders had selected to participate with missions to protect our natural environment, rounding *down* estimates of nutrient and sediment loading and rates of scour during storms?

Such casual stakeholder pronouncements quickly become scientific "fact" to those wedded to the CBF Bay cleanup agenda and further polarizes the public discourse. For example, in written Senate Field Hearing testimony, the CBF embraced the preliminary unreleased results of the LSRWA as providing "a new perspective concerning the impact of pollution stored behind the dam" and stating that the impacts from the sediment and nutrients scoured from behind the dam during storm events "are small compared to the overall pollution loads affecting the Chespaeake Bay" and that "[LSRWA] study results suggest that during typical storm events,[7] roughly 80 percent of the sediment pollution found downstream of the dam is associated with the high river flows and is not due to scouring of sediment from behind the dam." Statement for the Record by the Chesapeake Bay Foundation Subcommitee on Water and Wild life, United States Senate, on Finding Cooperative Solutions to Environmental Concerns with the Conowingo Dam to Improve the Health of the Chesapeake Bay, May 5, 2014.

The Coalition cautions against rushing to judgment about the impacts of Conowingo Pond scour on the Bay and downstream Bay restoration efforts based upon a

[7] Query what constitutes a "typical storm event" in the Chesapeake Bay watershed?

prelimary study by handpicked “stakeholders” that has not yet been made available to the public for review and comment and denies the opportunity for scientific peer review. Based upon our monitoring of the LSRWA, whose deliberations Coalition counties were denied access to or participation in and our understanding of the data and science underpinning the LSRWA, we will reserve judgment on the utility of any preliminary or final LSRWA report in the FERC relicensing proceedings and in general.

The Coalition encourages FERC to address USGS scientists, including Michael Langland and Robert Hirsch, as well as USACE on the meritless 20% sediment due to scour number presented by panelists with the conflicting studies and reports from the USGS in the LSRWA material. In doing so, we ask that focus be placed on flow rates above the 700,000 cfs cap (800,000, 900,000 and 1,000,000 cfs). We also note that potential impacts of climate change must be considered in accordance with the Executive Order of President Obama. *See* Executive Order 13653, *Preparing the United States for the Impacts of Climate Change*, November 1, 2013.[8]

The forgoing shortcomings make the Draft EIS noncompliant with the requirements of NEPA and the Data Quality Act. When data and information generated by the USGS is ignored and leading Bay restoration non-governmental organizations (NGOs) such as CBF, publicly downplay the impact of sediment scour and the Conowingo Dam, the findings and conclusions of the LSRWA, which were highly influenced by Gomez and Sullivan and the CBF, are necessarily suspect.

In several sections of the Draft EIS, FERC discusses Exelon’s proposal to conduct a bathymetric study every five years to monitor sediment transport and deposition patters in the Conowingo Pond as if that were a viable alternative to addressing the harm to the human environment caused by the scour and massive bulk release of sediments trapped by the dam over the course of a few days during high flow conditions. Such a periodic study would be entirely meaningless and could easily be designed to generate meaningless data which shows that there is virtually no change to the volume of sediments in the pond because the pond is in dynamic equilibrium according to USGS scientists (*i.e.*, USGS already has documented that the reservoir is full and has no significant trapping capacity left). Moderate flow events (150,000 to 250,000 cubic feet per second) will cause moderate scour and restore minor tapping capacity during drought to moderate flow conditions. Such capacity will be quickly exhausted and the scientists already predict that since the pond is in dynamic equilibrium, there will be only minor changes in the depth of the pond. There will not be significant change to the volume of sediments in the pond until there is a major high-flow event which significantly scours sediments from the floor of the reservoir and flushes then through the dam. The fact that FERC would discuss such a study as if it were a viable and meaningful exercise evidences FERC’s complete failure to comprehend the significance of the studies that have been conducted and the reports that have been complied by Langland and Hirsch of USGS. Such studies will do nothing but confirm that the pond is in dynamic equilibrium.

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[8] Attached as Ex. 68.

The sediments that have been trapped behind the dams over the last eighty years are a ticking time bomb or a volcano waiting to erupt.[9] There was a partial eruption in 2011 during Tropical Storm Lee, when flows through the Conowingo Dam exceeded 700,000 cubic feet per second for a couple of days, the upper Bay again was covered with a 3" to 6" blanket of sediments and the SAV which had been making a steady recovery over the past 20 years, was decimated back to 1985 levels.

If the sediments are not removed, it is only a matter of time before history repeats itself and we experience another Hurricane Agnes where flows exceeded 1.2 million cubic feet per second. The results will kill the Bay through the lifetime of our grandchildren's children. To allow the time bomb to continue to tick unabated is folly.

2. Prevention of migration of migratory fish species.

There is no dispute that the dams prevent migratory fish such as the American shad, river herring and the American eel from migrating up the Susquehanna River and to their historic spawning grounds. Two fish lifts have been installed at the Conowingo Dam to address this impact. The problem is that the lifts have not addressed the impact with respect to three of the most marketable and economically important species to the watermen who earn a living in the Chesapeake Bay, the American Shad, the American eel and river herring.

At the Senate Field Hearing, Genevieve Pullis LaRouche, Field Office Supervisor of the Chesapeake Bay Field Office of USFWS testified about the flow regime created by power project operations in the Lower Susquehanna River that upset the biorhythms of the American shad, the American eel, the river herring and perhaps other species of migratory fish. Senator Cardin, in his letter dated September 16, 2014 to Ms. Cheryl Lafleur, Chairperson, made the same observation in the last paragraph of his letter. Specifically, the operation of Muddy Run and dam operations for the hydroelectric projects restricted and enhanced flow of the Susquehanna River on a daily basis. During peak energy demand periods, the Muddy Run reservoir is drained and the turbines at all of the hydroelectric projects run at full throttle, which increased flows to the point where flows in the river simulated higher than average flow conditions. At off-peak energy demand periods, flows through the dams are reduced to drought levels so that water could be pumped from the Conowingo Pond to recharge the Muddy Run reservoir, water could be pumped to provide process water for other power projects, and the water in lakes and ponds behind the dams could recharge so that there is sufficient water to generate the flows necessary to maximize energy production during peak demand periods. This constant vacillation of flow conditions so disrupts the biorhythms of those migratory species that most do not make their way to the lifts/elevators that would carry them

[9] Donald Boesch, Ph. D., the president of the University of Maryland Center for environmental Science testified that nitric phosphorus binds to the sediments in the Susquehanna River, but when those sediments are discharged into the brackish water of the Bay, even at low levels of salinity, sulfur in the salt fuels the decomposition and release of nitrate and phosphorus, which feeds algae blooms and deprives the Bay water of oxygen, making it anoxic. Transcript of May 5, 2014 hearing of the U.S. Senate Subcommittee on Water and Wildlife and the Committee on Environmental Public Works at 20-21, 27-31.

through the dams and enable them to continue upstream to their spawning grounds. Transcript of May 5, 2014 hearing at 20-21, 27-31.[10]

The American eel, in addition to being a desirable bait fish, is also the host to the eastern elliptio mussel, which used to live throughout in the Susquehanna and was an important filter of nutrients and sediments. (*Id*. at 20-21.) When the eel cannot migrate in the Susquehanna River, the elliptio mussel is not transported into the Susquehanna to regenerate this filtering species, which has a significant detrimental impact to the water quality of the Susquehanna River. If the population of elliptio mussels in the lower Susquehanna was significantly enhanced, nutrients and sediments that otherwise would flow into the Bay would be removed before ever reaching the Bay.

Testimony at the Senate Field Hearing further explained the inadequacy of the current lifts at the dams. The current lifts are useless (too large and improperly designed and located to attract the American eel) for transporting American eel above the Conowingo Dam. (*Id*. at 32.) The lifts have insufficient capacity because the gizzard shad, which has little to no commercial value, dominate lift space to the exclusion of other species including the American shad. (*Id*. at 29-31.)

There was also testimony at the Senate Field Hearing about how the increased flow through the dams during peak energy demand periods was hurting SAV and thereby destroying oyster and rockfish habitat. (*Id*. at 27-28.)

The Draft EIS completely fails to discuss any of the foregoing impacts in a concise, scientific and meaningful way and fails to fashion and discuss alternatives for compensating for such negative impacts. Again, the Draft EIS is non-compliant with the requirements of the CEQ regulations and a number of the Executive Orders that dictate how FERC must work with other Federal, State and local governmental agencies, as well as industry groups such as the Coalition county watermen's associations, in order to fashion and implement alternatives that will be protective of the human environment.

Human Environment:

The CEQ requires FERC to consider the impact of the projects that it is licensing on the human environment. The human environment includes the economic, social, cultural and aesthetic environment as well as the natural or physical environment. FERC has not engaged in any analysis of how the projects impact the human environment. Again, without coordinating with the Coalition counties, FERC cannot fully appreciate the impact of the scour from behind the dams on the human environments of Maryland counties and their residents.

The scour from the Conowingo Pond and lakes behind the hydroelectric dams has significantly contributed to the destruction of numerous fisheries in the Bay upon which the economies of the Eastern Shore counties are dependent. The American shad fishery

[10] A copy of relevant portions of that transcript are attached as Ex. 69. Ms. LaRouche also submitted written comments which can be obtained from the Senate Subcommittee, further detailing her findings.

has been destroyed by the dams. The oyster fishery from the Choptank River north has been destroyed by scour from behind the dams in combination with sediments from the Susquehanna River during the major high flow events, *e.g.*, Hurricane Agnes, the 1996 thaw, and Hurricane Irene and Tropical Storm Lee.

The USACE discussion in the 2009 EA and the 2012 MP explains in depth the economic, social and cultural impact of the loss of the oyster fishery on Maryland Bay counties. The impact is the same because of the harm to the other fisheries.

Dorchester County used to have a Gorton's factory that processed shad and other finfish and made fish-sticks that were sold along the Atlantic seaboard and inland, as well as processing other finfish. There used to be oyster shucking businesses and crab picking businesses in Kent and Queen Anne's counties that have disappeared due to destruction of habitat as the result of Hurricane Agnes.

Now sediments from high-flow events deposit sediments that clog the navigable channels to the marinas and, in the Susquehanna Flats and Susquehanna Flats tributaries move channels. The marinas in Cecil, Harford, Queen Anne's and Kent counties and their recreational and charter boating businesses are detrimentally impacted for several years following a high-flow event due to the sediments that have to be dredged and the trash and uprooted SAV that defaces their environs following such high-flow events. Young watermen are not replacing the aging watermen that are going out of business. The children of families that have worked the water four to eight generations in the northern Bay are looking for other livelihoods due to the devastation to the habitat in the northern Bay caused by scour.

All of the Coalition counties are suffering as a result of the devastation to the oyster population because the Bay's best natural filter is gone. If oysters were restored to their pre-Hurricane Agnes levels in the northern Bay, the Coalition counties would not have to make the expenditures associated with the 2010 TMDL. The economic impact of the scour from the sediments that have stockpiled behind the dams is in the billions of dollars.

The culture of the Coalition's Eastern Shore counties is directly linked to a viable seafood industry. Fishing communities have long been vital to the culture of those counties. Tourism in all of the Bay counties in the Coalition is dependent on the maintenance of quaint fishing communities and the restaurants, pubs and businesses that serve and sell seafood harvested from the Bay by such fishing communities. Artisans who have moved to the Coalition counties on the Bay earn a living selling works that depict the activities and culture of such fishing communities.

The social fabric of the Eastern Shore Coalition counties is dependent on the seafood and farming industries. The volunteer fire departments depend on the services provided by the men and women who earn a living in the seafood and farming industries. Police, local school teachers and other public servants who provide essential public services often have secondary employment in the seafood industry or in a business tied to the seafood harvesting culture of those counties. Many community events and services would be lost or greatly diminished without the support of residents who are directly and indirectly dependent on the seafood and farming industries.

The farming industry will benefit greatly if oysters can be revived and not threatened by sediment scour from behind the hydroelectric power dams in the lower Susquehanna River because the State is pushing for the establishment of phosphorus regulations that will sound a death knell to the poultry industry and most cash crop farmers. The restoration of the oyster beds that were killed by sediment scour caused by Hurricane Agnes and subsequent high-flow events would more than offset a phosphorus runoff from farming and poultry operations, allowing the industries to maintain current best management practices without employing additional practices to remove further phosphorus that will undermine the ability of those industries to survive.

The power companies benefiting from the dams in Lower Susquehanna have not paid a cent for the feedstock (the waters of Maryland and Pennsylvania) from which they have and continue to make billions of dollars in revenues. The Draft EIS describes how power produced at the Conowingo hydroelectric power plant casts $17 to $18 less per MWh to produce and how an average of 1,615,813 MWh of power are produced annually. Of course the power costs less to produce. Exelon pays nothing for the feedstock used to produce the power. Exelon sells the power to the grid at market rates. No discount is received by Maryland or Pennsylvania residents for the power. Thus, the profits received by Exelon for the sale of hydroelectric power are even richer than the profits received for the sale of power from alternative production sources.

The same undoubtedly is true for the other projects producing hydroelectric power by harnessing the Susquehanna River.

It is long past time for the hydroelectric power companies to begin to pay for the feedstock from which they produce power by paying to dredge the sediments, maintain the reservoirs and to restore the oyster habitat that has been devastated the changes the dams have made to the Susquehanna River ecosystem.

The Federal Powers Act § 10(J) (16 U.S.C. § 803(j)):

Pursuant to Section 10(j) of the Federal Powers Act (FPA) FERC is required to include in any license fish and wildlife measures for the protection and the mitigation of damages to, and for the enhancement of fish and wildlife resources potentially affected by the project based on recommendations from the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and state and local fish and wildlife agencies. The Commission will include those recommended measures unless it believes that they are inconsistent with the FPA or other applicable law. Submission of recommendations by fish and wildlife agencies in response to the Ready for Environmental Analysis (REA) notice marks the beginning of the process under Section 10(j) of the FPA. 18 CFR 4.34(e)(1); 18 CFR 5.26(a)

In connection with its environmental review of an application for license, the Commission must analyze all recommended conditions timely filed by fish and wildlife agencies. The agency must specifically identify and explain the recommendations and the relevant resource goals and objectives and their evidentiary or legal basis. Commission staff may seek clarification of any recommendation from the appropriate fish and wildlife agency. If Commission staff finds any recommendation inconsistent with the FPA or other applicable law, the staff will make a preliminary determination, after which the staff shall attempt to reach with the agencies a mutually acceptable resolution of any such inconsistency. 18 CFR 4.34(e); 18 CFR 5.26(b)

The Commission is required under Section 10(j) of the FPA to include in any license fish and wildlife measures for the protection, mitigation of damages to, and enhancement of fish and wildlife resources potentially affected by the project based on recommendations from the National Marine Fisheries Service, the USFWS, and state fish and wildlife agencies, unless it finds the measures to be inconsistent with the FPA or other applicable law. 18 CFR 4.34(e)(1). As MDNR is not protecting the fisheries that have been detrimentally impacted by the hydroelectric dams, and without due consideration for the human environment, the Coalition counties must step forward to "carry the proverbial ball that MDNR has dropped."

Timing:

Sixty (60) days has been a woefully deficient period of time to meaningfully review the Draft EIS and to prepare and submit comments thereto, particularly given the significant non-compliance of the Draft EIS with the CEQ requirements applicable to an EIS and given the failure to properly scope the EIS and to coordinate with the Coalition counties as was required by the CEQ regulations. Quite frankly, FERC's denial of U.S. Department of Interior's (DOI) well-reasoned request for a 60-day extension to the comment period[11] was surprising and curious; particularly given the number of extensions liberally granted on the front end as Exelon assembled its Final License Application. On behalf of the Maryland local governments that comprise the Coalition and whose human environments have been, and continue to be, adversely impacted and imbalanced by the operating and maintenance of the subject power projects, we reserve the right to further supplement these comments.

Conclusion:

The impact to the Chesapeake Bay and Bay tributaries from sediments, including and particularly the scour of sediments accumulated behind the hydroelectric dams, has been studied enough.[12] It is time to stop studying the problem and task the projects with dredging accumulated sediments so that the ever more frequent high-flow events that will occur as a result of the climate change documented by the Federal government do not continue to undo all of the improvements made to the Bay by Maryland businesses and local governments implementing best management practices to restore the water quality

[11] DOI letter to FERC dated August 2, 2014.
[12] Attached as Ex. 70.

of the Bay. Such sediments need to be dredged and removed before the next major high-flow event. The lakes and pond behind those hydroelectric dams that were none existent before those dams were constructed need to be maintained. All of the rate payers on the electric grids that enjoy the power generated by those hydroelectric projects need to share in the true costs to the human environment caused by the sediment "time-bombs" made by the dams. Pennsylvania and New York residents need to do a better job in reducing the sediments that run into the Susquehanna River, but the impact of the manner in which such sediments are captured and then released in bulk loadings during a high-flow event cannot continue to be ignored.

The Coalition never contended that the power projects are solely and exclusively responsible for resolving the sediment problem. The owners of the power projects, however, have more political clout and more technical ability to responsibly address the sediment issues than any other entity that contributes to the problem. No persons are better suited to devise and to implement a program and to obtain the Federal and state support necessary to eradicate the conditions that caused more than 50% of the devastation from sediments due to Hurricane Agnes and a significant portion of the sediment damage during other high-flow events since Agnes, and will continue to cause significant damage during future high-flow events that will continue to prevent the recovery of the Bay.

The power projects in the lower Susquehanna River need to be required to dredge the sediments that have accumulated in the pond and lakes created by the hydroelectric dams that they constructed and derive substantial monetary benefit from. The economic benefit, stimulus and employment that would be derived from large-scale dredging projects would significantly eclipse the economic benefit, stimulus and employment derived from the operation of the hydroelectric projects. The residual economic, social and cultural benefits that would be achieved by citizens of the Coalition counties is in the billions of dollars over the 46 year lifespan of the license being issued to the Conowingo project.[13]

[13] An example of the benefit of an increased harvest is documented by the annual oyster surveys compiled by MDNR. In the 2012-2013 season, 341,000 bushels of oysters were harvested by Maryland watermen. 62% or more of the oysters were harvested where MDNR has permitted oyster dredging with power boats. Tarnowski, Mitchell and Staff, Maryland Oyster Population Status Report 2013 Fall Survey at 1, MDNR Publ. No. 17-8192014-723 (Aug. 2014) (2013 MDNR Oyster Survey). This was the highest harvest since the 2000-2001 season. (*Id.*) The dockside value of the 2012-2013 harvest was $10.9 million dollars. (*Id.* at 15.) This was a $6.3 million dollar increase over the dockside value of the 2011-2012 harvest. (*Id.*)

The harvest in 2013-2014 was even more robust and profitable than the 2012-2013 harvest. In the 2012-2013 season, the average dockside price for oysters was $30 per bushel. With over 500,000 bushels being harvested and sold, the dockside value of the 2013-2014 harvest was over $15 million dollars. Again, this was another significant increase in the economic value provided by oysters to the local economy of Maryland counties.

The USACE 2009 EA makes a point that shucking houses once had an important place in the economics of the Bay, but that they have disappeared. Had FERC been coordinating with the Coalition counties, it would know that there is presently a plan for opening two shucking houses in Dorchester county of the increasing oyster production.

The only alternative that complies with NEPA is to require the hydroelectric projects to dredge and to maintain the sediment reservoirs created by the dams built for such projects. If the owners of those projects support the recovery of oyster beds in the Bay, they can obtain further credits for the pollution that has been caused by their failure to maintain the "stormwater management ponds" created by the dams, lakes and ponds that they have constructed.

Respectfully submitted,

/s/

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Dated: September 29, 2014

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J. M. Clayton, a Cambridge business, is one Maryland seafood processor who announced that it is opening a shucking house later this year for the 2014-2015 oyster harvest. This will be the first Maryland shucking house to do business in Dorchester County since the prior shucking houses closed almost 40 years ago (a few years after the devastation of Hurricane Agnes). In addition to being a boon to the Dorchester County economy, such a shucking house would provide a source of shell to be returned to the Bay to expand natural habitat and expedite the restoration of the natural environment of the Bay. The recovery of the historic oyster bars from the Choptank River north would replicate the above described success several-fold.

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February 24, 2015

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: **Conowingo Hydroelectric Project, FERC Project No. 405-106**
Muddy Run Hydroelectric Project, FERC Project No. P-2355-018
York Haven Hydroelectric Project, FERC Project No. P-188-030
Clean Chesapeake Coalition Comments on Draft EIS – 2015 USGS Study

Dear Secretary Bose:

Attached please find a copy of USGS Report 2014-1235 titled *Sediment Transport and Capacity Change in Three Reservoirs, Lower Susquehanna River Basin, Pennsylvania and Maryland 1900 - 2012*. This report, was prepared in 2014 (and to our understanding circulated to a number of Federal agencies in 2014 for review) and was publicly released on February 18, 2015. The report is significant for a number of reasons, including the following:

1. The report further confirms that it has been reasonably foreseeable that the hydroelectric projects in the lower Susquehanna River are connected and similar actions as those terms are understood under the National Environmental Policy Act and the implementing regulations promulgated by the Counsel of Environmental Quality.

2. The report further confirms that it has been reasonably foreseeable that the hydroelectric projects in the lower Susquehanna River have cumulative impacts as that term is understood under the National Environmental Policy Act and the implementing regulations promulgated by the Counsel of Environmental Quality.

3. The report further confirms that the power projects licensed and permitted by FERC in the lower Susquehanna River have a significant impact on the human environment (*e.g.*, the natural, economic, social and cultural environments) of the jurisdictions in the lower Susquehanna River and the Upper Chesapeake Bay.

EXHIBIT
D

NEPA requires that federal agencies fully consider the environmental effects of proposed major actions, including actions that an agency permits, such as pipeline construction. *Delaware River Keeper Network v. FERC*, 753 F.3d 1304, 1309 (D.C. Cir. 2014)(citing 42 U.S.C. § 4332(2)(C)). The scope of an agency's NEPA review must include both "connected actions" and "similar actions." *Id*. (citing 40 C.F.R. § 1508.25(a)(1), (3)). Actions are "connected" if they trigger other actions, cannot proceed without previous or simultaneous actions, or are "interdependent parts of a larger action and depend on the larger action for their justification." *Id*. (citing 40 C.F.R. § 1508.25(a)(1)). And actions are "similar" if, "when viewed with other reasonably foreseeable or proposed agency actions, [they] have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography." *Id*. (citing 40 C.F.R. § 1508.25(a)(3)).

"An agency impermissibly 'segments' NEPA review when it divides connected, cumulative, or similar federal actions into separate projects and thereby fails to address the true scope and impact of the activities that should be under consideration." *Delaware River Keeper*, 753 F.3d at 1313. The Supreme Court has held that, under NEPA, 'proposals for . . . actions that will have cumulative or synergistic environmental impact upon a region . . . pending concurrently before an agency . . . must be considered together.'" *Id.* (citing *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976)). "Cumulative effects are defined by the Council on Environmental Quality as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." *Id.* at 1319. "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." *Id.* (citing 40 C.F.R. § 1508.7).

"When determining the contents of an EA or an EIS, an agency must consider all "connected actions," "cumulative actions," and "similar actions." *Id.* at 1314 (citing 40 C.F.R. § 1508.25(a); *see also, e.g., Am. Bird Conservancy, Inc. v. FCC,* 516 F.3d 1027, 1032, (D.C. Cir. 2008)).

"Reasonable forecasting and speculation is . . . implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry." *Delaware River Keeper*, 753 F.3d at 1310 (citing *Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1092, (D.C. Cir. 1973)).

"Simple, conclusory statements of 'no impact' are not enough to fulfill an agency's duty under NEPA." *Delaware River Keeper,* 753 F.3d at 1313 (citing *Found. on Econ. Trends v. Heckler*, 756 F.2d 143, 154, (D.C. Cir. 1985)). The agency must comply with "principles of reasoned decision making, NEPA's policy of public scrutiny, and [the Council on Environmental Quality's] regulations." (Citations omitted). *Id*. And under the applicable arbitrary and capricious standard of review,

> The agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made. In reviewing that explanation, we must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment. Normally, an agency rule would be arbitrary and capricious if the agency ... entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Id. (citing *Motor Vehicle Mfrs. Ass'n of the U.S., Inc. v. State Farm Mut. Auto. Ins*., 463 U.S. 29, 43 (1983).

FERC has wholly failed to scope and perform the studies necessary to access the cumulative impacts of the power projects in the lower Susquehanna River (*e.g.*, Three Mile Island; Muddy Run, Conowingo, Holtwood, and Safe Harbor).

FERC has wholly failed to begin to compile, to analyze and to draw conclusions from and to plainly, clearly and concisely present and explain its conclusions about the cumulative impacts of such projects in the DEIS.

We urge FERC not to wait for the Chairman and Commissioners or a reviewing court to order the mandated compilation, review, and presentation of information and conclusions. We urge FERC to require important data gaps to be filled and for existing reports and information to be properly analyzed and presented.

The licensing of the York Haven Hydroelectric Project does not appear to need to be tied to the other projects given the *de minimus* impact of that project in comparison to the Conowingo and Muddy Run Projects. The licensing/permitting of that project can be separated from the licensing/permitting of the Muddy Run and Conowingo Projects.

If an EIS is released tomorrow, we urge FERC to withdraw it and to reassess the applicable NEPA requirements, which will not have been satisfied judging from the disarray of the DEIS. Again, we urge FERC to proceed more deliberately, given that a long term license is unlikely to be issued this year. The magnitude of the impact of the power projects in the Lower Susquehanna River on the human environment is prodigious. Please do not cut corners and ignore the agency's duties and responsibilities under NEPA in order to satisfy a schedule that no longer makes sense given the developments of the past two years.

Very truly yours,

Jefferson L. Blomquist, Esq.
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36 S. Charles Street
Baltimore, Maryland 21201
Attorneys for the Clean Chesapeake Coalition

JLB/sls
Attachment

cc: Secretary, Maryland Department of the Environment
Secretary, Maryland Department of Natural Resources
Clean Chesapeake Coalition

58599.10:171689.v1

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EXHIBIT
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January 9, 2015

VIA Electronic Mail
U.S. Army Corps of Engineers
Baltimore District
Attn: Anna Compton
P.O. Box 1715
Baltimore, MD 21203
LSRWAcomments@usace.army.mil

Re: Clean Chesapeake Coalition – LSRWA Draft Report Comments

Dear U.S. Army Corps of Engineers:

The Maryland counties that have combined their efforts and resources in order to address concerns relative to the improvement of the water quality of the Chesapeake Bay in a meaningful and cost effective manner known as the Clean Chesapeake Coalition ("Coalition")[1] provide their comments and concerns with the Draft Lower Susquehanna River Watershed Assessment ("DLSRWA") [2] collectively instead of separately and individually. The Coalition appreciates this opportunity to provide comments.

The Coalition counties and their representatives have been precluded from participating in the scoping of the study underpinning the DLSRWA report and the quarterly progress meetings reviewing the progress of such studies and the report. At the quarterly progress meetings, critical decisions have been made about the scope and direction of the study, the information to be considered during the study, the underlying assumptions on which the modelling and study efforts have been predicated and the conclusions to be determined and reported based on the study and modelling results. Coalition members have requested to have meaningful input into this process and have been denied that opportunity by U.S. Army Corps of Engineers ("USACE") and the Federal and State agencies and private persons (including Exelon and Exelon's representatives) that are undertaking the Lower Susquehanna River Watershed Assessment ("LSRWA"). Indeed, handpicked "stakeholders" such as Exelon and The Nature Conservancy were afforded several months to review the draft report and appendices before its release while local government officials of the Coalition counties, along with the general public, got their first look in mid-November 2014 and have been pressed to review and analyze the roughly 1,500 pages that comprise the DLSRWA to meet today's public comment deadline.

[1] Coalition counties include Allegany, Caroline, Carroll, Cecil, Dorchester, Frederick, Harford, Kent, Queen Anne's and Wicomico.
[2] Dated October 2014. *See* link: http://mddnr.chesapeakebay.net/LSRWA/report.cfm.

Coalition counties have been mandated by the Maryland Department of the Environment and the Maryland General Assembly with planning, funding and implementing nutrient and sediment load allocation reductions in order to enable Maryland to meet the objectives of the U.S. Environmental Protection Agency's ("EPA") 2010 Chesapeake Bay TMDL ("2010 Bay TMDL"). Given the necessary role of Maryland local governments in the Bay restoration program (*i.e.*, watershed implementation plans), the concerns of the Coalition counties with the DLSRWA must not be ignored. Otherwise, we will continue spending billions of dollars to earn D+ "State of the Bay" report cards from the Chesapeake Bay Foundation for years to come.[3]

The human environment (*e.g.*, the economic, social and cultural, and natural environments) of the Coalition counties has been and will continue to be directly impacted by the conclusions and results of the LSRWA. Such conclusions and results are being used to direct the Environmental Impact Statement being prepared in the Federal Energy Regulatory Commission's pending relicensing of the Conowingo Hydroelectric Project and the relicensing of other power projects in the lower Susquehanna River, and will inform the EPA's 2017 recalibration of load allocations under the 2010 Bay TMDL.

The USACE and the other Federal and State agencies who have conducted the LSRWA have failed to coordinate with the Coalition member counties in the preparation of the LSRWA and have deprived them of their rights under the National Environmental Policy Act ("NEPA") and the Federal Advisory Committee Act ("FACA") as well violating a number of U.S. Presidential Executive Orders in the manner in which the study and report processes has been conducted to date. The Coalition counties urge USACE and the participating Federal and State agencies to revise their approach as they move forward with the LSRWA.

The Coalition counties observe with interest the report detailing the concerns of the Scientific and Technical Advisory Committee (STAC) of EPA's Chesapeake Bay Program with respect to the DLSRWA and generally concur with all of the STAC's comments and concerns, which have yet to be adequately addressed.[4] It is disingenuous for any person familiar with the STAC report to suggest that the DLSRWA has been favorably peer reviewed or has been endorsed by the scientific community.

We take issue, however, with one observation made by the STAC and with one issue overlooked by the STAC. The STAC suggests that the harm caused by an increased loading of sediments due to scour from the floors of the reservoirs behind the hydroelectric dams in the lower Susquehanna River will not be as harmful as the nutrients bound to the sediments, particularly phosphorus, to the Bay estuary. In their 2012 Native Oyster Restoration Master Plan USACE has documented the harmful impact of sediments to the habitat necessary to allow

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[3] CBF 2014 State of the Bay Report. *See* link: http://www.cbf.org/about-the-bay/state-of-the-bay-report-2014.
[4] Freidrichs, C., T. Dillaha, J. Gray, R. Hirsch, A. Miller, D. Newburn, J. Pizzuto, L. Sanford, J. Testa, G. Van Houtven, and P. Wilcock, *Review of Lower Susquehanna River Watershed Assessment*, Publication No. 14-006 of the Chesapeake Bay Scientific and Technical Advisory Committee (Aug. 2014).

bivalves (oysters, clams and mussels) to reproduce in the Bay.[5] The watermen working out of the Coalition counties on the Bay will testify about the harmful impact of the massive quantities of sediments entering the Bay during significant storm events such as the storms events of 2011 and how such events have devastated the habitat for bivalve breeding and have suffocated hibernating crabs and destroyed the SAV necessary to protect young of year crabs from predators. We observe that while the scientific credentials of the 11 member STAC team that reviewed the DLSRWA are not disclosed, none appear to have any, or an extensive, background in the marine science of bivalves or blue crabs. The National Oceanic and Atmospheric Administration and the U.S. Fish & Wildlife Service should be consulted before making such sweeping generalizations.

Neither the STAC nor the persons conducting the LSRWA have given any consideration to the toxic pollutants that are documented (*see* Susquehanna River Basin Commission reports to the Maryland Department of the Environment) as being in the sediments impounded in the reservoirs behind the hydroelectric power dams: herbicides; pesticides; sulfur and acid mine drainage; coal; PCBs; and other aromatic hydrocarbons and heavy metals, in addition to the nitrogen and phosphorus bound in such sediments. Such toxic pollutants must be accounted for in determining the impact of scour and in undertaking a benefit cost analysis of dredging above the dams in the lower Susquehanna River.

The initial pages of the attached comments and concerns provide a slightly more comprehensive overview of the comments and concerns of the local government members of the Coalition. The latter pages contain more detailed questions, comments and concerns focused on individual portions of the DLSRWA and the attached appendices. The Coalition members expect that the comments presented in each section of the attached review will be considered and addressed.

Given the predictive failure of the HEC-RAS and AdH models, upon which the major findings and conclusions of the DLSRWA are predicated and the reported fact that the underlying goals and objectives of the LSRWA were changed in midstream, the DLSRWA undisputedly is a mishmash of information rapidly cobbled together in a report and appendices in order to fulfill a political agenda. The DLSRWA is not scientifically sound and does not achieve valid objectives and outcomes. The Coalition urges the USACE and the other Federal and State agencies utilizing the report in conjunction with relicensing and regulatory objectives to restart

[5] The sediments deposited in the Bay during and in the aftermath of Hurricane Agnes in 1972 destroyed the oyster beds north of the Bay Bridge. (2012 MP § 4.6.3 at 83-84.) Sediments smother and kill oysters and prevent oyster spat from seeding because spat require hard clean shell on which to attach in order to grow new oysters. (2009 EA § 3.3.1 at 13 (sediments now cover most historic oyster beds and planted shell becomes covered in an average of 5.5 years); Chesapeake Bay Oyster Recovery: Native Oyster Restoration Master Plan, Maryland and Virginia dated September 2012 (2012 MP) § 2.1.1 at 17 ("Shell is being lost due to burial by sediments. Larval oysters require hard substrate on which to settle to grow."), § 4.1.1 at 49 (sediments eliminate oyster habitat), § 4.1.1.4 at 56 (sediment smothers oysters), § 5.5.4.5 at 150 (oyster growth must exceed sedimentation rates in order for oysters to survive).)

the process and to proceed in legal compliance with NEPA, FACA, the regulations of the Council of Environmental Equality implementing NEPA, and the applicable Executive Orders.

There is no denying that the hydroelectric power dams in the lower Susquehanna River have profoundly altered the lower Susquehanna River estuary and the Chesapeake Bay estuary. If the ongoing impact of the dams and the other power projects in the lower Susquehanna River are not addressed, the downstream efforts and expenditures undertaken by Marylanders will not achieve meaningful and lasting improvement to the upper Bay or overall Bay water quality.

The Coalition counties have suggestions about how a natural oyster bed cultivation and seeded shell relocation program could serve as a viable and cost effective alternative to full-scale dredging behind the dams. Again, if a proper NEPA process is instituted, such alternatives could be preliminarily scoped and given due consideration. The failure to adhere to such legal mandates will be more expensive and cause greater delay and expense for all involved in the long run.

Any questions about the Coalition's comments concerning the DLSRWA may be directed to Jeff Blomquist (jblomquist@fblaw.com or 410-659-4982), Michael Forlini (mforlini@fblaw.com or 410-659-7769) or Chip MacLeod (cmacleod@fblaw.com or 410-810-1381).

Very truly yours,

Ronald H. Fithian

Enclosures

cc: United States Environmental Protection Agency
United States Geological Survey
Maryland Department of the Environment
Maryland Department of Natural Resources
Maryland Geological Survey
Susquehanna River Basin Commission
The Nature Conservancy
Clean Chesapeake Coalition

Clean Chesapeake Coalition

Comments, Questions & Observations

Draft Lower Susquehanna River Watershed Assessment Report

January 9, 2015

Background

The Lower Susquehanna River Watershed Assessment ("LSRWA") was originally undertaken in 2011, before a number of Maryland counties coalesced to form the Clean Chesapeake Coalition (the "Coalition") in last quarter of 2012 and began to shine the spotlight on the problem of scour from the floors of the reservoirs behind the three major hydroelectric power dams in the lower Susquehanna River: the Safe Harbor Dam (Lake Clarke is the reservoir behind that dam); the Holtwood Dam (Lake Aldred is the reservoir behind that dam) and the Conowingo Dam (the Conowingo Pond is the reservoir behind that dam).[1] The Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment, Dec. 29, 2010 ("2010 Bay TMDL") was published in December 2010 and concluded that Lake Clarke and Lake Aldred already had reached dynamic equilibrium,[2] but that the Conowingo Pond would not reach dynamic equilibrium until sometime between 2025 and 2030. The United States Environmental Protection Agency ("USEPA"), therefore, erroneously concluded in the 2010 Bay TMDL that 50% of the sediments flowing down the Susquehanna River would continue to be trapped in the Conowingo Pond. The LSRWA study originally was undertaken by the United States Army Corps of Engineers ("USACE") and the Maryland Department of the Environment ("MDE") to begin to consider the impact that the sediments accumulating in the three reservoirs would have once the Conowingo Pond reached dynamic equilibrium some 15 to 20 years down the road. There was no urgency to the study and there was very little in funding procured for the study.

[1] Shawn A. Seaman, in the comments submitted by the Maryland Department of Natural Resources to FERC in Project No. P-405-106 on January 31, 2014 at 2, stated: "[T]he [LSRWA] was never intended to be part of FERC's licensing process." MDE and MDNR have repeatedly taken the position that Exelon must be required "to conduct appropriate sediment and nutrient studies to determine the Project's impacts on water quality and living resources of the Lower Susquehanna River and the Chesapeake Bay." (Footnote omitted.) (*Id.*) Nevertheless, USEPA, by letter dated December 29, 2014 from John R. Pompomo, the Director of Environmental Assessment and Innovation Division of USEPA, to FERC Secretary Kimberly Bose, requested FERC to include and consider the DLSRWA in the EIS being prepared by FERC for the Conowingo Hydroelectric Power Project. The LSRWA has morphed into something it never was intended to be.

[2] "Dynamic equilibrium" is the term used to indicate that the amount of sediments (suspended solids) in the water above the dam would be equivalent to the amount of suspended solids in the water below the dam. Before any of the hydroelectric dams were built in the Susquehanna River, it was a narrow, rapidly flowing river with whitewater rapids and falls. Most of the suspended solids in the river flowed into the Chesapeake Bay. When the hydroelectric dams were constructed, they were built well above the natural top of the river in order to build up and trap a large reservoir of water behind the dams that could be used to steadily turn (*i.e.*, power) the turbine electric power generators installed along the sluce gates in the bottom of the dams so that even during drought conditions there would be sufficient water with enough head space to power the generators. These dams acted as stormwater management ponds. They significantly slowed the flow of the water in the Susquehanna River and significantly deepened the river. As soon as the water deepened and slowed, suspended solids that used to flow down the river into the Bay began to settle out in the reservoirs behind the dams.

The issue of what would happen when dynamic equilibrium was reached was always "the elephant in the room" that the regulatory agencies and NGOs have avoided addressing, because it was too complicated and there is no existing legal framework that empowers the Federal or State regulators to directly address the problems that will result from such eventuality. Today, there is no commitment, plan, responsible party or budget to specifically address the devastating amounts of nutrients, sediment and other contaminants that are scoured into the Chesapeake Bay during storm events and in equally harmful proportions now on a regular basis.

Total Maximum Daily Loads

In 2008, the Chesapeake Bay Foundation, in a friendly lawsuit, sued USEPA to make it use its authority under the Clean Water Act to promulgate a total maximum daily load ("TMDL") for the Chesapeake Bay, in order to take control of the agenda for the clean-up of the Bay. In settlement of the lawsuit, USEPA generated the 2010 Bay TMDL and assigned to each Chesapeake Bay watershed state load allocations for the amount of nitrogen, phosphorus and sediments that each state would have to remove from the amount of such pollution currently being discharged to Bay tributaries. After the State of Maryland received its load allocation under the 2010 Bay TMDL, it determined that in excess of $14.5 billion dollars would have to be spent to meet its load allocation obligations. The State was unwilling to redirect its spending and/or to pass the additional taxes and fees necessary to fund this unprecedented obligation. The State, therefore, required each Maryland county to prepare a watershed implementation plan ("WIP") for meeting the 2010 Bay TMDL load allocation assessed against Maryland by USEPA and, among other mandates, passed legislation requiring the largest counties to adopt stormwater management fees (aka "rain tax") to raise the money necessary to implement the WIPs.

As counties undertook the WIP process and began examining what MDE and the Maryland Department of Natural Resources (MDNR) were doing and requiring counties to do in order to address Maryland's load allocation under the 2010 Bay TMDL, they recognized how useless the regulatory initiatives would be in making any meaningful improvement to the water quality of the Bay and how expensive, unproductive and inequitable Maryland's regulatory initiatives have been and would continue to be. They also recognized that the largest problems contributing to the pollution of the Bay were being ignored.

Major Sole Source of Sediment and Nutrient Loading

One of the largest problems being ignored was the impact of scour from the floors of the reservoirs behind the three hydroelectric power dams in the lower Susquehanna River during storm events. During storm events, suspended solids that were trapped behind the dams during low flow and normal flow conditions are agitated, become re-suspended in the river and flow into the Bay. Over the course of a 2 - 8 day storm event, including the high flows that are generated by runoff from the storm, as much as one-half-year to 12+ years of the average loading of suspended solids from the Susquehanna River are scoured and dumped in the upper Bay (*i.e.*, the Maryland portion of the Bay) over such 2 - 8 day period. Such massive loading over such a short period of time has a devastating impact, and a much greater impact than if such solids flowed into the Bay when they originally became suspended in the river.

Reports studying the impact of Hurricane Agnes on the Bay published by the Johns Hopkins University Press in 1978 concluded that 56% of the sediments flushed into the Bay during the hurricane were scoured from the floors of the reservoirs behind the hydroelectric power dams in the lower Susquehanna River - 20 million tons of sediments out of the 32 million tons of sediments flushed into the upper Bay from the Susquehanna River by the hurricane.

In August 2012, Robert M. Hirsch of the Department of Interior's U.S. Geological Survey ("USGS") published a report concluding that the Conowingo Pond had virtually reached dynamic equilibrium.[3] In presenting the report, Mr. Hirsch discussed the scour phenomena but advised that the bathymetric data (*i.e.*, raw data of the depth from surface to floor of the reservoirs before and after storm events) did not exist. The bathymetric data necessary to determine the amount of scour during different storm events still does not exist and has never been generated. Exelon, in the pending Federal Energy Regulatory Commission ("FERC") relicensing proceeding for the Conowingo Hydroelectric Project, has requested a year-to-year extension of its current license while it collects the bathymetric data after storm events necessary to engage in meaningful modelling and prediction.[4]

Mistaken Conclusions

Different persons are reporting that the LSRWA Draft Report ("DLSRWA") concludes that scour from the floor of the reservoir of the Conowingo Pond is not a significant source of pollution to the Bay. Such a conclusion, as discussed more fully below, is devoid of any scientific validation and support. The raw data necessary to make such a determination is nonexistent. There is no bathymetric data sufficient to enable a scientifically valid determination of the amount of scour from the floors of the reservoirs behind the hydroelectric power dams in the lower Susquehanna River. There is no scientific data on which to predicate a determination of the volume of nutrients bound to sediments in the Susquehanna River or what percentage of such bound nutrients become bioavailable when such scoured sediments are flushed into the Bay.

When the LSRWA was undertaken, the impact of scour on the Bay was not an issue. That issue became a hot topic because it was raised in the FERC relicensing proceeding for Conowingo Dam by the Coalition and because the Coalition has focused public attention on the issue.

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[3] Robert M. Hirsch, USGS, Scientific Investigations Report 2012-5185, *Flux of Nitrogen, Phosphorus, and Suspended Sediment from Susquehanna River Basin to Chesapeake Bay during Tropical Storm Lee, September 2011, as an Indicator of the Effects of Reservoir Sedimentation on Water Quality* at 4, 13 (August 30, 2012) (observing, when the Conowingo Reservoir is full and no longer has any trapping capacity, even at normal flows, there will be a 2% increase in total annual nitrogen loading from the Susquehanna River, a 70% increase in total annual phosphorus loading, and a 250% increase in annual sediment loading).

[4] Letter dated December 22, 2014 from Jay Ryan on behalf of Exelon to John B. Smith, Chief of the Mid-Atlantic Branch of the Division of Hydropower Licensing of FERC re: Conowingo Hydroelectric Project, FERC Project No. 405, Response to Letter from Office of Energy Project Regarding Withdrawal of Section 401 Water Quality Certification Application.

Several truths are inescapable:

(A) Instead of dredging sediments from behind the dams from the Bay after they have been flushed into and dispersed throughout the upper Bay causing damage to the marine environment and fisheries of the Bay, such sediments should be dredged from above the dams (thus ensuring that such pollution never reaches the Maryland portion of the Bay).

(B) Before Marylanders spend billions of dollars to implement clean-up programs that can be rendered completely useless by scour from a significant storm event and pollution above the dams, the harm caused by above the dam sediments and pollution needs to be addressed. It is a fool's errand to spend money on band-aids to cover superficial cuts before stopping the bleeding from the artery; and that is precisely what is happening when billions of tax dollars are spent on *de minimus* issues downstream while nothing meaningful is done to abate the harm above the dams.

(C) Years worth of the average annual loading of sediments and nutrients have been discharged from the Susquehanna River into the Bay in the matter of days during recent storm events. If the sediments and nutrients are not from scour, they are from upstream (above the dams) sources. None of the other states in the Chesapeake Bay watershed have adopted wastewater treatment discharge limits that are close to as stringent as those imposed on Maryland by MDE. None of the other states in the Chesapeake Bay watershed have stormwater management requirements that are as demanding and expensive to meet as those in Maryland. No other state in the Chesapeake Bay watershed has a "phosphorus management tool" that is as stringent and as costly to comply with as that mandated by the recently re-promulgated Maryland regulations. No other state in the Chesapeake Bay watershed has individual septic requirements that are as stringent and costly to comply with as Maryland. The above has been true for several decades, yet the additional expenditures paid by Marylanders have not resulted in any meaningful overall improvement to the water quality of the Bay. Instead, such regulations and expenditures have driven businesses and residents out of Maryland and caused fatigue among those being taxed to "save the Bay."

The foregoing inconvenient truths are ignored because such truths cause the public to question the actions being advocated by such agencies and organizations.

The DLSRWA attempts to minimize the significance of scour to the Bay without adequate scientific underpinning. Regulatory agencies and environmental organizations are stating that the DLSRWA concludes that the problems at the Conowingo Dam are not as bad as scientists thought. The statement is almost laughable because the problem had been completely ignored until it was raised by the Coalition. No thought was given to the problem, and now the problem is recognized as real such that MDE has required Exelon to engage in additional data compilation and studies before MDE will even begin its consideration of the Section 401 Clean Water Act water quality certification needed by Exelon in the FERC relicensing process for

Conowingo Dam. What is disconcerting for the reasons explained more fully below is that the DLSRWA discusses predicted minimum impacts instead of discussing the full range of impacts discussed in the projections underpinning the report.

DLSRWA Modelling Concerns

The work underpinning the DLSRWA is a misguided exercise in modelling. Considerable time and effort has been spent discussing and manipulating models to generate meaningless results instead of gathering and modeling meaningful information.[5] At least nine (9) different models were used to generate data for use in other models and for making predictions and estimations:

(1) The Chesapeake Bay Environmental Model Package (CBEMP) is used to project the water quality of the Chesapeake Bay. That model is predicated on a suite of models consisting of:

  (a) A watershed model (WSM);

  (b) A hydrodynamic model (HM);

  (c) A water quality eutrophication model (WQM);

(2) A computational hydrodynamics in a three-dimensions model (CH3D);

(3) A USACE integrated compartment water quality model (CR-QUAL-ICM), which model is predicated on a suite of models consisting of:

  (a) An ICM model;

  (b) A WQM model; and

  (c) A WQSTM model;[6]

(4) An adaptive hydrodynamics model (ADH), which was used for estimating sediment erosion in the Conowingo Pond based on projected data derived from other models; and

(5) A hydrodynamic engineering center river analysis system model (HEC-RAS), which was used to generate a rating curve for use in the ADH.[7]

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[5] "The [DLSRWA] investigation involves the use of numerous predictive environmental models and the transfer of information between the models." Carl F. Cerco & Mark R. Noel, *Application of the Chesapeake Bay Environmental Model Package to Examine the Impacts of Sediment Scour in Conowingo Reservoir on Water Quality in the Chesapeake Bay, A Report to the U.S. Army Corps of Engineers, Baltimore District, September 2014 Final Report* at 2.
[6] *Id.* at Fig. 1-2.
[7] *Id.* at 3.

DLSRWA Data Concerns

What little raw data was used in the CBEMP model was generated from raw data collected in the period from 1991 - 2000.[8] This outdated data as well as data generated by other models not designed to determine scour was used to run applications under the ADH for 2008 - 2011 timeframe. The ADH was run to project the amount of scour from the floors of the Conowingo Pond and Lakes Aldred and Clarke that serve as the reservoirs behind the three major hydroelectric power dams in the lower Susquehanna River: the Conowingo Dam, the Holtwood Dam and the Safe Harbor Dam.

Peter Moskos, a Harvard educated criminologist, author and professor, made a comment that appropriately captures the deficiency of the modelling exercises underpinning the DLSRWA: "And if you have bad data, it doesn't matter what fancy quantitative methods you use. It's putting lipstick on the damn pig of correlation." In short, a modelling conclusion is only as good as the data underpinning the modelling effort. When the data needed to generate a predictive model does not exist, the predictive conclusions generated from a cluster of other models used to generate data for use in the predictive model are meaningless.

Nowhere does the DLSRWA concisely list the raw data underpinning the reported results of the ADH modelling efforts. Nowhere does the DLSRWA clearly describe what actual data was used in what manner to generate the data on which particular modelling exercises were run. To provide such data would expose how the findings and conclusions of the DLSRWA are superficial.

The raw data necessary to determine the impact of scour from the ponds/lakes/reservoirs in the lower Susquehanna River on the Bay during storm events simply does not exist.

No bathymetry has been run before and after a major storm event in the Conowingo Pond, Lake Aldred or Lake Clark. Such bathymetry runs would show the elevation of the floor of such lakes and pond before and after a storm. From the difference in depth, the volume of scour could be determined and the amount of scour from a storm event with a peak flow measured in cubic feet per second through each dam could be determined. There is, therefore, no raw data from which to determine the volume of sediments scoured from the floors of such reservoirs during a storm event with a known flow rate.

Measuring bathymetry is not complicated. Sonar technology in conjunction with global positioning system (GPS) technology is relatively inexpensive and widely available. Such technology could be installed on any small and transportable boat and used to rapidly and efficiently chart the bathymetry of the lakes and pond before and after storm events. NOAA has published how its vessels equipped with such technology can record the topography/bathymetry of floor of the Bay so accurately that NOAA employees can detect if oysters have been illegally harvested from a harvest restricted area of the Bay.[9]

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[8] *Id.*

[9] *See* link: http://www.stardem.com/news/environment/article_f6f9782b-fbef-50de-890a-c99d918d2210.html, NOAA *analyzing oyster habitat, restoration* (Sept. 16, 2014). The National Oceanic and Atmospheric

Further evincing the complete void of data necessary to determine scour from the floor of the Conowingo Pond during storm events and the impact of such scour on the Bay is the December 22, 2014 letter from Jay Ryan on behalf of Exelon to John B. Smith, Chief of the Mid-Atlantic Branch of the Division of Hydropower Licensing of FERC re: Conowingo Hydroelectric Project, FERC Project No. 405, Response to Letter from Office of Energy Project Regarding Withdrawal of Section 401 Water Quality Certification Application. In the letter, Exelon's representative explains to the FERC why it withdrew its application for a Clean Water Act 401 water quality certification from MDE, why Exelon will keep re-filing and withdrawing the application over the next several years while it accumulates the raw data before and after storm events necessary to meaningful prepare an analysis of the impact of sediment scoured from the floor of the Conowingo Dam during storm events on the Bay, and why it would like FERC to issue one year renewal licenses for as many years as it takes to obtain the raw data necessary to meaningfully analyze the amount of scour and the impact of scour from the floor of the Conowingo Pond during storm events. If the data to conduct a meaningful analysis already existed, it would have been completely unnecessary for Exelon to make this request and for MDE to demand that additional raw data being gathered and analyzed before MDE is willing to consider Exelon's Clean Water Act 401 water quality certification application. The actions of MDE and Exelon constitute an admission that the raw data necessary to determine the amount of scour during storm events and the impact of such scour on the Bay simply does not exist.

DLSRWA Guesstimates and Assumptions

For the DLSRWA, scour has been guesstimated by comparing samples of total suspended solids (TSS) taken at various points above and below the Conowingo Dam and guesstimating the portion of such suspended solids attributable to stormwater runoff versus the portion attributed to scour from the floor of the Conowingo Pond, Lake Aldred and Lake Clark.

There is no analysis or even any discussion from a statistical science perspective of the confidence level of any data generated by any of the models or any conclusions or determinations made based on any of the modelling analysis. Undoubtedly that is because any such discussion would acknowledge that there is insufficient raw data to generate any meaningful modelling data or to draw any meaningful conclusions to a reasonable degree of scientific certainty.

Michael Langland, one of the USGS scientists, has admitted that there was insufficient data to calibrate the ADH model for river flows greater than 600,000 cfs. The table of predicted scour during storm events generating different flow rates in the lower Susquehanna River evidences the wide range of scour estimates based on the available data and modelling efforts.[10] The existing data and modelling efforts predict that between one-half million (500,000) tons and

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Administration has a boat with a multibeam – a surveying technology outfitted with 256 laser beams to get a data driven view of the bottom by bouncing sonar and laser beams off the bottom and collecting the data through a system on the boat – such surveys can be resolved both horizontally and vertically to within a few centimeters.

[10] *See* Michael J. Langland & Edward H. Koerkle, *Calibration of One Dimensional Hydraulic Model HEC-RAS for Simulating Sediment Transport through Three Reservoirs, Lower Susquehanna River Basin, 2008 - 2011*, USGS, Attachment A-1: Additional Information for Susquehanna River at Marietta, Pa. and Conowingo, Md. and Conowingo Reservoir at 41, Table A3.

1.5 million tons will be scoured from the floors of the lakes and pond during a one-in-five-year storm event (between 21% and 44% of the total sediment load during such a storm event). Thus, a single 1 - 3 day storm event will generate flows sufficient to scour from the floor of the Conowingo Pond and Lakes Aldred and Clarke one-half to 1 year-worth of the average annual sediment loading from the Susquehanna River and deposit such amount in the upper Bay in such 3-day period. The existing data and modelling efforts predict that between 10.5 million tons and 15.5 million tons will be scoured from the floor of the lakes and pond during a one-in-sixty-year storm event (between 39% and 50% of the total predicted sediment load during such a storm event).[11] Thus, one such 4 - 8 day storm event will scour and deposit from the floor of the Conowingo Ponds and Lakes Aldred and Clarke between 8 - 12 years-worth of average annual sediment loading from the Susquehanna River and deposit such amount in the upper Bay over the course of eight days. The Safe Harbor Dam, the Holtwood Dam and the Conowingo Dam have so altered the flow of the Susquehanna River and sediments in the Susquehanna River that one to twelve years or more of the average annual sediment loading from the Susquehanna River can be delivered over the course of a week or less to the upper Bay.

<u>Marginalizing Storm Events</u>

The last 60 year storm event occurred in 1972 (*i.e.*, Hurricane Agnes). The next 60-year storm event will occur during the term of the 40+ year license requested by Exelon from FERC for the continued operation of the Conowingo Hydroelectric Power Project. This means that during the next 20 years, we can expect that scour from the floor of reservoirs behind the three dams in the lower Susquehanna River will completely annihilate the marine habitat in the upper Chesapeake Bay if no action is taken to reduce the volume of sediments in those reservoirs.

The persons who drafted and edited the DLSRWA inexplicably chose the lowest levels of predicted scour to report in the DLSRWA and upon which to predicate the findings and conclusions made in the draft report without providing any explanation of why the lowest values, as opposed to the highest values or the middle values were selected. What agenda is served and whose interests are benefitted by downplaying the impacts of sediment scour?

<u>Toxic Pollutants and Dredging</u>

USACE does not want to dredge above Conowingo Dam because it will have to deal with the hazardous and toxic pollutants that are in those accumulated sediments. Currently, when USACE dredges sediments from the navigable channels of the Bay, it does not have to give significant concern to the hazardous and toxic substances found in the sediments in looking for a place to safely deposit such sediments. Such sediments historically have been deposited in impoundments in the Bay such as Poplar Island and other islands composed of dredged sediments in the Bay. Attention will be focused on the hazardous and toxic sediments that are dredged above the dams in the lower Susquehanna River in determining how and what to do with such sediments. The cost, therefore, in properly disposing of such sediments will be magnified, because instead of allowing such hazardous and toxic pollutants to discharge into the Bay and

[11] *Id.*

then largely ignoring them when determining where to deposit sediments dredged from the navigable channels, such hazardous and toxic pollutants will have to be addressed up front.

Exelon does not want to dredge sediments from behind the dams because in so doing it will exercise control over such sediments and in so doing will become responsible for disposing of such sediments in a manner that the hazardous and toxic pollutants in such sediments do not leach into the environment. Dredging sediments under the current legal framework will confer liability on Exelon for such hazardous and toxic substances. In fairness to Exelon, much of the hazardous and toxic pollutants in the accumulated sediments were not generated by Exelon or the power companies acquired by Exelon, so Exelon will fight hard not to dredge.

The DLSRWA is devoid of any analysis or meaningful discussion of the nutrients and pollutants that are bound to the sediments resting on the floor of the lakes and pond behind the three dams in the lower Susquehanna River. Studies conducted by the Susquehanna River Basin Commission ("SRBC") for MDE have determined that that the following nutrients and pollutants are bound to such sediments:

(i) Herbicides;

(ii) Pesticides;

(iii) Sulfur and acid mine drainage;

(iv) Coal;

(v) Polychlorinated Bi-phenyls (PCBs);

(vi) Nitrogen; and

(vii) Phosphorus.

The presence of such hazardous and toxic pollutants comes as no surprise given the extensive agricultural, mining and power generation activities that have historically been conducted in the Susquehanna River watershed.

During the December 9, 2014 presentation on the DLSRWA made at the Harford County Community College, Dan Bierly of the USACE, with acquiescence from the other panelists (*i.e.*, Bruce Michael from MDNR, Mark Bryer from The Nature Conservancy, Rich Batiuk from USEPA Reg. III, Matthew Rowe from MDE and Michael J. Langland from USGS) acknowledged that such nutrients and toxic and hazardous pollutants were bound to the sediments deposited on the floors of the pond and lakes in the lower Susquehanna River.

No study has been conducted to determine what nutrients that are bound to the sediments in the lower Susquehanna River estuary are released into the water of the Bay in the less oxygenated, more saline, more acidic, and warmer Bay estuary. Assumptions, for example, that none of the phosphorus that is bound to such sediments above the Conowingo Dam were released into the Bay estuary when such sediments were transported over or through the dam and into the Bay simply are unfounded. There are 4 - 8 ppm of salt in the Bay waters as far north as Tolchester and phosphorus and nitrogen that are bound to such sediments while they were in the Susquehanna River undoubtedly are released into the water in the Bay once such sediments are scoured and flushed into the Bay. Likewise, the coal, herbicides, pesticides, sulfur and acid mine drainage, and other toxic substances bound to such sediments above the dam probably are released into the Bay when such sediments are flushed through or over the dam. Again, during the December 9, 2014 presentation on the DLSRWA made at the Harford County Community College, Messrs. Bierly and Rowe acknowledged that no such analysis was made and there currently is no scientific basis for determining the impact of the release of nutrients bound to the sediments scoured from the floor of the lakes and the pond behind the dams in the lower Susquehanna River. Mr. Bierly further expounded on the limited scope of the LSRWA, the limited funding for the study and the limited sampling conducted in conjunction with the study.

Mr. Bierly stated some of the problems with dredging, *e.g.*, there are hundreds of millions of tons of sediments in the pond and lakes behind the three dams that have accumulated over the last 80 ± years and very limited places to deposit such sediments in close proximity to such ponds and lakes. The following concerns were not spoken, but undoubtedly influence the decision making process:

(a) USACE only has to dredge the navigable channels in the Bay. Sediments scoured and flushed into the Bay during storm events settle out all over the shallows and non-dredged tributaries in the upper Bay, and so a lesser percentage of such sediments that enter the Bay from above the dams probably need to be dredged by USACE, although no study ever has been conducted to make such a determination.

(b) Sediments dredged from the Bay historically have been deposited on manmade islands and containment areas in the Bay with little to no thought given to the leaching of nutrients and toxic and hazardous pollutants from such islands and containment areas. This historical course of dealing has generally allowed USACE to ignore the impacts of such nutrients and toxic and hazardous pollutants. Withdrawal of sediments above the dams will entail the analysis of such nutrients and pollutants and regulators will not allow the disposal of above the dam sediments until there has been an accounting of how such nutrients and toxic and hazardous substances will be neutralized or responsibly addressed.

(c) No one has been willing to answer the question of whether Exelon will assume liability for the nutrients and toxic and hazardous pollutants in above-dam sediments if it undertakes dredging operations. In fairness to Exelon, the dams impact the timing of the release of such nutrient and toxic and hazardous pollutant laden sediments into the Bay and the devastating shock of the massive releases over a short period of time due to the trapping and scour phenomena caused by the dams. With the exceptions of the PCBs and chemicals associated with keeping power company water intakes and discharge lines free and clear of biological life and growth, such nutrients and pollutants were not generated by the power companies, so it is not fair to saddle them with liability for such nutrients and toxic and hazardous pollutants in conjunction with remedial action undertaken to ameliorate the impact from trapping and scour.

Exelon's Involvement

Exelon has directly and indirectly contributed millions of dollars to Federal and State campaigns and has made undisclosed contributions, probably in the millions of dollars, to the environmental organizations that were allowed to participate in the decision making process underpinning the preparation of the DLSRWA. Exelon funded a large portion of the study underpinning the DLSRWA. Exelon's consultants, Gomez & Sullivan, had a voice in and directly participated in the decisions made about how to conduct the study, what assumptions to make, what data to use, and what conclusions to report. Exelon undoubtedly expects and demands a return on this investment. Exelon undoubtedly has influenced the politics underpinning the decision making processes that have led to the findings and conclusions reported in the DLSRWA.[12]

Non-Compliance With Federal Law

The studies underpinning the DLSRWA and the preparation of the DLSRWA were not undertaken in compliance with the National Environmental Policy Act (NEPA), the Federal Advisory Committee Act (FACA), the NEPA-implementing regulations of the President's Counsel of Environmental Quality (CEQ), or applicable Presidential Executive Orders. Select special interest groups including Exelon and environmental organizations that probably have been the recipients of significant monetary and non-monetary contributions from Exelon, Exelon executives and officials and non-profits funded by Exelon were granted a seat and voice at the study table. Exelon, directly and indirectly, was given considerable influence over the reported outcomes and there has been no opportunity for persons with countervailing perspectives to influence the decisional process and the reported outcomes. NEPA, FACA and the CEQ regulations were promulgated to preclude exactly what has happened in generating the DLSRWA. The report legally is not entitled to be given any deference in any governmental decision making process.

[12] The Coalition repeatedly was denied a right to participate in quarterly meetings where decisions relative to the data to obtain and to utilize and the assumptions to be made and utilized in generating the modelling efforts and reported the conclusions underpinning the DLSRWA were made. The process was and is not open and has wholly failed to comply with the requirements of NEPA, FACA, the regulations of the President's CEQ, and Presidential Executive Orders. The process is not open and has not been transparent.

The Elephant In The Room

Unfortunately, Federal and State environmental and natural resources agencies have conveniently chosen to ignore the impact to the Bay estuary of the hydroelectric power dams in the lower Susquehanna River for over eight (8) decades. USEPA conveniently and quite erroneously predicted in the 2010 Bay TMDL that the Conowingo Pond would not reach dynamic equilibrium and discontinue acting as a net trap of sediments until 2025 or 2030.[13] The same suite of models used to support that erroneous assumption in the 2010 Bay TMDL were used in the "studies" underpinning the DLSRWA.

Mr. Batiuk of USEPA Region III, during the December 9, 2014 presentation at Harford County Community college, as well as the other presenters (Messrs. Bierly and Michael), admitted that the Conowingo Pond is now in a state of dynamic equilibrium- *i.e.*, the Conowingo Pond no longer acts as a net trap of sediments and pollutants washing down the Susquehanna River to the Bay. They acknowledge that EPA's 2010 Bay TMDL prediction based on the CBEMP was off by 12-17 years.

MDNR and MDE completely ignored the impact of sediment scour from the floors of Lake Aldred, Lake Clarke and the Conowingo Pond in the 2010 Bay TMDL process and the FERC relicensing process until the Coalition made it an issue that those agencies could no longer ignore. Maryland's WIP makes no mention whatsoever of Conowingo Dam or sediment scour due to storm events. Shamelessly, Bruce Michael of MDNR explained during the December 9, 2014 informational meeting how MDNR and the other regulatory agencies have been aware of the problem for decades, and indeed they have been. Studies prepared and disseminated by the SRBC have documented the problem of sediment scour from the lower Susquehanna River for several decades. Unfortunately, the warnings sounded by such reports have been ignored throughout that period of time.

Conclusion

The LSRWA has been integrally linked with the FERC relicensing process for Conowingo Dam. The Draft Environmental Impact Statement prepared by FERC repeatedly references the LSRWA and what will be learned and divulged by that report.

At the December 9, 2014 public presentation, Mr. Batiuk of USEPA Region III stated that because of the findings of the DLSRWA, USEPA was in the process of recalibrating the 2010 Bay TMDL to recognize that the Conowingo Dam no longer acted as a net trap and, therefore, all waste load allocations would have to recalculated and revised.

By letter dated December 22, 2014 Exelon, in the FERC relicensing proceeding, requested FERC to issue temporary 1-year license renewals while it participated in the LSRWA with MDE in order to determine the impact of its operation on the water quality of the Bay.[14]

[13] 2010 TMDL, Apx. T at T-2.
[14] *See*, *supra*, FN4.

In short, the LSRWA is the linchpin for two major federal actions that will have significant and far reaching environmental impacts: (1) the FERC long-term relicensing of the Conowingo Hydroelectric Power Project and (2) the USEPA 2017 Chesapeake Bay TMDL recalibration. Given that this study will inform such major Federal actions, it should be conducted in compliance with NEPA, FACA, the CEQ regulations implementing NEPA, and the applicable Executive Orders issued by Presidents of the United States.

The Clean Chesapeake Coalition counties are stakeholders in both of the foregoing Federal actions and in myriad efforts to improve the water quality of the Chesapeake Bay. MDE and the Maryland General Assembly have empowered and tasked the counties with developing, funding and implementing WIPs and to implement and fund other local legislative and regulatory programs to improve the water quality of the Bay. The ability of the counties to implement such programs is directly impacted by the TMDL and the FERC relicensing of the Conowingo Dam. Economic development in the counties and the ability of the counties to retain existing businesses (including but not limited to agricultural and fishery dependent businesses) and to attract new businesses and residents is directly dependent on expenditures and programs associated with the WIPs, the 2010 Bay TMDL and the health of the Bay.

The members of the Clean Chesapeake Coalition request USACE, FERC and USEPA to set aside the DLSRWA and to reinstitute the study process in full compliance with NEPA, FACA, the NEPA implementing regulations promulgated by the President's CEQ, and a number of Presidential Executive Orders.

As discussed, the DLSRWA and appendices contain a host of information that was not well organized or concisely and clearly presented as required by NEPA and the NEPA implementing CEQ regulations. What follows, in no particular order, are additional concerns, questions and observations relative to the DLSRWA. The attached "Summary and Comments on Lower Susquehanna River Watershed Assessment Draft Report and Appendices" are by no means meant to be comprehensive or all inclusive; but are expected to be considered and addressed.

Any questions about the Coalition's comments concerning the DLSRWA may be directed to Jeff Blomquist (jblomquist@fblaw.com or 410-659-4982), Michael Forlini (mforlini@fblaw.com or 410-659-7769) or Chip MacLeod (cmacleod@fblaw.com or 410-810-1381).

Summary and Comments on Lower Susquehanna River Watershed Assessment Draft Report and Appendices

The following outline contains statements made in the Draft Lower Susquehanna River Watershed Assessment report and the Clean Chesapeake Coalition's (Coalition) comments regarding the Draft Report and its Appendices. Page numbers are included to provide reference to those statements made within the Draft Report.

DRAFT REPORT

Statements Regarding the Use and Limitations of Models in the Draft Study:

- According to the Draft LSRWA Report ("Draft Report"), an HEC-RAS model was designed primarily for non-cohesive sediment transport (sands and coarse silts) with additional, but limited, capability to simulate processes of cohesive sediment transport (generally medium silts to fine clays). Thus this model may not be suitable for all reservoir simulations, especially in areas of highly variable bed shear stress (the force of water required to move bed sediment) and active scour and deposition. Limitations of the model most likely resulted in less than expected deposition for the 2008 - 2011 simulation and less than expected erosion (scour) for the Tropical Storm Lee seven day event simulation, when compared to other approaches and estimates. (Pg. 33).

Comment DR-1: A one dimensional model cannot account for scour since there is no lateral variable to account for sediment load on the river basin. This was Langland's (*i.e.*, USGS') same concern regarding Exelon's use of the HEC6 model in their Sediment Transport Study.

- Produced two sediment inflow scenarios: Scenario 1 which included no scour from upper reservoirs and Scenario 2 which attempted to account for scour by estimating that 1.8 million tons of scour from the upper two reservoirs for a total inflow load of 24 million tons.

Comment DR-2: USACE's two dimensional AdH model computed detailed hydrodynamics and sediment transport in and out of Conowingo Reservoir, and the response of the reservoir and flats area to various sediment management scenarios and flows. According to the Draft Report the AdH simulates hydrodynamics and sediment transport. However, this may not the case given the following limitations:

- A one dimensional model, HEC-RAS, was used to provide data for the AdH model; the two dimensional AdH model utilized the HEC-RAS model results (sediment load and flow) from Holtwood Dam as the inflowing sediment load boundary condition. (Pg. 66).

- Through a validation process, the application of the AdH two dimensional model to the Conowingo Reservoir and Susquehanna Flats system was determined to be adequate for simulating general reservoir sediment scour and deposition modelling scenarios for the LSRWA. However, there is some uncertainty that remains with the estimates provided by the AdH model. (Pg. 37).

Comment DR-3: What was the validation process? Was it consensus at the meeting? By whom?

- The AdH sediment model (a two dimensional model) required bed sediment data. Only 8 bed core samples were taken from Conowingo Reservoir to a maximum depth of only one foot. Core samples were required to determine the inception of erosion (critical shear stress for erosion) and the erosion rate used to develop six material zones. (Pg. 19). The sediment bed in the AdH Model was approx. 3 feet deep. The properties of the lower 2 feet were either approximated from the SEDFlume data results (which is the one foot data) or determined from literature values.

Comment DR-4: How old is the SEDFlume data? If the age of the data is different than model runs how is this an accurate portrayal? What literature values were used?

- The hydrologic period used for these scenarios was 2008-11. This 4-year time period was utilized because it included low (less than 30,000 cfs.) moderate (30,000 to 150,000 cfs.) and high (greater than 150,000 cfs.) flows as well as two major flood events (above 400,000 cfs.). Each HECRAS simulation provided a range of probable conditions and also provided a range of uncertainty in the boundary condition flows. (*See* Appendix A for more details on the HECRAS analyses and model.) (Pg. 33).

- The second modelling tool utilized for this LSRWA effort was the AdH model. The AdH model was developed at the USACE's ERDC, located in Vicksburg, MS, and has been applied in riverine systems around the country and world. For this assessment, the AdH model was constructed and applied from Conowingo Reservoir to the Susquehanna Flats just below the Conowingo Dam, as shown in Figure 3- 2. Modelling scenarios were run by ERDC team members. (Pg. 34). Additional details about the AdH model and analyses are available in Appendix B. The AdH model was selected for the LSRWA effort and for use in the Conowingo Reservoir/Susquehanna Flats area (vs. HECRAS) because of the higher uncertainty of conditions and processes in this area, particularly in comparison to the upper two reservoirs which were understood to be in dynamic equilibrium for several decades. (Pg. 35). All AdH simulations that were run for the LSRWA effort were conducted with the same Susquehanna River flow and inflowing sediment boundary conditions. Using the HECRAS input, the 4-year flow period from 2008 - 2011 was simulated in the model. As noted earlier, this time period was utilized because it included low, moderate and high flows as well as two major high-flow events (above 400,000 cfs.). (Pg. 36). The AdH model was also utilized to estimate the effectiveness of selected sediment management strategies to reduce sediment loads transported through Conowingo Reservoir and Susquehanna Flats. Ultimately, the AdH model output was sediment transport, scouring loads or erosion from the reservoirs which were utilized in Chesapeake Bay Environmental Model Package (CBEMP) to compute the impact of the sediment management strategies on water quality in Chesapeake Bay. (Pg. 37).

Comment DR-5: AdH output data put into a model that has incorrect data based on 2010 TMDL with incorrect estimates? How can a two dimensional model rely on data generated from a one dimensional model?

- Through a validation process, the application of the AdH two dimensional model to the Conowingo Reservoir and Susquehanna Flats system was determined to be adequate for simulating general reservoir sediment scour and deposition modelling scenarios for the LSRWA. However, there is some uncertainty that remains with the estimates provided by the AdH model that were considered in results, as described below. One source of uncertainty was that the AdH model was not capable of simulating sediment passing through the flood gates of Conowingo Dam. Therefore, dam operations are not simulated in detail in the model; these include flood gate operation and Peach Bottom Atomic Power Station sequences. (Appendix K provides a description of dam operations.) For this study Conowingo Dam was modeled as an open boundary with downstream control represented by the water surface elevation at the dam. This limitation impacted how sediment was spatially distributed in the lower reach of Conowingo Reservoir near the dam. To minimize this uncertainty more sophisticated methods would need to be developed to incorporate dam operations in Conowingo Reservoir. (Pg. 37).

Comment DR-6: How can the two dimensional model (AdH model) provide accurate results with an open boundary approach? This approach is very limited given the cyclical movement of water (kicking up more sediment scour) as it is resisted by the dam.

Comment DR-7: According to Chesapeake Bay Program's (CBP) Scientific and Technical Advisory Committee (STAC): "The AdH application in this study has been developed to the point that scour and deposition is consistent with what is already known from survey and sampling observations. However, the AdH model application does not refine that empirical understanding. The uncalibrated and weakly constrained model application provides an essentially heuristic basis for scenario evaluation and the AdH model has not, as yet, added substantial new understanding of the sediment dynamics of the reservoir. The modelling does not strongly reinforce the existence of a scour threshold at 300,000 and 400,000 cfs. At best, it can be said that an uncalibrated model was found that produces results that are consistent with that particular threshold." (Pg. 22, Attachment I-7). How is the sediment dynamic of the reservoir evaluated and taken into account? Especially during episodic events?

- Another source of uncertainty concerned fine sediment flocculation and consolidation. Sediment transport models in general do not have a sophisticated approach to simulating fine sediment flocculation. Suspended fine sediment can either exist as primary silt and clay particles or in low energy systems such as reservoirs form larger particles in the water column due to flocculation. Particles that flocculate are larger and have higher settling velocities, thus their fate in the reservoir can be quite different than the lighter primary particles (Ziegler, 1995). When fine sediment particles deposit on the reservoir bed they compact and consolidate over time. As they consolidate the yields stress increases, meaning that the resistance to erosion becomes greater. Higher flows and subsequent bed shear stresses are required to scour the consolidated bed. Laboratory results show that sediment that erodes from consolidated beds may have larger diameters than the primary or flocculated particles (Banasiak, 2006). Scour may result in re-suspension of large aggregates that re-deposit in the reservoir and do not pass through the dam. To add to the complexity of this phenomenon, the large aggregate particles scoured from the bottom during a high flow event can break down to smaller particles in highly turbulent conditions. Thus the fate of inflowing sediment particles in the reservoir is highly variable and difficult to capture with current modelling techniques. The AdH model has the capability to relate flocculation to concentration but not to other variables such as shear stress which determines flock particle size and the overall fate of the sediment. The ability to predict flocculation dynamics is important to track the fate of sediment in a reservoir. To quantify this uncertainty numerous model simulations were conducted to determine a potential range of values. To reduce uncertainty more sophisticated methods would need to be developed to predict the flocculation dynamics. (Pg. 38).

Comment DR-8: How many numerous models were used? What is the margin of error pertaining to these models?

- The last major source of uncertainty was the limited data of suspended loads during storms and bed sediment erosion characteristics. Currently, the suspended sediment samples are collected from one location in Conowingo Reservoir. Because of the danger of sampling during large storms samples are not currently collected at the peak of the largest storms. To verify the estimations of bed scour during large storms improved field methods are required for sampling storm concentrations or turbidity over the entire storm hydrograph. Additionally, more samples of the reservoir bed would provide more data on the erosional characteristics of the sediment which would reduce uncertainty. (Pg. 38).

Comment DR-9: Please explain those improvements to field measurements or methods?

- CBEMP. The final modelling tool utilized for this LSRWA effort was CBEMP. CBEMP is an umbrella term used to describe a series of models that are applied to the Chesapeake Bay and its watershed. CBEMP was developed by CBP, the state-federal partnership responsible for coordinating the Chesapeake Bay and watershed restoration efforts. CBEMP has had almost three decades of management applications supporting collaborative, shared decision-making among the partners (USEPA, 2010b). This suite of environmental models has an unrivaled capacity to translate loadings in the watershed to water quality in the Chesapeake Bay (Linker et al., 2013). CBEMP includes the same models and was applied using the same scenario development and simulation methods for this LSRWA effort as were used in the development of the 2010 Chesapeake Bay TMDL (USEPA, 2010a, Appendix D). (Pg. 39). In addition, the full suite of Chesapeake Bay models has been regularly updated and calibrated based on the most recently available monitoring data, about every 5 to 7 years over the past three decades. Linker et al. (2013) provides a complete description of the different phases and versions of the Chesapeake Bay models. Used properly, CBEMP provides the best estimates of water quality and habitat quality responses of the Chesapeake Bay ecosystem to future changes in the loads of nutrient and sediment pollutants. For this LSRWA effort, CBEMP had two major applications. The first application was a series of modelling runs conducted by USACE ERDC documented within Appendix C. These CBEMP application scenarios were utilized to estimate water quality impacts of selected watershed and land use conditions, reservoir bathymetries, a major storm (scour) event (January 1996) at different times of year, and selected sediment management strategies. Sediment erosion or scour from the bed of Conowingo Reservoir estimated from AdH was utilized as input for selected CBEMP scenarios. The second CBEMP application was a series of modelling runs conducted by CBP, as described, *infra*, in more detail in Appendix D.

- Chesapeake Bay WSM Model. The Chesapeake Bay WSM simulates the 21-year period (1985 - 2005) on a 1-hour time step (USEPA, 2010b). Nutrient inputs from manure, fertilizers and atmospheric deposition are based on an annual time series using a mass balance of U.S. Census of Agriculture animal populations and crops, records of fertilizer sales and other data sources. Best management practices (BMPs) are incorporated on an annual time step; nutrient and sediment reduction efficiencies are varied by the size of storms. Municipal and industrial wastewater treatment and discharging facilities and on-site wastewater treatment systems' nitrogen, phosphorus and sediment contributions are also included in the Chesapeake Bay WSM. (Pg. 39).

Comment DR-10: How is this model run protective of scour entering Maryland's waters?

- Chesapeake Bay Estuarine Models. The hydrodynamic model computes intra-tidal transport using a three dimensional grid framework of 57,000 cells (Cerco et al., 2010). The hydrodynamic transport model computes continuous three dimensional velocities, surface elevation, vertical viscosity, and diffusivity, temperature, salinity, and density using time increments of 5 minutes. The hydrodynamic model was calibrated for the period 1991 - 2000 and verified against the large amount of observed tidal elevations, currents, and densities available for the Chesapeake Bay. Computed flows and surface elevations from the hydrodynamic model were output at 2-hour intervals for use in the water quality model. Boundary conditions were specified at all river inflows, lateral flows and at the mouth of the Chesapeake Bay.

- The eutrophication model, referred to as the Chesapeake Bay Water Quality/Sediment Transport Model 6, computes algal biomass, nutrient cycling and DO, as well as numerous additional constituents and processes using a 15-minute time step (Cerco and Cole, 1993; Cerco, 2000; Cerco et al., 2002; Cerco and Noel, 2004). In addition, the Chesapeake Bay Water Quality/Sediment Transport Model incorporates a predictive sediment diagenesis component, which simulates the chemical and biological processes which take place at the bottom sediment-water interface after sediment is deposited (Di Toro, 2001; Cerco and Cole, 1994). (Pg. 40).

- The Chesapeake Bay Water Quality/Sediment Transport Model simulates water quality, sediment, and living resources in three dimensional in 57,000 discrete cells, which extend from the mouth of the Bay to the heads of tide of the Bay and its tidal tributaries and embayments, as depicted in Figure 3-5. The primary application period for the combined hydrodynamic model and eutrophication model covers the decade from 1991 - 2000. For LSRWA applications the 1991 - 2000 hydrologic record was retained as this is the hydrologic period that CBEMP is based upon. Additionally, this is the same hydrologic period employed by the CBP partners in development of the 2010 TMDL (USEPA, 2010a).

- 1996 January High-Flow Event Scenario. The January high-flow event in 1996 was selected as the event to observe water quality impacts for LSRWA scenarios requiring a storm event because it is the highest observed flow within CBEMP's 1991 - 2000 hydrologic period. High-flow events wash in loads (sediment and nutrients) from the watershed; if there is high enough flow these events scour additional loads from the reservoir beds behind the three dams on the lower Susquehanna River. (Pg. 44).

- A one-dimensional HEC-RAS model computed hydraulic conditions and sediment transport in the reservoir system and sediment loads to Conowingo Reservoir for use in the two-dimensional model the Adaptive Hydraulics (AdH) model.

Comment DR-11: MDE admitted that this data was limited in terms of the number of core samples and the depth taken at the DLSRWA Public Hearing Meeting in December 2014 at Harford Community College.

- Model was not capable of passing sediment through the gates, therefore, for this study the dam was modeled as an open boundary with downstream control represented by the water surface elevation. (Pgs. 38 and 149).

- Flow rates capped at approximately at 620,000 cfs. - 640,000 cfs. for Tropical Storm Lee. (Pg. 62; *see* Figure 4.1). Table 4.3- Pg. 63 shows an event of 798,000 cfs. having an occurrence of 1 in 25 years.

- Each reservoir bed consists of a number of layers. The lowermost layer is considered an inactive layer that will rarely, if ever, scour to any degree. Above that, there is an "active" scour and depositional zone. The surface of the active layer consists of a relatively thin mixing layer that is unconsolidated and may have a high potential for scour at flows less than the scour threshold. For modelling purposes, the active layer is estimated to have a depth of approximately of 2 to 3 feet; however, it is spatially variable due to bed composition and consolidation. (Pg. 65).

Comment DR-12: How do 8 core samples with a depth of 1 foot delineate the reservoir bed in a 14 mile reservoir?

- Sediment transport is directly related to particle size. (Pg. 60). Storms can potentially scour the silts and clays, which are easier to transport, while frequently leaving behind the coarser, sand-sized sediment. For example, in the lower portion of Conowingo Reservoir in 1990, particle size analysis from 2-foot deep sediment cores indicated the area had about 5 percent sand; in 2012, it was projected to have 20 percent sand based on all previous cores. The reservoir sediment data collected show that generally there is more sand in the bed upstream and silts and clays are more prevalent closer to the dam for all three reservoirs. Silt is the dominate particle size transported from the reservoir system with little sand (less than 5 percent) transported to the upper Chesapeake Bay (*see* Appendix A for further discussion). (Pg. 60).

Comment DR-13: Was this 20 year old data used to address the inadequacies of the 8 core samples?

Comment DR-14: Core samples used in model runs from Conowingo Pond are inadequate given discussion later in the DLSRWA on Pg. 60. Generating data from a one dimensional model to be used in a two dimensional model is uncomforting and frightening. In addition, the following statements quoted below from the DLSRWA shows the lack of data in the models as it relates to scour. Such statements attempt to justify insufficient data in the model runs:

- "…more samples of the reservoir bed would provide more data on the erosional characteristics of the sediment which would reduce uncertainty." (Pg. 38).

- "Uncertainties in the total sediment load entering Conowingo Reservoir will affect scour and deposition, and thus affect the total load output to the Bay. Consequently, to provide more information on reservoir mass balance, future sampling program should extend both upstream and downstream of Conowingo Dam. To quantify the uncertainty of the limited data available to the LSRWA effort numerous model simulations were conducted to determine a potential range of values." (Pg. 38).

- "In summary, of all the modelling uncertainties that exist, three are most critical for interpreting the Conowingo Reservoir modelling results. These include the potential for flocculation of sediment flowing into the reservoir, the potential for large sediment aggregates to erode from cohesive beds and dam operations. Because of these uncertainties the AdH model may potentially over-predict to some degree the transport of scoured bed sediment through the dam to the Chesapeake Bay. Appendix B provides further detail on the uncertainty associated with AdH, as well as documentation of the model inputs, outputs and calculations." (Pg. 39).

Comment DR-15: Over-predict? The Corps is saying that the lack of data is somehow portraying the problem in a negative light to undermine the severity of this problem. How could there be an over-prediction of the transport of scour bed sediment when model runs are capped at 600,000 - 640,000 cfs. instead of running the models at the more appropriate level of 900,000 cfs.?

- Chesapeake Bay Environmental Model Package ("CBEMP" – Chapter 3 of the DLSRWA). This model is used to determine dredging effectiveness. (Pgs. 136-140). Developed by CBP and based on computed loads from the watershed at key locations in the reservoir system including the Conowingo inflow and outflow. Watershed loads at the Conowingo outfall computed by the Watershed Model ("WSM") were supplemented by bottom scour loads estimated through AdH and through data analysis. The WSM is considered part of the CBEMP.

- CBEMP includes the same models used in the development of the 2010 Chesapeake Bay TMDL, and is based on land use, management practices, wastewater treatment facility loads, and atmospheric deposition from the year 2010. (Pg. 39). This run is considered to represent existing conditions to provide assistance with projected land use, management practices, waste loads, and atmospheric deposition upon which the 2010 Chesapeake Bay TMDL was based. (Pg. 45).

- CBEMP produces estimates, not perfect forecasts. Hence, it reduces, but does not eliminate, uncertainty in environmental decision-making. There are several sources of uncertainty summarized and discussed in more detail in Appendix C. (Pg. 49).

- One source of uncertainty is the exact composition of nutrients associated with sediment scoured from the reservoir bed. Two alternative sets of observations are presented in Appendix C, one based on observations at the Conowingo Dam outfall in January 1996 and one based on observations collected at Conowingo Dam during Tropical Storm Lee in September 2011. The nutrients associated with suspended solids differ in the two events with 1996 being lower. In fact, both data sets represent a mixture of solids from the watershed and solids scoured from the bottom so that neither exactly represents the composition of scoured material alone. The 2011 observations are consistent with samples collected in the reservoir bed (Appendix C, Attachment C-1), are more recent and represent a typical tropical storm event rather than the anomalous circumstances of January 1996. For this reason nutrient composition observed at Conowingo Dam in 2011 is preferred and was utilized to characterize the future and is emphasized in the DLSRWA. Several key scenarios were repeated with the 1996 composition, however, to quantify the uncertainty inherent in the composition of solids scoured from the reservoir bottom. (Pg. 50).

- Another source of uncertainty is the availability (*i.e.*, bioavailability) and reactivity of the nutrients scoured from the reservoir bottom. The majority of analyses of collected data at the Conowingo Dam outfall and from within the reservoir bed sediment quantify particulate nitrogen and particulate phosphorus without further defining the nature of the nitrogen or phosphorus. For the LSRWA effort, modelers opted to maintain the accepted, consistent particle composition that has been employed throughout the application of CBEMP. Uncertainty in the particle composition, and consequently, the processes by which particulate nutrients are transformed into biologically available forms still exists. (Pg. 50).

- Some uncertainty in computed storm effects on Chesapeake Bay would result from considering solely a January storm. Bay response to storms in other seasons might vary. To reduce this uncertainty the January storm was moved to June and to October. The June storm coincides with the occurrence of the notorious Tropical Storm Agnes, which resulted in the worst recorded incidence of storm damage to the Bay. The October storm corresponds to the occurrence of Tropical Storm Lee and is in the typical period of tropical storm events. (Pg. 50).

- CBEMP evaluated water quality impacts from a single large flow event (January 1996). Lower flow, more frequent events may also have a cumulative impact over time in the future. Future modelling work could investigate the potential effects of smaller more frequent events to reduce uncertainty and expand understanding of how various flows influence Chesapeake Bay water quality. (Pg. 50).

Comment DR-16: This study has a schizophrenic analyses and discussion considering that the 2010 TMDLs need to be revised and yet the models that established those numbers are acknowledged and used to determine the effectiveness of dredging in the DLSRWA.

- Chesapeake Bay Estuarine Models – used to compute the impacts of sediment and nutrient loads to the estuary on light attenuation, SAV, chlorophyll, and DO concentrations in Chesapeake Bay tidal waters. (Pgs. 39-40).

- The eutrophication model, referred to as the Chesapeake Bay Water Quality/Sediment Transport Model6, computes algal biomass, nutrient cycling, and DO, as well as numerous additional constituents and processes using a 15-minute time step. (Pg. 40).

- In addition, the Chesapeake Bay Water Quality/Sediment Transport Model incorporates a predictive sediment diagenesis component, which simulates the chemical and biological processes which take place at the bottom sediment-water interface after sediment is deposited (Di Toro, 2001; Cerco and Cole, 1994). (Pg. 40).

- The primary application period for the combined hydrodynamic model and eutrophication model covers the decade from 1991 - 2000. For LSRWA applications the 1991 - 2000 hydrologic record was retained as this is the hydrologic period that CBEMP is based upon. Additionally this is the same hydrologic period employed by the CBP partners in development of the 2010 TMDL (USEPA, 2010a).

Comment DR-17: More predictions and scientific buzz words in establishing variables and definitely less science. Why not used data from the same years or timeframe as the other model runs? The eutrophication model does not include Tropical Storm Lee given the timeframe of 1991 - 2000.

- In order to compute water quality impacts with CBEMP, nutrient loads associated with sediment (in particular, nutrient loads carried over Conowingo Dam as a result of sediment scour from the reservoir bottom) were calculated by assigning a fractional nitrogen and phosphorus composition to the scoured sediment (solids). The initial fractions assigned for nitrogen and phosphorus were based on analyses of sediment cores removed from the reservoir (Appendix C, Attachment C-1). However, further analysis was done to ensure the most appropriate nutrient composition of loads was being utilized. (Pg. 46).

Comment DR-18: Are these the same core samples that were limited to 1 foot? If not, from where were these sediment core samples taken? And why weren't these samples used in the AdH Model run?

SAV

- "SAV species in the upper Bay were strongly affected by Hurricane Irene and Tropical Storm Lee which increased river flow and sediment loads in this region for almost two months (Gurbisz and Kemp, 2013). However, the dense SAV bed on the Susquehanna Flats persisted through the storms demonstrating how resilient SAV beds can be to water quality disturbances (CBP, 2013)." (Pg. 71).

- Regarding oysters, Maryland's 2011 oyster survey conducted after Tropical Storm Lee indicated that those high freshwater flows from heavy rains in the spring and two tropical storms in late summer impacted oysters in the upper Bay, although ultimately representing a relatively small proportion of the total oyster population. The lower salinities proved to be beneficial to the majority of oysters in Maryland by reducing disease impacts to allow the yearling oysters to thrive (MDNR, 2012). (Pgs. 71-72).

Comment DR-19: How was sediment scour ruled out given that this analysis seems to be based on observations? Who at DNR made these observations? Do DNR field notes exist that make such an observation?

Major Storms

- "The "Big Melt" event occurred in January 1996. The instantaneous peak flow for this event was 908,000 cfs. (Pgs. 73-74).

- Hurricane Agnes was the largest flood in the Susquehanna River basin since 1896, when recording of flow began at Harrisburg, PA. During the Agnes event the flow over Conowingo Dam peaked at 1,098,000 cfs.

- "As discussed in Chapter 3, the LSRWA modelling efforts included Tropical Storm Lee and the January 1996 high-flow event because these storms were included in the hydrologic period of the modelling tools utilized for this effort and because there was existing collected data available for these storms." (Pg. 74).

- Attachment 4 of Appendix J includes detailed information on "Septic Systems." (Pgs. 29-33).

Comment DR-20: Septic systems are not discussed at all in the corresponding tables for the cost analysis in Attachments 2 and 3. Why not?

Comment DR-21: However, the flow rate for model runs was set at approx. 620,000 cfs. - so how does the LSRWA modelling account for these storms? Figure 4.7 seems to undermine the "1996 Big Melt" by capping the flow rate at 600,000 cfs.

- "On average, flows above 800,000 cfs. produced a scour load that comprised about 30 to 50 percent of the total load entering the Bay. Flows of this magnitude are rare with a recurrence interval of 40 years or more." (Pg. 76). Keep in mind, that Pg. 63 shows an event of 798,000 cfs. having an occurrence 1 in 25 years. The assumptions and conclusions regarding the potential number of storm events in a given interval are inconsistent and result in minimizing the adverse impacts on the Bay.

- SAV, Chlorophyll and light attenuation relied on three model storms: January, June and October. (Charts on Pgs. 80-83).

- The June scour event had an estimated increase in deep-channel DO water quality standard nonattainment (negative impact) of 1 percent, 4 percent, 8 percent, and 3 percent in segments. (Pg. 93).

- The severity of the DO hypoxia response estimated by the degree of nonattainment of the deep channel and deep-water DO standards was greatest in the June storm scenario, followed by the January and October storm scenarios. The seasonal differences in water quality response, despite the same magnitude of nutrient and sediment loads in the June storm, October storm, and January storm scenarios, is thought to be because of the fate and transport of nutrients in the different seasons. (Pg. 94).

- CBEMP does not model direct storm wave damage to aboveground or belowground SAV tissue, nor direct impacts of excess storm bottom erosion and deposition upon SAV. Accordingly, to consider these other effects of major storms on SAV, it was appropriate to consider the CBEMP model outputs as well as other recent and historical information in this study. Effects of storms can differ based on SAV bed health, size, and density. (Pg. 95). Admission.

Comment DR-22: To investigate the effect of the storm season, scenarios were completed with the January 1996 Susquehanna storm flows and loads moved to June and October 1996. (Scenario 6 from Table 4-9, with three CBEMP model runs). Only one model run occurred during the growing season. Effects are discussed in terms of light attenuation, chlorophyll and DO. (Pg. 91). The models do not account for direct storm wave damage to above ground or below ground SAV. (Pg. 95).

- "Nitrogen loads associated with the scoured sediment exceed the phosphorus loads, as noted in Table 4-9. The excess of nitrogen over phosphorus in Conowingo Reservoir bed sediment indicates that the scoured nitrogen load will exceed the scoured phosphorus load any time bottom material is scoured (eroded), regardless of the quantity of bottom material." (Pg. 96).

Sediment Management Strategy

- "Storms will continue to occur and will vary in track, timing and duration. Due to global climate change it is predicted that there will be increased intensity of precipitation in spring and winter potentially causing more frequent scour events." (Pg. 99).

- "Watershed loads of sediment, nitrogen and phosphorus will continue to decrease compared to today due to the continued implementation of Pennsylvania, New York and Maryland WIPs to meet the 2010 Chesapeake Bay TMDL allocations. Predicted higher temperatures and continued warming of Chesapeake Bay's tidal waters could have negative implications on DO causing intense hypoxia to occur substantially earlier or end substantially later in the year making it more difficult to meet Chesapeake Bay water quality standards, potentially increasing costs to achieve the Bay TMDL." (Pg. 99).

- "In reducing the amount of sediment available for a scour event, water quality could be improved and impacts to aquatic life could be reduced." (Pg. 100).

Comment DR-23: According to the Draft Report: "It is important to note that if suspended sediment was passively transported (*e.g.*, via modification of reservoir operations, flushing, sluicing, or agitation) as discussed in this section, a permit may not be required. However, if sediment transport were done actively through dredging or a pipeline, a permit would be required (Elder Ghigiarelli, MDE, Deputy Program Administrator, Wetlands and Waterways Program, Water Management Administration, personal communication, 2013). (Pg. 107) Does the Study group still believe that a permit would not be required under a new Maryland Gubernatorial Administration?

- "There are hundreds of combinations of ways to dredge, manage and place material. However, there are two main types of dredging – hydraulic dredging and mechanical dredging". (Pg. 110).

Comment DR-24: What type of dredging did the Draft Study focus on in their cost estimates?

- Quarries appear to be the best option for material placement due to: (1) they can accept wet or dry material; (2) large volumes could be placed; and (3) there are several quarries nearby that can have material pumped in directly from Conowingo Reservoir without the need for costly re-handling or trucking. (Pg. 120).

- Additional analyses characterizing sediment to be dredged including grain size, plasticity and percent moisture, metals, non-metals, pesticides, PCB's and PAH's, paint filter, and elutriate tests. (Pg. 120).

- Must meet state regulations (PADEP for PA and MDE for MD). Transport containers must be watertight. Long transport distance. Water may need to be decanted, requiring another pipeline to return the effluent to the Susquehanna River. Mine owners contacted had no interest in sediment because of limitations on their mining permits. (Pg. 124).

Dredging Effectiveness

- It was assumed that 3 mcy (2.4 million tons) were removed by dredging from an area above the Conowingo Dam on the eastern side of the reservoir approximately 1 to 1.5 miles north of the dam. This dredging area was selected because large amounts of sediment still naturally deposit at this location. Although changing the dredging area location will likely influence results, removing such a relatively small quantity of sediment will have a minimal impact on total load delivered to the Bay when large flood events occur. (Pg. 136). The estimated scouring of sediment and nutrients was reduced by 32 percent in comparison to scour with a 2011 bathymetry (with all other parameters remaining the same). Dredging had little effect on model simulated water quality conditions in the Chesapeake Bay. (Pg. 136).

- CBEMP estimated a decrease (a positive improvement) of 0.2 percent nonattainment in the deep channel DO water quality standard for segments. (Pg. 137).

- The results imply that if 31 mcy (25 million tons) of sediment were removed, there would be a 9 percent decrease in total load to the Bay (from 22.3 to 20.3 million tons), a 40 percent decrease in bed scour (from 3.0 to 1.8 million tons) and a 50 percent increase in reservoir sedimentation or deposition (from 4.0 to 6.0 million tons). (Pg. 139).

Comment DR-25: Please provide the data and models used for this analysis.

- "However, these calculations do not take into account that the storage capacity would be increasing and thus more incoming sediment could be depositing." (Pg. 139).

- It was assumed that the average Susquehanna River flow during the winter months was 60,000 cfs., approximately twice that of the median flow of about 30,000 cfs. At 60,000 cfs., the average suspended sediment measurement below the dam was assumed to be about 12 mg/L, which equates to a daily load of about 1,940 tons of sediment passing through the dam. (Pg. 140).

Comment DR-26: CBEMP model is being used to determine dredging effectiveness. How could this be the case given that the CBEMP model has many uncertainties? (*See* Pgs. 3-4 of this outline). Moreover, calculations do not take into account that storage capacity is increasing in the reservoir behind the dam.

Findings

- "Sediment bypassing results in increased suspended solids computed in the Bay during the bypassing period. The bypassed sediment settles quickly after bypassing stops." (Pg. 141).

- "CBEMP estimated that deep-channel DO and deep-water DO water quality standards were seriously degraded as a result of nutrients associated with the bypassed sediment." (Pg. 141).

- "Bypassing costs are still high but not as high as dredging. Bypassing is just as effective as dredging at increasing sediment deposition and reducing available sediment for scour events. However, this method increases total sediment loads to the Bay. The environmental costs (diminished DO, increased chlorophyll) are roughly 10 times greater than the benefits gained from reducing bed sediment scour in Conowingo reservoir." (Pg. 142).

Comment DR-27: NEPA is required for these investigations. "It should be noted that the LSRWA effort was a watershed assessment and not a detailed investigation of a specific project alternative(s) proposed for implementation. That latter would likely require preparation of a NEPA document. The evaluation of sediment management strategies in the assessment focused on water quality impacts, with some consideration of impacts to SAV. Other environmental and social impacts were only minimally evaluated or not evaluated at all. A full investigation of environmental impacts would be performed in any future, project-specific NEPA effort." (Pg. 143).

Public Participation Concerns

- "The team sent out study coordination letters to various federal and state resource agencies in February 2012 to inform agencies of the initiation of the study and to request the level of involvement each agency would like to have with the study. Two response letters were received requesting involvement in the study as well as various emails from agencies confirming their willingness to participate in study. A study initiation notice was distributed via email in February 2012 as well." (Pg. 147).

- "The team held quarterly meetings to discuss, coordinate, and review technical components of the assessment, as well as management activities. These meetings were open to all stakeholders to attend. Agendas and handouts were provided to stakeholders via email prior to the meeting and the meeting summary with items presented at quarterly meetings was posted to the public website after quarterly meetings. A total of 10 quarterly meetings were held from November 2011 to January 2014, with attendance ranging from 30 to 50 participants. These participants represented 19 different stakeholder groups." (Pg. 147).

- "Throughout the duration of the assessment, the LSRWA team coordinated with other pertinent Chesapeake Bay groups, so as to be included on their agendas to provide updates and get feedback on the LSRWA. Feedback received from these other Chesapeake Bay groups was reported back to the rest of the LSRWA team and was incorporated into this LSRWA report." (Pg 147).

- "Throughout the duration of the assessment, email updates were sent out periodically to interested stakeholders on study progress and news. This email distribution list was started by the original Sediment Task Force (included interested stakeholders) that Susquehanna River Basin Commission led in 1999 and 2000. The team has been updating this list since 2009 with people interested in this effort." (Pg. 147).

- "Prior to public release the draft LSRWA report was reviewed by the agencies involved in quarterly meetings. Additionally, the STAC sponsored an independent scientific peer review of the draft LSRWA report in June - August of 2014. STAC provides scientific and technical guidance to the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. More information about STAC is located here: www.chesapeake.org/stac. Appendix I, Attachment I-7 contains the comments and LSRWA team responses to the LSRWA quarterly group's reviews and the STAC sponsored independent scientific peer review." (Pg. 147).

- At least one public meeting is expected to be held later in 2014. Once that meeting is held, a description of the meeting(s) will be placed here and will include a location, date, participants, and feedback received. All comments will become part of Appendix I, Attachment I-7. (Pg. 147).

Comment DR-28: Please explain how this study group involved public participation. How does the LSRWA's approach address NEPA public participation requirements and those required by the Federal Advisory committee Act (FACA)?

- Recommendation – U.S. EPA and Bay watershed jurisdictional partners should integrate findings from the LSRWA into their ongoing analyses and development of the seven watershed jurisdictions' Phase III WIPs as part of Chesapeake Bay TMDL 2017 mid-point assessment. (Pg. 160).

Comment DR-29: Having such findings integrate with 7 watershed jurisdictions requires a FACA approach. Was FACA ever discussed? If not, why not? If so, how was FACA addressed?

Finding #1: Conditions in the Lower Susquehanna reservoir system are different than previously understood. (Pg. 151).

- Conowingo Reservoir is essentially at full capacity; a state of dynamic equilibrium now exists. Previously, it was thought that Conowingo still had long-term net trapping capacity for decades to come.

- Storm event based scour of Conowingo Reservoir has increased. Previously, it was not fully understood how scouring was changing as the reservoirs filled. (Pg. 152).

- The LSRWA modelling efforts indicate that the scour threshold for the current Conowingo Reservoir condition ranges from about 300,000 cfs. to 400,000 cfs. (Pg. 152).

- Modelling simulations comparing current conditions of the Conowingo Reservoir to the mid-1990s indicate that a higher volume of sediment is scoured currently at flows above 150,000 cfs. in comparison to the mid-1990s, with the threshold for mass scouring occurring at about 400,000 cfs. (Pg. 152).

- Sediment transport is related to particle size. Storms can potentially scour the silts and clays (easier to transport) leaving behind the coarser sand-sized sediment. (Pg. 152).

Finding #2: The loss of long-term sediment trapping capacity is causing impacts to the health of the Chesapeake Bay ecosystem. (Pg. 153).

- The assessment indicates that the ecosystem impacts to the Chesapeake Bay result from the changed conditions and are due primarily to extra nutrients associated with the scoured sediment as opposed to the sediment itself.

Comment DR-30: Modelling estimates showed that the sediment loads (not including nutrients they contain) from Conowingo Reservoir scour events are not the major threat to Bay water quality. The models do not account for the sediment smothering that is occurring. Low DO was estimated to persist in the deeper waters of northern Chesapeake Bay for multiple seasons due to nutrient storage in the Bay's bed sediment and recycling between the bed sediment and overlying water column. (Pg. 153). This needs to be reviewed and there needs to be concern with the bed sediments and smothering.

- Full WIP implementation won't fully restore the Chesapeake Bay given changes to the Conowingo Reservoir sediment and associated nutrient trapping capacity. (Pg. 154).

- The Susquehanna River watershed, not the Conowingo Dam and its Reservoir, is the principal source of adverse pollutant impacts on upper Chesapeake Bay water quality and aquatic life. (Pg. 154).

Comment DR-31: So why has the U.S. EPA not declared the Susquehanna River (in Pennsylvania) impaired?

- On average flows above 800,000 cfs. produced scour load that comprised about 30 to 50 percent of the total load entering the Bay; however, an event of this magnitude is extremely rare with a recurrence interval of 40 years or more. (Pg. 155).

Comment DR-32: *See* Figure 4.1. (Pg. 62). Table 4.3 shows an event of 798,000 cfs. having an occurrence of 1 in 25 years. (Pg. 63). Exelon's relicensing application with FERC is for a 46 year license. So how is such an occurrence of flows above 800,000 cfs. a rarity? Why weren't the model runs conducted with a flow rate of at least 798,000 cfs., having an occurrence of 1 in 25 years?

APPENDIX A

Introduction – Facts

- Susquehanna River largest tributary to the bay transports about ½ of the total fresh water input.

- The three lower Susquehanna River reservoirs involve nearly 32 miles of river and have a designed storage capacity of 510,000 acre-feet at normal pool elevation. (Pg. 2).

- This Appendix begins with a discussion regarding a one dimensional model. Please keep in mind that the one dimensional model is utilized when water depth and laterally average conditions can provide adequate results to a problem and lateral sediment transport conditions are not considered.

- According to Appendix A the primary objective is to produce boundary conditions (data daily streamflow, sediment load and particle size) at a site monitored just upstream and at the upper Conowingo Reservoir. Between the Susquehanna River at Marietta, Pennsylvania streamgage (01576000) and the Susquehanna River at Conowingo, Maryland streamgage (01578310), Jan. 1, 2008 - Dec. 31, 2011. (Pg. 5).

- This one dimensional model was calibrated with downstream data from the USACE's bathymetric changes from 2008 - 2011.

Comment A-1: Two one dimensional models were used instead of more and current data and considering a three dimensional model.

<u>Statements Regarding the Use and Limitations of Models in the DLSRWA</u>

- Due to data limitations two one dimensional model simulations were produced: one for the modelling period 2008 - 2011 (representing net deposition) and a second for a high streamflow event using Tropical Storm Lee to represent net scour. (Pg. 1).

- Each simulation used the same model data inputs but model parameters were changed. The depositional model resulted in a net deposition of 2.1 million tons while the scour model resulted in a net loss of 1.5 million tons of sediments. (Pg. 1).

- Dynamic equilibrium results in increased loads that may have a greater impact on sediment and phosphorus that tend to transport in the particles phase and have less of an impact on nitrogen which tends to transport in a dissolved phase. (Pg. 4).

- It is implied that increasing concentrations and loads are due to the loss of storage capacity from a decrease in the scour threshold. These increases are not certain but likely involve changes in particle fall velocities, increased water velocity, transport capacities, and bed shear. (Pg. 4).

- The HEC-RAS one dimensional model simulates the capability of a stream to transport sediment, both bed and suspended flow, based on yield from upstream sources and current composition of bed. The HEC-RAS transport equations are designed mainly for sand and coarser particles. (Pg. 13).

Comment A-2: How does the HEC-RAS model account for clay sediments?

- Sediment loads entering and leaving a reservoir can be determined from a sediment (*i.e.*, transport) curve or from actual concentration data from upstream and/or downstream sites(s). (Pg. 11).

Comment A-3: Figure 6 (Pg. 1) portrays the discharge flow rate capped at 425,000 cfs., which triggers data manipulation concerns. Figure 7 portrays flow rate at approximately 625,000 cfs. The core samples utilized for the Conowingo Reservoir were limited to 8 samples of less than 12'' in depth. *See* Figures 7 and 8.

- At the time that this assessment began, there was concern about the issue of the reservoirs and their reduced trapping capacity because of the implications to sediment and the associated nutrient loads to the Chesapeake Bay and management of those loads. More specifically, there were significant implications to the then ongoing development of the Chesapeake Bay TMDL by EPA working collaboratively with the six watershed states and the District of Columbia. In the 2010 Chesapeake Bay TMDL report, EPA and its seven partner watershed jurisdictions documented their assumption that the Chesapeake Bay TMDL allocations were based on the Conowingo Dam and Reservoir's sediment and associated nutrient trapping capacity in the mid-1990s, the midpoint of the 10 years of hydrology (1991-2000) used in the underlying model scenarios (USEPA, 2010a). EPA documented within its 2010 Chesapeake Bay TMDL main report and supporting technical appendix that if future monitoring shows the trapping capacity of the dam were reduced, then EPA would consider adjusting the Pennsylvania, Maryland, and New York sediment and associated nutrient load reduction obligations based on the new delivered loads to ensure that they were offsetting any new loads of sediment and associated nutrients being delivered to Chesapeake Bay (USEPA, 2010a). (Pg. 9).

Comment A-4: Admission. It is interesting that they don't discuss this assumption in terms of its impact on the models.

- According to the DLSRWA the 52 flood gates that span the dam begin to open at a flow rate greater than 86,000 cfs. Each flood gate generally has the capability to pass up to about 15,000 cfs. (Pg. 14).

- During a large flood that requires the majority of the gate to be open, the spatial distribution of discharge shifts from the western side of the dam where the power plant resides, to the center of the channel. This shift in flow distribution and subsequent sediment load causes the sediment load on the eastern side of the reservoir t increase resulting in a high deposition rate in the area. (Page 14). "Thus depending on the reservoir inflows the spatial and quantitative fate of sediment in Conowingo Reservoir can be quite variable and difficult to stimulate with current modelling methods."

Comment A-5: Concerns expressed in the DLSRWA that the Conowingo Reservoir is quite variable and difficult to simulate. So how is the simulations conducted?

- A report prepared for the LSRWA study discusses modelling uncertainties in Attachment B-1. (Pg. 14).

- Susquehanna River Inflows- the AdH (2 dimensional) simulations used flow rates from 2008-2011- all but one - **Question:** what was the one's flow rate? (Pg. 15).

- Tropical Storm Lee (September 2011) with a peak discharge of 700,000 cfs. (Pg. 15) - 776,000 cfs. (Pg. 66).

Comment A-6: Peak flow rate is marginalized at 776,000 cfs. This rate seems to change throughout the report as a way to run the models with marginalized flow rates. The bathymetric discussion on Pg. 67 makes no sense.

- The HEC-RAS one dimensional model sediment rating curve produced two sediment inflow scenarios: scenario one no scour from upper reservoirs and scenario 2 with 1.8 million tons of scour from the upper two reservoirs for a total inflow load of 24 million tons. (Pg. 16).

Comment A-7: How are these numbers derived given the statement on Pg. 14 that stated the Conowingo Reservoir is quite variable and difficult to simulate?

- The one dimensional model HEC-RAS was used to provide data for the AdH model (two dimensional model). (Pg. 17). Figure 6 shows a sediment rating curve with this data at a flow rate slightly above 600,000 cfs. (Pg. 17). What does this purport to represent?

- In addition, the AdH sediment model requires bed sediments. This data was also manipulated as only 8 bed core samples were taken from the Conowingo Reservoir to a maximum depth of only 1 foot. Core samples were required to determine the inception of erosion (critical shear stress for erosion) and the erosion rate (Pg. 18) used to develop six material zones (Pg. 19). According to the DLSRWA the sediment bed in the AdH Model was approximately 3 feet. (Pg. 23). The properties of the lower 2 feet were either approximated from the SEDFlume data results (which is the one foot data) or determined from literature values. (Pg. 23).

Comment A-8: A general trend was established with this tenuous data which is used to account for sediment size and critical shear stress. Figure 11 is a not based on core samples but rather approximations. (Pg. 26). Figure 12's presentation of suspended sediment concentrations undermined Tropical storm Lee to 600,000 cfs. given that it relied on approximations from Figure 11.

Comment A-9: Because of the uncertainty of measured model boundary conditions the AdH two dimensional model was validated by comparing model output to the total suspended sample measurements below the Conowingo Dam. (Pg. 23). Where is this data from? How could these flow rates above the dam correlate with flow rates below the dam?

- "The hydrodynamics were successfully implemented in the AdH; however, the model was not capable of passing sediment through the gates, therefore, for this study the dam was modeled as an open boundary with downstream control represented by the water surface elevation at the dam. This limitation impacted how sediment was spatially distributed in the lower reach of the Conowingo Reservoir near the dam." (Pg. 60).

Comment A-10: This is an important factor to consider in the two dimensional AdH Model, yet the dam is somehow removed for the model run and flow rates above the dam are compared to flow rates below the dam. How does this account for scour from behind the dam and the circular river flow motion against the dam?

APPENDIX B

Two dimensional modelling results describe the transport of sediment solids and do not imply that a relationship exists between solids and after with nutrient loads. (Abstract (iii)).

Introduction

- The Susquehanna watershed is approximately 27,000 square miles. There exists three hydroelectric dams in the Lower Susquehanna River: Safe Harbor Dam (1931) – Lake Clarke located approximately 32 miles upstream of the Chesapeake Bay with water storage capacity of approximately 150,000 acre-feet; Holtwood Dam (1910) – Lake Aldred located approximately 25 miles upstream from Chesapeake Bay with water storage capacity 60,000 acre-feet; and Conowingo Dam (1928) which is approximately 10 miles upstream of the Bay with water storage capacity of 300,000 acre-feet. (Pg. 1).

Comment B-1: "Conowingo Reservoir currently is approaching a dynamic equilibrium state and continues to store inflowing sediments from non-flood periods." (Pg. 2) This discussion is not consistent or current throughout the DLSRWA as the Dam has indeed reached a state of dynamic equilibrium.

Background

- "The USGS estimates that the average inflow of sediment is about 3.2 million tons per year into the Conowingo reservoir, with deposition ranging from 1.0 to 2.0 million tons per year." (Pg. 5). HEC-6 model one dimensional mode under-predicted the trap efficiency. (Pg. 5).

Comment B-2: Exelon's report is cited as a good summary, which is concerning given that Exelon revised the USGS HEC-6 model and conducted a series of simulations to evaluate scour potential of the three reservoirs. (Pg. 5-6). Please keep in mind this is the same model (Exelon's HEC-6 model) that Langland criticized in his notes and review of the FERC required Exelon Sediment Transport Study.

Study Approach and Goals

- Models: Two dimensional model: AdH and HEC-RAS. (Pg. 7).

- Data: "The USGS provided reservoir surveys from 1996 and 2008 with Exelon Corporation providing the most recent 2011 survey. The survey was modified by USGS to represent a sediment capacity condition." (Pg. 7-8). "The 4-year flow period from

2008 - 2011 was simulated in the model. The flow and sediment entering the upstream model boundary (the channel below the dam of Lake Aldred) were provided by USGS from HEC-RAS (one dimensional model simulations of the 4 year period)." (Pg. 8).

Comment B-3: Not only is Exelon providing the model data to establish a full sediment capacity condition but the 1996 - 2008 reservoir data is being used with 2008 - 2011 flow data. The one dimensional model is not taking into account the impact of scour no matter what data manipulation is being considered. Why not use the USACE's bathymetric changes from 2008 - 2011 data (*see* Pg. 1) instead of Exelon's data? Wasn't there USGS data to consider?

Description of Modelling Uncertainties

- A report was prepared for the DLSRWA effort discussing modelling uncertainties. (Pg. 14).

Comment B-4: Where is this report?

- One dimensional models are typically utilized when depth and laterally average conditions can provide adequate results to a problem. Two dimensional models are appropriate when lateral sediment transport conditions need to be resolved. Model results are depth averaged with model results available throughout the domain area. Two dimensional models can be used to stimulate sediment transport over years or decades for long term simulations. Three dimensional models are the most complex and provide problem resolution in all three dimensions (*i.e.*, depth, lateral and longitudinal). However, three dimensional models are computationally intensive and require long periods of simulation time to rum relatively short problem durations. If the goal of a study is to better understand reservoir stratification in low flow, low turbulence conditions than a three dimensional model is required to differentiate vertical properties.

- "During a large flood that requires the majority of the gates to open, the spatial distribution of discharge shifts from the westerns side of the dam where the power plant resides, to the center of the channel. This shift in flow distribution and subsequent sediment load causes the sediment load on the eastern side of the reservoir to increase resulting in a high deposition rate in this area." (Pg. 14). According to Exelon: a flow rate greater than 86,000 cfs. the 52 flood gates that span the dam begin to open. Each flood gate generally has the capability to pass up to about 15,000 cfs." (Pg. 14).

Comment B-5: Having all gates operating at full capacity the flow rate would allow for 780,000 cfs. In addition two dimensional models are limited in the short term and are using data obtained from a one dimensional model.

Model Flow and Sediment Boundary Conditions

2008-2011 Time Period

- First two years had relatively low flows of approximately 300,000 cfs. The last two years had flows that reached or surpassed the scour threshold of 400,000 cfs. Tropical Storm Lee occurred in September 2011 with a peak discharge of approximately 700,000 cfs. (Pg. 15).
    - HECRAS Output Sediment 1st scenario indicated no scour from the upper two reservoirs and inflow of sediment into Conowingo of 22 million tons.
    - HECRAS Output Sediment 2nd Scenario indicated approximately 1.8 million tons of scour from the upper two reservoirs with inflow of sediment estimated at 24 million tons.

Comment B-6: According to the DLSRWA Tropical Storm Lee had a peak discharge of 776,000 cfs. (Page 66). The approximation marginalizes this storm by lowering the peak discharge to 700,000 cfs. Keep in mind that models aren't even running the flow rate at 700,000 cfs., but rather the 620,000 cfs. (Page 22).

- The scour load from the upper two reservoirs is needed because the maximum load may influence transport capacity in Conowingo and thus impact bed scour potential. Therefore, the 24 million ton HECRAS load was increased by 10 percent to reflect a potential maximum scour load from the upper reservoirs." (Pg. 17).

Comment B-7: What is the model or science behind this 10% increase?

- "Figures 6 and 7 show loads increasing exponentially after the 400,000 cfs. scour threshold…" (Pg. 17).

Comment B-8: Figure 6 shows that the AdH model is only considering a 600,000 cfs. flow rate and not a 700,000 cfs. that was initially discussed. (Pg. 17). Keeping in mind that as this is increasing exponentially these lower marginalized numbers significantly lower the scoured sediment amounts. How did these number associated with Tropical Storm Lee get to 600,000 cfs.? Again the actual numbers regarding Tropical Storm Lee (*i.e.*, the USGS number for Tropical Storm Lee is 709,000 cfs. (*see* Pg. 2 of Hirsch 2012 Report)) are being marginalized.

<u>Model Validation</u>

- SEDflume analysis of bed sediments. The AdH sediment model requires bed sediment properties for each layer in the bed. Eight bed core samples were taken from Conowingo. "The bed was sampled to a maximum depth of only one foot because the resistance of the more consolidated sediments at deeper depths." (Pg. 18).

Comment B-9: Figure 12 states 630,000 cfs. as the mean daily flow for Tropical Storm Lee. These numbers are being downplayed. The USGS number for Tropical Storm Lee is 709,000 cfs. (*See* Hirsch 2012 Report, Pg. 2). (Pg. 25). When simulated in the so-called "Hydrodynamic

Model" Tropical Storm Lee's flow velocity near the peak event was now 600,000 cfs. (Pg. 54). This data was used to address the sediment releases on the Susquehanna Flats SAV. One foot core sample limit makes no sense when other reports included much deeper samples.

- "A relatively small number of bed samples were taken from Conowingo Reservoir. Eight samples were used to represent the entire domain. Analysis of these samples revealed how the sediment size distribution coarsened with distance from the dam, and the subsequent variation of the critical shear stress and erosion rate. With such a small data set it was necessary to conduct a parametric model study in which variables were varied or adjusted to reflect the potential variation in bed properties."

Comment B-10: The meeting notes reveal that the core sample number was originally set at 16 instead of 8 and was reduced only due to cost concerns. (Pg. 28). Keep in mind that the HECRAS model was one dimensional and that the AdH model was used for a two dimensional approach to address lateral sediment transport conditions. Two dimensional model results are depth averaged throughout the domain area (which was stated earlier on Pg. 12) and are inadequate during well-mixed turbulent conditions. Not only is this model inadequate in predicting scour in high flow rate conditions but the data needed for the depth averaged in the domain area relied on only 8 samples of 1 foot depth. Due to the inadequate amount of samples, data had to be obtained from another model and assumptions had to be made. Given the foregoing what are the margins of error? This is a very serious concern given the limitations of both one dimensional and two dimensional models when considering sediment transport during turbulent conditions. (Pg. 12). The explanations associated with data and models have not shown model validation but rather the reverse.

Model Simulations – Impact of Temporal Change in Sediment Storage Capacity

- The scour load during Tropical Storm Lee comprised of 20% of Tropical Storm Lee's total load (*i.e.,* about 3 million tons of the 14.5 million tons). (Pg. 45). The reservoir will have more capacity as a result of this scouring. The large periodic storms like Tropical Storm Lee will continue to transport large quantities of sediment to the Bay which are much higher than the reduced scour loads resulting from sediment removal operations. (Pg. 45).

Comment B-11: The August 2012 USGS Hirsch Report determined sediment loads of 4 million tons from scour and 19 million tons of suspended solids. Why is this data different and why are these numbers being marginalized?

Simulation of Sediment Management Alternatives

- "Impact of Sediment Removal - assumed the removal of 2.4 million tons of sediments above the dam. Total outflow load to bay was reduced by about 1.4% from 22.3 to 22 million tons, scour load decreased by 10 % (from 3.0 to 2.7) and the net reservoir sedimentation increased by about 5.0% (4.1 to 4.3 million tons). For this simulation, the scour load decreased approx. 3.3 percent for every million cubic yards removed." (Pg. 47).

- "Although changing the dredging area location will likely influence model results, removing such a relatively small quantity of sediment will have a minimal impact on total load delivered to the Bay when large flood events occur." (Pg. 47).

Comment B-12: Simulation was run on inadequate data. *See* discussion, *infra*, in Section 6.

Conclusions

- "A number of conclusions can be drawn from the modelling study. Although the uncertainty of the modelling is high due to the uncertainty of sediment boundary conditions and model limitations, the existing versus alternate approach to simulations reveals change in sediment transport based on the alternate condition scenario." (Pg. 57).

Comment B-13: What is the meaning of this statement? That modelling uncertainty is high?

- The AdH sediment transport model results only estimated the transport and fate of sediments that enter the reservoir and scour from the bed. The model does not predict nutrient transport and does not imply any predictive relationship between nutrients and sediment transport. (Pg. 59).

Comment B-14: Nutrient transport is model limited and there is no relationship between nutrients and sediments.

Recommendations to Improve Future Modelling Efforts

- The AdH model was not capable of passing sediment through the gates, therefore, for the study the dam was modeled as an open boundary with downstream control represented by water surface elevation. (Pg. 60). This limitation impacted how sediment was spatially distributed in the lower reach of the Conowingo Reservoir near the dam.

Comment B-15: In this statement the DLSRWA admits its severe limitations. The model's limitations impacted how sediments were spatially distributed in the lower reach of the Conowingo Reservoir near the dam.

- Sediment transport models in general do not have a sophisticated approach to simulate fine sediment flocculation. The AdH model has the capability to relate flocculation to concentration, but not to other variables such as shear stress which determine flock particle size and overall fate. The ability to predict flocculation dynamics is critical to track the fate of sediment in a reservoir system. (Pg. 60).

Comment B-16: This is an admission by the DLSRWA regarding the inadequate modelling scheme utilized.

- Field data collection needs to continue both upstream and downstream of the Conowingo Dam to provide more information on reservoir balance. Currently, the suspended sediment samples are collected from one location near the power plant. (Pg. 60).

Comment B-17: This is an admission by the DLSRWA regarding the inadequate data.

<u>Attachment B1 – Evaluation of Uncertainties in Conowingo Reservoir Sediment Transport Modelling, October 2012, Baltimore District Corps of Engineers, Stephen Scott</u>

The Impact of Conowingo Dam on Hydraulics and Sediment Transport

- "The Presence of the dam creates a backwater effect, reducing the energy slope, thus reducing velocities and encouraging sedimentation. In the area adjacent to Conowingo Dam, circulation of water and sediment is directly impacted by both the Dam face and how water is discharged through the Dam.

- "There are 52 flood gates with a crest elevation of 89.2 feet NGVD 29. For flows exceeding 86,000 cfs., both the power plant and flood gates pass flow up to 400,000 cfs. At higher flows the power plant is shut down with all flow passing through the gates."

Significance of Low Flow Sediment Transport

- "Wind and wave action may impact how sediment moves through reservoir system."

- Suspended sediment transport is an inherently three dimensional process. Correction factor was used in the two dimensional model (AdH model) to account for three dimensional stratification by simulating three dimensional suspended sediment transport.

Comment B-17: How was this correction factor obtained? Does the correction factor also address the open boundaries once the dam was removed in the model run?

<u>Attachment B2 – SEDflume Erosion Data and Analysis</u>

- Cohesive sediment transports are a mixture of sand, silt, and clay particles. Cohesive forces are equivalent to or greater than the gravitational forces that dominate san transport. There are no quantitative methods available to determine erosion rate from cohesive sediment properties.

<u>APPENDIX C</u>

- "Application of the Chesapeake Bay environmental Model Package to examine the Impacts of Sediment Scour in Conowingo Reservoir on Water Quality in Chesapeake Bay," Report of the US Army Corps of Engineers.

- This report examines the impact of reservoir filling on water quality in the Chesapeake Bay with emphasis placed on chlorophyll, water clarity and DO.

- Models: numerous, predictive environmental models and transfer of information between the models. (Pg. 2).

- CBEMP consist of three independent modes: (1) Watershed Model (WSM 5.3.2); (2) Hydrodynamic model; and (3) WQM- Water Quality or Eutrophication Model.

- Analytical Model: Steady state – Reservoir volumetric inflow must equal volumetric outflow and sediment sources must equal sediment sink. Bottom shear stress is the product of shear velocity and fluid density. (Pg. 9).

- Results from Analytical Model: When volumetric flow is below the erosion threshold the solids concentration in the reservoir is independent of depth. (Pg. 10). As reservoir depth decreases the flow required to initiate erosion diminishes. (*Id*). When the erosion threshold is exceeded, the sediment concentration in the outflow is inversely proportional to depth. (Pg. 11). One significant insight is that the reservoir is never completely filled. Solids accumulate continuously until an erosion event occurs. As the reservoir fills, however, the flow threshold to initiate an erosion event diminishes. Erosion events become more frequent and severe. Equilibrium implies a balance between suspended solids inflows and outflows over a time period defined by erosion events. The conventional threshold for erosion of ≈ 11,000 m3 s-1 has a recurrence interval of five years (Langland, 2013) implying the equilibrium exists over roughly that period. If we believe the threshold for erosion is below 11,000 m3 s-1, when volumetric flow is below the threshold, the solids concentration in the reservoir is independent of depth. (Pg. 10). As reservoir depth decreases, the flow required to initiate erosion diminishes.

Comment C-1: The use of existing models and practices that the LSRWA points out as being advantageous to the DLSRWA since these tools could not be developed within the time and budget limitations of the LSRWA. The individual models within Chesapeake Bay Environmental Model Package (Watershed Model, Hydrodynamic Model, and Water Quality Model) are documented, reviewed and used. CBEMP relies on the flawed TMDL model.

- "The resources necessary to acquire raw observations, create model input decks, execute and validate the individual models within the CBEMP for the years 2008 - 2011 was beyond the scope of the LSRWA." (Pg. 17).

- Data limitations: "…[M]eans were required to transfer information from the 2008 - 2011 AdH application to the 1991 - 2000 CBEMP." (Pg. 17).

Comment C-2: What kinds of means were required?

- "The crucial transfer involved combining scour computed by AdH for Tropical Storm Lee with watershed loads computed by the WSM model for a January 1996 flood and scour event represented by the CBEMP. (Pg. 17). "The WSM provides computations of volumetric flow and associated sediment and nutrient loads throughout the watershed and at the entry points to Chesapeake Bay. Flow computations are based on precipitation, evapotranspiration, snow melt, and other processes. Loads are the result of land use, management practices, point-source wasteloads, and additional factors. The loads computed for 1991 - 2000 are no longer current and are not the loads utilized in the TMDL computation. To emphasize current conditions, a synthetic set of loads was created from the WSM based on 1991 - 2000 flows but 2010 land use and management practices. The set of loads is designated the "2010 Progress Run." The TMDL loads are a second set of synthetic loads created with the WSM. In this case, the 1991 - 2000 flows are paired with land uses and management practices sufficient to meet the TMDL limitations." (Page 17).

Comment C-3: Limited observations of sediment associated nutrients are available at the Conowingo outfall during the 1996 flood event.

- Major storm events occur at different times of the year. In order to examine the effect of seasonality of storm loads on Chesapeake Bay, the January 1996 storm was moved, within the model framework, to June and to October. The loads were moved directly from January to the other months. No adjustment was made for the potential effects of seasonal alterations in land uses. New Chesapeake Bay hydrodynamic model runs were completed based on the revised flows, to account for alterations in flow regime and stratification within the Bay. (Pg. 18).

Comment C-4: Limitations on the impact on growing cycles. Table 3-1 needs to reference the flow rate used in model runs. (Pgs. 20-21) What were the flow rates?

- Loads from the watershed are calculated by the CBP WSM for two configurations: existing conditions (2010 Progress Run) and total maximum daily load (TMDL). (Pg. 21).

- Nutrient loads associated with bottom erosion were calculated by assigning a fractional nitrogen and phosphorus composition to the eroded solids. The initial fractions assigned, 0.3% nitrogen and 0.1% phosphorus, were based on analyses of sediment cores removed from the reservoir (Cerco, 2012). (Pgs. 24-25).

Comment C-5: Sediment core samples from the reservoir were limited to 8 samples at less than 1 foot deep.

- Dilemma discussed in Appendix C (Pg. 25): Employment of the 1996 nutrient composition to characterize the nutrients associated with sediment eroded in 1996 results in reasonable agreement between observed and computed nutrients at the Conowingo outfall (Figures 4-5, 4-6) but presents a dilemma. Which nutrient fractions should be used in subsequent scenario analysis? The 1996 composition, which accompanied the 1996 event and was observed during the 1991 - 2000 scenario period? Or the 2011 composition which is more recent and characterizes a typical tropical storm event? In view of the dilemma, several key scenarios have been run with alternate composition, presenting a range of potential outcomes.

- The ADH model was run for several bathymetry sets including: existing (2008) bathymetry; equilibrium bathymetry; bathymetry following 1996 storm; and bathymetry resulting from dredging 2.3 x 106 m3 (3 million cubic yards).

- In all cases, the procedure for determining the scour load followed the same steps: Solids loads into and out of Conowingo Reservoir using the hydrologic record for the period 2008 to 2011were provided by the ADH model; Solids scour for two events in 2011 was determined by the excess of outflowing solids loads over inflowing solids loads; Scour for the 1996 hydrologic record was estimated by interpolation based on excess volume; Nutrient composition was assigned to the scoured solids based on 2011 observations; and For key scenarios, an alternate set of nutrient loads was constructed based on 1996 observed nutrient fractions.

Comment C-6: Mixing 1996 data for the ADH model that used the hydrogeological record for 2008 - 2011. When reviewing the tables in report please keep in mind that 1 cubic meter per second = 35.3146667 cfs. Table 4-3 (Pg. 29) sets the highest flow rate at 17,479 cubic meters per second multiplied by 35.3 result in 617,009 cubic feet per second, which is well below Tropical Storm Lee's flow rate. Table 4.4 (Pg. 30) is not much better at 621,986 cubic feet per second.

- Output Formats. A separate supplemental publication is planned to describe results of scenarios conducted for the EPA CBP. (Pg. 40).

- A scenario was run with Conowingo Reservoir removed from the system. This was accomplished by routing directly to the bay the calculated WSM loads into Conowingo Reservoir. The initial intent was to simulate a reservoir-full condition. In this interpretation, loads to the reservoir would pass directly through in the absence of deposition. This interpretation was superseded by a revised conceptual model in which settling occurs even under reservoir-full conditions.

APPENDIX D

- Estimated Influence of Conowingo reservoir Infill on Chesapeake Bay Water Quality.

- The Susquehanna River delivers about 41 percent of the nitrogen loads, 25 percent of the phosphorus loads, and 27 Percent of the suspended solids on an annual basis (CBOP 1991 - 2000 simulation period).

Comment D-1: The simulation period is flawed. Why was that simulation period, which doesn't take into account episodic event, such as Tropical Storm Lee, considered? As for the Phase 5.3.2 Watershed Model this relies on 2010 TMDLs. Doesn't the 5.3.2 model also have a problem with nutrient load estimations?

- The mid-point assessment of the Chesapeake TMDL is planned for 2017 to account for Conowingo Dam infill and to offset any additional sediment and associated nutrient loads to the Bay. (Pg. 3).

Comment D-2: Although the TMDL model is admittedly flawed for nutrient and sediment load, why is it still being used by the LSRWA team to estimate influence of the Conowingo reservoir infill on the Bay's water quality? Modelling for the Chesapeake Bay TMDL consisted of an assessment of the entire hydrologic period of 1991 - 2000, which only takes into account one high flow rate of the big ice melt in 1996. Why isn't flow rate ever discussed in terms of magnitude and velocity in the model? (Pg. 8).

APPENDIX E

Introduction

- May, 2, 2012 – Maryland Geological Survey (MGS) conducted 16 sediment grab samples (surficial grab samples) taken in the Susquehanna Flats area of the upper Chesapeake (Figure 1). (Pg. 2).

- Sample locations were determined through consultation with USACE based on existing sediment sample data available. (Pg. 2) Two samples sites located in the Susquehanna were not sampled because of concerns regarding bedrock.

- Sediment grab samples were analyzed for water content, bulk density and grain size. Two homogenous splits of each sample were processed with one for bulk property analyses and the other for gain-size characterization. (Pg. 4).

Comment E-1: How deep or what was the depth of these samples?

- Shephard's (1954) classification of sediment types presented in Figure 2. (Pg. 7).

Comment E-2: What is "1954 classification data"? Haven't the characteristics of sediments changed in the last 60 years?

- Table 3 – Results shows the field data of grain size based on the grab samples.

Comment E-3: The table emphasized the fact that samples were too shallow or very difficult to get. How were these limitations addressed?

APPENDIX F

- Need for updated chemical and physical measurements of suspended sediment flowing through Conowingo Dam.

- During four storm flow events in water year 2010 (October 1, 2010 - September 30, 2011) large volume samples were collected to support analysis of detailed suspended sediment with six fractions and physical and chemical measurements of sediments.

Comment F-1: What model runs used the USGS data described above?

- Ten samples were taken during four high flow events during water year 2011. The U.S. Department of Interior (MD-DE-DC Water Science Center, Baltimore, MD).

Comment F-2: At which high flow events were the ten samples taken during water year 2011?

- Table 4. Elements in suspended-sediment samples collected at the Susquehanna River at Conowingo, Maryland (USGS 01578310) were determined by cold vapor atomic absorption spectrophotometry.

Comment F-3: Were hazardous constituents such as PCBS also monitored in the ten samples? If not, why not?

APPENDIX G

- October 2011, Gomez and Sullivan Engineers conducted bathymetric surveys of the Conowingo Reservoir. These 2011 bathymetry survey data and methods were evaluated and approved by the USGS for the LSRWA's effort. Their efforts included: measured depth data combined with water surface elevation (WSE); the unit measured bottom depths several times per second, recorded averages. To account for the WSE difference, the WSE gradient between Conowingo Dam and Peach Bottom was used to determine the WSE throughout Conowingo Pond. (Pg. 3).

Comment G-1: How are the influences by Holtwood and the Muddy Run operations accounted for in this analysis? How were depth measurement points calculated between the two measurement areas?

- Sediment volume change for each cross section was calculated using the weighted and unweighted water volume methodologies. (Pg. 5).

Comment G-2: This study relied on a comparison of 2008 and 2011 data to get some insight into the sediment transport process focusing in the Conowingo Pond.

Comment G-3: Although these samples were taken in a short period of time they cannot really provide what the sediment transport rate would be with one major episodic event.

Comment G-4: Gomez and Sullivan stated that the 2011 cross-section data may serve as a reference point for future surveys. (Pg. 7). What additional surveys would be recommended by Gomez and Sullivan if these surveys were used as a reference point?

Comment G-5: According to Gomez and Sullivan's findings and conclusions, it appears that the zone of dynamic equilibrium has expanded farther downstream that in previous surveys, extending to about 3.7 miles upstream of the Conowingo Dam. (Pg. 8). Did any of the model runs account for this recent observation and conclusion? If not, how will this impact the model runs? Will scour amounts be adjusted to address this recent observation?

APPENDIX H

- A question that was not addressed in the DLSRWA is related to the various techniques for sediment management explored in the literature review of Appendix H. While different kinds of dredging are mentioned in the Appendix and in the body of the report, a technique known as hydro-suction dredging is mentioned several times in the Appendix but not mentioned explicitly in the DLSRWA. This technique would be especially useful for sediment bypassing because it makes use of the huge natural head difference between the reservoir and the river below the dam to maintain flow through a dredging pipe or bypass tunnel. (Pg. 35, Appendix 1-7).

Comment H-1: Was this technique considered in figuring the relatively low cost of bypassing, or not? Would it make a difference?

- The literature review in Appendix H ignored nutrients." (Pg. 35, Appendix 1-7).

- A literature search was conducted on managing watershed/reservoir sedimentation in Appendix H. Findings and lessons learned from the literature search were incorporated into refining sediment management strategies for this Assessment. Results of this literature search are presented in Appendix H.

Comment H-2: How could findings and lessons learned from case studies in which there is no consistency in the data presented for each LSRWA? For example, many of these case studies have no data for cost/funding or amount of sediment removed.

Comment H-3: Please explain why the case studies in Appendix H actually include the Susquehanna River Dams (*see* Pg. 26, No. 19). Oddly, the information contained for the Susquehanna River Dams is based on 1990 data. Why wasn't this information updated? How is old information and data useful and or important for the DLSRWA? If the Susquehanna River Dam information is outdated, how can the Study group ensure that case studies in Appendix H contain current and accurate information? Is this just a data dump that includes dams and reservoirs or was most of this information used for the DLSRWA? If it was used for the DLSRWA, how was it used?

- From the research found, especially overseas, warping technique was found to be often used where river water with high sediment loads is diverted onto agricultural land. The sediment deposition on the land enhances its agricultural value. (Pg. 52).

Comment H-4: Doesn't the warping technique increase the potential for erosion and greater sediment and nutrient runoff?

Comment H-5: Why does Appendix H include overseas sites located in China, Switzerland, Pakistan, etc.? Where is the value regarding such information?

- Minimizing Sediment Deposition includes a description of alternatives such as selectively diverting water. (Pg. 51).

Comment H-6: When these potential alternatives were identified, was there consideration given to the multiple uses of the Susquehanna reservoirs? For example the Peach Bottom Nuclear Plant relies on reservoir water for cooling, which begs the question: do these alternatives impact the industrial use of the Susquehanna River?

Comment H-7: One case study that was not listed in Appendix H is the Plainwell Impoundment located on the Kalamazoo River, Plainwell, Michigan. The dredged sediments associated with the Plainfield Impoundment contained levels of PCBs. Please keep in mind that recently EPA expressed this concern regarding the Conowingo sediments. This Plainwell Impoundment provided detailed cost data that could be very useful in the event that detectable levels of PCBs are present in the Conowingo sediments. Why was the Plainfield Impoundment overlooked? More information regarding the Plainfield Impoundment can be obtained from the following EPA Region V URL site: http://www.epaosc.org/site/site_profile.aspx?site_id=2815.

APPENDIX I-6

- The LSRWA revisited the goals that were developed for the study early on in the scoping process of the LSRWA in order to refine these goals. The purpose of the goals are to create bounds and focus for the team on what will be accomplished with the LSRWA and to communicate to stakeholders what the LSRWA will accomplish. Such goals included evaluating sediment management, and to determine the effects to the Chesapeake Bay from the sediment and nutrient storage located behind the dam. (Pg. 5).

- Exelon, the owner and operator of the dam, must undertake a variety of studies as requested by state and federal resource agencies to get an understanding of impacts of the dam. Several of the requested studies deal with sediment transport and accumulation in the dam system which relates to LSWRA efforts. At this time, most of the relicensing studies dealing with sediment transport and accumulation undertaken by Exelon are simply a compilation of existing literature and data. Their study findings were that 400,000 cfs. (cubic feet per second) is not the threshold where sediments are scoured from behind the Conowingo Dam and that overall Tropical Storm Agnes did not scour sediments but ended up depositing more sediment behind Conowingo Dam. Mike said that this latter finding is not supported by USGS at this time. (Pg. 5).

Comment I-6-1: Knowing that Exelon was responsible for studies dealing with sediment transport and accumulation behind the Dams as part of the license requirement, why did the LSRWA workgroup deicide to take on this task? Why would tax payer funds be used to perform these tasks when the burden was clearly on Exelon?

- Mike Langland noted in the past, USGS utilized a one dimensional HEC-6 model to assess sediment deposition and transport in the entire reservoir system including sediments from the watersheds. Mike noted that there were shortcomings to this model. As part of his LSRWA efforts, Mike will construct and calibrate an updated one dimensional HEC-RAS model that will route inflowing sediment through the reservoirs, accounting for both sediment deposition and erosion in the upper reservoirs. The output of this model will provide boundary conditions for the two dimensional model simulations that Steve will be conducting as part of his scope in the Conowingo Reservoir.

Comment I-6-2: STAC commented on limitations of the HEC-RAS and AdH models. These limitations were not made sufficiently clear in the DLSRWA. The HEC-RAS modelling effort was largely unsuccessful and the HEC-RAS simulation was largely abandoned as an integral part of the DLSRWA. (Pgs. 8-9, Appendix I-7). What were the limitations associated with the HEC-RAS model? Was USGS able to obtain a level of comfort with this model?

- Bruce Michael noted that there was minimal scouring during the spring 2011 high flow events. However, this was the worst year on record for hypoxia and second highest flow on record. (Pg. 8).

Comment I-6-3: Please provide the data that Bruce Michael based his observation on in the spring of 2011.

- Jeff noted that scouring occurred during Tropical Storm Lee from behind the Conowingo Dam. These sediments appeared to bypass the upper Bay and accumulated more in the middle Bay. The approach channels to the C&D Canal were scoured according to Philadelphia District and there did not appear to be significant burial of organisms since sediment was widely dispersed. (Pg. 8).

Comment I-6-4: Please provide the data source for Jeff's comments.

- Discussion ensued about the status of federal funding for this study. The study received funding for FY12 by mid-February. [Update: $300,000 received in February 2012.] The FY13 budget will be coming out in a few weeks and then it will be determined if funding is available for next FY. [Update: This project is not in the president's FY13 budget.] (Pg. 3 – January 23, 2012 Meeting at MDE).

Comment I-6-5: Again please explain why taxpayer money being used when the study should have been conducted by Exelon as part of the FERC relicensing application.

- Dave added that it is important as we finalize the watershed assessment that we make sure to refer back to the public outreach plan and follow what we have laid out to engage the public in the LSRWA. (Pg. 5).

Comment I-6-6: Why weren't the public involvement procedures established by the Federal Advisory Committee Act (FACA) followed and adhered to? What is this public outreach plan that is discussed above? Please provide a copy of this plan.

- Shawn Seaman will contact Michael Helfrich to notify him of quarterly meetings to see if he can attend. (Pg. 2).

Comment I-6-7: Is this how the public outreach plan works? There seems to be exclusivity involving who can participate.

- Herb mentioned that he, Secretary Summers (MDE) and Paul Swartz (Executive Director, SRBC) met with the Maryland delegation from the Eastern Shore. He noted that feedback from these meetings was that there is a lot of interest in water quality in the Bay; farmers feel like they are being picked on (it will be important to engage agriculture groups in study); and the costs of the implementation of the TMDL and the proposed "flush tax" to cover the cost of implementation of TMDL. (Pg. 5 – 2/16/2012).

Comment I-6-8: How were agriculture groups engaged in the DLSRWA? If not, why not?

- The Conowingo Dam has been undergoing the 5-year FERC relicensing process. Out of this relicensing process Exelon (owner and operator of Conowingo Dam) was required to conduct several studies that relate to sediment accumulation and transport. Year 2 study reports are due by January 23, 2012. Several contractors of Exelon attended the quarterly meeting and provided results of these studies to the LSRWA team. Marjie from URS explained that the objective of the sediment transport and accumulation study they conducted was to provide data that will be useful in the future development of an overall sediment management strategy for the Susquehanna River and Chesapeake Bay.

Comment I-6-9: Was Exelon's sediment transport and accumulation study relied upon or used in the overall sediment management study? Why didn't any workgroup member state that Exelon should be responsible for the LSRWA study given Exelon's contractor's (*i.e.*, URS) comment?

- Anna will send out an update via the large email distribution list that started with the original Sediment Task Force (includes academia, general public, federal, non-government organization (NGO), and state and counties representatives) notifying the group of LSRWA kick-off meeting and study start and will periodically update this group as the LSRWA progresses. (Action Items from November Meeting.)

Comment I-6-10: Was this update distributed? Did this update include future dates for meetings for all to attend? If so, why didn't the Clean Chesapeake Coalition receive this notice?

- Shawn will notify the team when the most recent Exelon study reports are released. Status – Recent report was sent out to the team; ongoing action. Shawn was not in attendance so Tom let the group know that the Exelon application for the Conowingo Dam license will be filed with FERC at the end of August [2012] and all required studies will be completed by the end of September with the exception of two fish studies. (Pg. 3 – 8/16/2012).

Comment I-6-11: Did LSRWA workgroup members review Exelon's required studies? If so, were deficiencies identified and discussed with Exelon and or its consultants?

- The LSRWA identified their mission as: "To comprehensively forecast and evaluate sediment and associated nutrient loads into and from the system of hydroelectric dams located on the Lower Susquehanna River above the Chesapeake Bay and consider structural and non-structural strategies to manage these loads to protect water quality and aquatic life in the Chesapeake Bay." (Pg. 4 – 8/16/2012).

Comment I-6-12: Did anyone on the LSRWA team question this mission, given that this was Exelon's obligation in the FERC relicensing application? How many scientists in the LSRWA were involved in this comprehensive study? Please provide their names and degrees. Did the LSRWA consist of any hydro engineers?

- Matt Rowe will compare the results from the analysis of sediment cores taken from behind the Conowingo dam in 2006 to the decision framework criteria laid out in the 2007 IRC report to help the team better understand the suitability of the sediments in the lower Susquehanna river watershed for innovative reuse options. (Pg. 2 – 12/26/2012).

Comment I-6-13: How does comparing 2006 data help in the decision making process? Doesn't Tropical Storm Lee in 2011 have a significant impact on this data?

- Currently the law firm Funk and Bolton is proposing and accepting money from counties for a study to be conducted by this law firm on the Bay TMDL. (Pg. 3 – 12/26/2012). Michael added that there has been concern raised by this coalition that MD has county WIPs while PA does not. Pat Buckley noted that PA has "WIP planning targets" in lieu of "County WIPs".

Comment I-6-14: Is there a reason why the Clean Chesapeake Coalition wasn't invited to attend this meeting? How does the Clean Chesapeake Coalition's attendance interfere with the LSRWA's mission to comprehensively forecast and evaluate sediment and associated nutrient loads into and from the system of hydroelectric dams located on the Lower Susquehanna River above the Chesapeake Bay and consider structural and non-structural strategies to manage these loads to protect water quality and aquatic life in the Chesapeake Bay? How is Funk & Bolton even relevant to this study?

- Carl noted that his previous efforts involved running modelling scenarios that removed Conowingo from the system to understand what it would look like with all sediments flowing into the bay and no longer being trapped by Conowingo. With this latest simulation, Carl looked at what the system would look like (*i.e.,* impacts on water quality) if there were a scouring event. More specifically, he took the system's current condition (Conowingo still trapping) with WIPs in place, using bathymetry from after the 1996 scour event. (Pg. 5 – 03/22/2013).

Comment I-6-15: How is a scoring event measured if the dam is removed in the model runs? How is the circular flow hitting the dam and scoring sediments adjusted in such a model run?

- Lew Linker noted that the results may not represent effects on SAV; a period of reduced light could really impact SAV. Carl noted that for the final report these final outputs need to be remedied. (Pg. 8 – 06/07/2013)

Comment I-6-16: Were these final outputs ever obtained? If so, please provide a copy of this study.

- Michael Helfrich noted that Carl's modelling is using the 4th biggest event we have on record to show storm scouring (the 1996 winter storm event). What about the storms that have occurred on record that were larger than this event? Also the loads (nutrient and solids) shown in Condition 6 (scour event in summer, fall, and winter) are less than loads in Conditions 3 - 5, which all included a simulation of the same storm event. Why is this? (Pg. 9 – 06/07/2013).

Comment I-6-17: Please provide an answer to Michael Helfrich's statement.

- "The group determined that data on nutrient (and sediment) in water outflows from Conowingo Pond was inadequate, and collecting data to fill gaps was scoped into the study. It was recognized that it would be useful to have additional information on Conowingo Pond bottom sediment biogeochemistry, particularly with regard to phosphorus. However, it was determined that existing information/data was adequate for study modelling purposes, and it was decided to not undertake such investigations in light of need to control study costs." (Pg. 3 – 09/24/2013).

Comment I-6-18: How does the use of old data to fill in the gaps effect the LSRWA's mission to comprehensively forecast and evaluate sediment and associated nutrient loads into and from the system of hydroelectric dams located on the Lower Susquehanna River above the Chesapeake Bay and consider structural and non-structural strategies to manage these loads to protect water quality and aquatic life in the Chesapeake Bay?

- With regard to (P) phosphorus biogeochemistry, Carl had identified Jordan and others (2008) as presenting a concept applicable to utilize for our situation. P is generally bound to iron in fine-grained sediments in oxygenated freshwater and of limited bioavailability. Under anoxic/hypoxic conditions iron is reduced and P can become more bioavailable. P rebinds to iron in sediments if oxygen is again present. P adsorbed to Conowingo Pond bottom sediments would remain bound to those sediments in the freshwater uppermost Bay. In saltwater, biogeochemical conditions change. Jordan and others (2008) indicate that as salinities increase above about 3-4 ppt/psu (parts per thousand/practical salinity units, P is increasingly released from sediments and becomes mobile and bioavailable to living resources, which is likely due to increased sulfate concentrations in marine water (*e.g.*, Caraco, N., J. Cole, and G. Likens, 1989. Evidence for Sulphate-controlled Phosphorus Release from Sediments of Aquatic Systems. (Pg. 3 – 09/24/2013).

Comment I-6-19: More recent studies show phosphorus is released and no longer bound to sediment s in the presence of higher salinity in water. Why weren't these more recent studies evaluated?

APPENDIX I 7

- The charge from STAC to the review team was: "You should focus your comments on the following [questions], but you are encouraged to provide additional comment that would improve the analyses, report or its recommendations." (Pg. 6).

Comment I-7-1: How were the questions developed that the review team focused on?

- "The science associated with assessing the evolving condition of the Lower Susquehanna River and its effects on the Chesapeake Bay is exceptionally challenging. As far as the reviewers are aware the Conowingo situation is truly unique. A major reservoir that had been an effective trap for fine sediment and associated nutrients has largely transitioned to one that no longer has an ability to perform this long-term function." (Pg. 6).

Comment I-7-2: If this were the case, how could the science associated with the LSRWA continuously flip flop back and forth on whether the reservoir still has trapping capacity or whether reservoirs are in dynamic equilibrium?

- "The goals stated in the main report (which stress both sediment and nutrient management) are inconsistent with the methodological approach taken by LSRWA (which mainly emphasized sediment) and appear not to be the study's original goals. This review recommends that the original goals of the study (*i.e.*, sediment management to extend the life of Conowingo Dam more than nutrient management to protect Chesapeake Bay water quality) be presented in the introduction followed by a fuller explanation of how and why the focus of the study evolved in time." (Pg. 7).

Comment I-7-3: If that is the case how adequately does the draft report stress both sediment and nutrient management?

- "It must also be stressed early and repeatedly that the dollar costs associated with alternative sediment management approaches specifically focus on the cost of reducing the amount of total sediment behind the dam, not on the cost of managing the impact of associated nutrients on the Chesapeake Bay. Further analysis would be required to appropriately rank the alternative strategies based on a more environmentally relevant total cost in terms of dollars per pound of nitrogen and/or phosphorus reduction." (Pg. 8).

Comment I-7-4: Such an analysis is extremely important and lost in the DLSRWA. If conducted, will the relevant total cost in terms of dollars per pound of nitrogen and/or phosphorus reduction be compared to all the BMPs and activities discussed in the DLSRA?

- "Although the report lists and discusses sources of uncertainty, it expresses the expected confidence intervals on its model predictions less often. Although there is no single accepted procedure for reporting uncertainty in the context of scenario modelling, a part of the report should more explicitly explain why confidence intervals on predictions are generally not provided." (Pg. 8).

Comment I-7-5: Why isn't there any reporting of uncertainty in the context of scenario modelling? Are the uncertainties that significant in terms of considering a margin of error analyses?

- "Key areas of concern which are expanded upon in response to Questions 3 and 4 include: (1) Stated sediment discharges from the Conowingo Dam are inconsistent with the literature. The report authors should either correct their numbers or present a clear explanation that reconciles why their estimates are significantly different from other estimates that are based on analysis of observed data. (2) Reduced deposition associated with reservoir infilling has been neglected. The fundamental issue motivating the LSRWA study is that the net trapping efficiency of Conowingo Reservoir has decreased dramatically over the past 15 to 20 years. Net trapping efficiency is the sum of increases in average annual scour and decreases in average annual deposition. However, the simulations and calculations in the study only considered the increase in scour. (3) Grain size effects within and exiting the reservoir were not sufficiently considered. The combination of two grain size effects – (i) changing grain size in time in the reservoir and (ii) the greater effects of fine sediment in transporting nutrients - mean that the effects of the reservoir on water quality have not reached a full dynamic equilibrium. However, the report did not address whether reservoirs were in dynamic equilibrium with respect to nutrients other than by assuming that if sediment was at equilibrium, then nutrients were also. (4) Limitations of the HEC-RAS and AdH models were not made sufficiently clear in the main report. The HEC-RAS modelling effort was largely unsuccessful, and the HEC-RAS simulation was largely abandoned as an integral part of the main report. Although consistent with four observed, integrated sediment-related properties of the system, the AdH model was not fully validated, and the AdH model was forced by boundary conditions outside the range of observed values. This means that the AdH model alone was not reliably predictive, and until the AdH model has been improved, observations should instead be emphasized to support the most important conclusions of the LSRWA study." (Pgs. 8-9).

Comment I-7-6: These are serious concerns and misinformation, how will this comment be addressed in the DLSRWA? The inconsistencies in data that pertains to sediment discharge, low rates, trapping capacity, dynamic equilibrium, grain size has a significant impact on model runs. How will this be addressed? How can Models be analyzed and compared with such inconsistencies? The DLSRWA authors should correct the fact that the Conowingo Dam is no longer trapping.

Comment I-7-7: If the AdH model alone was not reliably predictive, and needs substantial improvement, how can observations instead be emphasized to support the important conclusions of the study that relied heavily on the AdH two dimensional model? Does this statement mean that observations trump scientific data? Or does the statement mean that scientific data is not required?

- "Many of recommendations for future work and modelling tool enhancement are very good and are consistent with the views of this review." (Pg. 9).

Comment I-7-8: How could this statement be made given the statements above and the data inconsistencies and that the AdH model alone was not reliably predictive?

- "…[T]he HEC-RAS modelling effort was ultimately unsuccessful, and results of the HEC-RAS simulation did not form an integral part of the main report, and (ii) the existing application of the AdH model, although generally consistent with the validation data used, was not reliably predictive beyond constraints provided by a few integrated observations of sediment-related properties of the system."

Comment I-7-9: How can STAC say that these models did not provide an integral part of the report? If these models were not integral, why were they discussed and used? Why were these models used to identify concerns and also used to discuss the financial value of sediment management strategies if they were ultimately unsuccessful?

- The purpose of this assessment was to analyze the movement of sediment and associated nutrient loads within the lower Susquehanna watershed through the series of hydroelectric dams (Safe Harbor, Holtwood, and Conowingo) located on the lower Susquehanna River to the upper Chesapeake Bay. This included analyzing hydrodynamic and sedimentation processes and interactions within the lower Susquehanna River watershed, considering strategies for sediment management, and assessing cumulative impacts of future conditions and sediment management strategies on the upper Chesapeake Bay." A similar "purpose" statement appears in the Introduction. (Pgs. 5-6). Note that the word "nutrient" appears only once in the above statement, and the purpose of the study was mainly to address "sediment management".

Comment I-7-10: How was that purpose conducted through the use of unsuccessful modelling?

- "The report only briefly states that during the course of the study it became clear that nutrients were more important than sediment. More background is needed in the introduction regarding how and why this judgment was made and how the course of the study then evolved." (Pgs. 11-12).

Comment I-7-11: Once again the Report relies on assumptions. Is there any scientific background to this concern?

- "Although it is not specifically described as such in the draft report, the overall economic analysis in the LSRWA is in essence a cost-effectiveness analysis (CEA). In contrast to cost-benefit analysis in which the positive and negative impacts of alternatives are expressed and directly compared in monetary terms, CEA expresses some key impacts in non-monetary but still quantitative terms." (Pg. 14).

Comment I-7-12: Will a cost-benefit analysis be performed on this DLSRWA in terms of BMPs and sediment management strategies?

- "The report should also emphasize that further analysis would be required to appropriately rank the alternative strategies based on a more environmentally relevant total cost in terms of dollars per pound of nitrogen and/or phosphorus reduction." (Pg. 15).

Comment I-7-13: The Clean Chesapeake Coalition agrees with this comment. Will the final DLSRWA include alternative strategies based on environmental relevance with total cost in terms of dollars per pound of nitrogen and phosphorus reduction?

- "Although there is no single accepted procedure for reporting uncertainty in the context of scenario modelling, a part of the report should more explicitly explain why confidence intervals on predictions are generally not provided." (Pg. 16).

- **"**In many of the modeled scenarios, the changes in attainment of water quality criteria with fairly large management actions would appear to a non-technical reader to be very small. For instance, p. 135 states: "…estimated…nonattainment…of 1 percent, 4 percent, 8, percent, 3 percent…" One should ask if such estimates are statistically significant. Similarly, in appendix A, p. 25, the net deposition model indicated that ~2.1 million tons net deposition in the reservoirs occurred in 2008-11. This is the difference of two order-of-magnitude larger numbers (22.3M tons entered the reservoir, 20.2M tons entered the Bay). There is a rule-of-thumb in sedimentology: ±10% in concentration or transport is 'within error'." (Pg. 16).

Comment I-7-14: Does the precision of the computed difference fall within the margin of error in these metrics?

- On p. 113 the report states, "A close inspection of the model simulation results indicate that trace erosion does occur at lower flows (150,000 to 300,000 cfs.), which is a 1- to 2-year flow event. This finding is consistent with prior findings reported by Hirsch (2012)." The Hirsch (2012) findings are different from what is expressed here. The relevant statement from Hirsch (2012) is: "The discharge at which the increase [i.e., the increase in suspended sediment concentrations at the dam] occurs is impossible to identify with precision, though it lies in the range of about 175,000 to 300,000 cfs. Furthermore, the relative roles of the two processes that likely are occurring – decreased deposition and increased scour – cannot be determined from this analysis."

Comment I-7-15: Does the DLSRWA and the model runs account for such a discrepancy? If so, how? If not, why not?

- "Also on p. 190, the report indicates that, "The total sediment outflow load through the dam… increased by about 10 percent from 1996 to 2011…" These results are so strongly at odds with other published numbers on this subject that some explanation and discussion is certainly required. Hirsch (2012) reports an increase in flow-normalized flux over the period 1996-2011 of 97 percent (*see* Table 3 of Hirsch). Also, Langland and Hainly (1997) published an estimate of change in average flux from about 1997 to the time the reservoir is full of 250%. Reporting a 10% increase in light of these two other findings appears erroneous."

Comment I-7-16: Why weren't Hirsch's and Langland's numbers used instead of 10%?

- From STAC: "p. 138 Paragraph 2: Oysters are discussed here within a section that otherwise discussed the modelling and simulation activities. Is there a description of how model analysis was used in this report to determine flow and management effects on oysters? Whatever the case, it should be clearly stated where the oyster effects fit into this report and whether or not model simulations were used to understand effects on oysters."

- LSRWA Response: No specific modelling simulations were run to quantify oyster impacts. However this resource is of high interest so this qualitative language was added. This paragraph was deleted from this section since the context here is specific LSRWA simulation results (*i.e.*, quantified results). Section 2.7.4 discusses oysters and impacts from storm events summarizing a DNR report on effects from Tropical Storm Lee.

Comment I-7-17: Were model runs conducted by DNR to determine impact on oysters or was it based on observations? If based on observation were sediment levels that blanketed the oysters considered as an impact?

- "As described in Section 5.2, "the LSRWA team relied heavily on the Bay TMDL work done by CBP and state partners to develop the watershed management strategies. As such, the LSRWA team adopted the CBP methodology and unit costs as the representative alternative for a watershed management strategy; additional cost and design analyses were not undertaken." Citations are included where appropriate (e.g. U.S. Environmental Protection Agency (U.S. EPA). 2010), however, personal communication by LSRWA was required to ensure that LSRWA interpretations of CBP work on watershed BMPs/strategies were accurate." (Pg. 35).

Comment I-7-18: Throughout the report, statements are made that the Bay TMDL work needs to be reevaluated given that the Conowingo Dam no longer has the trapping capacity that was once considered. Given that the DLSRWA adopted the outdated CBP methodology, how could the team ignore additional cost and design alternatives?

- Attachment I-7 includes a letter from Exelon to the Army Corps of Engineers (dated July 18, 2014) thanking the Corps of Engineers for the opportunity to review and comment om the Draft LSRWA Study. (No Page number provided).

Comment I-7-19: Please explain why Exelon received the DLSRWA several months earlier to perform an extensive review of the main report and appendices. Why weren't other commenters, such as the Clean Chesapeake Coalition given that opportunity? Are we to expect that Exelon will assist the LSRWA study group in addressing our comments?

APPENDIX J

***It is quite evident that the data and studies used in the Watershed Strategy Section are outdated and incorrect. Appendix J relies on the following incorrect statements:**

- "Sediment deposition to Chesapeake Bay from the Susquehanna River is mitigated by the presence of three consecutive hydroelectric dams (Safe Harbor Dam, Holtwood Dam, and Conowingo Dam). These three dams form a reservoir system in the lower part of the River that These three dams form a reservoir system in the lower part of the River that has been trapping sediment behind the dams since they were constructed in 1910 (Holtwood Dam), 1928 (Conowingo Dam) and 1931 (Safe Harbor Dam). The uppermost two dams, Safe Harbor Dam and Holtwood Dam, have already reached their capacity to store sediment and sediment-related nutrients. Conowingo Reservoir, which is formed by Conowingo Dam, the lowermost and largest dam, has not reached storage capacity and is still capable of trapping." (Pgs. 1-2).

Comment J-2: Appendix J begins with incorrect information by expressing the remaining storage capacity of the Conowingo Dam. (Pg. 2). Given that this Appendix is used to develop a watershed strategy, a major concern and comment is how could this be accomplished if the current status of the Conowingo Dam is not properly delineated or understood?

*The Appendix discusses further the importance of the TMDLs and the CBP 5.3.2 Watershed model run established in 2010.

- The Chesapeake Bay Program developed the E3 scenario from a list of approved agriculture and urban/suburban BMPs using output from the Phase 5.3.2 Watershed Model, which is also used for tracking towards the TMDL. "The BMPs that are fully implemented in the E3 scenario were estimated to produce greater reductions than alternative practices that could be applied to the same land base (Jeff Sweeney, personal communication)."

Comment J-3: Is personal communication is now the new standard in determining scientific merit? What science is Jeff Sweeney using to make such an evaluation of BMPs and to make such a statement?

- The Chesapeake Bay Program also developed unit costs for the approved BMPs. Most, though not all, of the BMPs used in the E3 scenario have associated unit costs in either acres or feet. The primary source of the unit costs was the Bay Program approved list; however, in order to have as complete a cost estimate as possible, in the absence of unit costs from the Bay Program, costs from the Maryland Department of the Environment (MDE) (Greg Busch, MDE, personal communication), and costs from the Maryland

> Department of Agriculture (MDA) (John Rhoderick, MDA, personal communication) were used. (Pg. 5).

Comment J-4: Is there a cost benefit analysis associated with these expected costs on local governments? If so, is it based on science and data or someone's personal communication?

- Agriculture unit costs ranged from $2 per acre to develop conservation management plans to $1,948 per acre for "loafing lot management" (stabilizing areas frequently and intensively used by animals, people, or equipment).

Comment J-5: Where is the source of this data? Is it from the unit cost estimates from the Bay Program and other sources used to develop a range in the cost of achieving the theoretical maximum amount of sediment reduction to the Conowingo Reservoir (discussed on Pg. 6)? If so, where is this data and what are the other sources?

- "The maximum available load of sediment per year that could be reduced by additional BMP implementation above and beyond the WIPs throughout the Susquehanna River watershed is approximately 95,000 tons (equivalent to 190,000,000 lbs of sediment per year; or 117,284 cubic yards per year) 2,000 lbs is equivalent to approximately 1 ton; 190,000,000 lbs divided by 2,000 equals 95,000 tons per year; approximately 81 tons are in 1 cubic yard; or 1600 kilograms/cubic meter; 95,000 divided by .81 equals 117,284 cubic yards per year) at a cost of 1.5 to 3.6 Billion dollars. The amount of 95,000 tons is an order of magnitude less of what is estimated to flow over Conowingo Dam into Chesapeake Bay on an average annual basis, which is approximately, 1.8 million tons (1993-2012 hydrology)." (Pgs. 5-6).

Comment J-6: This no longer seems to be the case given that the Conowingo Reservoir was considered a trap and not a source of sediments and nutrients in these calculations.

Comment J-7: Attachments 2 and 3 (Pgs. 11-12) of Appendix J state the following: "Cost estimates are provided for planning purposes only, and are based on generalized costs of implementation. Project specific design and cost estimates would be required prior to actual implementation of any of these alternatives." What are the generalized costs of implementation? How do these attachments provide anyone with a true understanding of costs if design and cost estimates are not considered in the total cost analyses?

- "EPA uses unit costs for agricultural sediment or nutrient controls identified in the WIPs from USDA's Environmental Quality Incentive Program (EQIP), where available, and WIPs and prior studies where EQIP estimates are not available. In selecting relevant studies, EPA excludes those prior to 2000, and relies on EQIP and WIP estimates where feasible because these costs likely represent the most recent and best estimates of actual implementation costs."

Comment J-8: The U.S. Department of Agriculture's Environmental Quality Incentive Program (EQIP) is currently an interim rule open for comment. In addition, Executive Order 12866 and 13563 "Improving Regulation and Regulatory Review," directs agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). Executive Order 13563 emphasizes the importance of quantifying both costs and benefits, of reducing costs, of harmonizing rules, and of promoting flexibility. The Clean Chesapeake Coalition would appreciate an assessment of all costs and benefits of available regulatory alternatives, in particular analyses of how the unit costs were derived for the DLSRWA.

Comment J-9: Throughout the Document it is stated that: "EPA annualizes capital costs over the specified life of the BMP." How does EPA annualize capital costs?

> Forest buffers are linear wooded areas along rivers, stream, and shorelines. The recommended buffer width for riparian forest buffers (agriculture) is 100 feet, with a 35-foot minimum width required. Upfront installation costs associated with forest buffers typically include site preparation, tree planting and replacement planting, tree shelters, initial grass buffer for immediate soil protection, mowing (during the first 3 years), and herbicide application (during the first three years).

Comment J-10: Forrest Buffers are listed as a BMP. Has anyone evaluated Sapropel concerns from decaying leaves and their ability to seriously decrease deep water oxygen and increase Hydrogen sulfide deposits?

- Estimates pertaining to unit cost in association with frequent maintenance and pumping of septic systems is expected to reduce nitrogen loadings. (Pg. 29).

Comment J-11: What is the origin of these estimates? Where is the financial cost data associated with these estimates?

<u>Attachment J2: Cost Documentation – General Assumptions</u>

- The Costs associated with the Charts presented in Attachment J2 are "concept-level costs for planning purposes only. Detailed design and cost estimate would be required for any future studies investigation implementation of any of these alternatives. All alternatives assume the dredging of a location in Conowingo Reservoir which currently has the highest amounts of deposition in the entire lower Susquehanna reservoir system; similar costs could be developed for the other lower Susquehanna reservoirs."

Comment J-12: Given the assumption above, will the design and cost estimates be the same if the purpose of the DLSRWA were to comprehensively forecast and evaluate sediment and associated nutrient loads into and from the system of hydroelectric dams located on the Lower Susquehanna River above the Chesapeake Bay and consider structural and non-structural strategies to manage these loads to protect water quality and aquatic life in the Chesapeake Bay? (Pg. 4 – 08/16/2012, Attachment I- 6).

Comment J-13: Screening level estimates are included in charts that evaluate available capacity. Does the available capacity evaluation consider that the Conowingo Reservoir is still trapping? In addition, estimates are based on assumptions in the screening level cost estimates. How are the financial benefit analyses achieved with assumptions being made for estimates? Is there a margin of error available for these estimates? What is the source for the cost estimates related to temporary dewatering sediment?

Attachment J-3

- This analysis is based on planning level sediment management concepts. To fully understand and evaluate effects of any of these concepts detailed designs would be required. Fatal Flaw-Determined by team that strategy should be dropped from consideration.

Comment J-14: What is the basis for these management concepts? What scientific studies and/or data were considered in developing such concepts? According to the summary "…because of amount of variables, representative alternatives were developed to cover ranges of costs each one of these variables could impact." What are those variables and alternatives developed?

- Attachments 2 and 3 on Pgs. 12-13 in Appendix J show the costs by practice across the three states. However, the current information does not make it possible to assess the variation in cost effectiveness of the various urban and agricultural BMPs in meaningful terms, such as the dollars per cubic yard of sediment removal. Importantly, the cost-effectiveness between practice types typically varies by one or two orders of magnitude. Hence, the current analysis aggregates all practices types and reports an overall cost estimate at $3.5 billion in Table 3 (or Table 6-3). Then the report provides an overall average cost effectiveness of $256-$597 per cubic yard in Table 6-6, and seems to imply that this watershed BMP approach is supposedly the most expensive. But this assessment that aggregates all practice types may overlook the high degree of heterogeneity in costs between practice types. (Pg. 35, Appendix 1-7).

Comment J-15: Please explain how such an analysis is beneficial to the DLSRWA.

- Attachment 4 of Appendix J on pp. 29-33 includes detailed information on "Septic Systems". However, septic systems are not discussed at all in the corresponding tables for the cost analysis in Attachments 2 and 3.

Comment J-16: Please provide the cost analyses by different States.

APPENDIX K

Introduction

- Lake Clarke shallowest- averaging 15 feet deep.
- Lake Aldred is the deepest, with greatest depths of 80 to 120 feet.
- The deepest areas of Conowingo Reservoir are located near the dam, depths averaging 55 feet along the Spillway gates and about 70 feet near the turbine gates. (Pg. 4).
- Rolling hills of the Piedmont in the vicinity of the Conowingo Dam above the valley range in elevation from 250 to 400 feet maximum.
- The uplands above the gorge near the vicinity of safe harbor and Holtwood dams rise to about 750 feet in elevation.
- Climate trends in the last two decades have shown wetter conditions on average, than in previous decades. Increased precipitation has produced higher annual minimum flows and slightly higher median flows during summer and fall (Najjar et al., 2010). (Pg. 5).

Comment K-1: Why aren't climate change or climate trends considered in the draft model runs? If there were indeed considered why are the model runs capped at a flow rate slightly above 620,000 cfs.?

- As of 2003, 23 percent of the Chesapeake Bay watershed is used for agriculture and almost 12 percent has been developed. (Pg. 5).
- Water circulation in the Bay is primarily driven by the downstream movement of fresh water in from rivers and upstream movement of salt water from the ocean. Less dense, fresher surface water layers are seasonally separated from saltier and denser water below by a zone of rapid vertical change in salinity known as the pycnocline (CBP, 2013). The pycnocline plays an important role in Bay water quality acting to prevent deeper water from being reoxygenated from above (Kemp et al., 1999). Pycnocline depth varies in the Bay as a function of several factors. It shows general long-term geographic patterns as summarized in Table K-4, but varies over shorter time periods as a function of precipitation and winds. (Page 8) During warm weather months it promotes stronger stratification that can last for extended periods during a year. Conversely, sustained winds in a single direction for several days can cause the pycnocline to tilt, bringing deeper water up into shallows on the margins of the Bay.

Comment K-2: How do any of the models account for this water circulation or wave movement?

- Because of this partial seasonal separation into layers, or strata, the Bay is classified as a partially stratified estuary. Division of surface from deeper waters varies depending on the season, temperature, precipitation, and winds. In late winter and early spring, melting snow and high streamflow increase the amount of fresh water flowing into the Bay, initiating stratification for the calendar year. During spring and summer, the Bay's surface waters warm more quickly than deep waters, and a pronounced temperature difference forms between surface and bottom waters, strengthening stratification. In autumn, fresher surface waters cool faster than deeper waters and freshwater runoff is at its minimum. The cooler surface water layer sinks and the two layers mix rapidly, aided by winds. During the winter, relatively constant water temperature and salinity occurs from the surface to the bottom (CBP, 2013). (Pg. 9).

- USACE and SRBC recognize the Susquehanna River basin as one of the most flood-prone basins in the United States from a human impacts perspective. Flow conditions can vary substantially from month to month; floods and droughts sometimes occur in the same year. Floods can scour large volumes from the river bed and banks, and convey large quantities of nutrients and sediment downstream. (Pg. 11).

- Salinity is an important factor controlling the distribution of Bay plants and animals. Salinity is the concentration of dissolved solids in water and is often discussed in terms of parts per thousand (ppt). In Maryland, Bay surface waters range from fresh in headwaters of large tidal tributaries to a maximum of about 18 parts per thousand (ppt) in the middle Bay along the Virginia border. Salinity varies during the year, with highest salinities occurring in summer and fall and lowest salinity in winter and spring. (Pg. 13).

- The ETM zone is an area of high concentrations of suspended sediment and reduced light penetration into the water column. Each of the Bay's major tidal tributary systems has an ETM zone near the upstream limit of saltwater intrusion. The Susquehanna River ETM zone occurs in the upper Bay main stem. The position of the ETMs changes seasonally and with large freshwater flow events from storms. The ETMs extend further downstream into the Bay during times of year when lower salinities occur and following major storm events, and further upstream when seasonally higher salinities occur. The ETM zone is produced by a complex interaction of physical and biological processes, including freshwater inflow, tidal and wave-driven currents, gravitational circulation, particle flocculation, sediment deposition and resuspension, and biogeochemical reactions. (Pg. 13).

- Tidal resuspension and transport are primarily responsible for the maintenance of the ETM zone at approximately the limit of saltwater intrusion. Generally, fine-grained riverborne sediment in the ETM zones is exported further downstream into the main Bay only during extreme hydrologic events. The mainstem Bay ETM zone occurs in the upper Bay; in this region, most of the fine-grained particulate matter from the Susquehanna River is trapped, deposited, and sometimes resuspended and redeposited.

The mainstem ETM zone acts as a barrier under normal conditions for southward sediment transport of material introduced into the Bay from the Susquehanna River (USGS, 2003).

Eutrophication

- Anthropogenic nitrogen and phosphorus nutrient pollution delivered to the Bay exceeds the Bay ecosystem's capability to process it without ill effect. The Bay's physical character and circulation patterns tend to retain water-borne materials, thus exacerbating the effect of anthropogenic pollution. The Bay's natural capability to buffer the incoming nutrient loads are governed by seasonal stratification and limited tidal mixing rate (Bever et al., 2013). Anthropogenic nutrient pollution to the Bay derives from agricultural runoff and discharges, wastewater treatment plant discharges, urban and suburban runoff, septic tank discharges, and atmospheric deposition of exhaust (CBP, 2013). Water bodies possess a range of nutrient availability conditions. Water bodies possessing ample or excessive nutrients whether from natural or human sources are said to be eutrophic. The Bay became eutrophic because of inputs of large quantities of anthropogenic nutrients. Excess nutrients in the water column from human sources fuel the growth of excess phytoplankton. Zooplankton, oysters, menhaden, and other filter feeders eat a portion of the excess algae, but much of it does not end up being consumed by these organisms. The leftover algae die and sink to the Bay's bottom, where bacteria decompose it, releasing nutrients back into the water, fueling further algal growth. During this process in warm weather months, bacteria consume DO until there is little or none left in deeper bottom waters (CBP, 2013). Within the Bay, nitrogen is the principal limiting-nutrient regulating phytoplankton. The limiting nutrient is that nutrient available in lowest supply in proportion to biological demand. However, phosphorus is the limiting nutrient for phytoplankton growth in low salinity Bay waters in spring. Phosphorus is typically the limiting nutrient in freshwater ecosystems. (Pg. 16).

- Nitrogen and phosphorus actually occur in a number of different forms in the environment that differ in their biological availability and effects on water quality. (Pg. 17). Total nitrogen (TN) includes nitrate, nitrite, ammonia, and organic nitrogen. (Pg. 17).

- Ammonia is the dominant dissolved nitrogen form in deeper waters during warm months. Nitrite is generally unstable in surface water and contributes little to TN for most times and places. Organic nitrogen (mostly from plant material, but also including organic contaminants) occurs in both particulate and dissolved forms, and can constitute a substantial portion of the TN in surface waters. However, it is typically of limited bioavailability, and often of minimal importance with regard to water quality. Conversely, nitrate and ammonia are biologically available and their concentration is very important.

- Total phosphorus (TP) includes phosphates, organic phosphorus (mostly from plant material), and other phosphorus forms. Phosphates and organic phosphorus are the main components of TP. Phosphates tend to attach to soil and sediment where their bioavailability varies as a function of environmental conditions. Dissolved phosphate is readily bioavailable to aquatic plant life, and consequently promotes eutrophication (USGS, 1999). Phosphorus binds to river sediments and is delivered to the Bay with sediment. (Pg. 17).

Comment K-3: What model is used to address how phosphorus is bound to sediments? How are phosphorus levels and its impact addressed in the DLSRWA?

- Nutrient transport in rivers is usually considered in two fractions – that portion conveyed in dissolved form and that portion carried as particulates. Particulates include mineral sediments and plant debris. During downstream transport, bacteria and other stream organisms take up dissolved nutrients and convert them to organic form. When organisms containing these nutrients die, the nutrients return to the water in inorganic form, only to be taken up yet again by other organisms. This cycle is referred to as nutrient spiraling.

- Nutrient pollutants delivered to the Bay vary year to year as a function of amount and timing of precipitation. Wet years deliver greater nutrient pollution to the Bay than dry years. For example, the amounts of nitrogen and phosphorus transported during Tropical Storm Lee (a September 2011 high-flow event) were very large compared to long-term averages for the Susquehanna River over the past 34 years. However, this difference is less pronounced for nitrogen than it is for phosphorus, because on average, a large part of the nitrogen flux is delivered in dissolved form. Specifically, the amounts transported during the Tropical Storm Lee event were estimated to be 42,000 tons of nitrogen and 10,600 tons of phosphorus. For comparison, the estimates of the averages for the entire period from 1978 to 2011 were 71,000 tons per year for nitrogen and 3,300 tons per year for phosphorus (Hirsch, 2012). (Pg. 17).

Comment K-4: How were the phosphorus levels, namely 10,600 tons, generated for Tropical Storm Lee? Did the 10,600 tons number take into account phosphorus bound to sediments?

- Phosphorus is conveyed in rivers as phosphate adsorbed to sediment particles. It is also conveyed bound to calcium, and as organic particles. The processes by which phosphorus is released from sediments is complicated and affected by biological as well as physical chemical processes. In oxygenated fresh water, phosphorus adsorbed to fine-grained sediments remains bound and has limited bioavailability. Under anoxic or hypoxic freshwater conditions, phosphorus becomes more bioavailable, but phosphorus rebinds to sediments if oxygen is again present. In the Bay's saltwater environment, biogeochemical conditions change causing phosphorus bioavailability to differ from in freshwater. As salinities increase above about 3 to 4 ppt, phosphorus bound to sediments is increasingly released and becomes mobile and bioavailable to living resources (Jordan et al., 2008; Hartzell and Jordan, 2012). The uppermost Bay remains generally below salinities of 3 ppt all year, which tends to favor phosphorus immobilization in sediments, but otherwise the Bay is salty enough to allow phosphorus release from sediments (CBP, 2013). (Pg. 19).

- Conowingo Reservoir water temperatures range from about 59°F to 91°F during the period of April through October. The reservoir remains relatively constant in temperature vertically for much of the year, but reservoir water can be up to several degrees cooler at the bottom than at the surface for brief periods. DO in Conowingo Reservoir becomes depleted in waters of the reservoir greater than 25-foot depth under conditions of low river inflow (less than 20,000 cfs.) and warm water temperatures (greater than 75°F). Reservoir DO levels occasionally drop below 2 mg/L (Normandeau Associates and GSE, 2011). USGS collected and analyzed water samples of Conowingo Reservoir outflow during high-flow events during water year 2011 (which ran from October 1, 2010 to September 30, 2011) for this assessment. (Pg. 22).

Comment K-5: How did the models take into account reservoir water temperature? What type of model analysis was used to account for DO levels?

- The Susquehanna River transports large volumes of sediment to the Chesapeake Bay. Two flood events, associated with Hurricanes Agnes (1972) and Eloise (1975), contributed approximately 44 million tons of sediment to the Bay. Recent estimates calculate that the Susquehanna River transports 3.1 million tons annually, depositing 1.9 million tons behind Conowingo Dam with the remaining 1.2 million tons deposited in the Chesapeake Bay (1996-2008 evaluation periods) (Langland, 2009). In the upper Bay, the Susquehanna River is the dominant source of sediment influx, supplying over 80 percent of the total sediment load in the area (SRBC Sediment Task Force, 2001). (Pg. 27).

DECEMBER 9, 2014 PUBLIC MEETING

Comment Public Meeting: The three individuals at the December 9, 2014 meeting at Harford Community College that presented the DLSRWA (Messrs. Bierly, Michael and Bier) suggested that the report will be used to determine who should have responsibility for addressing harm to the Bay caused by sediment scour. The discussion overlooked the decades of harm from scour that already has occurred and the fundamental evolution of the surface solids that now settle in the reservoirs. When the dams were new and the reservoirs behind the dams were deep, clays and silts in addition to the larger grained sands settled in the reservoirs behind the dams. The clays are the easiest sediments to scour as they are the finest grained and lightest solids to settle out of suspension and become more easily resuspended. The clays also probably bond the most phosphorus and other pollutants and nutrients. Silts lie somewhere in the middle and the sands are the heaviest and probably bond the least amount of sediments and nutrients. For decades, the dams have deprived the upper Bay of sands and have allowed the less desirable and more harmful clays and silts to be scoured and flushed into the Bay in deathly quantities during storm events. Such clays and silts also are more likely to become resuspended during turbulent weather in the Bay than the sands. Now, much of the material remaining on the floor of the reservoirs consists of sand, as the clays and silts have been flushed into the Bay for the last 80 years, while the sand, due to particle size and weight, has settled to the bottom and has less frequently been scoured into the Bay. There are studies that confirm these phenomena. Any consideration of responsibility for scour should take into account how the dams already have materially altered and damaged the Bay estuary by depriving it of the more beneficial sand while flushing in the more harmful clays and silts, until the present, when most of what remains to be scoured consists primarily of sand.

Comment Public Meeting: The three individuals at the December 9, 2014 meeting at Harford Community College that presented the DLSRWA (Messrs. Bierly, Michael and Bier) suggested that the report had received favorable peer review. Peer review can take on several formats but it most commonly is understood as review by qualified scientists of written scientific reports to test and to assess the methodology used to reach findings and conclusions and to access the confidence level in/validity of the findings made and the conclusions drawn in the report. It is hard to imagine that the DLSRWA was peer reviewed because the report does not begin to explain the methodology used to derive any findings or conclusions. Only upon reading thousands of pages of appendices can one begin to assess what work was performed, and even then only in the most cursory of manners. For example, the flow chart used to diagram the models used to generate data is cursory. Nowhere is the raw data underpinning different modelling efforts set forth, let alone being adequately explained. If there was any meaningful peer review of the DLSRWA, any report or appendix attached to the report, or any of the findings and conclusions in the report, please identify by name and qualifications the each person who conducted any peer review and attach any written findings conclusions, and input made by each such individual or group of individuals. There should be a peer review document. Please identify and provide a link to such document.

Any questions about the Coalition's comments concerning the DLSRWA may be directed to Jeff Blomquist (jblomquist@fblaw.com or 410-659-4982), Michael Forlini (mforlini@fblaw.com or 410-659-7769) or Chip MacLeod (cmacleod@fblaw.com or 410-810-1381).

EXHIBIT
F

NASA photograph from the Terra satellite, September 13, 2011 (a few days after Tropical Storm Lee) showing sediment plume extending about 100 miles to the mouth of the Potomac River.

The objective of the Clean Chesapeake Coalition is to pursue improvement to the water quality of the Chesapeake Bay in a prudent and fiscally responsible manner – through research, coordination and advocacy.

A picture is worth a 1,000 words...

This NASA satellite image appeared in the August 2012 U.S. Geological Survey report that confirmed the exponential loss of trapping capacity in the Conowingo Dam reservoir, and has since served as a calling card for the Coalition. We added the county jurisdictional boundaries.

Here are the staggering numbers behind the photograph of the 100-mile long sediment plume emanating from the Conowingo Dam a few days after Tropical Storm Lee in September 2011.

<table>
<tr><th colspan="6">Estimated amounts transported into the Bay during this single storm event (over 9 days),
According to the U.S. Geological Survey:</th></tr>
<tr><td colspan="3">42,000 tons nitrogen</td><td colspan="3">10,600 tons phosphorus</td></tr>
<tr><td colspan="3">19 million tons sediment</td><td colspan="3">**4 million tons scoured (at least)</td></tr>
<tr><th colspan="6">According to the UMCES - Horn Point (Cambridge, MD) Survey:</th></tr>
<tr><td colspan="3">115,910 tons nitrogen</td><td colspan="3">14,070 tons phosphorus</td></tr>
<tr><th colspan="6">By comparison (yearly Susquehanna River pollutant loading averages 1978-2011):</th></tr>
<tr><td colspan="2">71,000 tons nitrogen</td><td colspan="2">3,300 tons phosphorus</td><td colspan="2">2.5 million tons sediment</td></tr>
</table>

Pollution reduction targets per EPA Bay TMDL and Maryland WIP (through 2025):

	<u>State WIP Costs (billions)</u>	**<u>State WIP Results (tons/year)</u>**
Stormwater	**$ 7.38**	Nitrogen – **1,100** | **P**hosphorus – **116** | Sediment – **102,370**
Septics	**$ 3.71**	Nitrogen – **620** | **P**hosphorus – **0** | Sediment – **0**
WWTP	**$ 2.36**	Nitrogen – **1,909** | **P**hosphorus – **46** | Sediment – **0**
Agriculture	**$ .928**	Nitrogen – **2,372** | **P**hosphorus – **187** | Sediment – **37,108**
<u>TOTAL</u>	**$ 14.4**	Nitrogen – **6,001** | **P**hosphorus – **349** | Sediment – **139,478**

Learn more at CleanChesapeakeCoalition.com and follow us on Facebook and Twitter.

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MEMORANDUM

TO: Clean Chesapeake Coalition Members

DATE: April 24, 2015

RE: Conowingo Dam Spring Melt 2015 – April 9th - 16th

As predicted the Susquehanna River has recently surged as snow and ice from its northern reaches melted with the warmth provided by the arrival of spring. The Conowingo Dam as a result opened several flood gates during the period of April 9 - 16, 2015 to account for this increased river flow. Not surprisingly this has caused for a sediment plume to appear (as depicted in the below satellite images) in the Upper Chesapeake Bay as the Susquehanna River's load contains significant suspended matter (both sediments and nutrients). The below images, data and descriptions explain the recent 2015 spring melt associated with the Susquehanna River/Conowingo Dam and its impact on the Upper Chesapeake Bay.

Spring Melt Satellite Images[1]

The following select images (April 13th, 16th and 18th were selected because of the image quality- *i.e.*, absence of cloud cover) represent a sediment plume emanating from the Susquehanna River well into the Upper Bay. Additionally, a satellite image representing the total suspended matter on April 18, 2015 is provided.[2]

[INTENTIONALLY LEFT BLANK]

EXHIBIT
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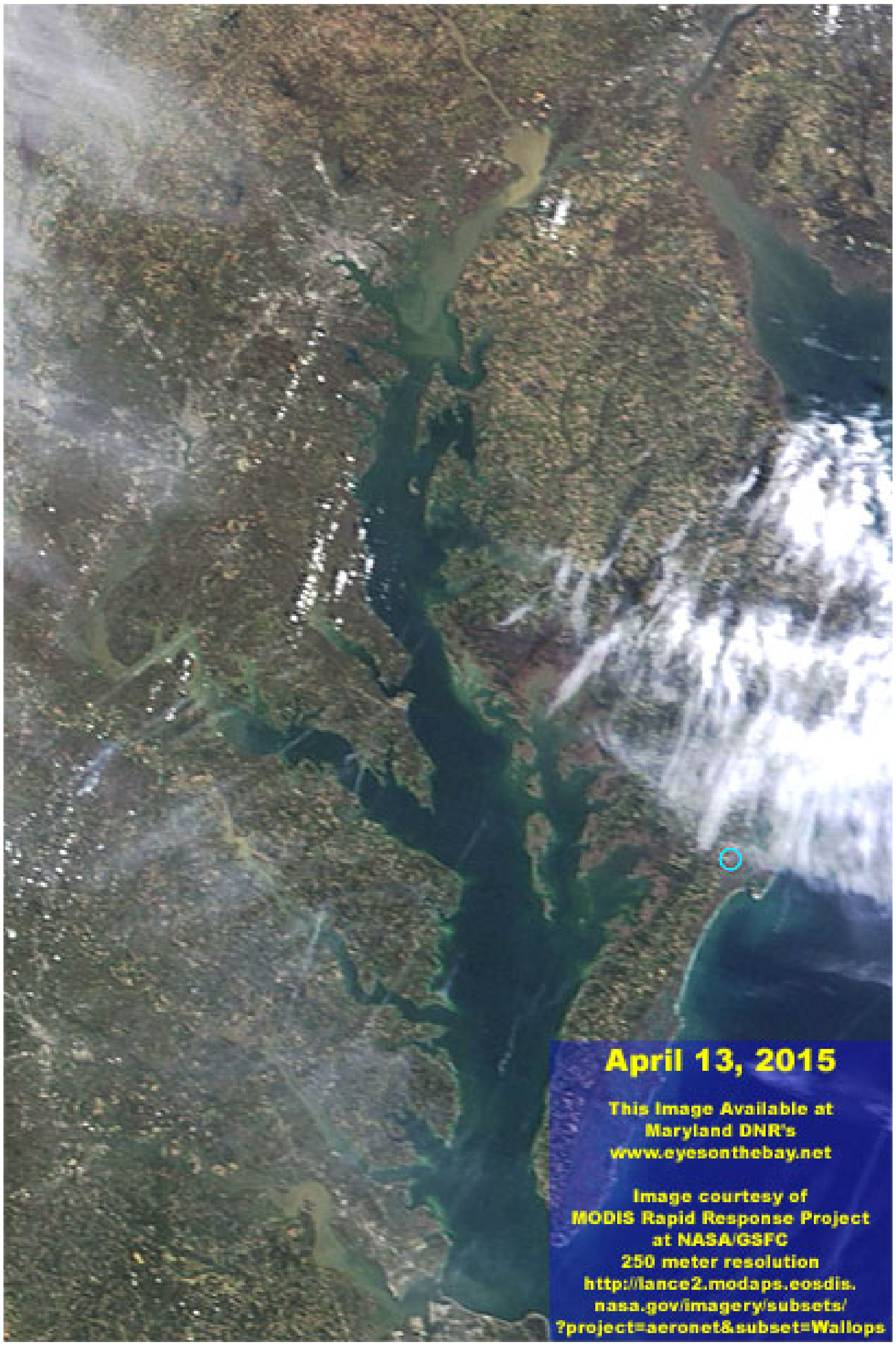
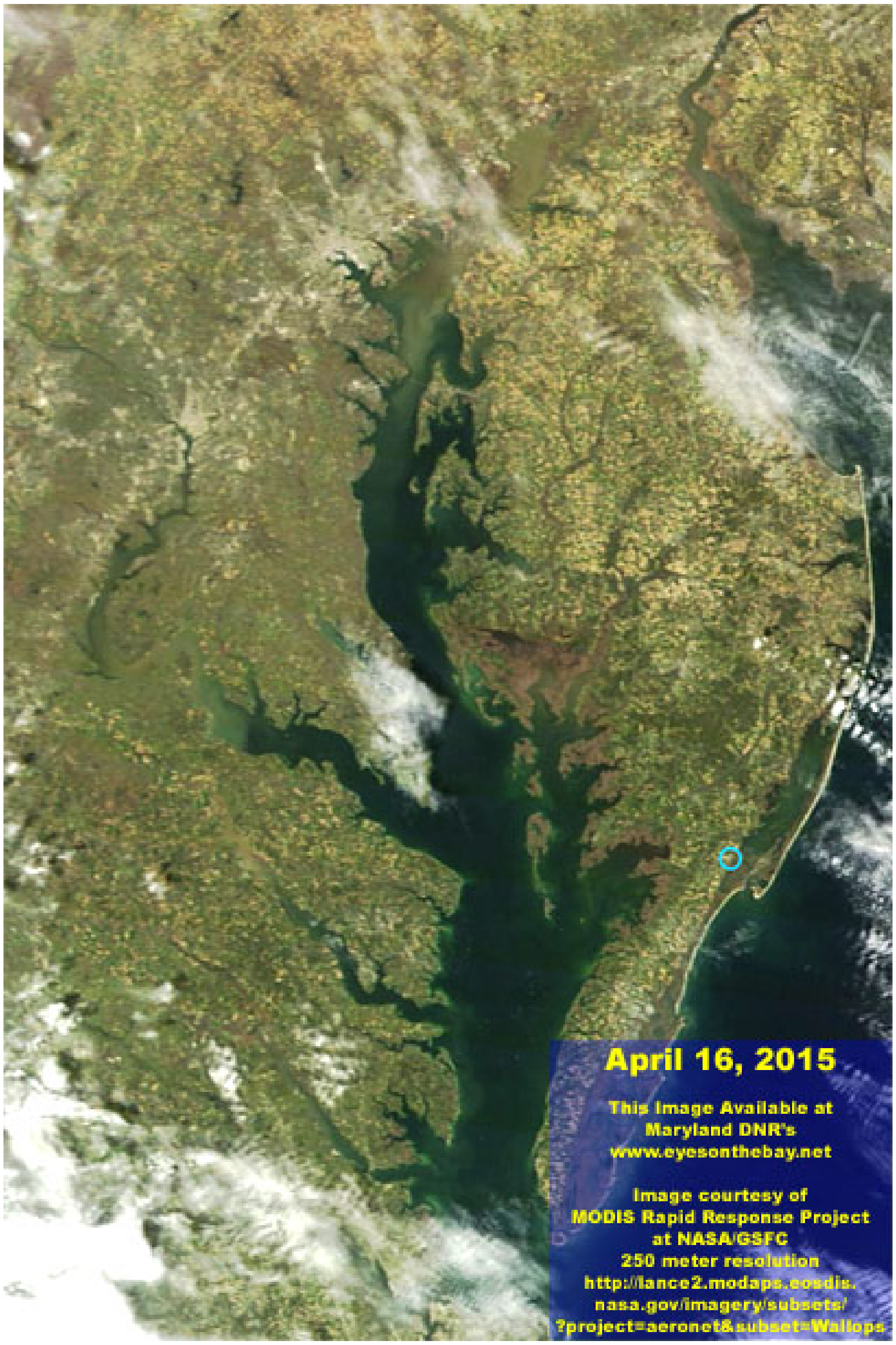
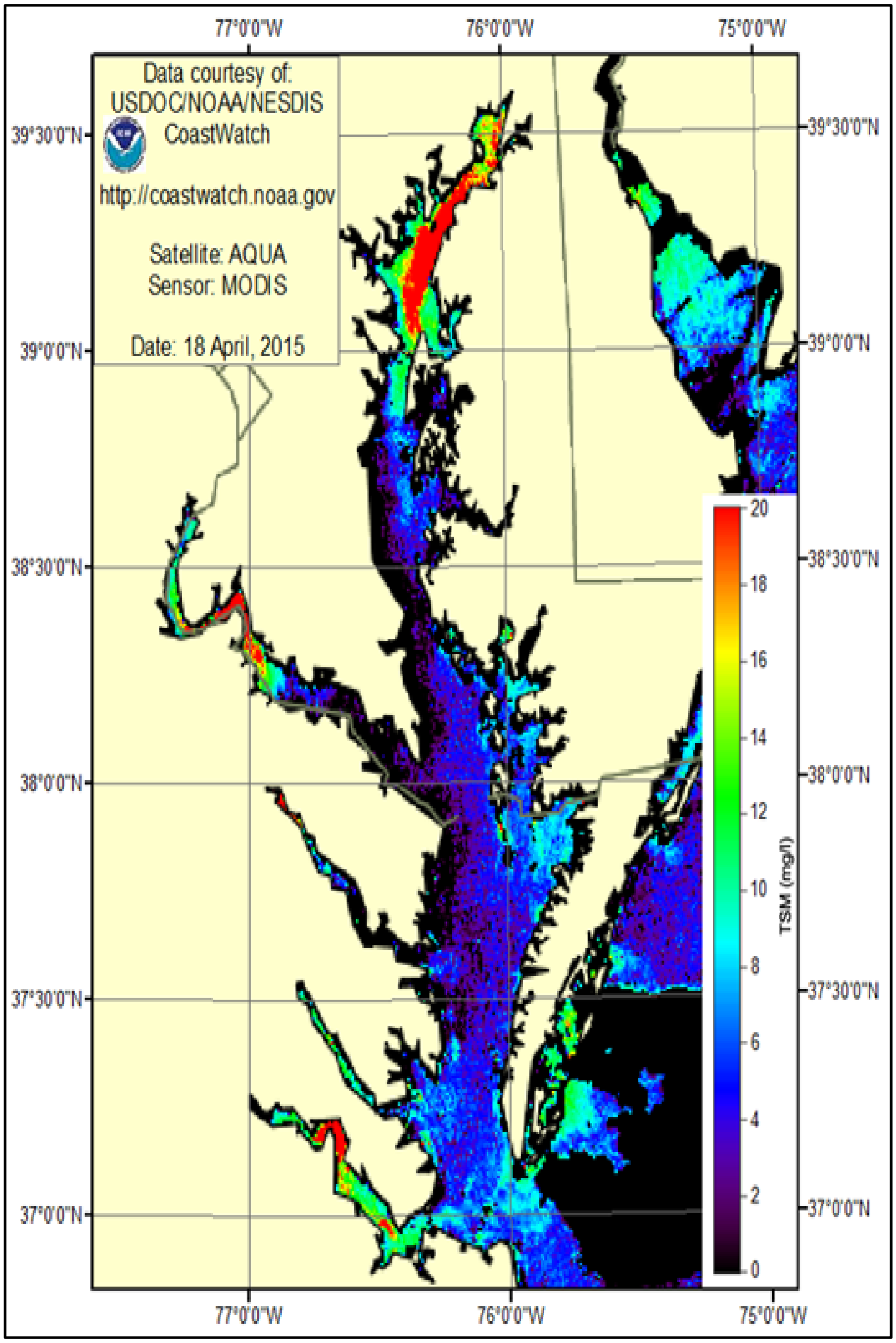
[1] Satellite images courtesy of DNR Eyes on the Bay, available at: http://mddnr.chesapeakebay.net/eyesonthebay/.
[2] This data is courtesy of NOAA CoastWatch, East Coast Node, available at: http://coastwatch.chesapeakebay.noaa.gov/.


April 13, 2015
This Image Available at
Maryland DNR's
www.eyesonthebay.net
Image courtesy of
MODIS Rapid Response Project
at NASA/GSFC
250 meter resolution
http://lance2.modaps.eosdis.
nasa.gov/imagery/subsets/
?project=aeronet&subset=Wallops


April 16, 2015
This Image Available at
Maryland DNR's
www.eyesonthebay.net
Image courtesy of
MODIS Rapid Response Project
at NASA/GSFC
250 meter resolution
http://lance2.modaps.eosdis.
nasa.gov/imagery/subsets/
?project=aeronet&subset=Wallops

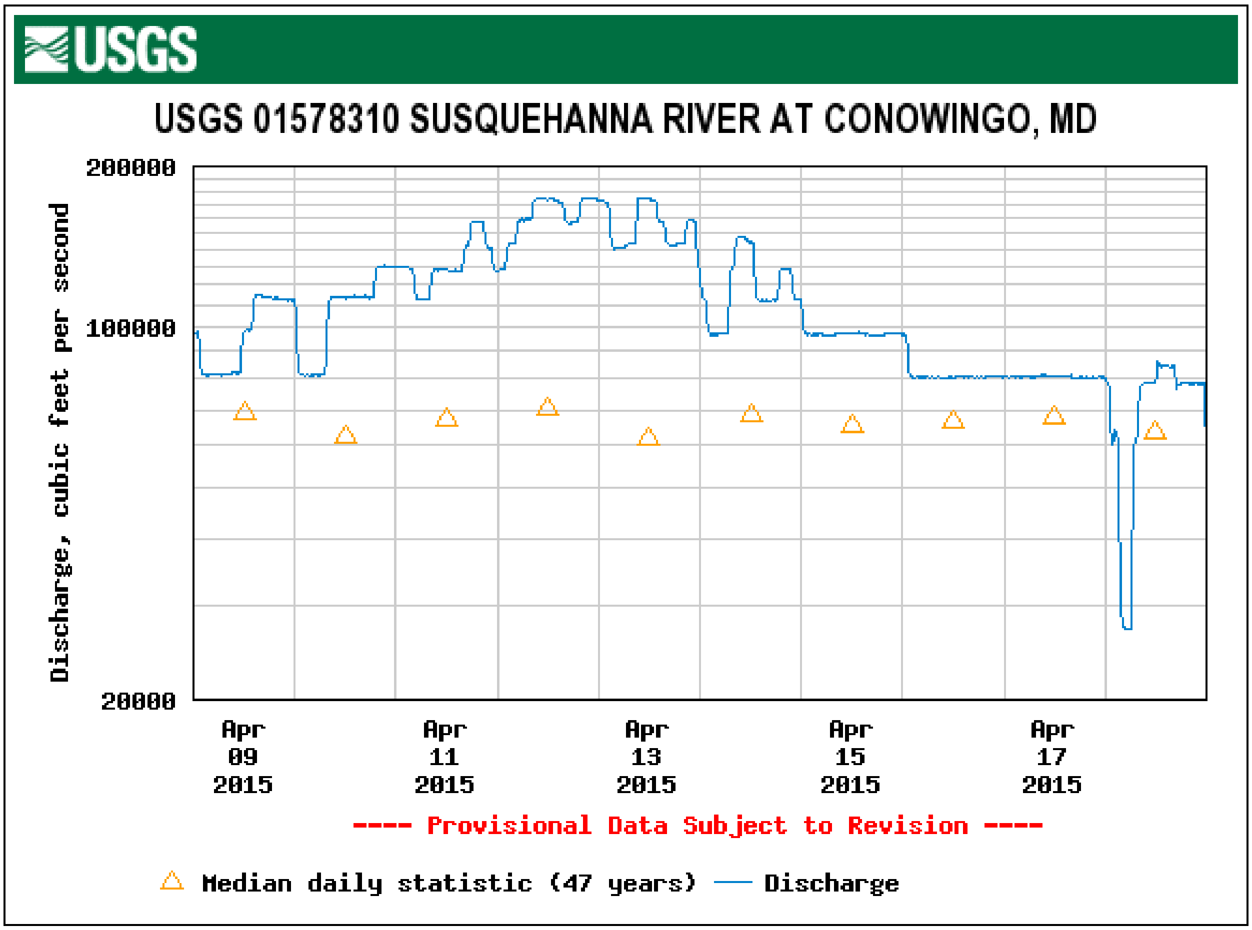

April 18, 2015
This Image Available at
Maryland DNR's
www.eyesonthebay.net
Image courtesy of
MODIS Rapid Response Project
at NASA/GSFC
250 meter resolution
http://lance2.modaps.eosdis.
nasa.gov/imagery/subsets/
?project=aeronet&subset=Wallops


Data courtesy of:
USDOC/NOAA/NESDIS
CoastWatch
http://coastwatch.noaa.gov
Satellite: AQUA
Sensor: MODIS
Date: 18 April, 2015
77°0'0"W
76°0'0"W
75°0'0"W
39°30'0"N
39°0'0"N
38°30'0"N
38°0'0"N
37°30'0"N
37°0'0"N
TSM (mg/l)
20
18
16
14
12
10
8
6
4
2
0

<u>Spring Melt Data</u>[3]

The following select data and respective graphs represent the water flow data that corresponds with the above satellite images. Enclosed as Exhibit A is data for the Susquehanna River at Conowingo Dam for April 9th - 16th, 2015 with river flow monitoring occurring every 15 minutes, every hour and day.

The first graph represents the cubic feet per second (ft^3/s) of the Susquehanna River's water at Conowingo Dam. The peak flow was 175,000 ft^3/s on April 12th and 13th.



It has been determined that scour occurs at discharges roughly greater than 175,000 ft^3/s with concentrations of discharges rising steeply when discharges are above that amount.[4]

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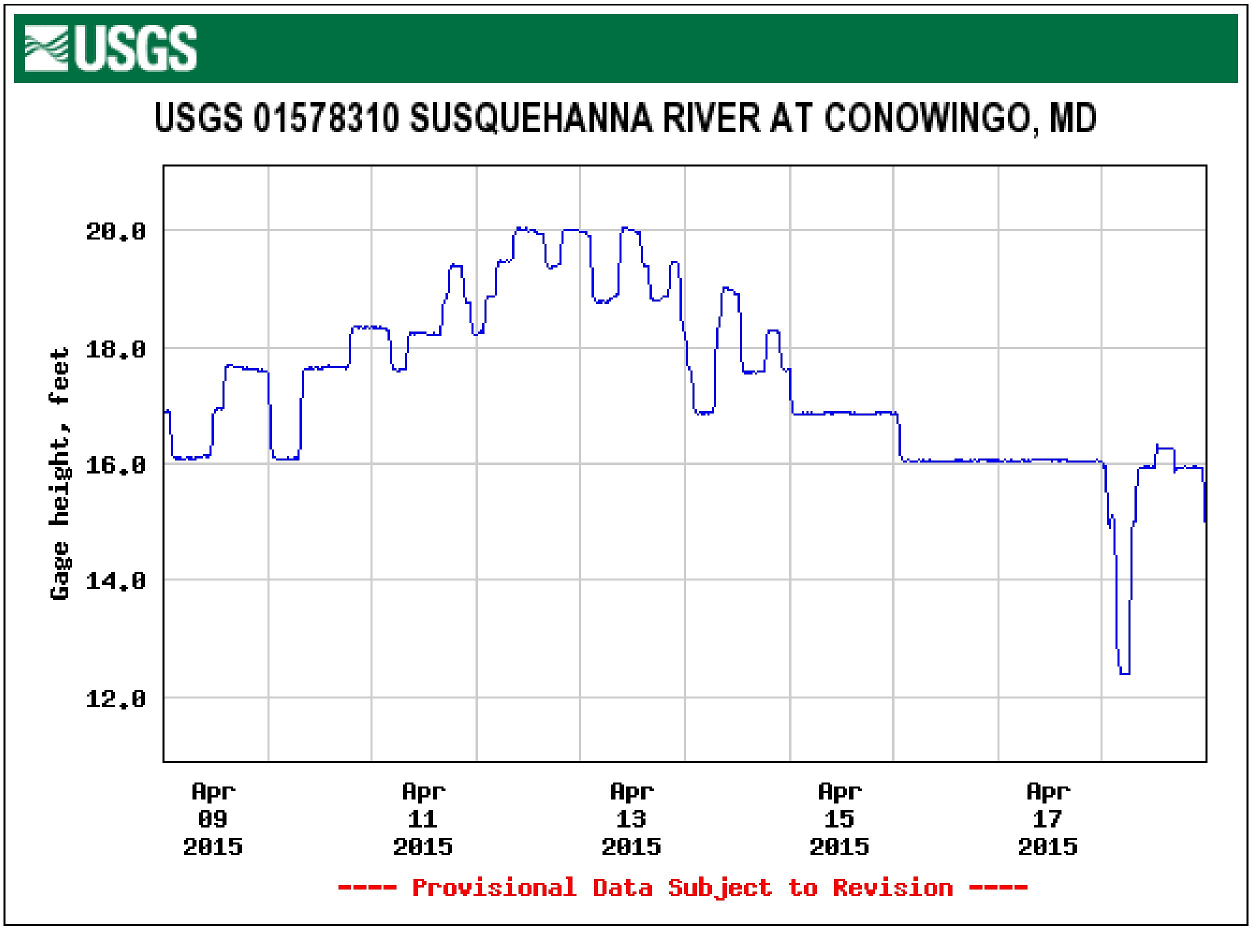
3 Data and graphs courtesy of U.S. Geological Survey Water Science Center, available at: http://waterdata.usgs.gov/md/nwis/uv?site_no=01578310.

4 Hirsch, R.M., 2012, Flux of nitrogen, phosphorus, and suspended sediment from the Susquehanna River Basin to the Chesapeake Bay during Tropical Storm Lee, September 2011, as an indicator of the effects of reservoir sedimentation on water quality: U.S. Geological Survey Scientific Investigations Report 2012–5185, 17 p.

The second graph represents the max gage (water level in feet) level of the Susquehanna River's water at Conowingo Dam. The peak gage level was 20.04' on April 12th and 13th.



The National Oceanic and Atmospheric Administration's ("NOAA") Advanced Hydrological Prediction Service provides that gage levels for the Conowingo Dam of 19' - 21' equates 147,000 ft^3/s - 204,000 ft^3/s, respectively. These were the same levels reached at Conowingo Dam during the recent spring melt. NOAA's instruction provides further that at such amounts Level 1 (20') was reached, which triggers 10-11 gates to be opened, while a Level 2 was nearly reached (21.5'), which triggers 12-15 gates to be opened.[5] Discussion with an Exelon employee revealed that the following amounts of gates were opened on the respective dates:

April 9th - 2 gates;
April 10th - 3 gates;
April 11th - 6 gates;
April 12th - 6 gates;

[5] *See* link: http://water.weather.gov/ahps2/hydrograph.php?wfo=phi&gage=CNWM2.

April 13th - 6 gates;
April 14th - 4 gates;
April 15th - 2 gates; and
April 16th - 1 gate.

Enclosure

Exhibit A – Conowingo Dam Discharge Data April 9th- 16th

Conowingo Dam Sediment Plume (April 8 – 11, 2017)

Per USGS, Susquehanna River flow at Conowingo exceeded 190,000 cfs on 4/8/17; the gage height exceeded 20 ft.

EXHIBIT

H

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Conowingo Dam Sediment Plume (April 8 – 11, 2017)

Per USGS, Susquehanna River flow at Conowingo exceeded 190,000 cfs on 4/8/17; the gage height exceeded 20 ft.

CLEAN CHESAPEAKE COALITION™

Conowingo Matters

The Chesapeake Bay is a national treasure.[i] The reasons to save the Bay are limitless and need not be debated.

The health of the Chesapeake Bay is impacted more by what flows downstream and from other watershed states than from the shoreline, tributaries and human activity in Maryland.[ii]

The Susquehanna River is the largest tributary to the Bay, providing more than 50% of the freshwater to the Bay, and is (where it flows through the Conowingo Dam) the single largest point source of pollution loading to the Bay – 46% of the nitrogen, 26% of the phosphorus and 33% of the sediment that is loaded annually into the Bay as a whole.[iii]

For more than 85 years, the Conowingo Dam has been harnessing the Susquehanna River to produce hydroelectric power for sale while also functioning as a large sediment trap. The 14-mile reservoir above the Dam (aka "Conowingo Pond") is the largest stormwater management pond (8,500 acres; 310,000 acre-feet) in the entire Chesapeake Bay watershed – and is now full.[iv]

Conowingo Pond has lost its trapping capacity (reached "dynamic equilibrium") whereby all that flows to the Dam passes through unchecked (without settling, as if the Dam was not there) into the Chesapeake Bay. At equilibrium, the annual average pollution loadings from the Susquehanna River are exacerbated: a 250% increase in the 2.5 million ton average annual suspended sediments load; a 70% increase in the 3,300 ton average annual phosphorus load; and a 2% increase in the 71,000 ton average annual nitrogen load.[v] Additionally, because Conowingo Pond is full, devastating amounts of accumulated nutrients, sediment and other contaminants are scoured from the reservoir and dumped into the Bay during storm events and in equally harmful proportions now on a regular basis.

The amount of nutrient-laden sediment accumulated in Conowingo Pond, waiting to be scoured into the Bay by the next storm, is enormous at more than 175 million tons – enough to fill about 80 football stadiums.[vi]

In the popular book "Turning the Tide – Saving the Chesapeake Bay" published by the Chesapeake Bay Foundation it was correctly forecasted that "a loss of trapping at Conowingo would cause major problems for water quality in the upper bay and also for dredging the economically vital ship channels serving the Port of Baltimore" - in a section of the book aptly titled "Time Bomb at Conowingo".[vii]

All things considered, dredging Conowingo Pond and upstream reservoirs to regain trapping capacity, and then maintaining those reservoirs, should be priority number one in our Chesapeake Bay restoration efforts as there is not currently available or in play a more cost effective and environmentally beneficial (measurable) single activity to improve the Bay's water quality; and such an undertaking would benefit local economies.

Today, there is no commitment, plan, responsible party or budget to specifically address the devastating amounts of nutrients, sediment and other contaminants that are scoured into the Bay during storm events and in equally harmful proportions now on a regular basis.

Since 1983, numerous federal, state and local government agencies and private organizations have spent more than $15 billion in the name of Bay restoration;[viii] and Maryland alone has committed its taxpayers to spend more than $14.4 billion by 2025 to meet pollution reduction goals set by the U.S. Environmental Protection Agency (EPA).[ix]

EXHIBIT
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The modeling used by EPA to establish the "pollution diet" for the Chesapeake Bay and to apportion cleanup responsibility among the watershed states does not adequately account for the loss of nutrient and sediment trapping capacity in Conowingo Pond and the resulting increased pollution to the Bay from upstream sources. In Appendix T of the 2010 Bay TMDL the trapping capacity of Conowingo Pond is erroneously assumed through 2025; and waiting to recalibrate is unfair to Marylanders.[x]

The State of Maryland's watershed implementation plan (WIP) ignores the pollution attributable to the loss of trapping capacity in Conowingo Pond and commits zero funding to the problem, while aggressively regulating septic tanks, agriculture and stormwater runoff at enormous costs with marginal returns.[xi]

The new Chesapeake Bay Watershed Agreement (signed June 16, 2014), under the auspices of the Chesapeake Bay Program, includes laudable principals, goals, outcomes and management strategies with no mention whatsoever of the once-in-a-generation opportunity to meaningfully help the Bay and protect Bay restoration efforts and expenditures through the relicensing of the Conowingo Dam now underway with the Federal Energy Regulatory Commission (FERC).[xii]

Exelon Corporation has filed for a 46-year federal license to continue operating Conowingo Dam with no requirements whatsoever to dredge or maintain Conowingo Pond to minimize the scouring of nutrients, sediment and other contaminates into the Bay.[xiii] The draft Environmental Impact Statement (EIS) recently issued by FERC suggests more study and no action by Exelon or others to address the downstream impacts from scour, sediment and the resulting harm to aquatic life.[xiv]

The federal relicensing requires Exelon to obtain from the State of Maryland a "water quality certification" pursuant to Section 401 of the Clean Water Act.[xv] Upon issuance of such, the State will have determined that the continued operation and maintenance of Conowingo Dam meets Maryland's water quality standards. To ensure that this most significant tool in the relicensing process is maximized, the State's attention and resources should be marshalled accordingly – not in the direction of costly programs, policies and practices with questionable or marginal pollution reduction benefits and adverse side effects on local economies.

Oysters and submerged aquatic vegetation (SAV) are Mother Nature's most efficient filters for improving water quality, and the most cost effective.[xvi] Addressing the loss of trapping capacity in Conowingo Pond will give oysters and SAV in the Upper Bay a fighting chance.[xvii] Accepting the status quo above the Dam and the shock loadings of sedimentation due to scour as the new normal leaves the Bay's flora and fauna in peril and undermines downstream efforts and expenditures to restore the ecosystem.

It is time to take a step back and look at the big Chesapeake Bay watershed picture, and to recognize the perfect storm of political, economic, governmental, regulatory, environmental and special interest forces – including the power of Mother Nature herself. It is time to reprioritize what we are doing and spending to meaningfully improve the water quality of the Bay. The next big storm could be devastating.

The Clean Chesapeake Coalition is a growing association of Maryland local governments whose elected officials have coalesced to seek improvement to the water quality of the Chesapeake Bay in the most prudent and fiscally responsible manner possible – through research, coordination and advocacy.

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[i] *See* President Obama Executive Order 13508, May 12, 2009.
See link: http://executiveorder.chesapeakebay.net/EO/file.axd?file=2009%2f8%2fChesapeake+Executive+Order.pdf.

[ii] U.S. Environmental Protection Agency, Chesapeake Bay Total Maximum Daily Load (TMDL) for Nitrogen, Phosphorus and Sediment; December 29, 2010, Section 4.1 – Sources of Nitrogen, Phosphorus and Sediment to the Chesapeake Bay: Jurisdiction Loading Contributions. 2009 model estimates: Maryland loadings – 20% of total nitrogen; 20% of total phosphorus; 17% of total sediment).

[iii] *Id*. at Section 4.2 – Sources of Nitrogen, Phosphorus and Sediment to the Chesapeake Bay: Major River Basin Contributions.

[iv] Hirsch, R.M., 2012, Flux of nitrogen, phosphorus, and suspended sediment from the Susquehanna River Basin to the Chesapeake Bay during Tropical Storm Lee, September 2011, as an indicator of the effects of reservoir sedimentation on water quality: U.S. Geological Survey Scientific Investigations Report 2012–5185, 17 p. *See* link: http://pubs.usgs.gov/sir/2012/5185/.

[v] *Id*.

[vi] Testimony of Colonel J. Richard Jordan, III, Commander and District Engineer, U.S. Army Corps of Engineers-Baltimore District; to Senate Committee on Environment and Public Works, Subcommittee on Water and Wildlife, Field Hearing on May 5, 2014 at Conowingo Dam Visitors Center; Chaired by Hon. Benjamin L. Cardin.

[vii] Horton, Tom, "Turning the Tide: Saving the Chesapeake Bay." Island Press, Revised Ed. 2003, pg. 97.

[viii] Jackson, Alex. "Following the money spent on Chesapeake Bay an elusive pursuit." CapitalGazette.com. October 4, 2013. *See* link: http://www.capitalgazette.com/news/environment/following-the-money-spent-on-chesapeake-bay-an-elusive-pursuit/article_bac613d3-fe43-591d-a7d6-a017bec635ae.html.

[ix] Maryland's Phase II WIP, Section I, pg. 56. *See* link:
http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Documents/FINAL_PhaseII_Report_Docs/Final_Documents_PhaseII/Final_Phase_II_WIP_MAIN_REPORT_102612.pdf.

[x] U.S. Environmental Protection Agency, Chesapeake Bay TMDL Appendix T. *See* link:
http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/FinalBayTMDL/AppendixTSusquehannaDams_final.pdf.

[xi] *See generally* Maryland's Phase II WIP. *See* link:
http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/FINAL_PhaseII_WIPDocument_Main.aspx.

[xii] *See generally* Chesapeake Watershed Agreement 2014. *See* link:
http://www.chesapeakebay.net/documents/FINAL_Ches_Bay_Watershed_Agreement.withsignatures-HIres.pdf.

[xiii] *See* Federal Energy Regulatory Commission Docket Number P-405, filing 20120831-5024, submitted August 30, 2012.

[xiv] *See* Federal Energy Regulatory Commission Docket Number P-405, filing 20140730-4001, submitted July 30, 2014.

[xv] Clean Water Act, Section 401(a)(1), 33 U.S.C. § 1341(a)(1).

[xvi] Oyster filtration- *see* link: http://chesapeakebay.noaa.gov/oysters/oyster-reefs.
SAV filtration- *see* link: http://web.vims.edu/bio/sav/AboutSAV.html.

[xvii] *See generally*: Dennison, W.C., T. Saxby, B.M. Walsh (eds.). 2012. *Responding to major storm impact: Chesapeake Bay and the Delmarva Coastal Bays*, pg. 9, concluding that: "The impact of [Tropical Storm] Lee on aquatic grasses at the [Susquehanna] flats was substantial." *See also*: U.S. Army Corps of Engineers, *Chesapeake Bay Oyster Recovery: Native Oyster Restoration Master Plan*, pg. 56, concluding that: "Sediment is a significant threat to oysters. Sediment effectively smothers oysters. Oyster growth must be greater than sediment rates in order for oysters to survive."

Toxins in Conowingo Pond Sediments

A Maryland Department of Natural Resources marine scientist, Brenda Davis, recently stated that toxic sediments from the Conowingo Pond probably contribute to the death of blue crabs in the Chesapeake Bay.[i]

Polychlorinated bi-phenyls ("PCBs") were once widely used as an additive to cooling and lubricating oil in electrical transformers and turbines at power plants.[ii] Such oils typically discharge onto the floor of the power plant during operation and are washed off during routine maintenance operations.[iii] PCBs are a suspected carcinogen that bio-accumulates in human and animal tissue. PCB's do not degrade or break down when released into the environment.

PCBs have been detected in the tissue of fish in the lower Susquehanna River and the upper Chesapeake Bay.[iv] The likely sources of such PCBs are the power plants, including the Conowingo Hydroelectric Plant and the Peach Bottom Nuclear Power Plant, in the lower Susquehanna River.

PCBs probably would be found in the accumulated sediments in the Conowingo Pond if the sediments are tested for PCBs. The U.S. Environmental Protection Agency ("EPA"), in its September 2014 formal comments on the Draft Environmental Impact Statement prepared by the Federal Energy Regulatory Commission ("FERC") in the Conowingo Project, requested FERC to require Exelon Corporation ("Exelon") "to consider the effects of PCB impairment in the Conowingo Po[nd]."[v, vi]

In 2013, Exelon "installed a new state-of-the-art, high performance oil/water separator [("OWS")] system at the Conowingo Hydroelectric Generating Station. The OWS system is designed for the removal of free-floating oil and oily-coated solids from oil-water mixtures."[vii] The OWS was installed at Conowingo Dam to reduce the release of power plant oil and oil contaminated solids to the Susquehanna River. The OWS would not have been installed if such releases were not problematic.

The Susquehanna River Basin Commission has documented that 3 of the 6 sub-basins in the Susquehanna River watershed (the Chemung, Middle Susquehanna and West Branch Susquehanna sub-basins) were home to significant coal mining operations and acid mine drainage ("AMD") were major sources of impairment to Susquehanna River tributaries in those sub-basins.[viii] AMD contributes sediments laden with heavy metals (*e.g.*, arsenic, mercury, copper, lead, chromium and cadmium).[ix] Radionuclides, pesticides and herbicides also can be found in the sediments as a result of the mining, agricultural and power plant operations in the Susquehanna River watershed.[x]

Exelon's hesitance to dredge sediments accumulated behind the Conowingo Dam undoubtedly stems in part from the toxic contaminants likely to be found in the sediments. The quality of the accumulated sediments may also explain the high cost estimates to dredge Conowingo Pond due to expensive disposal options (unfit for routine land application).[xi] The toxic shock to the Bay ecosystem resulting from the scour and release of such contaminated sediments following major storm events has never been studied; but undoubtedly is lethal.

EXHIBIT
J

CLEAN CHESAPEAKE COALITION

[i] "Panel discusses blue crab's decline," Henley Moore, The Star Democrat. Dated September 23, 2014. *See* link: http://www.stardem.com/news/local_news/article_bc637668-4693-51b1-b25c-2442f99c6450.html#.VCMSM1qryYw.twitter

[ii] *See* "PacifiCorp Wraps up Cleanup at Bigfork Hydroelectric Plant," Katrin Frye, MTPR News. Dated March 6, 2012. *See* link: http://mtprnews.wordpress.com/2012/03/06/pacific-corps-wraps-up-. *See also* "Lessons of the Elwha River: Health Hazards During Dam Removal," Wendee Nicole, Environmental Health Perspectives. Vol. 120, No. 11, dated November 2012. *See* link: http://ehp.niehs.nih.gov/120-a430/. "PCB contamination addressed, Peninsula Clarion," Doug Loshbaugh, Peninsula Clarion. Dated August 30, 2000. *See* link: http://peninsulaclarion.com/stories/083000/new_0830000001.shtml.

[iii] *Id*.

[iv] Source Water Assessment and Protection Report, Perryville, Contract No. V00P1200457. Produced for the Maryland Department of the Environment, at pg. 35. Dated May 30, 2003. *See* link: http://mde.maryland.gov/assets/document/hb1141/harford/harf_toxics.pdf.

[v] September 29, 2014, letter from U.S. Environmental Protection Agency Region III John R. Pomponio to Federal Energy Regulatory Commission Secretary Kimberly D. Bose. *See* Submittal 20140930-5066, FERC Project Nos.: 1888-030, 2355-018 and 405-106. Filed September 29, 2014.

[vi] Exelon is the current owner/operator of Conowingo Dam.

[vii] 2013 Exelon Corporation Sustainability Report, at pg. 51, "Protecting Water Quality at Conowingo." *See* link: http://www.exeloncorp.com/assets/newsroom/docs/CSR/index.html.

[viii] *See*, *supra*, FN iv, at 11, 13-14, 25-26, 37.

[ix] *Id*. at 26, 37, 44.

[x] *Id*. at 32-34, 35, 37, 44.

[xi] Colonel J. Richard Jordan, III, Commander and District Engineer, U.S. Army Corps of Engineers - Baltimore District stated that to dredge back to 1996 levels it is estimated to "cost somewhere between a half and $3 billion…" *See* transcript from May 5, 2014, U.S. Senate Committee on Environment and Public Works, Subcommittee on Water and Wildlife Field Hearing: "Finding Cooperative Solutions to Environmental Concerns with the Conowingo Dam to Improve the Health of the Chesapeake Bay," at pg. 35.

FOR CONCERNED CITIZENS and LEGISLATORS

Clean Chesapeake Coalition Advocates for Conowingo Pond Dredging

The Conowingo Dam (the "Dam") converted the lower Susquehanna River into a large stormwater management pond that Exelon, the Dam's owner, calls the "Conowingo Pond." The Dam widened the natural course of the river and increased the depth of the river. Widening and deepening the river slowed the rate of flow of water in the river, which allowed suspended solids in the river to settle (fall out of suspension) on the bottom of the reservoir and become "trapped" in the same manner that a stormwater management pond "traps" sediments.

Like all stormwater management ponds, the Dam has altered the otherwise normal or natural flow of water in the Susquehanna River. Like all stormwater management ponds that have not been maintained (*i.e.*, periodically dredged of the sediments that accumulate in the artificially created reservoir), during significant storm events, accumulated sediments have been scoured from the bottom of the pond and dumped in mass below the Dam, shocking the Maryland portion of the Chesapeake Bay with a blanket of deadly sediments.

Sediment Scoured From The Conowingo Reservoir During Significant Storm Events[1]

Storm	Year	Month	Peak Flow Cu^3/sec	Volume of Sediment Scoured into Bay (Million Tons)
Hurricane Agnes	1972	June	1,130,000	20
Hurricane Eloise	1975	September	710,000	5
Unnamed	1993	April	442,000	2
Unnamed	1996	January	909,000	12
Hurricane Ivan	2004	September	620,000	3
Unnamed	2011	March	487,000	2
Hurricane Irene	2011	July	Unmeasured	Unmeasured
Tropical Storm Lee	2011	September	778,000	4
Hurricane Sandy	2012	October	Unreported	Unreported

[1] Jeffrey Brainard, *Big Year for Bay Storms, Bad Year for Bay Sediment?*, Chesapeake Quarterly Vol. 10 No. 4, Dec. 2011. See link: http://www.mdsg.umd.edu/CQ/V10N4/main1/. *See also The Impact of Sediment on the Chesapeake Bay and its Watershed*: U.S. Geological Survey, June 3, 2005. See link: http://chesapeake.usgs.gov/SedimentBay605.pdf.

EXHIBIT
K

Billions of taxpayer dollars have been spent to dredge the navigable shipping channels in the upper Bay and the channels into local marinas that have been clogged with sediments. The largest source, if not the sole source, of those sediments is the Susquehanna River, including scour from the bottom of the Conowingo Pond. Economically and environmentally, those sediments should be dredged from the pond behind the Dam where they have accumulated (approximately 9,000 acres or 3,600 hectares), not after they are dumped into the Bay and spread across approximately 4,479 square miles.

Exelon, a company with over $30 billion in annual revenues, receives at least two benefits from the Dam: (1) it produces 572 megawatts of electricity, which is enough electricity to power an average of 572,000 or more homes; and (2) it receives renewable energy credits that may be used or sold to offset air emissions from power plants that burn fossil fuels.

Sediment Loading From Storm Event Scour In Comparison to Average Annual Sediment Loading from Susquehanna River

Storm	Year	Avg. Annual Sed. Load from Susquehanna River (Million Tons)	Sed. Load From Scour (Million Tons)	% of Avg. Annual Load from Scour
Hurricane Agnes	1972	1.5	20	1,333%
Hurricane Eloise	1975	1.5	5	333%
Unnamed	1993	1.5	2	133%
Unnamed	1996	1.5	12	800%
Hurricane Ivan	2004	1.5	3	200%
Unnamed	2011	1.5	2	133%
Tropical Storm Lee	2011	1.5	4	266%
Hurricane Sandy	2012	1.5	Undetermined	Undetermined

The photographs below were taken within 2-4 days after Tropical Storm Lee in September 2011.

Scour during significant storm events occurs in less than one week. Thus, in a matter of days, scour from the Conowingo Pond during a significant storm has added anywhere from 133% to 1,333% more than the average annual sediment loading from the Susquehanna River. Such loading results in a big die-off of oysters and underwater grasses in the Bay north of the Choptank River. In 1972, up to a meter of sediments was added to the floor of the upper Bay; two-thirds of that sediment was attributed to scour from the floor of the lakes and reservoirs behind the three dams in the lower Susquehanna River. During Tropical Storm Lee, over two inches of sediments were deposited on the floor of the upper Bay. In short, the shock effect of this rapid loading of scoured sediments is devastating to all fauna that cannot flee (swim) to the lower Bay and to all SAV in the upper Bay. The oysters and SAV in the upper Bay and the upper Bay tributaries have never recovered from the devastation caused by the scour from Hurricane Agnes. SAV in the Susquehanna Flats was killed to pre-1985 levels (thousands of acres of SAV were killed) as a result of the two storm events in 2011.

The Dam traps the best sediment - sand - and releases the most damaging sediments - clay and silt - into the Bay. The Bay has thus been deprived of sand that is necessary: (1) to hold the roots of SAV during storm events; (2) to support the shell beds of oysters; (3) to fortify shorelines and thus reduce erosion; and (4) to cover and suppress the clays and silts that are washed into the Bay so that those clays and silts (a) do not continue to emit phosphorus and nitrogen bound to them in the Susquehanna estuary, (b) do not continue to agitate into suspension and cloud the Bay waters; and (c) do not deprive Bay flora and fauna of needed sunlight and habitat.

If the Conowingo Pond is not dredged and maintained, the Bay will never recover. Coalition members have intervened in the relicensing of the Dam to urge the Federal Energy Regulatory Commission (FERC) to place conditions on the license to be issued that will require Exelon to dredge and maintain the stormwater management pond created by the Dam so that a blanket of deadly sediments cannot be scoured from the bottom of the reservoir and deposited in the Bay now with regularity and in devastating proportions during significant storm events.

The Coalition observes that the science underpinning the points being made all comes from federal agencies and institutions funded by federal agencies and federal tax dollars. The Coalition hopes that FERC will act consistently with federally conducted and federally funded studies, unless it is able to offer a scientifically based rationale for why such studies are invalid or unreliable and undeserving of due consideration in the relicensing of the Dam.

The Coalition observes that significant federal financial resources have been devoted to dredging below the Dam. Federal resources should be directed to the capture of sediments above the Dam before such sediments are widely dispersed over the Bay. It would be more cost effective to capture sediments above the Dam than below. To the extent that dredging of the Conowingo Pond will reduce the federal funds required to dredge the upper Bay in order to keep the Port of Baltimore and the stream of marine commerce viable, a portion of such savings could equitably be directed to assist Exelon with the cost of dredging and maintaining the Conowingo Pond.