Testimony of the Lower Susquehanna Riverkeeper in SUPPORT of House Bill 1465

March 4, 2020

Dear Chairman Barve and Members of the Committee,

As the Lower Susquehanna Riverkeeper, I thank you for this opportunity to submit testimony in support of HB1465.

1. Threats to the Susquehanna River & Chesapeake Bay

Since 1928, Conowingo dam has dramatically altered the Susquehanna River's flow patterns, holding back sediment and nutrients and preventing it from moving downstream at natural rates, while preventing the migration of many species of fish such as the American shad and American eel, in exchange for hydroelectric power that generates private profits for Exelon. Historically, the Susquehanna River has transported sediment, from 10 million tons per year (in the 1930s) to under 3 million tons per year (2000s). Part of the sediment, and associated pollutants including nitrogen and phosphorus, have entered the Chesapeake Bay, while the remainder has been trapped behind the lower Susquehanna River dams. Scouring of sediment from behind Conowingo Dam into the Chesapeake Bay and the loss of its sediment retaining capacity represent two imminent and substantial threats to the bay.

The first threat is commonly referred to as "dynamic equilibrium." Dynamic Equilibrium is the point at which the amount of sediment flowing into the reservoir equals the amount leaving the reservoir, and the stored volume of sediment is relatively static. As Conowingo Reservoir has already reached dynamic equilibrium we see a massive increase in the annual average output of sediment and phosphorus to the Chesapeake Bay. The annual load of sediment from the Susquehanna to the Chesapeake has increased, perhaps as much as an additional 2 million tons. Along with this sediment, we will see an additional 30 to 40% increase in phosphorus and a 2% increase in nitrogen. These increases, if not mitigated, will affect aspects of the Chesapeake Bay health and management from the size of dead zones, to feeding and breeding capabilities of aquatic species (including crab and oysters), to channel dredging frequency and costs.

The 2nd threat to complement dynamic equilibrium is called "catastrophic pulse." During 4 days in 1972, the flood waters of Tropical Storm Agnes transported 4 years-worth of sediment and pollutants down the Susquehanna River from New York and Pennsylvania. When the flood waters reached the lower Susquehanna River dams the waters scoured another 8 years of pollutant bearing sediment that had been trapped in the reservoir behind the dams (much from Conowingo). This "catastrophic pulse" of 12 years-worth, or 30 million tons of sediments combined with the surge of freshwater to inflict the biggest single damaging event ever recorded in the Chesapeake Bay. Over the past 40 years sediment has accumulated behind the dam to a level exceeding 1972 levels, creating a threat of damages even greater than that experienced in 1972. Over the next 40 years there is a 33% chance of a 100-year return interval storm event

similar to Agnes. Scientists agree that the question is not if a "catastrophic pulse" will occur again, but only a matter of when.

Hydroelectric dams serve one purpose, and that is to produce power. They do not serve as a best management practice for any watershed, as Exelon has repeatedly claimed it has throughout this relicensing process. In fact, there are considerable risks since the Dam's reservoir is now full. The Bay Program's Scientific and Technical Advisory Committee studied the impacts of increased sediments from the Susquehanna River on the Chesapeake Bay. According to the scientists the consequences includes increased amounts of phosphorus reaching the middle portions of the Chesapeake Bay. Increased turbidity in the Bay and faster sedimentation everywhere in the Upper Bay, especially in navigation channels, which would increase the need for channel dredging. Adverse impacts on the recovery of underwater grass beds because the sediment would reduce the amount of light reaching the plants. Benthic (bottom-dwelling) organisms would suffer increased mortality and reduced reproduction. Those that aren't killed would have to spend more energy to keep from being buried. Young oysters are especially sensitive to sediment deposition. Fish might be impacted as increased sediment could affect their feeding, clog gill tissues and smother eggs. Siltation could also result in habitat alterations, and increased turbidity may change the abundance of planktonic prey important for larval and juvenile fish. The Conowingo Dam exacerbates these threats.

2. Sediment/Nutrient Scour & Flow

When speaking about scour, Exelon's lead attorney David Bruin incorrectly stated that "Scour has no bearing on the dams operations. There is no science that shows the dam is causing harm to the bay." That statement is blatantly false in saying that a 94 foot tall Hydroelectric Dam, which has a reservoir full of harmful sediment and nutrients ready to be scoured and delivered downstream like a loaded cannon, doesn't cause any harm to the Chesapeake Bay. Anytime the flood gates open at Conowingo Dam, it causes harm to the River and Bay. After high flows in the summer of 2018, many captains all around the bay indicated that their businesses ceased to operate due to sediment and nutrient loads coming from the Conowingo Dam. And let's not forget what happened during Hurricane Agnes.

Researchers studied the effects of sediment transport in relation to flow using various models outlined in the study titled Lower Susquehanna River Watershed Assessment (LSRWA). However, decision makers cannot rely on the LSRWA because of its serious shortcomings. The LSRWA used a "daisy chain" of models to produce estimates and make predictions about future conditions related to the Conowingo Dam Project's sediment discharges, with output from one model fed into the next model in the series. At each stage, the modelers made choices that resulted in under-estimations of sediment quantities and therefore underrepresented potential sediment impacts and associated nutrient impacts on the Chesapeake Bay.

The LSRWA modelers did not model a 25-year, 50-year, 75-year, or 100-year return interval flow event, which have a high to reasonable chance of occurring during the license period**.** The decision not to model and study the effects of a larger return interval flow event was a serious omission in the LSRWA. Because the relationship between sediment concentration and flow is exponential, a 50-year, 75-year or 100-year return interval flow event would have produced

sediment scouring effects substantially greater than storms modeled by the LSRWA modelers. Given this omission, nobody knows what will happen to the Bay if a large storm hits the watershed, which was the essence of the LSRWA. To not include those modeling efforts, was disingenuous to this entire relicensing process and downplayed the true harm the dam poses to the River and Chesapeake Bay.

Also, The LSRWA modelers underestimated the effects of the flow events they modeled by using *averages* to represent peak flow conditions and associated sediment concentrations. Both the USGS and the Corps' models represented "peak" Tropical Storm Lee conditions based on *daily average flow* rather than using other methods of calculating peak conditions, a choice that caused the LSRWA to underrepresent the storm's effects. In particular, while the highest daily average flow recorded during Tropical Storm Lee was 709,000 cfs, the highest *24-hour running average flow* was 746,000 cfs, and the highest *instantaneous flow* was 778,000 cfs. Similarly, for one part of their analysis the Corps modelers represented Tropical Storm Lee by its *storm average flow*, which was just 632,000 cfs. These choices likely explain why the models predicted sediment quantities that were lower than the best available estimates or actual measured data suggested. The consequences of these choices were substantial because the relationship between flow and transport of sediment is an exponential, not linear, relationship. Had the LSRWA modelers represented these storms using a more appropriate measure of peak flows, because of the exponential relationship they would certainly have predicted much greater sediment and nutrient effects. Instead, the LSRWA models presented an unjustified rosy picture of the likely effects of future high-flow events.

Furthermore, it's important to note that the LSRWA modeling efforts indicate that the scour threshold for the current reservoir condition ranges from about 300,000 cfs to 400,000 cfs, with the threshold for mass scouring occurring at about 400,000 cfs, which represents a 4- to 5-year return flow event. The term mass scouring refers to the flow magnitude that results in very high erosion rates where significant high mass transport from the bed occurs. However, the often-cited 400,000 cfs value originated from Gross et al. (1978), cited by Lang (1982), and was based on a 1-year comparison of sediment loads at Harrisburg, PA, (upstream of the Marietta gauge) and Conowingo, assuming that the threshold occurs when loads at Harrisburg are lower than at Conowingo. This comparison necessarily assumed no sediment inputs/outputs between these two gauges, ignoring several small tributaries and perhaps more importantly the two reservoirs upstream of Conowingo. More recent work suggests that the scour threshold has decreased with Reservoir infill and now could be as low as 175,000 cfs (Palinkas, 2019)

Additionally, the LSRWA modelers did not properly evaluate the effects of a large flow event on the SAV growing season. The LSRWA modeling considered the effects of sediment discharges to the Chesapeake Bay during the months of January, June, and October. The modelers made this choice despite the fact that the 1967-2013 historic flow record shows there were more days at or above the scouring threshold during March, April, and May than all other remaining months. As a result, the SAV growing season was largely excluded from the analysis.

The inconclusiveness of the LSRWA and its inability to accurately forecast potential scour effects of the Dam remains to be a significant issue. Funding for resiliency initiatives must be greatly increased by Exelon in the settlement. Hypothetically speaking, if this settlement is

entered as agreed upon and we receive an Agnes level storm in the next 10 years, the millions of dollars of damage that the Dam will create in the Bay will not be properly mitigated for under this settlement. It provides grossly insufficient funding to account for extreme weather events that will cause harm to downstream water quality.

3. **Dredging**

When dredging is performed (hydraulically or mechanically), any contaminant attached to the sediment could be released during placement. To predict the release of contaminants, elutriate tests can be performed. The standard elutriate test is used to predict the release of contaminants to the water column resulting from open water placement. The modified elutriate test is used to evaluate the release from a confined disposal facility. The results will vary depending on the grain size of the material being dredged. Since the LSRWA was a broad assessment of alternatives, elutriate tests **were not** performed on the potential dredged material. If specific dredging and placement sites are investigated in the future, then it is recommended that these tests be done at that time. The LSWRA states that increasing or recovering sediment storage volume of the reservoirs via dredging or other methods is possible, and in some cases can effectively reduce sediment and associated nutrient scour. (Lower Susquehanna River Watershed Assessment, MD & PA, 2015)

The LSRWA claims that dredging will offer little value in offsetting sediment/nutrient load based on the models used in the study. However, considering the models' inputs are flawed and there are discrepancies in its methodology, it is inaccurate to claim dredging will have no significant effect. Also, the LSRWA is inconclusive is determining the effects of long-term dredging. It's critical to mention the deficiencies of the LSRWA as researchers used the models in the study to determine if dredging is a viable option. Unfortunately, due to the shortcomings of the LSRWA study stated above we cannot rely on the conclusions suggested in the study but must rely on those who have experience in the field of dredging and time-tested proven methods of successful implementation. Much of the several hundred million cubic yards of sediment dredged each year from U.S. ports, harbors, and waterways could be used in a beneficial manner, such as for habitat restoration and creation, beach nourishment, aquaculture, forestry, agriculture, mine reclamation, and industrial and commercial development.

Dredging was a concept that was shunned among researchers due to its high cost estimated at over $250 million per year to dredge an appropriate amount to offset loads coming in. However, due to the inconclusiveness of the LSRWA, those researchers cannot presume dredging the Conowingo Reservoir wouldn't be beneficial. In the proposed settlement, Exelon will provide a mere $500,000 which is allocated to a "sediment disposal study," not actual dredging. In this settlement, Exelon will put forth zero funding to maintain its reservoir capacity over the next 50 years. It is Exelon's absolute responsibility to address the infill of sediments and nutrients which is trapped behind their dam. The loss of trapping capacity and catastrophic pulse are the largest threats to the Chesapeake Bay. Actions need to be taken now to offset potential scour and Exelon must pay for routine dredging as part of the settlement agreement in addition to the sediment disposal study.

We have received excellent feedback on dredging the Reservoir by a highly respected company, Harbor Rock. HarborRock provides an environmentally friendly and sustainable dredged material management solution for the Conowingo Reservoir and a sediment and nutrient solution to the wider Chesapeake Bay ecosystem. HarborRock's state-of-the-art process can effectively destroy organic compounds, is designed to meet all existing air emissions standards, and will be routinely and accurately monitored. The end products are proven to be inert and pass all environmental tests. The facility will supply aggregate to construction markets by either truck, rail, or barge. HarborRock is the only proven innovative and environmentally sustainable management solution to the dredged material management problems facing the Chesapeake Bay that provides measurable environmental and economic development benefits in a fully sustainable way.

HarborRock has estimated the capital and operating costs for a reuse facility sized to remove enough sediment to meet the necessary nutrient reduction mentioned in the Conowingo Watershed Implementation Plan. HarborRock states that an all-inclusive reuse fee which includes dredging, reuse and sale of the final products will cost $41 million per year. This all-in cost is drastically lower than the $257 million which was suggested in previous reports. According to HarborRock, Hydraulic dredging, when the Dredge is in place, costs about $1.5 to $2.0 per Cubic yard with a CY being nominally 25% solids. HarborRock is budgeting about $800,000 per year as the operating cost for dredging. This figure does not include the capital costs for the Dredge, docks etc. A big cost component of dredging is the mobilization and demobilization of the Dredge itself. This will be especially true at Conowingo, given the fact a Dredge can't be pulled or sailed into place and road access is tough. Therefore, HarborRock is envisioning having to assemble the Dredge alongside the Reservoir and floating it into service on the Reservoir. To the dredging industry, dredging the Conowingo Reservoir is not a big job as compared to dredging a port or major waterway, river or channel for maritime commerce

By their calculation, nitrogen is the limiting nutrient, meaning more phosphorous will be removed than needed to meet MDE's requirement. In fact, over 153 tons in excess will be removed. At the same rates being charged Exelon, **the value of these credits is over $83 million/ year – twice the cost of the HarborRock reuse fee!**

As a service provider to Exelon, the State of Maryland or both:

I. HarborRock will privately finance, build, own & operate a $100+ million facility that will dredge the Conowingo Reservoir and convert the sediment into an inert lightweight aggregate (LWA), and;

II. <u>For less than the $41 million/year estimated for the Phase III Susquehanna River Basin WIP, LWA Reuse will:</u>

    a) Achieve Maryland's previously mandated goals for Exelon at the Conowingo Dam;

    b) Achieve Maryland's Phase III Watershed Implementation Plan (WIP) for the Susquehanna River Basin, and;

c) Create an additional 153 tons/year of phosphorous reductions available for sale, valued at $83 million/year;

d) Provide metered data to verify & quantify reductions in nutrients and contaminants in real-time;

e) Be "No-risk" to Maryland. The LWA Reuse fee will be indexed to the quantity of nutrients reduced. Maryland will only pay for what it actually gets;

f) Convert clean or contaminated sediments of varying properties into inert marketable products;

g) Create over 65 family-wage manufacturing jobs and over 200 in-direct jobs.

4. Final Thoughts

The Susquehanna River is a public resource and should not be sold off to a private company for exclusive use without ensuring that the impacts to the public have been properly mitigated. This bill will level the playing field, as MDE will not be able to blindly waive their right to a 401 water quality certification in the proposed settlement. The 401 water quality certification issued in April 2018 has substantive provisions that must be taken into account in this settlement. It would hypocritical for MDE to waive its right, in addition to setting horrible precedent for the state and the rest of the country. Again, the settlement provides grossly insufficient funding to mitigate the dam's operations over the next 50 years. This simply cannot happen as the settlement provides roughly $61 million over the license term while the substantive Water Quality Certification required over $8 billion over 50 years. It's worthy to note that Exelon's gross revenues were over $34 billion in 2019 with net income above $3 billion and free cash flow over $6 billion. Given their profitability, a company this size should be giving back to the environment and its people what has freely been given to them, rights to a public resource for pure profit. And given their profitability, increased funding should not be an issue for Exelon. They remain to be the most lucrative utility company in the entire country and must pay their fair share for exclusive use of the Lower Susquehanna River. As of right now the settlement falls short in providing those protective payments and this legislation will assure that more is done to protect the Bay.

Sincerely,

Ted Evgeniadis
Lower Susquehanna Riverkeeper