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Committee Chair Senator Muth, Senator Williams, Senator Collett, and members of the Pennsylvania Senate Democratic Policy Committee:

Good afternoon, my name is Kristen Bowman Kavanagh, and I am the Deputy Executive Director of the Delaware River Basin Commission (DRBC or Commission). Thank you for the opportunity to offer testimony today on behalf of the Commission.

Today I will share perspectives gained in the course of executing the Commission's mission to sustainably manage, protect and improve the water resources of the Delaware River Basin, on which over 14 million people (including 5.6 million Pennsylvanians, approximately 43 percent of the Commonwealth's population) and our region's economy depend.

The DRBC was formed in 1961 after decades of costly litigation among the Basin states over water rights and after significant pollution and flooding pointed to the need for cooperative, interstate management of the Basin's shared water resources. The Commission enables four states—Pennsylvania, New Jersey, New York, and Delaware—and the federal government to accomplish together what none could achieve working alone. The Delaware River Basin Compact (Compact) is the agreement among the five governments and has been enacted into law by the United States Congress and each of the four Basin states' legislatures. The Compact empowers the Commission's five members to exercise their sovereignty jointly to manage the water resources of the Basin to meet immediate and long-range needs.

The DRBC's responsibilities include managing the water resources of the Basin for diverse uses such as drinking water, sanitation, industry, recreation, and fisheries. We also coordinate flood loss reduction, manage streamflow during drought periods, help prevent excessive salinity to support drinking water providers, industry, power utilities and refineries, and protect and improve water quality. In essence, our mission is to ensure an adequate and sustainable supply of clean water for all users in the Basin.

Our staff expertise has led us to partner with and advise other agencies on water resources-related issues relevant to today's hearing. For example, DRBC contributes its expertise to both the Pennsylvania State Water Plan, having served on the 2022 plan update committee, and the Commonwealth Drought Task Force. The DRBC has managed the Southeastern Pennsylvania Groundwater Protected Area program on behalf of the Commonwealth since 1980 and has partnered with the Pennsylvania Emergency Management Agency (PEMA) on several hazard mitigation assistance grants.

Since the 1960s, the Delaware River Estuary has experienced significant revitalization due to the Delaware River Basin Commission's scientific and regulatory initiatives, combined with federal and state financial resources, mandates under the Clean Water Act and state laws, and changes in industrial, agricultural and municipal practices that improved the treatment of wastewater. While water quality improvements in the

Delaware River Basin have been significant, serious water quality concerns remain due to underinvestment in water infrastructure.

The Delaware River and its tributaries in Pennsylvania face multiple water quality stressors, including 1) nutrients, especially ammonia from municipal wastewater discharges; 2) bacteria from stormwater, combined sewer overflows (CSOs), and sanitary sewer overflows; 3) contaminants of emerging concern, including per-and polyfluoroalkyl substances (PFAS); 4) toxic chemicals, including polychlorinated biphenyls (PCBs); 5) salt from sea level rise and road deicing; 6) trash, litter, and microplastics; and 7) the force-multiplier of climate change.

You have requested testimony on the environmental impacts of underinvestment in water infrastructure to our communities, our ecosystems and our economy, so let me elaborate further.

Impact of Nutrient Pollution. Older technology at wastewater treatment plants—particularly those treating human waste—allows nutrient-rich effluent to enter our rivers and streams, causing eutrophication. This excess pollution can deplete dissolved oxygen, and in some cases can lead to harmful algal blooms (HABs), adversely affecting aquatic ecosystems and recreational access and posing challenges to drinking water supplies.

For the dissolved oxygen-sensitive fish species like the threatened Atlantic sturgeon, improving oxygen conditions in the Delaware River Estuary by reducing nutrients like ammonia, is vital to the propagation and survival at early life stages. Throughout the Delaware River Basin in Pennsylvania, there are numerous other living resources species that reply upon effective, nutrient-controlling wastewater and stormwater infrastructure to ensure clean and healthy waters, while balancing the need for continued economic development.

We have tackled insufficient wastewater treatment once already. DRBC water quality standards led to the addition of secondary treatment at municipal wastewater treatment plants in the 1970s and 1980s, improvements funded largely through Clean Water Act grants. This investment led to marked improvement in the Delaware River and other waterways. And we note that historic investments have been made in the nation's infrastructure, including its water infrastructure, in the last several years. That investment, however large, is better thought of as a down payment, as additional infrastructure needs abound in the water sector.

Proven technologies exist today to further reduce nutrient loadings but come with a high price tag. In a 2021 report, the DRBC evaluated the capital and operating and maintenance costs for the twelve (12) largest dischargers to the lower Delaware River to attain various levels of reduction of ammonia nitrogen, a key nutrient. The total capital cost was estimated at approximately $1.2 billion. Six (6) of these facilities are in Pennsylvania, and capital costs for those treatment plants to provide for additional ammonia removal are estimated at approximately $984 million.

Impact of Bacterial Pollution. Many sewer systems in Pennsylvania's older cities are combined with stormwater collection. The resulting volumes during heavy rainfall can lead to the discharge of untreated sewage and stormwater directly into rivers and streams, including in the Delaware River Basin. Known as Combined Sewer Overflows (CSOs), these cause significant, persistent water quality issues including unsafe levels of bacteria in our waterways.

Due to the frequency of CSOs and other sources of bacterial contamination entering the Delaware River and its tributaries, and the known health risks associated with recreating in these waters, the Delaware River is designated for secondary rather than primary contact recreation in a 27-mile reach of the Delaware River around Philadelphia.

We have the technologies and expertise to improve the operation of existing systems; in some cases, to hold untreated water in storage systems until it can be treated; and to minimize the water entering these combined systems through green stormwater infrastructure and low impact development. Many combined systems are implementing Long Term Control Plans to reduce and eliminate CSO discharges. The cost of fully implementing these plans ranges widely. For example, the City of Philadelphia in 2009 estimated its capital costs to achieve an 80% reduction in CSO discharges was $1.6 billion. A more recent estimate from DELCORA is $112 million to achieve a reduction in CSO discharges of 85%. Keep in mind these costs are completely separate from costs to treat drinking water, replace lead service lines, replace aging mains, address neighborhood flooding, and meet other infrastructure needs.

Impact of PFAS and Contaminants of Emerging Concern. As we make progress on well-established pollutants like nitrogen and bacteria, new water quality challenges, and therefore infrastructure challenges, emerge at a rate that seems to be accelerating.

Per- and polyfluoroalkyl substances (PFAS) are an ever-expanding group of more than 10,000 chemicals present in a variety of industrial and household products such as stain-repellant textiles, aqueous film-forming foams (AFFF), and paper coatings. PFAS have varying degrees of persistence, toxicity, and bioaccumulation in the environment. Human and wildlife exposure to several PFAS is widespread. Discharges to the environment include industrial outfalls, municipal treatment plants, stormwater runoff, landfill leachate, and the use of AFFF for firefighting. The adverse effects of some PFAS on human health are understood to include liver damage, increased cholesterol, thyroid disease, decreased response to vaccines, asthma, decreased fertility and birth weight, and pregnancy-induced hypertension in those exposed through drinking water and fish consumption. PFAS has been detected in surface water worldwide and is present in the Delaware River, raising numerous concerns, especially for potential impacts to surface water used as a source of drinking water, and in connection with fish consumption.

According to the EPA, treatment processes exist that may be effective for PFAS removal from drinking water. These include granular activated carbon, ion exchange resins, and high-pressure membrane systems. But all options come with a high price tag. Treatment of PFAS in wastewater is similarly complex, with known pathways to the environment through effluent discharges to surface water, application of biosolids to land, discharges of leachate to ground and surface water from the disposal of residual wastes, and even air emissions. The technologies and costs for wastewater treatment of PFAS are only beginning to come into focus. In a May report from the Minnesota Pollution Control Agency, the cost to remove PFAS from certain wastewater streams across that state was estimated at between $14 and $28 billion over 20 years.

PFAS are being studied by the DRBC and already the presence of these contaminants in Pennsylvania communities has led to fish consumption advisories and water utility operations changes. For example, in 2022, the Department of Environmental protection issued its first “Do Not Eat” advisory for all fish in the Neshaminy Creek, a tributary of the Delaware River, due to perfluorooctanoic acid (PFOA), one of the two most common PFAS chemicals.

Strategies for reducing the discharge of PFAS to our rivers and streams include enhanced treatment at wastewater treatment plants, expanded stormwater capture and treatment, and changes to consumer and industrial use. Current unknowns and uncertainties in PFAS toxicity, distribution, and regulations make environmental, economic, and community impacts hard to measure and remediate today. However, identifying property-value impacts near PFAS hot spots, and measuring impacts to human health and our aquatic and terrestrial habitats deserve—and are receiving—increased focus.

Impact on Climate Resilience and Adaptation Efforts. Local climate change impacts for the Delaware River Basin include increased air temperature, changes in precipitation patterns, and sea level rise, all of which affect water supply and water quality and have a considerable nexus to infrastructure needs.

Increased air temperatures will affect water quality, with two likely impacts being an increase in the occurrence and duration of harmful algal blooms and a decrease in dissolved oxygen levels. These anticipated effects of climate change will exacerbate the known environmental impacts from bacteria and nutrient pollution discussed previously, as well as reinforce the need to accelerate infrastructure improvements.

Climate change is also predicted to shift precipitation patterns to occur in the form of fewer, more intense storms occurring in the winter months. This means a potential increase in flood events coupled with extended drought cycles. Projected increases in the intensity, duration, and frequency of precipitation will further increase infrastructure needs for storage and treatment capacity, sewage system improvements, and stormwater management to reduce bacteria pollution.

Sea level rise could lead to costly infrastructure needs to protect drinking water resources from salinity intrusion in surface and groundwater and coastal communities from more frequent tidal flooding. In a recent study, DRBC evaluated the costs and feasibility should additional freshwater storage be required to better manage salinity and drought conditions.

DRBC has been working with the Pennsylvania Emergency Management Agency (PEMA) to help more local governments tap into existing funding to address local flooding and reduce future losses. While we know more investment is needed to mitigate these hazards, which will only be made more likely by climate change, the need to invest in connecting communities to the expertise, technical information, and capacity required to access infrastructure funding is also necessary to create more resilient communities. A 2019 study by the National Institute of Building Science states that for every $1 invested in federal hazard mitigation that $6 is saved, and this savings increases to $7 for riverine flooding, not to mention the reduced impacts to communities and reductions to lost business revenues.

Impact on Water Equity. The U.S. Water Alliance defines water equity as, the state "where all communities and households have access to safe, clean, affordable drinking water and wastewater services; are resilient in the face of floods, drought, and other climate risks; have a role in decision-making processes related to water management in their communities; and share in the economic, social, and environmental benefits of water systems."

Although the waters of the Delaware River Basin are an economically vital resource, historically, this resource has received significantly fewer federal dollars to tackle water resource and infrastructure needs than other interstate waters in our region, like the Chesapeake Bay, the Great Lakes, and the Long Island Sound to name a few, leading to inequities in areas such as recreational access and opportunities.

Pennsylvania's State Water Plan notes the Commonwealth has a very high infrastructure investment and renewal challenge, in part due to the location of systems in financially strapped and distressed communities. Within the Delaware River Basin, water quality infrastructure improvements in the cities of Philadelphia and Chester, for example, often are deferred due to affordability concerns. Additional infrastructure investments would help to address longstanding patterns of underinvestment and in turn deliver ecological, economic, and community benefits.

These remarks are not intended to be an exhaustive summary of all environmental challenges in the Delaware River Basin, and while we share many of the same challenges, throughout our diverse Commonwealth there may be unique environmental impacts beyond the scope of my remarks today.

For over 60 years, DRBC has developed sound science for shared water resource management. Please think of us as a resource as you consider future needs and investments in our Commonwealth's water infrastructure.

Thank you for the opportunity to provide this testimony.