REGION 3
PHILADELPHIA, PA 19103

March 29, 2024

Steven Saari, Deputy Director
Natural Resources Administration
DC Department of Energy and Environment
Water Quality Division
1200 First Street NE, 5th Floor
Washington, DC 20002

Dear Mr. Saari:

The U.S. Environmental Protection Agency Region 3 (EPA) is pleased to approve 48 Total Maximum Daily Loads (TMDLs) for arsenic, organochlorine pesticides, and PAH 2 group and PAH 3 group pollutants for the Anacostia River, its tributaries, and Kingman Lake in the District of Columbia. As further explained below, the TMDLs were established to replace older TMDLs for organics and metals and to address impairments of water quality as identified on the District's 2022 Integrated Report pursuant to Sections 303(d) and 305(b) of the Clean Water Act (CWA). The District of Columbia Department of Energy and Environment (DOEE) submitted the TMDLs in a report titled *Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed* (TMDL Report) to EPA for review and action on March 1, 2024. On March 26, 2024, DOEE submitted a revised TMDL Report to EPA that corrected transcription errors made in the March 1, 2024 TMDL Report.

A draft version of the TMDL Report initially was released for public notice and comment on July 9, 2021, for a 35-day comment period, until August 13, 2021. As a result of public comments, DOEE made several revisions to the draft TMDLs and released an updated draft TMDL Report for public notice and comment on September 8, 2023, for a 45-day comment period, until October 7, 2023. EPA appreciates DOEE's efforts to respond to and involve the public.

DOEE established and submitted the 48 TMDLs pursuant to Sections 303(d)(1)(c) and 303(d)(2) of the CWA. EPA's review concludes that, once fully implemented, the load and wasteload allocations in the TMDLs are established at levels necessary to attain and maintain the applicable water quality standards addressed by the TMDLs. For clarity, enclosed, please find three documents setting forth EPA's rationale for approving the TMDLs for arsenic, organochlorine pesticides, and PAH 2 group and PAH 3 group pollutants, respectively.

The TMDLs in the TMDL Report are intended to replace TMDLs for organics and metals that were established in "District of Columbia Final Total Maximum Daily Loads for Organics and Metals in the Anacostia River, Fort Chaplin Tributary, Fort Davis Tributary, Fort Dupont Creek, Fort Stanton Tributary,

Hickey Run, Nash Run, Popes Branch, Texas Avenue Tributary and Watts Branch" and "District of Columbia Final Total Maximum Daily Loads for Organics and Metals in Kingman Lake" (2003 TMDLs) following vacatur of EPA's approval of those 2003 TMDLs by the U.S. District Court for the District of Columbia and to the extent that the waterbody-pollutant combinations remain identified as impaired on DOEE's 2022 Integrated Report. A discussion of the litigation leading to vacatur of EPA's approval of the 2003 TMDLs is set forth in the TMDL Report and in the three enclosures.

Some of the waterbody-pollutant combinations that were part of the original 2003 TMDLs are no longer identified as impaired on DOEE's 2022 Section 303(d) List and Integrated Report. EPA appreciates that, where that is the case, DOEE has developed an informational TMDL pursuant to CWA Section 303(d)(3) and 40 C.F.R. 130.7(e). These "informational" TMDLs can be found in Appendix A to the TMDL Report. To the extent that DOEE has provided informational TMDLs set at levels to maintain water quality in unimpaired segments, EPA does not consider those informational TMDLs as submitted pursuant to Section 303(d)(2) of the CWA and is not taking action on those informational TMDLs.

However, EPA is approving TMDLs for the mainstem segments of the Anacostia River, known as Anacostia #1 and Anacostia #2, for arsenic, chlordane, DDT and its metabolites, dieldrin, heptachlor epoxide, the PAH 2 group, and the PAH 3 group. Where a waste load allocation (WLA) or load allocation (LA) to a specific source is identified both in an informational TMDL and as part of the TMDLs for Anacostia #1 and Anacostia #2, EPA's approval of the TMDLs for the Anacostia #1 and Anacostia #2 segments includes all WLAs and LAs for those pollutants to the extent they are part of the TMDLs for Anacostia #1 and Anacostia #2.

If you have any questions regarding EPA's action, please contact Mrs. Jessica Martinsen, Chief, Standards and TMDLs Section, at 215-814-5144.

Sincerely,

GillespieMarthaler, Leslie

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Date: 2024.03.29 13:03:57 -04'00'

Leslie L. Gillespie-Marthaler, Ph.D., Acting Director
Water Division

ENCLOSURE

1. Decision Rationale for the Organochlorine Pesticide TMDLs
2. Decision Rationale for the Arsenic TMDLs
3. Decision Rationale for the Polycyclic Aromatic Hydrocarbon TMDLs

Enclosure 1
Decision Rationale for the Organochlorine Pesticide TMDLs

Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed

I. Introduction

The Clean Water Act (CWA) and its implementing regulations at 40 C.F.R. Part 130 require that a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint and natural background sources, and a margin of safety (MOS) that takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$TMDL = \sum WLAs + \sum LAs + MOS$$

This document sets forth the U.S. Environmental Protection Agency (EPA) Region 3's rationale for approving TMDLs for organochlorine pesticides in the Anacostia River watershed. The TMDLs were developed to address impairments of water quality standards as identified on the District of Columbia's (the District's) 2022 Section 303(d) List of water quality-limited segments (WQLSs) and Integrated Report. The District Department of Energy and Environment (DOEE) submitted the report *Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed* (hereafter referred to as the "TMDL Report") to EPA for final review and action on March 1, 2024, which was received on the same day. DOEE submitted a revised TMDL Report to EPA on March 26, 2024 that corrected transcription errors made in the March 1, 2024 TMDL Report. The TMDL Report includes TMDLs that address impairments for seven different toxic pollutants/pollutant groups. In this document, EPA provides its rationale for approving the TMDLs that were developed to address the organochlorine pesticide impairments. The organochlorine pesticides addressed by these TMDLs include chlordane, dichlorodiphenyltrichloroethane (DDT) and its metabolites, dieldrin, and heptachlor epoxide. Additional documentation was developed for the TMDLs that address arsenic and polycyclic aromatic hydrocarbon (PAH) impairments. EPA will address the TMDLs for other pollutants separately.

The TMDLs in the TMDL Report are intended to replace TMDLs for organics and metals for the receiving waters that were established in *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in the Anacostia River, Fort Chaplin Tributary, Fort Davis Tributary, Fort Dupont Creek, Fort Stanton Tributary, Hickey Run, Nash Run, Popes Branch, Texas Avenue Tributary and Watts Branch* and *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in Kingman Lake* (collectively, the 2003 TMDLs). Anacostia Riverkeeper, Friends of the Earth, and Potomac Riverkeeper filed a complaint in the U.S. District Court for the District of Columbia, Case No. 1:09-cv-00098-JDB (*Anacostia Riverkeeper*) on January 15, 2009 challenging, among other things, EPA's approvals of the 2003 TMDLs. The district court ultimately

vacated EPA's approvals of the 2003 TMDLs because they lacked daily loads, but stayed vacatur until April 1, 2024.

EPA's decision is based upon its administrative record, which includes the TMDL Report and information in supporting files provided to EPA by DOEE, including DOEE's response to public comments (Appendix C to the TMDL Report). EPA has reviewed and determined that the TMDLs meet the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 C.F.R. Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in the District's TMDL Report and supporting documentation, unless otherwise noted.

II. Section 303(d) Listing Information

DOEE has submitted organochlorine pesticide TMDLs for eight WQLSs in the Anacostia River watershed in the District. The organochlorine pesticide TMDLs are for the following pollutants: chlordane, DDT and its metabolites (dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethylene (DDE)), dieldrin, and heptachlor epoxide (hereafter, referred to as the four organochlorine pesticides).

Initially, the District characterized the Anacostia River and its tributaries as impaired for "organic" (i.e., toxic) pollutants on its 303(d) list of WQLSs in 1998. The District first developed TMDLs for those impairments in 2003 based on data available at that time, including only limited ambient water quality data. In the following years, DOEE revised its water quality standards for many toxic pollutants. In addition, the impairments changed as more data were collected and analyzed. Based on DOEE's 2022 Integrated Report, which was approved on February 28, 2024, the tidal Anacostia River in the District, identified as two distinct segments, is listed as impaired for the four organochlorine pesticides. Some tributaries to the Anacostia River and Kingman Lake in the District are also listed as impaired for some of these four organochlorine pesticides. Table 1 below presents the WQLSs (i.e., assessment units) and associated organochlorine pesticide impairments from DOEE's 2022 Integrated Report.

Table 1. Organochlorine Pesticide Impairments

Assessment Unit	4,4 DDD	4,4 DDE	4,4 DDT	Chlordane	Dieldrin	Heptachlor epoxide
Nash Run					•	•
Hickey Run		•				
Watts Branch[1]					•	
Popes Branch		•		•	•	•
Texas Avenue Tributary	•	•	•	•	•	•
Kingman Lake	•		•	•	•	
Anacostia #2	•	•	•		•	•
Anacostia #1	•		•	•	•	•

• denotes that an impairment exists for a waterbody-pollutant combination.

[1] DC delineates Watts Branch as two assessment units but for the purposes of these TMDLs, Watts Branch #1 and #2 were combined.

III. TMDLs Overview

DOEE has submitted 22 TMDLs[1] for organochlorine pesticides within the Anacostia River watershed. These TMDLs address the impairment listings for the two Anacostia River mainstem segments (Anacostia #1 and #2), Kingman Lake, and the following tributaries: Nash Run, Hickey Run, Watts Branch, Popes Branch, and Texas Avenue Tributary. The TMDLs, including the source-specific LAs and WLAs, are presented in Section 6 of the TMDL Report. The TMDLs are summarized in Table 2 below.

[1] Note that, while Table 1 identifies 28 impairments, Table 2 identifies only 22 TMDLs. That is because the TMDL analysis consolidated DDT and its metabolites (DDD and DDE) into one pollutant group. The most stringent criterion of the three pollutants in this group was used as the TMDL endpoint for the entire group. See Section IV.1 below.

Table 2. Organochlorine Pesticide TMDLs

Segment	Pollutant	TMDL (g/day)	ΣWLA (g/day)	ΣLA (g/day)	Σ Upstream LAs/WLAs (g/day)	MOS
Kingman Lake	Chlordane	0.023	0.023	0	0	Implicit
Popes Branch	Chlordane	0.010	0.010	0	0	Implicit
Texas Avenue Tributary	Chlordane	0.010	0.010	0	0	Implicit
Anacostia #1	Chlordane	27.676	7.218	0.116	20.342	Implicit
Hickey Run	DDT and its Metabolites	0.0035	0.0035	0	0	Implicit
Kingman Lake	DDT and its Metabolites	2.00E-03	2.00E-03	0	0	Implicit
Popes Branch	DDT and its Metabolites	7.87E-04	7.87E-04	0	0	Implicit
Texas Avenue Tributary	DDT and its Metabolites	7.44E-04	7.44E-04	0	0	Implicit
Anacostia #2	DDT and its Metabolites	1.0135	0.1345	0.0064	0.8727	Implicit
Anacostia #1	DDT and its Metabolites	1.4030	0.3729	0.0161	1.0139	Implicit
Nash Run	Dieldrin	0	0	0	0	Implicit
Watts Branch	Dieldrin	5.04E-05	0	5.04E-05	0	Implicit
Kingman Lake	Dieldrin	0	0	0	0	Implicit
Popes Branch	Dieldrin	0	0	0	0	Implicit
Texas Avenue Tributary	Dieldrin	0	0	0	0	Implicit
Anacostia #2	Dieldrin	1.00E-02	0	0	1.00E-02	Implicit
Anacostia #1	Dieldrin	1.35E-02	3.50E-03	0	1.00E-02	Implicit
Nash Run	Heptachlor epoxide	5.51E-03	3.43E-03	2.08E-03	0	Implicit
Popes Branch	Heptachlor epoxide	2.16E-03	2.16E-03	0	0	Implicit
Texas Avenue Tributary	Heptachlor epoxide	2.08E-03	2.08E-03	0	0	Implicit
Anacostia #2	Heptachlor epoxide	2.57	0.32	4.07E-03	2.25	Implicit
Anacostia #1	Heptachlor epoxide	3.57	0.98	1.59E-02	2.57	Implicit

The Anacostia River drains more than 170 square miles across Maryland and the District. Approximately 80 percent of the watershed is in Maryland and 20 percent is in the District. The upper tributaries are non-tidal freshwater, while the mainstem of the Anacostia River within the District is tidally influenced. The Anacostia River is slow-moving and has a relatively slow flushing rate (average of 23-28 days), which is a result of the river's bathymetry, tidal nature, and the influence of the Potomac River on the Anacostia River at its mouth. In many cases, the downstream segment of the Anacostia River mainstem and some areas of Kingman Lake display the tendency for pollutants to persist. During low flow (or dry) conditions, pollutants tend to persist in these areas due to increased contaminant desorption from bottom sediments and decreased flushing. Whereas during high flow (or wet) conditions, pollutants tend to persist in these areas due to increased contaminant loading from upland sources through stormwater runoff and the tidal inflow of the Potomac River into the Anacostia River. These characteristics of the mainstem Anacostia River explain the persistence of these organochlorine pesticides over time. In addition, the Anacostia River watershed is highly urbanized. About 45 percent of the watershed is residential, the dominant land use in the watershed. Undeveloped land, primarily comprised of forests and parks, covers just under 30 percent of the watershed. The overall imperviousness of the watershed is 22.5 percent, although that is variable among subwatersheds. The highest levels of imperviousness are in the Hickey Run (41 percent) and Northeast Branch (37 percent) subwatersheds. Some areas of the tidal mainstem of the Anacostia River in the District, such as the northwest bank, have even higher levels of imperviousness (48 percent). For more information regarding the water quality characterization of the Anacostia River watershed, please refer to Section 2 of the TMDL Report.

Section 3 of the TMDL Report describes the toxic pollutant source assessments. Sources of toxic pollutants in the watershed include four individually permitted facilities under the National Pollutant Discharge Elimination System (NPDES) and stormwater discharges (i.e., municipal separate storm sewer system (MS4), the combined sewer system (CSS), and entities covered under the Multi-Sector General Permit (MSGP)). The four facilities with individual NPDES permits considered in the TMDL analysis include the Washington Navy Yard, Pepco Environment Management Services, Super Concrete Corporation, and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility[2]). Other sources of toxic pollutants in the watershed include upstream loads originating in Maryland and runoff from historically contaminated sites in the District.

Computational Procedure

Section 4 of the TMDL Report discusses the analysis framework and TMDL model. The linked watershed (Loading Simulation Program in C++ (LSPC)) and receiving water (Environmental Fluid Dynamics Code (EFDC)) models were simulated over a four-year period from 2014 – 2017 to capture a representative period of existing conditions in the Anacostia River system. Initially, baseline conditions were simulated for each identified source for each of the pollutants in every

[2] DC Water Outfall 019 was included as a source in the TMDLs. This outfall used to discharge to the Anacostia River and was an active source during the TMDL model simulation period from 2014 through 2017. Therefore, the TMDLs do not account for the on-the-ground changes resulting from the permanent closure of the Northeast Boundary Swirl Concentrator Facility. EPA recognizes that DC Water Outfall 019 is now a combined sewer outfall.

subwatershed. A calibration process was completed using the large dataset compiled on observed and simulated data. Once it was determined that the model simulation was appropriately capturing existing conditions when compared to observed data, the calibration was deemed acceptable and the process of developing a TMDL scenario begun.

The TMDL scenario was developed through an iterative process of first implementing watershed reductions until the TMDL endpoints were met in the tributaries and then evaluating whether those reductions were sufficient to meet the endpoints in the tidal segments of the Anacostia River. The development of the TMDL scenario involved two separate reduction processes to address endpoint exceedances in the tidal segments of the Anacostia River. An additional analysis was carried out to demonstrate that the TMDL endpoints will be met through the process of natural attenuation of the TMDL pollutants in bottom sediments after the TMDL allocations are achieved.

Bottom Sediments

In the case of these TMDLs, much of the impairment is due to the legacy presence of the TMDL pollutants on land and in the river system rather than through generation and discharge of these pollutants due to present, active operations. These organochlorine pesticides (chlordane, DDT and its metabolites, dieldrin, heptachlor epoxide) persist in the environment even though their use has been banned or substantially limited for decades. They have slow degradation rates in soils and sediments, very limited solubility in water, strong adherence to soils and sediments, and a strong tendency to bioaccumulate. This means that attainment of water quality standards must account for the fact that the pollutants are already in the water column and river bottom sediments.

The model accounts for the presence of the pollutants in the water column and river bottom sediments and simulates the interchange between the bottom sediments and the water column. Flux of toxic pollutants from bottom sediments and pore water to the water column through resuspension and diffusion can result in higher levels of toxic pollutants in the water column. The description of how bottom sediment flux can result in higher levels of pollutants in the water column is found in Section 3.1.3 of the TMDL Report. Conversely, toxic pollutants in the water column may preferentially sorb to suspended sediment in the water column and eventually settle on the river bottom and accumulate in the bottom sediments. In addition, resuspended sediment can be carried by the river and deposited to bottom sediments that could contribute to flux elsewhere within the system. The modeling framework simulated the bottom sediments and the water column as a single system, treating the interchange between bottom sediments and the water column as an internal load within the system and assigning TMDL loads only to external, land-based sources. Therefore, bottom sediments were not assigned a baseline load or load allocation because bottom sediments are not external to the system. In other words, the TMDLs treat the bottom sediments as part of, and inextricably intertwined with, the river itself.

Modeling the interchange between the water column and bottom sediments as one interconnected system is appropriate because elevated levels of toxic pollutants in fish tissue are a function of both water column and bottom sediment concentrations. It is the bioaccumulation

of toxins in fish tissue that are then eaten by humans that is one of the concerns addressed by the applicable water quality standards.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards because both the contributions from external, land-based sources and the interchange between bottom sediments and the water column were accounted for in the TMDL modeling framework. The TMDL modeling framework was configured to represent contributions from external sources within the watershed and tributaries to the Anacostia River and the mainstem Anacostia River and the flux between the river water column and the bottom sediments, including release from the contaminated river bottom sediment due to diffusion and resuspension. The model predicted and simulated resultant instream and bottom sediment conditions after contributions from external, land-based sources were controlled and the associated TMDL loads (LAs and WLAs) were achieved. As external, land-based loads are reduced, the external, land-based sources will contribute cleaner water and sediment into the system. This will result in burial of pollutants in the currently active layer of the bottom sediment and pore water and transport of pollutants out of the system through flushing. This process of burial and flushing, combined with other processes, like pollutant degradation, that would occur when inputs from external, land-based sources achieve LAs and WLAs is what the TMDL Report refers to as "natural attenuation."

DOEE completed a supplementary analysis to demonstrate that the process of natural attenuation will occur in the system and to estimate approximately how long it will take for the TMDL endpoints (and therefore, the water quality criteria) to be met following achievement of the TMDL LAs and WLAs and. This analysis demonstrated that the allocations in the TMDLs will ultimately result in the reduction of flux from the bottom sediments and the attainment of the TMDL endpoints. A complete description of natural attenuation and the associated analysis can be found in Section 5.4 of the TMDL Report and Sections 7.4 and 7.5 of the TMDL Modeling Report.

As a result of this analysis, DOEE demonstrated that the TMDLs are established at levels necessary to attain and maintain applicable water quality standards. DOEE estimated that the length of time it will take for the TMDL endpoints for the organochlorine pesticides to be met may take anywhere from four to 175 years, depending on the specific organochlorine pesticide and waterbody in question.[3] DOEE also demonstrated that the TMDLs are set at levels sufficient to attain and maintain applicable water quality standards without relying upon remediation of contaminated sediments (i.e., dredging, capping, carbon amendments).

The time required to attain water quality standards once the LAs and WLAs are achieved will depend upon such factors as the nature of the pollutant, the applicable water quality standards, and the nature of the receiving waters. Much of the impairment is due to the legacy presence of the organochlorine pesticides on land and in the river system rather than through active

[3] The mean estimated length of time it will take for the TMDL endpoints for the four organochlorine pesticides to be met across all and waterbodies is 34 years. Notably, at most of the locations in the Anacostia River watershed, the TMDL endpoints for all four organochlorine pesticides are estimated to be met within 40 years (i.e., 73% of the estimates are less than or equal to 40 years).

generation and discharge. The legacy presence, combined with the nature of the organochlorine pesticides, means that the return to water quality standards necessarily will take time.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards without relying upon additional measures such as remediation of the bottom sediments. By reducing the amount or availability of contaminated sediment for flux and resuspension, remediation of contaminated sediments, such as dredging, capping, or carbon amendments, can reduce the levels of these pollutants in the water column once resuspension associated with some of these activities – which could increase water column concentrations – has stabilized. Although sediment remediation is not an assumption of the TMDLs, nothing in these TMDLs precludes the use of dredging, capping, or other remediation efforts as tools to achieve the TMDL endpoints. Consequently, these TMDLs are not inconsistent with sediment remediation efforts that are currently planned as part of DOEE's Anacostia River Sediment Project (ARSP). The ARSP is a contaminated site project focused on remediation of contaminated bottom sediments in the Anacostia River mainstem and Kingman Lake that has occurred in parallel with TMDL development, but otherwise on a separate timeline. The ARSP focuses on PCB contamination.[4] Sediment remediation, including activities taken in connection with the ARSP, likely will also have the secondary benefit of reducing other sediment-bound pollutants, including the TMDL pollutants, such as the organochlorine pesticides, that are co-located. It is reasonable, therefore, to expect that the remediation of contaminated sediment would decrease the amount of time it will take for water quality to approach the TMDL endpoints.

LAs and WLAs in the Informational TMDLs

DOEE has developed TMDLs for waterbody-pollutant combinations that are within the Anacostia River watershed and are not listed as impaired in DOEE's 2022 Integrated Report but may have been listed as impaired for these pollutants in the past. As applied to the unimpaired waters, these are considered "informational" TMDLs and can be found in Appendix A to the TMDL Report. Section 303(d)(3) of the CWA and 40 C.F.R. 130.7(e) authorize states to develop informational TMDLs for waterbody-pollutant combinations that are not identified on its list of WQLSs; however, there is no requirement to submit informational TMDLs to EPA for approval when water quality standards are currently being met. 33 U.S.C. 1313(d)(3) and 40 C.F.R. 130.7(e). The intent is to develop information and identify levels that will protect the waterbodies that are not listed as impaired. Overall, DOEE's final TMDL submittal included 26 informational TMDLs for the organochlorine pesticides.

While EPA is not taking action on the informational TMDLs for unimpaired waters, the organochlorine pesticide TMDLs for Anacostia #1 and Anacostia #2 incorporate the same LAs and WLAs as those in the informational TMDLs. Appendix A of the TMDL Report explains that "the

[4] PCBs are the focus of the ARSP; however, the ARSP Remedial Investigation identified five contaminants of concern including PCBs, chlordane, dioxin-like PCBs, dioxin toxic equivalent, and benzo(a)pyrene. In 2020, the ARSP Interim Record of Decision was published, which identifies the early action areas or "hot spots" in the Anacostia River watershed where PCB contamination is highest and requires remediation. Overall, an area of approximately 77 acres will be remediated through a variety of remedial activities. The remediation at the 11 early action areas will likely also beneficially reduce other pollutants (e.g., metals, organochlorine pesticides, and PAHs) that concurrently exist in the PCB-contaminated sediment.

source-specific allocations presented below are incorporated into the TMDLs provided in Section 5.6 of the TMDL Report because those allocations are required to meet downstream water quality in the tidal mainstem Anacostia River" – meaning that the LAs and WLAs presented in Appendix A for the four organochlorine pesticides also function as LAs and WLAs within the TMDLs for the tidal mainstem Anacostia segments. As such, EPA herein approves the organochlorine pesticide TMDLs for Anacostia #1 and Anacostia #2 and also approves all LAs and WLAs for those two TMDLs, including the LAs and WLAs that are also a part of the informational TMDLs for the organochlorine pesticides. The mere fact that the informational organochlorine pesticide TMDLs include LAs and WLAs that are also part of the TMDLs for Anacostia #1 and Anacostia #2 does not mean that EPA is taking action on the informational TMDLs.

IV. Discussion of Regulatory Requirements

1) TMDLs are established at a level necessary to implement the applicable water quality standards.

EPA regulations at 40 C.F.R. 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards. States, with federal approval and oversight, adopt water quality standards for each particular waterbody or waterbody segment within their boundaries. 33 U.S.C. 1313(c)(1). Water quality standards are comprised of three components: (1) designated uses, (2) criteria (narrative or numeric) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality. EPA either approves a state's proposed water quality standards or, if it disapproves, promulgates standards for the state unless the state addresses EPA's disapproval. 33 U.S.C. 1313(c)(3).

Organochlorine pesticide TMDLs are presented for eight impaired waterbodies in the District. The following designated use classes apply to all eight impaired waterbodies: Class A – Primary Contact Recreation; Class B – Secondary Contact Recreation and Aesthetic Enjoyment; Class C – Protection and Propagation of Fish, Shellfish, and Wildlife; and Class D – Protection of Human Health Related to Consumption of Fish and Shellfish. For both Anacostia River mainstem segments (Anacostia #1 and #2), the Class E – Navigation designated use also applies. The organochlorine pesticide TMDLs are set at levels necessary to attain and maintain all designated uses. Within the District's water quality standards regulations there are a number of applicable narrative and numeric water quality criteria that were considered in the development of these TMDLs. All of the applicable criteria can be found in Section 1.4 of the TMDL Report.

The District has multiple numeric water quality criteria for each organochlorine pesticide (i.e., for Class C and Class D designated uses). Therefore, the District employed a conservative approach and used the most stringent of the numeric criteria as the TMDL endpoint to represent each pollutant. While the District generally does not have criteria for organochlorine pesticide for Class A and Class B designated uses, TMDL endpoints established to achieve the more stringent of the numeric criteria for Class C and Class D designated uses also will support Class A and Class B designated uses. The District's numeric water quality criteria for Class C waters include a criteria maximum concentration and criteria continuous concentration to protect acute and chronic exposure of aquatic life, respectively. The District's numeric water quality criteria for Class D

waters include a 30-day average concentration that is applied for the protection of human health related to the consumption of fish and shellfish. The District's numeric water quality criteria for Class D waters were updated by DOEE in 2020 through adoption of EPA's CWA Section 304(a) recommended ambient water quality criteria for the protection of human health, and the criteria for all four organochlorine pesticides for which TMDLs were developed herein were included in this update. The updated criteria reflect the latest scientific information and EPA recommendations regarding updated exposure factors (body weight, drinking water consumption, and fish consumption rate), bioaccumulation factors, health toxicity values, and relative source contributions. These updated criteria also consider exposure (i.e., incidental ingestion) resulting from recreation in and on the water (Class A and Class B). Criteria that protect human health related to the consumption of aquatic organisms (i.e., Class D) are generally expected to protect human health from less direct exposures (i.e., Class A and Class B).[5] Lastly, the TMDL pollutants do not affect navigation (Class E).

In addition to supporting numeric criteria, the TMDL endpoints are established at levels necessary to implement the District's applicable narrative criteria. The District's applicable narrative criteria, found at 21 D.C.M.R. § 1104.1, prohibit substances attributable to discharges in amounts that "[c]ause injury to, are toxic to, or produce adverse physiological or behavioral changes in humans, plants, or animals" and "impair the biological community that naturally occurs in the waters or depends upon the waters for its survival and propagation." As a general matter, narrative water quality criteria are intended to supplement, not supersede, numeric criteria or to establish water quality conditions for parameters for which no numeric criteria have been established. 40 C.F.R. § 131.11(b)(2). Regardless, and to the extent the narrative water quality criteria are "applicable" within the meaning of CWA Section 303(d)(1)(C), the TMDLs are expected to achieve the District's narrative water quality criteria. Like numeric criteria, narrative criteria represent a quality of water that supports a particular designated use; when criteria are met, water quality will generally protect the use. See 40 C.F.R. § 131.3(b). The TMDL endpoints are set at levels that will achieve all designated uses established for the relevant District waters. The narrative criteria refer to "amounts" of a pollutant that will cause or result in a particular water quality condition. In this case, each numeric criterion for the organochlorine pesticides represents the referenced "amount" of that pollutant that is expected to avoid the adverse impacts described at §§ 1104.1(d) and (f). The District's other narrative criteria do not apply to the organochlorine pesticides.[6]

[5] EPA has considered whether there are cases for which water quality criteria for the protection of human health based only on fish ingestion (or only criteria for the protection of aquatic life) may not adequately protect recreational users from health effects resulting from incidental water ingestion. EPA reviewed information that provided estimates of incidental water ingestion rates averaged over time. EPA generally believes that the averaged amount is negligible and will not have any impact on the chemical criteria values based on fish consumption only, unless the chemical exhibits no bioaccumulation potential. See EPA, Methodology for Deriving Ambient Water Quality Criteria for Protection of Human Health – Revised Methodology (2000) (available at: https://www.epa.gov/wqc/human-health-water-quality-criteria-and-methods-toxics#methodology).

[6] The narrative criteria at 21 D.C.M.R. §§ 1104.1(a), (b), (c) and (e) are not relevant because, while the organochlorine pesticides do bind to sediment, they themselves do not settle to form objectionable deposits. The

The TMDL endpoints also are set at levels necessary to implement the Class D designated use at fish consumption levels generally expected in the District. The District's updated criteria for the Class D use are based upon data derived from the general population and are calculated at a 10^{-6} risk level (corresponding to an increased chance of cancer of one in a million). EPA calculates human health criteria values at a 10^{-6} (one in one million) cancer risk level and recommends that states and authorized tribes use cancer risk levels of 10^{-6} or 10^{-5} (one in one hundred thousand) when deriving human health criteria for the general population (EPA, 2000). For example, the state of Maryland has adopted human health criteria for toxic pollutants at the 10^{-5} risk level. For subsistence fishers consuming between 130 – 142.4 grams per day (U.S. NPS, 2018) consistent with EPA's national default subsistence rate, as compared with the 22 grams per day incorporated in the derivation of DOEE's criteria, the cancer risk level for subsistence fishers would equate to less than 10^{-5} (one in one hundred thousand) risk level, which is within the range that EPA's guidance contemplates as acceptable in this situation.[7]

In addition to using the most stringent of the numeric criteria as the TMDL endpoint to represent each pollutant, the TMDL analysis consolidated DDT and its metabolites (DDD and DDE) into one pollutant group. The most stringent criterion of the three pollutants in this group was used as the TMDL endpoint for the entire group.

Lastly, while the majority of the impaired waterbody-pollutant combinations addressed by these TMDLs were based on water column criteria exceedances, there are three "Dieldrin in Fish Tissue" listings in both Anacostia mainstem segments (Anacostia #1 and Anacostia #2) and Kingman Lake that are based on exceedances of DOEE's fish tissue listing threshold of 2.5 parts per billion. Using the bioaccumulation factors on which the District's water column criteria are based (EPA, 2016), translation of the water column criterion for dieldrin (which is used as the TMDL endpoint) into a fish tissue equivalent results in a value that is lower (i.e., more stringent) than DOEE's fish tissue listing threshold. Therefore, the dieldrin TMDLs herein adequately address both the water column-based and fish tissue-based impairments.

Based on the foregoing, EPA finds that the TMDLs are established at a level necessary to implement the applicable water quality standards.

In response to comments received during the first round of public notice and comment in the summer of 2021, DOEE undertook an analysis that simulated the fate and transport of the TMDL pollutants under predicted conditions of climate-induced changes in precipitation quantity and intensity, air temperature, and sea level rise. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report. The Anacostia River is a tributary to the Chesapeake Bay;

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organochlorine pesticides also do not: float as debris, scum, oil, or other matter; produce objectionable odor, color, taste, or turbidity at environmentally relevant levels; or produce undesirable or nuisance aquatic life or result in the dominance of nuisance species. DOEE also considered the narrative criteria at §§ 1104.3 through 1104.7, which do not relate to toxic pollutants and instead focus on specific topics such as aesthetic properties, untreated sewage and litter, the burial or obstruction of objects, concentrations of chlorophyll *a*/algae, or unmarked submerged or partially submerged man-made objects.

[7] Criteria based on a 10^{-5} risk level are acceptable for the general population as long as states and authorized tribes ensure that the risk to more highly exposed subgroups (sport or subsistence fishers) does not exceed the 10^{-4} level (EPA, 2000).

therefore, DOEE selected the projected climate change effects and time horizons to be consistent with the Chesapeake Bay Program's medium- to long-term planning outlook. The analysis was performed for two time horizons: a near-term horizon around 2035 (2034 – 2037) and a long-term horizon around 2055 (2054 – 2057). This analysis estimated both the change in water column concentrations for each pollutant under future climate scenarios compared to the TMDL allocation scenario and how long it will take to achieve the TMDL endpoints through natural attenuation of toxic pollutants in bottom sediments under future climate scenarios relative to the natural attenuation results documented for the TMDL allocation scenarios. Although the analysis of future climate conditions points to an expected greater load of toxic pollutants to the Anacostia River due to increased precipitation and associated runoff, it also points to dilution of these toxic pollutants due to sea level rise and other hydrologic functions that counteract the increased load. Whether attainment of applicable water quality criteria would take more or less time under future climate scenarios depended upon a number of factors, primarily the location of the segment within the watershed. EPA finds no basis in the analysis of future climate conditions for disagreeing with the conclusion that the TMDLs are established at levels necessary to implement applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 C.F.R. § 130.2(i) define TMDL as the sum of the wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint and natural background sources. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to EPA regulations at 40 C.F.R. § 130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. As described in Section 3.2 of the TMDL Report, WLAs were assigned to four individual point sources (Washington Navy Yard (DC0000141), Pepco Environment Management Services (DC0000094), Super Concrete (DC0000175), and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility) (DC0021199)) and regulated stormwater sources (MS4, CSS, and entities covered under the MSGP).[8] Tables 6-4 through 6-7, 6-31, A-4 through A-7, and A-39 provide daily WLAs for point sources. Tables 6-11 through 6-14, 6-32, A-14 through A-17, and A-40 provide annual WLAs for point sources.[9]

The annual WLAs for the four individual point sources were calculated using water quality criteria concentrations and maximum discharge flows set by design flows specified in the associated NPDES permit for each facility. In addition to having individual NPDES permits, the Washington Navy Yard and Pepco sites are also considered contaminated sites with completed or ongoing clean-up investigations for legacy contamination, and so their WLAs include the sum of the land-

[8] The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or DOEE that there are no additional sources in the watershed that are subject to the NPDES program.

[9] The WLAs and LAs presented in Appendix A for heptachlor epoxide, chlordane, DDT and its metabolites, and dieldrin are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are included in Appendix A because they discharge directly to an unimpaired waterbody-pollutant combination.

based loads attributed to the contaminated land and the loads attributed to their NPDES-regulated discharges, which were set at water quality criteria concentrations and design flows.

The annual WLAs for the regulated stormwater sources including the MS4, CSS[10], and entities covered under the MSGP were calculated through watershed model simulations using simulated rainfall-runoff and pollutant loading relationships for the watershed land areas. Watershed land area loadings were reduced using a top-down approach where the farthest upstream subwatersheds were targeted first. Once instream water quality targets were met in those watersheds, the subwatersheds directly downstream were reduced until targets were met in all subwatersheds. In certain cases, although water quality targets were met in upstream subwatersheds, additional reductions were identified within those subwatersheds in order to meet water quality targets in the downstream tidal waters. Subwatershed loadings were reduced on a land use basis. Within each subwatershed, all urban land uses were assigned equal percent load reductions up to a threshold of 99.9% reduction. If this was not sufficient to meet the endpoint, then all agricultural land uses in the subwatersheds were reduced equally until the water quality target was met. These watershed loadings were then partitioned to the MS4, CSS, and to entities covered under the MSGP at the waterbody scale based on simulated rainfall-runoff and pollutant loading relationships for their associated watershed land areas within the watershed model.

Several point sources, including the MS4, Pepco, the CSS (other than Outfall 019) and sources covered by the MSGP have received WLAs equal to 0 for dieldrin. Two point sources have received very small WLAs (Super Concrete WLA equal to 0.0007 grams/year and DC Water Outfall 019 WLA equal to 0.0020 grams/year). The nonpoint sources received LAs equal to 0, except for the LA representing the boundary condition with Maryland, which received a cumulative LA of 0.0049 grams/year (See TMDL Report Table 6-13). These WLAs (and LAs) are a function of the extremely low numeric Class D water quality criterion for dieldrin, which is also used as the TMDL endpoint (0.0000012 µg/L). This TMDL endpoint is lower than the method detection limits used to monitor and collect the observed data. Given the very low concentration endpoint, and after accounting for uncertainty through various implicit, conservative modeling assumptions, the model suggests minimal assimilative capacity for dieldrin within the Anacostia River, its tributaries, and Kingman Lake. As a result, certain sources of these pollutants were necessarily assigned annual and daily WLAs (and LAs) of 0 grams/year and 0 grams/day, respectively, in order to demonstrate attainment of the applicable water quality standards.

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report. Daily loads were developed in a manner consistent with Section 303(d) of the CWA, EPA's implementing

[10] Loadings from the CSS were estimated using custom function tables within the TMDL watershed model (LSPC) designed to simulate the sewer lines of the CSS. These function tables define storage overflow relationships that replicate conditions where CSO reaches only discharge during significant rainfall events and were developed using information provided by DC Water. Concentrations of the TMDL pollutants were then assigned to overflows based on simulated instream concentrations.

regulations at 40 C.F.R. § 130.7, and EPA guidance.[11] The LSPC model was used to calculate daily flow and pollutant concentration time series data from the most downstream pour point of the impaired segments. For each of the impaired segments, a total daily load was calculated for each day of the TMDL allocation scenario across the four-year (2014 – 2017) simulation period, and the highest daily load was selected as the maximum daily load for that impaired segment. In order to assign daily WLAs and LAs to each point and nonpoint source, the ratio of source loads presented in the annual TMDLs was used to parse the maximum daily load into individual daily WLAs and LAs for each pollutant source within each impaired segment.

Based on the foregoing, EPA finds that both the annual and daily WLAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

EPA is the National Pollutant Discharge Elimination System (NPDES) Program authority for the District of Columbia. The effluent limitations in any new or revised NPDES permits must be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL pursuant to 40 C.F.R. § 122.44 (d)(1)(vii)(B). It is expected that periodic monitoring of the point source(s) will be required through the NPDES permit process, in order to determine consistency with the assumptions and requirements of the WLAs in the TMDLs. The WLAs were calculated for the four individual point sources using an assumption of discharge at water quality criteria concentrations and for the MS4, CSS, and individual sources of industrial stormwater covered by the MSGP using watershed model simulations. In the event that new facilities arise within the watershed, any new facility may not discharge at concentrations greater than the applicable water quality criteria at the end of the discharge pipe to be consistent with the assumptions and requirements of the TMDLs.

Load Allocations

According to federal regulations at 40 C.F.R. § 130.2(g), an LA is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. As described in Section 3.1.1 and 3.1.2 of the TMDL Report, LAs were assigned to upstream loads from Maryland and to historically contaminated sites in the District.[12] Tables 6-4 through 6-7, 6-18 through 6-21, A-4 through A-7, and A-22 through A-25 provide daily LAs for nonpoint sources. Tables 6-11 through 6-14, 6-25

[11] In November 2006, EPA released the memorandum *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA et. al., No. 05-5015 (April 25, 2006) and Implications for NPDES permits*, which recommends that all TMDLs and associated LAs and WLAs include a daily time increment in conjunction with other appropriate temporal expressions that might be necessary to implement the relevant water quality standards.

[12] EPA's approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA's review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

through 6-28, A-14 through A-17, and A-30 through A-33 provide annual LAs for nonpoint sources.[13]

To account for the loads of toxic pollutants originating in Maryland, the calibrated watershed model characterized loadings starting at the headwaters in Maryland. The Maryland portion of the Anacostia River watershed was assigned an upstream LA for each TMDL pollutant at a level to attain the District's water quality standards at the boundary. The TMDLs set an upstream boundary condition that appropriately accounts for loads reaching District waters from Maryland and represents an aggregate of all upstream nonpoint and point source loadings. The Maryland upstream LA has been established at a level to meet downstream water quality criteria within the District portion of the Anacostia River mainstem. See TMDL Modeling Report Section 2.3.1.2. By setting a boundary condition that is designed to achieve water quality standards in the District's waters, the TMDLs do not determine that the entire load from Maryland is a nonpoint source load. Rather, this load allocation represents an aggregate load to point and nonpoint sources within Maryland and appropriately allows Maryland, rather than the District, to allocate loads among Maryland sources. Consistent with CWA Section 402(b)(3) and (5), Maryland's permitting regulations require notification and an opportunity to comment to the District when Maryland authorizes a discharge that could affect the District's waters. See COMAR 26.08.04.01-2.B(3)(a). The MS4 for Prince George's County and Montgomery County each cover the entire county up to the Maryland/District of Columbia boundary, and the NPDES permits for those systems would be subject to COMAR 26.08.04.01-2.B(3)(a). Certain aspects of Maryland's water quality standards also account for the need to achieve downstream water quality standards. E.g., COMAR 26.08.02.03-3 and 26.08.02.05-1.

As described in Section 3.1.2 of the TMDL Report, LAs were assigned to ten historically contaminated sites in the District. As described above, there were two other contaminated sites that were assigned WLAs (Washington Navy Yard and Pepco) because they each have a NPDES permit. The loads attributed to Washington Navy Yard and Pepco as contaminated sites are incorporated into the WLA assigned to each.

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report and described above in the *Wasteload Allocation* subsection. Based on the foregoing, EPA finds that both the annual and daily LAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

3) TMDLs consider natural background sources.

According to EPA regulations at 40 C.F.R. § 130.2(g) & (i), natural background sources of pollutants are part of the LA and, wherever possible, natural and nonpoint source loads should be distinguished. None of the organochlorine pesticides (chlordane, DDT and its metabolites, dieldrin, and heptachlor epoxide) addressed by the TMDLs occur naturally in the environment. Therefore, the natural background loads are expected to be zero. Based on the foregoing, EPA

[13] The WLAs and LAs presented for heptachlor epoxide, chlordane, DDT and its metabolites, and dieldrin in Appendix A are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are placed into Appendix A because they discharge directly to an unimpaired waterbody.

finds the TMDLs account for natural background sources consistent with the regulations at 40 C.F.R. § 130.2(g) & (i).

4) TMDLs consider critical conditions.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. Critical conditions are discussed in Section 6.8 of the TMDL Report. Critical conditions were captured in the TMDLs through the use of a dynamic linked watershed and receiving water model and analysis of all flow conditions in the watershed. The linked dynamic model simulates water quality on an hourly time step over a four-year period, ensuring that acute and long-term conditions are accounted for. Available water quality and flow data show that critical conditions for toxic pollutants in the watershed occur under all conditions (i.e., under both low-flow and high-flow scenarios); therefore, the use of a dynamic modeling application capable of representing conditions resulting from both low and high flow regimes is appropriate. While low flow conditions exhibited exceedances due to increased contaminant desorption from bottom sediments and decreased flushing, high flow conditions exhibited exceedances due to increased contaminant loading from upland sources. In addition, the linkage of the tidal Anacostia River to a dynamic watershed loading model ensures that nonpoint and point source loads from the watershed delivered at times other than the critical period were also considered.

The TMDLs are based on the entire modeled period of 2014 through 2017, which inherently captures a wide variety of naturally occurring conditions. The 2014 – 2017 model period captured a representative range of precipitation conditions including several extreme precipitation events that occurred in that period and relatively wet (2014-2015) and dry (2016-2017) periods. Annual precipitation rates during the 2014 – 2017 model period are consistent with historic precipitation rates (see Figure 3-5 and Table 5-8 of the TMDL Modeling Report).

In response to public comment received concerning the perceived exclusion of 2018 as part of the modeling period, EPA understands that 2018 was not included in the modeling period due to practical limitations; to meet its TMDL development schedule, DOEE needed to finalize model set-up and calibration before 2018 data were available to be incorporated within the model. From a scientific standpoint, 2018 need not be included within the model period to appropriately capture critical conditions. For the period 1991-2020, average annual precipitation was 41.82 inches. The 2014 – 2017 time period captures two years with greater than average precipitation (45.78 inches in 2014 and 45.02 inches in 2015). Additionally, DOEE performed an analysis to assess attainment of the TMDL endpoints under the TMDL allocation scenario using predicted conditions of climate induced changes in precipitation quantity and intensity, air temperature, and sea level rise. This analysis incorporated predicted increases in precipitation quantity and intensity expected in 2035 and 2055. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report and are further described in Section IV.1 of this document.

Based on the foregoing, EPA finds that the TMDLs account for critical conditions consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variations are discussed in Section 6.8 of the TMDL Report. The water quality criteria for each pollutant is applicable year-round without changes based on season. However, loads may change in response to variations in seasonal hydrologic conditions and source loading. Model simulation of multiple complete and consecutive years, from 2014 – 2017, accounted for seasonal variations. Continuous simulation over a period of several years that captured precipitation extremes inherently considers seasonal hydrologic and source loading variability. The pollutant concentrations were simulated on a sub-daily time step, further capturing seasonal variation. Based on the foregoing, EPA finds the TMDLs have been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity.

These TMDLs use an implicit MOS, which is discussed in Section 6.7 of the TMDL Report. As described by the U.S. District Court for the District of Columbia, this type of implicit MOS uses conservative assumptions that result in over-predicting the amount of pollutant present, thereby accounting for uncertainty. *See Anacostia Riverkeeper v. Jackson*, 798 F. Supp. 2d 210, 251-52 (D.C.C. 2011). The specific conservative analyses and assumptions that contributed to the implicit MOS are detailed in Section 6.7 of the TMDL Report and further detailed below:

(1) The modeling framework and TMDLs were developed based on the entire period of 2014 – 2017 to incorporate a wide range of environmental conditions;
(2) DDT and its metabolites were modeled as a group as total DDT and the most stringent water quality criterion (DDE) was used as the TMDL endpoint. Using the most stringent of the applicable criteria for DDT, DDD, and DDE as the endpoint ensures that the criterion for that individual, most stringent metabolite is met. Further, doing so is more protective than required for the other metabolites that have less stringent criteria. The TMDL ensures that the sum of all metabolites of DDT will not exceed the criteria associated with the most stringent metabolite, meaning that the metabolites individually will be below their criteria threshold.
(3) The modeling framework was developed prior to and therefore does not incorporate reductions in combined sewer overflows (CSOs) due to the construction and operation of the Anacostia River Tunnel System, parts of which were completed in both 2018 and 2023, which is expected to capture and divert most of the CSOs for treatment. It is anticipated that operation of the Anacostia River Tunnel system will reduce CSOs by 98 percent, which is expected to achieve significant reductions in the toxic pollutant loads from the CSS. The reduction in CSOs due to the operation of the

Anacostia River Tunnel system is not captured by the model simulation period and is part of the margin of safety.

(4) The discharge at Outfall 019 from the Northeast Boundary Swirl Concentrator Facility was included within the TMDL model simulation, but the Northeast Boundary Swirl Concentrator Facility subsequently was taken out of service permanently. Outfall 019 remains an active CSS outfall, and Outfall 019a has been added to accommodate discharges that may occur when the Anacostia River Tunnel reaches capacity. Discharges through Outfall 019a will be part of the allocation to the CSS. It is anticipated that discharges through Outfalls 019 and 019a will be less frequent/lower volume with the operation of the Anacostia River Tunnel System than the modeled discharge from the Northeast Boundary Swirl Concentrator.

(5) For the four individually permitted facilities, WLAs were calculated based on maximum flows from dischargers set by design flows specified in the NPDES permit for each facility as opposed to the actual, smaller reported flow.

Based on the foregoing, EPA finds that DOEE has incorporated an MOS into the TMDLs consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 C.F.R. § 130.7(a) & (c)(1)(ii) require that TMDLs be subject to public review and that the state implements a process for involving the public in development of TMDLs. In accordance with DOEE's Continuing Planning Process for Water Quality Management (2018), DOEE released the draft TMDLs for a public review and comment period beginning on July 9, 2021 and ending on August 13, 2021. In addition to the formal public comment period, DOEE held a public meeting on July 22, 2021 to provide an overview of the draft TMDLs to the public. As a result of public comments received, DOEE made various revisions to the draft TMDLs. DOEE ultimately released revised, draft TMDLs for a public review and comment period for a second time beginning on September 8, 2023 and ending on October 23, 2023.

Across both public comment periods, DOEE received five sets of public comments from four different organizations. DOEE responded to each public comment in a response to comment document that was included as Appendix C to the TMDL Report. Based on the foregoing, EPA finds that the TMDLs have been subject to DOEE's public participation process.

V. Discussion of Reasonable Assurance

Section 303(d) of the CWA requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate appropriate loadings to point sources.

Reasonable assurance is detailed in Section 9 of the TMDL Report. The only nonpoint sources of the TMDL pollutants within the District are ten historically contaminated sites. A list of these contaminated sites can be found in Table 3-1 of the TMDL Report. These ten contaminated sites are assigned LAs within the TMDL Report. DOEE described prior and planned future management of and corrective action at these contaminated sites as reasonable assurance that the specified LAs will be achieved. DOEE's Anacostia River Sediment Project (ARSP)[14] is a source of reasonable assurance that LAs for these ten contaminated sites will be achieved. Although the ARSP is not itself a Superfund project, DOEE is remediating contamination in the tidal portion of the Anacostia River under the District's Brownfields Revitalization Amendment Act of 2000, D.C. Code §§ 8-631.01, et seq. (DCBRA), and D.C. Code § 8-104.31, which require that DOEE select a remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (42 United States Code [U.S.C.] §§ 9601-9675), and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP). As a result, CERCLA-patterned investigations, assessments, and evaluations were completed that form the basis for the response to contamination in the Anacostia River.

In addition, several of the Contaminated Sites are being remediated pursuant to separate legal agreements. DOEE provides information regarding clean-up efforts at the Washington Navy Yard, the Pepco Benning Service Center, the Washington Gas – East Station Site, the Kenilworth Park Landfill Site, and Poplar Point.[15] In addition, DOEE describes several ongoing programs throughout the District that involve the construction and maintenance of various best management practices (BMPs) to capture stormwater, which may also capture stormwater from contaminated sites depending on their location in the watershed. DOEE and their partners install BMPs through a variety of voluntary and nonvoluntary programs like the MS4 permit and the Chesapeake Bay Agreement. For a discussion of the upstream LA to Maryland, see the *Load Allocation* subsection above.

The reasonable assurance that WLAs assigned to point sources will be achieved is through the issuance of a NPDES permit(s). Specifically, 40 C.F.R. § 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with the assumptions and requirements of any available WLA. Development of a Consolidated Implementation Plan is a requirement of the MS4 permit ("2.2.1 Maintaining and Refining TMDL Databases and Modeling Tools - The Permittee shall continue to update the Consolidated TMDL Implementation Plan modeling tool and associated databases, which shall be used in the development of revised plans, schedules, or strategies. The modeling tool and/or associated databases shall also be used to provide consistent tracking of progress against milestones and benchmarks. Milestone and benchmark progress shall be included in each year's Annual Report for effective utilization by multiple audiences, including the public"). The District most recently updated its Consolidated TMDL Implementation Plan in 2022. The TMDLs include WLAs for stormwater sources, including the MS4 and CSS. Figure 1 below (or Figure 3-2

[14] See information regarding the ARSP, including links to the Remedial Investigation report, Feasibility Study, and Interim Record of Decision (available at: https://restoretheanacostiariver.com/arsp-home).
[15] See more information on DOEE's website (available at: https://restoretheanacostiariver.com/faq).

in the TMDL Report) displays the areas of the District that are covered by the MS4, CSS, and other point and nonpoint sources. Overall, this figure illustrates that a majority of the District is covered by the MS4 and CSS. Therefore, assigning WLAs to these stormwater sources and implementing those WLAs in the NPDES permits for these stormwater sources will ensure that the WLAs are achieved.

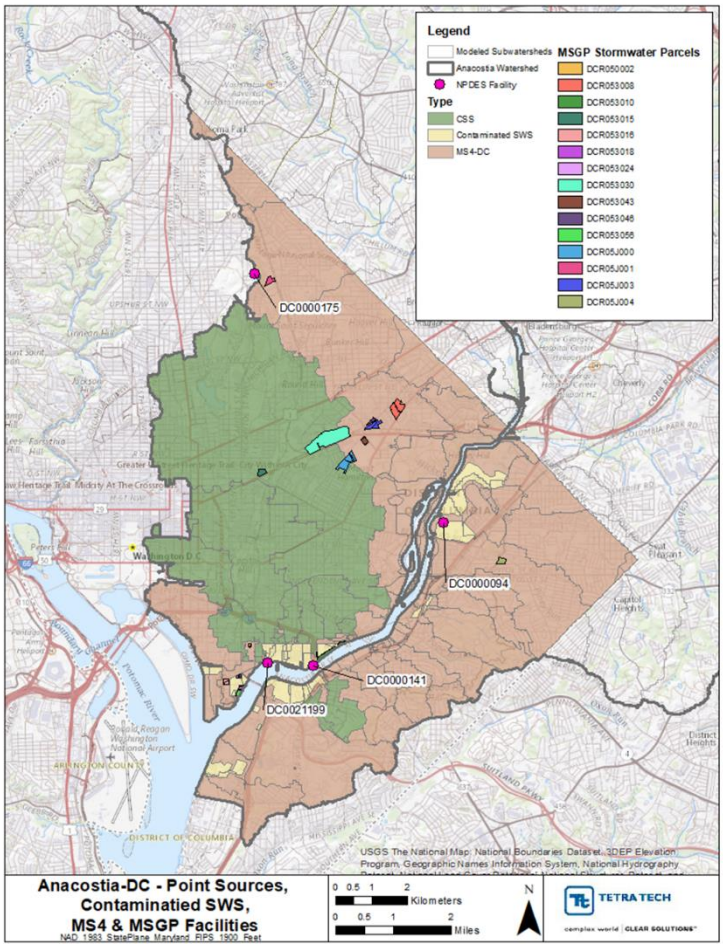

Figure 1. Locations of MS4, CSS, MSGP, and Contaminated Site Subwatersheds in the District (Note: Figure 3-2 in the TMDL Report)

DOEE intends to conduct post-TMDL monitoring of the organochlorine pesticides to monitor concentrations in the system. DOEE collects and measures the concentrations of toxic pollutants, including the organochlorine pesticides, in fish tissue every few years. As the consumption of fish with elevated levels of toxic pollutants is the main pathway for these pollutants to impact human health, DOEE is committed to continuing to conduct fish tissue sampling.

EPA accepts the reasonable assurances set forth in the TMDL Report.

Enclosure 2
Decision Rationale for the Arsenic TMDLs

Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed

I. Introduction

The Clean Water Act (CWA) and its implementing regulations at 40 C.F.R. 130 require that a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint and natural background sources, and a margin of safety (MOS) that takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$\text{TMDL} = \sum\text{WLAs} + \sum\text{LAs} + \text{MOS}$$

This document sets forth the U.S. Environmental Protection Agency (EPA) Region 3's rationale for approving TMDLs for arsenic in the Anacostia River watershed. The TMDLs were developed to address impairments of water quality standards as identified on the District of Columbia's (the District's) 2022 Section 303(d) List of water quality-limited segments (WQLSs) and Integrated Report. The District Department of Energy and Environment (DOEE) submitted the report *Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed* (hereafter referred to as the "TMDL Report") to EPA for final review and action on March 1, 2024, which EPA received on the same day. DOEE submitted a revised TMDL Report to EPA on March 26, 2024 that corrected transcription errors made in the March 1, 2024 TMDL Report. The TMDL Report includes TMDLs that address impairments for seven different toxic pollutants/pollutant groups. In this document, EPA provides its rationale for approving the TMDLs that were developed to address the arsenic impairments. Additional documentation was developed for the TMDLs that address the organochlorine pesticides and polycyclic aromatic hydrocarbon (PAH) impairments. EPA will address the TMDLs for other pollutants separately.

The TMDLs in the TMDL Report are intended to replace TMDLs for organics and metals for the receiving waters that were established in *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in the Anacostia River, Fort Chaplin Tributary, Fort Davis Tributary, Fort Dupont Creek, Fort Stanton Tributary, Hickey Run, Nash Run, Popes Branch, Texas Avenue Tributary and Watts Branch* and *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in Kingman Lake* (collectively, the 2003 TMDLs). Anacostia Riverkeeper, Friends of the Earth, and Potomac Riverkeeper filed a complaint in the U.S. District Court for the District of Columbia, Case No. 1:09-cv-00098-JDB (*Anacostia Riverkeeper*) on January 15, 2009 challenging, among other things, EPA's approvals of the 2003 TMDLs. The district court ultimately

vacated EPA's approvals of the 2003 TMDLs because they lacked daily loads, but stayed vacatur until April 1, 2024.

EPA's decision is based upon its administrative record, which includes the TMDL Report and information in supporting files provided to EPA by DOEE, including DOEE's response to public comments (Appendix C to the TMDL Report). EPA has reviewed and determined that the TMDLs meet the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 C.F.R. Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in the District's TMDL Report and supporting documentation, unless otherwise noted.

II. Section 303(d) Listing Information

DOEE has submitted arsenic TMDLs for ten WQLSs in the Anacostia River watershed in the District.

Initially, the District characterized the Anacostia River and its tributaries as impaired for "organic" (i.e., toxic) pollutants on its 303(d) list of WQLSs in 1998. The District first developed TMDLs for those impairments in 2003 based on data available at that time, including only limited ambient water quality data. The impairments changed as more data were collected and analyzed. Based on DOEE's 2022 Integrated Report, which was approved on February 28, 2024, the tidal Anacostia River in the District, identified as two distinct segments, is listed as impaired for arsenic. Some tributaries to the Anacostia River and Kingman Lake in the District are also listed as impaired for arsenic. Table 1 below presents the WQLSs (i.e., assessment units) and associated arsenic impairments from DOEE's 2022 Integrated Report.

Table 1. Arsenic Impairments

Assessment Unit	Arsenic
Nash Run	•
Watts Branch[1]	•
Fort Chaplin Run	•
Fort Dupont Creek	•
Fort Davis Tributary	•
Texas Avenue Tributary	•
Kingman Lake	•

Anacostia #2	•
Fort Stanton Tributary	•
Anacostia #1	•

• denotes that an impairment exists for a waterbody-pollutant combination.

[1] DC delineates Watts Branch as two assessment units but for the purposes of these TMDLs, Watts Branch #1 and #2 were combined.

III. TMDLs Overview

DOEE has submitted ten TMDLs for arsenic within the Anacostia River watershed. These TMDLs address the impairment listings for the two Anacostia River mainstem segments (Anacostia #1 and #2), Kingman Lake, and the following tributaries: Nash Run, Watts Branch, Fort Chaplin Run, Fort Dupont Creek, Fort Davis Tributary, Texas Avenue Tributary, and Fort Stanton Tributary. The TMDLs, including the source-specific LAs and WLAs, are presented in Section 6 of the TMDL Report. The TMDLs are summarized in Table 2 below.

Table 2. Arsenic TMDLs

Segment	Pollutant	TMDL (g/day)	ΣWLA (g/day)	ΣLA (g/day)	Σ Upstream LAs/WLAs (g/day)	MOS
Nash Run	Arsenic	10.82	6.86	0.24	3.73	Implicit
Watts Branch	Arsenic	36.4	14.59	0.21	21.6	Implicit
Fort Chaplin Run	Arsenic	6.17	6.17	0	0	Implicit
Fort Dupont Creek	Arsenic	12.37	12.19	0.18	0	Implicit
Fort Davis Tributary	Arsenic	4.9	4.9	0	0	Implicit
Texas Avenue Tributary	Arsenic	5.17	5.17	0	0	Implicit
Kingman Lake	Arsenic	14.16	14.16	0	0	Implicit
Anacostia #2	Arsenic	5736.88	588.68	6.78	5141.42	Implicit
Fort Stanton Tributary	Arsenic	3.39	3.39	0	0	Implicit
Anacostia #1	Arsenic	7914.48	2122.91	51.31	5740.27	Implicit

The Anacostia River drains more than 170 square miles across Maryland and the District. Approximately 80 percent of the watershed is in Maryland and 20 percent is in the District. The upper tributaries are non-tidal freshwater, while the mainstem of the Anacostia River within the

District is tidally influenced. The Anacostia River is slow-moving and has a relatively slow flushing rate (average of 23-28 days), which is a result of the river's bathymetry, tidal nature, and the influence of the Potomac River on the Anacostia River at its mouth. In many cases, the downstream segment of the Anacostia River mainstem and some areas of Kingman Lake display the tendency for pollutants to persist. During low flow (or dry) conditions, pollutants tend to persist in these areas due to increased contaminant desorption from bottom sediments and decreased flushing. Whereas during high flow (or wet) conditions, pollutants tend to persist in these areas due to increased contaminant loading from upland sources through stormwater runoff and the tidal inflow of the Potomac River into the Anacostia River. These characteristics of the mainstem Anacostia River explain the persistence of arsenic over time. In addition, the Anacostia River watershed is highly urbanized. About 45 percent of the watershed is residential, the dominant land use in the watershed. Undeveloped land, primarily comprised of forests and parks, covers just under 30 percent of the watershed. The overall imperviousness of the watershed is 22.5 percent, although that is variable among subwatersheds. The highest levels of imperviousness are in the Hickey Run (41 percent) and Northeast Branch (37 percent) subwatersheds. Some areas of the tidal mainstem of the Anacostia River in the District, such as the northwest bank, have even higher levels of imperviousness (48 percent). For more information regarding the water quality characterization of the Anacostia River watershed, please refer to Section 2 of the TMDL Report.

Section 3 of the TMDL Report describes the toxic pollutant source assessments. Sources of toxic pollutants in the watershed include four individually permitted facilities under the National Pollutant Discharge Elimination System (NPDES) and stormwater discharges (i.e., municipal separate storm sewer system (MS4), the combined sewer system (CSS), and entities covered under the Multi-Sector General Permit (MSGP)). The four facilities with individual NPDES permits considered in the TMDL analysis include the Washington Navy Yard, Pepco Environment Management Services, Super Concrete Corporation, and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility[1]). Other sources of toxic pollutants in the watershed include upstream loads originating in Maryland and runoff from historically contaminated sites in the District.

Computational Procedure

Section 4 of the TMDL Report discusses the analysis framework and TMDL model. The linked watershed (Loading Simulation Program in C++ (LSPC)) and receiving water (Environmental Fluid Dynamics Code (EFDC)) models were simulated over a four-year period from 2014 – 2017 to capture a representative period of existing conditions in the Anacostia River system. Initially, baseline conditions were simulated for each identified source for each of the pollutants in every subwatershed. A calibration process was completed using the large dataset compiled on observed and simulated data. Once it was determined that the model simulation was

[1] DC Water Outfall 019 was included as a source in the TMDLs. This outfall used to discharge to the Anacostia River and was an active source during the TMDL model simulation period from 2014 through 2017. Therefore, the TMDLs do not account for the on-the-ground changes resulting from the permanent closure of the Northeast Boundary Swirl Concentrator Facility. EPA recognizes that DC Water Outfall 019 is now a combined sewer outfall.

appropriately capturing existing conditions when compared to observed data, the calibration was deemed acceptable and the process of developing a TMDL scenario begun.

The TMDL scenario was developed through an iterative process of first implementing watershed reductions until the TMDL endpoints were met in the tributaries and then evaluating whether those reductions were sufficient to meet the endpoints in the tidal segments of the Anacostia River. The development of the TMDL scenario involved two separate reduction processes to address endpoint exceedances in the tidal segments of the Anacostia River. An additional analysis was carried out to demonstrate that the TMDL endpoints will be met through the process of natural attenuation of the TMDL pollutants in bottom sediments after the TMDL allocations are achieved.

Bottom Sediments

In the case of these TMDLs, much of the impairment is due to the legacy presence of the TMDL pollutants on land and in the river system rather than through generation and discharge of these pollutants due to present, active operations. Arsenic persists in the environment and has slow degradation rates in soils and sediments, very limited solubility in water, strong adherence to soils and sediments, and a tendency to bioaccumulate. This means that attainment of water quality standards must account for the fact that the pollutants are already in the water column and river bottom sediments.

The model accounts for the presence of the pollutants in the water column and river bottom sediments and simulates the interchange between the bottom sediments and the water column. Flux of toxic pollutants from bottom sediments and pore water to the water column through resuspension and diffusion can result in higher levels of toxic pollutants in the water column. The description of how bottom sediment flux can result in higher levels of pollutants in the water column is found in Section 3.1.3 of the TMDL Report. Conversely, toxic pollutants in the water column may preferentially sorb to suspended sediment in the water column and eventually settle on the river bottom and accumulate in the bottom sediments. In addition, resuspended sediment can be carried by the river and deposited to bottom sediments that could contribute to flux elsewhere within the system. The modeling framework simulated the bottom sediments and the water column as a single system, treating the interchange between bottom sediments and the water column as an internal load within the system and assigning TMDL loads only to external, land-based sources. Therefore, bottom sediments were not assigned a baseline load or load allocation because bottom sediments are not external to the system. In other words, the TMDLs treat the bottom sediments as part of, and inextricably intertwined with, the river itself.

Modeling the interchange between the water column and bottom sediments as one interconnected system is appropriate because elevated levels of toxic pollutants in fish tissue are a function of both water column and bottom sediment concentrations. It is the bioaccumulation of toxins in fish tissue that are then eaten by humans that is one of the concerns addressed by the applicable water quality standards.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards because both the contributions from external, land-based sources and the interchange between bottom sediments and the water column were accounted for in the TMDL modeling

framework. The TMDL modeling framework was configured to represent contributions from external sources within the watershed and tributaries to the Anacostia River and the mainstem Anacostia River and the flux between the river water column and the bottom sediments, including release from the contaminated river bottom sediment due to diffusion and resuspension. The model predicted and simulated resultant instream and bottom sediment conditions after contributions from external, land-based sources were controlled and the associated TMDL loads (LAs and WLAs) were achieved. As external, land-based loads are reduced, the external, land-based sources will contribute cleaner water and sediment into the system. This will result in burial of pollutants in the currently active layer of the bottom sediment and pore water and transport of pollutants out of the system through flushing. This process of burial and flushing, combined with other processes, like pollutant degradation, that would occur when inputs from external, land-based sources achieve LAs and WLAs is what the TMDL Report refers to as "natural attenuation."

DOEE completed a supplementary analysis to demonstrate that the process of natural attenuation will occur in the system and to estimate approximately how long it will take for the TMDL endpoints (and therefore, the water quality criteria) to be met following achievement of the TMDL LAs and WLAs. This analysis demonstrated that the allocations in the TMDLs will ultimately result in the reduction of flux from the bottom sediments and the attainment of the TMDL endpoints. A complete description of natural attenuation and the associated analysis can be found in Section 5.4 of the TMDL Report and Sections 7.4 and 7.5 of the TMDL Modeling Report.

As a result of this analysis, DOEE demonstrated that the TMDLs are established at levels necessary to attain and maintain applicable water quality standards. DOEE estimated that the length of time it will take for the TMDL endpoints for arsenic to be met may take anywhere from nine to 206 years, depending on the waterbody in question.[2] DOEE also demonstrated that the TMDLs are set at levels sufficient to attain and maintain applicable water quality standards without relying upon remediation of contaminated sediments (i.e., dredging, capping, carbon amendments).

The time required to attain water quality standards once the LAs and WLAs are achieved will depend upon such factors as the nature of the pollutant, the applicable water quality standards, and the nature of the receiving waters. Much of the impairment is due to the legacy presence of arsenic on land and in the river system. The legacy presence, combined with the nature of arsenic, means that the return to water quality standards necessarily will take time.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards without relying upon additional measures such as remediation of the bottom sediments. By reducing the amount or availability of contaminated sediment for flux and resuspension, remediation of contaminated sediments, such as dredging, capping, or carbon amendments, can reduce the levels of arsenic in the water column once resuspension associated

[2] The mean estimated length of time it will take for the TMDL endpoint for arsenic to be met across all waterbodies is 47 years. Notably, at most of the locations in the Anacostia River watershed, the TMDL endpoint for arsenic is estimated to be met within 50 years (i.e., 71% of the estimates are less than or equal to 50 years).

with some of these activities – which could increase water column concentrations – has stabilized. Although sediment remediation is not an assumption of the TMDLs, nothing in these TMDLs precludes the use of dredging, capping, or other remediation efforts as tools to achieve the TMDL endpoints. Consequently, these TMDLs are not inconsistent with sediment remediation efforts that are currently planned as part of DOEE's Anacostia River Sediment Project (ARSP). The ARSP is a contaminated site project focused on remediation of contaminated bottom sediments in the Anacostia River mainstem and Kingman Lake that has occurred in parallel with TMDL development, but otherwise on a separate timeline. The ARSP focuses on PCB contamination.[3] Sediment remediation, including activities taken in connection with the ARSP, likely will also have the secondary benefit of reducing other sediment-bound pollutants, including the TMDL pollutants, such as arsenic, that are co-located. It is reasonable, therefore, to expect that the remediation of contaminated sediment would decrease the amount of time it will take for water quality to approach the TMDL endpoints.

LAs and WLAs in the Informational TMDLs

DOEE has developed TMDLs for waterbody-pollutant combinations that are within the Anacostia River watershed and are not listed as impaired in DOEE's 2022 Integrated Report but may have been listed as impaired for arsenic in the past. As applied to the unimpaired waters, these are considered "informational" TMDLs and can be found in Appendix A to the TMDL Report. Section 303(d)(3) of the CWA and 40 C.F.R. 130.7(e) authorize states to develop informational TMDLs for waterbody-pollutant combinations that are not identified on its list of WQLSs; however, there is no requirement to submit informational TMDLs to EPA for approval when water quality standards are currently being met. 33 U.S.C. 1313(d)(3) and 40 C.F.R. 130.7(e). The intent is to develop information and identify levels that will protect the waterbodies that are not listed as impaired. Overall, DOEE's final TMDL submittal included two informational TMDLs for arsenic (for Hickey Run and Popes Branch).

While EPA is not taking action on the informational TMDLs for unimpaired waters, the arsenic TMDLs for Anacostia #1 and Anacostia #2 incorporate the same LAs and WLAs as those in the informational TMDLs. Appendix A of the TMDL Report explains that "the source-specific allocations presented below are incorporated into the TMDLs provided in Section 5.6 of the TMDL Report because those allocations are required to meet downstream water quality in the tidal mainstem Anacostia River" – meaning that the LAs and WLAs presented in Appendix A for arsenic also function as LAs and WLAs within the TMDLs for the tidal mainstem Anacostia segments. As such, EPA herein approves the arsenic TMDLs for Anacostia #1 and Anacostia #2 and approves all LAs and WLAs for those two TMDLs, including the LAs and WLAs that are also part of the informational TMDLs for arsenic. The mere fact that the informational arsenic

[3] PCBs are the focus of the ARSP; however, the ARSP Remedial Investigation identified five contaminants of concern including PCBs, chlordane, dioxin-like PCBs, dioxin toxic equivalent, and benzo(a)pyrene. In 2020, the ARSP Interim Record of Decision was published, which identifies the early action areas or "hot spots" in the Anacostia River watershed where PCB contamination is highest and requires remediation. Overall, an area of approximately 77 acres will be remediated through a variety of remedial activities. The remediation at the 11 early action areas will likely also beneficially reduce other pollutants (e.g., metals, organochlorine pesticides, and PAHs) that concurrently exist in the PCB-contaminated sediment.

TMDLs for Hickey Run and Popes Branch include LAs and WLAs that are also part of the TMDLs for Anacostia #1 and Anacostia #2 does not mean that EPA is taking action on the informational TMDLs.

IV. Discussion of Regulatory Requirements

1) TMDLs are established at a level necessary to implement the applicable water quality standards.

EPA regulations at 40 C.F.R. 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards. States, with federal approval and oversight, adopt water quality standards for each particular waterbody or waterbody segment within their boundaries. 33 U.S.C. 1313(c)(1). Water quality standards are comprised of three components: (1) designated uses, (2) criteria (narrative or numeric) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality. EPA either approves a state's proposed water quality standards or, if it disapproves, promulgates standards for the state unless the state addresses EPA's disapproval. 33 U.S.C. 1313(c)(3).

Arsenic TMDLs are presented for ten impaired waterbodies in the District. The following designated use classes apply to all ten impaired waterbodies: Class A – Primary Contact Recreation; Class B – Secondary Contact Recreation and Aesthetic Enjoyment; Class C – Protection and Propagation of Fish, Shellfish, and Wildlife; and Class D – Protection of Human Health Related to Consumption of Fish and Shellfish. For both Anacostia River mainstem segments (Anacostia #1 and #2), the Class E – Navigation designated use also applies. The arsenic TMDLs are set at levels necessary to attain and maintain all designated uses. Within the District's water quality standards regulations there are a number of applicable narrative and numeric water quality criteria that were considered in the development of these TMDLs. All of the applicable criteria can be found in Section 1.4 of the TMDL Report.

The District has multiple numeric water quality criteria for arsenic (i.e., for Class C and Class D designated uses). Therefore, the District employed a conservative approach and used the most stringent of the numeric criteria as the TMDL endpoint to represent arsenic. While the District generally does not have criteria for arsenic for Class A and Class B designated uses, TMDL endpoints established to achieve the more stringent of the numeric criteria for Class C and Class D designated uses also will support Class A and Class B designated uses. The District's numeric water quality criteria for Class C waters include a criteria maximum concentration and criteria continuous concentration to protect acute and chronic exposure of aquatic life, respectively. The District's numeric water quality criterion for Class D waters is a 30-day average concentration that is applied for the protection of human health related to the consumption of fish and shellfish. The Class D criterion is the most stringent of the District's numeric water quality criteria for arsenic, and DOEE adopted this criterion from EPA's existing 304(a) criteria recommendation. This numeric arsenic criterion considers exposure (i.e., incidental ingestion, dermal exposure)

resulting from recreation in and on the water (Class A and Class B) (EPA, 1980[4], EPA, 1995[5], and EPA, 2000). Criteria that protect human health related to the consumption of aquatic organisms (i.e., Class D) are generally expected to protect human health from less direct exposures (i.e., Class A and Class B).[6] Lastly, the TMDL pollutants do not affect navigation (Class E).

In addition to supporting numeric criteria, the TMDL endpoints are established at levels necessary to implement the District's applicable narrative criteria. The District's applicable narrative criteria, found at 21 D.C.M.R. § 1104.1, prohibit substances attributable to discharges in amounts that "[c]ause injury to, are toxic to, or produce adverse physiological or behavioral changes in humans, plants, or animals" and "impair the biological community that naturally occurs in the waters or depends upon the waters for its survival and propagation." As a general matter, narrative water quality criteria are intended to supplement, not supersede, numeric criteria or to establish water quality conditions for parameters for which no numeric criteria have been established. 40 C.F.R. § 131.11(b)(2). Regardless, and to the extent the narrative water quality criteria are "applicable" within the meaning of CWA Section 303(d)(1)(C), the TMDLs are expected to achieve the District's narrative water quality criteria. Like numeric criteria, narrative criteria represent a quality of water that supports a particular designated use; when criteria are met, water quality will generally protect the use. See 40 C.F.R. § 131.3(b). The TMDL endpoints are set at levels that will achieve all designated uses established for the relevant District waters. The narrative criteria refer to "amounts" of a pollutant that will cause or result in a particular water quality condition. In this case, each numeric criterion for arsenic represents the referenced "amount" of that pollutant that is expected to avoid the adverse impacts described at §§ 1104.1(d) and (f). The District's other narrative criteria do not apply to arsenic.[7]

The TMDL endpoints also are set at levels necessary to implement the Class D designated use at fish consumption levels generally expected in the District. The District's arsenic criterion for the Class D use is based upon data derived from the general population and is calculated at a 10^{-6} risk

[4] See EPA 1980 Guidelines and Methodology Used in the Preparation of Health Effect Assessment Chapters of the Consent Decree Water Criteria Documents (available at: https://19january2017snapshot.epa.gov/sites/production/files/2015-10/documents/45fedreg7.pdf).

[5] See EPA 1995 Water Quality Criteria (available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/910076BC.PDF?Dockey=910076BC.PDF).

[6] EPA has considered whether there are cases for which water quality criteria for the protection of human health based only on fish ingestion (or only criteria for the protection of aquatic life) may not adequately protect recreational users from health effects resulting from incidental water ingestion. EPA reviewed information that provided estimates of incidental water ingestion rates averaged over time. EPA generally believes that the averaged amount is negligible and will not have any impact on the chemical criteria values based on fish consumption only, unless the chemical exhibits no bioaccumulation potential. See EPA, Methodology for Deriving Ambient Water Quality Criteria for Protection of Human Health – Revised Methodology (2000) (available at: https://www.epa.gov/wqc/human-health-water-quality-criteria-and-methods-toxics#methodology).

[7] The narrative criteria at 21 D.C.M.R. §§ 1104.1(a), (b), (c) and (e) are not relevant because, while arsenic does bind to sediment, arsenic does not itself settle to form objectionable deposits. Arsenic also does not: float as debris, scum, oil, or other matter; produce objectionable odor, color, taste, or turbidity at environmentally relevant levels; or produce undesirable or nuisance aquatic life or result in the dominance of nuisance species. DOEE also considered the narrative criteria at §§ 1104.3 through 1104.7, which do not relate to toxic pollutants and instead focus on specific topics such as aesthetic properties, untreated sewage and litter, the burial or obstruction of objects, concentrations of chlorophyll *a*/algae, or unmarked submerged or partially submerged man-made objects.

level (corresponding to an increased chance of cancer of one in a million). EPA calculates human health criteria values at a 10^{-6} (one in one million) cancer risk level and recommends that states and authorized tribes use cancer risk levels of 10^{-6} or 10^{-5} (one in one hundred thousand) when deriving human health criteria for the general population (EPA, 2000). For example, the state of Maryland has adopted human health criteria for toxic pollutants at the 10^{-5} risk level. For subsistence fishers consuming between 130 – 142.4 grams per day (U.S. NPS, 2018) consistent with EPA's national default subsistence rate, as compared with the 6.5 grams per day incorporated in the derivation of DOEE's arsenic criteria, the cancer risk level for subsistence fishers would be greater than 10^{-5} (one in one hundred thousand), but substantially less than the 10^{-4} (one in ten thousand) risk level, which is within the range that EPA's guidance contemplates as acceptable in this situation.[8]

Based on the foregoing, EPA finds that the TMDLs are established at a level necessary to implement the applicable water quality standards.

In response to comments received during the first round of public notice and comment in the summer of 2021, DOEE undertook an analysis that simulated the fate and transport of the TMDL pollutants under predicted conditions of climate-induced changes in precipitation quantity and intensity, air temperature, and sea level rise. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report. The Anacostia River is a tributary to the Chesapeake Bay; therefore, DOEE selected the projected climate change effects and time horizons to be consistent with the Chesapeake Bay Program's medium- to long-term planning outlook. The analysis was performed for two time horizons: a near-term horizon around 2035 (2034 – 2037) and a long-term horizon around 2055 (2054 – 2057). This analysis estimated both the change in water column concentrations for each pollutant under future climate scenarios compared to the TMDL allocation scenario and how long it will take to achieve the TMDL endpoints through natural attenuation of toxic pollutants in bottom sediments under future climate scenarios relative to the natural attenuation results documented for the TMDL allocation scenarios. Although the analysis of future climate conditions points to an expected greater load of toxic pollutants to the Anacostia River due to increased precipitation and associated runoff, it also points to dilution of these toxic pollutants due to sea level rise and other hydrologic functions that counteract the increased load. Whether attainment of applicable water quality criteria would take more or less time under future climate scenarios depended upon a number of factors, primarily the location of the segment within the watershed. EPA finds no basis in the analysis of future climate conditions for disagreeing with the conclusion that the TMDLs are established at levels necessary to implement applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 C.F.R. § 130.2(i) define TMDL as the sum of the wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint and natural background sources. The development of the WLAs and LAs is further discussed below.

[8] Criteria based on a 10^{-5} risk level are acceptable for the general population as long as states and authorized tribes ensure that the risk to more highly exposed subgroups (sport or subsistence fishers) does not exceed the 10^{-4} level (EPA, 2000).

Wasteload Allocations

According to EPA regulations at 40 C.F.R. § 130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. As described in Section 3.2 of the TMDL Report, WLAs were assigned to four individual point sources (Washington Navy Yard (DC0000141), Pepco Environment Management Services (DC0000094), Super Concrete (DC0000175), and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility) (DC0021199)) and regulated stormwater sources (MS4, CSS, and entities covered under the MSGP).[9] Tables 6-3, 6-31, A-1, and A-39 provide daily WLAs for point sources. Tables 6-10, 6-32, A-11, and A-36 provide annual WLAs for point sources.[10]

The annual WLAs for the four individual point sources were calculated using water quality criteria concentrations and maximum discharge flows set by design flows specified in the associated NPDES permit for each facility. In addition to having individual NPDES permits, the Washington Navy Yard and Pepco sites are also considered contaminated sites with completed or ongoing clean-up investigations for legacy contamination, and so their WLAs include the sum of the land-based loads attributed to the contaminated land and the loads attributed to their NPDES-regulated discharges, which were set at water quality criteria concentrations and design flows.

The annual WLAs for the regulated stormwater sources including the MS4, CSS[11], and entities covered under the MSGP were calculated through watershed model simulations using simulated rainfall-runoff and pollutant loading relationships for the watershed land areas. Watershed land area loadings were reduced using a top-down approach where the farthest upstream subwatersheds were targeted first. Once instream water quality targets were met in those watersheds, the subwatersheds directly downstream were reduced until targets were met in all subwatersheds. In certain cases, although water quality targets were met in upstream subwatersheds, additional reductions were identified within those subwatersheds in order to meet water quality targets in the downstream tidal waters. Subwatershed loadings were reduced on a land use basis. Within each subwatershed, all urban land uses were assigned equal percent load reductions up to a threshold of 99.9% reduction. If this was not sufficient to meet the endpoint, then all agricultural land uses in the subwatersheds were reduced equally until the water quality target was met. These watershed loadings were then partitioned to the MS4, CSS, and to entities covered under the MSGP at the waterbody scale based on simulated rainfall-runoff and pollutant loading relationships for their associated watershed land areas within the

[9] The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or DOEE that there are no additional sources in the watershed that are subject to the NPDES program.

[10] The WLAs and LAs presented in Appendix A for arsenic are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are placed into Appendix A because they discharge directly to an unimpaired waterbody-pollutant combination.

[11] Loadings from the CSS were estimated using custom function tables within the TMDL watershed model (LSPC) designed to simulate the sewer lines of the CSS. These function tables define storage overflow relationships that replicate conditions where CSO reaches only discharge during significant rainfall events and were developed using information provided by DC Water. Concentrations of the TMDL pollutants were then assigned to overflows based on simulated instream concentrations.

watershed model. In some cases, point and nonpoint sources received small WLAs and LAs, respectively, for arsenic, which are a function of the relatively low numeric Class D water quality criterion for arsenic, which is also used as the TMDL endpoint (0.14 µg/L).

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report. Daily loads were developed in a manner consistent with Section 303(d) of the CWA, EPA's implementing regulations at 40 C.F.R. § 130.7, and EPA guidance.[12] The LSPC model was used to calculate daily flow and pollutant concentration time series data from the most downstream pour point of the impaired segments. For each of the impaired segments, a total daily load was calculated for each day of the TMDL allocation scenario across the four-year (2014 – 2017) simulation period, and the highest daily load was selected as the maximum daily load for that impaired segment. In order to assign daily WLAs and LAs to each point and nonpoint source, the ratio of source loads presented in the annual TMDLs was used to parse the maximum daily load into individual daily WLAs and LAs for each pollutant source within each impaired segment.

Based on the foregoing, EPA finds that both the annual and daily WLAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

EPA is the National Pollutant Discharge Elimination System (NPDES) Program authority for the District of Columbia. The effluent limitations in any new or revised NPDES permits must be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL pursuant to 40 C.F.R. § 122.44 (d)(1)(vii)(B). It is expected that periodic monitoring of the point source(s) will be required through the NPDES permit process, in order to determine consistency with the assumptions and requirements of the WLAs in the TMDLs. The WLAs were calculated for the four individual point sources using an assumption of discharge at water quality criteria concentrations and for the MS4, CSS, and individual sources of industrial stormwater covered by the MSGP using watershed model simulations. In the event that new facilities arise within the watershed, any new facility may not discharge at concentrations greater than the applicable water quality criteria at the end of the discharge pipe to be consistent with the assumptions and requirements of the TMDLs.

Load Allocations

According to federal regulations at 40 C.F.R. § 130.2(g), an LA is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. As described in Section 3.1.1 and 3.1.2 of the TMDL Report, LAs were assigned to upstream loads from Maryland and to historically

[12] In November 2006, EPA released the memorandum *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA et. al., No. 05-5015 (April 25, 2006) and Implications for NPDES permits*, which recommends that all TMDLs and associated LAs and WLAs include a daily time increment in conjunction with other appropriate temporal expressions that might be necessary to implement the relevant water quality standards.

contaminated sites in the District.[13] Tables 6-3, 6-17, and A-1 provide daily LAs for nonpoint sources. Tables 6-10, 6-24, and A-11 provide annual LAs for nonpoint sources.[14]

To account for the loads of toxic pollutants originating in Maryland, the calibrated watershed model characterized loadings starting at the headwaters in Maryland. The Maryland portion of the Anacostia River watershed was assigned an upstream LA for each TMDL pollutant at a level to attain the District's water quality standards at the boundary. The TMDLs set an upstream boundary condition that appropriately accounts for loads reaching District waters from Maryland and represents an aggregate of all upstream nonpoint and point source loadings. The Maryland upstream LA has been established at a level to meet downstream water quality criteria within the District portion of the Anacostia River mainstem. See TMDL Modeling Report Section 2.3.1.2. By setting a boundary condition that is designed to achieve water quality standards in the District's waters, the TMDLs do not determine that the entire load from Maryland is a nonpoint source load. Rather, this load allocation represents an aggregate load to point and nonpoint sources within Maryland and appropriately allows Maryland, rather than the District, to allocate loads among Maryland sources. Consistent with CWA Section 402(b)(3) and (5), Maryland's permitting regulations require notification and an opportunity to comment to the District when Maryland authorizes a discharge that could affect the District's waters. See COMAR 26.08.04.01-2.B(3)(a). The MS4 for Prince George's County and Montgomery County each cover the entire county up to the Maryland/District of Columbia boundary, and the NPDES permits for those systems would be subject to COMAR 26.08.04.01-2.B(3)(a). Certain aspects of Maryland's water quality standards also account for the need to achieve downstream water quality standards. E.g., COMAR 26.08.02.03-3 and 26.08.02.05-1.

As described in Section 3.1.2 of the TMDL Report, LAs were assigned to ten historically contaminated sites in the District. As described above, there were two other contaminated sites that were assigned WLAs (Washington Navy Yard and Pepco) because they each have a NPDES permit. The loads attributed to Washington Navy Yard and Pepco as contaminated sites are incorporated into the WLA assigned to each.

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report and described above in the *Wasteload Allocation* subsection. Based on the foregoing, EPA finds that both the annual and daily LAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

3) TMDLs consider natural background sources.

According to EPA regulations at 40 C.F.R. § 130.2(g) & (i), natural background sources of pollutants are part of the LA and, wherever possible, natural and nonpoint source loads should be distinguished. Arsenic, like other metals, naturally exists at low levels in the environment.

[13] EPA's approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA's review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

[14] The WLAs and LAs presented for arsenic in Appendix A are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are included in Appendix A because they discharge directly to an unimpaired waterbody.

Although arsenic occurs naturally in the environment, contamination of the Anacostia River, its tributaries, and Kingman Lake at levels that pose a risk to human health results from metals that enter the environment through anthropogenic activities. For example, arsenic is an ingredient commonly used in wood preservation and can also be an ingredient in insecticides and herbicides. Ultimately, it is expected that high levels of arsenic in the District are a result of historic activities and stormwater runoff from hazardous or contaminated waste sites. Therefore, natural background loads of arsenic are expected to be minimal and not a significant factor. Natural background levels of arsenic were captured in the TMDLs through the parametrization and calibration of the dynamic linked watershed and receiving water model, which incorporated estimated background concentrations from various literature sources. The linked dynamic model simulates water quality on an hourly time step over a four-year period, ensuring that natural background loads were accounted for. Based on the foregoing, EPA finds the TMDLs account for natural background sources consistent with the regulations at 40 C.F.R. § 130.2(g) & (i).

4) TMDLs consider critical conditions.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. Critical conditions are discussed in Section 6.8 of the TMDL Report. Critical conditions were captured in the TMDLs through the use of a dynamic linked watershed and receiving water model and analysis of all flow conditions in the watershed. The linked dynamic model simulates water quality on an hourly time step over a four-year period, ensuring that acute and long-term conditions are accounted for. Available water quality and flow data show that critical conditions for toxic pollutants in the watershed occur under all conditions (i.e., under both low-flow and high-flow scenarios); therefore, the use of a dynamic modeling application capable of representing conditions resulting from both low and high flow regimes is appropriate. While low flow conditions exhibited exceedances due to increased contaminant desorption from bottom sediments and decreased flushing, high flow conditions exhibited exceedances due to increased contaminant loading from upland sources. In addition, the linkage of the tidal Anacostia River to a dynamic watershed loading model ensures that nonpoint and point source loads from the watershed delivered at times other than the critical period were also considered.

The TMDLs are based on the entire modeled period of 2014 through 2017, which inherently captures a wide variety of naturally occurring conditions. The 2014 – 2017 model period captured a representative range of precipitation conditions including several extreme precipitation events that occurred in that period and relatively wet (2014-2015) and dry (2016-2017) periods. Annual precipitation rates during the 2014 – 2017 model period are consistent with historic precipitation rates (see Figure 3-5 and Table 5-8 of the TMDL Modeling Report).

In response to public comment received concerning the perceived exclusion of 2018 as part of the modeling period, EPA understands that 2018 was not included in the modeling period due to practical limitations; to meet its TMDL development schedule, DOEE needed to finalize model set-up and calibration before 2018 data were available to be incorporated within the model. From a scientific standpoint, 2018 need not be included within the model period to appropriately capture critical conditions. For the period 1991-2020, average annual precipitation was 41.82 inches. The 2014 – 2017 time period captures two years with greater than average precipitation

(45.78 inches in 2014 and 45.02 inches in 2015). Additionally, DOEE performed an analysis to assess attainment of the TMDL endpoints under the TMDL allocation scenario using predicted conditions of climate induced changes in precipitation quantity and intensity, air temperature, and sea level rise. This analysis incorporated predicted increases in precipitation quantity and intensity expected in 2035 and 2055. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report and are further described in Section IV.1 of this document.

Based on the foregoing, EPA finds that the TMDLs account for critical conditions consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variations are discussed in Section 6.8 of the TMDL Report. The water quality criteria for each pollutant is applicable year-round without changes based on season. However, loads may change in response to variations in seasonal hydrologic conditions and source loading. Model simulation of multiple complete and consecutive years, from 2014 – 2017, accounted for seasonal variations. Continuous simulation over a period of several years that captured precipitation extremes inherently considers seasonal hydrologic and source loading variability. The pollutant concentrations were simulated on a sub-daily time step, further capturing seasonal variation. Based on the foregoing, EPA finds the TMDLs have been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity.

These TMDLs use an implicit MOS, which is discussed in Section 6.7 of the TMDL Report. As described by the U.S. District Court for the District of Columbia, this type of implicit MOS uses conservative assumptions that result in over-predicting the amount of pollutant present, thereby accounting for uncertainty. *See Anacostia Riverkeeper v. Jackson*, 798 F. Supp. 2d 210, 251-52 (D.C.C. 2011). The specific conservative analyses and assumptions that contributed to the implicit MOS are detailed in Section 6.7 of the TMDL Report and further detailed below:

(1) The modeling framework and TMDLs were developed based on the entire period of 2014 – 2017 to incorporate a wide range of environmental conditions;
(2) The modeling framework was developed prior to and therefore does not incorporate reductions in combined sewer overflows (CSOs) due to the construction and operation of the Anacostia River Tunnel System, parts of which were completed in both 2018 and 2023, which is expected to capture and divert most of the CSOs for treatment. It is anticipated that operation of the Anacostia River Tunnel system will reduce CSOs by 98 percent, which is expected to achieve significant reductions in the toxic pollutant loads from the CSS. The reduction in CSOs due to the operation of the

Anacostia River Tunnel system is not captured by the model simulation period and is part of the margin of safety.

(3) The discharge at Outfall 019 from the Northeast Boundary Swirl Concentrator Facility was included within the TMDL model simulation, but the Northeast Boundary Swirl Concentrator Facility subsequently was taken out of service permanently. Outfall 019 remains an active CSS outfall, and Outfall 019a has been added to accommodate discharges that may occur when the Anacostia River Tunnel reaches capacity. Discharges through Outfall 019a will be part of the allocation to the CSS. It is anticipated that discharges through Outfalls 019 and 019a will be less frequent/lower volume with the operation of the Anacostia River Tunnel System than the modeled discharge from the Northeast Boundary Swirl Concentrator.

(4) For the four individually permitted facilities, WLAs were calculated based on maximum flows from dischargers set by design flows specified in the NPDES permit for each facility as opposed to the actual, smaller reported flow.

Based on the foregoing, EPA finds that DOEE has incorporated an MOS into the TMDLs consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 C.F.R. § 130.7(a) & (c)(1)(ii) require that TMDLs be subject to public review and that the state implements a process for involving the public in development of TMDLs. In accordance with DOEE's Continuing Planning Process for Water Quality Management (2018), DOEE released the draft TMDLs for a public review and comment period beginning on July 9, 2021 and ending on August 13, 2021. In addition to the formal public comment period, DOEE held a public meeting on July 22, 2021 to provide an overview of the draft TMDLs to the public. As a result of public comments received, DOEE made various revisions to the draft TMDLs. DOEE ultimately released revised, draft TMDLs for a public review and comment period for a second time beginning on September 8, 2023 and ending on October 23, 2023.

Across both public comment periods, DOEE received five sets of public comments from four different organizations. DOEE responded to each public comment in a response to comment document that was included as Appendix C to the TMDL Report. Based on the foregoing, EPA finds that the TMDLs have been subject to DOEE's public participation process.

V. Discussion of Reasonable Assurance

Section 303(d) of the CWA requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate appropriate loadings to point sources.

Reasonable assurance is detailed in Section 9 of the TMDL Report. The only nonpoint sources of the TMDL pollutants within the District are ten historically contaminated sites. A list of these contaminated sites can be found in Table 3-1 of the TMDL Report. These ten contaminated sites are assigned LAs within the TMDL Report. DOEE described prior and planned future management of and corrective action at these contaminated sites as reasonable assurance that the specified LAs will be achieved. DOEE's Anacostia River Sediment Project (ARSP)[15] is a source of reasonable assurance that LAs for these ten contaminated sites will be achieved. Although the ARSP is not itself a Superfund project, DOEE is remediating contamination in the tidal portion of the Anacostia River under the District's Brownfields Revitalization Amendment Act of 2000, D.C. Code §§ 8-631.01, et seq. (DCBRA), and D.C. Code § 8-104.31, which require that DOEE select a remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (42 United States Code [U.S.C.] §§ 9601-9675), and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP). As a result, CERCLA-patterned investigations, assessments, and evaluations were completed that form the basis for the response to contamination in the Anacostia River.

In addition, several of the Contaminated Sites are being remediated pursuant to separate legal agreements. DOEE provides information regarding clean-up efforts at the Washington Navy Yard, the Pepco Benning Service Center, the Washington Gas – East Station Site, the Kenilworth Park Landfill Site, and Poplar Point.[16] In addition, DOEE describes several ongoing programs throughout the District that involve the construction and maintenance of various best management practices (BMPs) to capture stormwater, which may also capture stormwater from contaminated sites depending on their location in the watershed. DOEE and their partners install BMPs through a variety of voluntary and nonvoluntary programs like the MS4 permit and the Chesapeake Bay Agreement. For a discussion of the upstream LA to Maryland, see the *Load Allocation* subsection above.

The reasonable assurance that WLAs assigned to point sources will be achieved is through the issuance of a NPDES permit(s). Specifically, 40 C.F.R. § 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with the assumptions and requirements of any available WLA. Development of a Consolidated Implementation Plan is a requirement of the MS4 permit ("2.2.1 Maintaining and Refining TMDL Databases and Modeling Tools - The Permittee shall continue to update the Consolidated TMDL Implementation Plan modeling tool and associated databases, which shall be used in the development of revised plans, schedules, or strategies. The modeling tool and/or associated databases shall also be used to provide consistent tracking of progress against milestones and benchmarks. Milestone and benchmark progress shall be included in each year's Annual Report for effective utilization by multiple audiences, including the public"). The District most recently updated its Consolidated TMDL Implementation Plan in 2022. The TMDLs include WLAs for stormwater sources, including the MS4 and CSS. Figure 1 below (or Figure 3-2

[15] See information regarding the ARSP, including links to the Remedial Investigation report, Feasibility Study, and Interim Record of Decision (available at: https://restoretheanacostiariver.com/arsp-home).
[16] See more information on DOEE's website (available at: https://restoretheanacostiariver.com/faq).

in the TMDL Report) displays the areas of the District that are covered by the MS4, CSS, and other point and nonpoint sources. Overall, this figure illustrates that a majority of the District is covered by the MS4 and CSS. Therefore, assigning WLAs to these stormwater sources and implementing those WLAs in the NPDES permits for these stormwater sources will ensure that the WLAs are achieved.

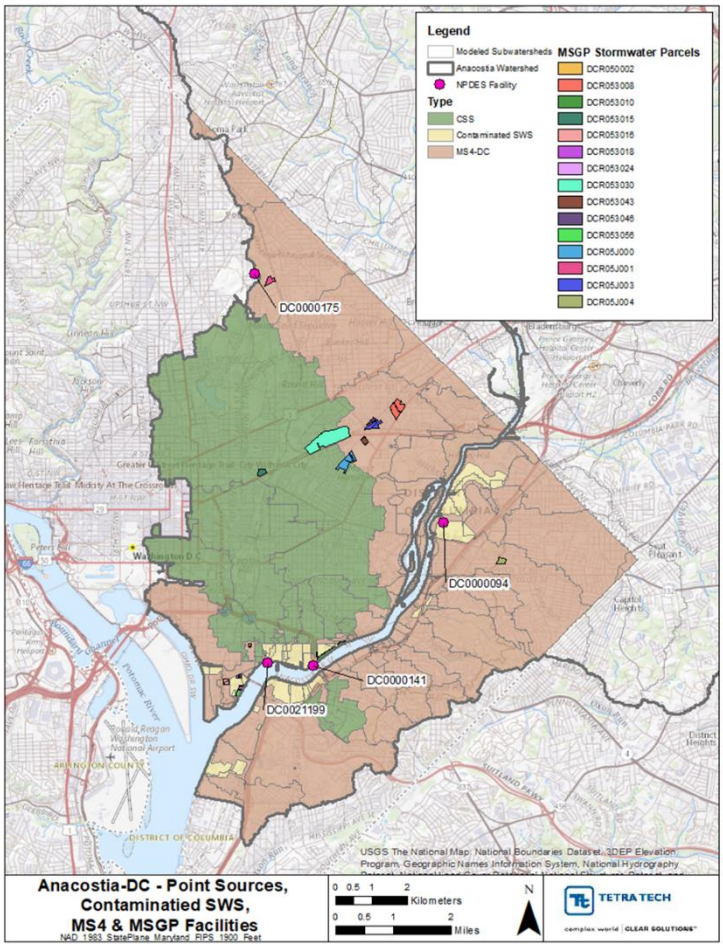

Figure 1. Locations of MS4, CSS, MSGP, and Contaminated Site Subwatersheds in the District (Note: Figure 3-2 in the TMDL Report)

DOEE intends to conduct post-TMDL monitoring of arsenic to monitor its concentration in the system. DOEE collects and measures the concentrations of toxic pollutants, including arsenic, in fish tissue every few years. As the consumption of fish with elevated levels of toxic pollutants is the main pathway for these pollutants to impact human health, DOEE is committed to continuing to conduct fish tissue sampling.

EPA accepts the reasonable assurances set forth in the TMDL Report.

Enclosure 3
Decision Rationale for the Polycyclic Aromatic Hydrocarbon TMDLs

Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed

I. Introduction

The Clean Water Act (CWA) and its implementing regulations at 40 C.F.R. 130 require that a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint and natural background sources, and a margin of safety (MOS) that takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$\text{TMDL} = \sum\text{WLAs} + \sum\text{LAs} + \text{MOS}$$

This document sets forth the U.S. Environmental Protection Agency (EPA) Region 3's rationale for approving TMDLs for polycyclic aromatic hydrocarbons (PAHs) in the Anacostia River watershed. The TMDLs were developed to address impairments of water quality standards as identified on the District of Columbia's (the District's) 2022 Section 303(d) List of water quality-limited segments (WQLSs) and Integrated Report. The District Department of Energy and Environment (DOEE) submitted the report *Total Maximum Daily Loads for Organics and Metals in the Anacostia River Watershed* (hereafter referred to as the "TMDL Report") to EPA for final review and action on March 1, 2024, which EPA received on the same day. DOEE submitted a revised TMDL Report to EPA on March 26, 2024 that corrected transcription errors made in the March 1, 2024 TMDL Report. The TMDL Report includes TMDLs that address impairments for seven different toxic pollutants/pollutant groups. In this document, EPA provides its rationale for approving the TMDLs that were developed to address the polycyclic aromatic hydrocarbon (PAH) impairments. Additional documentation was developed for the TMDLs that address the organochlorine pesticides and arsenic impairments. EPA will address the TMDLs for other pollutants separately.

The TMDLs in the TMDL Report are intended to replace TMDLs for organics and metals for the receiving waters that were established in *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in the Anacostia River, Fort Chaplin Tributary, Fort Davis Tributary, Fort Dupont Creek, Fort Stanton Tributary, Hickey Run, Nash Run, Popes Branch, Texas Avenue Tributary and Watts Branch* and *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in Kingman Lake* (collectively, the 2003 TMDLs). Anacostia Riverkeeper, Friends of the Earth, and Potomac Riverkeeper filed a complaint in the U.S. District Court for the District of Columbia, Case No. 1:09-cv-00098-JDB (*Anacostia Riverkeeper*) on January 15, 2009 challenging, among other things, EPA's approvals of the 2003 TMDLs. The district court ultimately

vacated EPA's approvals of the 2003 TMDLs because they lacked daily loads, but stayed vacatur until April 1, 2024.

EPA's decision is based upon its administrative record, which includes the TMDL Report and information in supporting files provided to EPA by DOEE, including DOEE's response to public comments (Appendix C to the TMDL Report). EPA has reviewed and determined that the TMDLs meet the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 C.F.R. Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in the District's TMDL Report and supporting documentation, unless otherwise noted.

II. Section 303(d) Listing Information

DOEE has submitted PAH TMDLs for eight WQLSs in the Anacostia River watershed in the District. The PAH TMDLs were established for two PAH groups, PAH 2 and PAH 3, which were used to group PAH compounds based on molecular ring structure and toxicity. In the PAH 2 group, the following 4-ring individual PAH compounds are grouped together: benzo[a]anthracene, chrysene, fluoranthene, and pyrene. In the PAH 3 group, the following 5- and 6-ring individual PAH compounds are grouped together: benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, and indeno[1,2,3-c,d]pyrene.

Initially, the District characterized the Anacostia River and its tributaries as impaired for "organic" (i.e., toxic) pollutants on its 303(d) list of WQLSs in 1998. The District first developed TMDLs for those impairments in 2003 based on data available at that time, including only limited ambient water quality data. In the following years, DOEE revised its water quality standards for many toxic pollutants. In addition, the impairments changed as more data were collected and analyzed. Based on DOEE's 2022 Integrated Report, which was approved on February 28, 2024, the tidal Anacostia River in the District, identified as two distinct segments, is listed as impaired for PAHs. Some tributaries to the Anacostia River and Kingman Lake in the District are also listed as impaired for PAHs. Table 1 below presents the WQLSs (i.e., assessment units) and associated PAH impairments from DOEE's 2022 Integrated Report.

Table 1. PAH Impairments

Assessment Unit	PAH 2	PAH 3
Nash Run	•	•
Hickey Run	•	•
Popes Branch	•	•
Texas Avenue Tributary	•	•
Kingman Lake	•	•
Anacostia #2	•	•
Fort Stanton Tributary	•	•
Anacostia #1	•	•

• denotes that an impairment exists for a waterbody-pollutant combination.

III. TMDLs Overview

DOEE has submitted 16 TMDLs for PAHs within the Anacostia River watershed. These TMDLs address the impairment listings for the two Anacostia River mainstem segments (Anacostia #1 and #2), Kingman Lake, and the following tributaries: Nash Run, Hickey Run, Popes Branch, Texas Avenue Tributary, and Fort Stanton Tributary. The TMDLs, including the source-specific LAs and WLAs, are presented in Section 6 of the TMDL Report. The TMDLs are summarized in Table 2 below.

Segment	Pollutant	TMDL (g/day)	ΣWLA (g/day)	ΣLA (g/day)	Σ Upstream LAs/WLAs (g/day)	MOS
Nash Run	PAH 2	0	0	0	0	Implicit
Hickey Run	PAH 2	0	0	0	0	Implicit
Popes Branch	PAH 2	0	0	0	0	Implicit
Texas Avenue Tributary	PAH 2	0	0	0	0	Implicit
Kingman Lake	PAH 2	0	0	0	0	Implicit
Anacostia #2	PAH 2	3.13	0.28	0	2.84	Implicit
Fort Stanton Tributary	PAH 2	0	0	0	0	Implicit
Anacostia #1	PAH 2	4.25	1.12	0	3.13	Implicit
Nash Run	PAH 3	0	0	0	0	Implicit
Hickey Run	PAH 3	0	0	0	0	Implicit
Popes Branch	PAH 3	0	0	0	0	Implicit
Texas Avenue Tributary	PAH 3	0	0	0	0	Implicit

Kingman Lake	PAH 3	0	0	0	0	Implicit
Anacostia #2	PAH 3	0.32	0.03	0	0.29	Implicit
Fort Stanton Tributary	PAH 3	0	0	0	0	Implicit
Anacostia #1	PAH 3	0.44	0.12	0	0.32	Implicit

The Anacostia River drains more than 170 square miles across Maryland and the District. Approximately 80 percent of the watershed is in Maryland and 20 percent is in the District. The upper tributaries are non-tidal freshwater, while the mainstem of the Anacostia River within the District is tidally influenced. The Anacostia River is slow-moving and has a relatively slow flushing rate (average of 23-28 days), which is a result of the river's bathymetry, tidal nature, and the influence of the Potomac River on the Anacostia River at its mouth. In many cases, the downstream segment of the Anacostia River mainstem and some areas of Kingman Lake display the tendency for pollutants to persist. During low flow (or dry) conditions, pollutants tend to persist in these areas due to increased contaminant desorption from bottom sediments and decreased flushing. Whereas during high flow (or wet) conditions, pollutants tend to persist in these areas due to increased contaminant loading from upland sources through stormwater runoff and the tidal inflow of the Potomac River into the Anacostia River. These characteristics of the mainstem Anacostia River explain the persistence of PAHs over time. In addition, the Anacostia River watershed is highly urbanized. About 45 percent of the watershed is residential, the dominant land use in the watershed. Undeveloped land, primarily comprised of forests and parks, covers just under 30 percent of the watershed. The overall imperviousness of the watershed is 22.5 percent, although that is variable among subwatersheds. The highest levels of imperviousness are in the Hickey Run (41 percent) and Northeast Branch (37 percent) subwatersheds. Some areas of the tidal mainstem of the Anacostia River in the District, such as the northwest bank, have even higher levels of imperviousness (48 percent). For more information regarding the water quality characterization of the Anacostia River watershed, please refer to Section 2 of the TMDL Report.

Section 3 of the TMDL Report describes the toxic pollutant source assessments. Sources of toxic pollutants in the watershed include four individually permitted facilities under the National Pollutant Discharge Elimination System (NPDES) and stormwater discharges (i.e., municipal separate storm sewer system (MS4), the combined sewer system (CSS), and entities covered under the Multi-Sector General Permit (MSGP)). The four facilities with individual NPDES permits considered in the TMDL analysis include the Washington Navy Yard, Pepco Environment Management Services, Super Concrete Corporation, and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility[1]). Other

[1] DC Water Outfall 019 was included as a source in the TMDLs. This outfall used to discharge to the Anacostia River and was an active source during the TMDL model simulation period from 2014 through 2017. Therefore, the TMDLs do not account for the on-the-ground changes resulting from the permanent closure of the Northeast Boundary Swirl Concentrator Facility. EPA recognizes that DC Water Outfall 019 is now a combined sewer outfall.

sources of toxic pollutants in the watershed include upstream loads originating in Maryland and runoff from historically contaminated sites in the District.

Computational Procedure

Section 4 of the TMDL Report discusses the analysis framework and TMDL model. The linked watershed (Loading Simulation Program in C++ (LSPC)) and receiving water (Environmental Fluid Dynamics Code (EFDC)) models were simulated over a four-year period from 2014-2017 to capture a representative period of existing conditions in the Anacostia River system. Initially, baseline conditions were simulated for each identified source for each of the pollutants in every subwatershed. A calibration process was completed using the large dataset compiled on observed and simulated data. Once it was determined that the model simulation was appropriately capturing existing conditions when compared to observed data, the calibration was deemed acceptable and the process of developing a TMDL scenario begun.

The TMDL scenario was developed through an iterative process of first implementing watershed reductions until the TMDL endpoints were met in the tributaries and then evaluating whether those reductions were sufficient to meet the endpoints in the tidal segments of the Anacostia River. The development of the TMDL scenario involved two separate reduction processes to address endpoint exceedances in the tidal segments of the Anacostia River. An additional analysis was carried out to demonstrate that the TMDL endpoints will be met through the process of natural attenuation of the TMDL pollutants in bottom sediments after the TMDL allocations are achieved.

Bottom Sediments

In the case of these TMDLs, much of the impairment is due to the legacy presence of the TMDL pollutants on land and in the river system rather than through generation and discharge of these pollutants due to present, active operations. These PAHs persist in the environment and have slow degradation rates in soils and sediments, very limited solubility in water, strong adherence to soils and sediments, and a strong tendency to bioaccumulate. This means that attainment of water quality standards must account for the fact that the pollutants are already in the water column and river bottom sediments.

The model accounts for the presence of the pollutants in the water column and river bottom sediments and simulates the interchange between the bottom sediments and the water column. Flux of toxic pollutants from bottom sediments and pore water to the water column through resuspension and diffusion can result in higher levels of toxic pollutants in the water column. The description of how bottom sediment flux can result in higher levels of pollutants in the water column is found in Section 3.1.3 of the TMDL Report. Conversely, toxic pollutants in the water column may preferentially sorb to suspended sediment in the water column and eventually settle on the river bottom and accumulate in the bottom sediments. In addition, resuspended sediment can be carried by the river and deposited to bottom sediments that could contribute to flux elsewhere within the system. The modeling framework simulated the bottom sediments and the water column as a single system, treating the interchange between bottom sediments and the water column as an internal load within the system and assigning TMDL loads only to external,

land-based sources. Therefore, bottom sediments were not assigned a baseline load or load allocation because bottom sediments are not external to the system. In other words, the TMDLs treat the bottom sediments as part of, and inextricably intertwined with, the river itself.

Modeling the interchange between the water column and bottom sediments as one interconnected system is appropriate because elevated levels of toxic pollutants in fish tissue are a function of both water column and bottom sediment concentrations. It is the bioaccumulation of toxins in fish tissue that are then eaten by humans that is one of the concerns addressed by the applicable water quality standards.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards because both the contributions from external, land-based sources and the interchange between bottom sediments and the water column were accounted for in the TMDL modeling framework. The TMDL modeling framework was configured to represent contributions from external sources within the watershed and tributaries to the Anacostia River and the mainstem Anacostia River and the flux between the river water column and the bottom sediments, including release from the contaminated river bottom sediment due to diffusion and resuspension. The model predicted and simulated resultant instream and bottom sediment conditions after contributions from external, land-based sources were controlled and the associated TMDL loads (LAs and WLAs) were achieved. As external, land-based loads are reduced, the external, land-based sources will contribute cleaner water and sediment into the system. This will result in burial of pollutants in the currently active layer of the bottom sediment and pore water and transport of pollutants out of the system through flushing. This process of burial and flushing, combined with other processes, like pollutant degradation, that would occur when inputs from external, land-based sources achieve LAs and WLAs is what the TMDL Report refers to as "natural attenuation."

DOEE completed a supplementary analysis to demonstrate that the process of natural attenuation will occur in the system and to estimate approximately how long it will take for the TMDL endpoints (and therefore, the water quality criteria) to be met following achievement of the TMDL LAs and WLAs. This analysis demonstrated that the allocations in the TMDLs will ultimately result in the reduction of flux from the bottom sediments and the attainment of the TMDL endpoints. A complete description of natural attenuation and the associated analysis can be found in Section 5.4 of the TMDL Report and Sections 7.4 and 7.5 of the TMDL Modeling Report.

As a result of this analysis, DOEE demonstrated that the TMDLs are established at levels necessary to attain and maintain applicable water quality standards. DOEE estimated that the length of time it will take for the TMDL endpoints for PAHs to be met may take anywhere from nine to 210 years, depending on the PAH group and waterbody in question.[2] DOEE also demonstrated that the TMDLs are set at levels sufficient to attain and maintain applicable water quality standards

[2] The mean estimated length of time it will take for the TMDL endpoints for PAH 2 and PAH 3 to be met across all waterbodies is 46 years. Notably, at most of the locations in the Anacostia River watershed, the TMDL endpoints for PAH 2 and PAH 3 are estimated to be met within 50 years (i.e., 75% of the estimates are less than or equal to 50 years).

without relying upon remediation of contaminated sediments (i.e., dredging, capping, carbon amendments).

The time required to attain water quality standards once the LAs and WLAs are achieved will depend upon such factors as the nature of the pollutant, the applicable water quality standards, and the nature of the receiving waters. Much of the impairment is due to the legacy presence of the PAHs on land and in the river system. The legacy presence, combined with the nature of the PAHs, means that the return to water quality standards necessarily will take time.

The TMDLs are established at levels necessary to attain and maintain applicable water quality standards without relying upon additional measures such as remediation of the bottom sediments. By reducing the amount or availability of contaminated sediment for flux and resuspension, remediation of contaminated sediments, such as dredging, capping, or carbon amendments, can reduce the levels of these pollutants in the water column once resuspension associated with some of these activities – which could increase water column concentrations – has stabilized. Although sediment remediation is not an assumption of the TMDLs, nothing in these TMDLs precludes the use of dredging, capping, or other remediation efforts as tools to achieve the TMDL endpoints. Consequently, these TMDLs are not inconsistent with sediment remediation efforts that are currently planned as part of DOEE's Anacostia River Sediment Project (ARSP). The ARSP is a contaminated site project focused on remediation of contaminated bottom sediments in the Anacostia River mainstem and Kingman Lake that has occurred in parallel with TMDL development, but otherwise on a separate timeline. The ARSP focuses on PCB contamination.[3] Sediment remediation, including activities taken in connection with the ARSP, likely will also have the secondary benefit of reducing other sediment-bound pollutants, including the TMDL pollutants, such as PAHs, that are co-located. It is reasonable, therefore, to expect that the remediation of contaminated sediment would decrease the amount of time it will take for water quality to approach the TMDL endpoints.

LAs and WLAs in the Informational TMDLs

DOEE has developed TMDLs for waterbody-pollutant combinations that are within the Anacostia River watershed and are not listed as impaired in DOEE's 2022 Integrated Report but may have been listed as impaired for these pollutants in the past. As applied to the unimpaired waters, these are considered "informational" TMDLs and can be found in Appendix A to the TMDL Report. Section 303(d)(3) of the CWA and 40 C.F.R. 130.7(e) authorize states to develop informational TMDLs for waterbody-pollutant combinations that are not identified on its list of WQLSs; however, there is no requirement to submit informational TMDLs to EPA for approval when water quality standards are currently being met. 33 U.S.C. 1313(d)(3) and 40 C.F.R. 130.7(e). The intent is to develop information and identify levels that will protect the waterbodies that are not

[3] PCBs are the focus of the ARSP; however, the ARSP Remedial Investigation identified five contaminants of concern including PCBs, chlordane, dioxin-like PCBs, dioxin toxic equivalent, and benzo(a)pyrene. In 2020, the ARSP Interim Record of Decision was published, which identifies the early action areas or "hot spots" in the Anacostia River watershed where PCB contamination is highest and requires remediation. Overall, an area of approximately 77 acres will be remediated through a variety of remedial activities. The remediation at the 11 early action areas will likely also beneficially reduce other pollutants (e.g., metals, organochlorine pesticides, and PAHs) that concurrently exist in the PCB-contaminated sediment.

listed as impaired. Overall, DOEE's final TMDL submittal included eight informational TMDLs for PAH 2 and PAH 3.

While EPA is not taking action on the informational TMDLs for unimpaired waters, the PAH 2 and PAH 3 TMDLs for Anacostia #1 and Anacostia #2 incorporate the same LAs and WLAs as those in the informational TMDLs. Appendix A of the TMDL Report explains that "the source-specific allocations presented below are incorporated into the TMDLs provided in Section 5.6 of the TMDL Report because those allocations are required to meet downstream water quality in the tidal mainstem Anacostia River" – meaning that the LAs and WLAs presented in Appendix A for PAH 2 and PAH 3 also function as LAs and WLAs within the TMDLs for the tidal mainstem Anacostia segments. As such, EPA herein approves the PAH 2 and PAH 3 TMDLs for Anacostia #1 and Anacostia #2 and also approves all LAs and WLAs for those two TMDLs, including the LAs and WLAs that are also part of the informational TMDLs for PAH 2 and PAH 3. The mere fact that the informational PAH 2 and PAH 3 TMDLs include LAs and WLAs that are also part of the TMDLs for Anacostia #1 and Anacostia #2 does not mean that EPA is taking action on the informational TMDLs.

IV. Discussion of Regulatory Requirements

1) TMDLs are established at a level necessary to implement the applicable water quality standards.

EPA regulations at 40 C.F.R. 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards. States, with federal approval and oversight, adopt water quality standards for each particular waterbody or waterbody segment within their boundaries. 33 U.S.C. 1313(c)(1). Water quality standards are comprised of three components: (1) designated uses, (2) criteria (narrative or numeric) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality. EPA either approves a state's proposed water quality standards or, if it disapproves, promulgates standards for the state unless the state addresses EPA's disapproval. 33 U.S.C. 1313(c)(3).

PAH 2 and PAH 3 TMDLs are presented for eight impaired waterbodies in the District. The following designated use classes apply to all eight impaired waterbodies: Class A – Primary Contact Recreation; Class B – Secondary Contact Recreation and Aesthetic Enjoyment; Class C – Protection and Propagation of Fish, Shellfish, and Wildlife; and Class D – Protection of Human Health Related to Consumption of Fish and Shellfish. For both Anacostia River mainstem segments (Anacostia #1 and #2), the Class E – Navigation designated use also applies. The PAH TMDLs are set at levels necessary to attain and maintain all designated uses. Within the District's water quality standards regulations there are a number of applicable narrative and numeric water quality criteria that were considered in the development of these TMDLs. All of the applicable criteria can be found in Section 1.4 of the TMDL Report.

The District has multiple numeric water quality criteria for each PAH (i.e., for Class C and Class D designated uses). Though, there are only a few Class C numeric water quality criteria for PAHs. Therefore, the District employed a conservative approach and used the most stringent of the

numeric criteria as the TMDL endpoint to represent each PAH group. While the District generally does not have criteria for PAHs for Class A and Class B designated uses, TMDL endpoints established to achieve the more stringent of the numeric criteria for Class D designated uses also will support Class A and Class B designated uses. The District's numeric water quality criteria for Class C waters include a criteria continuous concentration to protect chronic exposure of aquatic life. The District's numeric water quality criteria for Class D waters include a 30-day average concentration that is applied for the protection of human health related to the consumption of fish and shellfish. The District's numeric water quality criteria for Class D waters were updated by DOEE in 2020 through adoption of EPA's CWA Section 304(a) recommended ambient water quality criteria for the protection of human health, and the criteria for many of the individual PAH compounds in the PAH 2 and PAH 3 groups for which TMDLs were developed herein were included in this update. The updated criteria reflect the latest scientific information and EPA recommendations regarding updated exposure factors (body weight, drinking water consumption, and fish consumption rate), bioaccumulation factors, health toxicity values, and relative source contributions. These updated criteria also consider exposure (i.e., incidental ingestion) resulting from recreation in and on the water (Class A and Class B). Criteria that protect human health related to the consumption of aquatic organisms (i.e., Class D) are generally expected to protect human health from less direct exposures (i.e., Class A and Class B).[4] Lastly, the TMDL pollutants do not affect navigation (Class E).

In addition to supporting numeric criteria, the TMDL endpoints are established at levels necessary to implement the District's applicable narrative criteria. The District's applicable narrative criteria, found at 21 D.C.M.R. § 1104.1, prohibit substances attributable to discharges in amounts that "[c]ause injury to, are toxic to, or produce adverse physiological or behavioral changes in humans, plants, or animals" and "impair the biological community that naturally occurs in the waters or depends upon the waters for its survival and propagation." As a general matter, narrative water quality criteria are intended to supplement, not supersede, numeric criteria or to establish water quality conditions for parameters for which no numeric criteria have been established. 40 C.F.R. § 131.11(b)(2). Regardless, and to the extent the narrative water quality criteria are "applicable" within the meaning of CWA Section 303(d)(1)(C), the TMDLs are expected to achieve the District's narrative water quality criteria. Like numeric criteria, narrative criteria represent a quality of water that supports a particular designated use; when criteria are met, water quality will generally protect the use. See 40 C.F.R. § 131.3(b). The TMDL endpoints are set at levels that will achieve all designated uses established for the relevant District waters. The narrative criteria refer to "amounts" of a pollutant that will cause or result in a particular water quality condition. In this case, each numeric criterion for the individual PAH compounds represents the referenced "amount" of that pollutant that is expected to avoid the adverse

[4] EPA has considered whether there are cases for which water quality criteria for the protection of human health based only on fish ingestion (or only criteria for the protection of aquatic life) may not adequately protect recreational users from health effects resulting from incidental water ingestion. EPA reviewed information that provided estimates of incidental water ingestion rates averaged over time. EPA generally believes that the averaged amount is negligible and will not have any impact on the chemical criteria values based on fish consumption only, unless the chemical exhibits no bioaccumulation potential. See EPA, Methodology for Deriving Ambient Water Quality Criteria for Protection of Human Health – Revised Methodology (2000) (available at: https://www.epa.gov/wqc/human-health-water-quality-criteria-and-methods-toxics#methodology).

impacts described at §§ 1104.1(d) and (f). Other data and information were considered to quantify the "amount" of the pollutants that would result in an exceedance of the narrative water quality criteria at §§ 1104.1(d) and (f). The District's other narrative criteria do not apply to the PAHs.[5]

In addition, the District does not have numeric criteria associated with the Class C use for most of the individual PAH compounds within PAH 2 and PAH 3. At the time of TMDL endpoint selection, the District considered a range of potential water quality endpoints for use in TMDL development, including numeric water quality criteria, fish tissue screening levels, and freshwater sediment screening benchmarks. The benchmarks were developed to assess ecological risk and are intended to be protective of sensitive aquatic species, and as such, can provide information for Class C use support decisions.[6] EPA further evaluated the freshwater sediment screening benchmarks, along with the related freshwater screening benchmarks, and compared them to the model output and associated information presented in the TMDL Modeling Report and found that the TMDL allocations, which were designed to attain the Class D PAH 2 and PAH 3 criteria, are sufficiently stringent to meet both the freshwater screening benchmarks and freshwater sediment screening benchmarks.

For the freshwater screening benchmarks, the TMDL endpoints used for the PAH 2 and PAH 3 groups are more stringent than the benchmarks set for those individual PAH compounds; meaning that the TMDLs are sufficiently stringent to meet the benchmarks and therefore support the Class C use. For the freshwater sediment screening benchmarks, the TMDL Modeling Report demonstrates that the TMDLs are sufficiently stringent to meet the freshwater sediment screening benchmarks. As described in the TMDL Modeling Report, the TMDL allocation scenario simulates a 99.5 percent and 99.50 percent reduction in PAH 2 and PAH 3 bottom sediment concentrations, respectively. These resultant PAH 2 and PAH 3 bottom sediment concentrations are more stringent than the sum of the freshwater sediment screening benchmarks for the individual PAH compounds within the PAH 2 and PAH 3 groups; meaning that the TMDLs are sufficiently stringent to meet the benchmarks and therefore support the Class C use. Although these benchmarks have not been adopted by the District as numeric water quality criteria, in the absence of numeric criteria, the benchmarks provide sufficient evidence that the TMDLs are set

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[5] The narrative criteria at 21 D.C.M.R. §§ 1104.1(a), (b), (c) and (e) are not relevant because, while PAHs do bind to sediment, the PAHs themselves do not settle to form objectionable deposits. The PAHs also do not: float as debris, scum, oil, or other matter; produce objectionable odor, color, taste, or turbidity at environmentally relevant levels; or produce undesirable or nuisance aquatic life or result in the dominance of nuisance species. DOEE also considered the narrative criteria at §§ 1104.3 through 1104.7, which do not relate to toxic pollutants and instead focus on specific topics such as aesthetic properties, untreated sewage and litter, the burial or obstruction of objects, concentrations of chlorophyll *a*/algae, or unmarked submerged or partially submerged man-made objects.

[6] In 2006, EPA Region 3 developed freshwater screening benchmarks and freshwater sediment screening benchmarks for a number of PAH compounds, including those addressed by these TMDLs. Both sets of benchmarks were developed by the EPA Region 3 Biological Technical Assistance Group (BTAG) and were used to facilitate consistency in screening ecological risk assessments throughout EPA Region 3. See BTAG's screening benchmarks (available at: https://19january2017snapshot.epa.gov/risk/biological-technical-assistance-group-btag-screening-values_.html#:~:text=The%20Region%203%20BTAG%20Screening,risk%20assessments%20throughout%20Region%203).

at a level sufficient to attain and maintain the Class C use and associated narrative water quality criteria.

The TMDL endpoints also are set at levels necessary to implement the Class D designated use at fish consumption levels generally expected in the District. The District's updated criteria for Class D are based upon data derived from the general population and are calculated at a 10^{-6} risk level (corresponding to an increased chance of cancer of one in a million). EPA calculates human health criteria values at a 10^{-6} (one in one million) cancer risk level and recommends that states and authorized tribes use cancer risk levels of 10^{-6} or 10^{-5} (one in one hundred thousand) when deriving human health criteria for the general population (EPA, 2000). For example, the state of Maryland has adopted human health criteria for toxic pollutants at the 10^{-5} risk level. For subsistence fishers consuming between 130 – 142.4 grams per day (U.S. NPS, 2018) consistent with EPA's national default subsistence rate, as compared with the 22 grams per day incorporated in the derivation of DOEE's criteria, the cancer risk level for subsistence fishers would equate to less than 10^{-5} (one in one hundred thousand) risk level, which is within the range that EPA's guidance contemplates as acceptable in this situation.[7]

In addition to using the most stringent of the numeric criteria as the TMDL endpoint to represent each pollutant, the TMDL analysis consolidated individual PAH compounds into two PAH groups (PAH 2 and PAH 3) based on the compounds' molecular ring structure and toxicity. The most stringent criterion of the individual PAH compounds in each group was used as the TMDL endpoint for the entire group.

Based on the foregoing, EPA finds that the TMDLs are established at a level necessary to implement the applicable water quality standards.

In response to comments received during the first round of public notice and comment in the summer of 2021, DOEE undertook an analysis that simulated the fate and transport of the TMDL pollutants under predicted conditions of climate-induced changes in precipitation quantity and intensity, air temperature, and sea level rise. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report. The Anacostia River is a tributary to the Chesapeake Bay; therefore, DOEE selected the projected climate change effects and time horizons to be consistent with the Chesapeake Bay Program's medium- to long-term planning outlook. The analysis was performed for two time horizons: a near-term horizon around 2035 (2034 – 2037) and a long-term horizon around 2055 (2054 – 2057). This analysis estimated both the change in water column concentrations for each pollutant under future climate scenarios compared to the TMDL allocation scenario and how long it will take to achieve the TMDL endpoints through natural attenuation of toxic pollutants in bottom sediments under future climate scenarios relative to the natural attenuation results documented for the TMDL allocation scenarios. Although the analysis of future climate conditions points to an expected greater load of toxic pollutants to the Anacostia River due to increased precipitation and associated runoff, it also points to dilution of these toxic pollutants due to sea level rise and other hydrologic functions that counteract the

[7] Criteria based on a 10^{-5} risk level are acceptable for the general population as long as states and authorized tribes ensure that the risk to more highly exposed subgroups (sport or subsistence fishers) does not exceed the 10^{-4} level (EPA, 2000).

increased load. Whether attainment of applicable water quality criteria would take more or less time under future climate scenarios depended upon a number of factors, primarily the location of the segment within the watershed. EPA finds no basis in the analysis of future climate conditions for disagreeing with the conclusion that the TMDLs are established at levels necessary to implement applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 C.F.R. § 130.2(i) define TMDL as the sum of the wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint and natural background sources. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to EPA regulations at 40 C.F.R. § 130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. As described in Section 3.2 of the TMDL Report, WLAs were assigned to four individual point sources (Washington Navy Yard (DC0000141), Pepco Environment Management Services (DC0000094), Super Concrete (DC0000175), and District of Columbia Water and Sewer Authority (DC Water) Outfall 019 (Northeast Boundary Swirl Concentrator Facility) (DC0021199)) and regulated stormwater sources (MS4, CSS, and entities covered under the MSGP).[8] Tables 6-8, 6-9, 6-31, A-9, and A-10 provide daily WLAs for point sources. Tables 6-15, 6-16, 6-32, A-19, and A-20 provide annual WLAs for point sources.[9]

The annual WLAs for the four individual point sources were calculated using water quality criteria concentrations and maximum discharge flows set by design flows specified in the associated NPDES permit for each facility. In addition to having individual NPDES permits, the Washington Navy Yard and Pepco sites are also considered contaminated sites with completed or ongoing clean-up investigations for legacy contamination, and so their WLAs include the sum of the land-based loads attributed to the contaminated land and the loads attributed to their NPDES-regulated discharges, which were set at water quality criteria concentrations and design flows.

The annual WLAs for the regulated stormwater sources including the MS4, CSS[10], and entities covered under the MSGP were calculated through watershed model simulations using simulated rainfall-runoff and pollutant loading relationships for the watershed land areas. Watershed land area loadings were reduced using a top-down approach where the farthest upstream

[8] The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or DOEE that there are no additional sources in the watershed that are subject to the NPDES program.

[9] The WLAs and LAs presented in Appendix A for PAH 2 and PAH 3 are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are included in Appendix A because they discharge directly to an unimpaired waterbody-pollutant combination.

[10] Loadings from the CSS were estimated using custom function tables within the TMDL watershed model (LSPC) designed to simulate the sewer lines of the CSS. These function tables define storage overflow relationships that replicate conditions where CSO reaches only discharge during significant rainfall events and were developed using information provided by DC Water. Concentrations of the TMDL pollutants were then assigned to overflows based on simulated instream concentrations.

subwatersheds were targeted first. Once instream water quality targets were met in those watersheds, the subwatersheds directly downstream were reduced until targets were met in all subwatersheds. In certain cases, although water quality targets were met in upstream subwatersheds, additional reductions were identified within those subwatersheds in order to meet water quality targets in the downstream tidal waters. Subwatershed loadings were reduced on a land use basis. Within each subwatershed, all urban land uses were assigned equal percent load reductions up to a threshold of 99.9% reduction. If this was not sufficient to meet the endpoint, then all agricultural land uses in the subwatersheds were reduced equally until the water quality target was met. These watershed loadings were then partitioned to the MS4, CSS, and to entities covered under the MSGP at the waterbody scale based on simulated rainfall-runoff and pollutant loading relationships for their associated watershed land areas within the watershed model.

Several point sources, including the MS4, Pepco, the CSS (other than Outfall 019) and sources covered by the MSGP have received WLAs equal to 0 for PAH 2 and PAH 3. Two point sources have received very small WLAs (Super Concrete WLA equal to 0.79 grams/year for PAH 2 and 0.079 grams/year for PAH 2 and DC Water Outfall 019 WLA equal to 2.22 grams/year for PAH 2 and 0.22 grams/year for PAH 3). The nonpoint sources received LAs equal to 0, except for the LA representing the boundary condition with Maryland, which received a cumulative LA of 5.93 grams/year for PAH 2 and 0.63 grams/year for PAH 3 (See TMDL Report Tables 6-15 and 6-16). These WLAs (and LAs) are a function of the low numeric Class D water quality criteria used as the TMDL endpoints for PAH 2 (0.0013 µg/L) and PAH 3 (0.00013 µg/L), when compared to the observed data. These TMDL endpoints are lower than the method detection limits used to monitor and collect the observed data. Given the very low concentration endpoint, and after accounting for uncertainty through various implicit, conservative modeling assumptions, the model suggests minimal assimilative capacity for PAH 2 and PAH 3 compounds within the Anacostia River, its tributaries, and Kingman Lake. As a result, certain sources of these pollutants were necessarily assigned annual and daily WLAs (and LAs) of 0 grams/year and 0 grams/day, respectively, in order to demonstrate attainment of the applicable water quality standards.

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report. Daily loads were developed in a manner consistent with Section 303(d) of the CWA, EPA's implementing regulations at 40 C.F.R. § 130.7, and EPA guidance.[11] The LSPC model was used to calculate daily flow and pollutant concentration time series data from the most downstream pour point of the impaired segments. For each of the impaired segments, a total daily load was calculated for each day of the TMDL allocation scenario across the four-year (2014-2017) simulation period, and the highest daily load was selected as the maximum daily load for that impaired segment. In order to assign daily WLAs and LAs to each point and nonpoint source, the ratio of source loads presented

[11] In November 2006, EPA released the memorandum *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA et. al., No. 05-5015 (April 25, 2006) and Implications for NPDES permits*, which recommends that all TMDLs and associated LAs and WLAs include a daily time increment in conjunction with other appropriate temporal expressions that might be necessary to implement the relevant water quality standards.

in the annual TMDLs was used to parse the maximum daily load into individual daily WLAs and LAs for each pollutant source within each impaired segment.

Based on the foregoing, EPA finds that both the annual and daily WLAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

EPA is the National Pollutant Discharge Elimination System (NPDES) Program authority for the District of Columbia. The effluent limitations in any new or revised NPDES permits must be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL pursuant to 40 C.F.R. § 122.44 (d)(1)(vii)(B). It is expected that periodic monitoring of the point source(s) will be required through the NPDES permit process, in order to determine consistency with the assumptions and requirements of the WLAs in the TMDLs. The WLAs were calculated for the four individual point sources using an assumption of discharge at water quality criteria concentrations and for the MS4, CSS, and individual sources of industrial stormwater covered by the MSGP using watershed model simulations. In the event that new facilities arise within the watershed, any new facility may not discharge at concentrations greater than the applicable water quality criteria at the end of the discharge pipe to be consistent with the assumptions and requirements of the TMDLs.

Load Allocations

According to federal regulations at 40 C.F.R. § 130.2(g), an LA is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. As described in Section 3.1.1 and 3.1.2 of the TMDL Report, LAs were assigned to upstream loads from Maryland and to historically contaminated sites in the District.[12] Tables 6-8, 6-9, 6-22, 6-23, A-9, A-10, A-27, and A-29 provide daily LAs for nonpoint sources. Tables 6-15, 6-16, 6-29, 6-30, A-19, A-20, A-35, and A-38 provide annual LAs for nonpoint sources.[13]

To account for the loads of toxic pollutants originating in Maryland, the calibrated watershed model characterized loadings starting at the headwaters in Maryland. The Maryland portion of the Anacostia River watershed was assigned an upstream LA for each TMDL pollutant at a level to attain the District's water quality standards at the boundary. The TMDLs set an upstream boundary condition that appropriately accounts for loads reaching District waters from Maryland and represents an aggregate of all upstream nonpoint and point source loadings. The Maryland upstream LA has been established at a level to meet downstream water quality criteria within the District portion of the Anacostia River mainstem. See TMDL Modeling Report Section 2.3.1.2.

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[12] EPA's approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA's review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

[13] The WLAs and LAs presented for PAH 2 and PAH 3 in Appendix A are WLAs and LAs included within the TMDLs for the Anacostia #1 and Anacostia #2 segments. These WLAs and LAs are placed into Appendix A because they discharge directly to an unimpaired waterbody.

By setting a boundary condition that is designed to achieve water quality standards in the District's waters, the TMDLs do not determine that the entire load from Maryland is a nonpoint source load. Rather, this load allocation represents an aggregate load to point and nonpoint sources within Maryland and appropriately allows Maryland, rather than the District, to allocate loads among Maryland sources. Consistent with CWA Section 402(b)(3) and (5), Maryland's permitting regulations require notification and an opportunity to comment to the District when Maryland authorizes a discharge that could affect the District's waters. See COMAR 26.08.04.01-2.B(3)(a). The MS4 for Prince George's County and Montgomery County each cover the entire county up to the Maryland/District of Columbia boundary, and the NPDES permits for those systems would be subject to COMAR 26.08.04.01-2.B(3)(a). Certain aspects of Maryland's water quality standards also account for the need to achieve downstream water quality standards. E.g., COMAR 26.08.02.03-3 and 26.08.02.05-1.

As described in Section 3.1.2 of the TMDL Report, LAs were assigned to ten historically contaminated sites in the District. As described above, there were two other contaminated sites that were assigned WLAs (Washington Navy Yard and Pepco) because they each have a NPDES permit. The loads attributed to Washington Navy Yard and Pepco as contaminated sites are incorporated into the WLA assigned to each.

The calculation of daily loads is discussed in Section 5.5 of the TMDL Report and described above in the *Wasteload Allocation* subsection. Based on the foregoing, EPA finds that both the annual and daily LAs included in the TMDLs satisfy the regulations at 40 C.F.R. Part 130.

3) TMDLs consider natural background sources.

According to EPA regulations at 40 C.F.R. § 130.2(g) & (i), natural background sources of pollutants are part of the LA and, wherever possible, natural and nonpoint source loads should be distinguished. Although some PAHs occurs naturally in the environment, contamination of the Anacostia River, its tributaries, and Kingman Lake at levels that pose a risk to human health results from PAHs that enter the environment through anthropogenic activities. For example, PAHs can enter the environment during the incomplete combustion of gas, oil, coal, wood, trash, or other organic substances. Ultimately, it is expected that high levels of PAHs in the District are a result of historic activities and stormwater runoff. Therefore, natural background loads of PAHs are expected to be minimal and not a significant factor. Natural background levels of PAHs were captured in the TMDLs through the parametrization and calibration of the dynamic linked watershed and receiving water model, which incorporated estimated background concentrations from various literature sources. The linked dynamic model simulates water quality on an hourly time step over a four-year period, ensuring that natural background loads were accounted for. Based on the foregoing, EPA finds the TMDLs account for natural background sources consistent with the regulations at 40 C.F.R. § 130.2(g) & (i).

4) TMDLs consider critical conditions.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. Critical conditions are discussed in Section 6.8 of the TMDL Report. Critical conditions were captured in the TMDLs through the use of a

dynamic linked watershed and receiving water model and analysis of all flow conditions in the watershed. The linked dynamic model simulates water quality on an hourly time step over a four-year period, ensuring that acute and long-term conditions are accounted for. Available water quality and flow data show that critical conditions for toxic pollutants in the watershed occur under all conditions (i.e., under both low-flow and high-flow scenarios); therefore, the use of a dynamic modeling application capable of representing conditions resulting from both low and high flow regimes is appropriate. While low flow conditions exhibited exceedances due to increased contaminant desorption from bottom sediments and decreased flushing, high flow conditions exhibited exceedances due to increased contaminant loading from upland sources. In addition, the linkage of the tidal Anacostia River to a dynamic watershed loading model ensures that nonpoint and point source loads from the watershed delivered at times other than the critical period were also considered.

The TMDLs are based on the entire modeled period of 2014 through 2017, which inherently captures a wide variety of naturally occurring conditions. The 2014 – 2017 model period captured a representative range of precipitation conditions including several extreme precipitation events that occurred in that period and relatively wet (2014-2015) and dry (2016-2017) periods. Annual precipitation rates during the 2014 – 2017 model period are consistent with historic precipitation rates (see Figure 3-5 and Table 5-8 of the TMDL Modeling Report).

In response to public comment received concerning the perceived exclusion of 2018 as part of the modeling period, EPA understands that 2018 was not included in the modeling period due to practical limitations; to meet its TMDL development schedule, DOEE needed to finalize model set-up and calibration before 2018 data were available to be incorporated within the model. From a scientific standpoint, 2018 need not be included within the model period to appropriately capture critical conditions. For the period 1991-2020, average annual precipitation was 41.82 inches. The 2014-2017 time period captures two years with greater than average precipitation (45.78 inches in 2014 and 45.02 inches in 2015). Additionally, DOEE performed an analysis to assess attainment of the TMDL endpoints under the TMDL allocation scenario using predicted conditions of climate induced changes in precipitation quantity and intensity, air temperature, and sea level rise. This analysis incorporated predicted increases in precipitation quantity and intensity expected in 2035 and 2055. The details of this analysis can be found in Section 7 and Appendix B of the TMDL Report and are further described in Section IV.1 of this document.

Based on the foregoing, EPA finds that the TMDLs account for critical conditions consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variations are discussed in Section 6.8 of the TMDL Report. The water quality criteria for each pollutant is applicable year-round without changes based on season. However, loads may change in response to variations in seasonal hydrologic conditions and source loading. Model simulation of multiple complete and consecutive years, from 2014 – 2017, accounted for seasonal variations. Continuous simulation over a period of several years that captured precipitation extremes inherently considers seasonal hydrologic and source loading variability. The pollutant

concentrations were simulated on a sub-daily time step, further capturing seasonal variation. Based on the foregoing, EPA finds the TMDLs have been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 C.F.R. § 130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity.

These TMDLs use an implicit MOS, which is discussed in Section 6.7 of the TMDL Report. As described by the U.S. District Court for the District of Columbia, this type of implicit MOS uses conservative assumptions that result in over-predicting the amount of pollutant present, thereby accounting for uncertainty. *See Anacostia Riverkeeper v. Jackson*, 798 F. Supp. 2d 210, 251-52 (D.C.C. 2011). The specific conservative analyses and assumptions that contributed to the implicit MOS are detailed in Section 6.7 of the TMDL Report and further detailed below:

(1) The modeling framework and TMDLs were developed based on the entire period of 2014 – 2017 to incorporate a wide range of environmental conditions;
(2) Individual PAH compounds were modeled as two PAH groups (PAH 2 and PAH 3), and the most stringent water quality criterion within each group was used as the TMDL endpoint. Using the most stringent of the applicable criteria of the PAHs in each group as the endpoint ensures that the criterion for that individual, most stringent PAH compound is met. Further, doing so is more protective than required for the other PAH compounds that have less stringent criteria. The TMDL ensures that the sum of all PAH compounds will not exceed the criteria associated with the most stringent PAH compound, meaning that the PAHs individually will be below their criteria threshold.
(3) The modeling framework was developed prior to and therefore does not incorporate reductions in combined sewer overflows (CSOs) due to the construction and operation of the Anacostia River Tunnel System, parts of which were completed in both 2018 and 2023, which is expected to capture and divert most of the CSOs for treatment. It is anticipated that operation of the Anacostia River Tunnel system will reduce CSOs by 98 percent, which is expected to achieve significant reductions in the toxic pollutant loads from the CSS. The reduction in CSOs due to the operation of the Anacostia River Tunnel system is not captured by the model simulation period and is part of the margin of safety.
(4) The discharge at Outfall 019 from the Northeast Boundary Swirl Concentrator Facility was included within the TMDL model simulation, but the Northeast Boundary Swirl Concentrator Facility subsequently was taken out of service permanently. Outfall 019 remains an active CSS outfall, and Outfall 019a has been added to accommodate discharges that may occur when the Anacostia River Tunnel reaches capacity. Discharges through Outfall 019a will be part of the allocation to the CSS. It is anticipated that discharges through Outfalls 019 and 019a will be less frequent/lower

volume with the operation of the Anacostia River Tunnel System than the modeled discharge from the Northeast Boundary Swirl Concentrator.

(5) For the four individually permitted facilities, WLAs were calculated based on maximum flows from dischargers set by design flows specified in the NPDES permit for each facility as opposed to the actual, smaller reported flow.

Based on the foregoing, EPA finds that DOEE has incorporated an MOS into the TMDLs consistent with the regulations at 40 C.F.R. § 130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 C.F.R. § 130.7(a) & (c)(1)(ii) require that TMDLs be subject to public review and that the state implements a process for involving the public in development of TMDLs. In accordance with DOEE's Continuing Planning Process for Water Quality Management (2018), DOEE released the draft TMDLs for a public review and comment period beginning on July 9, 2021 and ending on August 13, 2021. In addition to the formal public comment period, DOEE held a public meeting on July 22, 2021 to provide an overview of the draft TMDLs to the public. As a result of public comments received, DOEE made various revisions to the draft TMDLs. DOEE ultimately released revised, draft TMDLs for a public review and comment period for a second time beginning on September 8, 2023 and ending on October 23, 2023.

Across both public comment periods, DOEE received five sets of public comments from four different organizations. DOEE responded to each public comment in a response to comment document that was included as Appendix C to the TMDL Report. Based on the foregoing, EPA finds that the TMDLs have been subject to DOEE's public participation process.

V. Discussion of Reasonable Assurance

Section 303(d) of the CWA requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate appropriate loadings to point sources.

Reasonable assurance is detailed in Section 9 of the TMDL Report. The only nonpoint sources of the TMDL pollutants within the District are ten historically contaminated sites. A list of these contaminated sites can be found in Table 3-1 of the TMDL Report. These ten contaminated sites are assigned LAs within the TMDL Report. DOEE described prior and planned future management of and corrective action at these contaminated sites as reasonable assurance that the specified LAs will be achieved. DOEE's Anacostia River Sediment Project (ARSP)[14] is a source of reasonable assurance that LAs for these ten contaminated sites will be achieved. Although the ARSP is not

[14] See information regarding the ARSP, including links to the Remedial Investigation report, Feasibility Study, and Interim Record of Decision (available at: https://restoretheanacostiariver.com/arsp-home).

itself a Superfund project, DOEE is remediating contamination in the tidal portion of the Anacostia River under the District's Brownfields Revitalization Amendment Act of 2000, D.C. Code §§ 8-631.01, et seq. (DCBRA), and D.C. Code § 8-104.31, which require that DOEE select a remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (42 United States Code [U.S.C.] §§ 9601-9675), and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP). As a result, CERCLA-patterned investigations, assessments, and evaluations were completed that form the basis for the response to contamination in the Anacostia River.

In addition, several of the Contaminated Sites are being remediated pursuant to separate legal agreements. DOEE provides information regarding clean-up efforts at the Washington Navy Yard, the Pepco Benning Service Center, the Washington Gas – East Station Site, the Kenilworth Park Landfill Site, and Poplar Point.[15] In addition, DOEE describes several ongoing programs throughout the District that involve the construction and maintenance of various best management practices (BMPs) to capture stormwater, which may also capture stormwater from contaminated sites depending on their location in the watershed. DOEE and their partners install BMPs through a variety of voluntary and nonvoluntary programs like the MS4 permit and the Chesapeake Bay Agreement. For a discussion of the upstream LA to Maryland, see the *Load Allocation* subsection above.

The District has regulations limiting the use of products containing PAHs within the District. Under the Comprehensive Stormwater Management Enhancement Amendment Act of 2008, it is illegal to sell, use, or permit the use of coal tar pavement products in the District. Further, the Limitations on Products Containing Polycyclic Aromatic Hydrocarbons Amendment Act of 2018 expanded the 2008 act to include sealants containing steam cracked asphalt and any other products with PAH concentrations greater than 0.1 percent by weight on the list of banned sealant products. This is one example of a specific, on-going program in the District that is expected to decrease the amount of PAHs in the environment over time, and ultimately, provides reasonable assurance that the LAs for PAHs will be achieved.

The reasonable assurance that WLAs assigned to point sources will be achieved is through the issuance of a NPDES permit(s). Specifically, 40 C.F.R. § 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with the assumptions and requirements of any available WLA. Development of a Consolidated Implementation Plan is a requirement of the MS4 permit ("2.2.1 Maintaining and Refining TMDL Databases and Modeling Tools - The Permittee shall continue to update the Consolidated TMDL Implementation Plan modeling tool and associated databases, which shall be used in the development of revised plans, schedules, or strategies. The modeling tool and/or associated databases shall also be used to provide consistent tracking of progress against milestones and benchmarks. Milestone and benchmark progress shall be included in each year's Annual Report for effective utilization by multiple audiences, including the public"). The District most recently updated its Consolidated TMDL Implementation Plan in 2022. The TMDLs

[15] See more information on DOEE's website (available at: https://restoretheanacostiariver.com/faq).

include WLAs for stormwater sources, including the MS4 and CSS. Figure 1 below (or Figure 3-2 in the TMDL Report) displays the areas of the District that are covered by the MS4, CSS, and other point and nonpoint sources. Overall, this figure illustrates that a majority of the District is covered by the MS4 and CSS. Therefore, assigning WLAs to these stormwater sources and implementing those WLAs in the NPDES permits for these stormwater sources will ensure that the WLAs are achieved.

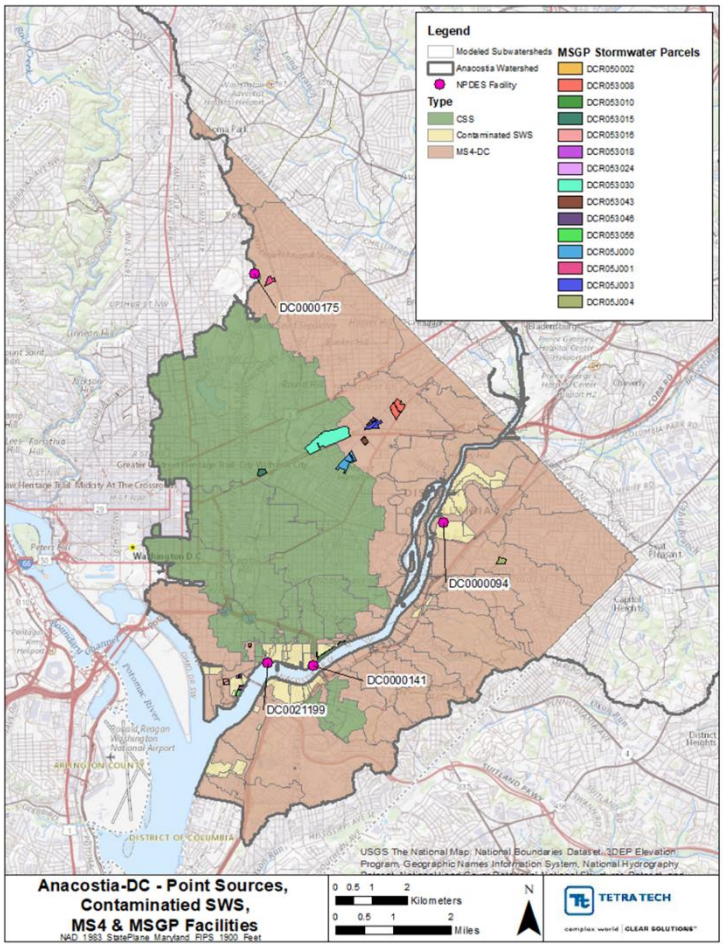

Figure 1. Locations of MS4, CSS, MSGP, and Contaminated Site Subwatersheds in the District (Note: Figure 3-2 in the TMDL Report)

DOEE intends to conduct post-TMDL monitoring of the PAHs to monitor concentrations in the system. DOEE collects and measures the concentrations of toxic pollutants, including the PAHs, in fish tissue every few years. As the consumption of fish with elevated levels of toxic pollutants is the main pathway for these pollutants to impact human health, DOEE is committed to continuing to conduct fish tissue sampling.

EPA accepts the reasonable assurances set forth in the TMDL Report.