Appendix C: Anacostia River Sediment Project Interim Record of Decision

INTERIM RECORD OF DECISION

EARLY ACTION AREAS IN THE MAIN STEM, KINGMAN LAKE, AND WASHINGTON CHANNEL

ANACOSTIA RIVER SEDIMENT PROJECT

SEPTEMBER 30, 2020

ANACOSTIA RIVER SEDIMENT PROJECT
DEPARTMENT OF ENERGY AND ENVIRONMENT

DEPARTMENT OF ENERGY & ENVIRONMENT

GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

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ACRONYMS AND ABBREVIATIONS

95 UCL	95 percent upper confidence limit on the mean
ARAR	Applicable or Relevant and Appropriate Requirement
ARSP	Anacostia River Sediment Project
Authority	District Waterways Management Authority
AVS	Acid volatile sulfide
AWCAC	Anacostia Watershed Community Advisory Committee
AWI	Anacostia Waterfront Initiative
AWRC	Anacostia Watershed Restoration Committee
AWTA	Anacostia Watershed Toxics Alliance
BERA	Baseline ecological risk assessment
bss	below sediment surface
BTV	Background threshold value
CAG	Community Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituents of concern
Commission	District Waterways Management Commission
CSA	Contaminant Source Assessment
CSM	Conceptual site model
CSS	Combined sewer system
CSX	CSX Transportation Corporation
CTE	Central tendency exposure
CWG	Consultative Work Group
CY	Cubic yards
DC Water	District of Columbia Water and Sewer Authority
DC	District of Columbia
DCBRA	District of Columbia Brownfields Revitalization Act
DCDOH	DC Department of Health
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDOT	District Department of Transportation
DDT	Dichlorodiphenyltrichloroethane
DOEE	Department of Energy and Environment
EAA	Early action area
EPA	U.S. Environmental Protection Agency
EPBC	Eastern Power Boat Club
FDMB	Frederick Douglas Memorial Bridge
FI	Fish ingestion
FNC	Federal Navigation Channel
FS	Feasibility study
HEM	Hexane extractable material
HHRA	Human health risk assessment
HI	Hazard index

IC	Institutional control
ICPRB	Interstate Commission on the Potomac River Basin
JCO	Johnson Company
KLHS	Kingman Lake Hot Spot
LCCAR	Leadership Council for a Cleaner Anacostia River
LPAH	Low molecular weight polycyclic aromatic hydrocarbons
M	Million
MDE	Maryland Department of Environment
MGP	Manufactured gas plant
MLLW	Mean low-low water level
µg/kg	Microgram per kilogram
MSHS	Main Stem Hot Spot
MS4	Municipal separate storm sewer system
NAPL	Non-aqueous phase liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administrative
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
OC	Organochlorine
OU	Operable unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzo-p-dioxins
PCDF	Polychlorinated dibenzofurans
PECS	Potential Environmental Cleanup Site
Pepco	Potomac Electric Power Company
PMWP	Performance Monitoring Work Plan
PRG	Preliminary remediation goal
QAPP	Quality Assurance Project Plan
RAL	Remedial action level
RAO	Remedial action objective
RI	Remedial investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
SEFC	Southeast Federal Center
SEM	Simultaneously extracted metals
SOW	Statement of work
SWAC	Surface-weighted average concentration
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEQ	Toxic equivalent
TMDL	Total maximum daily load
TOC	Total organic carbon
TSS	Total suspended sediments

U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WCHS	Washington Channel Hot Spot
WGL	Washington Gas Light
WNY	Washington Navy Yard
WRDA	Water Resources Development Act

PART I
DECLARATION FOR THE INTERIM RECORD OF DECISION

SITE NAME AND LOCATION

The Anacostia River Sediment Project (ARSP) study area includes the approximately 9-mile tidal portion of the Anacostia River that begins at the confluence of the Northwest Branch and Northeast Branch near Bladensburg in Prince George's County, Maryland, and extends downstream to its confluence with the Potomac River. The lower 6.7 miles are within the District of Columbia (DC or the District) and the upper 2.3 miles are within the state of Maryland. The ARSP study area was divided into three operable units (OU): the Main Stem OU, the Kingman Lake OU, and the Washington Channel OU. This interim remedy is a limited-scope early action selected for a portion of the ARSP study area in all three OUs. The interim remedy applies to 11 early action areas (EAAs) within the District that are not targeted for on-going study at a potential environmental cleanup site (PECS). A PECS is an area bordering the Anacostia River where current activities, documented previous activities, or suspected previous activities include or included storage, handling, use, and potential release of hazardous substances or petroleum products. Currently, there are 15 PECSes; additional PECSes may be added as appropriate. This interim remedy does not apply to the Maryland portion of the ARSP study area.

The DC Department of Energy and Environment (DOEE) is remediating the site 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 CFR 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, but the ARSP study area is not a CERCLA site, is not on the CERCLA National Priorities List, and does not have a CERCLA information system identification number.

STATEMENT OF BASIS AND PURPOSE

This Interim Record of Decision (ROD) presents the selected interim remedy to address contaminated surface sediment, defined as 0 to 6 inches deep, in 11 EAAs in the DC portion of the ARSP study area. The selected interim remedy was chosen by DOEE in accordance with DCBRA, CERCLA, and the NCP. This decision is based on the Administrative Record for the ARSP study area (www.anacostiasedimentproject.com/library).

DOEE released a Proposed Plan identifying its preferred alternative for addressing the 11 EAAs and supporting documents to the public and other stakeholders on December 27, 2019. In addition, DOEE has consulted with the U.S Environmental Protection Agency (EPA) Region 3, the U.S. Army Corps of Engineers (USACE), the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS), and the National Oceanic and Atmospheric Administration (NOAA) in the investigations, evaluations, and selection of the interim remedy included in the Interim ROD.

ASSESSMENT OF THE SITE

The interim remedial action selected in this Interim ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

DOEE determined that the use of a limited-scope response action is appropriate for addressing areas with sediment having elevated contaminant concentration levels (also referred to herein as Hot Spots), while continuing evaluations of the overall study area to manage the complexity of and the need to reduce uncertainties associated with contaminated sediment remediation. The interim remedy will be supported by adaptive management to (1) help reduce these uncertainties, (2) provide information on the performance of the interim remedial action, and (3) inform DOEE's final decision, which may require that subsequent remedial actions occur in the ARSP study area, or modifications be made to the selected interim remedy. Although source control is not part of the selected interim remedy, DOEE, in cooperation with the corresponding agencies from Prince George's County, Montgomery County, and the State of Maryland are engaged in efforts to control contaminant sources external to the ARSP study area in the upstream Anacostia River watershed. DOEE views such efforts as critical to achieving the overall cleanup of the study area water bodies.

The interim remedy is intended to primarily target four constituents of concern (COC) in sediment that pose a risk to human health at or above 1E-05 (one-in-one hundred thousand) or to ecological receptors: total polychlorinated biphenyl (PCB) congeners (human health), dioxin toxic equivalent (TEQ) (ecological), chlordane (ecological), and dioxin-like PCBs (human health and ecological).

DOEE is selecting MSHS-4 (Containment with Selective Dredging and Disposal) for the Main Stem OU, KLHS-4 (Containment by Thin-Layer Cap Placement with Selective Dredging and Disposal) for the Kingman Lake OU, and WCHS-3 (Containment) for the Washington Channel OU as the interim remedy. The selected interim remedy includes the following major components:

- Selective dredging in the federal navigation channel (FNC) within the Main Stem OU that will be completed by mechanical or hydraulic methods prior to placing caps (clean material placed over contaminated sediment to isolate and contain COCs)
- Selective dredging within the Kingman Lake OU that will be completed by mechanical or hydraulic methods prior to placing caps
- Off-site disposal of dredged material in a solid waste landfill
- Construction of sand caps over the EAAs in the Main Stem and Washington Channel OUs that may be augmented with amendments
- Construction of thin-layer caps over the EAAs in the Kingman Lake OU that may be augmented with amendments

- Placement and implementation of institutional controls (IC) to maintain the integrity of the caps
- Performance monitoring to identify key indicators for assessing progress toward achieving the remedial action objectives (RAO). Performance monitoring activities will include key indicators for assessing progress toward the RAOs, monitoring and sampling activities, data interpretation methods, criteria that will indicate attainment or nonattainment of an RAO, and potential follow-on actions in the EAAs or other locations in the river. In addition, ecological indicator monitoring will address uncertainty about the effect of the remedy on ecological receptors. A performance monitoring work plan (PMWP) will be issued after issuance of this Interim ROD. The PMWP will provide an outline and details for the remedy assessment decision process, including the definitions of the trigger criteria supporting this process.

The Proposed Plan noted that benzo(a)pyrene equivalent (BaPE) was identified as a COC in the ARSP RI human health risk assessment. However, BaPE does not pose risk to human health at or above the 1E-05 risk level selected for the interim remedial action. Although BaPE is not a COC, concentrations of BaPE within the 11 EAAs will be incidentally reduced by the interim remedial action. BaPE poses risk to human health at the 1E-06 (one in one million) target risk level and may be addressed by future remedial action in the ARSP study area.

In the Proposed Plan, DOEE presented its preferred alternative for the Kingman Lake OU of Alternative KLHS-3 (Enhanced Monitored Natural Recovery by Direct Application of Activated Carbon). As discussed in the Responsiveness Summary, DOEE's long-term plans at Kingman Lake and public comments received on the Proposed Plan led DOEE to select Alternative KLHS-4 (Containment by Thin-Layer Cap Placement with Selective Dredging and Disposal) as the interim remedy for the Kingman Lake OU.

STATUTORY DETERMINATIONS

In accordance with DCBRA, CERCLA, and the NCP, the following statutory determinations are made:

Protection of Human Health and the Environment. The interim remedy will protect human health and the environment in the EAAs in each OU. The interim remedy is expected to (1) provide protection of human health and the environment until a Final ROD is signed, (2) be effective at reducing risks to human and ecological receptors, and (3) make progress toward achieving the ARSP RAOs.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). The interim remedy will meet ARARs pertinent to the actions that are part of the interim remedy, and DOEE is not seeking a waiver of any ARAR.

Cost Effectiveness. The interim remedy provides overall protectiveness relative to its costs and is cost effective.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable. The interim remedy is intended to remove, stabilize, and prevent further migration of COCs or further environmental degradation at the 11 EAAs as a permanent solution for the EAAs in each OU but is not intended to be a permanent solution for the whole ARSP study area. Additional follow-on actions may be determined to be necessary to address other contaminated areas of the ARSP study area and/or to modify the remedies selected for the EAAs. Follow-on remedial actions are not expected to change or conflict with the interim remedy selected for the EAAs in the three OUs. The selective dredging will permanently remove contaminated sediment and dispose of it off-site. The caps are expected to be a "permanent solution" for COCs remaining in the sediment in the EAAs because they will be subject to long-term performance monitoring that will continue to evaluate the integrity and the effectiveness of the caps. But the interim remedy is a limited-scope action and is not intended to utilize "permanent solutions" and alternative treatment technologies *to the maximum extent practicable* for the entire ARSP study area.

Preference for Treatment as a Principal Element. The interim remedy does not utilize treatment of COCs as a principal element of the remedy. The selective dredging will reduce the volume of COCs in the sediment and the caps will reduce the mobility of COCs in sediment; however, the interim remedy will not accomplish those reductions through treatment. Because this interim remedy does not constitute the final remedy for the ARSP study area, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element are not included in this Interim ROD.

Five-Year Review Requirements. CERCLA § 121 and DCBRA § 8-634.05 require reviews (statutory reviews) of response actions no less often than each 5 years after the initiation of the response action ("Five-Year Review"), where the action does not achieve concentrations of hazardous substances acceptable for unlimited use/unrestricted exposure (UU/UE). CERCLA 5-year reviews are also done as a matter of policy (policy reviews) when UU/UE will result upon completion of the remedy but completing the remedy takes longer than 5 years. The interim remedy will result in hazardous substances remaining in the sediment in the ARSP study area above the preliminary remediation goals (PRGs) applied on a surface-weighted average concentration (SWAC) basis, so statutory reviews will be conducted to ensure that the interim remedy, including the ICs, continues to provide adequate protection of human health and the environment. In addition, because this is an interim remedy, performance monitoring will be ongoing as DOEE continues to develop an understanding of the ARSP study area and of the effectiveness of the interim remedy.

DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary (Part II of this Interim ROD). Additional information can be found in the Administrative Record file https://www.anacostiasedimentproject.com/library.

- COCs and their respective concentrations are described in **Section 5.0** Summary of Site Characteristics

- Baseline risks for human health and the environment are described in **Section 7.0** Summary of Site Risks
- PRGs established for the COCs are described in **Section 9.0** Preliminary Remediation Goals and Hot Spot RAL
- Current and reasonably anticipated future use assumptions used in the baseline risk assessment and the Interim ROD are described in **Section 6.0** Current and Potential Future Land and Resource Uses
- Costs estimated for the selected interim remedy are presented in **Tables 11.2 and 11.3** for the Main Stem OU; **Table 11.6** for the Kingman Lake OU; and **Table 11.8** for the Washington Channel OU
- Key factors that led to selecting the interim remedy (that is, describing how the selected interim remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) are described in **Section 11.0** Comparative Analysis of Early Action Alternatives and **Section 13.1** Summary of the Rationale for the Selected Interim Remedy

AUTHORIZING SIGNATURE

Tommy Wells
Director

September 30, 2020
Date

PART II
DECISION SUMMARY FOR THE
INTERIM RECORD OF DECISION

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The portion of the Anacostia River Sediment Project (ARSP) within the District of Columbia (DC, also referred to herein as the District) is being addressed pursuant to the District's Brownfield Revitalization Act at DC Code §§ 8-631.01 et seq. (DCBRA), which requires that DC Department of Energy and Environment (DOEE) select a remedy in accordance with the Comprehensive Environmental Response and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Therefore, DOEE completed CERCLA-patterned investigations and evaluations, and in this Interim ROD has selected an interim remedy for a portion of the ARSP study area. The ARSP study area for this investigation (**Figure 1.1**) includes the approximately lower 9-mile tidal portion of the Anacostia River that begins at the confluence of the Northwest Branch and Northeast Branch near Bladensburg in Prince George's County, Maryland, and extends downstream to its confluence with the Potomac River. The ASRP study area was divided into three operable units (OU) (see **Figure 1.2**): Main Stem OU (main channel of the Anacostia River); Kingman Lake OU (an oxbow-type lake connected to and paralleling a portion of the Main Stem); and Washington Channel OU (a waterway connected to the Main Stem near the confluence of the Main Stem with the Potomac River).

The ARSP included a remedial investigation (RI), a river-wide feasibility study (FS), a focused FS and various supporting studies that were conducted primarily to characterize contaminant sources to the tidal river. Due to the complexity of contaminated sediment remediation and the need to identify and address active contaminant sources and reduce other uncertainties, DOEE determined that use of a limited-scope interim remedy, which is contained in this Interim ROD, supported by adaptive management[1] (US Environmental Protection Agency [EPA] 2018b), is the appropriate approach to address contamination in each OU in the Washington, DC portion of the ARSP study area. Information on the interim remedy obtained through performance monitoring will be used to help define any necessary subsequent remedial alternatives that will ultimately be the final remedy included in a Final ROD for the DC portion of the river, as well as potential modifications to the interim remedy. **Figure 1.3** shows the role of this Interim ROD in the overall decision-making process for the ARSP study area from the RI/FS phase through the Final ROD. While DOEE recognizes that source control is an important factor in addressing overall river cleanup, source control is not directly addressed in this Interim ROD. Successful

[1] "Adaptive management is a formal and systematic site or project management strategy approach centered on rigorous site planning and a firm understanding of site conditions and uncertainties. This technique, rooted in the sound use of science and technology, encourages continuous re-evaluation and management prioritization of site activities to account for new information and changing site conditions. A structured and continuous planning, implementation and assessment process allows EPA, states, Tribes and Alaskan Native Villages, other federal agencies, or responsible parties to target management and resource decisions with the goal of incrementally reducing site uncertainties while supporting continued site progress" (EPA 2018b).

source control requires close cooperation between DOEE, Maryland Department of Environment (MDE), and the governments of Prince George's and Montgomery counties, since most of the upstream, nontidal watershed is in Maryland. DOEE, in cooperation with the Council of Governments, established a Source Control Workgroup in April 2019, and DOEE meets regularly with MDE and Prince George's Department of Environment technical staff and is coordinating with both agencies on a source control strategy. Meeting minutes from the Source Control Workgroup are available in ARSP Administrative Record (www.anacostiasedimentproject.com/library).

1.1 SITE CHARACTERISTICS

The tidal river watershed encompasses an area of approximately 176 square miles in DC and adjacent Prince George's County and Montgomery County in Maryland. The study area within DC also includes Washington Channel and Kingman Lake, water bodies in limited hydraulic connection with the main river channel. Washington Channel is a 2-mile-long waterway extending northward from the mouth of the Anacostia River to the Tidal Basin, adjacent to the National Mall. The peninsula containing East Potomac Park and Haines Point separates the Washington Channel from the Potomac River. Kingman Lake is a shallow, marshy, oxbow-type water body with downstream and upstream inlets to the main channel at approximately 3.5 and 5.5 miles from the mouth of the river.

The DC portion of the study area is bordered by Anacostia Park, a 1,200-acre park **(Figure 1.4)** under the jurisdiction of the National Park Service (NPS) and managed by National Capital Parks – East under the authority of the Capper-Cramton Act (PL71-284). This legislation mandates the NPS to preserve the flow of water and prevent pollution in Rock Creek and the Potomac and Anacostia Rivers, to preserve forests and the natural scenery in and about Washington, DC, and to provide recreational opportunities in the nation's capital.

For the purposes of the RI, the 9-mile study area was divided into six reaches (**Figure 1.5**), also referred to as exposure areas in the risk assessments. The reaches are defined based on sediment characteristics, river hydraulics, and hydraulic connectivity to the main channel of the river. From upstream to downstream, the reaches are defined as follows:

- Reach 7 – from the confluence of Northwest Branch and Northeast Branch (proximate to the upper tidal limit in these two tributaries) to the downstream end of the Bladensburg Marina.
- Reach 67 – from the downstream end of Bladensburg Marina to Nash Run.
- Reach 456 – from Nash Run to the CSX Transportation Corporation (CSX) Railroad Bridge.
- Kingman Lake – parallels approximately 2 miles of the river with interaction limited to upstream and downstream inlets.
- Reach 123 – from the CSX Railroad Bridge to the confluence with the Potomac River.
- Washington Channel – an approximately 2-mile waterway from the Tidal Basin to Reach 123 in the main stem of the Anacostia River just upstream from its confluence with the Potomac River.

To support the identification of remedial alternatives in the FS, the reaches defined for the RI were grouped into three OUs **(Figure 1.2)**. Hydraulic conditions are relatively similar within each OU but differ among the OUs. The rationale for designation of the three OUs is described below:

- **Washington Channel Operable Unit.** Based on surface water quality sampling (discussed in RI Report Section 8 [Tetra Tech 2019a]) and results from the ARSP surface water model (Tetra Tech 2019b), hydraulic interaction between the Washington Channel and the river is limited and sedimentation rates in Washington Channel are low relative to the Main Stem of the river. The Washington Channel receives small inflows from the Tidal Basin, flows from 16 municipal outfalls, and limited tidal influx from the Anacostia and Potomac Rivers. Any remedial actions in Washington Channel could be executed without substantial interaction with the main channel of the river. The limited connectivity between Washington Channel and the river and Tidal Basin supports the separate evaluation of remedial alternatives for this OU. The Washington Channel is entirely located in the District.
- **Kingman Lake Operable Unit.** Like Washington Channel, the hydraulic interaction between Kingman Lake and the river is limited (Tetra Tech 2019a and Tetra Tech 2019b), allowing for independent remedial action, if deemed necessary. Kingman Lake receives inflows from the main river channel, five municipal outfalls, and a small, unnamed tributary draining a wooded portion of the National Arboretum. The limited connectivity between Kingman Lake and the Anacostia River supports the separate evaluation of remedial alternatives specific for this OU. Kingman Lake is located entirely in the District.
- **Main Stem Operable Unit**. The Main Stem OU includes the entire main channel of the tidal river (Reaches 123, 456, 67, and 7). The Main Stem is an inherently more complex water body than either Washington Channel or Kingman Lake primarily because it receives greater surface water and sediment inflows from tributaries and municipal outfalls. The Main Stem receives inflows from five major tributaries, nine minor tributaries, 115 municipal outfalls, Kingman Lake, Washington Channel, and the Potomac River (during high tide). The lower 6.7 miles of the Main Stem are located in the District (Reaches 123, 456, and the lower approximately 0.5 mile of Reach 67). Owing to the limited movement of water from the Main Stem to either Kingman Lake or Washington Channel, remedial alternative evaluations in the Main Stem can be conducted separate from the other two OUs.

Figure 1.6 shows the conceptual site model (CSM) for the ARSP. A CSM illustrates the physical, chemical, and biological processes that govern the movement of contaminants and their potential exposure routes to various human or ecological receptors. Various features of the ARSP study area (for example, marinas, bridges, seawalls) may influence the 11 EAAs (defined in **Section 1.2**) that are the focus of this interim remedy and affect future remedial decisions. These features are summarized in the ARSP Focused Feasibility Study (FS) (Tetra Tech 2019c) and are described fully in the ARSP RI and River-wide FS reports (Tetra Tech 2019a and 2019d, respectively).

Potential Environmental Cleanup Sites (PECSes): A Potential Environmental Cleanup Site (PECS) is defined as an upland site on the shore of the study area where current or historical activities include or included the storage, handling, use, or potential release of hazardous substances or petroleum products. Fifteen PECSes (listed below) were previously identified within the ARSP study area (**Figure 1.1**).

- Colmar Manor Landfill
- Kenilworth Park Landfill
- Langston Golf Course
- Kingman Island Illicit Dumping Area
- Potomac Electric Power Company (Pepco) Benning Road Facility
- CSX Benning Yard
- Former Steuart Petroleum Company Terminal adjacent to the Washington Gas Light Company (WGL) East Station Site
- WGL East Station (shown as Washington Gas on **Figure 1.1**)
- Washington Navy Yard (WNY)
- Poplar Point
- General Services Administration Southeast Federal Center (SEFC) (historically was part of the WNY)
- Former Hess Oil Corporation Petroleum Terminal
- Former Steuart Petroleum Company/Gulf Oil Corporation Terminals
- Joint Base Myer – Henderson Hall (shown as Fort McNair on **Figure 1.1**)
- Joint Base Anacostia – Bolling (JBAB)

The ARSP RI Report (Tetra Tech 2019a) summarizes available data on contaminants in sediment and other environmental media for each PECS. DOEE may add other sites to this list. As discussed in **Section 2**, environmental investigations are performed under existing legal agreements at some of the PECSes. Details on the status of these investigations are summarized in **Section 2.5**.

Tributaries and Outfalls: Water and sediment flow into study area water bodies (Main Stem, Kingman Lake, and Washington Channel) from 14 tributary streams and many outfalls. The three largest tributaries are Northwest Branch, Northeast Branch, and Lower Beaverdam Creek, which together contribute 94 percent of the total flow of the Anacostia River. In addition to the tributaries, 16 combined sewer system (CSS) outfalls[2] and 136 municipal separate storm sewer

[2] CSS outfalls discharge a mixture of sewage and storm water to surface water during high runoff periods such as a significant high flow storm event. Under minimal precipitation conditions, sewer capacity is sufficient to convey wastewater and runoff discharge volumes to a treatment facility (Blue Plains Advanced Wastewater Treatment Plant for the DC Water system). To avert flooding during a storm when the combined wastewater and storm water flows exceed the wastewater system capacity, CSS outfalls divert a mixture of raw sewage and storm water directly to the receiving surface water body (CSS outfall

system (MS4) outfalls contribute flow to the river. Two industrial outfalls, regulated via EPA National Pollutant Discharge Elimination System (NPDES) permits, are active in the study area and include an outfall at the Pepco Benning Road PECS and an outfall at the WNY PECS. Outfall inputs are the subject of ongoing investigations of their influence on long-term remediation and management of the Anacostia River.

Federal Navigation Channel: A federal navigation channel (FNC) extends through the Main Stem and Washington Channel OUs **(Figure 1.7**). The USACE has been responsible for maintaining the authorized depth and width of the channel so that commercial river traffic, defined as river traffic associated with commodity production, can move freely. In the lower portion of Reach 123, the FNC is referred to as the Washington Ship Channel. Commercial traffic associated with commodity production no longer uses the Anacostia River, and USACE has informed DOEE that it no longer intends to actively dredge the channel. USACE also informed DOEE that, pursuant to Section 10 of the Rivers and Harbors Act, no materials may be placed in the channel that would decrease its depth to less than the currently authorized depth, unless the FNC's authorized depth is modified. Some of the areas in the Main Stem OU subject to the sediment remedy described in this Interim ROD overlap the FNC. As a result of the July 2020 U.S. House version of the Water Resources Development Act of 2020 (WRDA of 2020), the proposed modification of the FNC in the Anacostia River is as follows:

Location (Reach)	Final Dimensions	Previous Dimensions
Buzzard Point to 11th Street Bridge	15 feet deep / 300 feet wide	24 feet deep / 400 – 800 feet wide
11th Street Bridge to 200 meters downstream of Sousa Bridge (Station 0+000)	15 feet deep / 200 feet wide	24 feet deep / 200 – 600 feet wide

Areas of the FNC where the authorized depth will remain unchanged include:

- The Washington Channel (24 feet deep / 200 feet wide)
- The mouth of the Anacostia River to Buzzard Point (24 feet deep / 400 feet wide)
- The area 200 meters downstream from the Sousa Bridge (Station 0+000) to Bladensburg, Maryland (8 feet deep / 60 feet wide)

Site History and Ongoing Contamination: The contaminated sediment deposited in the Anacostia River originated from many sources. The USACE began dredging in the late 1800s for navigation. Since then, sedimentation rates have slowly decreased from the highest measured rates when development around the Anacostia River was at its peak. Recent

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overflow). MS4 outfalls are not connected to sewage pipes and, therefore, discharge only storm water. With the startup of the Clean Rivers Project Anacostia River Tunnel in March 2018, DC Water estimates that CSS discharges to the Anacostia River have been reduced to date by more than 90 percent.

modeling (Tetra Tech 2019b) shows that most sediment now comes from upstream tributaries, with smaller loads from outfalls into the river. The modeling results and studies of tributary loading (Wilson 2019) suggest that although most new sediment is uncontaminated, a fraction of tributary sediment exhibits elevated levels of contaminants, such as the sediment contributions to the Main Stem from Lower Beaverdam Creek, Watts Branch, and Hickey Run. The model further suggests that outfall contributions of sediment are small compared to sediment from the tributaries. Some industrial outfalls may also contribute elevated levels of contaminants and are the subject of ongoing investigations. Contaminants can also be transported in groundwater seeping into the river from adjacent upland properties, such as the PECSes identified above. Ongoing transport of contaminants to river media in groundwater at various PECSes is under investigation. Investigatory work comparing the relative contributions of new sediment, outfalls, and legacy sediment is ongoing.

1.2 EARLY ACTION AREAS

The limited-scope early action contained in this Interim ROD is intended to primarily target four constituents of concern (COC) that pose a risk to human health at or above 1E-05 (one-in-one hundred thousand) or to ecological receptors in 11 EAAs within the ARSP study area: total PCB congeners, dioxin-like PCBs, dioxin toxic equivalent (TEQ), and chlordane (to the extent it is collocated with the target areas defined based on PCBs). **Figure 1.8** shows the area that total PCBs in surface sediments exceeds its preliminary remediation goal (PRG) in the ARSP study area (also known as the total PCB footprint). The total PCB footprint covers a large portion of the study area and approximates the combined footprints of all four COCs. Additional discussion of the combined COC footprint is provided in **Section 5.3**. The Focused FS was developed to identify, screen, and cost remedial alternatives for a limited-scope early action to address the four identified COCs.

Since total PCB congener concentrations overlap with the other COCs to a large extent, EAA boundaries were defined based on the total PCB congener concentration. EAAs are areas with surface sediment concentrations exceeding a total PCB congener concentration of 600 micrograms per kilogram (µg/kg) (referred to as the Hot Spot remedial action level [RAL]). The Hot Spot RAL of 600 µg/kg for total PCB congeners is three times greater than the river-wide RAL[3] of 200 µg/kg. Using the Hot Spot RAL of 600 µg/kg, remediation of total PCB congeners is estimated to reduce the risk to humans from ingesting PCB-contaminated fish by approximately 90 percent. Specific details regarding the derivation of the 600 µg/kg Hot Spot RAL are provided in **Section 9**.

Based on the Hot Spot RAL, 11 EAAs throughout the three OUs are targeted for an early action. **Figure 1.9** shows the 11 EAAs that are the subject of this early action. Collectively, the 11 EAAs

[3] A RAL for a reach is the maximum concentration of a COC that can remain in sediment upon completion of remediation in that reach in order to achieve the PRG for the COC on a SWAC basis. The river-wide RAL is the average of the RALs defined for each of the six reaches.

encompass 77.2 acres of the total 815-acre study area. Two EAAs (26.9 acres) are in the Washington Channel OU, three EAAs (6.2 acres) are in Kingman Lake OU, and six EAAs (44.1 acres) are in the Main Stem OU. The Hot Spot RAL was determined by DOEE to be the optimal level for defining EAAs and achieving substantial risk reduction while following the adaptive management decision framework defined in **Section 10.1.6**. All areas (other than those that are currently being addressed or are expected to be addressed in conjunction with a PECS investigation) where PCB concentrations in sediment are greater than 600 µg/kg, are defined as EAAs. Sediment at three PECSes (Pepco Benning Road Facility, WGL East Station, and WNY) is being investigated under separate regulatory agreements and is, therefore, not targeted for interim remedial actions in this Interim ROD. Cleanup at a fourth PECS, CSX Benning Yard, is covered by a separate legal agreement. Current/historical CSX Benning Yard operations may have potentially contaminated sediment in the river adjacent to this PECS. DOEE is in discussions with CSX regarding further investigations.

2.0 SITE ENVIRONMENTAL HISTORY

Environmental activities in the study area include site characterization work by governmental and public/private partnerships, total maximum daily load (TMDL) evaluations, outfall permitting and modifications, the ARSP RI, River-wide FS, Focused FS, and related investigations and various PECS investigations conducted in accordance with separate legal agreements. The following sections present the site history with a focus on the environmental sampling and other activities that have resulted in the development of a functional understanding of nature and extent of contaminant concentrations resulting in elevated risks to receptors in the study area water bodies.

2.1 INITIAL WATERSHED CHARACTERIZATION EFFORTS

A multi-jurisdictional restoration effort for the Anacostia River watershed was initiated in 1984 with the establishment of the Anacostia Watershed Restoration Strategy Agreement signed by the MDE and the District of Columbia Department of Health (DCDOH, predecessor to DOEE). In 1987, this agreement resulted in the launch of the Anacostia Watershed Restoration Committee (AWRC),[4] which included DCDOH, MDE, Prince George's County Department of Environment, the Montgomery County Department of Environmental Protection, USACE, EPA, NPS, the Interstate Commission on the Potomac River Basin (ICPRB), and the Metropolitan Washington Council of Governments. The committee identified six watershed restoration goals, including the reduction of pollution loads, restoration of ecological integrity, improvement of fish passage, increase in wetlands, expansion of forests, and increase in public and private participation and stewardship.

DOEE has been monitoring fish contamination levels in District waters since 1980. Fish consumption advisories for PCB contamination were first issued in 1993 (EPA 2005). In 1999, the EPA Chesapeake Bay Program identified the Anacostia River (along with Baltimore Harbor and the Elizabeth River in Portsmouth, Virginia) as regions of concern to the health of Chesapeake Bay. The Anacostia Watershed Toxic Alliance (AWTA) was convened in 1999 by EPA as a voluntary public and private partnership consisting of more than 25 groups representing governmental organizations, academic institutions, commercial interests, and various community representatives. AWTA's objectives were to identify and quantitatively assess human and ecological risks resulting from toxic contaminants in the river, reduce these risks, and foster effective partnerships to promote restoration of the watershed.

Prior to the formation of the AWRC and AWTA, environmental investigations of the Anacostia River were not sufficiently coordinated and too broadly scoped to allow a comprehensive evaluation of risks to human and ecological receptors. In response to this need, various investigations were conducted in the late 1990s and 2000s either jointly or separately by

[4] The AWRC is now known as the Anacostia Watershed Management Committee which serves as the technical resource for the Council of Government's Anacostia Watershed Steering Committee.

ICPRB, AWRC, and AWTA. ICPRB conducted three investigations mostly focused on lower Anacostia River (downstream of the CSX Railroad Bridge) and Kingman Lake; two to measure PCB, PAH, pesticide, and metals concentrations in subsurface samples (Limno-Tech 1990 and Velinsky et al. 1997); and one measuring the concentrations of these constituents in manhole sediment and surface sediment samples (Velinsky et al. 1992). Doelling Brown (2001) showed that sediments could be a source of contaminants to fish tissue via fish consumption of prey items from the river bottom and water column. On behalf of AWTA, the Academy of Natural Sciences collected surface sediment samples distributed throughout the Main Stem and Washington Channel during a comprehensive study conducted in 2000 (Syracuse Research Corporation and National Oceanic and Atmospheric Administration [NOAA] 2000). These samples were analyzed for PCBs, PAHs, pesticides, and metals. Studies were conducted in 2000 and 2001 to examine the effects of contaminants on the benthic community through the use of the Sediment Quality Triad (McGee et al. 2009, Velinsky and Ashley 2001). Each of these investigations and others conducted during this time indicated that toxic constituents (principally PCBs, pesticides, and some trace metals) were present in the upstream watershed and in sediments at concentrations that exceeded biological effects screening levels and likely served as a source of contamination to benthic organisms and fish.

In 2004 on behalf of AWTA, DCDOH, and others, a consortium of academic institutions in partnership with EPA performed a demonstration sediment capping project at a location adjacent to the O Street Outfall in Reach 123 (Reible et al. 2006). For this demonstration project, four test plots were constructed, three with active capping materials designed to sequester various contaminants and one sand cap serving as a control. Each of the test plots showed reductions in concentrations of contaminants in surface sediment pore water samples compared to the control, indicating that an expected benefit would be realized from broad use of reactive capping materials.

2.2 ANACOSTIA RIVER TMDL DEVELOPMENT

Contemporaneous with the work being conducted in the Anacostia River by AWTA, AWTC, and ICPRB, DOEE listed the Anacostia River (and other water bodies in the District) as impaired in 1988. In 1998, DOEE identified surface water TMDLs for a number of toxic chemicals including PCBs, four pesticides, PAHs (up to three aromatic rings), and three metals (arsenic, copper, and zinc). The four pesticides included chlordane, dieldrin, heptachlor epoxide, and dichlorodiphenyltrichloroethane (DDT). TMDLs also were defined for DDT’s breakdown products (dichlorodiphenyldichloroethane [DDD], dichlorodiphenyldichloroethylene [DDE]). Since the initial impairment listing, Anacostia River TMDLs have been established for *E. coli*, floating trash, total suspended sediment (TSS), oil and grease, chlorophyll A, nitrogen, and phosphorous. Anacostia River, Kingman Lake, and Washington Channel are classified as not supporting swimming, secondary contact recreation use, shellfish habitat, or fish consumption (DOEE 2018). The dissolved fractions of PCBs and some pesticides and PAHs exceed DC water quality criteria. Recent (but not the only) exceedances of these constituents are documented in Ghosh et al. (2019)[5]. Regarding metals, dissolved phase monitoring results from 1990 through 2016 indicate that the metals concentrations are frequently less than the detection level and, when detected, are typically less than the associated water quality criterion (DOEE 2018).

2.3 TRIBUTARY TMDL DEVELOPMENT AND OUTFALL MONITORING

The watersheds for the three largest tributaries (Northwest Branch, Northeast Branch, and Lower Beaverdam Creek) account for approximately 94 percent of the flow in the tidal river and are entirely or mostly in Maryland while the watersheds for the other 11 tributaries are primarily located in the District. Toxic chemical loading (including PCBs) from the Maryland and District tributaries are regulated by TMDLs established by MDE and DOEE, respectively. Based on surface water modeling studies (Tetra Tech 2019b) and sampling results from an ARSP supporting study (Wilson 2019), suspended sediment-borne PCB loading is the most significant source of new PCB contamination entering the tidal river. Even though Lower Beaverdam Creek accounts for a relatively minor portion of the inflow to the tidal river (approximately 10 percent of inflow compared to approximately 84 percent for the combined Northeast Branch and Northwest Branch flow), it accounted for 60 percent of the PCB mass input in 2017 (Wilson 2019). The Northwest Branch was the second largest 2017 contributor of PCBs (18 percent), followed by Northeast Branch (11 percent). The remaining smaller tributaries together account for approximately 10 percent of the total PCB mass input. Further, an independent passive-sampler-based investigation conducted in the five major tributaries provides an additional line of evidence that Lower Beaverdam Creek contributes significant PCB contamination in the dissolved phase (Ghosh et al. 2019).

The National Pollutant Discharge Elimination System (NPDES) permitting process regulates contaminant discharges from the combined sewer system (CSS), MS4, and industrial wastewater outfalls in the District including those that discharge to the study area water bodies. NPDES permits establish contaminant discharge limits, monitoring requirements, and compliance schedules. The District first applied for an NPDES permit for MS4 outfall discharges in 1999, and CSS discharges have been monitored through the NPDES process since the 1980s. NPDES permits exist for several industrial facilities. Discharges from the industrial outfalls at the Washington Navy Yard and Pepco's Benning Road facility have been regulated since 2000 (www.epa.gov/npdes-permits/district-columbia-npdes-permits).

In accordance with a four-party 2005 consent decree signed by the Assistant U.S. Attorney General, the EPA Regional Administrator, the DC Water and Sewer Authority (DC Water), and the DC City Administrator, DC Water developed a comprehensive plan to address combined sewer overflows, also known as a Long Term Control Plan. As part of this plan under DC

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[5] In the ARSP Administrative Record (www.anacostiasedimentproject.com/library), Ghosh et al. (2019), cited in this Interim ROD, is superseded by Ghosh et al. (2020), the most recent version of this document as of this writing.

Water's Clean Rivers Project, DC Water completed construction in March 2018 on a tunnel and pumping system that substantially reduces combined sewer overflows (CSOs) from CSS outfalls by collecting and storing excess storm water flows for treatment at the DC Water Blue Plains Advanced Wastewater Treatment Plant. With the startup of the Clean Rivers Project Anacostia River Tunnel (ART) in March 2018, DC Water estimates that CSS discharges to the Anacostia River have been reduced by more than 90 percent (www.dcwater.com/cleanrivers).

2.4 ARSP REMEDIAL INVESTIGATION, FEASIBILITY STUDIES, AND SUPPORTING INVESTIGATIONS

DOEE developed a strategy for restoring the Anacostia River in 2008 which led to a longer-term initiative known as *For a Cleaner Anacostia River*. The strategy identifies various actions for improving water quality, stormwater runoff, and site remediation. One element of the strategy was that the District would craft a plan to remediate river media to address the persistent levels of toxic contaminants that make it unsafe for people to consume fish caught in the river. In 2013, DOEE allocated funding for an RI/FS and published the "Statement of Work for Remedial Investigation (RI) and Feasibility Study (FS) of Contaminated Sediment in the Anacostia River, Washington DC." The statement of work (SOW) outlined the RI tasks needed to identify sources of sediment contamination in the Anacostia River, evaluate the nature and extent of contamination in the sediments in the tidal portion of the Anacostia River, and conduct an FS to develop and evaluate potential remedial actions to eliminate elevated risk (risks above the selected target risk level) to human health and the environment. The RI focused on characterization of the nature and extent of contamination in the 9-mile tidal river Main Stem, Kingman Lake, and Washington Channel and outfall and tributary source characterization. The supporting investigations, with some exceptions, focused mainly on characterizing contaminant sources.

2.4.1 RI, RIVER-WIDE FS, AND FOCUSED FS

A detailed bathymetric survey of the Main Stem, Kingman Lake, and Washington Channel was completed in the fall of 2013 to support RI work plan development. The ARSP RI Work Plan was completed in June 2014, after public review and comment on a draft version, to characterize the nature and extent of contamination in the tidal river and to determine the associated baseline risks to human and ecological receptors. Field sampling for the RI began in June 2014 and was completed in 2016. During the 2014 sampling event, 134 surface sediment, 250 subsurface sediment, 23 surface sediment pore water, 43 toxicity test samples, 14 surface water, and 238 fish tissue samples were collected. By design, the 2014 sampling event focused on portions of the river elsewhere than adjacent to the 15 currently defined PECSes that border the river. The rationale for this approach was that contamination in the river associated with each PECS would best be investigated by the potentially responsible party.

In the summer of 2014, the DC City Council enacted legislation that the ARSP ROD documenting the identification, costing, and screening of alternatives for the cleanup of the study area be finalized by June 2018 (later, the ROD deadline was extended to December 31, 2018 and then to September 30, 2020). Following the 2014 field event, DOEE determined that the PECS parties were unlikely to investigate their respective sites within a timeframe consistent with the City Council-mandated ARSP ROD deadline. DOEE initiated additional investigations in

2015 based on an addendum to the 2014 Work Plan. This sampling focused on the PECSes and other data gaps. During the 2015 sampling event, DOEE collected an additional 39 surface sediment, 205 subsurface sediment, 18 surface sediment pore water, 34 surface sediment toxicity testing, and 16 bioaccumulation assessment samples. In addition, 20 surface sediment samples from the Potomac River were collected for background characterization.

The RI dataset created to support the baseline risk assessments conducted for the study area water bodies is a composite dataset including the DOEE-collected data in the 2014, 2015, and 2016 sampling events and the datasets collected in 2016 or earlier by Pepco, CSX, and WNY (discussed in **Section 2.5**). In addition, the RI dataset included the game fish fillet tissue dataset collected by Pinkney (2014) to support the DC fish consumption advisory. Data generated during the post-2016 sampling events at Pepco and WGL East Station Site were collected too late for consideration in the ARSP RI and baseline risk assessments. However, each of the post-2016 datasets were considered by DOEE in the agency's oversight of the characterization of contamination at these sites. Based on these reviews, direct consideration of these data in the ARSP would not have changed the conclusions of the RI or the risk assessment results.

DOEE documented the field sampling performed during 2014 and 2015 in a Draft Phase 1 RI Report, which was issued for public review on March 18, 2016 (Tetra Tech 2016b). The report documented the nature and extent of contamination in river media and included a Baseline Ecological Risk Assessment (BERA) and Human Health Risk Assessment (HHRA). It also defined a number of data gaps which included the need for an improved background fish tissue quality dataset, additional PECS sediment characterization, data collection regarding benthic invertebrate tissue quality, characterization of upgradient, non-tidal outfalls and tributaries as contaminant sources, and investigation of observed trends in surface water quality. On behalf of DOEE, Tetra Tech prepared a second addendum to the 2014 RI Work Plan (Tetra Tech 2016a) to address data gaps identified in the March 18 Draft Phase 1 RI Report. Addendum 2 to the Work Plan detailed the additional sampling and was issued in draft in May 2016 and finalized in July 2016.

The Phase 2 field sampling event to support the ARSP was conducted between May and August 2016. During the 2016 sampling event, 134 surface samples were collected and 12 sediment cores for radiometric age dating (cesium 137 method) were also collected. Additional subsurface coring resulted in the collection of 1,609 subsurface sediment samples for nature and extent characterization and forensic chemical fingerprinting. Also collected in 2016 were 80 composite background fish samples, eight composite crayfish samples, 22 turtle tissue samples, and 25 benthic invertebrate samples. In addition, sampling to support 33 larval fish toxicity tests was performed.

DOEE prepared a revised RI Report consisting of the draft Phase 1 RI Report (Tetra Tech 2016b), updated to include results and analyses from the field sampling completed in the summer of 2016. The revised RI Report included changes made to address stakeholder comments received on the Draft Phase 1 Report. The resulting Draft RI Report was issued by DOEE for public review on March 30, 2018. The report included updated versions of the BERA and HHRA. The report indicated that greater than 1E-06 cancer risks (one-in-one million, the lower bound of the risk range) exist in much of the study area for 15 chemicals (total PCB congeners, dioxin-like PCBs, dioxin TEQ, 4,4'-DDD, 4,4'DDE, aldrin, chlordane, dieldrin, heptachlor epoxide, alpha benzene hexachloride [BHC], arsenic, mercury, benzo(a)pyrene, benzo(a)pyrene equivalent (BaPE)[6], and dibenzo(a,h)anthracene) and concluded that sufficient data had been generated from the RI to proceed with the FS. DOEE submitted a final RI Report in December 2019 (Tetra Tech 2019a) which accounted for stakeholder comments received on the 2018 draft.

DOEE issued the Draft River-wide FS for selected stakeholder (Leadership Council for a Cleaner Anacostia River [LCCAR] and Consultative Work Group [CWG] [defined in **Section 3.2**]) review in April 2019. The River-wide FS defined the remedial action objectives (RAO) for the project area and evaluated a range of viable alternatives to meet these objectives on a river-wide basis. In addition, based on the supporting studies discussed in the next section (**Section 2.4.2**), the River-wide FS Report included comprehensive, lines-of-evidence-based evaluation of sources in the upstream, non-tidal watershed. However, based on the complexity of contaminated sediment remediation and uncertainties identified in the CSM (such as the degree to which game fish tissue concentrations are related to sediment concentrations), DOEE proposed that an approach consisting of remediation of contaminant Hot Spots and performance monitoring data collection was the appropriate path forward for cleaning up the river. A Focused FS (Tetra Tech 2019c) was completed to identify, screen, and cost remedial alternatives in support of selecting early actions to address contaminated Hot Spots (the EAAs). Although not covered by the Interim ROD, DOEE views contaminant source control in the upstream watershed as vital to achieving overall cleanup of the river.

2.4.2 ARSP SUPPORTING STUDIES

A number of supporting studies were conducted within and around the study area for various purposes including source characterization, source identification and quantification, and background refinement. Two studies (Manhole Sediment Investigation [Tetra Tech 2019e] and Tributary Study [Wilson 2019]) were performed under the auspices of the ARSP Work Plan and Quality Assurance Project Plan (QAPP) and two were "desk-top" studies (Contaminant Source Assessment Report [Tetra Tech 2019f] and Groundwater Modeling Investigation Report [Tetra Tech 2019g]). To address uncertainties related to the sediment background concentrations defined in the RI, NPS conducted a background characterization effort in the upstream, non-tidal watershed (JCO 2019). This background study was also conducted consistent with ARSP QAPP requirements. Two additional studies supporting the ARSP RI (but conducted under a separate QAPP) are (1) a study reporting the results of passive sampling and caged mussel deployments in the Anacostia River and its tributaries (Ghosh et al. 2019) and (2) a study of PCB and organochlorine (OC) pesticide concentrations in whole body forage fish from the

[6] BaPE: benzo(a)pyrene equivalent concentration is calculated from scaled concentrations of the seven carcinogenic PAHs identified by EPA.

Anacostia River watershed (Pinkney and Perry 2020). Summary descriptions of these studies follow.

- **Manhole Sediment Investigation Report (Tetra Tech 2019e).** This report documents the sampling and characterization of ARSP RI COC concentrations in manhole-accessible sediments in the sewer pipes feeding nine CSS and 20 MS4 municipal outfalls discharging to the study area.
- **USGS Tributary Study Report (Wilson 2019).** This report documents the sampling and characterization of selected hydrophobic chemicals and metals in suspended sediment and bottom sediment samples collected from nine study area tributaries (five major and four minor tributaries) under storm and non-storm flow conditions.
- **Contaminant Source Assessment (CSA) Report (Tetra Tech 2019f).** The CSA consisted of a multivariate factor analysis that objectively and simultaneously considered 73 chemicals from three data sets (tidal river surface sediment, tributary bottom sediment, and manhole bottom sediment) to identify the PECSes and the likely tributaries and municipal outfalls that are active sources of contaminants to the study area water bodies.
- **Groundwater Modeling Investigation Report (Tetra Tech 2019g).** This report documents groundwater modeling evaluations performed at six PECSes for which sufficient data were available to assess the potential for adverse impacts to surface sediment from contaminated groundwater discharge. As indicated in the ARSP Groundwater Modeling Work Plan (Tetra Tech 2018a), modeling will be eventually completed at 13 PECSes and documented in a future version of the Groundwater Modeling Investigation Report.
- **Passive Samplers and Mussel Deployment, Monitoring, and Sampling for Organic Constituents in Anacostia River tributaries: 2016 – 2018 (Ghosh et al. 2019)**. Passive sampling methods were used to measure freely dissolved concentrations of total PCB congeners and other hydrophobic COCs in surface water and surface sediment pore water in the tidal river and its major tributaries. This study also included the measurement of atmospheric concentrations of these contaminants. Study results and data from the USGS Tributary Study were used to generate estimates of: (1) the COC inputs from the five major tributaries to the tidal Anacostia River, and (2) PCB-mass-transfer-coefficient-based inputs and outputs of PCBs from the surficial sediments in the tributaries and study area to the overlying water column and from the water column to the atmosphere. Concurrently, caged mussels were deployed in the five major tributaries to measure uptake of pollutants via filter feeding. Concentrations of PCBs and other organic chemicals reported in Ghosh et al. (2019) for passive samplers and caged mussels were congruent with studies of sediment loading (Wilson 2019) and concentrations in forage fish from the tributaries, discussed below (Pinkney and Perry 2020).
- **Polychlorinated Biphenyls and Organochlorine Pesticide Concentrations in Whole Body Mummichog and Banded Killifish from the Anacostia River Watershed: 2018-2019** (Pinkney and Perry 2020). Forage fish (mummichog and banded killifish) were collected from 12 locations in the study area and three locations in the Potomac River.

This study supports the establishment of pre-early action baseline concentrations of PCBs and organochlorine pesticides in fish species with limited home ranges and relatively short life spans. Given that contaminant concentrations in these fish are in part reflective of contaminant concentrations in surface sediment they are exposed to, this work provides a reference for comparison with forage fish samples that will be collected following sediment cleanup in the EAAs and source mitigation efforts in the upstream, non-tidal watershed.

2.5 PECS ENFORCEMENT ACTIONS

Three PECSes situated adjacent to the Main Stem OU are sites where certain sediment investigations and upland cleanup efforts are currently ongoing and are being performed under various legal agreements. The three sites include the Pepco Benning Road Facility, WGL East Station, and WNY. At a fourth PECS, CSX Benning Yard, upland cleanup is also being performed under separate agreement and, as noted in **Section 1.2**, DOEE is in negotiations with CSX regarding additional sediment investigations. DOEE, NPS, and/or EPA Region 3 have lead or support agency authority over the cleanups being performed at each of these sites. Elevated surface sediment concentrations of PCBs and other chemicals at each site are potential sources of contamination to the study area. DOEE intends for remedies ultimately selected for the PECSes and for other contaminant sources support and compliment remedies selected for the ARSP study area. The following sections summarize site industrial operations and the characterization sampling conducted to identify contaminated sediments at each site. Section 2.6.1 of the ARSP RI Report (Tetra Tech 2019a) provides additional discussion for each site including a summary of contaminant characterization results.

2.5.1 PEPCO BENNING ROAD FACILITY

The Pepco Benning Road facility is located at 3400 Benning Road NE, Washington, D.C. Pepco operated a coal, then oil-fired electric power generating station on the property from 1906 until 2012, when the power station was decommissioned. Pepco began demolition of the power station in 2014 and completed the demolition and removal of the power plant building and related infrastructure in 2015. Pepco currently uses the 77-acre site to manage operations and maintain equipment associated with their electrical distribution system. Several documented PCB, petroleum, and metals releases to the environment occurred between 1987 and 2003 resulting from spills of contaminated oil or leaking equipment. Pepco performed upland cleanup activities in response to each of these releases in accordance with applicable legal requirements. Pepco prepared an RI/FS Work Plan pursuant to a Consent Decree with DOEE that was entered by the U.S. District Court for the District of Columbia on December 1, 2011. After a review and comment period, the Work Plan (AECOM 2012) was approved by DOEE on December 28, 2012. DOEE is the lead regulatory agency at the Pepco site. The Administrative Record for the site is accessible from https://doee.dc.gov/page/pepco-benning-road-facility-plans-and-deliverables.

The Pepco RI was conducted in two phases, with Phase I sampling conducted between 2013 and 2014 and Phase II sampling conducted between 2016 and 2018. Pepco submitted a Draft RI Report in 2015 (AECOM 2015a) that presented the results of the field work performed in 2013 through 2015. Following review and comment by DOEE, Pepco prepared a Work Plan

Addendum in 2016 (AECOM 2016) to guide additional soil, groundwater, and sediment sampling targeted to close remaining landside and waterside data gaps. Following the 2016–2018 field work, Pepco documented the sampling results from both phases of the RI in a Draft Revised RI Report (AECOM 2019).

Sediment samples for Phase I were collected between November 2013 and January 2014. A total of 46 surface sediment and 208 subsurface samples were collected in Phase I. The Phase II sediment investigation was conducted May through June 2017 and included the collection of 22 surface and 158 subsurface sediment samples. The Phase I portion of the Pepco investigation characterized surface and subsurface sediment quality in the near vicinity of the Pepco site. Phase I covered approximately 10 to 15 acres and extended approximately 1,500 feet downstream and 1,000 feet upstream of the site. To address data gaps identified in the initial sediment investigation, Phase II sampling was performed in an enlarged investigation area including the river 1.3 miles downstream and 3.3 miles upstream of the Pepco facility. Phase I surface sediment samples were analyzed for PCB Aroclors, metals, PAHs, and acid volatile sulfide (AVS)/simultaneously extracted metals (SEM). Selected surface sediment samples (up to 20) were analyzed for VOCs, SVOCs, pesticides, polychlorinated dibenzo-p-dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs). In addition, selected samples were also analyzed for PCB homologs and/or PCB congeners and compounds for alkylated PAH fingerprinting analyses. Phase II subsurface samples were analyzed for PCB Aroclors, non-halogenated VOCs, and SVOCs with selected samples also analyzed for PCB congeners, alkylated PAHs, and various forensic constituents.

Pepco documented the results of the RI for the upland (landside) and adjacent sediments (waterside) portions of the Pepco Benning Road Facility in an RI report submitted for public review and comment in September 2019. DOEE approved in February 2020 the Pepco RI Report (AECOM 2020a) with respect only to the landside portion of the site and the 4.2-acre cove bordering the northwestern boundary of the landside area ("Pepco Cove" on **Figure 1.8**). DOEE believes Pepco has not characterized the nature and extent of its contamination to the Anacostia River outside of these areas. Based on statistical evaluation of up-river (predominantly from Reaches 456, 67, and 7) surface sediment concentrations, Pepco estimates a site-specific total PCB congener background concentration or background threshold value (BTV) of 421 µg/kg, which Pepco will use to define an early action cleanup area. Regarding the waterside portion of the site, Pepco concluded that several metals, pesticides, PAHs, and PCBs in sediment adjacent to the site exceed ecological screening levels; highest concentrations were measured in samples from the cove. The primary outfall for the facility and three outfalls not associated with the facility discharge to the cove. In addition to the cove, PCB concentrations in sediment exceed site-specific background concentrations at several areas bordering the site. Pesticides, PAHs, and metals were also elevated in the same general areas as PCBs. Regarding subsurface sediment adjacent to the site, the total PCB maximum concentrations occur at approximately 2 feet below the river bottom, corresponding to sediment deposited in 1963 based on radiometric cores collected to age-date sediment at the site. Pepco will seek to document the full nature and extent of site-related contamination in a forensic report that is currently being prepared and will be submitted to DOEE for review and approval by fall 2020.

Pepco is currently conducting a treatability study to evaluate various sediment remedial options to address elevated PCBs and other constituents in the cove adjacent to the site. Pepco will regard any cleanup action defined for the cove as an early action. Pending DOEE review and approval of the above-mentioned forensic report, Pepco anticipates completing the FS in September 2021.

2.5.2 CSX BENNING YARD

CSX owns and operates Benning Yard, located at 225 33rd Street, SE, Washington, D.C. Benning Yard is an active railroad switching yard. Historically, a portion of Benning Yard was used to store and dispense diesel fuel to locomotives. In 2004, a new office building and parking facility were constructed in the area where fueling operations had previously been conducted. Subsurface hydrocarbon contamination was observed during this construction and, subsequently, it was determined that hydrocarbon-impacted groundwater was seeping into adjacent Fort Dupont Creek, a tributary to the tidal Anacostia River. Although Fort DuPont Creek receives inflows from CSX Benning Yard Outfall 002, it also receives runoff from the remaining portion of the 376-acre Fort Dupont Creek watershed upstream from CSX Benning Yard. Further investigations of the observed hydrocarbon contamination at Benning Yard revealed the presence of a light non-aqueous phase liquid plume in the water table aquifer and, on occasion, the presence of a petroleum sheen on Fort Dupont Creek. In accordance with a Consent Decree executed by CSX and the District and entered by the Superior Court of the District of Columbia on June 17, 2011, CSX conducted sediment investigations in Fort Dupont Creek and the Anacostia River to characterize petroleum constituent and PCB contamination in these water bodies. DOEE is the lead regulatory agency at this site. The Administrative Record for CSX Benning Yard is available at the following web link: https://doee.dc.gov/service/csxt-benning-yard-cleanup-site. In accordance with the Consent Decree, to address the land-side soil and groundwater contamination associated with the diesel release, CSX prepared a corrective action plan for the CSX Yard Office area that included excavating petroleum-impacted soils, installing oxygen releasing compound in trenches at the bottom of the excavated area, and backfilling with clean fill.

CSX conducted a sediment investigation including Fort Dupont Creek and a small portion of the Anacostia River in 2011 (EnviroScience 2013). Surface sediment grab samples were collected at 18 locations on Fort Dupont Creek and 35 locations on the Anacostia River. Sediment core samples were collected at 18 of the surface sediment sampling locations. All samples were analyzed for TPH-DRO (Method 8015), VOCs (Method 8260), SVOCs (Method 8270), metals (Method 6020), pesticides (Method 8081), PCB Aroclors (Method 8082), total organic carbon (TOC) (Method 9060), oil and grease hexane extractable material (HEM), and TPH HEM silica gel treated. Anacostia River samples were also analyzed for 209 PCB congeners (EPA Method 1668) and PAH fingerprinting analyses. The total PAH analyses reported concentration results for 51 PAH compounds and alkylated PAH groups. Surface sediment and subsurface sediment samples were collected. Subsurface samples were collected from the depths of 0.5 to 1.0 foot, 1.0 to 2.0 feet, and 2.0 to 3.0 feet below the river bottom.

Based on the sampling performed in 2011 and documented by EnviroScience (2013), CSX concluded that the Yard Office diesel spill has not measurably impacted sediment in either Fort

Dupont Creek or in the Anacostia River sediments adjacent to Benning Yard. As noted above, off-site impacts from the spill have been mitigated through landside remediation activities completed at the site in 2016. However, DOEE's review of the available data for the landside and waterside suggests that the release of hazardous constituents and petroleum may have occurred in addition to the Yard Office diesel release.

2.5.3 WASHINGTON GAS LIGHT EAST STATION

The WGL East Station Site is the location of a former manufactured gas plant (MGP), which was operated from 1888 to 1948 by WGL. From 1948 to 1983, the plant was operated only for peaking purposes or once a year to check equipment operation. The plant was closed in 1983 and demolition of the plant was largely completed in 1986. Remaining facility oil storage tanks were removed in 1997 (Hydro-Terra 1999). The Site currently covers an area of approximately 18 acres. On September 26, 2012, WGL entered into a Consent Decree with the District, Department of the Interior, NPS, and EPA to conduct additional landside and sediment studies. NPS is the lead regulatory agency at the WGL East Station site in consultation with and with the support of DOEE. NPS maintains an online document repository for the East Station Site at www.nps.gov/nace/learn/management/wgsite.htm. The 2012 SOW addresses the impacts to surface soil and subsurface soil (Operating Unit 1 [OU1]) as well as to groundwater, surface water, and river sediments (OU2). A remedial design/remedial action of OU1 was completed in 2015. An RI/FS work plan for OU2 was approved by NPS and DOEE in 2015 (AECOM 2015b), and the OU1 remedial action construction work was completed in 2015.

Between April and July 2017, WGL collected surface sediment grab samples and sediment cores from 77 near-site locations. Surface sediment samples were collected using a clamshell type sampler (Ponar sampler) and as the top interval of the sediment cores collected at each location (AECOM 2018). In addition, 67 sediment pore water, 19 beneath-the-river groundwater, and 18 surface water samples were collected. Depending on the medium sampled, samples were analyzed for AVS/SEM metals, VOCs, metals, mercury, pesticides, and various forensic compounds.

During the East Station OU2 RI, WGL discovered MGP impacts in soil and benzene in groundwater at the former East Station and the Eastern Power Boat Club (EPBC), the property bordering the eastern side of the East Station OU2 Site. Based on a review of data obtained under the OU2 CD, NPS with the concurrence of DOEE directed WGL to expand the investigation onto the adjacent EPBC property. In accordance with a consent order negotiated between DOEE and WGL, WGL is conducting a separate RI of the EPBC property with scope restricted to potential MGP impacts to soil and potential vapor intrusion in EPBC structures. Sediment and groundwater impacts at EPBC remain under NPS oversight as per the East Station OU2 CD.

WGL submitted a Draft OU2 RI Report (AECOM 2020b) to NPS and DOEE for review in June 2020. Although the conclusions of the RI are currently under agency review, sampling results show that visual indications of non-aqueous phase liquid (NAPL) contamination were observed in river sediment near the sediment surface in the area between the site shoreline (defined by a seawall) and the FNC. In addition, visual and NAPL impacts were observed progressively deeper as distance from the seawall increased. In the area between the site seawall and the FNC, results from a supporting forensic study (conducted in association with the Draft OU2 RI Report) indicate that the PAH signatures in this area are consistent with typical MGP site impacts. Similar to the visual and NAPL impacts, the forensic study shows the MGP impacts occur at progressively greater depths away from the site toward the FNC, with cleaner sediment overlying the MGP-impacted sediment. A second area of sediment impacts is defined adjacent to the District Yacht Club (the upstream property bordering the eastern side of EPBC), which will be further delineated in a pre-design investigation. In addition, sheens are typically observed leaving the site and entering the river at low tide. Pending agency review and approval of the Draft OU2 RI Report, WGL anticipates completing an FS to address sediments impacted by the WGL East Station in 2020.

2.5.4 WASHINGTON NAVY YARD

The WNY is an EPA Superfund Site located on M Street Southeast, near the 11th Street Bridge in southeast Washington, DC. At its largest, the WNY site occupied 129 acres; it was reduced to 63 acres after World War II as the facility's mission transitioned from performing manufacturing operations to providing administrative services. The western 63-acre portion of the WNY site was sold in 1963 to the General Services Administration for redevelopment as the SEFC office park. The southern side of WNY is bounded by the Anacostia River. The WNY waterfront has historically consisted of piers, quay walls, slips, and dry dock facilities. WNY commenced operations in 1799 as a shipyard (CH2M Hill 2011). Throughout its history, operations at WNY have included shipbuilding, ordinance research, ordinance production, naval gun manufacturing, and administrative activities (CH2M Hill 2011). In 1999, the Navy, EPA, and DOEE signed a Federal Facilities Agreement, which defined EPA's and DOEE's oversight roles in the Navy's management and cleanup of sites. The Navy partners with the EPA and DOEE to set priorities and to manage the best course of action for investigations and cleanups.

The WNY consists of 16 OUs with Anacostia River sediment adjacent to the site defined as OU2. Below are listed the various OUs at WNY and the current decision document status for each OU as of the date of this Interim ROD:

- OU 00: SITEWIDE (decision document not applicable)
- OU 01: GROUNDWATER (ROD date September 27, 2019)
- OU 02: ANACOSTIA RIVER SEDIMENT (on-going)
- OU 04: SITE 4 CARTRIDGE CASE SHOP (ROD date September 28, 2004)
- OU 05: BLDG 73 (OU05) (ROD date September 29, 2006)
- OU 06: SITE 6 – HEATING PLANT/POWER PLANT (OU06) (ROD date September 30, 2016)
- OU 08: SITE 8 PAINT & OIL STORAGE (ROD date September 27, 2017)
- OU 10: ADMIRAL'S QUARTERS (ROD date September 18, 2009)
- OU 12: SSA-12 – SITEWIDE FILL (ROD date September 27, 2017)
- OU 13: NFA PHASE II SITES (ROD date December 20, 2007)
- OU 16: SITE 5 – BLDG 73 – GUN MOUNT SHOP (OU16) (ROD date September 29, 2006)

- OU 17: SITE 17 – AUTOMOTIVE MAINTENANCE FACILITY (OU17) (ROD date September 29, 2011)
- OU 21: SITE 21 – BOAT MAINTENANCE YARD (OU21) (no decision document)
- OU 22: SITE 22 – POLISHING & PLATING SHOP (OU22) (ROD date September 30, 2016)
- OU 23: SITE 23 – BREACH MAINTENANCE SHOP (OU23) (ROD date March 11, 2013)
- OU 24: SITE 24 – QUARTERS U (OU24) (ROD date October 14, 2005)

Information on the status of the cleanup progress at the WNY OUs is available at the Washington Navy Yard Clean Progress site.[7]

A discussion of sediment conditions for the portion of the site still designated as the WNY is followed by a discussion of conditions in the former portion of the WNY now known as the SEFC. A “Notification of Hazardous Waste Activity” at WNY was submitted to EPA by the Navy in 1985. In 1998, the WNY was placed on the EPA National Priorities List because of the contamination that was detected in on-site soil and groundwater. In the portion of the river proximate to WNY, the Navy collected 20 surface sediment samples in 2006 and another 39 surface sediment samples in 2009. The results of this sampling and other investigation activities of the near-shore sediments (designated as OU2) are documented in a Final OU2 RI Report (CH2M Hill 2013). The RI was conducted in accordance with a Federal Facilities Agreement established for the site.

Subsurface sediment samples were collected within and near the five piers that extended from the site into the Anacostia River. Samples were collected from depths greater than 0.5-foot below sediment surface (bss) and composited over “middle” depth and “deep” depth intervals. Sediment cores were collected to a maximum depth of 20 feet bss. Sediment density was noted to change at about 10 feet bss, signifying the historical dredging depth. The “middle depth” interval composite samples represent sediments from 0.5 feet bss to the uppermost depth at which the density change was observed (between 5 and 15 feet bss). The deep samples consisted of a grab sample collected from the top 1-foot interval below the density change depth. The middle depth samples correspond to the interval above the typical dredging depth and the deep depth samples correspond to sediment just below the historical dredging depth.

Sediment samples from all depths were analyzed for Target Analyte List metals (Method 6010B), cyanide (Method 9012B), PCB Aroclors (Method 8082), and PAHs (Method 8270_SIM), TOC, and grain size. Selected samples were also analyzed for VOCs (Method 8260), target compound list pesticides (Method 8081A), 129 PCB Congeners (EPA Method 1668A), PCDDs and PCDFs (Method 8290), and AVS/SEM. The total PAH analyses reported concentrations of 31 PAH compounds.

[7] https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.schedule&id=0300031

To address data gaps identified in the OU2 RI Report, additional surface and subsurface sediment samples were collected in March 2016 and March 2018. This sampling included the combined waterfront inclusive of both WNY and SEFC. The results are documented in CH2M (2018) and reported in a pending FS report currently undergoing review by the agencies. Surface sediment samples were collected at 46 locations and 216 subsurface sediment samples were collected from 11 coring locations. Sample locations were distributed on an approximate grid extending from the WNY/SEFC shoreline to the middle of the river and approximately 1,000 feet downstream from the SEFC western boundary. Surface sediment samples were analyzed for 209 PCB congeners (Method 1668C), PAHs (Method 8270D SIM), selected metals (Method 6010A), gamma chlordane (Method 8081B), grain size, and TOC (Method 9060M). All subsurface sediment samples were subjected to PCB screening analyses and from these results, selected samples were analyzed (by the same analytical methods as noted for surface sediment) for total PCB congeners, parent and alkylated PAHs, select metals, gamma chlordane, grain size, and TOC.

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3.0 COMMUNITY PARTICIPATION

Community involvement activities for the ARSP are governed by the ARSP Community Involvement Plan, the latest version of which was released in December 2016 (DOEE 2016). Since the inception of the ARSP in 2013, DOEE's community involvement activities have consisted of releases of factsheets and information online, coordination of meetings with stakeholder groups, enlisting the services of Community Ambassadors, and provision of opportunities for public review of key project documents.

3.1 GENERAL INVOLVEMENT ACTIVITIES

Periodically, DOEE releases factsheets and other similar materials as website posts, social media posts on Facebook and Twitter, or as handouts at meetings to keep the public informed regarding general project status, progress achieved, and any significant developments. DOEE maintains a dedicated website (www.anacostiasedimentproject.com) for posting public meeting announcements and general information, soliciting public input and feedback (for example, public surveys), and providing the repository for the documents comprising the Administrative Record for the project.

3.2 PUBLIC AND STAKEHOLDER OUTREACH

Throughout the project, DOEE seeks public engagement by periodically convening public meetings with various groups of stakeholders and the general public. The meetings include project status meetings for the general public, LCCAR meetings with members and concerned governmental and nongovernmental organizations (selected by the office of the Mayor with DOEE consultation), and Consultative Work Group (CWG) meetings with the various governmental and private entities associated with the PECSes.

Meetings with the General Public. At key milestones prior to issuance of the Proposed Plan, DOEE convened ARSP public meetings to inform the general public of the current status and the timeline for completing the RI/FS, ROD, and overall cleanup of the river. The ARSP public meetings, held between 2014 and 2018, took place in venues close to metro stations and in the communities near the river. Each meeting was announced via the ARSP website, DOEE website, social media, and email notices to stakeholders.

LCCAR Meetings. Established in 2015 by Mayor Muriel Bowser, the LCCAR serves as a multi-jurisdictional advisory group for the project. The LCCAR helps ensure that the project receives the guidance and support to succeed. Its mission has two parts: (1) advise and support the For a Cleaner Anacostia Rivers sediment remediation project, and (2) address ongoing pollution to the Anacostia River from all jurisdictional sources in the watershed (the District, Montgomery County, and Prince George's County). Central to its mission is using the knowledge and influence of members and subject matter experts to help advise and promote the ARSP, contribute to the progress and momentum of the project, and foster collaboration across jurisdictions and different sectors to help ensure project success. The council consists of 20 members comprised of officials from federal, state, and local government, representatives from environmental and other nongovernmental organizations, and representatives of communities adjacent to the Anacostia River. LCCAR members are sworn into service by the Mayor.

Meetings serve to update LCCAR members, stakeholders, and the public on ARSP progress and discuss key decision points necessary to issue the Interim ROD by the legislative deadline of September 30, 2020 and are convened approximately quarterly. LCCAR meetings are generally attended by more than 60 persons, recorded, and open to the general public. The selection of the adaptive management approach for implementing site remedies was a key outcome from these discussions. LCCAR meetings are announced and their proceedings are maintained on anacostiasedimentproject.com and open-dc.gov/public-bodies/meetings.

Community Outreach. DOEE provided grant funding to a nongovernmental organization for ARSP document review, following the model of EPA funding for Community Advisory Groups (CAGs) at CERCLA sites. The purpose of this funding was to provide nongovernmental organizations and the general public with the appropriate technical expertise to review the technical documents developed in support of the overall cleanup approach. DC Appleseed was awarded a document review grant in February 2018 to hire one or more technical consultant(s) to help DC Appleseed, as well as environmental and community organizations and the general public, to better understand the various technical documents being prepared under the ARSP. This grant enabled DC Appleseed to access technical expertise for reviewing ARSP documents, including the Interim ROD. To further assist DOEE in fulfilling some of its community engagement goals under the ARSP, an amendment to this grant was issued in May 2019 that requested DC Appleseed increase outreach to Anacostia Corridor residents in Wards 7 and 8, so that residents better understand the various technical documents being prepared under the ARSP and heighten their awareness of the restoration planned for the Anacostia River. DC Appleseed engaged Community Ambassadors to assist with this outreach.

CWG Meetings. In September 2016, DOEE and the NPS launched the CWG consisting of DOEE, NPS, and various PECS parties that chose to participate. The principal participating members are Pepco, Department of the Navy, DC Water, WGL, Washington Suburban Sanitary Commission, and Prince George's County, Maryland. The purpose of the CWG was to provide a forum for sharing technical information and viewpoints pertaining to the RI, the River-wide FS, and the Focused FS, coordinate efforts to identify additional PECS parties, and initiate a process for allocating costs. The CWG meetings, which in some cases were day-long sessions, provided the opportunity for DOEE to engage with the PECS parties and their consultants in detailed discussions of sampling results, data evaluation approaches, and technical conclusions. From these meetings, DOEE provided clarifications regarding data collection, analyses, and interpretation. The ascertainment of general acceptance by CWG members of the adaptive management approach for implementing site remedies was a key outcome from these discussions. Twelve CWG meetings occurred between September 2016 and August 2018. Beginning in late 2018, to ensure consistency in the information disseminated to the two stakeholder groups, DOEE opened the LCCAR meetings to the CWG. CWG attendees of LCCAR meetings have no formal speaking role. At present, CWG members continue to attend the LCCAR meetings, which take place quarterly.

Federal Partners Meetings. Following the issuance of the draft FS Report (revised later to become the River-wide FS Report) in April 2019, DOEE convened a series of approximately monthly meetings from May through October 2019, separate from the LCCAR and CWG meetings, for Federal stakeholders to discuss implementing an adaptive management approach for the ARSP. The "Federal Partners" meetings included representatives from DOEE and various federal partners including EPA, NPS, USFWS, the Navy, and NOAA. These entities are either responsible for a PECS (Navy and NPS), oversee or assist in regulatory oversight of PECS cleanup (EPA and NPS), or provide support to DOEE regarding investigations and natural resource damage assessment (NRDA) at several PECSes (NOAA and USFWS). The additional purpose of the federal partners meetings was to achieve coordination among these federal entities regarding the performance of PECS risk assessments, background concentration evaluations, and the establishment of appropriate PRGs. The topics covered in these meetings included the Interim ROD approach, results of the NPS background investigation (report issued in 2019), and various RALs for total PCB congeners. Based in part on these discussions, DOEE determined that an interim remedy identifying early remedial actions, source control, and post remedial monitoring to inform an adaptive management decision framework was appropriate.

3.3 PUBLIC DOCUMENT REVIEW BEFORE ISSUANCE OF THE PROPOSED PLAN

The process of public review and comment on ARSP documents is an important component of the project. Each review involves a broad range of stakeholders, including private citizens, non-governmental and governmental organizations, and commercial entities. DOEE solicited public feedback on the following documents before issuance of the Proposed Plan.

- Work Plan: public review from February – March 2014
- Phase 1 RI Report: public review from March – April 2016
- Draft RI Report: public review from March – April 2018

In addition to the above reviews, DOEE released the Draft FS Report (revised later to become the River-wide FS Report) for LCCAR and CWG comment at a special LCCAR meeting held on April 8, 2019. DOEE solicited high-level comments on the document from assembled stakeholders and combined the comments received into a series of comment themes. DOEE then convened LCCAR meetings on May 21, June 13, and August 2, 2019, for an open discussion of each of the comment themes. The themes included the following: adaptive management, Interim ROD/early action, river use/FNC, living shorelines/sediment reuse, NRDA, surface water model, ongoing sources/sub-operable units, reactive capping, background, fish consumption rate, and incomplete data. Views were aired regarding each of these topics. DOEE's decision for an Interim ROD approach was shared with the LCCAR and CWG at the August 2, 2019, LCCAR meeting and was proposed to the general public with the release of the Proposed Plan.

3.4 COMMUNITY INVOLVEMENT ACTIVITIES AFTER ISSUING THE PROPOSED PLAN

The Proposed Plan and supporting documents including the Focused FS Report, River-wide FS Report, Final RI Report, Surface Water Model Report, Manhole Sediment Investigation Report, Contaminant Source Assessment Report, and Groundwater Modeling Report were made available to the public on December 27, 2019. Each of these documents was made available (and are currently available) in the project Administrative Record (www.anacostiasedimentproject.com/library). Also, on December 27, 2019, hard copy versions of these documents were made available at two public libraries, the Francis A. Gregory Neighborhood Library (Ward 7) and Rosedale Neighborhood Library (Ward 6).

A public comment period was held from December 27, 2019, until March 2, 2020. In addition, DOEE convened four public meetings to present the Proposed Plan, explain the interim remedy approach, and answer stakeholder questions. The meetings occurred between January 23 and February 4, 2020, with one held in each of the four wards bordering the Anacostia River and Washington Channel. In all, more than 200 people attended the Proposed Plan public meetings. Each meeting was electronically documented (video and/or audio recordings available for review at www.anacostiasedimentproject.com/library). Representatives from DOEE addressed stakeholder questions, which covered a range of topics including, but not limited to, EAA delineations, risk reduction, adaptive management, the interim remedy approach, and future use of the study area following remediation. Verbal and written comments were collected during the public comment period. DOEE's responses to each of the comments received are included in the Responsiveness Summary, which is Part III (Appendix B) of this Interim ROD.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

Overall goals for cleanup of the river were identified in the River-wide FS (Tetra Tech 2019d). The River-wide FS identified four RAOs to be met upon completion of the final remedial actions for the river. These RAOs are identified in **Section 9.0**. Due to the complexity and uncertainty associated with addressing contaminated sediment, the limited-scope strategy of addressing a portion of the contamination (Hot Spots defined by the EAAs) was determined to be the most appropriate strategy. This Interim ROD describes the early actions that will be taken in 11 EAAs distributed among the three OUs within the DC portion of the river. The early actions target the highest levels of contaminants in sediment in each OU and are expected to be a permanent solution to contaminated sediment in the EAAs in each OU. The early actions are estimated to result in an approximate 90 percent reduction in risk to human health and the environment across the three OUs and will make meaningful progress toward achieving the four RAOs but may not by themselves achieve the RAOs. Additional remedial actions for the remainder of the ARSP study area, and/or modifications to the EAA remedies, and/or source control may be necessary. Remedial actions conducted by PECS parties at their respective sites likely will be necessary and DOEE intends to work with stakeholders at these sites so that overall remediation objectives align.

In addition, while DOEE recognizes that source control is an important factor in addressing overall river cleanup, source control is not directly addressed in this Interim ROD. Successful source control will require close cooperation between DOEE, MDE, and the governments of Prince George's and Montgomery counties, as most of the upstream, nontidal watershed is in Maryland. DOEE, in cooperation with the Council of Governments, established a Source Control Workgroup in April 2019. DOEE meets regularly with MDE technical staff and is coordinating with MDE on source control strategy. However, the early actions described in this Interim ROD are not inconsistent with nor will they preclude any further necessary remedial or source control actions. Instead, information obtained from post-early action remedy performance monitoring data will be used to better inform additional remedy selection decisions and to help determine if the early actions are, in fact, successful in achieving the RAOs.

5.0 SUMMARY OF SITE CHARACTERISTICS

This Interim ROD addresses elevated (greater than the Hot Spot RAL) contaminant concentrations in 11 EAAs that are a subset of the ARSP study area. This summary presents the site characteristics for the entire 185-acre study area and is drawn from the RI and supporting investigations.

5.1 OVERVIEW

The physical setting of the Anacostia River has significantly changed since the 1800s by development and navigational dredging. Section 2.2 in the ARSP RI Report (Tetra Tech 2019a) describes the dredging history of the tidal Anacostia River. Dredge spoils and random fill were used to extend upland areas into the river and adjacent wetlands. Kingman and Heritage Islands were created in the early part of the last century from navigational dredging. Kingman Island separates Kingman Lake from the Main Stem; Heritage Island is in Kingman Lake. Random fill typically consists of building rubble, heterogeneous soils, and other miscellaneous materials. Sediments that comprise the bottom of the ARSP study area range from less than 3 feet thick in the upstream limit of the study area to more than 30 feet in the downstream portions of the Main Stem and Washington Channel OUs. Most of the water comprising the river flow comes from tributaries and outfalls. Tidal influences in the Anacostia River range up to three feet per tidal cycle.

5.2 CONSTITUENTS OF CONCERN

The following COCs pose risk to human health (1E-05 cancer risk level) or the environment (ecological receptors):

- **Total PCB congeners**: the total sum of the PCB congener concentrations detected in a sample. Although there are 209 PCB congeners, because of coelutions (that is, congeners that are undifferentiable in the laboratory using routine methods of analyses), 162 congeners are uniquely defined in the ARSP dataset.
- **Dioxin-like PCBs:** the TEQ calculated from the scaled concentrations of 12 planar, mono-ortho-substituted PCB congeners identified by the World Health Organization as being particularly hazardous to human health.
- **Dioxin TEQ:** 2,3,7,8-TCDD TEQ calculated from the scaled concentrations of 17 individual dioxin and furan congeners.
- **Chlordane:** typically reported as technical chlordane or, for samples for which individual chlordane isomers were reported, the sum of the isomer concentrations.

The cancer risk range established in the NCP of 1E-06 to 1E-04 and noncancer hazards above 1 are the basis for establishing the appropriate risk level targeted by remediation at a CERCLA site. Cancer risks less than 1E-06 and noncancer hazards at or below 1 are considered insignificant and do not require remediation. Cancer risks greater than 1E-04 (one-in- ten thousand) and noncancer hazards greater than 1 are unacceptable and require remediation. Risks within the cancer risk range may require remediation, at the discretion of risk managers. For the purposes of the baseline HHRA documented in the RI Report, chemicals were identified using the conservative end (1E-06) of the NCP risk range (referred to as the "point of departure"). This was done to identify for risk managers the full range of potential chemicals that could require remediation based on their potential to cause cancer at the 1E-06 cancer level in human receptors. There are no chemicals that pose a noncancer hazard greater than one. The following 15 chemicals were identified in the ARSP RI as posing risk to human health at the 1E-06 level and/or to ecological receptors throughout the ARSP study area:

- Total PCB congeners
- Dioxin-like PCBs
- Dioxin TEQ
- Seven pesticides (4,4'-DDD, 4,4'-DDE, aldrin, chlordane, dieldrin, heptachlor epoxide, alpha BHC)
- Two metals (arsenic and mercury)
- BaP, BaPE, and dibenzo(a,h)anthracene

Most of the chemicals were identified as being a risk to human health from the consumption of contaminated fish (for example, dioxin-like PCBs, total PCB congeners, dioxin TEQ, 4,4'-DDD, 4,4'-DDE, aldrin, alpha BHC, chlordane, dieldrin, heptachlor epoxide, mercury, and arsenic). Dioxin-like PCBs, dioxin TEQ, benzo(a)pyrene, and BaPE were also identified as posing risk to human health through direct contact with sediment. The PAH dibenzo(a,h)anthracene was associated with human health exposure to surface water.

For the River-wide FS, Focused FS, and Interim ROD early actions, DOEE defined the human health target risk level at 1E-05, which represents the midpoint of the EPA-defined range of acceptable risk (1E-04 to 1E-06). DOEE selected 1E-05 as the target risk level for the following reasons: (1) compliance with EPA guidance, (2) technical feasibility of achieving protective sediment concentrations, (3) timeliness of remediation, (4) control of contaminant migration into lower concentration areas, and (5) costs.

COCs identified in the BERA for benthic and aquatic invertebrates included dioxin-like PCBs, dioxin TEQ, and chlordane. The ecological risk level was defined using consensus-based probable effect concentrations (defined in **Section 7.2**) in sediment.

For the Interim ROD, four COCs were identified: (1) total PCB congeners (human health), (2) dioxin TEQ (ecological), (3) chlordane (ecological), and (4) dioxin-like PCBs (human health and ecological).

The Proposed Plan noted that BaPE was identified as a COC in the ARSP RI human health risk assessment. However, BaPE does not pose risk to human health at or above the 1E-05 risk level selected for the interim remedial action. Although BaPE is not a COC, concentrations of BaPE within the 11 EAAs will be incidentally reduced by the interim remedial action. BaPE poses risk to human health at the 1E-06 target risk level and may be addressed by future remedial action in the ARSP study area.

5.3 SUMMARY OF SAMPLING RESULTS

The nature and extent of COC contamination is documented in the ARSP RI Report (Tetra Tech 2019a). Other investigations corroborate and expand the conclusions presented in the RI Report (Ghosh et al. 2019, Wilson 2019, Pinkney and Perry 2020).

5.3.1 SEDIMENT

Sediment concentrations of the hydrophobic COCs identified in the risk assessments tend to be inversely correlated to the grain size of the sediment. **Figure 5.1** shows the percentage of silt and clay (defined as particles smaller than 75 micrometers [µm]) in surface sediment samples. Sediment particle size in the Main Stem is sandy at Bladensburg (Reach 7) at the upper extent of tidal influence in the study area. Downstream of Reach 7, the grain size transitions sharply from sandy silt to silt and clay. Most of the Main Stem is dominated by silt and clay with localized sandy deltas where most outfalls and tributaries enter the river. Downstream of the CSX Railroad Bridge, clay is dominant. Sediments in Kingman Lake and Washington Channel are dominated by silty clay, with coarser-grained patches. Surface sediment where concentrations equal or exceed the PRGs for COCs are identified as contaminated.

Figure 5.2 shows the combined footprint of the four COCs (total PCB congeners, dioxin-like PCBs, dioxin TEQ, and chlordane). Geospatial kriging using COC concentrations measured in surface and subsurface sediment was used to estimate the COC concentrations shown on the figures. The kriging approach is discussed in Appendix L of the RI Report (Tetra Tech 2019a). Areas on the maps where COC concentrations are less than the PRG are shaded gray. In areas where the PRG is exceeded, the magnitude of the exceedance is denoted by color, with red indicating the highest concentrations (at least 500 times the PRG) and blue the lowest (1 to 2 times the PRG).The colors represent the highest exceedance of the PRG (among the four COCs) at each point in the kriging grid, so the specific COC represented can vary by location.

Characterizing the nature and extent of contamination resulting from current or historical releases of hazardous constituents from a PECS or other sites in the upstream, non-tidal watershed requires background concentrations for these constituents. Chemical concentrations in environmental media can result from two separate and distinct sources: (1) releases from dispersed “anthropogenic background” sources present in the urban area of greater Washington, D.C. and (2) potential releases from defined locations within the study area and the associated watershed. The term “background” (as used herein) refers to low levels of contamination resulting from the first of these two sources and has the same meaning as the term “anthropogenic background.” EPA (2002) defines anthropogenic background as natural or human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA release in question).

Numerous point sources (regulated sites where hazardous constituents were released) are present in the upstream, non-tidal watershed for the Anacostia River, raising the concern that background defined based on samples from the upstream watershed would not satisfy EPA’s definition of anthropogenic background (that is, the chemical concentrations of these samples would be elevated from site releases). The NPS Tributary Study Report (Johnson Company [JCO] 2019) identified many such sites and is discussed further below. The Potomac River in

Washington, DC, between Chain and Key Bridges, was therefore selected as the reference water body to provide background concentrations for the RI (**Figure 5.3**). Far removed from known releases affecting the study area, this reach of the Potomac River is approximately 4 miles upstream from the confluence of the Potomac and Anacostia Rivers. In addition, it is upstream from the historically industrialized waterfronts of Georgetown and Alexandria yet is still within the heavily urbanized area comprising greater Washington, D.C. The reach of the Potomac River selected is marginally impacted by outfalls (there are two CSS outfalls in the Key Bridge vicinity) as shown in the DC Water link: www.dcwater.com/css.

To address stakeholder concerns that surface sediment COC concentrations in the selected DC reach of the Potomac River might be insufficiently representative of anthropogenic background for the Anacostia River watershed, NPS (JCO 2019) conducted a field sampling effort with the objective of characterizing COC concentrations in surface sediment from five upstream, nontidal tributaries to the study area water bodies. The five tributaries included Northwest Branch, Northeast Branch, Lower Beaverdam Creek, Hickey Run, and Watts Branch. The sampling was performed in December 2018 and the samples were analyzed for mercury, dioxins and furans, pesticides, PCB congeners, alkylated PAHs, TOC, and grain size.

NPS estimated COC background concentrations after the removal of the subset of samples that NPS determined were impacted by site releases. With the removal of the impacted sampling locations and equal weighting of each tributary in the calculation, the resulting background concentration (95 percent upper confidence limit on the mean [95 UCL]) estimate for total PCB congeners is 80 µg/kg. However, based on DOEE's evaluation, if only the data from the top three tributaries responsible for 94 percent of the inflow to the tidal river are considered, the 95 UCL background estimate for total PCB congeners is 19 µg/kg. From the Potomac River samples, DOEE estimated that the background concentration for total PCB congeners is 17 µg/kg, very comparable to the NPS-calculated concentration obtained from the three tributaries responsible for nearly all of the inflow to the study area. The NPS results, therefore, are consistent with the DOEE-estimated background concentration for total PCB congeners obtained from the Potomac River samples.

5.3.2 WATER COLUMN

The ARSP RI included seasonal (spring and fall) wet and dry event monitoring at 24 sampling locations distributed throughout the study area. The sampling was conducted in 2016 and is documented in the ARSP RI Report (Tetra Tech 2019a). TSS concentrations along the main stem suggest active TSS sources from Lower Beaverdam Creek in Reach 67 south to the WGL East Station PECS in Reach 123. Using total concentrations (that is, water concentrations measured without first filtering the sample to remove suspended sediment), total PCB congeners, total PAHs, dioxin TEQ, arsenic, and lead were used as surrogates to qualitatively investigate spatial trends of project constituents. Total PCB congeners and total lead concentrations in surface water exhibited variability similar to TSS. Concentrations of these constituents appear to be related to the elevated TSS. Because concentrations increase near the confluence with Lower Beaverdam Creek, these results suggest that Lower Beaverdam Creek and the other upper-mid-section of the Main Stem tributaries are active sources.

Concentrations of total PCB congeners and total PAHs indicate active sources in Kingman Lake. Concentrations of these two constituents and of dioxin TEQ, arsenic, and lead are generally similar to the Main Stem between Lower Beaverdam Creek and the WGL East Station PECS. Concentrations of these COCs in Washington Channel are lower and less variable compared with the Main Stem and Kingman Lake. Overall, the data suggest that only a limited hydraulic connection exists between Washington Channel and the Main Stem both seasonally and for individual precipitation events.

Studies of freely dissolved PCBs and other contaminants (OC pesticides and PAHs) were conducted to assess the exchange between river sediment, surface water and air for these chemicals (Ghosh et al. 2019). The goals of this study were to accurately measure the freely dissolved concentrations of PCBs and other contaminants that can be directly related to toxicity and bioaccumulation in aquatic organisms in the river and to assess pollutant exchange with the sediment, water, and air. Freely dissolved PCB concentrations in the surface water of tributaries were lower than those in the surface water of the main stem of the Anacostia River, with the exception of Lower Beaverdam Creek, which exhibited freely dissolved PCB levels up to 20 times higher than the concentrations in the main stem of the Anacostia River. Based on these results, Ghosh et al. (2019) estimated PCB-mass-transfer-coefficient-based inputs and outputs between surficial sediments and the surface water column and between the surface water column and the air for the studied tributaries and main stem of the Anacostia River for PCBs, OC pesticides, and alkylated PAHs. The results indicate that these chemicals are discharged from Anacostia River water to the atmosphere (net flux is from the river to the atmosphere). In addition to showing that Lower Beaverdam Creek is a source of PCBs to the river, this study also shows that bottom sediments in the study area water bodies serve as sources and sinks for PCBs to surface water depending on location.

5.3.3 FISH

Samples of fish were collected and analyzed for several purposes during the ARSP RI. Mixed-species composite samples of fish from three feeding guilds were used as measurement endpoints for the BERA. Game fish fillets were analyzed to support estimates of fish consumption risk in the HHRA. To the extent feasible, the two risk assessments made use of shared analytical results. However, the HHRA objectives required evaluation of fish species and body parts typically consumed by people, so the principal focus was on fillets of large species of game fish. It is acknowledged that some individuals may include other parts of the fish in their meals (e.g., fins and skin in deep fried panfish, or heads in soups and chowders). However, the typical preparation of catfish, the most commonly caught fish in the river, is skin-free fillets. Therefore, evaluation of exposure via ingestion of fillets most appropriately represents reasonable maximum exposure (RME) conditions. In the BERA, the fish themselves were assessment endpoints.

In summer 2014, fish were collected by electroshocking from 44 locations in the tidal Anacostia River to support the BERA. Fish were identified to species, counted, and sorted into three feeding groups (forage fish, mid-trophic-level predators, and top predators [game fish]) for whole body chemical analysis. In 2016, additional mid-trophic level and top predator fish samples were collected from two upstream, non-tidal tributaries (Northeast Branch and Northwest Branch) to characterize background fish concentrations in the Anacostia Watershed.

Game fish fillet samples collected from the tidal Anacostia River and Potomac River under the Fish Consumption Advisory program were used in the HHRA to estimate the risk posed to people eating fish from the tidal Anacostia River. Concentrations of chemicals in fillets and whole fish collected for the ARSP RI from the tidal Anacostia River study area were compared with samples from the non-tidal tributaries. Concentrations of PCB congeners and DDT in fish samples from the tidal Anacostia River showed a notable downstream increase. These chemicals were also biomagnified through the food web; concentrations were lowest in forage fish, followed by mid-trophic-level fish, then top predator fish.

PCBs, dioxin TEQ, low molecular weight polycyclic aromatic hydrocarbons (LPAHs), DDT and its metabolites, gamma-BHC (lindane), lead, and a few other chemicals were detected at higher concentrations in mid-trophic-level fish from the tidal Anacostia than in the same species from the upstream Anacostia background area; the greatest difference in concentration was in dioxin-like PCB TEQ, indicating that fish from the tidal Anacostia River contained about 6.6 times the dioxin-like PCB TEQ concentration of similar fish in the upstream Anacostia background. Concentrations of LPAH in fish from the lower Anacostia River (below the CSX Bridge) exceeded concentrations in the non-tidal background area.

Concentrations of PCB Aroclors in whole body fish were higher in the tidal Anacostia River than in the same species from the upstream non-tidal Anacostia River background area, based on the 95 UCL concentrations. In game fish, the 95 UCL PCB Aroclor concentration was 429 µg/kg in whole fish from the tidal Anacostia River and 177 µg/kg in comparable whole fish samples from the non-tidal upstream area. In mid-trophic level whole fish samples, the 95 UCL concentrations were 160 µg/kg in the tidal river and 44 µg/kg in the upstream background area.

It is understood that fish movement patterns vary by species, location, and season. Because no site-specific tagging study was conducted in the Anacostia River, concentrations in whole fish from the tidal and nontidal Anacostia River were compared to test assumptions of independence of the populations of fish in the two regions. Concentrations of most chemicals (Interim ROD COCs in whole largemouth bass and sunfish [*Lepomis* spp.] from the tidal Anacostia River were statistically different from concentrations in the same species from the nontidal upstream background Anacostia River [$p < 0.05$]). Only chlordane was not significantly different in the two datasets ($p = 0.09$ for both fish datasets).

To further investigate the association between sediment and whole fish tissue concentrations, DOEE supported a study by USFWS focused on whole body concentrations of two species of forage fish (mummichog and banded killifish), both of which were included in the ARSP whole forage fish composite samples (RI Table I.2.13). The samples collected for this study (Pinkney and Perry 2020]) were analyzed for PCBs and OC pesticides. Pinkney and Perry (2020) noted variability in PCB concentrations in forage fish between species, sampling locations, and years. Five of the USFWS sample locations were within the ARSP Study Area (the rest were in tributaries outside the RI boundaries). Total PCB concentrations in USFWS single-species fish samples ranged from 214 to 420 µg/kg (banded killifish) and 199 to 486 µg/kg (mummichog).

The range was broader in composite samples of banded killifish and mummichog combined (157 to 552 µg/kg). Concentrations of total PCBs in forage fish samples collected in these same areas (EU-2, EU-3, and Kingman Lake) for the ARSP RI were within the range reported by USFWS, although less variable (310 to 360 µg/kg). Concentrations of PCBs in banded killifish from the Potomac River and the Northwest and Northeast Branches were less than 100 µg/kg, confirming their use as background locations for the ARSP (Pinkney and Perry 2020). The maximum PCB concentrations of 1,100 µg/kg was in whole body samples of forage fish from Lower Beaverdam Creek, although the specific set of PCB homologs in these samples suggest a different source of PCBs in this tributary than in the tidal river and other tributaries (Pinkney and Perry 2020). Concentrations of total chlordane and total DDT were less variable among locations; no single tributary consistently ranked highest.

Concentrations of PCBs and OC pesticides (chlordane and DDT) in forage fish from the tributaries are congruent with passive sampling and caged mussel studies (Ghosh et al. 2019) and sediment loading (Wilson 2019) that identified some but not all tributaries as sources of PCBs in the tidal Anacostia River. For example, total PCB concentrations in forage fish from the Northwest and Northeast Branch were lower, indicating that these inputs to the river do not contain substantial loads of PCBs (Pinkney and Perry 2020). DOEE intends to incorporate similar measures into the post-remediation performance monitoring, as will be detailed in the forthcoming Performance Monitoring Work Plan (PMWP).

6.0 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

The designated uses of the District's waters are summarized in the 2018 Integrated TMDL Report prepared by DOEE (DOEE 2018). Water bodies are classified as fully supporting a use, as having insufficient information to assess if a use is supported, and as not supporting a use. For the Main Stem, although the river supports navigation, it is non-supportive of the protection and propagation of fish, shellfish, and wildlife, human health related to the consumption of fish and shellfish, secondary contact recreation (wading), and aesthetic enjoyment uses. The TMDL Report indicates that *E. coli* (pathogenic bacteria contamination) and total suspended sediment are the causes of nonsupport for primary contact recreation (swimming) use for the Main Stem.

DOEE posted the first fish advisory for human consumption of fish caught in the District's waters in 1993. For the Anacostia River, the current advisory for carp, eel, and striped bass is do not eat for everyone because of PCB levels in the tissues of these fish. Other species such as sunfishes, catfish, and perch are safe to eat but in limited portions, from one to four servings per month, depending on the species (https://doee.dc.gov/service/fishdc).

Current and future uses specific to each OU are discussed below.

An FNC extends through the Main Stem and Washington Channel OUs. The USACE is responsible for maintaining the authorized depth and width of the channel so that commercial river traffic can move freely. Commercial traffic, defined as vessels that transport commodities, no longer uses the Anacostia River and the USACE has informed DOEE that it no longer intends to actively dredge the channel. USACE also informed DOEE that no materials may be placed in the channel that would decrease its depth to less than the authorized depth unless the FNC is modified. DOEE is in the process of seeking modification of the FNC as described in **Section 1.1** and **Section 6.1**.

6.1 MAIN STEM AND WASHINGTON CHANNEL OUS

Current and future use patterns for the Main Stem and Washington Channel reflect the presence of the FNC in these water bodies. The Main Stem OU includes an FNC from the river's confluence with the Potomac River to the upstream end of the OU at Bladensburg Marina in Maryland.

Since the publication of the Proposed Plan, the DOEE has worked with the office of Congresswoman Eleanor Homes Norton (D-DC), the USACE (Baltimore Section and Headquarters), the DC Office of Federal and Regional Affairs, and stakeholders to develop a proposal for partial deauthorization[8] of the FNC in the Anacostia River to modify the

[8] Partial deauthorization consists of changing the lateral dimensions and/or altering the depths of a federal navigation channel and requires Congressional action.

navigational width/depth. As a result of the July 2020 U.S. House version of the WRDA, the proposed modification of the FNC in the Anacostia River is as follows:

Location (Reach)	Final Dimensions	Previous Dimensions
Buzzard Point to 11th Street Bridge	15 feet deep/ 300 feet wide	24 feet deep/400 – 800 feet wide
11th Street Bridge to 200 meters downstream of Sousa Bridge (Station 0+000)	15 feet deep/ 200 feet wide	24 feet deep/200 – 600 feet wide

Areas of the FNC where the authorized depth will remain unchanged include:

- The Washington Channel (24 feet deep/200 feet wide)
- The mouth of the Anacostia River to Buzzard Point (24 feet deep/400 feet wide)
- The area 200 meters downstream from the Sousa Bridge (Station 0+000) to Bladensburg, Maryland (8 feet deep/60 feet wide)

Modification of the FNC of the upper half (approximately 1 mile) of the Washington Channel occurred in 2012[9], where the FNC width was modified from 400 feet wide to 200 feet wide to support development in the Southwest waterfront area (U.S. Congress 2012).

The following discussion of river use is focused on the anticipated depth requirements for future uses for the Main Stem. With the exception of the installation of potential swimming structures and/or more passive infrastructure like sand beaches or wading areas, much of the water body use information is also relevant for future use of the Washington Channel. DOEE has examined several sources of information to determine reasonably anticipated current and future uses of the Anacostia River: (1) USACE current and future dredging plans; (2) a recent study of vessel use as part of the Frederick Douglass Memorial Bridge (FDMB) Project; (3) survey data collected by DOEE on current and future river use expectations; (4) depths necessary for proposed swim platforms and swimming access infrastructure in the District; and (5) the District's comprehensive plan and other District and federal planning documents. The use information from these sources is summarized in the following sections.

6.1.1 USACE DREDGING

The USACE conducted maintenance dredging of the FNC in Anacostia River and Washington Channel every 10 to 12 years between 1938 and 2000. The USACE does not currently perform maintenance dredging. The only current dredging in the Main Stem is near the marina at

[9] Norton Scores Major Victory for Anacostia River in Water Infrastructure Bill. July 2020. https://norton.house.gov/media-center/press-releases/norton-scores-major-victory-for-anacostia-river-in-water-infrastructure

Bladensburg Waterfront Park, which is conducted by the Maryland-National Capital Park & Planning Commission to maintain access to the marina.

6.1.2 FREDERICK DOUGLASS MEMORIAL BRIDGE (FDMB) PROJECT

The District Department of Transportation (DDOT) and Parsons Brinckerhoff conducted an evaluation of Anacostia River use in 2014 to support a project to replace the FDMB drawbridge with a fixed bridge (Parsons Brinckerhoff 2014). The location of FDMB is shown on **Figure 1.7**. The aim was to determine whether the proposed 42-foot vertical clearance of the fixed bridge was sufficient for current and future vessel use.

A first phase of the study documented current vessel population from a review of bridge opening logs from 2002 to 2013 and a survey of potential waterway users, including local marinas, recreational teams, yacht clubs, and independent operators. DDOT also met with the U.S. Navy and the U.S. Coast Guard regarding their use of the Anacostia River near the bridge. A second phase documented actual vessel traffic from video footage of bridge use between July and October 2013.

The study showed that small to medium-sized recreational boats comprised approximately 90 percent of the traffic, including rowing shells and power boats. Other boats observed near the bridge were tugs, barges, kayaks, water taxis, police boats, fire boats, canoes, and sailboats. The study concluded that the 42-foot clearance of the fixed bridge was sufficient to accommodate 99.9 percent of projected vessel use but was insufficient for a handful of U.S. Coast Guard, U.S. Navy, or privately-owned vessels that made at most two trips each year. However, shortly after the DDOT study concluded, DC Sail (www.dcsail.org) moved from the Washington Channel to a pier by Yards Park. DC Sail planned to bring tall ships to their new location, but this would now not be possible with the fixed bridge.

The DDOT study also examined the effects of future development of the Anacostia River on vessel population and concluded that a number of planned developments would likely increase the number of recreational and passenger boats. Such projects include Yards Park, Boathouse Row, Poplar Point, Capital Yacht Club, expansion by American River Taxi and the Potomac River Boat Company, Hill East Waterfront Redevelopment, and enhancement of Marvin Gaye and Kingman and Heritage Island parks. However, an increase in the number of commercial/industrial vessels was deemed unlikely, especially upstream of the FDMB, because the existing land use along the Anacostia River is mostly designated as park land and for recreational use, and the river's navigational channel width and depth are substantially reduced upstream from the 11th Street Bridge. In addition, DDOT met with the U.S. Navy, and the Navy confirmed that operational naval vessels have no current requirement to enter the Anacostia River, but the Navy needs at least 67 feet horizontally and 35 feet vertically to accommodate critical military traffic.

While the FDMB project was concerned with vessel height, DOEE is concerned with vessel draft requirements to select dredging depths that will accommodate reasonably anticipated current and future uses. Accordingly, JCO (JCO 2017a) analyzed the DDOT vessel data and determined the depth necessary to accommodate the types of vessels using the Anacostia River near the FDMB in 2013. JCO concluded that the maximum depth needed to accommodate the vessels observed in the DDOT study was 11.8 feet (for a type of commercial tugboat).

6.1.3 DOEE RIVER USE SURVEYS

DOEE has conducted two river use surveys to determine current and reasonably anticipated future Anacostia River uses. DOEE placed one survey on its website, which had 13 questions about boating and other recreational uses of the Anacostia River[10]. A total of 1,255 participants responded to the survey as of December 20, 2019. Approximately 54 percent of participants said they currently boated on the Anacostia River. Approximately 35 percent said they needed more than 10 feet of depth downstream of the CSX Bridge to support their current and future boating needs, while approximately 47 percent reported needing between 5 and 10 feet. Similarly, approximately 32 percent reported needing more than 10 feet of depth upstream of the CSX Bridge, while 54 percent reported needing from 5 to 10 feet.

Participants also expressed an interest in swimming in the Anacostia River in the future when it meets water quality standards, with approximately 27 percent saying they would swim once a week for an hour and 20 percent saying they would swim once a day for an hour or more. The majority of swimmers said they would like to access the Anacostia via a swimming dock, beach, or swimming platform.

For the second survey, DOEE targeted specific groups and individuals who are known Anacostia River users, including representatives from the DC Water, USACE, Yards Marina, James Creek Marina, Anacostia Riverkeeper, the District Wharf, Potomac Riverboat Company, Entertainment Cruises, and the U.S. Navy, among others. That survey asked respondents what types of boats they used, including the length, weight, draft, and height of the boats, what they used the boats for, their current water depth and width needs, their preferred water depth and width in 10 years, and how far up the Anacostia River they travel, among other questions.

While the majority of the 94 respondents said they needed from 3 to 6 feet in water depth for their current fleet, approximately 20 percent reported needing more than 10 feet. Respondents reported desiring greater water depth in 10 years, with approximately 30 percent saying they would need from 15 to 25 feet; 30 percent needing 10 to 15 feet, and 23 percent needing from 6 to 10 feet. While 60 percent of respondents reported needing from 50 to 100 feet in channel width currently, more than 90 percent reported needing that width or greater in 10 years, with approximately 8 percent needing from 100 to 200 feet; 23 percent needing from 200 to 300 feet; 23 percent needing from 300 to 500 feet; and 15 percent requiring more than 500 feet.

[10] Anacostia River Use Survey. January 2020. https://www.dropbox.com/s/nd1m1yg0iypuuog/ANACOSTIA%20RIVER%20USE%20SURVEY_012220.xlsx?dl=0

In terms of boat draft (the same parameter analyzed by JCO using data from the DDOT study), close to 60 percent of respondents reported a current boat draft of less than 3 feet; 20 percent reported a draft of 3 to 5 feet; just under 10 percent reported drafts of both 5 to 7 feet and 7 to 9 feet; 5 percent reported drafts of 9 to 12 feet; and 2 percent reported drafts of more than 12 feet. While the majority of the respondents view the CSX Bridge as dividing the upper and lower Anacostia and rowers starting in Bladensburg rarely travel below the CSX Bridge, 7 percent of the larger boat respondents would like access to the entire river as part of their future business plans.

6.1.4 ANACOSTIA RIVER POOL INITIATIVE

The Anacostia Waterfront Trust retained SmithGroup to conduct an FS for building a swimming facility on the Anacostia River (SmithGroup 2019[11]). The SmithGroup assessed nine possible locations for a swimming pool: Diamond Teague Park, Poplar Point, the 11th Street Bridge Park, Anacostia Park Pool, Anacostia Park Playground, Anacostia Park Roller Skating Pavilion, Kingman Island near Benning Road, Kingman Lake, and Kenilworth Park north of Watts Branch. SmithGroup evaluated the sites in terms of opportunities for a shallow wading pool or splash pad, general swim area, lap pool, jumping area, and deep dive area. The study also considered proximity to adjacent neighborhoods; access; presence of landside facilities such as open space, parking, restrooms; waterway conditions such as depth and rowing or boating conflicts; and proximity to wetlands or contamination. Diamond Teague Park, Poplar Point, the 11th Street Bridge Park, Anacostia Park Pool, and the Anacostia Park Playground ranked the highest among the sites.

The SmithGroup study does not address water depth or water quality. JCO analyzed the typical depth needed for swimming structures by examining others constructed around the world (JCO 2017b). According to JCO, an FS for a swimming structure on the Charles River in Boston concluded that water must be between 9 and 15 feet deep to avoid contact with contaminated sediment. The Islands Brygge Harbour Bath and other pools in Copenhagen, Denmark, are approximately 15 feet deep; a pool in Bassin de la Villete, Paris, France is a maximum of 7 feet deep; and a proposed pool in New York called The Plus Pool will be a maximum of 10 feet deep.

DOEE is also planning for a swimmable Anacostia River. In August 2012, DOEE created an exception to the prohibition of swimming in the District's portion of the Potomac River and authorizes qualifying special swimming events in the Potomac River for limited amounts of time under limited conditions. This exception was extended to include the Anacostia River in August 2018. Applicants must show water meets DC water quality standards prior to the event.[12]

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[11] https://www.anacostiariverpool.com/

[12] DOEE's Action to Amend the Ban on Swimming in the Anacostia River, 2012 permits swimming in the Anacostia River on certain occasions. Swimming events are permitted if:"(a) A study conducted by the special swimming event organizer shows that the numeric criteria for Class A listed in §1104.8 are being

Except as otherwise provided, primary contact recreation is prohibited in the Potomac and Anacostia Rivers and Rock Creek until such time as the standards for Class A beneficial use (bacterial, pH, turbidity) are consistently maintained.

DOEE has increased its water quality monitoring in the Anacostia River and issued a grant to Anacostia Riverkeeper (ARK) for *Citizen Science Water Quality Monitoring.* In summer 2019 with funding from DOEE, ARK began a citizen science program for weekly water quality monitoring at 22 sites using 85 trained and certified volunteers. The programs continue in summer 2020, with some modifications for COVID-19. Current test results can be viewed on ARK's website[13] or SwimGuide[14].

6.1.5 THE DISTRICT'S PLANNING DOCUMENTS

Consistent with the studies and surveys discussed above, numerous District planning documents expect recreational boating and other river uses to increase in the future, warranting a federal channel depth sufficient to support such activities. In October 2019, the District proposed amendments to its Comprehensive Plan — a 20-year framework for the future planning and development of the District— that contemplate increased boating and recreational use of the Anacostia River (DC Office of Planning 2019). The draft amendments to the Comprehensive Plan for Parks, Recreation, and Open Space Element discuss the need for new aquatics facilities and "[o]ther water-oriented activities, such as river canoeing, kayaking, and fishing." Another revision to the plan is to "[d]evelop additional marine facilities, including rowing centers, appropriately-scaled boathouses, boat slips, and piers along the banks of the Anacostia River as recommended in the [Anacostia Waterfront Initiative (AWI)] Framework Plan."

The District's Office of Planning issued the AWI Framework Plan in 2003 (DC Office of Planning 2003), which detailed five themes aimed at increasing use of the Anacostia River: a clean and active river through environmental restoration; eliminating barriers to the river through infrastructure design; creating a system of interconnected waterfront parks; enhancing cultural destinations along the river; and building strong waterfront neighborhoods through economic development. More specifically, on the east side of the river, the plan contemplated a full refurbishment of the boat ramp at the northernmost reach of Anacostia Park, an enhanced Boathouse Row in the southeastern part of the District, and new boat launching sites at Good Hope Road and at the recreation center in Anacostia Park. On the west side, the plan proposes that existing boat clubs and marinas be enhanced to create a Boathouse Row, potential new marinas at Buzzard Point, and a small boat launch on the eastern edge of Kingman Island. The Seafarers Yacht Club is the oldest Black yacht club in the United States. It has sought

attained; and (b) The other provisions of this section have been satisfied." 59 DCR 32 (Aug. 10 2012), 009470.

13 https://www.anacostiariverkeeper.org/

14 https://www.theswimguide.org/

assistance from the District in recent years to address lack of water depth at its marina. Most of its boats cannot be moved except at the highest tides.

In 2018, the District's Office of Planning published an update to The Anacostia Waterfront Framework Plan: 15 Years of Progress Along the Anacostia River, which reported some success in achieving the 2003 objective of increased Anacostia River use, noting "[r]esidents have been coming back to the river to take advantage of its numerous recreational opportunities, including maritime activities like kayaking, boating, and recreational fishing" (DC Office of Planning 2018).

Additional plans governing District resources also recognize the goal of increased boating on the Anacostia River. The District's Parks and Recreation Master Plan, a long-range plan for the District's parks and recreation resources, envisions development of the riverfront that includes canoe and kayak storage, rentals, launches, and swimming areas (DC Parks and Recreation 2014). Also, the NPS Anacostia Park Management Plan Environmental Assessment, which is the primary guidance document for 15 to 20 years from its issuance in 2017, contemplates the creation of a "natural resource recreation zone" in Anacostia Park abutting the Anacostia River, which would enhance existing conditions on the Anacostia River by providing additional boating opportunities, piers, docks, floating boat tie-ups, ramps, non-motorized boat launches, boat tours, and boat rentals (NPS 2017).

The Main Stem of the Anacostia River is the subject of additional ongoing planning activities. The Council of the District of Columbia introduced the District Waterways Management Act of 2019, which would establish a District Waterways Management Authority (Authority) and the District Waterways Management Commission (Commission). Information on the status of this legislation is available at the following link: https://lims.dccouncil.us/Legislation/B23-0396. This legislation would also focus on future planning for the Potomac River and Washington Channel. The purpose of the Authority and Commission would be to comprehensively plan, manage, coordinate, promote, and advocate for the diverse uses of and access to the District's waterways and adjacent property, and to require the development of a District Waterways Management Action Plan. The Action Plan would include recommendations for safe boating and recreation, property use adjacent to the waterways, interagency and regional coordination, economic growth, safety, transportation on and near the waterways, and opportunities to increase local control.

6.2 KINGMAN LAKE OU

Kingman Lake is a shallow, marshy, oxbow-type water body with downstream and upstream inlets to the Main Stem at approximately 3.5 and 5.5 miles from the mouth of the river. Although an oxbow-type feature, Kingman Lake was constructed in the early portion of the 20th century by dredging and use of the dredged materials to construct Kingman Island and Heritage Island. Benning Road crosses the approximate mid-point of Kingman Lake and effectively divides the lake into an upper portion dominated by wetland areas, mudflats, and isolated areas of open water from a lower portion dominated mostly by open water with more limited mud flats and wetlands. No FNC is present in Kingman Lake, and access of this water body even by shallow draft boats is limited at low tide. Wetland areas and areas of submerged aquatic vegetation within the District are designated as critical resources and are protected. Kingman Lake is the location of several significant wetland and submerged aquatic vegetation areas and serves as habitat to several Species of Greatest Conservation Need.

Kingman Island separates Kingman Lake from the Main Stem and Heritage Island is a small island located in the lower half of Kingman Lake. In 1999, Kingman and Heritage Islands were transferred from NPS to the District of Columbia with the intent that their use be focused on children. The District of Columbia published the Kingman Island and Heritage Island Planning and Feasibility Study Act of 2016 (District of Columbia 2017), a proposal for the use of the islands for educational, environmental, and recreational purposes. This document lays out a vision for the islands and for Kingman Lake that includes the construction of outdoor classroom resources. Channels, floats, docks, walkways, and landing platforms in Kingman Lake are among the resources being considered. The development of these facilities is currently in the planning stage and is envisioned to occur in phases.

7.0 SUMMARY OF SITE RISKS

Based upon the site characterization results presented in the ARSP RI Report, a baseline risk assessment was conducted for the Site to estimate the risks associated with current and future site conditions. Baseline risk assessments (human health and ecological) evaluate the potential adverse effects of site hazardous substances on people and ecological receptors assuming no further actions are taken to control or mitigate exposure to these hazardous substances. The complete HHRA and BERA are in ARSP RI Report (Tetra Tech 2019a) Appendices J and I, respectively.

7.1 HUMAN HEALTH RISK ASSESSMENT

The procedures used in the HHRA are consistent with EPA risk assessment guidance and the NCP with the objective of assessing the full range of potential health concerns. Consistent with Superfund policy and guidance, the HHRA is a baseline risk assessment and therefore assumes no actions (remediation) to control or mitigate hazardous substance releases and no institutional controls (ICs), such as the DOEE fish consumption advisories. Cancer risks and the non-cancer hazard index (HI) were calculated based on an estimate of the RME expected to occur under current and future conditions at the Site. The RME is defined as the highest exposure that is reasonably expected to occur at a site. DOEE also estimated cancer risks and the non-cancer HI based on Central Tendency Exposure (CTE), or average, exposures at the Site. Remedial decisions under the CERCLA program are based on the RME.

The HHRA quantified risks and hazards from three exposure scenarios: (1) fish ingestion by recreational and subsistence adult, adolescent, and child anglers; (2) direct contact with, and (3) incidental ingestion of sediment and surface water by child, adolescent, and adult waders, swimmers, and anglers, and adult shoreline workers. Risk in this discussion is defined as the probability of developing cancer. Cancer risk is characterized as “greater than the risk range” (greater than 1E-04), within the risk range (between 1E-04 – 1E-06), and less than the risk range (less than 1E-06, referred to as the “point of departure”). Non-cancer hazards are based on the HI (equal to the ratio of the potential exposure to the substance and the level at which no adverse effects are expected). An HI (or “hazard”) greater than 1 indicates a need for a remedial response. Hazards less than or equal to 1 indicate that adverse non-cancer effects are not likely to occur.

Risks from direct contact of sediment were assessed by considering only surface sediment in shallow water (defined as low tide minus 1 foot or “fringe sediment”). The rationale for this approach is that only through direct human exposure to fringe sediment could any contacted sediment adhere to a receptor’s skin. Sediment contacted in areas of deeper water would be expected to be washed off, resulting in no chemical absorption. Most fringe sediment occurs in Reach 456, Kingman Lake, and Reach 7, as shown on **Figure 7.1**. Reach 123 has little fringe sediment; Washington Channel has no fringe sediment.

Tables 7.1 and 7.2 present summaries of receptor- and exposure area-specific total risk and hazard under RME and CTE conditions. **Table 7.3** summarizes the RME risk distribution for the four receptor types evaluated in the HHRA (swimmer, wader, shoreline worker, and angler) in the six reaches comprising the study area. **Table 7.3** focuses on cancer risks and denotes risks less than 1E-06 in green, risks between 1E-04 and 1E-06 (within the risk range) in yellow, and risks that exceed 1E-04 in red. The pattern of elevated hazards approximates the pattern of elevated cancer risks (specifically, hazards greater than 1 are generally co-located with risks within and exceeding the risk range); hazards for each scenario and reach are provided in the ARSP RI Report (Tetra Tech 2019a, Appendix J).

Risks are shown in **Table 7.3** for current and future conditions. Current conditions represent the study area "as is," that is, consistent with the currently observed levels of human exposure (fishing, boating, swimming, etc.). Under current conditions, risks determined for each scenario are based on appropriate assumptions reflective of current use patterns. Future conditions represent a greater level of use than current conditions. This assumed greater use level is associated with actions that will improve the health and appearance and related public perception of the river and thus will tend to drive increased human exposure to study area media. Examples of these actions include completion of the Anacostia River Tunnels as part of the Clean Rivers Project, which will reduce harmful bacteriological levels and organized efforts to remove visible trash, waste, oil, and grease, which will improve the river's appearance. Risk calculations for future scenarios, therefore, are based on different assumptions (compared to those used for current conditions) reflective of increased use.

Table 7.3 shows that the fish consumption pathway presents the greatest risks and hazards to human receptors. Total risk to all swimmers, waders, and shoreline workers (based on incidental ingestion and direct contact with sediment and surface water) is within or below the risk range and total hazard is < 1 (Tetra Tech 2019a, Appendix J) for all study area water bodies.

The procedures and inputs used to assess risks in this evaluation are subject to a variety of uncertainties. The main sources of uncertainty include the representativeness of the fish fillet tissue data set (reflecting 2013 conditions) which is small; whether and to what extent future conditions reasonably can be expected to result in greater sediment, surface water, and fish ingestion exposures; and the applicability of the dioxin-like toxicity approach to PCBs.

Regarding game fish tissue, a new sampling round completed in 2017 and 2018 was collected for updating the DC fish consumption advisory (Pinkney 2018). The new data set includes eight composite fillet samples from the Lower Anacostia and eight from the Upper Anacostia. Compared with the game fish fillet samples collected in 2013, tissue chemical concentrations decreased in some species and increased in other species and the overall number of samples is similar; however, the 2018 fish data set showed similar overall fish ingestion results/conclusions as compared to the 2013 Pinkney data set. Thus, the HHRA was not revised to incorporate the 2018 fish consumption advisory dataset. It is expected that additional game fish survey datasets will continue to be provided every three to five years to support DOEE's public fish consumption advisory. These datasets will be useful for documenting existing and predicting future overall trends in game fish in the District but will not replace the site-specific data collected for the ARSP.

To the extent that fish tissue and sediment concentrations are changing over time, uncertainty is introduced by using medium-specific exposure point concentrations based on samples collected as part of or in the same time period as the RI to represent future medium-specific concentrations.

7.2 ECOLOGICAL RISK ASSESSMENT

As part of the ARSP RI, DOEE conducted a BERA to assess potential risk posed by chemicals in sediments and surface water in the absence of remediation, consistent with Superfund policy and EPA guidance. The BERA is Appendix I of the ARSP RI Report (Tetra Tech 2019a).

The BERA considered numerous lines of evidence to characterize risk to ecological receptors and identify ecological risk drivers. Lines of evidence included direct analysis of chemical concentrations in sediment, surface water, sediment pore water, and field-collected animals, as well as laboratory toxicity tests exposing invertebrates and larval fish to surface sediments from the river. Bioavailability of chemicals in sediment was demonstrated under laboratory conditions (*Lumbriculus* and larval fish) and in field-collected invertebrates (snail, clam, crayfish), fish, and snapping turtle. The BERA characterized risks to benthic and aquatic invertebrates, fish, turtles, birds, and mammals, as summarized below and in **Table 7.4.**

- **Benthic and aquatic invertebrates.** Surface sediments in all reaches of the tidal river demonstrated some form of significant direct toxicity to *Hyalella*, *Chironomus*, or both species. Invertebrates in Reaches 123 and 456 exhibited the greatest adverse effects in laboratory toxicity tests. PCBs, dioxin TEQ, and chlordane concentrations in surface sediment exceeded probable effect concentrations for benthic invertebrates in the whole river, but concentrations varied among reaches. Sediment concentrations in Reach 7 were below probable effect concentrations. Some chemicals in surface water and pore water exceeded chronic water quality criteria, indicating risk to aquatic organisms. Multivariate regression analysis did not identify any chemical risk drivers that explained the toxicity test results. COCs (dioxin-like PCBs, dioxin TEQ, and chlordane) were identified based on exceedance of probable effect concentrations in surface sediment and results of sediment toxicity tests.
- **Fish.** Chemicals in surface sediment were shown to be bioavailable to fish. Survival and growth were reduced in larval fish exposed to sediment from Reaches 123, 456, and Kingman Lake. Fish were shown to bioaccumulate PCBs and dioxins throughout the study area. Whole fish concentrations, although variable by reach, were lowest in Reach 7.
- **Turtles.** Available data indicate that turtles in the tidal Anacostia River bioaccumulate chemicals from sediments, surface water, or prey; however, no unacceptable risk was indicated.
- **Birds and mammals.** Available data indicate that aquatic birds and mammals are exposed to little or no unacceptable risk from chemicals in the Anacostia River sediment, surface water, or prey.

Three chemicals for which the 95 UCL concentration in surface sediment exceeded the probable effects concentration by a factor of 2.0 were identified as ecological risk drivers: dioxin-like PCBs, dioxin TEQ, and chlordane. Concentrations of chlordane in sediment exceeded the probable effect concentration for benthic invertebrates in sediment, but toxicity tests did not support a site-specific PRG for chlordane. Instead, DOEE selected the consensus-based probable effect concentration as the sediment PRG. Although the Interim ROD EAAs are designed to address PCBs, risks posed to ecological receptors by dioxin TEQ and chlordane will also be reduced. At DOEE's selected risk range of 1E-05, remediating sediment to achieve human health PRGs for PCBs and dioxin-like PCBs will also reduce exposure of ecological receptors to dioxin-like PCBs, dioxin TEQ, and chlordane (which is not strongly collocated with other COCs). The early action will reduce risk to ecological receptors posed by chlordane in the Main Stem of the river to less than five times the ecological PRG (18 µg/kg), and in Kingman Lake to 2.6 times the PRG. In Washington Channel, which already met the chlordane PRG, the early action will reduce the chlordane SWAC by 40 percent. Given the inherent uncertainty in analytical results for this legacy pesticide, and the preponderance of evidence indicating widespread sources to the river, DOEE considers the substantial reduction in chlordane concentrations in sediment a protective response action for benthic and aquatic invertebrates. The anticipated reductions in chlordane concentrations throughout the tidal Anacostia River will be confirmed during the post-remediation performance monitoring, which will include measures to refine DOEE's understanding of chlordane's residual effect on benthic and aquatic invertebrates.

Concentrations of total PAHs in surface sediment did not exceed consensus probable effect concentrations for benthic invertebrates; however, tumors in resident brown bullhead have been causally linked with PAHs in river sediment (Pinkney et al. 2004, 2009, 2014). Although recent studies report that the incidence of tumors in brown bullhead in the Anacostia River has declined in recent years (Pinkney et al. 2018), measures of effects on fish in the study area may be addressed in the forthcoming PMWP.

8.0 REMEDIAL ACTION OBJECTIVES

Overall remedial goals for this project are to protect human health and the environment from risks associated with exposure to the four COCs in sediment (total PCB congeners, dioxin-like PCBs, dioxin TEQ, and chlordane). Sediment is considered the primary exposure medium for remediation and RAOs focused on sediment. Surface water will not be actively remediated as part of this project however, improvements to surface water quality will be achieved through remediation of sediment in the Anacostia River and DC Water's Clean Water Project.

Four RAOs were developed in the River-wide FS based on results of the HHRA and BERA and consideration of applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) criteria. The RAOs serve as the design basis for the remedial alternatives developed in the Focused FS. The RAOs are meant to be as detailed as possible without limiting the range of possible remedial alternatives. RAO 2 from the River-wide FS is not identified in this Interim ROD. RAO 2 is based on direct contact exposure by people to fringe sediment. However, at the 1E-05 risk level, the RAO has been satisfied and no COCs for human health are identified. The following RAOs from the River-wide FS are identified in this Interim ROD:

RAO 1. Reduce risks associated with the consumption of COCs in fish from the tidal Anacostia River by people with the highest potential exposure.

The RME scenario with the highest risk estimates for the ARSP study area was consumption of fish by subsistence anglers. Carcinogenic and non-cancer hazard COCs identified for this scenario are described in **Section 7.1**.

Meeting this RAO will require that SWACs in surface sediments be reduced to achieve a corresponding reduction in the concentration of COCs in fish. A SWAC is the average concentration of a contaminant applicable to the area of interest. For the ARSP, SWACs are calculated using the Thiessen polygon method, which is based on the division of each reach into a series of polygons. Each polygon is centered on a concentration measurement point and the polygon area is used to weight the concentration at that point in the calculation of the surface weighted average for the reach. For the human health fish ingestion scenarios, the tidal Anacostia River above and below the CSX Bridge represents two separate reaches. However, PRGs will be applied on a whole-river basis in recognition that fish may cross the artificial CSX Bridge boundary.

Fish can be directly exposed to chemicals within the biologically active surface sediments where larval fish are in contact with sediment and older fish purposefully or incidentally ingest sediment and associated chemicals. Fish can be indirectly exposed to sediment-associated chemicals that have been accumulated by algae, invertebrates, and animal prey ingested by the fish. Deeper sediments will not contribute appreciably to these risks unless they are exposed in the future because of dredging, scour, or other disturbances of overlying sediments. In some areas, achieving and maintaining this RAO may therefore include addressing deeper sediments that contain these COCs if they are potentially subject to exposure in the future.

RAO 2. Reduce risks associated with direct exposure of people to surface sediment in shallow water (fringe sediment) in the tidal Anacostia River.

This RAO is satisfied at the selected target risk level of 1E-05 for the interim action.

RAO 3. Reduce risks associated with COCs in sediment to levels protective of benthic and aquatic invertebrates based on direct chronic exposure to surface sediment and surface water.

The BERA concluded that risks to benthic and aquatic invertebrates were above probable effect concentrations, defined as refined sediment ecological screening values (RSV) and other similar benchmarks. Exposure of benthic and aquatic invertebrates to COCs occurs within the biologically active zone, which is generally defined as the top 6 inches of sediment in the tidal Anacostia River. The remedial actions in the EAAs were based primarily on the PRGs for human health at a target risk level of 1E-05 for total PCBs and dioxin-like PCBs. The PRG for dioxin-like PCBs for human health is lower than the PRG for ecological receptors, and will meet RAO 3 as well. Uncertainties regarding the potential adverse impacts of chlordane and dioxin TEQ on ecological receptors will be evaluated in accordance with the forthcoming PMWP and associated data evaluations.

RAO 4. Reduce risks associated with COCs in surface sediment to levels protective of fish based on direct contact with and ingestion of surface water, sediment, and prey.

Achievement of RAO 4 is based on addressing risks to fish by reducing the concentrations of bioaccumulative COCs in surface sediment. It is assumed that reducing concentrations of COCs in the biologically active sediment layer will lead to lower concentrations of COCs in sediment pore water, surface water, and prey consumed by fish, which would in turn lead to reductions in fish tissue concentrations. It is recognized that zero (or nondetect) concentrations in fish may not be achievable for all bioaccumulative COCs.

Ecological RAOs were developed to address the protection of specific ecological receptor groups. RAO 3 addresses protection of benthic invertebrates from direct exposure to sediment and RAO 4 addresses risks of bioaccumulative chemicals to fish. No RAOs were developed for birds or mammals because chemicals at the site were found to pose little to no unacceptable risk to these receptors.

9.0 PRELIMINARY REMEDIATION GOALS AND HOT SPOT RAL

PRGs are concentrations of COCs expected to protect target receptors evaluated in the HHRA and BERA. PRGs were used to evaluate the SWAC for each of the six reaches in the study area to establish reach-specific RALs and the RAL applicable to the study area at large (i.e., the river-wide RAL).

9.1 ESTABLISHMENT OF PRGS

The ARSP PRGs are the risk-based concentrations (RBC) in surface sediment for each COC that will achieve the RAOs. No PRG for sediment was set lower than the regional background threshold value (BTV) for that COC. Sediment PRGs were based on the following factors:

- **ARARs**. No ARARs were used to develop numerical PRGs.
- **RBCs.** RBCs were based on human exposure scenarios or, with regard to ecological receptors, consensus-based, empirically-derived, probable effects concentrations (NPS 2018, EPA 2018a) to protect invertebrate or fish receptors. RBCs are concentrations of COCs in sediment that correspond to threshold risk levels for each human health and ecological exposure pathways. The focus of RBC development is exposure pathways associated with greatest risk to human and ecological receptors. RBCs selected as PRGs form the basis for setting both RALs for sediment and risk-based monitoring and/or post-remediation performance criteria.
- **BTVs**. Sediment samples were collected from the Potomac River about 4.5 to 6 miles upstream of its confluence with the Anacostia River, as discussed in **Section 5.3.1**. Statistical analysis of the background data set occurred after removal of outliers to calculate a set of BTVs for the Anacostia River. Setting numerical cleanup goals at levels below background is impractical because of potential for recontamination from sources unrelated to the site and considerations of cost-effectiveness and implementability.

Both human health and ecological sediment PRGs reflect sediment concentrations expected to reduce risk to target receptors. For human receptors, risk levels are set by EPA guidance and standard exposure inputs. Models and equations are less codified for ecological receptors, but EPA guidance, standard industry practices, and consensus-based probable effect concentrations are available to support the PRGs. PRGs are meant to represent concentrations of chemicals in sediment that are both protective of target receptors and achievable given available remedial technologies and resources.

Sediment RBCs were back-calculated from fish tissue RBCs to address risk related to human consumption of fish. In keeping with EPA guidance, the HHRA characterized risk using a risk level of 1E-06. For the River-wide FS, the Focused FS, and the Interim ROD, DOEE selected the midpoint (1E-05) of the NCP-defined range of acceptable risk for developing the RBCs.

Human health RBCs were defined as the lower of COC concentrations associated with a 1E-05 cancer risk and a hazard quotient of 1. Ecological RBCs were based on sediment probable effects concentrations for benthic invertebrates. These PRGs achieve the appropriate balance between protectiveness and achievability of a remedy.

9.1.1 DEVELOPMENT OF HUMAN HEALTH PRGS

The results of the HHRA are summarized in **Section 7.1**. As shown in **Table 7.3**, exposure pathways and receptors threatened by a significant COC-specific cancer risk or non-cancer hazard related to sediment were: future child, adolescent, and adult waders directly contacting sediment; future child, adolescent, and adult subsistence and recreational anglers; future child, adolescent, and adult swimmers; and current and future adult shoreline workers. The exposure pathway and receptor combination exhibiting the greatest risk across all exposure pathways and receptors considered in the HHRA is potential exposure via fish tissue ingestion. Greatest risks were observed for future recreational and current and future subsistence anglers; the subsistence angler scenarios exhibited the greatest risk.

Fish ingestion-based sediment PRGs were developed for total PCBs and dioxin-like PCBs, which pose risk above the selected human health risk level (1E-05), as described in **Section 5.2**.

The process of deriving PRGs and final cleanup levels for sediment in the Anacostia River requires estimates of the sediment-to-fish-to-human pathway. Human health sediment PRGs were back-calculated from RBCs for fish ingestion to address RAO 1. RBCs for fish were derived by reference to calculated fish tissue risk concentrations for screening levels and RME parameters for subsistence and recreational fishers.

Three methods of back-calculating sediment PRGs are presented. Each method is tailored to a specific fish bioaccumulation and human consumption scenario. Parameters and values used in each method are defined as follows:

(1) Direct Analysis of All Game Fish Fillets (fish representing species and sizes typically targeted by anglers and consumed as fillets)

(2) Direct Analysis of Forage Fish Modeled to Game Fish Fillets

(3) Direct Analysis of Invertebrate Prey and Mid-Trophic Whole Fish.

Sediment PRGs back-calculated by application of the three methods listed above reflect concentrations of COCs in surface sediment expected to result in risks less than or equal to 1E-05 and hazards less than or equal to 1 under the subsistence angler exposure scenario of the HHRA. A subsistence angler, by definition, catches and eats fish opportunistically and ingests a variety of fish species over a lifetime. Therefore, the most representative PRGs for subsistence anglers are those calculated based on all fish from the whole river. Human health sediment PRGs for total PCBs and dioxin-like PCBs, which are based on fish ingestion by subsistence anglers, are summarized in **Table 9.1**.

9.1.2 DEVELOPMENT OF ECOLOGICAL PRGS

The BERA focused on ecological receptors of concern and exposure pathways identified in the CSM. Target receptors were selected as representative surrogates for animals likely to be exposed to chemicals in the Anacostia River study area. Based on results of the BERA, ecological PRGs focused on direct exposure to benthic and aquatic invertebrates (for example, chironomids, amphipods, oligochaetes, clams, mussels, snails, and crayfish).

Three chemicals for which the 95 UCL concentration in surface sediment exceeded the probable effects concentration by a factor of 2.0 were identified as ecological risk drivers and brought forward to the River-wide FS for further evaluation: dioxin-like PCBs, dioxin TEQ, and chlordane.

Ecological PRGs were selected to address RAO 3 and RAO 4. A TBC that influenced the selection of numerical sediment PRGs for the ARSP was the NPS Protocol for the Selection and Use of Ecological Screening Values (ESVs) for Non-Radiological Analytes (NPS 2018), and the EPA Region 4 refined screening values (RSV) (EPA 2018a). The probable effect concentrations provide a basis for the management and reduction of concentrations of COCs in surface sediment and guide sediment cleanup efforts. They include consensus-based effect concentrations that protect the benthic and aquatic invertebrates directly exposed to sediment (and hence apply to RAO 3).

The benthic invertebrate sediment probable effect concentrations are not specifically intended to be protective of fish. However, precedent for extending surface water criteria to fish has been set in the National Water Quality Standards as well as in the NPS (2018) guidance, which recommends applying surface water criteria not just to fish but also to amphibians. In the absence of sediment screening values derived specifically for fish, sediment concentrations protective of the benthic invertebrates are expected to be protective of fish if applied at the level of the SWAC. Therefore, toxicity-based probable effect concentrations for benthic invertebrates were extrapolated as RBCs for fish on an area-wide basis. Performance monitoring will include measures of toxicity to and bioaccumulation in resident fish to assess the strength of this assumption and measure the efficacy of the remedial actions in reducing risk to fish.

Although most benthic invertebrates have limited home ranges, PRGs for benthic invertebrates are considered applicable on a site-wide basis because the unit of protection is the population rather than the individual. Remediation that results in SWACs at or below the RBCs is expected to be protective of benthic invertebrates directly and in their role as prey for fish and other vertebrates, and of fish directly exposed to the sediment.

The RBCs for benthic invertebrates were developed using the preponderance of evidence from three sources: (1) exposure indicated by presence at the site and bioaccumulation in tissues; (2) consensus-based empirically-derived sediment effect levels in NPS (2018) and/or EPA (2018a); and (3) the high percentage of sediment samples exhibiting toxicity to benthic invertebrates. As discussed in **Section 7**, evaluation of site-specific bioassays using two species and five toxicity endpoints did not yield statistically significant relationships that could be used to calculate PRGs. Ecological PRGs for dioxin-like PCBs, dioxin TEQ, and chlordane are shown in **Table 9.2.** Uncertainties regarding the potential adverse impacts of chlordane on ecological receptors will be evaluated during the interim remedy performance monitoring period, as discussed in **Section 1.2** and detailed in the forthcoming PMWP.

9.1.3 SELECTED PRGS

Selected sediment PRGs (1E-05 selected risk level) are summarized in **Table 9.3**. The selected PRG is the lower of the human health and the ecological PRG. The lowest human health PRG for total PCBs was based on fish consumption; total PCBs was not an ecological COC, so the fish consumption PRG was selected. For dioxin-like PCBs, the human health PRG based on fish consumption was lower than the ecological PRG, so the fish consumption PRG was selected. Neither dioxin TEQ nor chlordane was a human health COC at a risk level of 1E-05; PRGs protective of benthic invertebrates were selected as the PRGs for these two COCs. All selected PRGs are greater than their respective sediment BTVs. Comprehensive performance monitoring will evaluate residual post-remediation risks of all COCs (**Section 10.1.6.2**).

9.2 DERIVATION OF THE HOT SPOT RAL

The 11 EAAs addressed by this Interim ROD were delineated based on a Hot Spot RAL equal to 600 µg/kg total PCBs, as discussed in **Section 1.2**.

9.2.1 DETERMINATION OF EAA EXTENT

The PRGs are applied on a SWAC basis within each of the six reaches of the Anacostia River study area. PRGs applied on a SWAC basis require that the average sediment concentration over the applicable reach be below the PRG; in other words, the PRG is applied as an average concentration throughout the reach rather than to an individual point. RALs were developed for each of the six reaches of the river and for the whole ARSP study area (the river-wide RAL). A RAL for a reach is the maximum concentration of a COC that can remain in sediment in order to achieve the PRG for the COC on a SWAC basis. The river-wide RAL is the average of the RALs defined for each of the six reaches. DOEE established the Hot Spot RAL for the early actions that is based on the river-wide RAL.

Since the RAL for each COC and river reach is the maximum concentration remaining once a reach meets the PRG on a SWAC basis, the RAL depends on concentration distribution of the COC and the spatial distribution of the sampling points in the reach. **Table 9.4** shows the PRG and the reach-specific RALs for total PCB congeners. The average RAL across the six reaches was 176 µg/kg, which was rounded to 200 µg/kg to produce the river-wide RAL. A river-wide RAL is necessary to establish an average RAL that accounts for differing conditions across the ARSP study area. The maximum reach-based RAL was 220 (in Kingman Lake and Washington Channel OUs) and the minimum reach-based RAL was 74 (in Reach 7).

The river-wide RAL is the estimated cleanup level that would achieve the PRG on a river-wide basis. Cleanup areas representing 2x, 3x, 4x, 5x, 6x, and 10x the river-wide RAL are presented on **Table 9.5 and Figure 9.1**. Although the estimated risk reduction is subject to a number of assumptions and uncertainty, the risk reduction calculation can be used as a net estimate of reduction achieved by a given RAL. **Figure 9.1** shows a steady increase in risk reduction from 6x to 5x to 4x to 3x the RAL. However, between 3x and 2x the RAL, essentially no additional risk reduction is achieved. At the same time with the decrease in RAL multiplier, the cleanup area and associated cost steadily increases at an increasing rate. The estimated cleanup acreage varies between 3 acres to 84 acres. The cleanup acreage increases sharply between 3x the river-wide RAL (52 acres) and 2x river-wide RAL (84 acres) (these areas do not include “buffering;” see Part III, Responsiveness Summary, Section 3.6.1 for additional discussion). Additional expense associated with the increase in acreage associated with the RAL below 600 µg/kg PCBs is not justified by a commensurate reduction in risk. **Table 9.5** and **Figure 9.1** support the selection of 600 µg/kg PCBs as a reasonable and appropriate EAA cleanup level. Based on this break point in the acreage, the cleanup area for 3x the river-wide RAL (600 µg/kg) was determined to be the optimal cleanup level for EAAs to achieve significant risk reduction and control migration of contamination while maintaining consistency within adaptive management principles.

9.2.2 ESTIMATED RISK REDUCTION FOR ESTABLISHED EAA EXTENT

To support the establishment of the extent of the EAAs, DOEE estimated the risk reduction that would be achieved in each OU. The calculated risk reductions are based on OU-based SWACs and therefore apply across each OU (Main Stem, Kingman Lake, and Washington Channel) in their entirety. PCB concentration reductions as a result of the cleanup of the EAAs in each OU were estimated by removing the concentrations (as represented by Thiessen polygons) greater than the Hot Spot RAL, then recalculating the SWAC for each OU. The difference in the pre- and post-remediation SWAC is the concentration reduction (on an OU-wide basis) achieved as a result of the early actions. **Table 9.6** shows the pre- and post-remedy SWAC concentration reductions and the pre- and post-remedy risk reductions for each OU.

The risk reduction from the early actions in each OU was calculated from the SWAC reductions achieved from the 600 µg/kg Hot Spot RAL. Post-EAA risk levels for PCBs were calculated by dividing the post-EAA SWAC by the modeled fish-to-sediment adult subsistence angler PRG for PCBs at the target risk level of 1E-05 and then by multiplying this quotient by the target risk level (1E-05). This approach for risk reduction estimation assumes the following:

- The early action remedies will reduce concentrations of PCBs below detection levels or block biological exposure pathways to PCBs in the EAAs (a simplifying assumption; following carbon amendment application, benthic organism uptake of hydrophobic contaminants is reduced by 70 to 90 percent [Patmont 2014])
- Source control in upstream, non-tidal watershed will be effective
- The early action remedies will reduce PCB concentrations in pore water in surface sediment
- The concentration reductions achieved in the OU are based on the existing dataset and are accurately reflected in the calculated post-remediation SWAC

As shown by **Table 9.6**, the SWAC reductions in each OU translate to estimated risk reductions of approximately 90 percent across the study area.

10.0 DESCRIPTION OF EARLY ACTION ALTERNATIVES

CERCLA Section (§) 121 (42 *United States Code* [U.S.C.] § 9621) and D.C. Code § 8-634.01 require remedial actions to be protective of human health and the environment, comply with federal and state requirements determined to be ARARs unless a waiver is justified; be cost-effective, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. CERCLA § 121(b)(1) and D.C. Code § 8-634.01(e) also establish a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site.

During the initial development and screening of alternatives, several potentially applicable remedial technologies or process options for addressing COC-contaminated sediments in the ARSP study area were identified for each OU and evaluated based on effectiveness and technical implementability. Retained technologies for each OU were then assembled into alternatives and further evaluated in a second screening process based on the assessment of effectiveness, implementability, and cost. Detailed descriptions of technologies, process options, and the remedial alternatives for addressing the contamination associated with the Site can be found in the Focused FS Report (Tetra Tech 2019c).

10.1 DESCRIPTION OF ALTERNATIVE COMPONENTS

DOEE considered a broad range of general response actions (GRA), technologies, and process options used successfully or considered at similar contaminated river sediment sites. The remedial alternatives developed for the EAAs are consistent with the remedial alternatives developed in the River-wide FS. This section reviews sediment remediation technologies screened and identified as suitable in the River-wide FS and presents remedial alternatives for the EAAs in the Main Stem, Washington Channel, and Kingman Lake.

10.1.1 CONTAINMENT

Containment through capping involves physical isolation or immobilization of contaminated sediment. An engineered cap or barrier requires no natural processes to augment the cap, which is typically thicker than the thin layer cap used in enhanced monitored natural recovery (EMNR) (discussed below). An engineered cap can incorporate specific granular material or armoring to resist erosion and scour. The ARSP surface water model was used to assess the stability of a sand cap placed over broad portions of the Main Stem. The model assumed a 100-year storm isolated over the Anacostia River watershed and non-storm flow conditions in the Potomac River. A storm such as this presents a worst-case scenario since the hydraulic gradient in the Anacostia River will be large, resulting in high flow velocities and scour potential in the Main Stem. Model results indicate potential substantial but localized scouring, suggesting that specialized cap designs augmented by armoring would be necessary in some areas. Each EAA will be evaluated during design to determine the most suitable material for a containment system.

Conventional Sand Cap. An engineered sand or granular cap can be effective in preventing direct contact of receptors with contaminated sediment. It is most effective for immobilizing contaminants such as PCBs that are readily adsorbed to sediment. A sand cap would become effective immediately upon placement, providing a clean substrate for colonization by biofilms and benthic infauna. A sand cap would be most effective in areas protected from high-energy forces such as water flow or propeller wash.

Armored Cap. Like a sand cap, an armored cap may consist of sand or other granular material, but large rock or engineered barriers are placed on top to resist erosion in high-energy areas. Most types of armoring would provide little to no opportunity for survival of benthic infauna, although biofilms, algae, and some invertebrates could attach to the armor material.

Reactive Cap. Reactive caps include a thin, chemically active adsorption layer, such as activated carbon or organoclay, with a sand, granular, or armored cap. The reactive agents can prevent the migration of contaminants into the overlying sediment and water column. Reactive caps have been used effectively to remediate moderate to high concentrations of hydrophobic organic chemicals such as PCBs; examples include the Grasse River in Massena, New York, and Hunters Point in San Francisco, California (Patmont et al. 2015). Reactive caps are more costly than other types of caps; they also pose installation challenges, particularly in the deeper portions of the tidal river.

10.1.2 MONITORED NATURAL RECOVERY AND ENHANCED MONITORED NATURAL RECOVERY (EMNR)

Monitored natural recovery (MNR) generally relies on natural physical, chemical, or biological processes to reduce risk by reducing bioavailable COC concentrations or diminishing the exposure pathway to COCs. The natural processes include physical burial from sedimentation, biological degradation through chemical breakdown by naturally occurring microbes, and chemical degradation such as sequestration or transformation. EMNR generally relies on the same natural physical, chemical, or biological processes as MNR, with the addition of some active management or alteration to enhance the natural processes. EMNR is usually used as a stand-alone remedy when it is expected to meet RAOs within a timeframe considered reasonable compared to other response actions (EPA 2005). Based on sedimentation modeling and analysis of deposition completed as part of the River-wide FS, of the 11 EAAs addressed by this Interim ROD, only those in Kingman Lake are in suitable locations for EMNR.

Thin-layer cap placement (TLCP) consists of the addition of a thin cap in areas where natural processes are not sufficient for achieving RAOs within an acceptable timeframe. The thin cap could consist of sand, sand mixed with an amendment such as activated carbon, or an amendment alone. The partial cap augments natural processes to sequester or degrade contaminants in the sediment.

Direct application of activated carbon to surface sediment can reduce the bioavailability of COCs in a short period, allowing other physical and biological processes to complete natural recovery through sequestration or degradation. Several recent projects demonstrate the technical and cost-savings advantages of applying activated carbon directly to the sediment (e.g., Environmental Security Technology Certification Program [ESTCP] [2019] and references within). Very shallow areas or wetlands where placement of material may adversely affect ecological habitat function may be suitable for amendment addition alone.

10.1.3 SEDIMENT REMOVAL

Sediment removal from hot spots has the advantage of reducing the mobility and volume of contaminated mass within the system. The resulting mass reduction benefits the river system. However, complete removal of sediment from the site to achieve residual concentrations below clean-up goals may be physically infeasible or economically prohibitive. Although complete removal typically allows immediate unrestricted use of the site, it can result in destruction of benthic communities and wetland habitat in the short term.

Selective removal (i.e., selective dredging) offers many of the benefits but fewer adverse effects than complete removal. Selective dredging can be used in combination with other remedial actions to achieve target water depths and river bottom conditions. For example, selectively dredging shallow areas before placing a cap would maintain water depths necessary to reduce erosion of the cap and support current use of the river (i.e., boating).

Removal technologies can be used to rapidly reduce the overall risk at a site by eliminating the most contaminated sediments; in some cases, selective removal can create conditions that favor follow-on MNR. The material removed from the river would be managed by off-site disposal.

Hydraulic Dredging. A hydraulic dredge uses a cutterhead to agitate the surface sediment, which is then pumped through a suction hose as a slurry (e.g., 10 percent solids) to a barge or a land-based dewatering or disposal facility in the vicinity. Booster pumps can transport the slurry up to several miles. Environmental hydraulic dredges typically have an 8-to-12-inch intake pipe that can remove 50 to 150 cubic yards (CY) of sediment per hour. Because of the low solids content, up to one million gallons of water per day can be generated from the dredged sediment. On-site sediment dewatering capability, a water treatment system, and a NPDES discharge permit allowing release of the treated water back to the river would be required for this action to be cost-effective. Hydraulic dredging is feasible at all the EAAs.

Mechanical Dredging. A mechanical dredge operates from a floating barge by deploying a clamshell or bucket to collect sediment. Environmental buckets are designed to release trapped water as the bucket is lifted, then sediment is dropped into an adjacent barge. The loaded sediment barge is moved to an unloading facility for dewatering. Alternatively, water is added to make a slurry that is then pumped to a wastewater facility. An environmental mechanical dredge produces a slurry with substantially more solids than a hydraulic dredge, reducing water treatment costs. Mechanical dredging can remove between 2 to 18 CY of material with each lift (100 to 300 CY per hour). This type of dredge typically requires more turbidity control and a larger area for support vehicles to operate. Mechanical dredging is feasible at all the EAAs.

Dry Excavation. Dry excavation is typically limited to nearshore sediments exposed at low tide. A common land excavator equipped with a sediment bucket can remove 500 to 1,000 CY per day (50 to 100 CY per hour). Excavated sediment would be stockpiled near the excavation or placed directly on trucks for transport either to a second staging and dewatering area or directly to a disposal site (if water content is sufficiently low). Most excavated sediment would likely require dewatering prior to transport and disposal; dry excavation is feasible only in Kingman Lake.

10.1.4 DISPOSAL

Off-site disposal at a commercial disposal facility involves transportation of dewatered dredged material to a licensed landfill. A determination will be made at the time the dredged material is generated as to the appropriate type of off-site disposal facility it should be disposed in. Based on the data generated in the RI, the dredged sediment is not expected to be Resource Conservation and Recovery Act hazardous or a Toxic Substances Control Act waste; therefore, a Subtitle D landfill will likely be adequate for off-site disposal. Sufficient landfill capacity in the study area vicinity of Washington DC and neighboring states of Maryland and Virginia, exists to support this option. Once the sediment is dewatered and meets the landfill's waste acceptance criteria, it would be transported by truck or rail to a landfill. Management of water removed from the sediment would likely require construction of a dewatering and water treatment facility. Sediment transported over roadways must be cohesive and not generate free liquids. To meet this requirement, the sediment may require treatment with amendments.

10.1.5 INSTITUTIONAL CONTROLS

ICs are administrative and legal instruments designed to minimize the potential for human exposure to contaminants and protect the integrity of a response action. Such controls are typically used in conjunction with other active remediation technologies to achieve the final remedy. For example, an IC may restrict future dredging in areas where contaminated sediments have been capped as part of the remedy. In some cases, ICs are implemented as interim measures to reduce risk until the final remedial action is selected and implemented. Although the interim remedy will substantially reduce risk and control migration of contamination, the river-wide SWAC will likely continue to exceed the PRGs and reach-based RALs (see **Section 9 and Section 10**); therefore, current ICs such as fish consumption advisories will remain in effect during the implementation period as a risk reduction measure.

The following process options would be easily implemented and cost effective:

Administrative Controls. Administrative ICs include fish consumption advisories, swimming prohibitions, community outreach, educational outreach, and other means to restrict certain activities and uses. Administrative controls were retained because they can be effective in informing the public of hazards associated with contaminated sites.

Legal Controls. Legal ICs include waterway and land use restrictions, permit limits, property covenants, and deed restrictions. Legal controls were retained for their potential effectiveness in some areas; however, without fences or barriers to limit physical access to public lands, legal controls alone may not be effective.

Enforcement Tools. Like legal controls, enforcement tools may have limited effectiveness in public areas. Nevertheless, enhanced enforcement is retained as an IC because they may be effective in some areas.

10.1.6 MONITORING REQUIREMENTS

Following each of the planned early actions, remedy efficacy in each OU will be assessed in accordance with a PMWP that will be prepared following issuance of the Interim ROD. DOEE will seek stakeholder consultation on the PMWP which will document the media, sampling locations, laboratory analyses, and “trigger criteria” that will be used to (1) define baseline (pre-remedial) COC concentrations in each medium and (2) measure the performance of the remedy in accordance with the adaptive management decision framework defined in Section 4 of the River-wide FS Report. DOEE anticipates that the draft PMWP will be completed in late 2020.

DOEE will develop the PMWP in accordance with state-of-the-science methods and best industry practices and with periodic stakeholder consultations. The PMWP will be posted on www.anacostiasedimentproject.com/library.

BASELINE MONITORING

Monitoring of various environmental media will occur before the performance of the early actions (baseline monitoring). More targeted monitoring will occur following the early actions to assess progress toward RAOs (performance monitoring). The objective of baseline monitoring is the documentation of starting conditions in the study area before any active cleanup actions occur. With broadly distributed sampling, baseline monitoring will establish this synoptic concentration dataset for surface sediment, surface sediment pore water, surface water, and various tissues; remedy-induced reductions in COC concentrations will be determined relative to baseline levels. In addition, baseline data collection will include a sitewide bathymetric survey. Baseline bathymetry will provide a physical reference against which DOEE can compare to the previous site-wide 2013 survey (and bathymetric data collected by others) to measure sediment scour and deposition in the study area on a gross level.

Baseline sampling locations will be selected to broadly characterize COC concentrations in the media to be tracked during performance monitoring. Specific sampling locations will be defined in the PMWP. In addition to surface water, surface sediment, surface sediment pore water, water column and benthic invertebrate tissue, forage fish and game fish tissue concentrations will also be documented in the baseline monitoring. The specific game fish to be included in baseline sampling will be defined in the PMWP.

PERFORMANCE MONITORING

Performance monitoring will be conducted in accordance with the PMWP. Performance monitoring will include multiple media monitoring and will provide the data that will support the project’s adaptive management decision framework shown in **Table 10.1.** The adaptive management decision-making framework and its relationship to the four RAOs, which are presented in **Section 8,** incorporates the following five elements:

- Key indicators (for example, game fish fillet or organ tissue, forage fish whole body or organ tissue, benthic invertebrate tissue, surface sediment, surface sediment pore water, surface water, and others) relevant for assessing progress toward ARSP RAOs
- Monitoring and sampling activities
- Data interpretation methods
- Trigger criteria that will indicate progress toward attainment/nonattainment of an RAO. The trigger criteria will include direct comparison to project-specific criteria (for example, RALs), benchmark-type criteria (for example, Washington, D.C. fish tissue advisory concentration limits, national consensus ecological effects levels), and percent reductions in measured COC concentrations

- Potential follow-up actions

The PMWP will include the above decision framework and detailed information necessary to support adaptive decision making. As shown in **Table 10.1**, possible actions that could be taken if RAOs are not achieved in an acceptable timeframe range from relatively limited (for example, continuation of performance monitoring and ICs) to moderate (for example, additional cleanup actions or more focused source tracking and control in the upstream watershed) to extreme (for example, recalculation of PRGs). **Section B.3.1** in the Responsiveness Summary provides details regarding the ways DOEE will use adaptive management to implement the Interim ROD. Continued monitoring will provide the data necessary to detect and confirm trends and percent reduction of COC concentrations in various media. If concentration trends indicate that RAOs will be achieved within the "acceptable timeframe," DOEE will begin the transition from Interim to Final ROD. The ARSP PMWP will provide an outline and details for the decision process, including the definitions of the aforementioned trigger criteria ("acceptable timeframe" to achieve cleanup and "percent COC concentration reduction" indicative of acceptable cleanup progress). DOEE will seek stakeholder consultation in the overall preparation of the PMWP.

10.2 DESCRIPTION OF EARLY ACTION REMEDIAL ALTERNATIVES

Remedial alternatives were developed for the EAAs in each OU in accordance with applicable regulatory guidance including *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA 1988), *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005), and other applicable guidance. Each alternative was assembled from the retained GRAs, technologies, and process options.

10.2.1 MAIN STEM OU EARLY ACTION AREAS

Four remedial alternatives were evaluated for the Main Stem OU EAAs. The combined surface areas of the Main Stem EAAs is 44.1 acres (**Figure 1.9**). The Main Stem OU EEAs include some acreage within the current FNC. Modification of the FNC is contained in the WRDA of 2020 that passed the US House of Representatives in July 2020. The modifications being sought for the FNC are described in **Sections 1.1 and 6.1**. The evaluation of alternatives in the Main Stem OU assume the necessary deauthorization/modification has been completed. Other than the No Action alternative, only MSHS-4 is carried forward because of cost and implementation constraints associated with the other alternatives. Area and volumes in each alternative are based on results of the RI and will be updated based on pre-design sampling.

ALTERNATIVE MSHS-1 – NO ACTION

The NCP requires evaluation of the no action alternative to serve as a baseline for comparison with the other remedial alternatives. Under the no action alternative, nothing would be done to alter the conditions described in the ARSP RI Report (Tetra Tech 2019a). Any natural recovery would not be monitored.

ALTERNATIVE MSHS-2 – DREDGING AND DISPOSAL IN A COMMERCIAL LANDFILL

Alternative MSHS-2 is complete removal of all surface sediment containing COCs at concentrations exceeding the Hot Spot RAL within each EAA in the Main Stem, and disposal of that sediment at an off-site landfill. The estimated dredge volume is 475,000 CY, using the surface area of the EAAs and the average removal depth calculated in the River-wide FS (Tetra Tech 2019d). Sediment would be removed by mechanical and/or hydraulic methods, dewatered, and transported to a disposal facility. Structures and habitats in the removal footprint would be protected or removed and replaced. Alternative MSHS-2 was not carried forward into the detailed evaluation of alternatives due to concerns over implementability (including uncertainty about the extent of contamination in deeper sediment that would be exposed), short-term effectiveness (including effects associated with large-scale transportation, construction, and materials management), and high cost (estimated to be more than $125 million to implement this alternative) relative to other alternatives (Tetra Tech 2019c).

ALTERNATIVE MSHS-3 – CONTAINMENT

This alternative involves placement of an approximately 12-inch-thick containment cap over all EAAs. For the 44.1 acres of Main Stem OU EAAs targeted for remediation, 71,000 CY of sand will be required. The sand cap would be placed either mechanically or hydraulically, depending on site conditions. Opportunities to minimize the thickness of the installed sand cap through addition of reactive amendments and the need for armoring in high scour areas will be evaluated in the design phase. Alternative MSHS-3 was not carried forward into the detailed evaluation of alternatives due to concerns over implementability (placement of a sediment cap will result in a final sediment elevation higher than permitted by current and reasonably anticipated future use assumptions) (Tetra Tech 2019c).

ALTERNATIVE MSHS-4 – CONTAINMENT WITH SELECTIVE DREDGING AND DISPOSAL

This alternative is similar to MSHS-3 with the addition of selective dredging before placement of the containment cap. Dredging would be required in the EAA at RW-HS-FNC-456d to meet the final sediment elevation dictated by the current and reasonably anticipated future use of the river and maintain the FNC. The average sediment elevation at RW-HS-FNC-456d is -4.5 feet mean low-low water level (MLLW). The final sediment elevation in RW-HS-FNC-456d is -8.0 feet (MLLW), which will require removal of 4.5 feet of sediment over the 2.1-acre area, or 15,250 CY. All EAAs would then be capped with approximately 12 inches of sand. The dredged sediment will be disposed off-site in the same way as Alternative MSHS-2. Alternative MSHS-4 was retained for detailed analysis.

10.2.2 KINGMAN LAKE OU EARLY ACTION AREAS

Four remedial alternatives were described and screened for the Kingman Lake OU EAAs. The combined surface area of the Kingman Lake EAAs is 6.2 acres. Kingman Lake is very shallow; large areas of mud flat are exposed at low tide.

ALTERNATIVE KLHS-1 – NO ACTION

The NCP requires evaluation of the no action alternative to serve as a baseline for comparison with the other remedial alternatives. Under the no-action alternative, nothing would be done to alter the conditions described in the ARSP RI Report (Tetra Tech 2019a). Any natural recovery would not be monitored.

ALTERNATIVE KLHS-2 – DREDGING AND DISPOSAL IN A COMMERCIAL LANDFILL

Alternative KLHS-2 is complete removal of all surface sediment containing COCs at concentrations exceeding the Hot Spot RAL, and disposal of that sediment at an off-site landfill.

The estimated dredge volume is 50,000 CY from excavation to an average depth of approximately 5 feet over the EAA, based on the surface area of the EAAs and the average removal depth in Kingman Lake in the River-wide FS (Tetra Tech 2019d). Sediment would be removed by mechanical and/or hydraulic methods, dewatered, and transported to a disposal facility. Additional sampling would be required to verify removal depth and volume with potential escalation of volume and costs. Alternative KLHS-2 was not retained for detailed analysis due to concerns over effectiveness (including potential mass-scale disturbance of natural habitat) and high cost (estimated to exceed $13 million) relative to other alternatives (Tetra Tech 2019c).

ALTERNATIVE KLHS-3 – EMNR WITH DIRECT APPLICATION OF ACTIVATED CARBON

This alternative involves direct placement of activated carbon over 6.2 acres. The activated carbon is a preliminary estimate based on the initial studies by ESTCP (2019) and would need to be confirmed in the design phase. The activated carbon will sequester PCBs desorbed into porewater from deeper contaminated sediment. The activated carbon can be applied using conveyors or spreader systems to reach shallow inaccessible areas. The activated carbon gradually mixes into the surface sediment though natural processes with minimal increase in sediment surface elevation. Alternative KLHS-3 was retained for detailed analysis (Tetra Tech 2019c).

ALTERNATIVE KLHS-4 – CONTAINMENT BY TLCP WITH SELECTIVE DREDGING AND DISPOSAL

This alternative involves removing sediment from the Kingman Lake EAAs followed by placement of a thin-layer 6-inch sand cap over sediment remaining in place that exceeds the RAL. Dredging two feet over 6.2 acres (i.e., 20,000 CY) will remove surface sediment with higher concentrations of PCBs and allow conventional cap placement equipment to access the area. Removal depths will be confirmed during the design phase. Following removing of the surface sediment, approximately 5,000 CY of thin sand cap will be placed; conveyor or spreader systems will be used to access shallow areas. The dredged sediment will be disposed off-site as described in Alternative MSHS-2. Alternative KLHS-4 was retained for detailed analysis (Tetra Tech 2019c).

10.2.3 WASHINGTON CHANNEL OU EARLY ACTION AREAS

Five alternatives for the Washington Channel OU EAAs (combined area of 26.9 acres) were developed for initial screening. As a water body hydrologically related to, but separate from, the Main Stem, the Washington Channel exhibits lower sedimentation and more restricted water circulation than the Main Stem and Kingman Lake.

ALTERNATIVE WCHS-1 – NO ACTION

The NCP requires evaluation of the no action alternative to serve as a baseline for comparison with the other remedial alternatives. Under the no-action alternative, nothing would be done to alter the conditions described in the ARSP RI Report (Tetra Tech 2019a). Any natural recovery would not be monitored.

ALTERNATIVE-WCHS-2 – DREDGING AND DISPOSAL IN A COMMERCIAL LANDFILL

Alternative WCHS-2 is complete removal of all surface sediment containing COCs at concentrations exceeding the Hot Spot RAL, and disposal of that sediment at an off-site landfill. The volume of surface sediment containing COC concentrations exceeding the Hot Spot RAL in the Washington Channel is 348,000 CY, based on the surface area of the Washington Channel EAAs (26.9 acres) and the average removal depth calculated in the River-wide FS (Tetra Tech 2019d). Removal of material along the seawalls that are present along the entire shoreline of this water body may be limited because of seawall structural stability concerns. Dredging may also expose additional subsurface sediment that would require lateral and vertical expansion of the defined EAA. Alternative WCHS-2 was not retained for detailed analysis due to concerns over implementability (including concerns about potential effects on existing structures such as marinas and the seawall), short-term effectiveness (including uncertainty over the extent of contamination in deeper sediment that would be exposed), and high cost (estimated to be over $250 million for the alternative) relative to other alternatives (Tetra Tech 2019c).

ALTERNATIVE WCHS-3 – CONTAINMENT

Alternative WCHS-3 involves covering the combined acreage of the EAAs (26.9 acres) with approximately 12 inches of clean sand, which would require approximately 43,500 CY of sand to construct the cover. The sand cap would be either mechanically or hydraulically placed, depending on site conditions. Opportunities to minimize the thickness of the installed sand cap and the need for armoring in high scour areas will be evaluated in the design phase. Alternative WCHS-3 was retained for detailed analysis (Tetra Tech 2019c).

ALTERNATIVE WCHS-4 – EMNR WITH DIRECT APPLICATION OF ACTIVATED CARBON

Alternative WCHS-4 involves direct placement of activated carbon over 26.9 acres. The 50-percent activated carbon is an estimate based on the initial studies by ESTCP (2019) and would need to be confirmed in the design phase. Placement will be similar to the approach discussed for Kingman Lake in **Section 10.2.2.3**, although marinas at the locations of the EAAs and water depth may require diver-assisted placement for adequate coverage. The sediment surface in Washington Channel may not allow mixing of the activated carbon as readily as the sediment in Kingman Lake. Alternative WCHS-4 was retained for detailed analysis (Tetra Tech 2019c).

ALTERNATIVE WCHS-5 – CONTAINMENT WITH SELECTIVE DREDGING AND DISPOSAL

Alternative WCHS-5 is similar to Alternative WCHS-3 with additional dredging and off-site disposal of shallow sediment within 8 feet of the MLLW datum to mitigate disturbance of the cap (see **Figure 1.9**). The dredged sediment volume for this alternative is estimated at 2,000 CY. Alternative WCHS-5 was retained for detailed analysis (Tetra Tech 2019c).

11.0 COMPARATIVE ANALYSIS OF EARLY ACTION ALTERNATIVES

This section summarizes the comparison of the remedial alternatives for the Main Stem OU, Kingman Lake OU, and Washington Channel OU EAAs. Alternatives evaluated for each OU are ranked relative to each other based on the NCP selection criteria.

Alternative 1 (No Action) serves as a baseline against which all other alternatives within each OU are evaluated. The comparative analysis identifies relative advantages and disadvantages of alternatives to define the key tradeoffs that decision-makers must balance in selecting a remedy (EPA 1988). In the Focused FS, the alternatives were evaluated against each other and then scored according seven of the nine NCP criteria; the two threshold criteria of (1) overall protection of human health and the environment and (2) compliance with ARARs and the five balancing criteria of (3) long-term effectiveness, (4) reduction of toxicity, mobility , or volume through treatment, (5) short-term effectiveness, (6) implementability, and (7) cost. The two modifying criteria, (8) state and (9) community acceptance were evaluated after DOEE considered stakeholder comments on the Proposed Plan (DOEE 2019) and are discussed in **Section 15**.

Threshold criteria must be met and so are scored only as “Pass” or “Fail.” Balancing criteria are scored from 0 to 5, with 0 being meets the criterion the least and 5 being meets the criterion the best. The scores for these five criteria represent the relative ability of each alternative to satisfy NCP criteria. Comparative evaluation and scoring for the three OUs are presented in **Tables 11.1, 11.4, and 11.7.**

11.1 MAIN STEM OU COMPARATIVE ANALYSIS

Two alternatives for the Main Stem were included in the comparative evaluation: Alternative MSHS-1 (No Action) and MSHS-4 (Containment with Selective Dredging and Disposal). **Table 11.1** summarizes the comparison.

11.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion assesses how well the alternatives achieve and maintain protection of human health and the environment in the Main Stem EAAs. Alternative MSHS-1 (No Action) would not improve current conditions, reduce risk, or protect human health or the environment. Because Alternative MSHS-1 does not meet threshold criteria, it is not discussed further in this section. Alternative MSHS-4 (Containment with Selective Dredging and Disposal) is expected to meet the hot spot RAL and be effective at reducing risks to human and ecological receptors and achieving progress toward achieving ARSP RAOs.

11.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Alternative MSHS-4 is expected to meet ARARs and TBCs.

11.1.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative MSHS-4 would meet the Hot Spot RAL and provide long-term effectiveness and permanence, given that ICs to protect the cap would be placed and remain effective.

11.1.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

For MSHS-4, a portion of sediment removed and disposed of off-site would be treated during the dewatering process, reducing the contaminant mobility within the removed material. The containment cap will reduce mobility of COCs in impacted sediment.

11.1.5 SHORT-TERM EFFECTIVENESS

Construction of each active remedy can be accomplished in less than one year.

11.1.6 IMPLEMENTABILITY

Alternative MSHS-4 is readily implementable by capable construction contractors available in the region.

11.1.7 COST

Costs estimated for alternative MSHS-4 are presented in **Tables 11.2 and 11.3** for outside and inside the FNC, respectively. The estimates are accurate within +50 to -30 percent, consistent with EPA Guidance (1988). The total cost to implement alternative MSHS-4 is estimated at $19.47 M.

11.2 KINGMAN LAKE OU COMPARATIVE ANALYSIS

Three alternatives for Kingman Lake were included in the comparative evaluation: Alternative KLHS-1 (No Action), KLHS-3 (EMNR with Direct Application of Activated Carbon), and KLHS-4 (Containment by TLCP with Selective Dredging and Disposal). **Table 11.4** summarizes the comparison.

11.2.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion assesses how well the alternatives achieve and maintain protection of human health and the environment in the EAAs in Kingman Lake. Alternative KLHS-1 (No Action) would not improve current conditions, reduce risk, or protect human health or the environment. Because Alternative KLHS-1 does not meet threshold criteria, it is not discussed further in this section. Alternatives KLHS-3 and KLHS-4 are expected to meet the Hot Spot RAL and be effective at reducing risks to human and ecological receptors and achieving progress toward achieving ARSP RAOs.

11.2.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Both active remedial alternatives are expected to meet ARARs and TBCs.

11.2.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative KLHS-3 will be effective in the long-term as COCs in the surface sediment are adsorbed onto the activated carbon. The carbon does not degrade over time so that the COCs are bound within the carbon matrix, reducing the bioavailability for the foreseeable future. Alternative KLHS-4 is effective in the long-term as the surface sediment with the higher COC concentrations is dredged and disposed off-site. Sediment remaining after dredging is capped with approximately six inches of sand. With the passage of time, continued sediment deposition in Kingman Lake will provide additional protection under both alternatives.

11.2.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

The direct application of activated carbon in KLHS-3 will reduce toxicity and mobility of COCs in the surface sediment through sorption of the COCs into the carbon matrix resulting in reduced bioavailability of the COCs. For KLHS-4, a portion of sediment removed and disposed off-site would be treated during the dewatering process, reducing the contaminant mobility within the matrix. The approximate 6-inch sand cap will reduce mobility of COCs in impacted sediment. KLHS-4 removes mass of COCs from Kingman Lake. However, neither of these alternatives will accomplish this through treatment.

11.2.5 SHORT-TERM EFFECTIVENESS

The relative short-term effectiveness of these two active alternatives is comparable to the Main Stem EAA alternative. Alternative KLHS-3 is the superior of the two because sediment exceeding the hot spot RAL is not disturbed.

11.2.6 IMPLEMENTABILITY

Alternative KLHS-4 is readily implementable by capable construction contractors available in the region. Bridges to Kingman Island provide access to long reach equipment for the excavation of sediment near the bank. Alternative KLHS-4 requires a staging area to manage dredged sediment. Alternative KLHS-3 is also implementable. Shallow water areas may require specialized equipment to place the activated carbon materials.

11.2.7 COST

Costs estimated for KLHS-3 are presented in **Table 11.5**. Costs estimated for Alternative KLHS-4 are presented in **Table 11.6**. The estimates are accurate within +50 to -30 percent. Alternative KLHS-3 at $1.10 million (M) is the least expensive alternative, followed by Alternative KLHS-4 at $7.01 M. The lower estimated costs for Alternative KLHS-3 result from not dredging and managing contaminated river sediment.

11.3 WASHINGTON CHANNEL OU COMPARATIVE ANALYSIS

Four alternatives for Washington Channel were included in the comparative evaluation: Alternative WCHS-1 (No Action), WCHS-3 (Containment), WCHS-4 (EMNR Direct Application of Activated Carbon), and WCHS-5 (Containment with Selective Dredging and Disposal). For a summary of the comparative evaluation, refer to **Table 11.7**.

11.3.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion assesses how well the alternatives achieve and maintain protection of human health and the environment in the EAAs in Washington Channel. Alternative WCHS-1 (No Action) would not improve current conditions, reduce risk, or protect human health or the environment. Because Alternative WCHS-1 does not meet threshold criteria, it is not discussed further in this section. The remaining alternatives are expected to meet the Hot Spot RAL and be effective at reducing risks to human and ecological receptors and making progress toward the achievement of ARSP RAOs.

11.3.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Both active remedial alternatives are expected to meet ARARs and TBCs.

11.3.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives WCHS-3 and WCHS-5 are expected to be effective in the long term. Marina activity will be evaluated further to determine whether shallow sediment elevations and boating activity potentially impair the long-term performance of the containment cap. Dredging or addition of an armored layer on the cap may be required in isolated areas. Alternative WCHS-4 will be somewhat effective since mixing into the underlying sediment may be limited and, depending on the product used, some of the activated carbon product may be flushed outside the EAAs.

11.3.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative WCHS-4 includes treatment to reduce toxicity and mobility of COCs in the sediment. Neither WCHS-3 or WCHS-5 reduce toxicity. However, for WCHS-5, a portion of sediment removed and disposed of off-site would be treated during the dewatering process, reducing the contaminant mobility within the matrix. All alternatives cap contaminated sediment to reduce mobility of COCs in impacted sediment.

11.3.5 SHORT-TERM EFFECTIVENESS

The relative short-term effectiveness is comparable to the EAA remedial alternatives in both the Main Stem and Kingman Lake. Alternatives WCHS-3 and WCHS-4 are the superior of the two because sediment exceeding the Hot Spot RAL is not handled.

11.3.6 IMPLEMENTABILITY

Alternatives WCHS-3 and WCHS-5 are readily implementable by capable local construction contractors. Alternative WCHS-4 is implementable.

11.3.7 COST

Costs estimated for Alternatives WCHS-3, WCHS-4, and WCHS-5 are presented in **Tables 11.8, 11.9, and 11.10**, respectively. The estimates are accurate within +50 to -30 percent. Alternative WCHS-3 at $9.02 M is the least expensive alternative, followed by Alternative WCHS-5 at $10.02 M. Alternative WCHS-4 is the most expensive at $13.93 M because of material and placement costs.

12.0 PRINCIPAL THREAT WASTES

The NCP (40 CFR §300.430(a)(1)(iii)(A)), and to a degree, DCBRA § 8-634.01, establish an expectation that the remedy will use treatment alternatives to address the principal threats posed by a site, wherever practicable. The principal threat waste concept is applied to the characterization of "source material" at a site. Source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contaminants to groundwater, surface water, or air, or acts as a source for direct exposure. The EPA defines principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. DOEE has determined that contaminated sediment in the Anacostia River does not constitute a principal threat waste.

13.0 SELECTED INTERIM REMEDY

The selected remedy for each OU meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. Modifying criteria, which were evaluated based on stakeholder comments received on the Proposed Plan, generally indicate support for the selected interim remedy. The selected interim remedy will not be inconsistent with or preclude implementation of other remedial actions that may occur in the ASRP study area. **Table 13.1** summarizes the selected remedy for each OU. The selected remedy for Kingman Lake has been updated from what was presented in the Proposed Plan as described in **Section 15.0**. **Figures 13.1, 13.2, and 13.3** show the selected interim remedy for the Main Stem OU, Kingman Lake OU, and the Washington Channel OU, respectively.

Table 13.1. Selected Interim Remedy

Operable Unit	Preferred Alternative	General Features	Present Worth Cost
Main Stem OU Six EAAs	MSHS-4	Containment that may be augmented with amendments with selective dredging and disposal	$ 19,470,000
Kingman Lake OU Three EAAs	KLHS-4	Containment by thin layer cap placement that may be augmented with amendments with selective dredging and disposal	$ 7,010,000
Washington Channel OU Two EAAs	WCHS-3	Containment that may be augmented with amendments	$ 9,020,000

EAA: Early Action Area
OU: Operable Unit

13.1 SUMMARY OF THE RATIONALE FOR THE SELECTED INTERIM REMEDY

The interim remedy will address the subset of the contaminated sediment in the ARSP study area represented by the 11 EAAs. Addressing a portion of the contamination was determined to be the appropriate strategy for cleaning up the river due to the complexities and uncertainties associated with contaminated sediment remediation. The interim remedy approach with performance monitoring provides a balance of implementing limited cleanup actions and allowing for flexible decision-making in the face of uncertainty. Performance monitoring (in accordance with the PMWP) will provide information on the success of the early actions regarding RAO achievement, on the implementation of the same or similar remedies in other areas of the river, and on the impact the cleanup actions have on the whole river.

The interim remedy will be protective of human health and the environment and will attain ARARs determined to be pertinent to the actions included in the interim remedy (see **Table 13.2**). Containment of COCs with caps will provide an immediately effective mechanism to immobilize the COCs and to prevent direct contact with COCs. Augmentation of the caps with amendments, such as activated carbon or organoclay, will aid in the sequestration of the COCs. Sand caps are also effective at providing a clean substrate for colonization by biofilms and benthic fauna, and submerged aqueous vegetation are expected to recover and not have long-term impacts. In addition, the cap design can accommodate areas of the EAAs that may be subject to high-energy forces such as storm water flow or propeller wash.

Dredging in some EAA locations prior to placement of a cap was included to ensure appropriate post-remediation river-bottom conditions and to be consistent with the anticipated long-term uses of the river. Dredging will reduce the mobility and volume of contaminated mass in the sediment and may create conditions favorable to MNR.

13.2 DESCRIPTION OF THE SELECTED INTERIM REMEDY

13.2.1 CONTAINMENT

The interim remedy selected for all EAAs in each OU includes containment of contaminated sediment. EAAs in the Main Stem and Washington Channel OUs will be capped with clean sand that may be augmented with amendments, such as activated carbon or organoclay. EAAs in the Kingman Lake OU will be capped with a thin-layer cap of clean sand to encourage channel stabilization that may be augmented with activated carbon or organoclay. Note that Kingman Lake is shallower than the Main Stem and the Washington Channel OUs and provides habitat for resident and migratory fish and other aquatic species in addition to supporting human recreation. Both shallow vegetated wetlands and deeper unvegetated channels provide important year-round food and shelter for fish, wading birds, ducks, aquatic mammals, and other wildlife (see **Section 15.0**). Specialized cap designs augmented by armoring may be necessary for EAAs to control scouring. The determination of whether a specific EAA will need a specialized cap design and issues regarding impacts to submerged aqueous vegetation and other habitat will be addressed in the remedial design.

The caps will be subject to ICs to maintain their integrity. The specific IC implementation actions necessary to maintain the caps and control uses that may impair the integrity of the caps, will be included in the remedial design.

13.2.2 SELECTIVE DREDGING

Dredging with mechanical or hydraulic methods will be completed first for some of the EAAs in the Main Stem OU and the Kingman Lake OU prior to placement of the cap. Dredging is necessary in the FNC of the Main Stem OU and in the shallow Kingman Lake OU, especially where channels are planned (see **Figure 15.1**). The dredging locations for the Kingman Lake OU will be determined after additional pre-investigation design. The dredged areas would then be covered with caps to contain and prevent exposure to contaminated sediment remaining in place.

The dredged material will be dewatered, then transported to an off-site disposal facility. Structures and habitats in the dredged areas would be protected or removed and replaced.

13.2.3 PERFORMANCE MONITORING

DOEE will develop the PMWP that will provide the inputs and the basis for post-interim remedy decision-making. The PMWP will describe key indicators for assessing progress toward achieving the four RAOs, monitoring activities, data interpretation methods, trigger criteria that will indicate attainment or nonattainment of an RAO, and potential follow-on actions in the EAAs or other locations in the river. **Table 10.1** presents the preliminary adaptive management decision framework. The PMWP will be used to (1) define baseline (pre-remedial) COC concentrations in surface sediment, surface sediment pore water, water column, surface water, and various tissues and baseline conditions of the river bottom; and (2) measure the performance and progress of the remedy. In addition, ecological indicator monitoring conducted in accordance with the adaptive management decision framework will address uncertainty regarding the effect of the remedy on ecological receptors.

13.3 EXPECTED OUTCOMES OF THE SELECTED INTERIM REMEDY

The interim remedy is expected to remove and contain contaminated sediment with concentrations of total PCB congeners at or above the Hot Spot RAL in each EAA in each OU. The interim remedy is not expected to result in unlimited use/unrestricted exposure (UU/UE) to sediment because use and activity restrictions must be placed and maintained in order to prevent disturbance to the cap and exposure of and to contaminated sediment. The expected outcomes of the interim remedy on achieving the river-wide RAOs, on surface water, and on fish tissue are examples of items that will be evaluated during performance monitoring and are uncertain at this time.

14.0 STATUTORY DETERMINATIONS

In accordance with DCBRA, CERCLA and the NCP, the following statutory determinations are made:

Protection of Human Health and the Environment. The interim remedy will protect human health and the environment in the EAAs in each OU. The interim remedy is expected to provide protection of human health and the environment until a Final ROD is signed, be effective at reducing risks to human and ecological receptors and make progress toward achieving the ARSP RAOs.

Compliance with Applicable or Relevant and Appropriate Requirements. The interim remedy will meet ARARs pertinent to the actions that are part of the interim remedy, and DOEE is not seeking a waiver of any ARAR. The ARARs that the interim remedy will meet are contained in **Table 13.2**.

Cost Effectiveness. The interim remedy provides overall protectiveness relative to its costs and is cost effective. Costs estimated for the selected remedy for the Main Stem OU are presented in **Tables 11.2 and 11.3**. Costs estimated for the selected remedy for the Kingman Lake OU are presented in **Table 11.6**. Costs estimated for the selected remedy for the Washington Channel OU are presented in **Table 11.8**.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable. The interim remedy is intended to remove, stabilize, and prevent further migration of COCs or further environmental degradation at the 11 EAAs as a permanent solution for the EAAs in each OU, but is not intended to be a permanent solution for the whole ARSP study area. Additional follow-on actions may be determined to be necessary to address other contaminated areas of the ARSP study area and/or to modify the remedies selected for the EAAs. Follow-on remedial actions are not expected to change or conflict with the interim remedy selected for the EAAs in the three OUs. The selective dredging will permanently remove contaminated sediment and dispose of it off-site. The caps are expected to be a “permanent solution” for COCs remaining in the sediment in the EAAs because they will be subject to long-term performance monitoring that will continue to evaluate the integrity and the effectiveness of the caps. But the interim remedy is a limited-scope action and is not intended to utilize “permanent solutions” and alternative treatment technologies *to the maximum extent practicable* for the entire ARSP study area.

Preference for Treatment as a Principal Element. The interim remedy does not utilize treatment of COCs as a principal element of the remedy. The selective dredging will reduce the volume of COCs in the sediment and the caps will reduce the mobility of COCs in sediment; however, the interim remedy will not accomplish those reductions through treatment. Because this interim remedy does not constitute the final remedy for the ARSP study area, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element is not included in this Interim ROD.

Five-Year Review Requirements. CERCLA § 121 and DCBRA § 8-634.05 require reviews (statutory reviews) of response actions no less often than each 5 years after the initiation of the response action ("Five-Year Review"), where the action does not achieve concentrations of hazardous substances acceptable for unlimited use/unrestricted exposure (UU/UE). CERCLA 5-year reviews are also done as a matter of policy (policy reviews) when UU/UE will result upon completion of the remedy but completing the remedy takes longer than 5 years. The interim remedy will result in hazardous substances remaining in the sediment in the ARSP study area above the preliminary remediation goals (PRGs) applied on a surface-weighted average concentration (SWAC) basis, so statutory reviews will be conducted to ensure that the interim remedy, including the ICs, continues to provide adequate protection of human health and the environment. In addition, because this is an interim remedy, performance monitoring will be ongoing as DOEE continues to develop an understanding of the ARSP study area and of the effectiveness of the interim remedy.

15.0 DOCUMENTATION OF SIGNIFICANT CHANGES

DOEE issued the ARSP Proposed Plan for public review on December 27, 2019. The Proposed Plan presented Alternative MSHS-4 (Containment with Selective Dredging and Disposal) for the Main Stem OU and Alternative WCHS-3 (Containment) for the Washington Channel OU as the preferred remedial alternatives. DOEE evaluated the NCP modifying criteria of state and community acceptance by reviewing comments received on the Proposed Plan (**Appendix A**). Stakeholder comments on the Proposed Plan generally indicate support for the selection of these alternatives as the remedy for the Main Stem and the Washington Channel OUs.

The Proposed Plan presented Alternative KLHS-3 (EMNR with Direct Application of Activated Carbon) as the preferred remedial alternative to address the Kingman Lake OU. A significant change from the Proposed Plan is DOEE's intention to select KLHS-4 (Containment by TLCP with Selective Dredging and Disposal) as the remedy for the Kingman Lake OU. DOEE is making this change after completing a review of the requirements for various District natural resource restoration projects that are either underway or are in the planning phase for Kingman Lake, as well as considering public comments. Some of DOEE's projects require an increase in the lake's water depth that would be inconsistent with KLHS-3 but can be accommodated by KLHS-4, which includes selective dredging. In the following, KLHS-3 and KLHS-4 are described, the water depth requirements of the District restoration projects are summarized, and DOEE's rationale for revising the selected interim remedial alternative from KLHS-3 to KLHS-4 is provided.

KLHS-3 and KLHS-4 Descriptions. KLHS-3 and KLHS-4 are described in **Sections 10.2.2**. KLHS-3 involves the placement of activated carbon over 6.2 acres of sediment with PCB concentrations exceeding the hot spot RAL. The water depth in the vicinity of the EAAs and in most of southern Kingman Lake is approximately 4 feet (relative to neutral tide) and at low tide is approximately 2 to 3 feet with emergent mud flats in many areas. KLHS-3 will not materially make the lake shallower in the EAAs since only a several centimeter thickness of carbon pellets would be applied and, over time, the pellets break down and become incorporated into the existing sediment resulting in a minimal net change in bottom elevation. KLHS-4 consists of removing approximately 2 feet of sediment from the Kingman Lake OU EAAs followed by placement of an approximate 6-inch sand cap over any sediment exposed by the dredging that exceeds the hot spot RAL. For estimation purposes, approximately 5,000 CY of thin hybrid sand cap (sufficient to cover 6.2 acres with a sand thickness of 6 inches) will be needed for sediment exceeding the hot spot RAL. The cap will be placed by boat or by shore side conveyor or spreader systems with capability to project the sand into each of the EAAs.

District Restoration Projects. The DOEE Natural Resources Administration is engaged in a number of projects focused on restoring various environmental resources related to the surface water bodies in the District including the three OUs that comprise the ARSP study area. The projects include wetland preservation and restoration, shoreline restoration, re-establishment of mussels, expansion of submerged aquatic vegetation, and restoration of natural habitat for a range of animal species. The District of Columbia published the Kingman Island and Heritage Island Planning and Feasibility Study (District of Columbia 2017)[15], a proposal for the use of the islands for educational, environmental, and recreational purposes. Development of Kingman Island will include the construction of outdoor classroom platforms, boat docks, boardwalks, channels, and habitat restoration areas in Kingman Lake. With the exception of the channels, these projects can be accommodated during the design phase of sediment remedy implementation. Specifically, appropriate protections and safeguards will be identified to account for the presence of submerged aquatic vegetation, wetlands, shorelines, and sensitive habitats when detailed remedy designs are prepared for each EAA. **Figure 15.1** shows preliminarily planned routes of the channels. Planning of all features for the Kingman and Heritage Island project is in the conceptual phase and is subject to change. The channels will require increased water depth to provide sufficient draft for canoeing as well as deeper water habitat for aquatic species. Based on preliminary discussions, DOEE anticipates that the channels will require an average depth and width of 6 (at low tide) and 20 feet, respectively. Where the channels cross the EAAs, a 6" thin sand cap will be placed to help stabilize the channels. In the remaining part of the Kingman Lake EAAs, EAAs will be dredged to 2 feet, and capped with a cap that may be augmented by activated carbon or organoclay.

Rationale for Changing the Selected Remedy. DOEE's consideration of the objectives for the restoration projects planned for Kingman Lake necessitates a reconsideration of the selected remedy for this OU from what was identified in the Proposed Plan. Placement of carbon amendment in the EAAs in accordance with KLHS-3, although effective in addressing the presence of elevated PCB concentrations, would not be compatible with the planned future use objectives, described above, which will be installed in the same general areas as the EAAs. In order to avoid installing a remedy that could need to be removed to accommodate future use requirements, DOEE is changing the remedy to KLHS-4. KLHS-4 was evaluated in the detailed analysis of alternatives in the Focused FS and was determined to meet the threshold requirements of protection of human health and the environment and compliance with requirements determined to be ARARs. KLHS-4 was also determined to provide an adequate balance between the NCP criteria of long- and short-term effectiveness and implementability in proportion to its cost and was included as an alternative in the Proposed Plan. Therefore, KLHS-4 also meets the criteria for selection as an interim remedy. Since the dredging included in KLHS-4 can be done to ensure consistency of the remedy with the water depth objectives of the Kingman Island and Heritage Island projects, KLHS-4 is the preferred remedy. The portions of the EAAs that could be traversed by future channels and provide fish habitat can be dredged to 6 feet or other specified depth and the remaining portions of the EAAs dredged to a 2 foot

[15] Available from https://www.anacostiasedimentproject.com/library under Background & Reference Material, Anacostia River Watershed Planning.

depth consistent with KLHS-4. Making sure that the selected Kingman Lake OU remedy is in harmony with future use objectives avoids restricting future uses and/or potential disruption to the remedy. DOEE evaluated the NCP modifying criteria of state and community acceptance by reviewing comments received on the Proposed Plan. Stakeholder comments received on the Proposed Plan generally indicate support for the selection of KLHS-4 as the remedy for the Kingman Lake OU.

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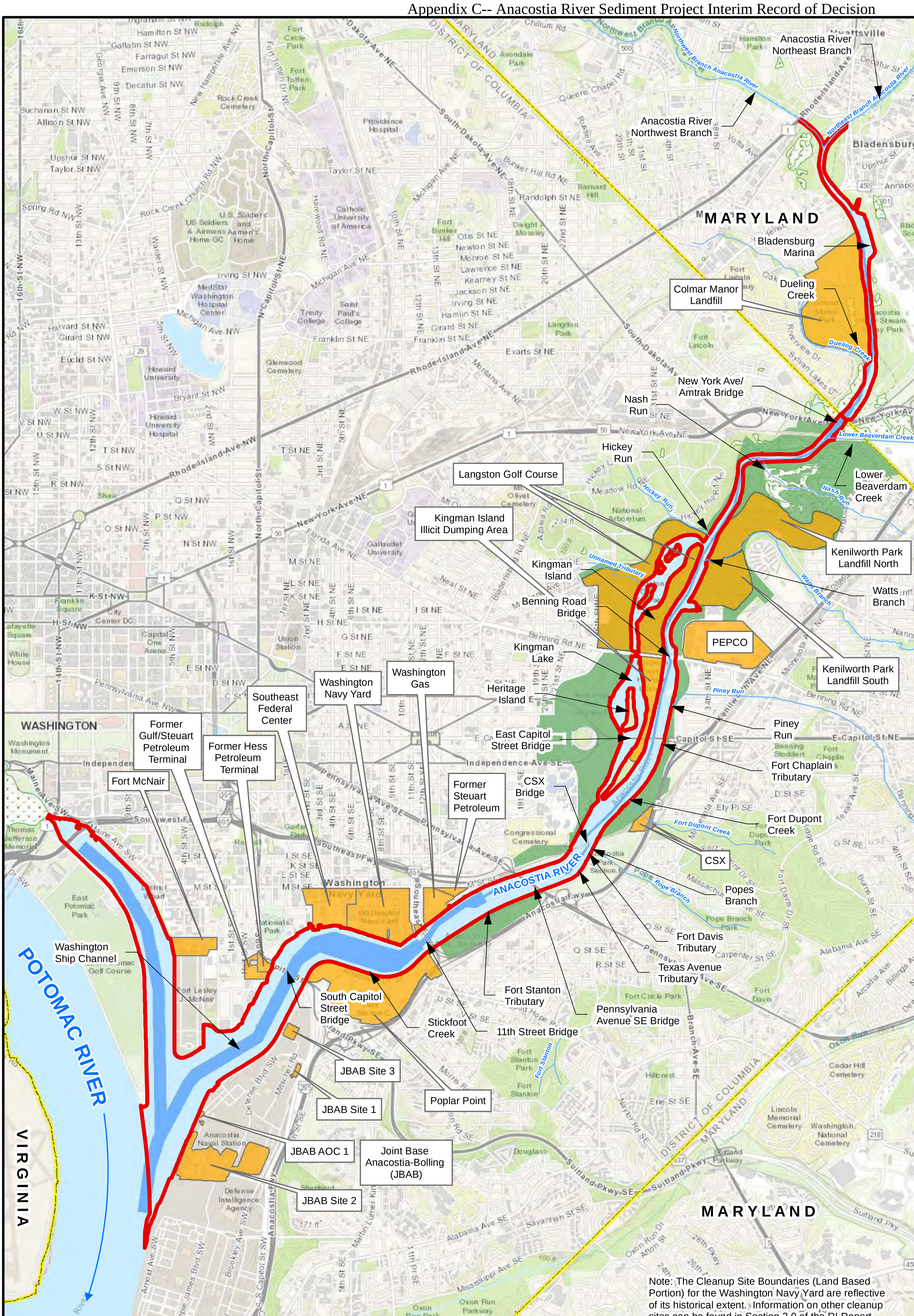
FIGURES



Legend

- STUDY AREA
- CLEANUP SITE BOUNDARY (LAND BASED PORTION)
- ANACOSTIA PARK
- FEDERAL NAVIGATION CHANNEL
- WASHINGTON DC BOUNDARY
- WETLANDS

AOC: Area of Concern

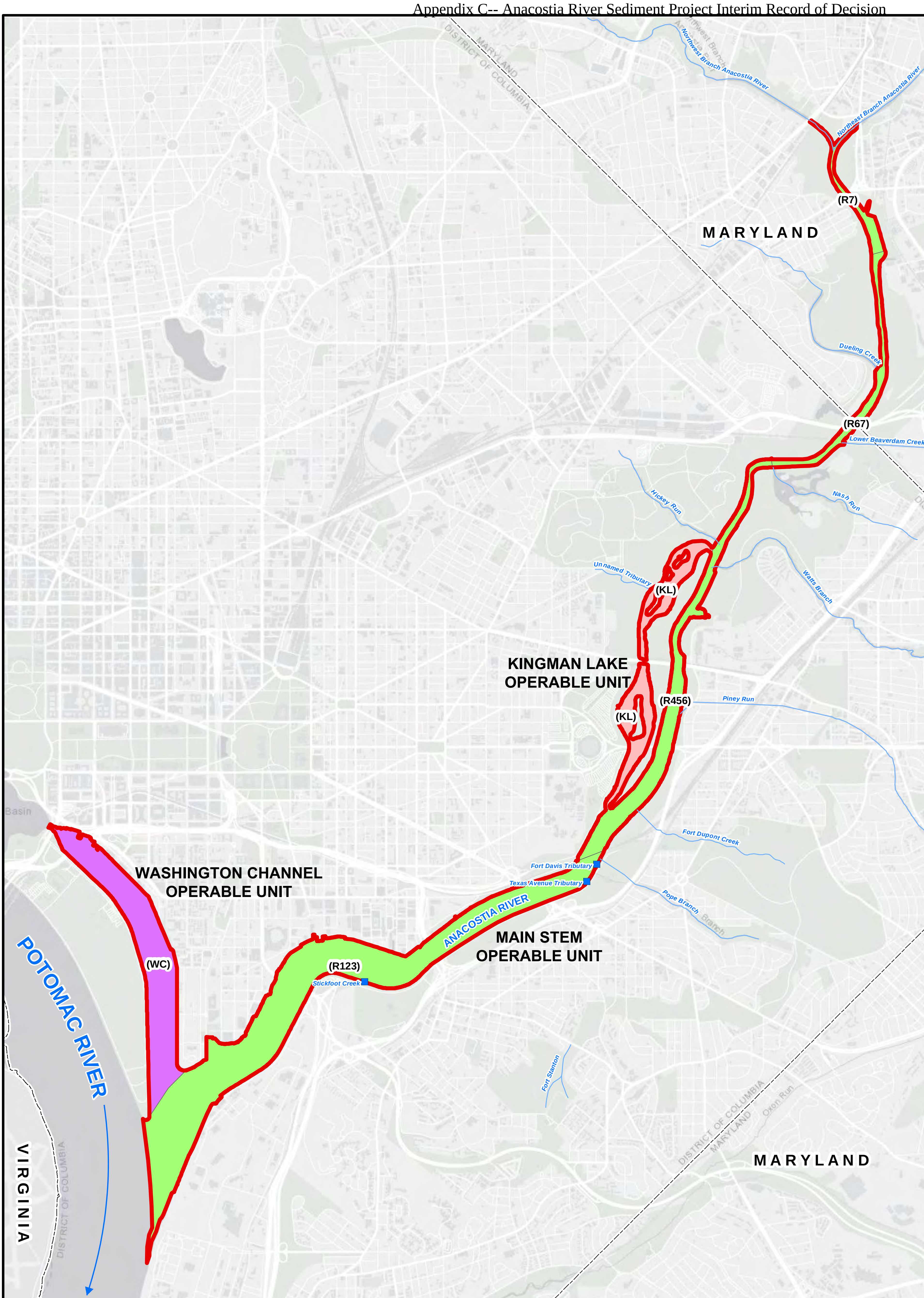
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, USFWS, 2012, DC WATER 2016, AND ESRI TOPOGRAPHIC BASEMAP, 2017.

0 1,500 3,000 Feet

ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 1.1
SITE LOCATION MAP

TETRA TECH



Legend

- TRIBUTARY CONFLUENCE FROM STORM SEWER
- STUDY AREA
- WASHINGTON DC BOUNDARY
- WASHINGTON CHANNEL OPERABLE UNIT
- MAIN STEM OPERABLE UNIT
- KINGMAN LAKE OPERABLE UNIT

N E S W

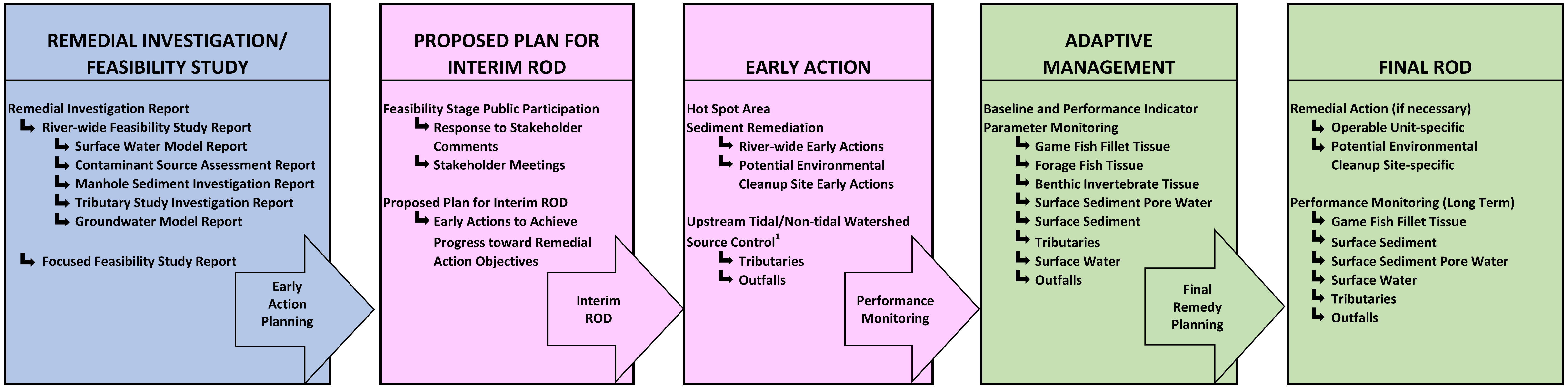
0 1,500 3,000 Feet

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS 2012, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 1.2
LOCATION OF OPERABLE UNITS

TETRA TECH



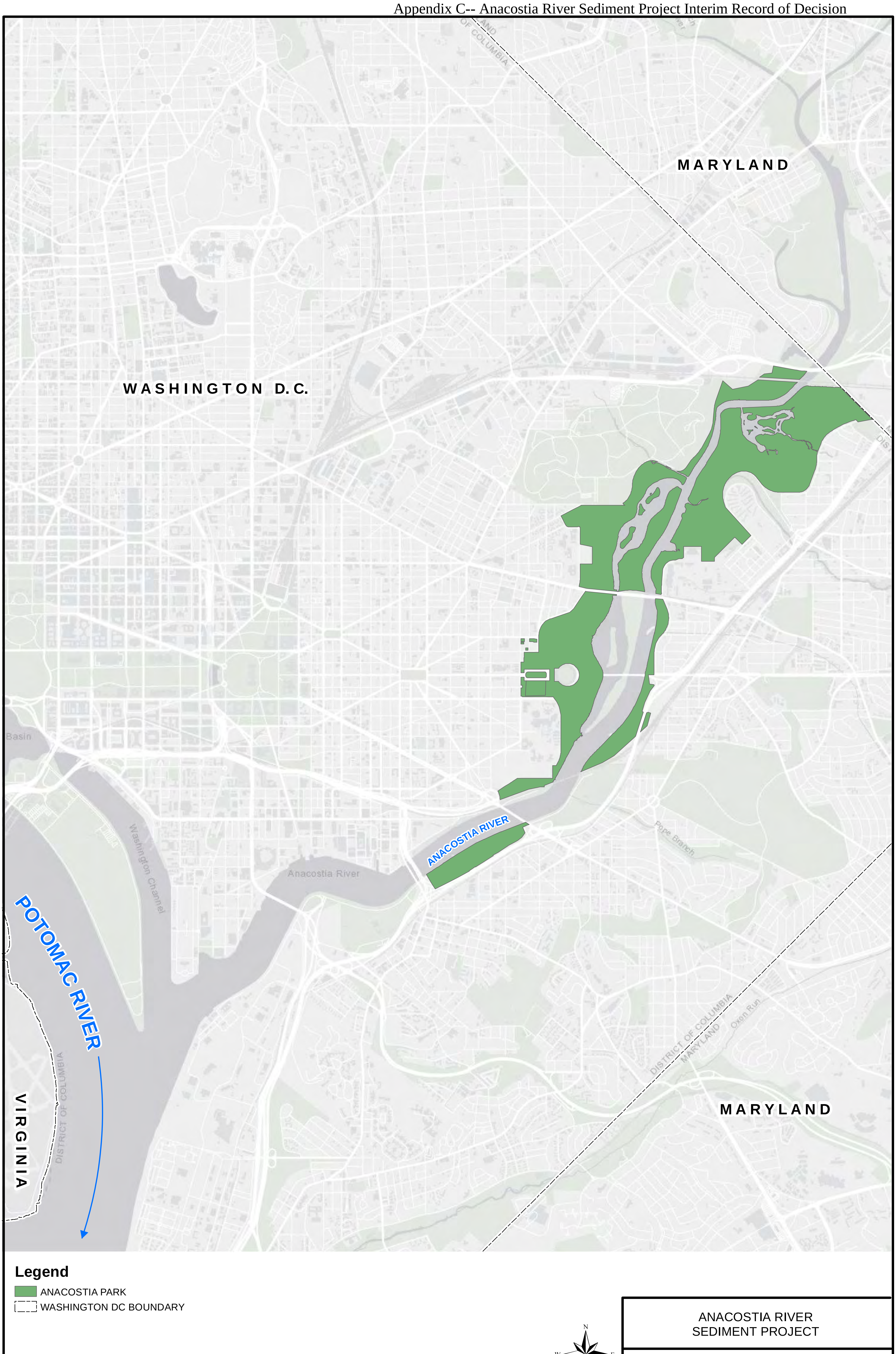
Notes

1 Early actions for hot spots are covered in this IROD and other tributary actions will be ongoing but are not described in this ROD.

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 1.3
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY TO INTERIM AND FINAL RECORD OF DECISION PROCESS

TETRA TECH

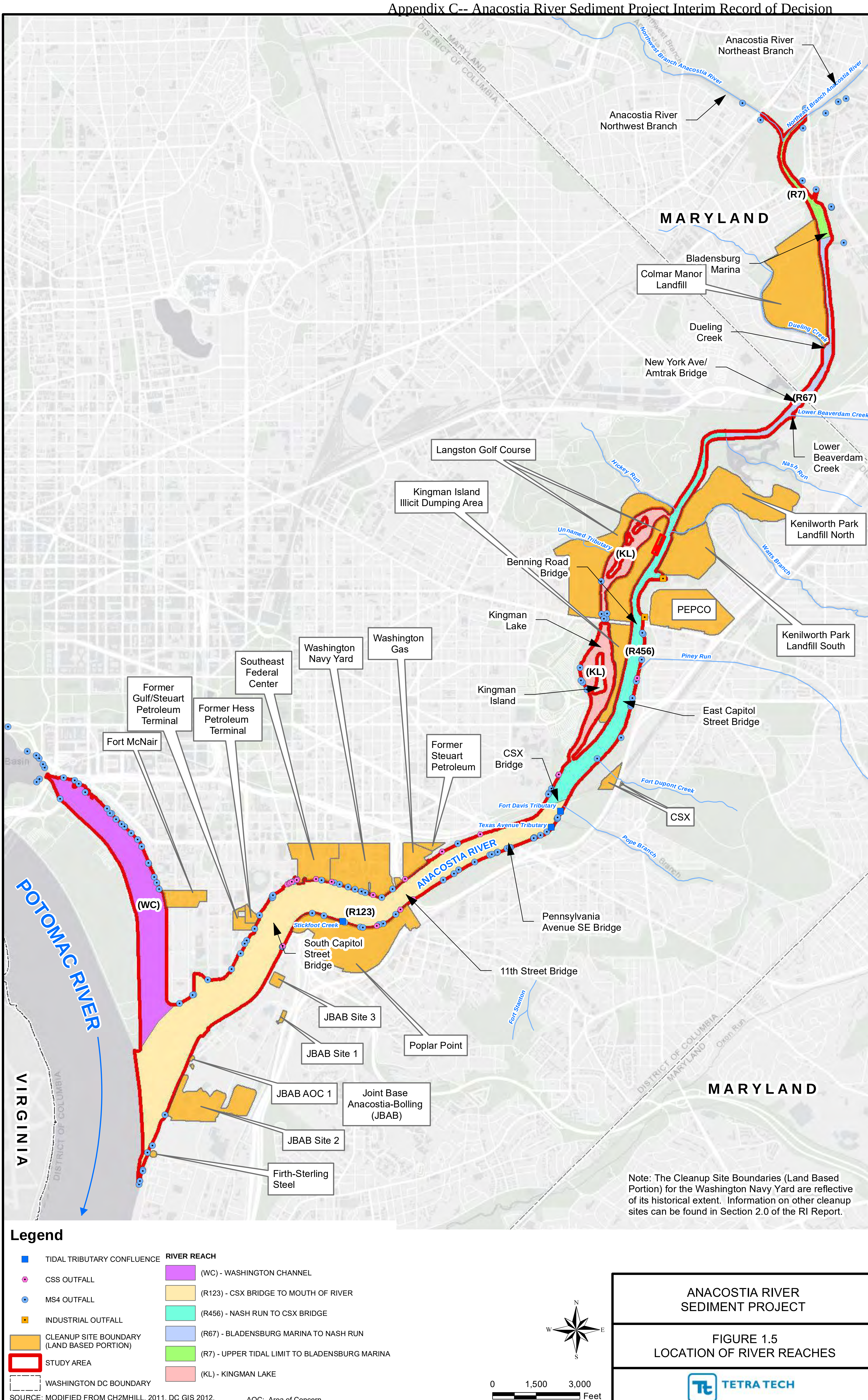


SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS 2012, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2020.

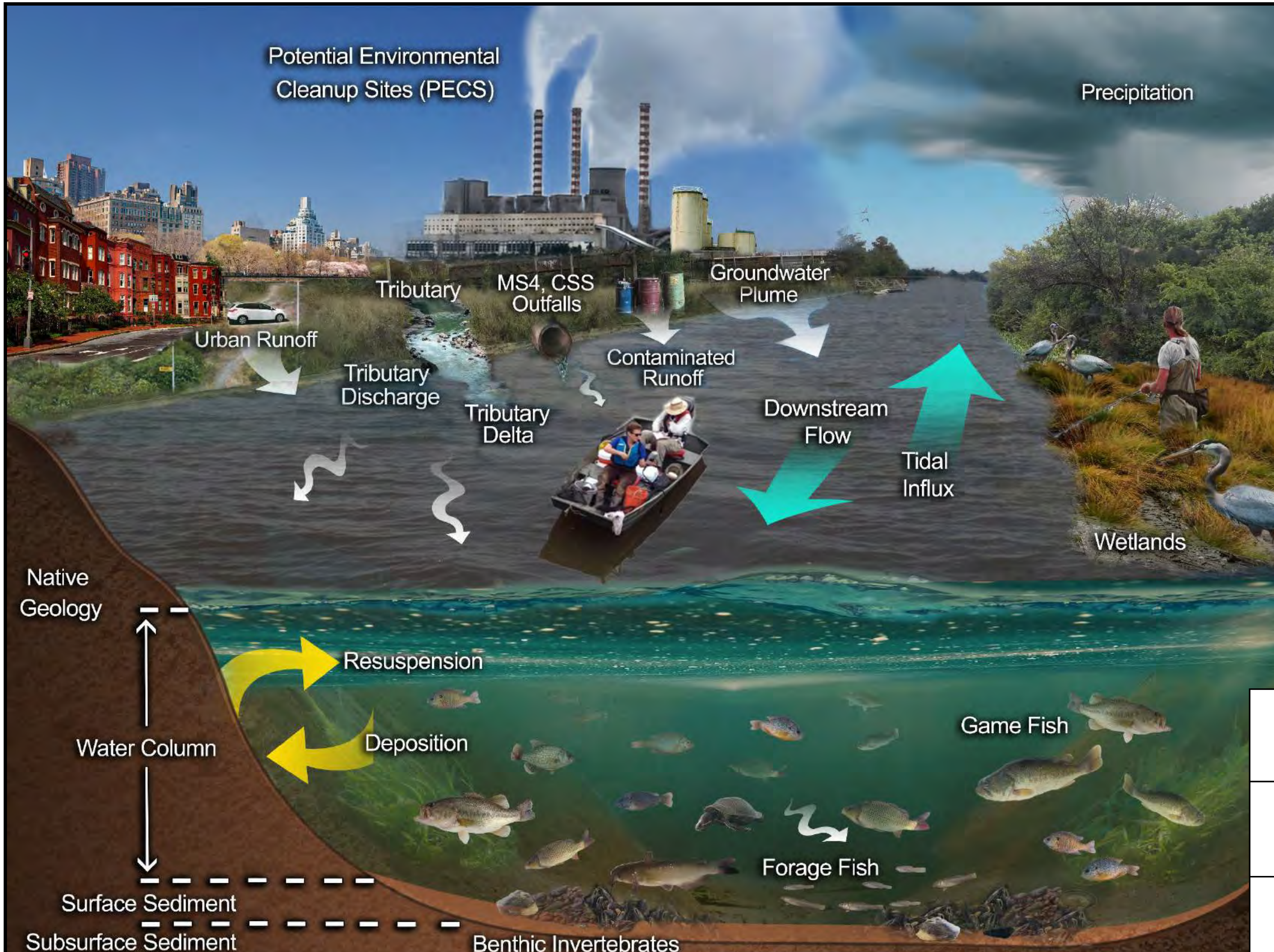
ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 1.4
LOCATION OF ANACOSTIA PARK

TETRA TECH



Anacostia River Northeast Branch
Anacostia River Northwest Branch
MARYLAND
(R7)
Bladensburg Marina
Colmar Manor Landfill
Dueling Creek
New York Ave/ Amtrak Bridge
(R67)
Lower Beaverdam Creek
Langston Golf Course
Kingman Island Illicit Dumping Area
Kenilworth Park Landfill North
(KL)
Benning Road Bridge
PEPCO
Kingman Lake
(R456)
Kenilworth Park Landfill South
Washington Gas
Washington Navy Yard
Southeast Federal Center
Former Gulf/Steuart Petroleum Terminal
Former Hess Petroleum Terminal
Fort McNair
Kingman Island
East Capitol Street Bridge
Former Steuart Petroleum
CSX Bridge
CSX
ANACOSTIA RIVER
POTOMAC RIVER
(WC)
(R123)
South Capitol Street Bridge
Pennsylvania Avenue SE Bridge
11th Street Bridge
JBAB Site 3
JBAB Site 1
Poplar Point
JBAB AOC 1
Joint Base Anacostia-Bolling (JBAB)
JBAB Site 2
Firth-Sterling Steel
VIRGINIA
MARYLAND
Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.
Legend
TIDAL TRIBUTARY CONFLUENCE
CSS OUTFALL
MS4 OUTFALL
INDUSTRIAL OUTFALL
CLEANUP SITE BOUNDARY (LAND BASED PORTION)
STUDY AREA
WASHINGTON DC BOUNDARY
RIVER REACH
(WC) - WASHINGTON CHANNEL
(R123) - CSX BRIDGE TO MOUTH OF RIVER
(R456) - NASH RUN TO CSX BRIDGE
(R67) - BLADENSBURG MARINA TO NASH RUN
(R7) - UPPER TIDAL LIMIT TO BLADENSBURG MARINA
(KL) - KINGMAN LAKE
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS 2012, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.
AOC: Area of Concern
0 1,500 3,000 Feet
ANACOSTIA RIVER SEDIMENT PROJECT
FIGURE 1.5 LOCATION OF RIVER REACHES
TETRA TECH



ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 1.6
CONCEPTUAL SITE MODEL

TETRA TECH

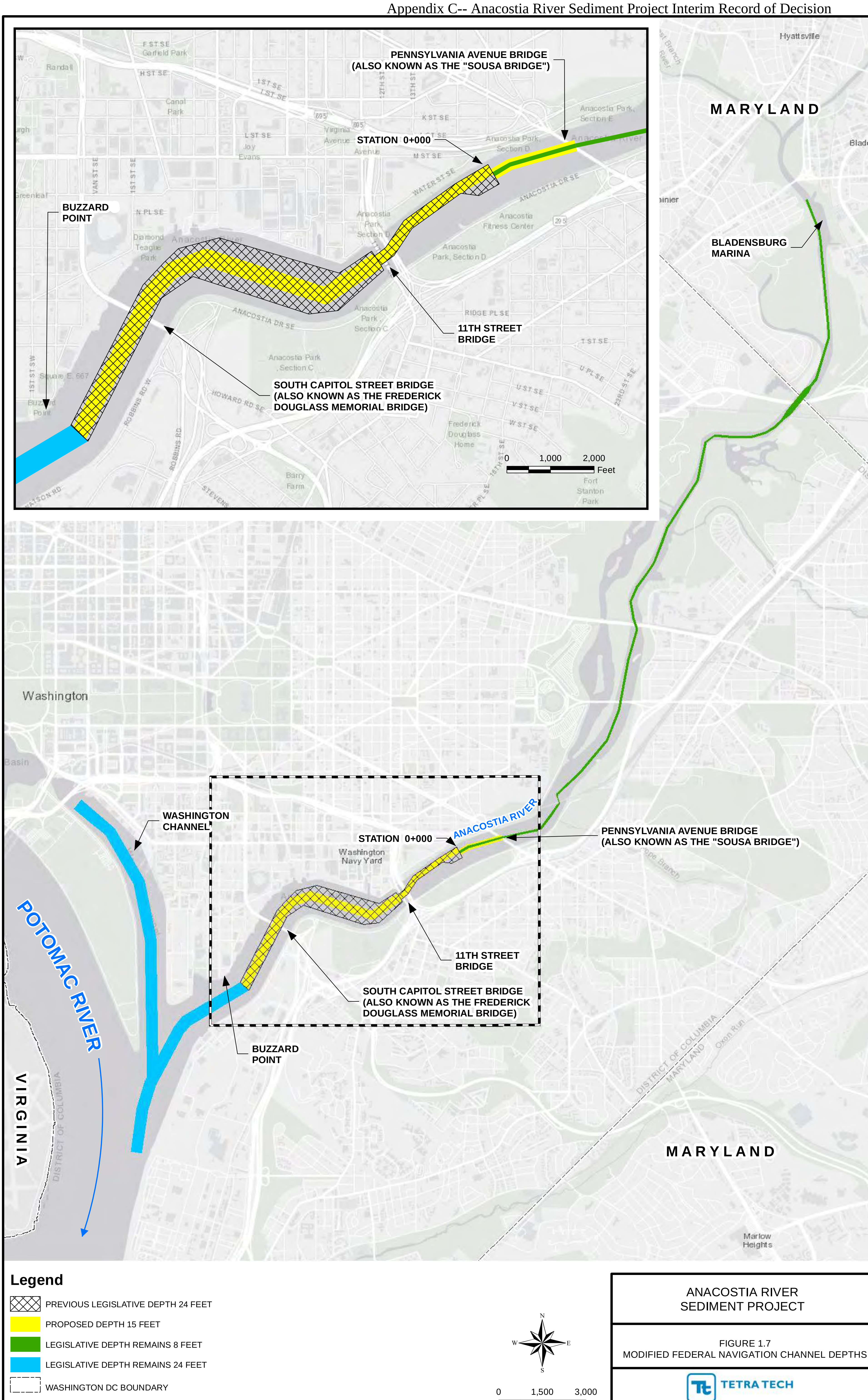
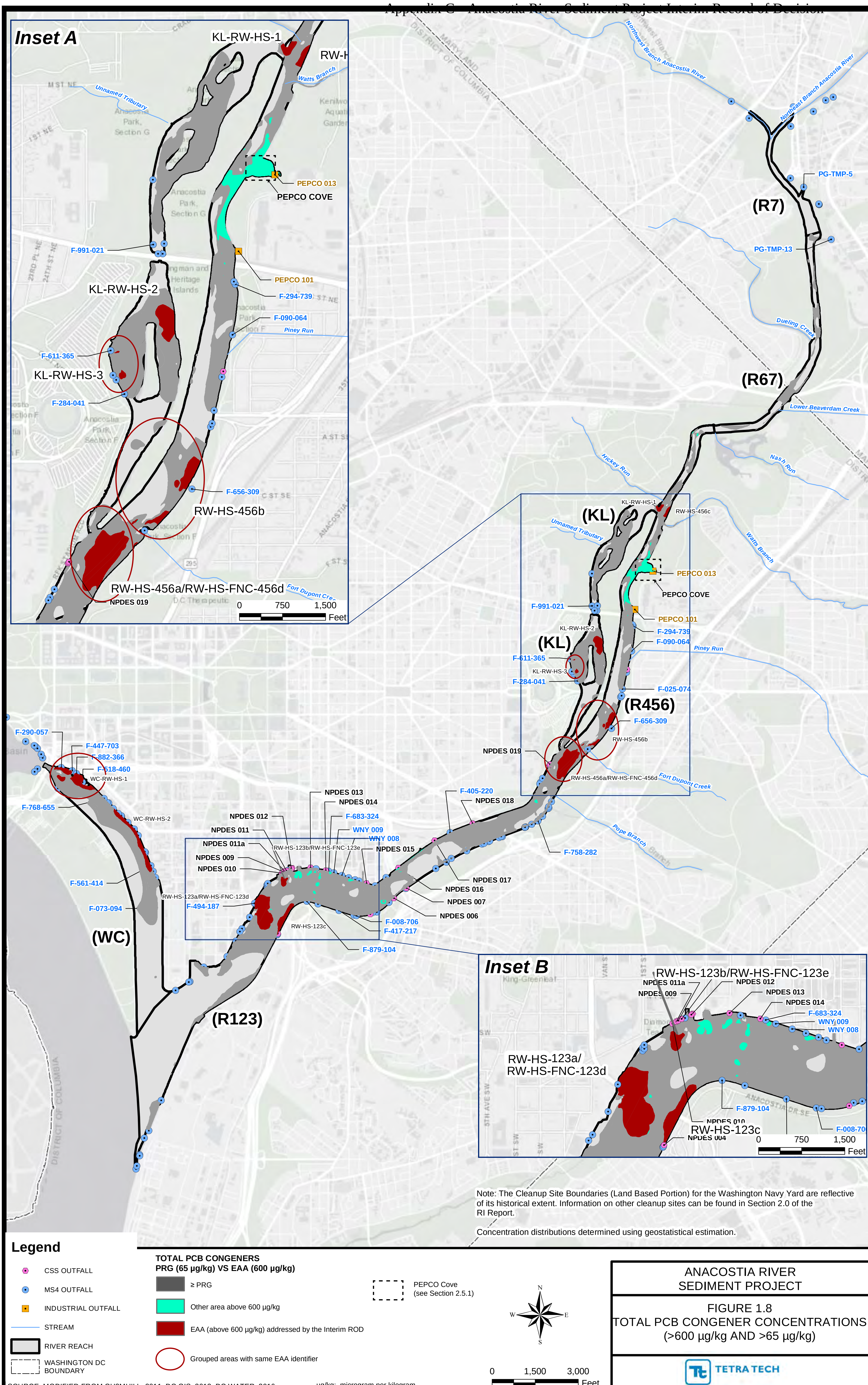
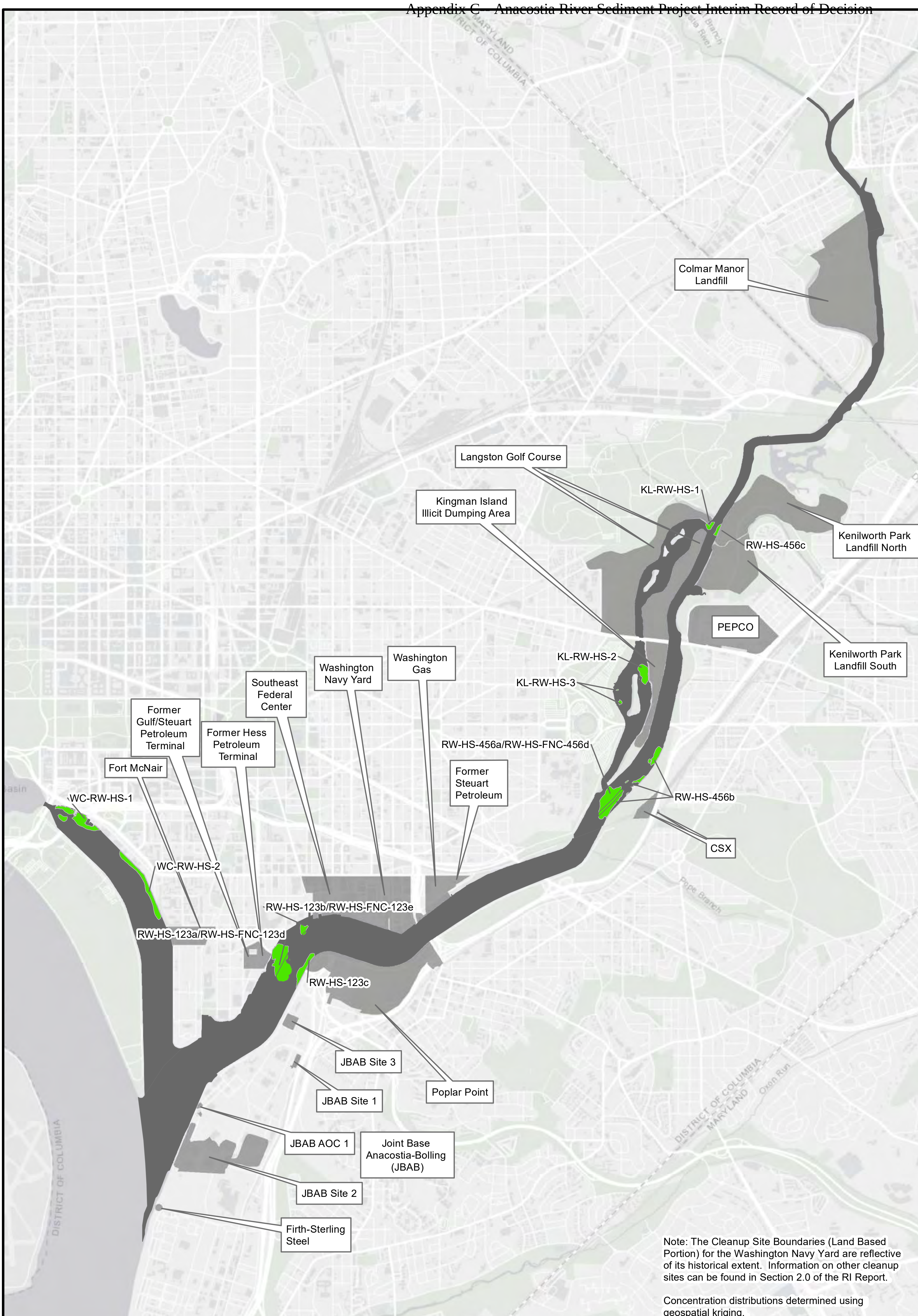


FIGURE 1.7
MODIFIED FEDERAL NAVIGATION CHANNEL DEPTHS



Inset A
KL-RW-HS-1
PEPCO 013
PEPCO COVE
F-991-021
PEPCO 101
F-294-739
F-090-064
KL-RW-HS-2
F-611-365
KL-RW-HS-3
F-284-041
F-656-309
RW-HS-456b
RW-HS-456a/RW-HS-FNC-456d
NPDES 019
Watts Branch
Unnamed Tributary
Piney Run
Fort Dupont Creek
0 750 1,500 Feet
Northwest Branch Anacostia River
Northeast Branch Anacostia River
PG-TMP-5
(R7)
PG-TMP-13
Dueling Creek
(R67)
Lower Beaverdam Creek
Hickey Run
Nash Run
(KL)
RW-HS-456c
F-025-074
(R456)
F-405-220
NPDES 018
F-758-282
Pope Branch
F-290-057
F-447-703
F-882-366
F-518-460
WC-RW-HS-1
F-768-655
WC-RW-HS-2
F-561-414
F-073-094
(WC)
NPDES 013
NPDES 014
NPDES 012
F-683-324
NPDES 011
WNY 009
WNY 008
NPDES 011a
RW-HS-123b/RW-HS-FNC-123e
NPDES 015
NPDES 009
NPDES 010
NPDES 017
NPDES 016
NPDES 007
NPDES 006
RW-HS-123a/RW-HS-FNC-123d
F-494-187
F-008-706
F-417-217
RW-HS-123c
F-879-104
(R123)
Inset B
NPDES 004
Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.
Concentration distributions determined using geostatistical estimation.
Legend
CSS OUTFALL
MS4 OUTFALL
INDUSTRIAL OUTFALL
STREAM
RIVER REACH
WASHINGTON DC BOUNDARY
TOTAL PCB CONGENERS
PRG (65 µg/kg) VS EAA (600 µg/kg)
≥ PRG
Other area above 600 µg/kg
EAA (above 600 µg/kg) addressed by the Interim ROD
Grouped areas with same EAA identifier
PEPCO Cove (see Section 2.5.1)
0 1,500 3,000 Feet
N S E W
µg/kg: microgram per kilogram
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017
ANACOSTIA RIVER SEDIMENT PROJECT
FIGURE 1.8
TOTAL PCB CONGENER CONCENTRATIONS (>600 µg/kg AND >65 µg/kg)
TETRA TECH



Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.

Concentration distributions determined using geospatial kriging.

Legend

- > 600 µg/kg KRIGED SURFACE-EARLY ACTION AREAS
- STREAM
- CLEANUP SITE BOUNDARY (LAND BASED PORTION)
- WASHINGTON DC BOUNDARY

N W E S

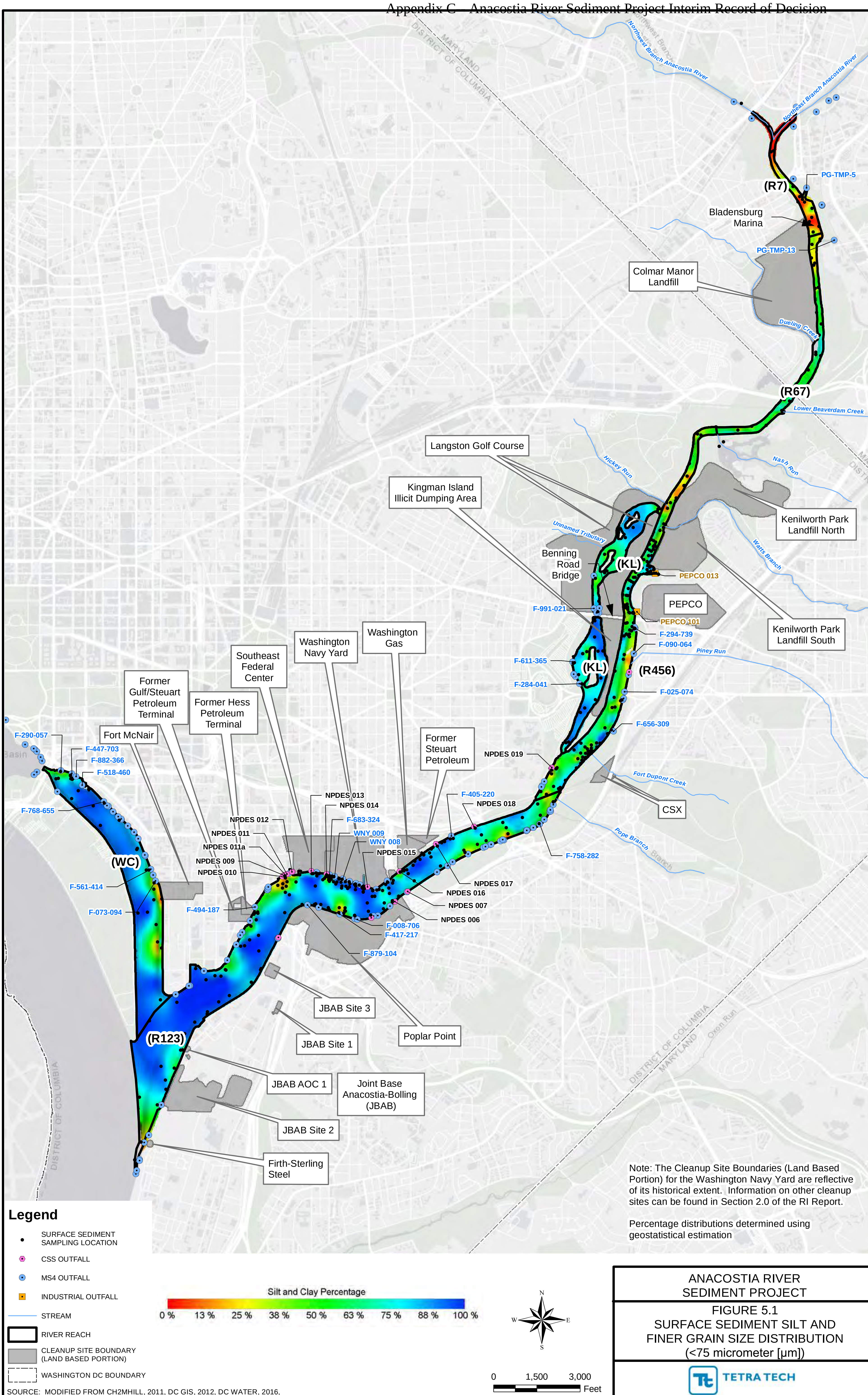
0 1,500 3,000 Feet

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

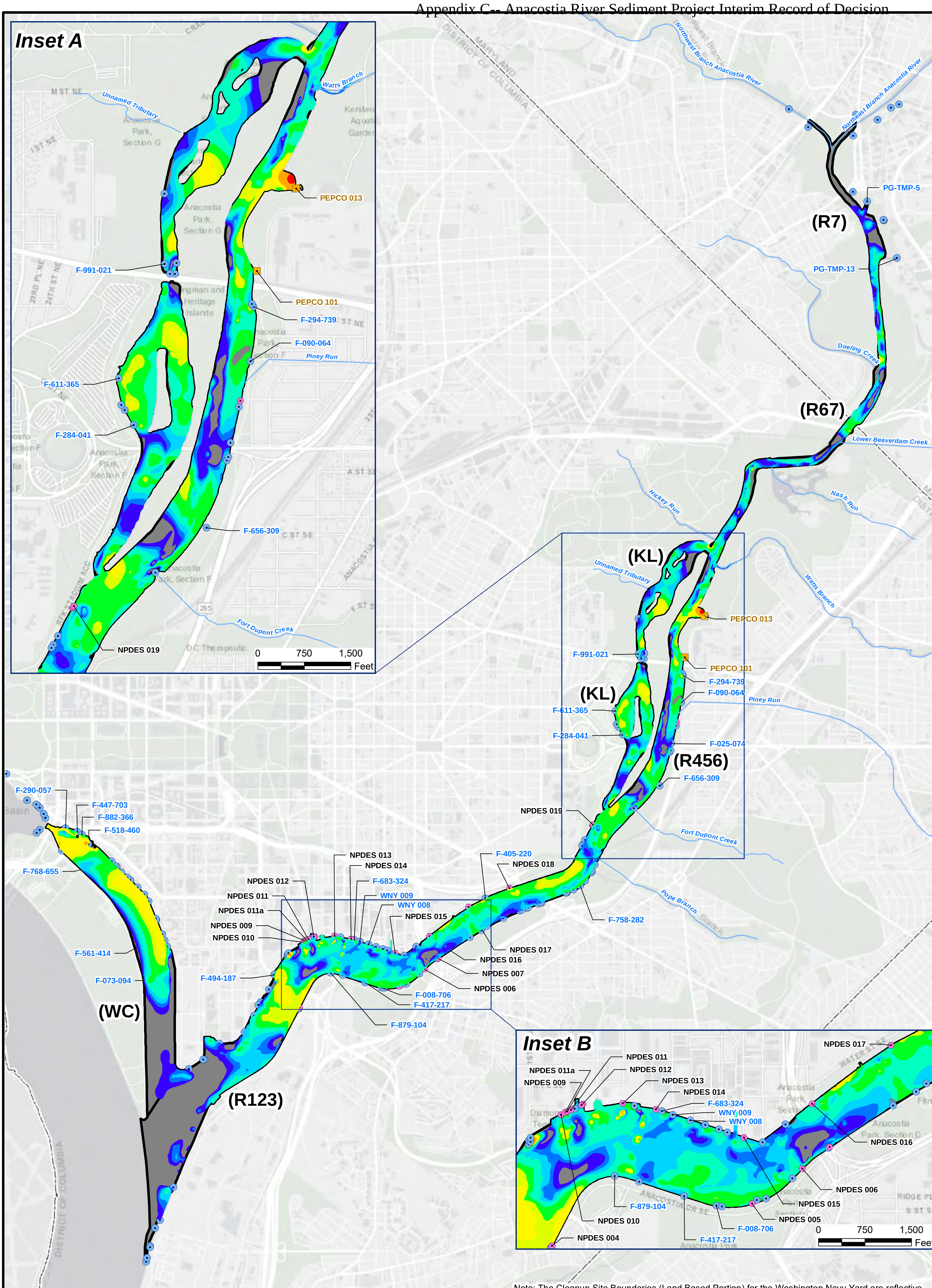
ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 1.9
ESTIMATED EARLY ACTION AREAS USING KRIGING

TETRA TECH



Northwest Branch Anacostia River
Northeast Branch Anacostia River
DISTRICT OF COLUMBIA
MARYLAND
PG-TMP-5
(R7)
Bladensburg Marina
PG-TMP-13
Colmar Manor Landfill
Dueling Creek
(R67)
Lower Beaverdam Creek
Langston Golf Course
Hickey Run
Nash Run
Kingman Island Illicit Dumping Area
Kenilworth Park Landfill North
Unnamed Tributary
Watts Branch
Benning Road Bridge
(KL)
PEPCO 013
F-991-021
PEPCO
PEPCO 101
Kenilworth Park Landfill South
F-294-739
F-090-064
Piney Run
F-611-365
(KL)
(R456)
F-284-041
F-025-074
Washington Gas
Washington Navy Yard
Southeast Federal Center
Former Gulf/Steuart Petroleum Terminal
Former Hess Petroleum Terminal
Fort McNair
F-656-309
Former Steuart Petroleum
NPDES 019
F-290-057
F-447-703
F-882-366
F-518-460
Fort Dupont Creek
CSX
NPDES 013
NPDES 014
F-405-220
NPDES 018
F-768-655
NPDES 012
F-683-324
NPDES 011
WNY 009
WNY 008
NPDES 011a
NPDES 015
Pope Branch
F-758-282
(WC)
NPDES 009
NPDES 010
F-561-414
NPDES 017
NPDES 016
F-073-094
F-494-187
NPDES 007
NPDES 006
F-008-706
F-417-217
F-879-104
JBAB Site 3
JBAB Site 1
Poplar Point
(R123)
JBAB AOC 1
Joint Base Anacostia-Bolling (JBAB)
JBAB Site 2
Firth-Sterling Steel
Oxon Run
Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.
Percentage distributions determined using geostatistical estimation
Legend
SURFACE SEDIMENT SAMPLING LOCATION
CSS OUTFALL
MS4 OUTFALL
INDUSTRIAL OUTFALL
STREAM
RIVER REACH
CLEANUP SITE BOUNDARY (LAND BASED PORTION)
WASHINGTON DC BOUNDARY
Silt and Clay Percentage
0 % 13 % 25 % 38 % 50 % 63 % 75 % 88 % 100 %
N
W E
S
0 1,500 3,000
Feet
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.
ANACOSTIA RIVER SEDIMENT PROJECT
FIGURE 5.1
SURFACE SEDIMENT SILT AND FINER GRAIN SIZE DISTRIBUTION (<75 micrometer [µm])
TETRA TECH



Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.

Concentration distributions determined using geostatistical estimation.

Legend

- CSS OUTFALL
- MS4 OUTFALL
- INDUSTRIAL OUTFALL
- STREAM
- RIVER REACH
- CLEANUP SITE BOUNDARY (LAND BASED PORTION)
- WASHINGTON DC BOUNDARY

COMBINED CHLORDANE, TOTAL PCB, DIOXIN TEQ, AND PCB TEQ (PRG VARIES)

≤ PRG	10X - 20X
1X - 2X	20X - 30X
2X - 3X	30X - 100X
3X - 5X	100X - 500X
5X - 10X	>500X

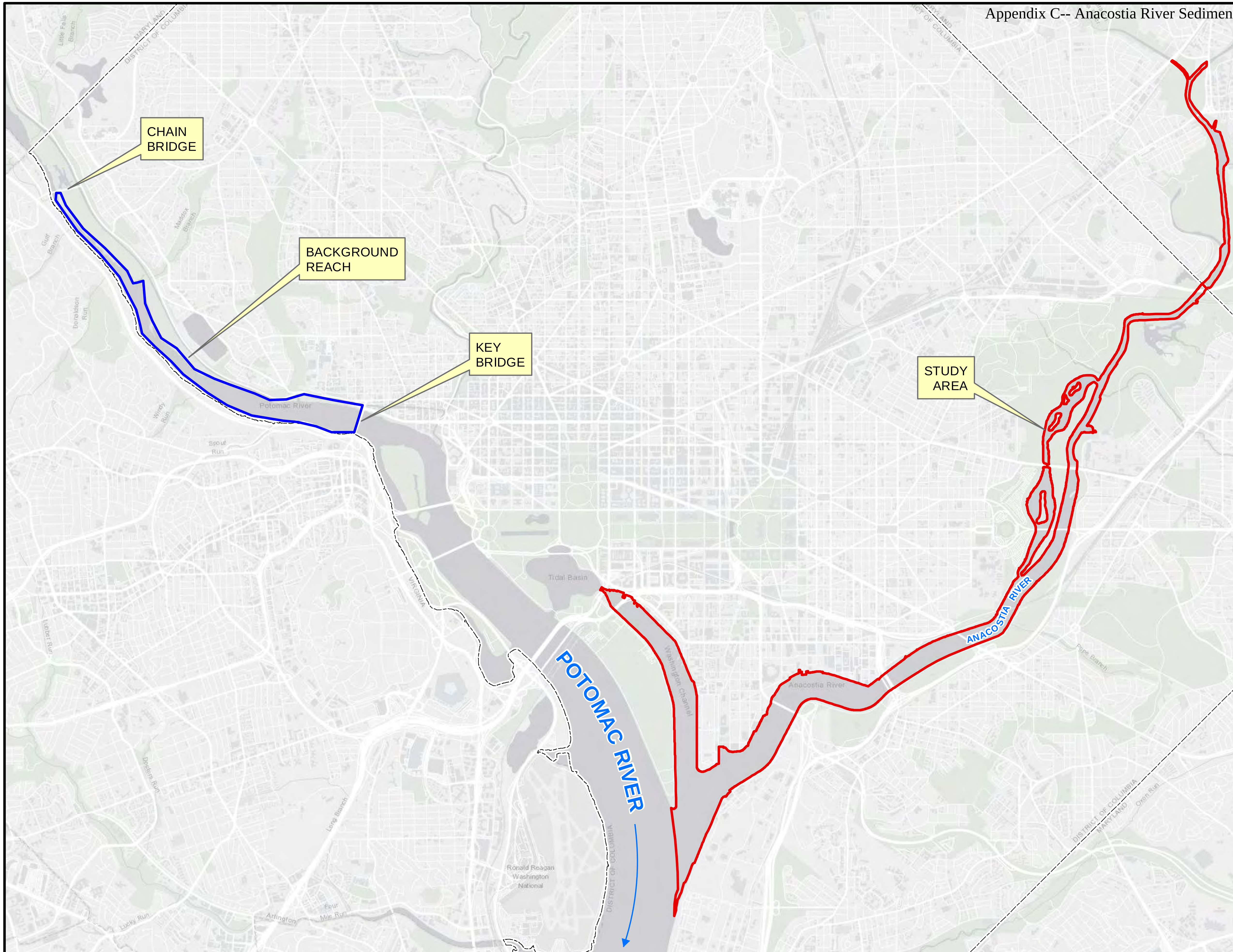
0 1,500 3,000 Feet

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 5.2
SURFACE SEDIMENT FOOTPRINT: TOTAL PCB CONGENERS, DIOXIN-LIKE PCBS, DIOXIN TEQ, AND CHLORDANE CONCENTRATIONS EXCEEDING THE PRG

TETRA TECH

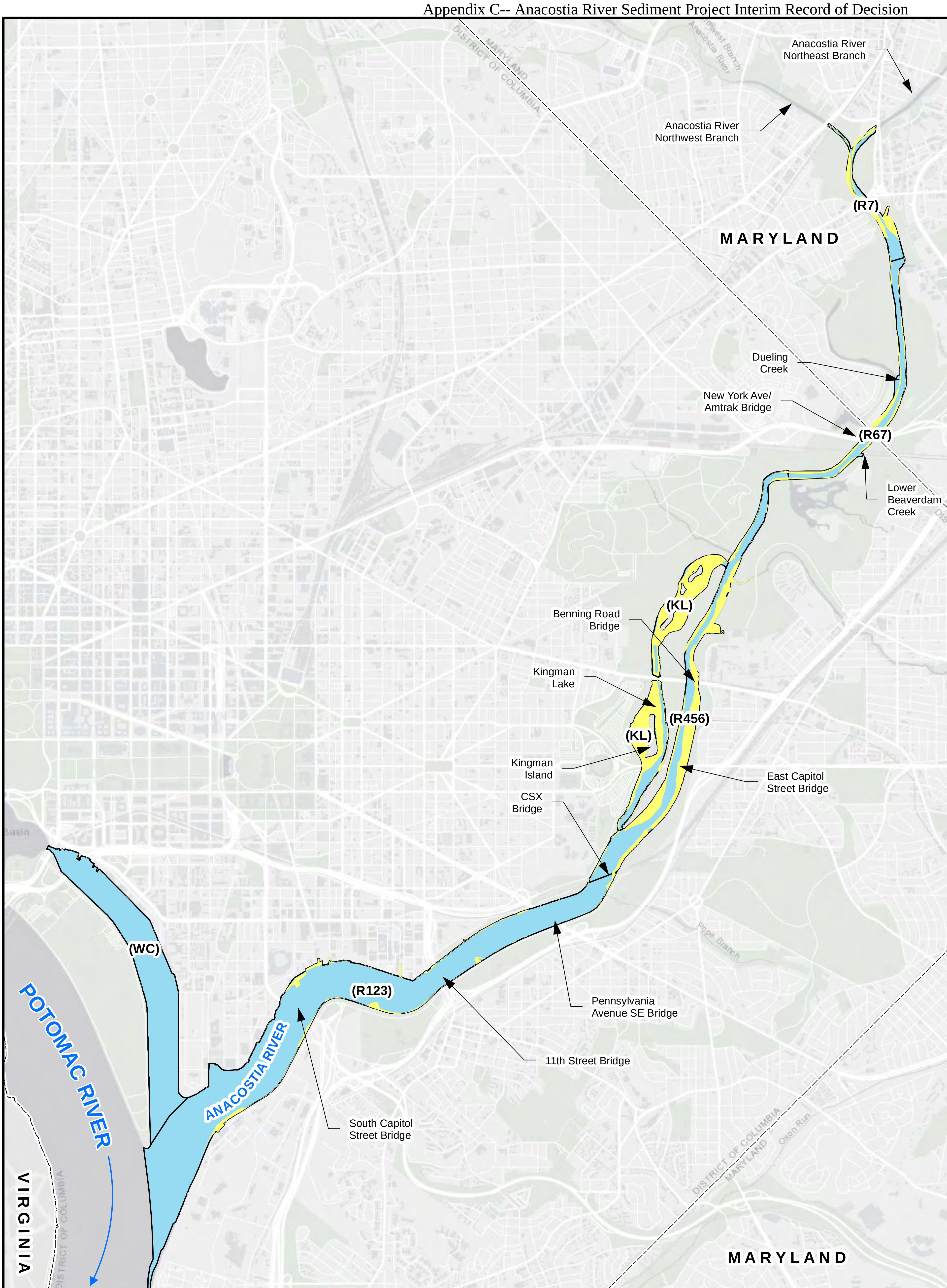


SOURCE: MODIFIED FROM DC GIS, 2012, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE 5.3
LOCATION, RELATIVE TO THE STUDY AREA, OF THE POTOMAC RIVER REACH USED TO ESTIMATE BACKGROUND CONCENTRATIONS

TETRA TECH



Legend

- FRINGE SEDIMENT - LOW TIDE MINUS ONE FOOT
- RIVER REACH
- WASHINGTON DC BOUNDARY

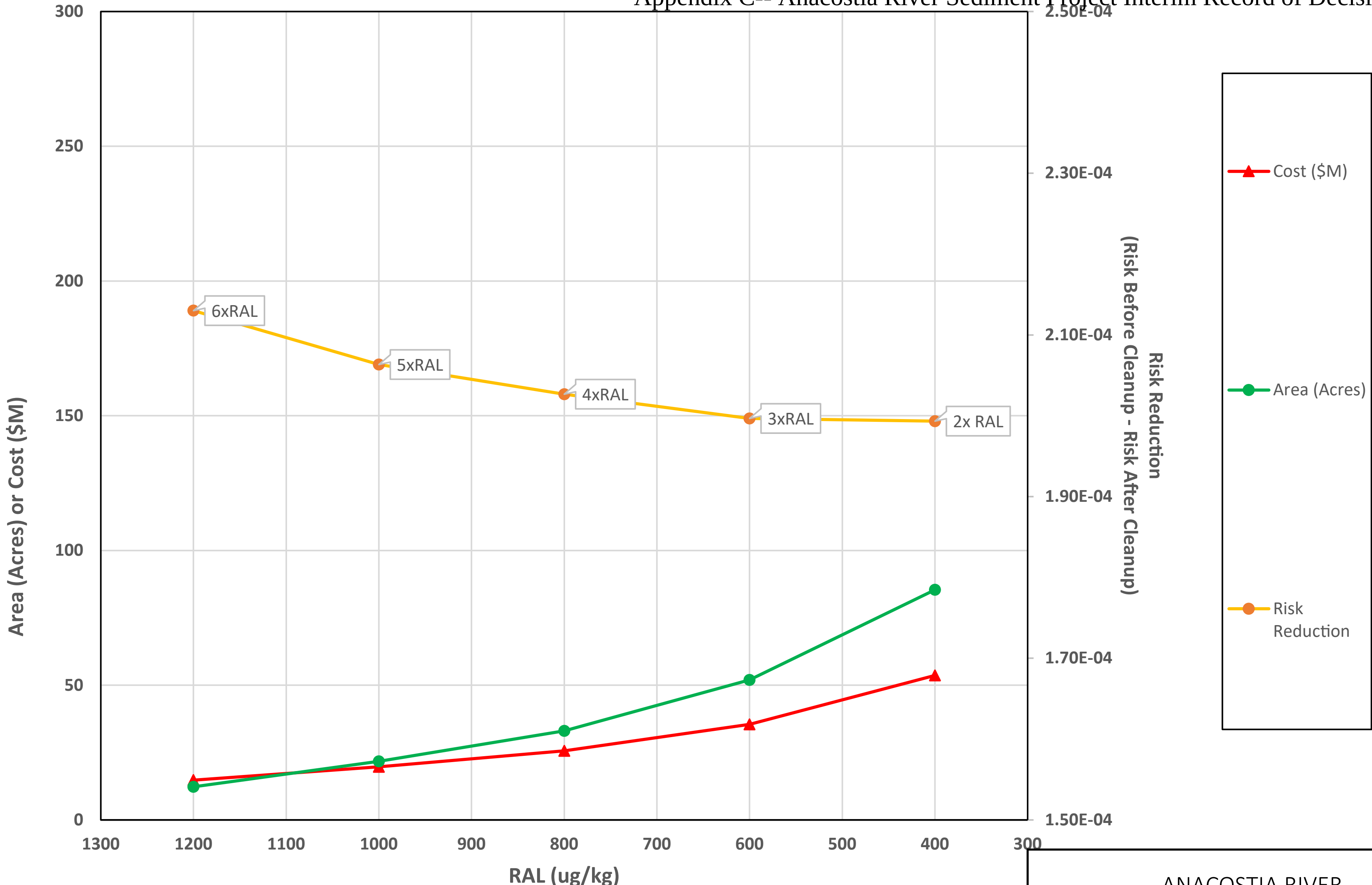
0 1,500 3,000 Feet

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 7.1
FRINGE SEDIMENT - LOW TIDE MINUS ONE FOOT

TETRA TECH

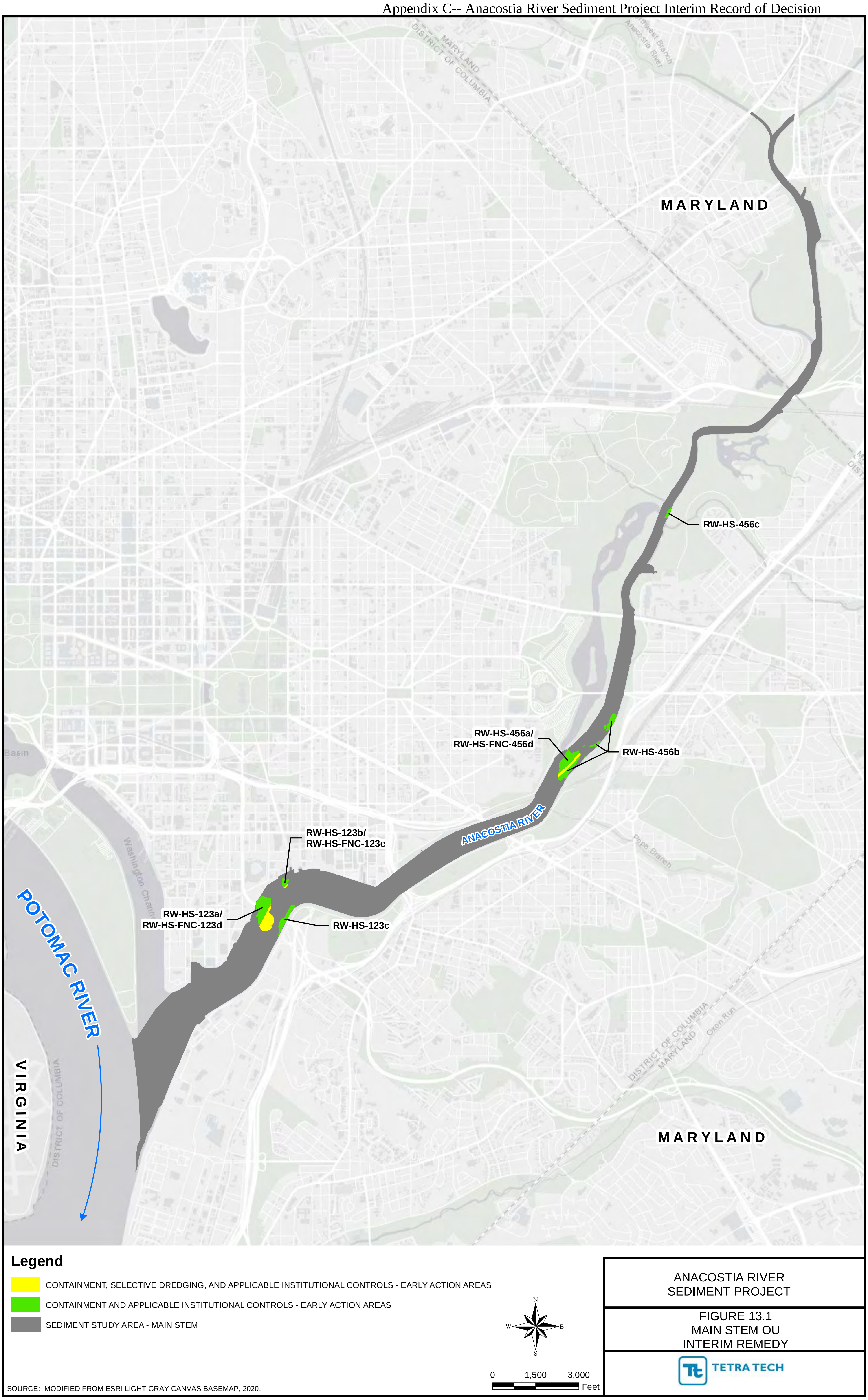
SOURCE: MODIFIED FROM DC GIS, 2012, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.



ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 9.1
PLOT OF RAL VERSUS COST,
AREA SIZE, AND RISK REDUCTION

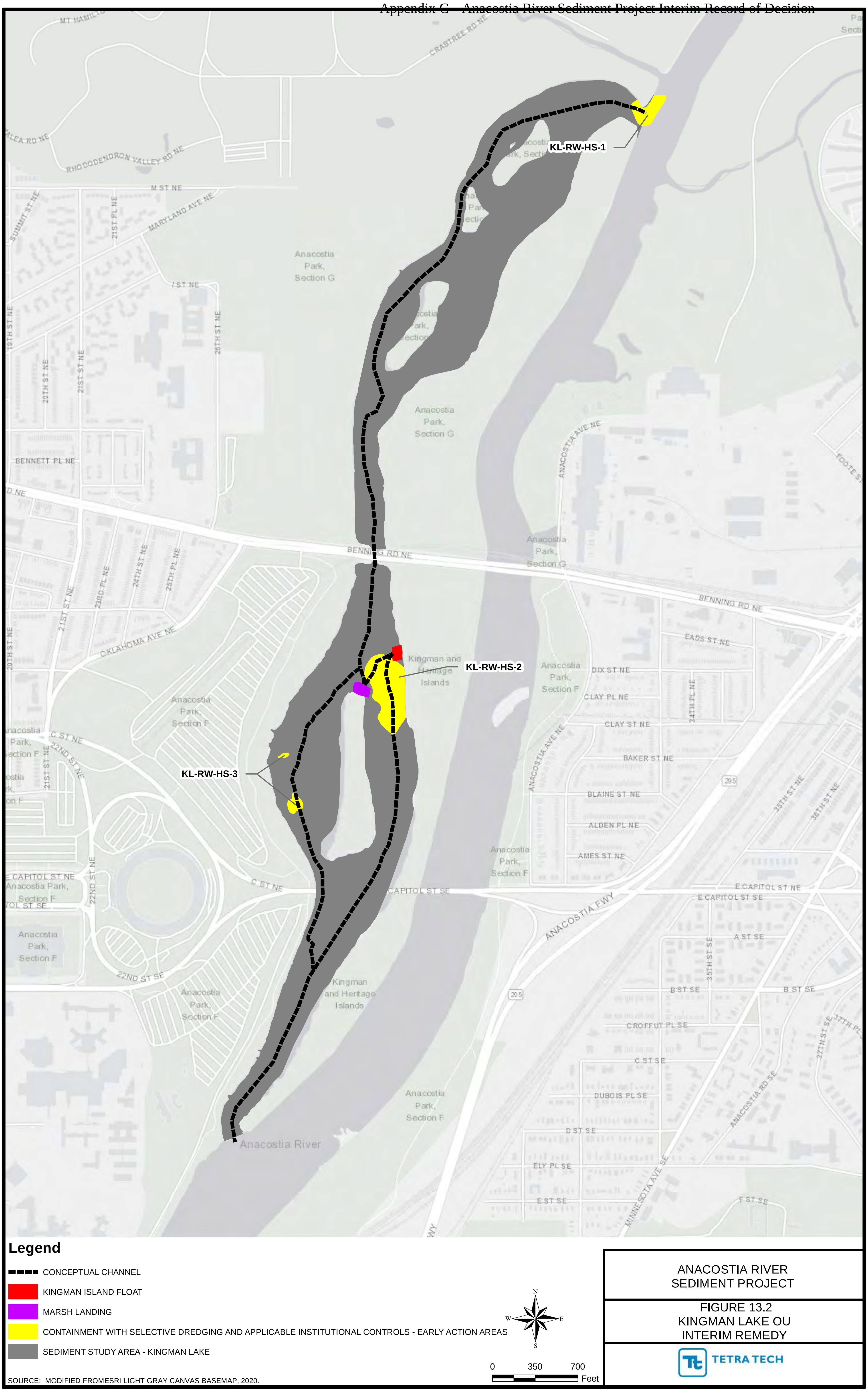
TETRA TECH

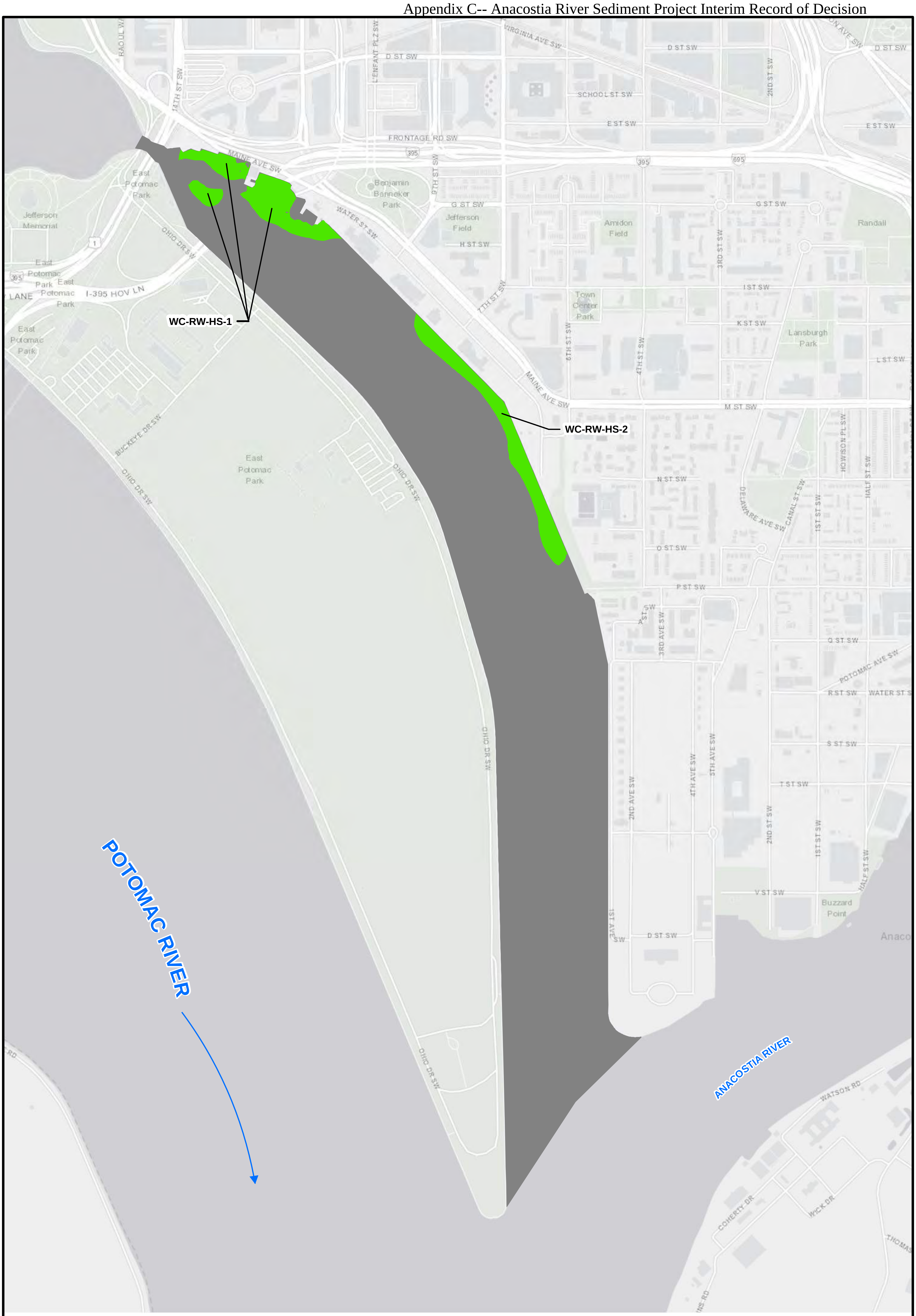


ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 13.1
MAIN STEM OU
INTERIM REMEDY

TETRA TECH


KL-RW-HS-1
KL-RW-HS-2
KL-RW-HS-3
Anacostia Park, Section G
Anacostia Park, Section F
Kingman and Heritage Islands
Anacostia River
BENNING RD NE
OKLAHOMA AVE NE
C ST NE
E CAPITOL ST NE
ANACOSTIA FWY
ANACOSTIA AVE NE
MINNESOTA AVE SE
Legend
CONCEPTUAL CHANNEL
KINGMAN ISLAND FLOAT
MARSH LANDING
CONTAINMENT WITH SELECTIVE DREDGING AND APPLICABLE INSTITUTIONAL CONTROLS - EARLY ACTION AREAS
SEDIMENT STUDY AREA - KINGMAN LAKE
0 350 700 Feet
SOURCE: MODIFIED FROMESRI LIGHT GRAY CANVAS BASEMAP, 2020.
ANACOSTIA RIVER SEDIMENT PROJECT
FIGURE 13.2
KINGMAN LAKE OU
INTERIM REMEDY
TETRA TECH



Legend

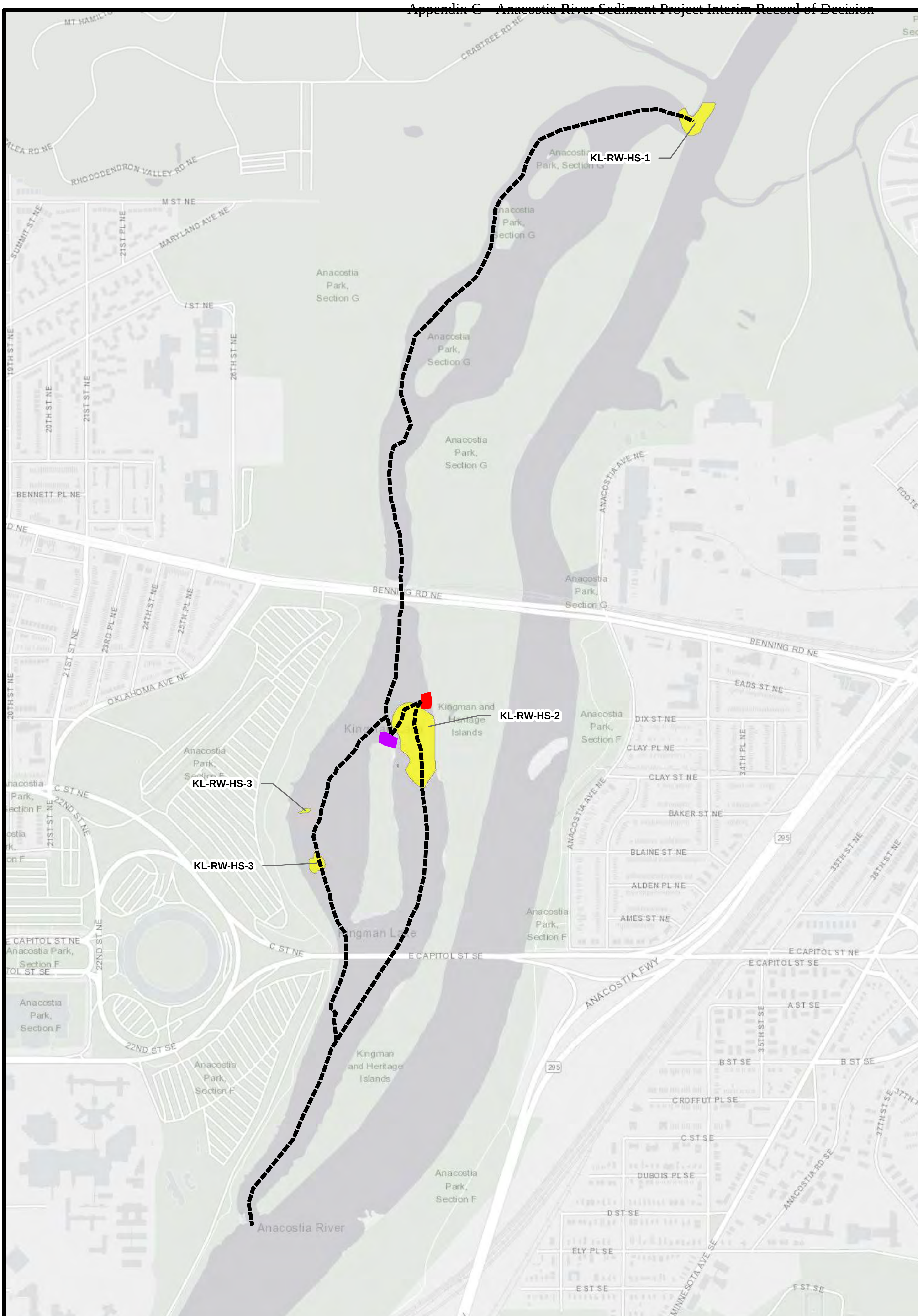
- CONTAINMENT AND APPLICABLE INSTITUTIONAL CONTROLS - EARLY ACTION AREAS
- SEDIMENT STUDY AREA - WASHINGTON CHANNEL

SOURCE: MODIFIED FROM ESRI LIGHT GRAY CANVAS BASEMAP, 2020.

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 13.3
WASHINGTON CHANNEL OU
INTERIM REMEDY

TETRA TECH



Legend

- CHANNELS
- KINGMAN ISLAND FLOAT
- MARSH LANDING
- > 600 µg/kg KRIGED SURFACE-EARLY ACTION AREAS

µg/kg - MICROGRAMS PER KILOGRAM

SOURCE: MODIFIED FROM DCGIS, 2020, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2020.

0 350 700 Feet

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE 15.1
EAAs FOR KINGMAN LAKE
AND CHANNELS

TETRA TECH

TABLES

TABLE 7.1

Overall Summary of Potential Cancer Risks and Noncancer Hazards -- Reasonable Maximum Exposure, Page 1 of 1

River Area	Exposure Area	Endpoint	Swimmer[a] Current	Swimmer[a] Future	Wader[a] Current	Wader[a] Future	Shoreline Worker[a] Current/Future	Recreational Angler[b] Current	Recreational Angler[b] Future	Subsistence Angler[b] Current/Future[c]
Upper Anacostia	Reach 7	Risk	6E-07	3E-06	3E-07	1E-06	6E-07	9E-05	2E-04	3E-04
		Hazard	0.03	0.08	0.02	0.08	0.03	9	20	30
	Reach 67	Risk	4E-07	7E-07	3E-07	1E-06	1E-06	9E-05	2E-04	3E-04
		Hazard	0.1	0.1	0.05	0.2	0.06	9	20	30
	Reach 456	Risk	2E-06	4E-06	2E-06	7E-06	8E-06	9E-05	2E-04	3E-04
		Hazard	0.2	0.5	0.2	0.7	0.3	9	20	30
	Kingman Lake	Risk	8E-07	2E-06	6E-07	2E-06	2E-06	9E-05	2E-04	3E-04
		Hazard	0.06	0.1	0.06	0.2	0.07	9	20	30
Lower Anacostia	Reach 123	Risk	6E-07	1E-06	6E-07	2E-06	2E-06	1E-04	2E-04	5E-04
		Hazard	0.07	0.1	0.07	0.2	0.08	8	10	30
	Washington Channel	Risk	8E-08	2E-07	2E-08	6E-08	4E-08	1E-04	2E-04	5E-04
		Hazard	0.0007	0.001	0.0002	0.0005	0.0002	8	10	30
Background	Upper Non-Tidal Anacostia	Risk	No sediment or surface water data were collected. Therefore, direct contact exposure scenarios were not evaluated.					1E-05	2E-05	4E-05
		Hazard						1	2	4
	Potomac River	Risk	1E-07	3E-07	1E-07	5E-07	6E-07	The Potomac River fish data set is not considered to be representative of background conditions. The discussion of angler-specific exposures, risks, and hazards associated with the Potomac River is presented and discussed in the uncertainty assessment for informational purposes only. It should be noted that sediment-based risks are < 1E-06 and hazards are < 1 for all anglers.		
		Hazard	0.005	0.01	0.005	0.02	0.006			

Notes:

(yellow) Denote cancer risks ≥ 1E-06 and ≤ 1E-04

(orange) Denotes cancer risks > 1E-04 or HI > 1.

a Potential exposure via direct contact and incidental ingestion with fringe sediment and surface water only. Highest risk/hazard for each scenario is presented (the results vary by age group and polychlorinated biphenyl [PCB] toxicity method).

b Potential exposure via direct contact and incidental ingestion with fringe sediment and surface water and via consumption of fish. Highest risk/hazard for each scenario is presented (the results vary by age group and PCB toxicity method).

c Total risk/hazard for current and future subsistence anglers are the same at one significant figure, and are therefore presented together. Sediment and surface water exposure frequencies (and therefore, risks and hazards) are higher for the future scenario. Fish consumption rates are identical for current and future scenarios.

TABLE 7.2

Overall Summary of Potential Cancer Risks and Noncancer Hazards -- Central Tendency Exposure, Page 1 of 1

River Area	Exposure Area	Endpoint	Swimmer[a] Current	Swimmer[a] Future	Wader[a] Current	Wader[a] Future	Shoreline Worker[a] Current/Future	Recreational Angler[b] Current	Recreational Angler[b] Future	Subsistence Angler[b] Current/Future[c]
Upper Anacostia	Reach 7	Risk	2E-07	5E-07	9E-08	2E-07	6E-08	1E-05	2E-05	3E-05
		Hazard	0.007	0.02	0.006	0.01	0.01	2	5	7
	Reach 67	Risk	1E-07	3E-07	1E-07	2E-07	1E-07	1E-05	2E-05	3E-05
		Hazard	0.03	0.03	0.01	0.02	0.02	2	5	7
	Reach 456	Risk	7E-07	1E-06	7E-07	1E-06	9E-07	1E-05	2E-05	3E-05
		Hazard	0.06	0.1	0.06	0.1	0.1	2	5	7
	Kingman Lake	Risk	2E-07	5E-07	2E-07	4E-07	2E-07	1E-05	2E-05	3E-05
		Hazard	0.02	0.03	0.02	0.03	0.03	2	5	7
Lower Anacostia	Reach 123	Risk	2E-07	4E-07	2E-07	4E-07	2E-07	2E-05	3E-05	5E-05
		Hazard	0.02	0.04	0.02	0.04	0.03	2	4	6
	Washington Channel	Risk	2E-08	4E-08	3E-09	6E-09	3E-09	2E-05	3E-05	5E-05
		Hazard	0.0002	0.0004	0.00003	0.00005	0.00007	2	4	6
Background	Upper Non-Tidal Anacostia	Risk	No sediment or surface water data were collected. Therefore, direct contact exposure scenarios were not evaluated.					2E-06	3E-06	5E-06
		Hazard						0.3	0.6	0.9
	Potomac River	Risk	6E-08	1E-07	6E-08	1E-07	7E-08	The Potomac River fish data set is not considered to be representative of background conditions. The discussion of angler-specific exposures, risks, and hazards associated with the Potomac River is presented and discussed in the uncertainty assessment for informational purposes only. It should be noted that sediment-based risks are < 1E-06 and hazards are < 1 for all anglers.		
		Hazard	0.002	0.003	0.002	0.003	0.002			

Notes:

(Yellow) Denote cancer risks ≥ 1E-06 and ≤ 1E-04

(Orange) Denotes cancer risks > 1E-04 or HI > 1.

a Potential exposure via direct contact and incidental ingestion with fringe sediment and surface water only. Highest risk/hazard for each scenario is presented (the results vary by age group and polychlorinated biphenyl [PCB] toxicity method).

b Potential exposure via direct contact and incidental ingestion with fringe sediment and surface water and via consumption of fish. Highest risk/hazard for each scenario is presented (the results vary by age group and PCB toxicity method).

c Total risk/hazard for current and future subsistence anglers are the same at one significant figure, and are therefore presented together. Sediment and surface water exposure frequencies (and therefore, risks and hazards) are higher for the future scenario. Fish consumption rates are identical for current and future scenarios.

Table 7.3
Summary of Human Health Risk Results - All Exposure Scenarios, Page 1 of 1

	BERA		Swimmers						Waders						SLW	Anglers											
Reach/Receptor	Benthic Invertebrate Survival, Growth, and Reproduction	Larval Fish Survival and Growth	Current Child Swimmer	Current Adolescent Swimmer	Current Adult Swimmer	Future Child Swimmer	Future Adolescent Swimmer	Future Adult Swimmer	Current Child Wader	Current Adolescent Wader	Current Adult Wader	Future Child Wader	Future Adolescent Wader	Future Adult Wader	Current/Future Shoreline Worker	Current Child Recreationalist Angler	Current Adolescent Recreationalist Angler	Current Adult Recreationalist Angler	Future Child Recreationalist Angler	Future Adolescent Recreationalist Angler	Future Adult Recreationalist Angler	Current Child Subsistence Angler	Current Adolescent Subsistence Angler	Current Adult Subsistence Angler	Future Child Subsistence Angler	Future Adolescent Subsistence Angler	Future Adult Subsistence Angler
Reach 7	`																				(3)						
Reach 67												(2)			(2)						(3)						
Reach 456					(2)						(2)										(3)						
Kingman Lake														(2)							(3)						
Reach 123																						(1)	(1)		(1)	(1)	
Washington Channel																						(1)	(1)		(1)	(1)	
Background/Reference (4)																											

Notes:

Baseline Ecological Risk Assessment (BERA)

No Risk	Green cells indicate that survival, growth, or reproduction was not statistically different from reference samples.
Risk	Orange cells indicate that survival, growth, or reproduction was reduced in at least one invertebrate sample, or growth was reduced in larval fish sample relative to reference samples.

Human Health Risk Levels

All human health cancer risk for exposure to Anacostia River sediment, surface water and fish are shown, but non-cancer hazards are not. Fish sample spatial information is reported within river region not river reach. Also, it should be noted that the noncancer hazards exceeded 1 for all recreational and subsistence anglers, except for current recreational angler for the upper non-tidal Anacostia River.

	No exposure to suface sediment (Washington Channel) or no surface water data available (non-tidal Anacostia River and Potomac River). In Washington Channel, all surface water risks are <10-6 and hazards <1 for all swimmers, waders, and shoreline workers. Similarly, for background, all sediment risks are <10-6 and hazards <1 for all swimmers, waders, and shoreline workers.
	$<10^{-6}$ (less than 1 in 1 million)
	$\geq 10^{-6}$ and $\leq 10^{-4}$ (1 in 1 million to less than 1 in 10,000)
	$>10^{-4}$ (1 in 10,000 or greater)

(1) - Risk is >1E-04 when including dioxin-like PCBs and excluding total PCBs.

(2) - Risk is 1E-06 when including dioxin-like PCBs and excluding total PCBs.

(3) - Risk is > 1E-04 when including total PCBs and excluding dioxin-like PCBs.

(4) - For swimmers, waders, and shoreline workers only background sediment from the Potomac River is available. For all anglers, only background fish from the upper, non-tidal Anacostia River is available.

Abbreviations:

SLW	Shoreline Worker

TABLE 7.4
Summary of Ecological Risk Assessment Results, Matrix of Risk by Exposure Unit and Receptor, Page 1 of 1

Exposure Unit / Reach	Ecological Receptors and Endpoints: Benthic Invertebrate Survival, Growth, and Reproduction	Fish Survival and Growth	Benthic Invertebrates (chemicals in tissues)	Fish (chemicals in tissues)	Turtles (chemicals in tissues)	Birds and Mammals
Washington Channel, EU-1					--	
Reach 123, EU-2					--	
Reach 456, EU-3						
Reach 67, EU-4						
Reach 7, EU-5			--		--	
Kingman Lake, EU-6						
Whole River						
Background - Potomac River			--	--	--	

No unacceptable risk
Exposure and potential risk based on PCBs and pesticides in tissues
Risk based on direct toxicity of sediment
No data

Notes:

- *Benthic Invertebrate Survival, Growth, and Reproduction:*
  Orange cells indicate that survival, growth, or reproduction was reduced in at least one sample within that reach.
- *Fish Survival and Growth:*
  Orange cells indicate that growth was reduced in at least one sample.
- *Benthic Invertebrates (chemicals in tissues):*
  Yellow cells indicate that PCBs or pesticides in tissues were at least 10 times greater than in sediments.
- *Fish (chemicals in tissues):*
  Yellow cells indicate that PCBs or pesticides in whole fish were at least 10 times greater than in Sediments or biomagnification factor was greater than 10.
- *Turtles (chemicals in tissues):*
  Green cells indicate that chemicals in turtles were similar to turtles from unpolluted areas.
- *Birds and Mammals:*
  Green cells indicate that the diets of birds and mammals contain acceptable concentrations of chemicals.

Abbreviations:

EU Exposure Unit
PCB polychlorinated biphenyl

Table 9.1
Human Health Sediment PRGs Based on Fish Ingestion by Subsistence Anglers, Whole River,
Page 1 of 1

Chemical[1]	Units	Top Predator Whole Body[2,3]
PCBC_TEQ_1B[4]	µg/kg	1.16E-03
PCBC_TOTAL1B	µg/kg	6.55E+01

Notes:

1. Back-calculated risk-based concentrations for humans ingesting fish based on exposure factors presented in EPA 2017 RSL tables, at a target risk of 1E-05 and non-cancer hazard of 1.0. Consumption rates based on a local survey of anglers (OpinionWorks 2012, Gibson and McClafferty 2005, LBG 2014a), assuming a consumption rate of 65 grams a day for current and future adult subsistence anglers. Derivation of all fish ingestion rates is detailed in Attachment J-2 to Appendix J of the ARSP RI Report (Tetra Tech 2019).

2. This table presents the RBCs calculated by Method 2, Top predator (whole body), one of three methods considered during development of the risk-based concentrations and was selected as the method upon which the sediment PRG is based because it is the most representative PRG for subsistance anglers.

3. Top predator (whole body) with a fillet fraction applied, a BMF from forage fish to top predators, and a bioaccumulation factor from sediment to forage fish.

4. TEQ calculations used TEFs from Van Den Berg et al. (2006).

Acronyms and Abbreviations:

ARSP	Anacostia River Sediment Project	PCB	Polychlorinated biphenyl
BMF	Biomagnification Factor	PRG	Preliminary remediation goal
COC	Contaminant of Concern	RBC	Risk-based concentration
Dioxin-like PCBs	WHO 2005 dioxin-like PCB Toxic equivalent using detected results (Van den Berg 2006)	RSL	Regional Screening Level
		RI	Remedial Investigation
		Total PCB (Aroclors)	Sum of detected Aroclors
EPA	Environmental Protection Agency	Total PCB (Congeners)	Sum of detected PCB congeners
HHRA	Human Health Risk Assessment	TEQ	Toxic Equivalent
µg/kg	Microgram per kilogram	TEF	Toxicity equivalency factor

References:

Gibson J.C., and McClafferty J.A. 2005. Chesapeake Bay Angler Interviews: Identifying Populations at Risk for Consuming Contaminated Fish in Three Regions of Concern. Prepared for the Chesapeake Bay Program. Prepared by Conservation Management Institute, College of Natural Resources, Virginia Polytechnic Institute, and State University Blacksburg, VA. Final Report CMI-HDD-05-01. March 29.

Louis Berger Group (LBG). 2014a. Appendix D – Risk Assessment to the Remedial Investigation report for the Focused Feasibility Study, Lower Eight Miles of the Lower Passaic River. Prepared in conjunction with Battelle, HDR/HydroQual.

OpinionWorks. 2012. Addressing the Risk: Understanding the Changing Anglers' Attitudes about the Dangers of Consuming Anacostia River Fish. http://www.anacostiaws.org/userfiles/file/AWS_angling_FINAL_web.pdf

Tetra Tech. 2019. Anacostia River Sediment Project Remedial Investigation Report. December 2019.

Van Den Berg, M; Birnbaum, L; Denison, M; et al. 2006. The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences, Vol. 93, Is. 2; p 223-241.

Table 9.2
Ecological Preliminary Remediation Goals, Page 1 of 1

Chemical of Ecological Concern	Ecological PRG	Units
Dioxin-like PCBs	2.50E-02	µg/kg
Dioxin TEQ	2.50E+01	ng/kg
Chlordane	1.80E+01	µg/kg

Acronyms and Abbreviations

µg/kg	Microgram per kilogram
ng/kg	Nanogram per kilogram
PCB	Polychlorinated biphenyl
TEQ	Toxic equivalent

Table 9.3

Sediment Preliminary Remediation Goals, Page 1 of 2

COC[1]	Units	Site-Specific Concentrations			Risk-Based Concentrations				Selected PRGs	Notes
		Fringe Surface Sediment 95UCL[2]	All Surface Sediment 95UCL[2]	BTV[3]	Human Health PRGs based on Subsistence Fish Ingestion[4]			Ecological PRGs [5]		
		Fringe	All		RSL = 1E-06	RSL = 1E-05	RSL = 1E-04			
Dioxin-like PCBs	µg/kg	1.50E-01	5.00E-02	5.50E-04	1.20E-04	1.20E-03	2.50E-03	2.50E-02	1.20E-03	Fish Ingestion
Total PCBs	µg/kg	9.60E+02	5.00E+02	1.70E+01	7.00E+00	6.50E+01	6.50E+01	NA	6.50E+01	Fish Ingestion
Chlordane	µg/kg	1.20E+02	7.10E+01	1.10E+01	NA	NA	NA	1.80E+01	1.80E+01	Benthic Invertebrates
Dioxin TEQ[6]	ng/kg	8.90E+01	3.80E+01	8.60E+00	NA	NA	NA	2.50E+01	2.50E+01	Benthic Invertebrates

Notes:

1. Chemicals posing risk at 1E-05 risk level for human health or exceeding the ecological probable effect concentration by a factor of 2 on one or more OUs are presented; COCs are matrix specific.

2. The 95 percent upper confidence limit on the mean (95UCL) concentrations were calculated using ProUCL 5.1.002 (EPA 2015). The human health surface sediment exposure includess only the sediment exposed at low tide minus one foot. The BERA assumes exposure to all surface sediment.

3. BTV, calculated as the USL, is the estimated upper boundary (at the 95 percent confidence level) of the largest value of the background dataset calculated using ProUCL 5.1.002 (EPA 2015).

4. RBCs for human health are back calculations for forage fish to gamefish (Method 2) for the lower of the cancer risk and non-cancer hazard index of 1 with exposure factors for humans ingesting fish based on risk-based factors presented in RSL tables (EPA 2017a). Fish consumptions rates are based on a local survey of anglers and (OpinionWorks 2012, Gibson and McClafferty 2005); a consumption rate of 65 grams per day for adult subsistence angler was assumed for RME. Child and adolescent fish ingestion rates were calculated as one-third and two-thirds of the adult rates, respectively. Subsistence fish ingestion is representative of the lowest calculated human health PRGs for the Anacostia River as a whole.

5. Ecological PRGs are based on probable effect concentrations in NPS (2018) and EPA (2018).

6. TEQ calculations used toxicity equivalency factors from Van den Berg et al. (2006). Note that dioxin TEQ results are reported as ng/kg.

Acronyms and Abbreviations

µg/kg	Microgram per kilogram
BTV	Background threshold value

Table 9.3
Sediment Preliminary Remediation Goals, Page 2 of 2

COC	Chemical of concern
DIOX_TEQ	WHO 2005 dioxin toxic equivalent using detected results
Dioxin-like PCBs	WHO 2005 dioxin-like PCB toxic equivalent using detected results (Van den Berg 2006)
EPA	Environmental Protection Agency
mg/kg	Milligram per kilogram
ng/kg	Nanogram per kilogram
NA	Not applicable because the chemical is not a human health COC at the 1E-05 risk level.
PCB	Polychlorinated biphenyl
PRG	Preliminary remediation goal
RSL	Regional Screening Level
RBC	Risk-based concentration
TEQ	Toxic equivalent
Total PCBs	Sum of detected PCB congeners

References:

Gibson J.C., and McClafferty J.A. 2005. Chesapeake Bay Angler Interviews: Identifying Populations at Risk for Consuming Contaminated Fish in Three Regions of Concern. Prepared for the Chesapeake Bay Program. Prepared by Conservation Management Institute, College of Natural Resources, Virginia Polytechnic Institute, and State University Blacksburg, VA. Final Report CMI-HDD-05-01. March 29.

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EPA. 2015. ProUCL Version 5.1.002 Technical Guide." EPA/600/R-07/041. Prepared by A. Singh and A.K. Singh. Office of Research and Development,

EPA. 2017. Regional Screening Levels (RSLs) -- Generic Tables (June 2017). https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-

EPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance, Interim Draft: Table 2a (metals, PCBs, pesticides).

TABLE 9.4

Reach-specific RALs, Total PCB Congeners, Page 1 of 1

Chemical of Concern	Units	PRG	RALs						
			Reach 7	Reach 67	Reach 456	Reach 123	Kingman Lake OU	Washington Channel OU	River-wide RAL[1]
Total PCB Congeners	µg/kg	65	74	160	170	210	220	220	200

1. Average RAL for the six reaches is 176 µg/kg which is rounded up to 200 µg/kg for the River-wide RAL

Acronyms and Abbreviations:

OU	Operable Unit
PCB	Polychlorinated biphenyls
PRG	Preliminary Remediation Goals
RAL	Remedial Action Levels
µg/kg	Micrograms per kilogram

Table 9.5
Reach-specific and Site-wide Cleanup Acreages for 2x, 3x, 4x, 5x, 6x, and 10x the River-wide RAL (200 µg/kg) for Total PCB Congeners, Page 1 of 1

Operable Unit	Reach	Early Action Area	10x RAL (2000 µg/kg) (Acres)	6x RAL (1200 µg/kg) (Acres)	5x RAL (1000 µg/kg) (Acres)	4x RAL (800 µg/kg) (Acres)	3x RAL (600 µg/kg) (Acres)	2x RAL (400 µg/kg) (Acres)
Main Stem	123	RW-HS-123a/RW-HS-FNC-123d	2.4	6.3	7.7	9.7	12.8	26.0
		RW-HS-123b/FW-HS-FNC-123e	0.0	0.6	0.8	1.0	1.8	2.2
		RW-HS-123c	0.1	1.0	1.5	2.2	3.5	0.0
	456	RW-HS-456a/RW-HS-FNC-456d	0.0	0.2	4.6	7.2	7.6	15.6
		RW-HS-456b	0.0	0.2	0.7	1.9	6.2	4.6
		RW-HS-456c	0.0	0.0	0.2	0.5	0.8	1.3
Kingman Lake	KL	KL-RW-HS-1	0.0	0.1	0.3	0.5	0.9	1.5
		KL-RW-HS-2	0.0	1.0	1.6	2.4	3.4	5.4
		KL-RW-HS-3	0.0	0.0	0.0	0.1	0.4	1.5
Washington Channel	WC	WC-RW-HS-1	0.8	3.0	4.2	5.1	7.3	11.8
		WC-RW-HS-2	0.0	0.0	0.1	2.5	7.0	14.0
Totals (Acres)			**3**	**12**	**22**	**33**	**52**	**84**

Acronyms and Abbreviations:

PCB	Polychlorinated biphenyls
RAL	Remedial Action Levels
µg/kg	Micrograms per kilogram

Table 9.6

Pre- and Post-EAA Remedy SWAC and Risk for Total PCB Congeners, Page 1 of 1

Operable Unit	Pre-Remedy SWAC (µg/kg)	Post Remedy SWAC (µg/kg)	SWAC Percent Reduction	Pre-Remedy Risk	Post- Remedy Risk	Estimated Risk Reduction (Percent)
Main Stem	207	160	23	2.30E-04	2.30E-05	90
Kingman Lake	270	184	32	2.60E-04	2.80E-05	89
Washington Channel	306	84	73	2.20E-04	1.30E-05	94

Notes:

Main Stem OU includes Reach 123 and Reach 456; no EAAs were identified in Reach 67 or Reach 7.

Acronyms an Abbreviations:

SWAC	Surface weighted average concentration
µg/kg	micrograms per kilogram
EAA	Early Action Area

Table 10.1
Preliminary Adaptive Management Decision Framework, Page 1 of 2

Remedial Action Objective	Potential Indicator[1]	Decision Framework			
		Sampling Activity	Interpretation	Trigger Criteria	Potential Actions
RAO1 - Reduce Human Fish Consumption Risk[2]	GFFT	Fillet samples of game fish species with small home range (e.g., brown bullhead)	Compare sample concentrations to fish advisory criteria and project-specific risk based criteria; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in game fish fillets will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm trends ● Implement institutional controls ● Conduct additional early targeted action sediment remediation ● Conduct additional targeted source control ● Revise PRG
	SW	Passive sampling of surface water in each OU	Compare sample concentrations to selected effect levels; explore multivariate correlations among all indicators, with focus on game fish fillets	Game fish fillets are the primary indicator; other indicators will be used as supporting lines of evidence	
	FFT	Forage fish whole body and/or organ samples			
	BT	Benthic organism tissue samples			
	SSPW	Passive sampling of surface sediment pore water			
	SS	Surface sediment	Compare sample concentrations with reach and river-wide remedial action levels; explore multivariate correlations among all indicators, with focus on game fish fillets		
RAO2 - Reduce Human Exposure to Sediment Risk[3]	At 1E-05 risk level, this RAO is satisfied and therefore is not considered further in the adaptive management decision process.				
RAO3 - Protect Benthic and Aquatic Invertebrates[4]	SS	Surface sediment	Compare sample concentrations to probable effect concentrations; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in sediment will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm temporal trends ● Characterize geographic extent of impairment and conduct focused sediment remediation based on toxicity test results ● Revise PRG
	SW	Passive sampling of surface water in each OU	Compare sample concentrations to selected chronic effect concentrations; explore multivariate correlations among all indicators	Primary medium is surface sediment; other indicators will be used as supporting lines of evidence	
	SSPW	Passive sampling of surface sediment pore water			
	BT	Benthic organism tissue samples			

Table 10.1
Preliminary Adaptive Management Decision Framework, Page 2 of 2

Remedial Action Objective	Potential Indicator[1]	Decision Framework			
		Sampling Activity	Interpretation	Trigger Criteria	Potential Actions
RAO4 - Protect Fish[5]	GFFT	Fillet, whole fish, and/or organ samples of game fish species with small home range (e.g., brown bullhead)	Compare sample concentrations to effect levels; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in sediment will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm temporal trends ● Characterize geographic extent of impairment and conduct focused sediment remediation based on direct bioaccumulation in fish ● Revise PRG
	FFT	Forage fish whole body and/or organ samples of species with small home			
	BT	Benthic organism tissue samples	Compare sample concentrations to selected chronic effect concentrations; explore multivariate correlations among all indicators	Primary medium is forage and game fish tissue; other indicators will be used as supporting lines of evidence	
	SW	Passive sampling of surface water in each OU			
	SSPW	Passive sampling of surface sediment pore water			
	SS	Surface sediment			

Notes:

1. Selection of indicators, sampling activities, and actions will be based on scientific data within an adaptive management framework.
2. RAO1: Reduce risks associated with the consumption of COCs in fish from the tidal Anacostia River by people with the highest potential exposure.
3. RAO2: Reduce risks associated with direct exposure of people to surface sediment in shallow water (fringe sediment) in the tidal Anacostia River.
4. RAO3: Reduce risks associated with COCs in sediment to levels protective of benthic and aquatic invertebrates based on direct chronic exposure to surface sediment and surface water.
5. RAO4: Reduce risks associated with COCs in surface sediment to levels protective of fish based on direct contact with and ingestion of surface water, sediment, and prey.

Acronyms and Abbreviations:

BT	Benthic Invertebrate Tissue	RAO	Remedial Action Objective
FFT	Forage Fish Tissue	SS	Surface Sediment SWAC
GFFT	Game Fish Fillet Tissue	SSPW	Surface Sediment Pore Water
OU	Operable Unit	SW	Surface Water

Table 11.1
Comparative Evaluation of Remedial Alternatives: Main Stem Early Action Areas, Page 1 of 2

EVALUATION CRITERIA	Alternative MSHS-1 No Action	Alternative MSHS-4 Containment with Selective Dredging and Disposal
THRESHOLD CRITERIA		
Overall Protection to Human Health and the Environment	Not protective. No action would be taken.	Protective. Sediment would be covered with clean material.
Criteria Score	**Fail**	**Pass**
Compliance with ARARs	Would not meet ARARs	Would meet ARARs
Criteria Score	**Fail**	**Pass**
PRIMARY BALANCING CRITERIA		
Long-Term Effectiveness and Permanence	Not Applicable	Highly Effective
	Not Applicable	All sediment above the RAL is capped. Shallow sediment removed to limit future cap disturbance.
Criteria Score	**0**	**4**
Reduction of Toxicity, Mobility, or Volume through Treatment	Not Applicable	Does not reduce toxicity or volume. Somewhat effective in reducing mobility for dredged sediment treated prior to off-site disposal. Sand cap reduces mobility of COCs in surface sediment.
Criteria Score	**0**	**2**
Short-term Effectiveness	Not Applicable	Minimal impacts during implementation
	Not Applicable	Implementation in one year period. Risks are controllable. Truck traffic for delivery of cap materials and disposal of sediment. Potential for air emissions from sediment management process.
Criteria Score	**0**	**3**

EVALUATION CRITERIA	Alternative MSHS-1 No Action	Alternative MSHS-4 Containment with Selective Dredging and Disposal
Implementability	Not Applicable	Readily Implementable
	Not Applicable	Dredging and capping are readily implementable.
Criteria Score	**0**	**4**
Cost (relative to other alternatives)	$0	$19,470,000 ($11,340,000 for EAAs outside federal channel and $8,130,000 for EAAs within the federal channel)
Criteria Score	**0**	**1**
Alternative Total Score not including Modifying Criteria	**Not Acceptable**	**14**

Notes:

1. The Threshold Criteria have been evaluated on a pass/fail basis. An Alternative must pass both threshold criteria in order to be considered as a remedial action. Alternatives that fail either threshold criteria are marked as not applicable (NA) for the Alternative total score.
2. The Primary Balancing Criteria have been evaluated on a scale of 1-5. Details on each scale criterion are listed below.

<u>Long-Term Effectiveness and Permanence</u>

1 = Ineffective and temporary
2 = Somewhat effective
3 = Effective
4 = Highly Effective
5 = Highly Effective and Permanent

<u>Short-term Effectiveness</u>

1 = Detrimental impacts during implementation
2 = Significant impacts during implementation
3 = Minimal impacts during implementation
4 = Slight impacts during implementation
5 = No impacts during implementation

Table 11.1
Comparative Evaluation of Remedial Alternatives: Main Stem Early Action Areas, Page 2 of 2

Reduction of Toxicity, Mobility, or Volume through Treatment
- 1 = Does not reduce toxicity, mobility, or volume
- 2 = Somewhat effective at reducing toxicity, mobility, or volume
- 3 = Effective at reducing toxicity, mobility, or volume
- 4 = Highly Effective at reducing toxicity, mobility, or volume
- 5 = Complete reduction of toxicity, mobility, or volume

Implementability
- 1 = Very difficult to implement
- 2 = Difficult to implement
- 3 = Implementable
- 4 = Readily implementable
- 5 = Easily implementable

3. A full presentation of alternative costs can be found in Section 4 of the Focused FS report.

Table 11.2

Main Stem Detailed Cost Analysis for Alternative MSHS-4 – Containment with Selective Dredging and Disposal (Outside Federal Navigation Channel), Page 1 of 2

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 343,750.00	$ 343,750
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 1,203,125.00	$ 1,203,125
	Preparation Subtotal				**$ 1,546,875**
Implementation					
3	Sand Cap Placement (12 inch minimum)	55,000	CY	$ 125.00	$ 6,875,000
	Implementation Subtotal				**$ 6,875,000**
Site Restoration					
4	Site Restoration and Demobilization	1	Lump	$ 171,875.00	$ 171,875
	Site Restoration Subtotal				**$ 171,875**
Construction Subtotal					$ 8,593,750
5	Construction Contractor Bonds	2%			$ 171,875
6	Project Management and Construction Oversight				$ 257,813
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 9,023,438**
CAPITAL COST SUBTOTAL					**$ 9,023,438**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	240	hr	$ 110.00	$ 26,400
2	Meetings with agencies (senior staff and attorneys)	80	hr	$ 250.00	$ 20,000
Institutional Controls Subtotal					**$ 46,400**

TOTAL COSTS		
Description		**Subtotal**
Construction		$ 9,023,438
Institutional Controls		$ 46,400
Contingency	25%	$ 2,267,459
Total (Rounded)		**$ 11,340,000**

Table 11.2
Main Stem Detailed Cost Analysis for Alternative MSHS-4 – Containment with Selective Dredging and Disposal (Outside Federal Navigation Channel), Page 2 of 2

Acronyms and Abbreviations:

CY	Cubic yards	LUC	Land use controls
EMNR	Enhanced monitoried natural recovery	MNR	Monitoried natural recovery
hr	hour	O&P	Overhead and profit

Table 11.3

Main Stem Detailed Cost Analysis for Alternative MSHS-4 – Containment with Selective Dredging and Disposal (Inside Federal Navigation Channel), Page 1 of 2

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 245,637.50	$ 245,638
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 859,731.25	$ 859,731
	Preparation Subtotal				**$ 1,105,369**
Implementation					
3	Dredging and Dewatering and Disposal				
3a	Dredging and Sediment Transport	15,250	CY	$ 70.00	$ 1,067,500
3b	Sediment Dewatering	15,250	CY	$ 35.00	$ 533,750
3c	Amendment Addition for Sediment Dewatering (20% of total)	3,050	CY	$ 5.00	$ 15,250
3d	Waste Water Treatment	15,250	CY	$ 15.00	$ 228,750
3e	Transportation and Disposal	21,350	Ton	$ 50.00	$ 1,067,500
4	Sand Cap Placement (12 inch minimum)	16,000	CY	$ 125.00	$ 2,000,000
	Implementation Subtotal				**$ 4,912,750**
Site Restoration					
6	Site Restoration and Demobilization	1	Lump	$ 122,819.00	$ 122,819
	Site Restoration Subtotal				**$ 122,819**
Construction Subtotal					$ 6,140,938
7	Construction Contractor Bonds	2%			$ 122,819
8	Project Management and Construction Oversight				$ 184,228
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 6,447,985**
CAPITAL COST SUBTOTAL					**$ 6,447,985**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	300	hr	$ 110.00	$ 33,000
2	Meetings with agencies (senior staff and attorneys)	100	hr	$ 250.00	$ 25,000
Institutional Controls Subtotal					**$ 58,000**

Table 11.3

Main Stem Detailed Cost Analysis for Alternative MSHS-4 – Containment with Selective Dredging and Disposal (Inside Federal Navigation Channel), Page 2 of 2

TOTAL COSTS			
Description			**Subtotal**
Construction		$	6,447,985
Institutional Controls		$	58,000
Contingency	25%	$	1,626,496
Total (Rounded)		**$**	**8,130,000**

Acronyms and Abbreviations:

CY	Cubic yards	LUC	Land use controls
EMNR	Enhanced monitoried natural recovery	MNR	Monitoried natural recovery
hr	hour	O&P	Overhead and profit

Table 11.4
Comparative Evaluation of Remedial Alternatives: Kingman Lake Early Action Areas, Page 1 of 2

EVALUATION CRITERIA	Alternative KLHS-1	Alternative KLHS-3	Alternative KLHS-4
	No Action	**EMNR Direct Application of Activated Carbon**	**EMNR TLCP with Selective Dredging and Disposal**
THRESHOLD CRITERIA			
Overall Protection to Human Health and the Environment	Not protective. No action would be taken.	Protective. Sediment would be covered with clean material	Protective. Sediment would be covered with clean material
Criteria Score	**Fail**	**Pass**	**Pass**
Compliance with ARARs	Would not meet ARARs	Would meet ARARs	Would meet ARARs
Criteria Score	**Fail**	**Pass**	**Pass**
PRIMARY BALANCING CRITERIA			
Long-Term Effectiveness and Permanence	Not Applicable	Effective	Effective
	Not Applicable	Activated carbon mixed into surface sediment to facilitate EMNR. Carbon does not degrade with time. Limited chance of disturbance with modest long-term sediment deposition.	All sediment above the hot spot RAL is capped. Shallow sediment removed to limit future cap disturbance. Additional long-term sediment deposition over cap enhances effectiveness and permanence.
Criteria Score	**0**	**3**	**3**
Reduction of Toxicity, Mobility, or Volume through Treatment	Not Applicable	Does not reduce volume. Effective in reducing mobility and toxicity.	Does not reduce volume. Effective in reducing mobility for sediment treated prior to disposal.
	Not Applicable	Activated carbon reduces COC toxicity and mobility. No reduction in volume.	Sand cap limits future sediment mobility. Amendments added to portion of dredged sediment reduce contaminant mobility.
Criteria Score	**0**	**3**	**2**
Short-term Effectiveness	Not Applicable	Slight impacts during implementation	Minimal impacts during implementation
	Not Applicable	Implementation in one year period. Risks are controllable. Truck traffic for delivery of activated carbon products materials.	Implementation in one year period. Risks are controllable. Truck traffic for delivery of cap materials and disposal of sediment. Potential for air emissions from sediment management process.
Criteria Score	**0**	**4**	**3**

Table 11.4
Comparative Evaluation of Remedial Alternatives: Kingman Lake Early Action Areas, Page 2 of 2

EVALUATION CRITERIA	Alternative KLHS-1 No Action	Alternative KLHS-3 EMNR Direct Application of Activated Carbon	Alternative KLHS-4 EMNR TLCP with Selective Dredging and Disposal
Implementability	Not Applicable	Implementable	Implementable
	Not Applicable	Activated carbon placement on wetland areas similar to Kingman Lake completed at several sites in the last 5 years. Activated carbon material readily available. Some specialized equipment may be required to place carbon in very shallow areas away from the shoreline.	Dredging and capping capabilities are readily implementable. Requires local staging area to handle sediment dewatering.
Criteria Score	**0**	**3**	**3**
Cost (relative to other alternatives)	**0**	$1,100,000	$7,010,000
Criteria Score	$0	**4**	**1**
Alternative Total Score not including Modifying Criteria	**Not Acceptable**	**17**	**12**

Notes:

1. The Threshold Criteria have been evaluated on a pass/fail basis. An Alternative must pass both threshold criteria in order to be considered as a remedial action. Alternatives that fail either threshold criteria are marked as not applicable (NA) for the Alternative total score.

2. The Primary Balancing Criteria have been evaluated on a scale of 1-5. Details on each scale criterion are listed below.

Long-Term Effectiveness and Permanence
- 1 = Ineffective and temporary
- 2 = Somewhat effective
- 3 = Effective
- 4 = Highly Effective
- 5 = Highly Effective and Permanent

Reduction of Toxicity, Mobility, or Volume through Treatment
- 1 = Does not reduce toxicity, mobility, or volume
- 2 = Somewhat effective at reducing toxicity, mobility, or volume
- 3 = Effective at reducing toxicity, mobility, or volume
- 4 = Highly Effective at reducing toxicity, mobility, or volume
- 5 = Complete reduction of toxicity, mobility, or volume

Short-term Effectiveness
- 1 = Detrimental impacts during implementation
- 2 = Significant impacts during implementation
- 3 = Minimal impacts during implementation
- 4 = Slight impacts during implementation
- 5 = No impacts during implementation

Implementability
- 1 = Very difficult to implement
- 2 = Difficult to implement
- 3 = Implementable
- 4 = Readily implementable
- 5 = Easily implementable

Short-term Effectiveness
- 1 = Detrimental impacts during implementation
- 2 = Significant impacts during implementation
- 3 = Minimal impacts during implementation
- 4 = Slight impacts during implementation
- 5 = No impacts during implementation

Implementability
- 1 = Very difficult to implement
- 2 = Difficult to implement
- 3 = Implementable
- 4 = Readily implementable
- 5 = Easily implementable

3. A full presentation of alternative costs can be found in Section 9 of the FS report.

Abreviations:

ARAR	Applicable or Relevant and Appropriate Requirements
COC	Constituents of Concern
EMNR	Enhanced managed natural recovery
MNR	Managed natural recovery
RAL	Remedial action level
TLCP	Thin-layer cap placement

Table 11.5
Kingman Lake Detailed Cost Analysis for Alternative KLHS-3 – EMNR Direct Application of Activated Carbon

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 30,975.00	$ 30,975
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 108,412.50	$ 108,413
	Preparation Subtotal				**$ 139,388**
Implementation					
3	50% Acivated Carbon Material Cost	5.9	Acre	$ 90,000.00	$ 531,000
4	Placement cost	5.9	Acre	$ 15,000.00	$ 88,500
	Implementation Subtotal				**$ 619,500**
Site Restoration					
4	Site Restoration and Demobilization	1	Lump	$ 15,488.00	$ 15,488
	Site Restoration Subtotal				**$ 15,488**
Construction Subtotal					$ 774,376
5	Construction Contractor Bonds	2%			$ 15,488
6	Project Management and Construction Oversight				$ 21,295
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 811,159**
CAPITAL COST SUBTOTAL					**$ 811,159**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	360	hr	$ 110.00	$ 39,600
2	Meetings with agencies (senior staff and attorneys)	120	hr	$ 250.00	$ 30,000
Institutional Controls Subtotal					**$ 69,600**

TOTAL COSTS		
Description		**Subtotal**
Construction		$ 811,159
Institutional Controls		$ 69,600
Contingency	25%	$ 220,190
Total (Rounded)		**$ 1,100,000**

Acronyms and Abbreviations:

CY	Cubic yards
hr	hour
LUC	Land use controls
O&P	Overhead and profit

Table 11.6

Kingman Lake Detailed Cost Analysis for Alternative KLHS-4 – Containment by a TLCP with Selective Dredging and Disposal, Page 1 of 1

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 211,450.00	$ 211,450
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 740,075.00	$ 740,075
	Preparation Subtotal				**$ 951,525**
Implementation					
3	Dredging and Dewatering and Disposal				
3a	Mechanical Dredging and Sediment Transport	19,000	CY	$ 70.00	$ 1,330,000
3b	Sediment Dewatering	19,000	CY	$ 35.00	$ 665,000
3c	Amendment Addition for Sediment Dewatering (20% of total)	3,800	CY	$ 5.00	$ 19,000
3d	Waste Water Treatment	19,000	CY	$ 15.00	$ 285,000
3e	Transportation and Disposal	26,600	Ton	$ 50.00	$ 1,330,000
4	Thin Sand Cap (Material and Placement)	4,800	CY	$ 125.00	$ 600,000
					$ 4,229,000
Site Restoration					
5	Site Restoration and Demobilization	1	Lump	$ 105,725.00	$ 105,725
	Site Restoration Subtotal				**$ 105,725**
Construction Subtotal					$ 5,286,250
6	Construction Contractor Bonds	2%			$ 105,725
7	Project Management and Construction Oversight				$ 145,372
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 5,537,347**
CAPITAL COST SUBTOTAL					**$ 5,537,347**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	360	hr	$ 110.00	$ 39,600
2	Meetings with agencies (senior staff and attorneys)	120	hr	$ 250.00	$ 30,000
Institutional Controls Subtotal					**$ 69,600**

TOTAL COSTS		
Description		**Subtotal**
Construction		$ 5,537,347
Institutional Controls		$ 69,600
Contingency	25%	$ 1,401,737
Total (Rounded)		**$ 7,010,000**

Acronyms and Abbreviations:

CY	Cubic yards
hr	hour
LUC	Land use controls
O&P	Overhead and profit

TABLE 11.7
Comparative Evaluation of Remedial Alternatives: Washington Channel, Page 1 of 2

EVALUATION CRITERIA	Alternative WCHS-1 No Action	Alternative WCHS-3 Containment	Alternative WCHS-4 EMNR Direct Application of Activated Carbon	Alternative WCHS-5 Containment with Selective Dredging and Disposal
THRESHOLD CRITERIA				
Overall Protection to Human Health and the Environment	Not protective. No action would be taken.	Protective. Sediment would be covered with clean material	Protective. Sediment would be covered with clean material	Protective. Sediment would be covered with clean material
Criteria Score	**Fail**	**Pass**	**Pass**	**Pass**
Compliance with ARARs	Would not meet ARARs	Would meet ARARs	Would meet ARARs	Would meet ARARs
Criteria Score	**Fail**	**Pass**	**Pass**	**Pass**
PRIMARY BALANCING CRITERIA				
Long-Term Effectiveness and Permanence	Not Applicable	Effective	Soemwhat Effective	Effective
	Not Applicable	All sediment above the RAL is capped. Cap susceptible to disturbance at shallow locations below marinas.	Carbon does not degrade with time. Potential for limited mixing into the underlying sediment. Chance of disturbance with marina stormwater activity.	All sediment above the RAL is capped. Shallow sediment removed to limit future cap disturbance.
Criteria Score	**0**	**3**	**2**	**3**
Reduction of Toxicity, Mobility, or Volume through Treatment	Not Applicable	Does not reduce toxicity or volume. Somewhat effective in reducing mobility.	Does not reduce volume. Effective in reducing mobility and toxicity.	Does not reduce toxicity or volume. Somewhat effective in reducing mobility.
	Not Applicable	Sand cap limits future sediment mobility.	Activated carbon reduces COC toxicity and mobility. No reduction in volume.	Sand cap limits future sediment mobility. Amendments added to portion of dredged sediment reduce contaminant mobility.
Criteria Score	**0**	**2**	**3**	**2**
Short-term Effectiveness	Not Applicable	Slight impacts during implementation	Slight impacts during implementation	Minimal impacts during implementation
	Not Applicable	Implementation in one year period. Risks are controllable. Truck traffic for delivery of cap materials.	Implementation in one year period. Risks are controllable. Truck traffic for delivery of activated carbon product.	Implementation in one year period. Risks are controllable. Truck traffic for delivery of cap materials and disposal of sediment. Potential for air emissions from sediment management process.
Criteria Score	**0**	**4**	**4**	**3**

TABLE 11.7
Comparative Evaluation of Remedial Alternatives: Washington Channel, Page 2 of 2

EVALUATION CRITERIA	Alternative WCHS-1 No Action	Alternative WCHS-3 Containment with Selective Dredging and Disposal	Alternative WCHS-4 EMNR Direct Application of Activated Carbon	Alternative WCHS-5 Containment with Selective Dredging and Disposal
Implementability	Not Applicable	Readily Implementable	Implementable	Readily Implementable
	Not Applicable	Capping readily implementable.	Placement of activated carbon is implementable. Specialized equipment may be required to adequately place product under marinas in a uniform layer	Dredging and capping are readily implementable.
Criteria Score	**0**	**4**	**3**	**4**
Cost (relative to other alternatives)	$0	$9,020,000	$13,930,000	$10,020,000
Criteria Score	**0**	**3**	**2**	**3**
Alternative Total Score not including Modifying Criteria	**Not Acceptable**	**16**	**14**	**15**

Notes:

1. The Threshold Criteria have been evaluated on a pass/fail basis. An Alternative must pass both threshold criteria in order to be considered as a remedial action. Alternatives that fail either threshold criteria are marked as not applicable (NA) for the Alternative total score.
2. The Primary Balancing Criteria have been evaluated on a scale of 1-5. Details on each scale criterion are listed below.

Long-Term Effectiveness and Permanence
- 1 = Ineffective and temporary
- 2 = Somewhat effective
- 3 = Effective
- 4 = Highly Effective
- 5 = Highly Effective and Permanent

Reduction of Toxicity, Mobility, or Volume through Treatment
- 1 = Does not reduce toxicity, mobility, or volume
- 2 = Somewhat effective at reducing toxicity, mobility, or volume
- 3 = Effective at reducing toxicity, mobility, or volume
- 4 = Highly Effective at reducing toxicity, mobility, or volume
- 5 = Complete reduction of toxicity, mobility, or volume

Short-term Effectiveness
- 1 = Detrimental impacts during implementation
- 2 = Significant impacts during implementation
- 3 = Minimal impacts during implementation
- 4 = Slight impacts during implementation
- 5 = No impacts during implementation

Implementability
- 1 = Very difficult to implement
- 2 = Difficult to implement
- 3 = Implementable
- 4 = Readily implementable
- 5 = Easily implementable

3. A full presentation of alternative costs can be found in Section 4 of the focused FS report.

Table 11.8
Washington Channel Detailed Cost Analysis for Alternative WCHS-3 - Containment, Page 1 of 2

CAPITAL COSTS							
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**		**Total Cost**	
Preparation							
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$	284,375.00	$	284,375
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$	710,937.50	$	710,938
	Preparation Subtotal					**$**	**995,313**
Implementation							
3	Sand Cap Placement (12 inch minimum)	45,500	CY	$	125.00	$	5,687,500
	Implementation Subtotal					**$**	**5,687,500**
Site Restoration							
4	Site Restoration and Demobilization	1	Lump	$	142,188.00	$	142,188
	Site Restoration Subtotal					**$**	**142,188**
Construction Subtotal						$	6,825,001
5	Construction Contractor Bonds	2%				$	136,500
6	Project Management and Construction Oversight					$	187,688
Construction subtotal plus Contractor Bonds, Project Management, and Oversight						**$**	**7,149,189**
CAPITAL COST SUBTOTAL						**$**	**7,149,189**

INSTITUTIONAL CONTROLS COSTS							
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**		**Total Cost**	
Institutional Controls							
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	360	hr	$	110.00	$	39,600
2	Meetings with agencies (senior staff and attorneys)	120	hr	$	250.00	$	30,000
Institutional Controls Subtotal						**$**	**69,600**

Table 11.8
Washington Channel Detailed Cost Analysis for Alternative WCHS-3 - Containment, Page 2 of 2

TOTAL COSTS		
Description		**Subtotal**
Construction		$ 7,149,189
Institutional Controls		$ 69,600
Contingency	25%	$ 1,804,697
Total (Rounded)		**$ 9,020,000**

Acronyms and Abbreviations:

CY	Cubic yards
hr	hour
LUC	Land use controls
O&P	Overhead and profit

Table 11.9

Washington Channel Detailed Cost Analysis for Alternative WCHS4 - EMNR with Direct Application of Activated Carbon, Page 1 of 2

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 423,000.00	$ 423,000
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 1,480,500.00	$ 1,480,500
	Preparation Subtotal				**$ 1,903,500**
Implementation					
3	50% Acivated Carbon Material Cost	28.2	Acre	$ 270,000.00	$ 7,614,000
4	Placement cost	28.2	Acre	$ 30,000.00	$ 846,000
	Implementation Subtotal				**$ 8,460,000**
Site Restoration					
4	Site Restoration and Demobilization	1	Lump	$ 211,500.00	$ 211,500
	Site Restoration Subtotal				**$ 211,500**
Construction Subtotal					$ 10,575,000
5	Construction Contractor Bonds	2%			$ 211,500
6	Project Management and Construction Oversight				$ 290,813
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 11,077,313**
CAPITAL COST SUBTOTAL					**$ 11,077,313**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	360	hr	$ 110.00	$ 39,600
2	Meetings with agencies (senior staff and attorneys)	120	hr	$ 250.00	$ 30,000
Institutional Controls Subtotal					**$ 69,600**

Table 11.9

Washington Channel Detailed Cost Analysis for Alternative WCHS4 - EMNR with Direct Application of Activated Carbon, Page 2 of 2

TOTAL COSTS			
Description			**Subtotal**
Construction			$ 11,077,313
Institutional Controls			$ 69,600
Contingency	25%		$ 2,786,728
Total (Rounded)			**$ 13,930,000**

Acronyms and Abbreviations:

CY	Cubic yards
EMNR	Enhanced monitored natural recovery
hr	hour
LUC	Land use controls
O&P	Overhead and profit

Table 11.10

Washington Channel Detailed Cost Analysis for Alternative WCHS-5 – Containment with Selective Dredging and Disposal, Page 1 of 2

CAPITAL COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Preparation					
1	Engineering Design/Agency Approvals/Access Agreements	1	Lump	$ 303,475.00	$ 303,475
2	Construction Contractor Mobilization, Site Preparation, Surveys, and Submittals	1	Lump	$ 1,062,162.50	$ 1,062,163
	Preparation Subtotal				**$ 1,365,638**
Implementation					
3	Dredging and Dewatering and Disposal				
3a	Dredging and Sediment Transport	2,000	CY	$ 70.00	$ 140,000
3b	Sediment Dewatering	2,000	CY	$ 35.00	$ 70,000
3c	Amendment Addition for Sediment Dewatering (20% of total)	400	CY	$ 5.00	$ 2,000
3d	Waste Water Treatment	2,000	CY	$ 15.00	$ 30,000
3e	Transportation and Disposal	2,800	Ton	$ 50.00	$ 140,000
4	Sand Cap Placement (12 inch minimum)	45,500	CY	$ 125.00	$ 5,687,500
	Implementation Subtotal				**$ 6,069,500**
Site Restoration					
5	Site Restoration and Demobilization	1	Lump	$ 151,738.00	$ 151,738
	Site Restoration Subtotal				**$ 151,738**
Construction Subtotal					$ 7,586,876
6	Construction Contractor Bonds	2%			$ 151,738
7	Project Management and Construction Oversight				$ 208,639
Construction subtotal plus Contractor Bonds, Project Management, and Oversight					**$ 7,947,253**
CAPITAL COST SUBTOTAL					**$ 7,947,253**

INSTITUTIONAL CONTROLS COSTS					
Item	**Description**	**Quantity**	**Unit**	**Unit Price (Incl. O&P)**	**Total Cost**
Institutional Controls					
1	Prepare LUC Implementation Plan (mid-level staff with senior review)	360	hr	$ 110.00	$ 39,600
2	Meetings with agencies (senior staff and attorneys)	120	hr	$ 250.00	$ 30,000
Institutional Controls Subtotal					**$ 69,600**

Table 11.10

Washington Channel Detailed Cost Analysis for Alternative WCHS-5 – Containment with Selective Dredging and Disposal, Page 2 of 2

TOTAL COSTS		
Description		**Subtotal**
Construction		$ 7,947,253
Institutional Controls		$ 69,600
Contingency	25%	$ 2,004,213
Total (Rounded)		**$ 10,020,000**

Acronyms and Abbreviations:

CY	Cubic yards
hr	hour
LUC	Land use controls
O&P	Overhead and profit

Table 13.2
Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria for the Selected Interim Remedy, Page 1 of 5

Brief Description	Citation	Requirement	Comments
CHEMICAL-SPECIFIC (FEDERAL)			
Toxic Substances Control Act	15 U.S.C §§ 2601 et seq. 40 CFR Part 761	PCB remediation requirements.	**Relevant and Appropriate** – PCB-contaminated sediments may remain in place after completion of remedy.
NPS Protocol for the Selection and Use of Ecological Screening Values for Non-Radiological Analytes	NPS; updated February 2016	Guidance on selection of ecological screening values for surface water and sediment.	**TBC** – in developing ecological risk assessment in sediment and surface water; broad overlap with EPA and DOEE regulatory criteria.
LOCATION-SPECIFIC (FEDERAL)			
Migratory Bird Treaty Act	16 U.S.C § 703	Protects more than 800 species of birds from unregulated taking.	**Applicable** – to Site remediation involving activities that could affect migratory birds.
Responsibilities of Federal Agencies to Protect Migratory Birds	Executive Order 13186, 66 Fed. Reg. 3853 (Jan. 17, 2001)	Directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act, including supporting the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing adverse impacts on migratory bird resources when conducting agency actions.	**TBC** – in designing and implementing Site remediation activities that could affect migratory birds.
Clean Water Act § 404 and Clean Water Act, § 404(b)(1) Guidelines	33 U.S.C § 1344 and 40 CFR 230.10	Establishes criteria for evaluating impacts to waters of the U.S. (including wetlands) and sets forth factors for considering mitigation measures.	**Applicable** – to Site remediation involving the placement of fill or dredging of material in on-site wetlands and waterways. District-specific conditions are incorporated into Federal permit through Water Quality Certification requirement.
Anacostia Park Establishment of the Comprehensive Park	An Act preserving specific land along the Anacostia River as Anacostia Park, Pub. L. No 65-208, 40 Stat. 918 (1918) An Act providing for a comprehensive development of	The continued reclamation and development of Anacostia River designated as Anacostia Park Parks established as a part of this system, including Anacostia Park, are established, in part, “to prevent	**Applicable –** these Acts and their Amendments provide authority to the NPS to manage of the park, including the river.

Table 13.2
Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria for the Selected Interim Remedy, Page 2 of 5

Brief Description	Citation	Requirement	Comments
and Playground System of the National Capital	the park and playground system of the National Capital, as amended, Pub. L. No. 68-202, 43 Stat. 463 (1924), Pub. L. No. 69-158, 44 Stat. 374 (1926)	pollution of... [the] Anacostia River [], [and] to preserve forests and natural scenery in and about Washington."	
Establishment of Anacostia Park	Capper- Cramton Act, Pub. L. No. 71-284, 46 Stat. 482 (1930), as amended by Pub. L. No. 79-699, 60 Stat. 960 (1946), Pub. L. No. 82-592, 66 Stat. 781, 791 (1952), and Pub. L. No. 85-707, 72 Stat. 705 (1958)		
Orders Concerning Floodplains	Executive Order No. 11988 NPS Director's Order No. 77-2: Floodplain Management	Requires consideration of impacts to floodplain areas in order to reduce flood loss risks; minimize flood impacts on human health, safety, and welfare; and preserve and/or restore floodplain values.	**TBC** – in designing and implementing Site remediation activities occurring within the 100-year floodplain.
Fish and Wildlife Coordination Act	16 U.S.C §§ 661 et seq.	Requires consideration of impacts to wildlife resources resulting from the modification of waterways.	**Applicable** - to Site remediation activities involving the diversion or other modification of rivers or streams.
Rivers and Harbors Act, § 10 and Regulations	33 U.S.C § 403 33 CFR Parts 320-330	Requirements for evaluating excavation activities or the placement of structures or fill material within tidal navigable waters.	**Applicable** - to Site remediation activities involving excavation or filling in the tidal Anacostia River.
National Park Service Organic Act	54 U.S.C § 100101(a) et seq. 36 CFR Part 1	Requires that units of the National Park System be managed in such a manner as to conserve the scenery, natural and historic objects, and wildlife, and in such a manner as to leave them unimpaired for the enjoyment of future generations.	**Applicable** to Site remediation activities within the boundaries of the park unit; **Relevant and Appropriate** to Site remediation activities in the river bed.
General Authorities Act, as amended	54 U.S.C § 100101(b)	The General Authorities Act further provides that the protection, management, and administration of Park System units shall be conducted in light of the high public value and integrity of the NPS and shall not be exercised	**Applicable** to Site remediation activities within the park unit boundaries; **Relevant and Appropriate** to Site remediation activities in the river bed.

Table 13.2

Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria for the Selected Interim Remedy, Page 3 of 5

Brief Description	Citation	Requirement	Comments
		in derogation of the values and purposes for which System units have been established.	
National Park Resource Protection, Public Use and Recreation	36 CFR Part 2	Prescribes and regulates various activities on lands and waters administered by the National Park Service. For example, § 2.14 (a) prohibits "(1) Disposing of refuse in other than refuse receptacles… (6) Polluting or contaminating park area waters or water courses."	**Applicable** to activities carried out by third parties.
National Park Area Nuisance	36 CFR § 5.13	Prohibits the creation or maintenance of a nuisance within a park area.	**Applicable** to activities carried out by third parties.
NPS Management Policies 2006	Available at: https://www.nps.gov/policy/mp2006.pdf	Provides policies and guidance governing NPS management of natural and cultural resources in national parks, including revegetation of disturbed land. Provides guidance on returning disturbed areas to the natural conditions and processes characteristic of the ecological zone in which damaged resources are situated. The NPS policy on implementation of the non-impairment mandate is set forth in § 1.4 of NPS Management Policies 2006.	**TBC** – in designing and implementing Site remediation activities affecting the park.
General Management Plan for Anacostia Park	Available at: https://parkplanning.nps.gov/parkHome.cfm?parkID=425	The General Management Plan for the Park is the primary guidance document for managing the Park for the next fifteen to twenty years. It identifies the preferred vision for the future of the Park and provides the framework for decision making regarding the management of the Park's natural and cultural resources.	**TBC** – in designing and implementing Site remediation activities. The General Management Plan for Anacostia Park establishes a framework for determining what is required to attain the Organic Act non-impairment requirement.
		LOCATION-SPECIFIC (DISTRICT)	
District of Columbia Flood Hazard Control	D.C. Code §§ 6- 501 to 506 20 DCMR Chapter 31	Regulates the placement of fill, grading, excavation and other disturbances within the defined flood hazard area and/or floodplain of rivers and/or streams.	**Applicable** - to Site remediation activities occurring within the flood hazard area or floodplain of on-site rivers/streams.
Chesapeake 2000 Agreement	Chesapeake 2000 Agreement and Chesapeake Executive Council directives:	Establishes goals, agreements, and directives for the protection and restoration of the Chesapeake Bay watershed, including protection and restoration of living	**TBC** - in designing and implementing Site remediation activities.

Table 13.2
Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria for the Selected Interim Remedy, Page 4 of 5

Brief Description	Citation	Requirement	Comments
	www.chesapeake bay.net/c2k.htm	resources, vital habitat, and water quality, and stewardship and community engagement.	
Anacostia River Watershed Restoration Agreement	Anacostia River Watershed Restoration Program 10 DCMR § 405	Establishes goals to reduce pollutant loads to the watershed, restore ecological integrity to encourage aquatic diversity and encourage a quality urban fishery, restore the spawning range of anadromous fish, encourage the natural filtering capacity of the waterbody by increasing the acreage and quality of tidal and non-tidal wetlands, expanding forest cover and creating a continuous corridor of forest along the streams and rivers in the watershed, and increasing public awareness and participation in restoration activities.	**TBC -** in designing and implementing Site remediation activities.
		ACTION-SPECIFIC (FEDERAL)	
National Ambient Air Quality Standards-Particulates	42 U.S.C §§ 7409 – 7410 40 CFR Part 50	Establishes maximum concentrations for specified emissions.	**Applicable** – to Site remediation activities that generate certain air emissions including dust/particulate emissions.
Clean Water Act Effluent Guidelines and Standards	33 U.S.C §§ 1251 and 1311 et seq. 40 CFR Part 401	Provides requirements for point source discharges of pollutants.	**Applicable** – to Site remediation activities that result in the point source discharge of pollutants to surface water bodies.
Clean Water Act Stormwater Program	33 U.S.C § 1342 40 CFR Part 122	Regulates the discharge of stormwater from industrial and construction activities. Requires implementation of best management practices, *inter alia,* such as use of stormwater fencing and other measures to prevent the discharge of sediments to surface waters.	**Applicable** - to discharges of stormwater to surface waters from remediation that results in soil disturbance of more than one acre of land; relevant and appropriate for smaller land disturbances; EPA-issued General Permit for Stormwater Discharges from Construction Activities may be TBC
		ACTION-SPECIFIC (DISTRICT)	
District of Columbia Water Quality Standards for Surface Water	D.C. Code §§8- 103 et seq. 21 DCMR Chapter 11	Water quality standards for surface waters; includes draft total maximum daily load for oil and grease, organic chemicals, and metals in the Anacostia River.	**Applicable** - to discharges or impacts to surface waters. D.C. Standards contain some constituents not included in Federal standards and some criteria, such as for E. coli, are District specific.

Table 13.2

Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria for the Selected Interim Remedy, Page 5 of 5

Brief Description	Citation	Requirement	Comments
District of Columbia Soil Erosion and Sedimentation Control Act and Stormwater Regulations	21 DCMR Chapter 5	Regulates the discharge of stormwater from land disturbing activities.	**Applicable** - to Site remediation activities that result in land disturbance.
District of Columbia Air Pollution Control Act, Air Quality Regulations	D.C. Code §§ 8- 101 et seq. 20 DCMR Chapter 6	Provides requirements applicable to particulate air pollution sources.	**Applicable** – to Site remediation activities that result in the generation and emission of particulate or volatile air pollutants.
District of Columbia Air Pollution Control Act, Engine Idling	D.C. Code §§ 8- 101 et seq. 20 DCMR § 900	A vehicle that is parked, stopped or standing shall not idle for more than three minutes.	**Applicable** – to Site remediation activities that involve trucks on the Site (e.g., for removal of excavated soils for off-site disposal or importation of clean soil).
District of Columbia Air Pollution Control Act, Vehicle Exhaust Emissions	D.C. Code §§ 8- 101 et seq. 20 DCMR § 901	The engine, power, and exhaust mechanism of each motor vehicle must be equipped, adjusted, and operated to prevent the escape of a trail of visible fumes or smoke for more than ten consecutive seconds.	**Applicable** – to Site remediation activities that involve trucks or other motorized equipment on the Site (e.g., for removal of excavated soils for off-site disposal or importation of clean soil).
District of Columbia Air Pollution Control Act, Odorous or Other Nuisance Air Pollutants	D.C. Code §§ 8- 101 et seq. 20 DCMR § 903	An emission into the atmosphere of odorous or other air pollutants from any source in any quantity and of any characteristic, and duration which is, or is likely to be injurious to the public health or welfare, or which interferes with the reasonable enjoyment of life and property is prohibited.	**Applicable** – to Site remediation activities that result in the generation and emission of air pollutants.

Acronyms and Abbreviation:

§	Section	No.	Number
CFR	Code of Federal Regulations	NPS	National Park Service
D.C	District of Columbia	PCB	Polychlorinated biphenyl
DCMR	District of Columbia Municipal Regulations	Pub L. No	Public law number
DOEE	Department of Energy and the Environment	Stat.	Statutes
EPA	United States Environmental Protection Agency	TBC	To be considered
et seq.	And the following	U.S.C	*United States Code*

PART III
RESPONSIVENESS SUMMARY
FOR THE INTERIM RECORD OF DECISION

Part III of the Interim Record of Decision is found in **Appendix B. Responsiveness Summary**

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APPENDICES

APPENDIX A. STAKEHOLDER COMMENT MATRIX

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
1	MDE	The Maryland Department of the Environment ("the Department") fully supports moving forward with interim action at discrete, well-defined early action areas within the Main Stem of the tidal Anacostia River. Initiating interim action on hot spots will allow time to collect data and analyze the effects of watershed wide efforts to improve water quality and assess the extent to which hot spot remediation improves fish tissue concentrations of poly-chlorinated biphenyls (PCBs) utilizing an adaptive management approach.	Adaptive Management	N
6	MDE	Page 8 of the PP states that "additional early remedial actions may be needed if performance monitoring shows that the remedies in this PP and those by the PECSes are not making sufficient progress toward achieving the Remedial Action Objectives (RAOs) for the whole river." Would this additional early action fall under the current Interim Record of Decision (ROD), or does DOEE envision a second Interim ROD to capture these "additional early remedial actions?".	Adaptive Management	N
14	MDE	Section 2.7.2 ("Source Control Strategy") states that the objectives of the SCS are to identify and control sources that could recontaminate the sediments of the tidal Anacostia River following early action remediation and inform the adaptive management approach. As part of the adaptive management approach, the watershed model should be re-run prior to preparation of the Final ROD, using up-to-date data collected during implementation of the early actions. Re-running the model will allow for reevaluation of relative contributions from Municipal Separate Storm Sewer Systems and tributaries and their potential for recontamination, as well as whether a subsequent source track-down study (or studies) will be necessary.	Adaptive Management	N
20	MDE	Section 4.2.2 states that "revision of any PRG would require revision of the FS." It is the Department's understanding that the RFS will be subject to revision regardless of whether the PRG is recalculated, because the results from early action will need to be taken into consideration and potential remedial alternatives updated accordingly. Please confirm whether this is correct.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
36	Navy	The Navy concurs with DOEE that a phased adaptive management approach is appropriate for the Anacostia River given the uncertainties related to source control and development of achievable cleanup goals. While the River-wide FS Report references and describes uncertainties in various places in the text, Section 4 of the FS would benefit from a centralized and more comprehensive discussion of the primary uncertainties influencing river-wide cleanup decisions (and thus the adaptive management approach). Some of the key uncertainties for the ARSP are 1) source identification and control, 2) the relationship between contaminant concentrations in sediment and fish tissue (i.e., will reductions in surface sediment COC concentrations lead to commesurate reductions in fish tissue concentrations?), and 3) net sediment accumulation rates, particularly in the lower Anacostia River (i.e., to support the evaluation of monitored natural recovery as a component of the river-wide management strategy). For example, the text at the top of page ES-6 and and elsewhere in the report indicates that adaptive management is appropriate for the ARSP because of the need for source control, but does not mention any other significant uncertainties. The second paragraph of Section 4.1 touches on some of the key uncertainties and could be developed more fully.	Adaptive Management	N
62	Navy	"Possible actions that could be taken if RAOs are not achieved in an acceptable time frame range from relatively limited . . . to extreme (for example, recalculation of PRGs.)" Given the uncertainties related to relationships between COC concentrations in sediment and fish tissue, the performance monitoring data should be collected and used explicitly to reduce those uncertainties and reassess sediment-fish tissue relationships. Most of these uncertainties relate to data set limitations and an incomplete understanding of the tidal river-specific linkages between sediment and fish tissue (Appendix A Section A.5.3.4). Revisiting PRGs is an important aspect of the adaptive management learning step and should not be viewed as an extreme or unlikley measure. In fact, the last paragraph in Section 4.2 indicates that PRGs will be recalculated if the monitoring data show that the sediment-fish tissue relationships are markedly different than what was assumed in the FS. Recommend removing references to this activity being "extreme" or "unlikely."	Adaptive Management	N
163	NPS	Please explain what adaptive management is.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
182	NPS	Under what circumstances would the sediment cleanup goal be re-evaluated and what would be the basis for recalculating the PRG? The reduction in uncertainty which is the goal of the adaptive management framework will lead to a better understanding of how the river will respond to actions. It is not clear how that will lead to a change in cleanup levels. Please elaborate under what circumstances the RG would be changed.	Adaptive Management	N
188	NPS	Under what circumstances would the PRGs at 10-5 be modified?	Adaptive Management	N
212	NPS	"A key component of adaptive management is the collection and evaluation of data to reduce uncertainty over time and support decision-making." What uncertainty is DOEE looking to reduce? This text is repeated throughout, but no explanation is provided to define what it actually means in relation to this Site.	Adaptive Management	N
213	NPS	"Adaptive management is appropriate for the ARSP because of the need to identify active contaminant sources, effectively control them, and manage remedy implementation accordingly". Also include upstream sources, which include contaminated sediment in the tributaries which may not be due to an "active" source but may represent a historical source that contaminated upstream sediment. This uncontained contaminated sediment may still migrate downstream and impact the main stem.	Adaptive Management	N
215	NPS	"The early action river-wide hot spot remedial alternatives documented in the aforementioned FFS and proposed plan and the companion early action cleanups conducted by the PECSes in the PECS hot spot sites are the first (and perhaps only necessary) efforts toward achieving the RAOs defined for the ARSP." It seems too early to assume that this is the only necessary effort. Please explain DOEE thoughts in more detail.	Adaptive Management	N
236	NPS	Please add subsection which outlines the specific uncertainties the ARSP adaptive management framework is aiming to address. Specific site uncertainties should be listed here, such as: the relationship between sediment COC concentrations and fish tissue concentrations; potential for recontamination from outfalls and tributaries; the applicability of certain technologies to site conditions; how site conditions will change as a result of sea level rise and increased flooding that is expected to occur with climate change. In addition, you use the term "through adaptive management" throughout, but this seams like a misuse of the terminology. How are active sources being addressed through adaptive management? Is source control an aspect of the adaptive management framework for this site?	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
237	NPS	Text states, "to extreme (for example, recalculation of PRGs)". What would be the basis for recalculating the PRGs? Text also states, "If trends based on at least eight temporally-independent monitoring samples indicate that RAOs will be achieved within the predetermined timeframe" This seems very arbitrary without knowing the timing of monitoring.	Adaptive Management	N
238	NPS	"An extreme but unlikely outcome of the decision framework is the recalculation of one or more PRGs. If results of the eight temporally independent monitoring events indicate that trends in COC concentrations and/or percent reduction have plateaued or are unlikely to achieve the RAOs within the acceptable timeframe, DOEE may decide to adjust one or more PRGs to a more achievable level. DOEE would prefer to make any adjustments to PRGs before developing the Final ROD. Revision of any PRG would require revision of the FS." NPS believes this paragraph is problematic because it appears to indicate that if the PRG cannot be met, would change the PRG so it could be "met". This approach as described here does not seem technically defensible. Suggest deleting text.	Adaptive Management	N
268	NPS	Is the purpose of the adaptive management approach to expedite remediation as indicated in the text? That is not typically the purpose of using an adaptive management approach, which when used properly is designed to reduce uncertainties regarding the conditions of the Site and how the Site will respond to various remedies.	Adaptive Management	N
328	Anacostia Riverkeeper	If any cleanup goals are to be changed, they should only be changed to be more protective, never less. This project must not find itself successful only because it has moved the goal posts.	Adaptive Management	N
332	Anacostia Watershed Community Advisory Committee	The employment of performance monitoring and adaptive management strategies sounds like a very practical and expeditious approach to remediation. It is very encouraging to know that this important work will commence soon. Addressing hot spots is very practical and efficient.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
360	Anacostia Watershed Society	It is not clear that this plan is a first step of perhaps 10 more steps as evidenced by DC Appleseed's comment on their Eblast of January 13, 2020 They are saying this plan will inform the final Plan in September! Goodness gracious, if DC Appleseed believes this then we are doomed to get the public to understand the process. It needs to be crystal clear that this is a first step in a 12-step program. DC Appleseed expects 2020 to be one of the most important years in our history as four of our longest-standing, high-impact projects reach significant milestones. 1. Cleaning up the Anacostia In late December, the D.C. Department of Energy and the Environment released its Proposed Plan for cleaning the Anacostia River, and the agency will issue its final Plan by the end of September. Working with our legal and technical experts and Community Ambassadors, we will be commenting on the Plan in early March and assisting others in doing so. The adoption of the final Plan will be a momentous step forward in over two decades of DCA leadership in the fight to make the River swimmable, fishable, and boatable for people of the region.	Adaptive Management	N
376	Audubon Naturalist Soc	Reevaluating the efficacy of remedial actions after they have already been performed at early action areas (EAAs) will likely be costly and time consuming. We recommend that DOEE indicate that it has considered whether the Proposed Plan supports the ultimate PRG, not just the RAL goals. If DOEE finds it is likely that additional remediation will be needed to reach the PRG, it should amend the Proposed Plan to include these remedial actions during the first cleanup stage	Adaptive Management	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
385	DC Appleseed	"...The Proposed Plan identifies 11 hot-spots that will be the focus of early action. Using an adaptive management approach, DOEE proposes to select a preferred action for each site, implement the actions, and then conduct performance monitoring of key environmental indicators every 3 years. Essential features of an effective early action or adaptive management plan include expectations for each year of work, a specific goal for the work at each of the 11 sites each year, and steps that will be taken if annual goals are not met. These elements are not included in DOEE's Proposed Plan, supporting materials, or subsequent correspondence. How the early action hot-spots work relates to the overall cleanup of the river and what further steps might be considered to ensure an overall river cleanup are included (in a separate document, Table 4.1 of the River-wide Feasibility Study (FS)) . However, the Plan does not make clear what monitoring outcomes would lead to which specific steps..."	Adaptive Management	Y
390	DC Appleseed	One of the justifications provided for the 600 µg/kg RAL is "maintaining consistency within an adaptive management decision framework." It is not clear what this means. Why would a different RAL be inconsistent with the framework?	Adaptive Management	N
431	DC Appleseed	The statement about additional actions potentially being necessary to achieve the sediment PRG of 65 µg/kg implies that EAA and PECS cleanups will not achieve this PRG. Table 1 should be referenced here.	Adaptive Management	N
457	DC Appleseed	The text indicates that definitions of key trigger criteria (such as acceptable timeframe) are not currently available and will be specified in the Performance Monitoring Work Plan. While it may be appropriate to defer some of the technical details of the monitoring to this work plan, many of the decision framework elements specified on Table 4.1, such as interpretation methods and trigger criteria, should be specified now. Without these specifics it is not possible to determine what monitoring outcomes could lead to specific actions.	Adaptive Management	N
458	DC Appleseed	How was it determined that eight temporally-independent samples is the appropriate number for indicating whether the RAOs will be achieved within the predetermined timeframe? Establishment of a statistically significant trend, regardless of the number of samples, would be more technically defensible.	Adaptive Management	N
481	DC Appleseed	Another potential action related to evaluating achievement of RAO 1 is to conduct bioaccumulation modeling. The existing method for calculating the PRG is highly uncertain. A calibrated and validated mechanistic bioaccumulation model would likely reduce that uncertainty.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
482	DC Appleseed	The potential actions seem reasonable, but additional information should be provided on factors that would lead to preferring one action over another. As configured in this table, the "roadmap" has too many destinations that cannot be easily differentiated.	Adaptive Management	N
483	DC Appleseed	All the sampling activities in this table appear to be within the Anacostia River. Given the importance of source control for assessing remedy success, consider also repeating at least some of the source characterization sampling that have previously occurred. Such data would aid in assessing the degree to which recontamination has happened, or is likely to happen in the future.	Adaptive Management	N
504	Greylin Presbury, Fairlawn Citizens Assoc.	1) How will decisions on EAAs affect addressing contaminations in other adjacent areas? 2) Are you saying addressing the hot spots will essentially clean the river to acceptable level?	Adaptive Management	N
507	Lois Schiffe, DC Appleseed	What is the process for measuring progress so that you know that it is or is not working?	Adaptive Management	N
508	Marian Dombroski, AWCAC	Is there an expectation that contamination at sites not included in early action will be reduced? If not, will these untreated sites be usable?	Adaptive Management	N
24	Navy	The adaptive management step should also include reassessment of background conditions to faciliate setting realistic and achievable cleanup goals in the final ROD. Additionally, recommend updating the human health risk estimates using the performance monitoring data. Please consider explicitly stating in the interim ROD that risk assessments will be revised and updated as appropriate to support the development of cleanup goals in the final ROD.	Adaptive Management	N
41	Navy	As part of the baseline data collection effort outlined under the "Adaptive Management" component, recommend including collection of additional data to reduce uncertainties about net sediment accumulation rates, particularly in the lower Anacostia River (see comments below about modeled sedimentation rates). The additional data could include empirical measurements and/or additional data needed to improve the calibration and performance of the surface water model. This component of the CSM is critical to evaluating natural recovery potential as a component of the overall management strategy for the river.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
68	Navy	The surface water model appears to be signficantly underestimating sediment accumulation rates in the Lower Anacostia River, which in turn leads to underestimates of sediment accumulation over 10-, 20- and 30-year time frames (this topic is addressed further in comments on the Surface Water Model report). Recommend revisiting these maps after monitoring has been completed to reassess conclusions about the feasibility of ENR and MNR, particularly in the lower portion of the river.	Adaptive Management	N
809	Anonymous	1) What will be the monitoring schedule during & after EAA remediation? 2) When will this schedule be published, if only as a draft?	Adaptive Management	N
518	Sierra Club	It is repeatedly mentioned throughout the document that if the proposed actions at the early action areas (EAAs) do not demonstrate enough improvement, then further work will be done elsewhere in the river. This suggests a lack of robust analysis of contaminant fate and transport in the river system. While having a 90 percent risk reduction is worth noting, this does not tell whether this reduction is still enough to restore the target beneficial uses of the river - swimming and fishing.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
585	Pepco & WG	"...Managing uncertainties should be at the heart of an adaptive management framework. The National Research Council (NRC) defines adaptive management as a process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood (NRC, 2004). Adaptive management is a structured and iterative decision-making process that can reduce uncertainty over time by taking account of the outcomes of prior decisions. The use of an adaptive management framework to help manage uncertainties is explicitly recommended in the USEPA's Sediment Directives Memo (USEPA, 2017) and in the Superfund Task Force Report (USEPA, 2019). The River-wide FS Report states in many places that "a key component of adaptive management is the recurring collection of data, systematically evaluated to reduce uncertainty over time to support decision-making." The adaptive management strategy presented by DOEE includes an elaborate monitoring strategy for: (i) Baseline Monitoring; (ii) Performance Monitoring; and (iii) Long-Term Monitoring. These plans are primarily designed to collect data to monitor the performance of early actions and source control activities implemented under the Interim ROD. These plans do not, however, discuss how DOEE will use this information to address the many uncertainties Pepco and Washington Gas have commented on previously in a number of submissions, and in our companion comment topics to these comments. For example, the uncertainties include..."	Adaptive Management	Y
772	Anonymous	The anticipated reduction in contamination for the main stem is from 210 ppm to 160. That doesnt' seem like a lot. Why not go for more?	Adaptive Management	N
839	Stacy Baker	Four things I support: 4 Tackling Kingman Lake first among Early Action Areas. It makes sense to start with the most natural and least costly interventions and buy time while the District coordinates with Maryland. Without intensive action in Maryland, I am concerned that we will risk undermining Main Stem outcomes as more chemicals are deposited anew.	Adaptive Management	N
773	Anonymous	What would be the expected timeframe to see if Enhanced Monitored method works. Once implemented would a determination be made in a year or longer?	Adaptive Management	N
285	USFWS	The Ghosh et al. 2020 report should be included as one of the Companion Reports since it is discussed in detail. Throughout the document, the date should be changed to 2020 and the reference citation should be corrected to include all authors.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
730	Steuart Investment Co.	The issue is exacerbated by DOEE's selection of an adaptive management strategy, whichmeans that remedial decisions will be made in the future based on information that has not yet been collected. Fair notice for public comment on the remedial actions in the FFS requires more information than DOEE can provide at this time particularly for the more downstream areas. DOEE should take comment only on the first phase of the FFS for the upstream EAAs where the remedial actions are reasonably well defined, contingencies are limited, and DOEE has the information needed to assess cost and feasibility. The downstream EAAs, including Reach 123 of the Main Stem, should be conducted later after the early phase EAAs are remediated and after some of the contingencies and uncertainties are resolved. Only then will DOEE be able to offer a remedial plan with sufficient definition of location and scope to give the public a meaningful opportunity to comment on the remedial measures in the FFS.	Adaptive Management	Y
572	Pepco & WG	"Pepco and Washington Gas strongly support DOEE's proposal to follow an adaptive management approach for remedial action to address Anacostia River sediments. Adaptive management is a phased approach which addresses uncertainties by implementing remedial actions incrementally, allowing each stage of the remedial activity to inform subsequent ones. For the ARSP, as the Proposed Plan and Focused Feasibility Study make clear, this adaptive management approach will allow DOEE the flexibility to make substantial reductions in risk by focusing first on 11 areas where contaminant concentrations are highest, while affording DOEE the ability to continue to collect additional data to inform the decision on whether additional remedial actions are warranted..."	Adaptive Management	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
586	Pepco & WG	"...DOEE's approach to PRGs provides a particular example of how its adaptive management strategy should be refined and clarified. As noted above and explained in more detail in our specific comments on the PRGs, the derivation of the PRGs presented in the Proposed Plan is subject to many uncertainties and data gaps. Adaptive management provides a useful framework for gathering information to reduce those uncertainties before attempting to define long term numerical cleanup goals. DOEE's adaptive management approach, however, appears to be focused principally on assessing the need for additional remedial actions if cleanup goals defined at the outset of the process are not met by initial actions, describing the recalculation of PRGs as "an extreme but unlikely outcome of the decision framework." (River-wide FS Page 46 start of Second Paragraph). The recalculation of remedial goals as the existing uncertainties are reduced through additional data collection and evaluation should be a primary objective of DOEE's adaptive management approach, not a last resort. That is the only way to fully realize the benefit of adaptive management in ensuring that cleanup goals are both reasonably necessary to manage site risks and achievable and sustainable in practice..."	Adaptive Management	Y
7	MDE	Page 8 of the PP mentions that the trigger criteria for further action in the river is found in Section 7 of the FFS. The concept of trigger criteria is more prominently presented in the River-wide Feasibility Study (RFS), not the FFS. In Section 4.2.2 of the RFS, trigger criteria are not fully defined per se, but this section describes how trigger criteria will be defined in the Anacostia River Sediment Project Performance Monitoring Work Plan. Please update the text of the PP with reference to the correct document and section for trigger criteria.	Adaptive Management	N
18	MDE	When will the Performance Monitoring Work Plan identified in §4.2.2 (Adaptive Management Process) and §4.3.1.1 be available for review? Will stakeholders be given an opportunity to comment on this document? Has the monitoring mentioned already begun?	Adaptive Management	N
19	MDE	Please clarify the intent of the "eight temporally independent monitoring samples" mentioned in §4.2.2. Temporally independent samples are mentioned twice in this section, one for triggering transition from Interim to Final ROD and the other for when recalculation of the PRG may be necessary. What data will be collected for these temporally-independent monitoring events, if known at this time? Will any of the data that has been already collected be considered for one (or more) of these temporally-independent monitoring events?	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
21	MDE	Please confirm that the baseline environmental monitoring data described in §4.3.1.1 will include both comprehensive study area characteristics and strategic performance monitoring in areas of greatest interest.	Adaptive Management	N
22	MDE	Performance Monitoring Parameters and frequency of performance monitoring are described in §4.3.2. Please consider adjustments to the suggested temporal monitoring plan of fish species and frequency to allow for sufficient data to evaluate effectiveness of the EAAs. For instance, sampling every 2 years would allow DOEE to make adjustments to early actions in a meaningful and statistically valid manner in a shorter time frame. This would also allow for 2-3 monitoring events to be evaluated as part of each Five-Year Review, rather than only 1-2 monitoring events per Five-Year Review.	Adaptive Management	N
180	NPS	"General principles of adaptive management will be followed during all phases of the work which will be informed by a post-remedy monitoring plan to be developed during implementation of the Interim ROD". Why wouldn't the required monitoring be discussed here? Monitoring is the critical action that will be taken to measure success of these interim remedies, and the required monitoring, timeframe, and benchmarks should be agreed upon by stakeholders and be documented in the interim ROD.	Adaptive Management	N
193	NPS	What sort of monitoring will be conducted to determine effectiveness of ICs?	Adaptive Management	N
246	NPS	How does the 5-year reviews align with the 3-year performance monitoring of fish? What is the reporting frequency?	Adaptive Management	N
294	USFWS	On the third from last paragraph, the discussion of bullhead is inaccurate and should cover the following key points. Bullheads ranging from 240 to 280 should be targeted. Based on past studies, these fish would be primarily age 3 to 5 and of a size that may be consumed by anglers. Depending on the dates of remediation and collection, this schedule could be used to track the progress of remediation.	Adaptive Management	N
296	USFWS	Last para.: Add forage fish, specifically mummichogs and banded killifish.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
324	Anacostia Riverkeeper	DOEE has stated in all the community meetings and in the 1-29-20 AWRP Steering Committee meeting that the ~90% estimated risk reduction in all OUs will be achieved without the work to be done in the PECSes. As such, ARSP post remedy performance monitoring should begin in each OU when that OU's EAA remedies have been implemented. ARSP post remedy performance monitoring should not be tied to the timeline of work at PECSes, especially given the historical trend of those sites to grossly miss their original predicted timelines.	Adaptive Management	N
388	DC Appleseed	"...In your letter of February 21, 2020, you stated that “[t]hese issues (development of the trigger criteria) are best addressed once public feedback is obtained regarding the concept of site cleanup via performance of early actions within an adaptive management framework.” We disagree with this statement..."	Adaptive Management	Y
435	DC Appleseed	The "trigger criteria" mentioned in the first paragraph should be explicitly described.	Adaptive Management	N
460	DC Appleseed	Baseline sediment sampling should be conducted using a randomized grid method (one sample randomly placed in each similarly sized grid cell). This will make it possible to calculate a 95UCL that is essentially equivalent to a SWAC.	Adaptive Management	N
463	DC Appleseed	Assumptions for the timeframe over which risk reduction might be expected should be described. Without an assumed risk reduction trajectory, it will not be possible to determine if performance monitoring results meet expectations.	Adaptive Management	N
479	DC Appleseed	Targeting game fish species with a small home range makes sense for judging remedy effectiveness. However, the estimated fish consumption risks for the project include consumption of other species with larger home ranges. The procedures for ongoing evaluation of tissue concentrations from these other game fish species should be described here as well.	Adaptive Management	N
840	Stacy Baker	Three things I would like to see DoEE do or change: 1 Focus more on DoEE's goal of lowering PCBs river-wide, as it relates to human health risk. Create an overall action plan (of which this sediment project plan is a part). Anacostia Riverkeeper and other advocates have said hotspot remediation will be insufficient to reach DoEE's overall PCB goal, and this concerns me.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
828	Marian Dombroski	Row 4, 3/10/2020. In December, DOEE published the Proposed Plan for the Project, which identifies how the agency plans to tackle the contamination. The Plan indicates that DOEE will begin by reducing contamination in 11 "hot spots," which have the highest pollution levels throughout the river. These spots are called Early Action Areas and DOEE hopes that by reducing pollutant concentrations here, that these spots will stop contaminating the rest of the river.	Adaptive Management	N
4	MDE	Figure 1 of the PP depicts a flow chart demonstrating how early action fits into the broader work of the Anacostia River Sediment Project. Development of detailed work plans for early action in each of the EAAs is not mentioned in this figure, nor in the text of the PP. The Department assumes these plans are currently being developed and the plans may address some of the uncertainty identified in Comments 1 and 2 above. Is this assumption by the Department accurate?	Adaptive Management	N
11	MDE	Please confirm that the goal during Interim Record of Decision (ROD) implementation, source control efforts and potential environmental cleanup sites (PECSes) efforts is to generate a new version of the RFS when adequate information and adaptive strategies have sufficiently advanced. Although not necessary and not explicitly defined within the Proposed Plan/Focused Feasibility Study (PP/FFS), does Washington D.C.'s Department of Energy and the Environment (DOEE) have an approximate schedule and timetable for development of this next RFS that could be shared with the Department for planning purposes, or is the uncertainty surrounding the overall effectiveness of the Interim ROD and the timeframe over which success may or may not be observed too great to estimate when the next RFS might be completed?	Adaptive Management	N
166	NPS	This section should include information about the timing of cleanup at PECS hot spots in the discussion on how remedies will be aligned with remedies selected for the ARSP study area.	Adaptive Management	N
171	NPS	"The EAA remedial alternatives (and associated cleanup) and the cleanups conducted by the PECSes in the PECS hot spot areas are the first (and perhaps only necessary) efforts toward achieving the RAOs defined for the ARSP." This is not known at this time and should not be assumed. In the same paragraph you discuss assessing progress towards achieving RAOs to determine if additional actions are necessary, but do not provide a timeframe for assessing progress.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
318	Anacostia Riverkeeper	What is the general timeline for seeing acceptable PCB concentrations in fish? This information should be relayed to the public instead of giving a general idea that the levels will be monitored for an indeterminate amount of time and then reassessed. The set thresholds and "trigger criteria" should have been described with the Proposed Plan so the public can evaluate these steps that will be included in the Interim ROD. The timeline should be displayed throughout the process as well so the public has a reference point for accountability and to know if the Interim ROD is on schedule and going to plan.	Adaptive Management	N
373	Audubon Naturalist Soc	ANS supports D.C. Appleseed's recommendation of more frequent pollutant monitoring. We also encourage DOEE to consider amending its calculations to support high sensitivity pollutant level models. ANS's priorities are to ensure that the ARSP achieves the highest water quality possible within the fastest timeline possible, that implementation of the Project is equitable, and that the Project documents and Feasibility Study accruately consider the impacts of climate change on the project design.	Adaptive Management	Y
386	DC Appleseed	"...The Plan is not clear on several points that could allow for the remediation process to move faster. For example, we are unclear why generating a summary response to comments (rather than a comment matrix) should take nine months and delay design and permitting work by that length of time. The Plan is also unclear as to why work on the Operating Units [OUs] can't be done in parallel or overlap. Finally, the more frequent annual review we suggest would allow for faster correction in the event that initial remedies aren't having the desired effect. It is not clear why more frequent reviews are not being proposed..."	Adaptive Management	Y
419	DC Appleseed	The Proposed Plan should present a detailed hypothetical schedule for the activities described therein. The letter provided to DC Appleseed on February 21, 2020 contains such a schedule.	Adaptive Management	N
459	DC Appleseed	The concepts of "performance rounds" and "temporally independent monitoring events" need to be reconciled. Table 4.1 indicates sampling would occur at 3-year intervals. If eight events are needed to conclusively assess trend, this would equate to 24 years, an unacceptably long time. Existing data, from the last two or three monitoring rounds, may be appropriate for establishing a trend in the absence of remediation (but with an increasing amount of source control). A hypothetical timeline(s) should be provided to support the decision framework summarized in Table 4.1.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
470	DC Appleseed	A hypothetical schedule should be added to this figure. The letter provided to DC Appleseed on February 21, 2020 contains such a schedule.	Adaptive Management	N
471	DC Appleseed	The Early Action section of the flowchart should include Baseline Monitoring (Sec 4.3.1) and Remedial Design sampling.	Adaptive Management	N
480	DC Appleseed	The target timeframe should be defined.	Adaptive Management	N
765	Anonymous	Page 10 in Proposed Plan: No plan fully meets the reduction of toxicity criteria. How will these be reconciled long term (i.e will it stop at 90% risk reduction). It seems 65 ug/kg is the goal in the long run.	Adaptive Management	N
156	NPS	The FS Report states that the “Proposed Plan for the Interim ROD will define the aforementioned sediment cleanup (detailed in the FFS), source control, and monitoring activities that will be conducted in advance of FS refinement and establishment of the final ROD.”16But the interim Proposed Plan does not, in fact, discuss source control efforts or monitoring in any detail. In fact, the FFS Report states that “DOEE is addressing tributary and outfall source control as efforts separate from this FFS.”17Because the FS Report adopts BTVs that ignore ongoing contributions of hazardous substances from upstream sources, it is critically important that the FS Report, FFS Report, and/or Proposed Plan include a comprehensive and well-designed plan to identify and control those sources prior to remedy implementation. More generally, while the use of an interim remedy is consistent with adaptive management principles, the FFS Report and Proposed Plan contain scant discussion of how these early actions will fit into the broader adaptive management framework. For example, the documents should address how the remedies will be assessed through an adaptive management lens, with specific information about timeframe, monitoring, and how benchmarks for success will be measured. Similarly, there is no explanation of how the early actions will tie into the final ROD, or how other elements of adaptive management (e.g., upstream source tracking and control) will be integrated into that process.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
721	Steuart Investment Co.	DOEE has requested that commenters focus on sections 1 through 6 of the River-wide Feasibility Study ("RFS"). The remainder of the RFS is provided for informational purposes, but DOEE states that it will not be implementing the river-wide remedial alternatives discussed in the RFS at this time and will revisit the analysis as part of an adaptive management process after implementing the remedial actions selected in a to-be-developed Interim Record of Decision. See DOEE River-wide Feasibility Study Commenting Instructions. In reliance upon DOEE's representation and our understanding that we will have another opportunity for public comment on the Interim Record of Decision and any future remedial actions prior to implementation, SIC is limiting its comments to sections 1 through 6 of the RFS as instructed by DOEE.	Adaptive Management	N
764	Anonymous	The main risk is from eating fish. Is it correct to say that the risk objective is to reduce fish tissue PCB concentrations and not necessarily sediment PCB concentration. So will DC monitor fish to determine success?	Adaptive Management	N
812	Anonymous	Will the interim ROD include a detailed plan for monitoring during the 5 years? How will the public ensure accountability after the Interim ROD?	Adaptive Management	N
763	Anonymous	What is the plan for montioring after early actions and future clean up, if needed?	Adaptive Management	N
770	Anonymous	What is the general timeline for remediation monitoring? Would it be years to see adequate reductions of PCBs in fish tissue? How will we get updates on this? When would we expect the final ROD to be announced?	Adaptive Management	N
34	Navy	"In addition, the preferred alternatives for the 11 EAAs are consistent with the alternatives identified and considered in the River-wide FS and will not be inconsistent with or preclude implementation of the final remedy selected for the ARSP study area". The meaning of this statement is unclear - how could the EAA remedies be inconsistent with or preclude implementation of a final remedy that has not been identified yet?	Adaptive Management	N
218	NPS	"DOEE will review and refine as necessary in a future supplemental FS the results of the River-wide FS." This text is confusing, please clarify how this would actually work.	Adaptive Management	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
843	Stacy Baker	Assess whether the total expenses from all parties are worth the gains--and will be enough-- to create lasting human health safety for fish consumption (the #1 goal). If some river advocates are right that the hotspot approach isn't aggressive enough, let's not do it just to do something. The public hearings raised concerns that health risks from fish consumption could still remain too high because of river-wide PCBs, incoming watershed contaminants, and larger contaminated fish migrating from other areas.	Adaptive Management	N
30	Navy	This section focuses on sources of ongoing contamination but does not discuss the issue of urban runoff and the role that it plays in setting achievable cleanup goals in the final ROD. Suggest that the interim ROD explictly consider this issue.	Background	N
32	Navy	This table should clarify that the post-remedy average PCB concentration in sediment does not take into account recontamination by ongoing deposition of suspended sediments from upstream; as noted above, recommend excluding quantitative estimates of expected risk reduction from the Interim ROD.	Background	N
58	Navy	As documented in comments on the ARSP Remedial Investigation report, the Navy does not concur that the area of the Potomac River sampled by DOEE is an appropriate background area for the Anacosta River; however, this concern does not influence the implementation of the proposed adaptive management strategy.	Background	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
153	NPS	"...In general, remediation goals are not set below natural or anthropogenic background concentrations of hazardous substances present in the environment.15To establish background concentrations of contaminants of concern (COCs) in the Anacostia River, the DOEE used samples collected from a reference area in the Potomac River. There are a number of reasons that concentrations of hazardous substances in the Potomac River reference area may not be representative of background concentrations in the Anacostia River watershed. Most significantly, hazardous substances originating from upstream sources continue to enter the Anacostia River through the tributaries. Some of those releases may be from discrete, identifiable sources that can be addressed later as part of a separate source control strategy. But others may be from diffuse, non-point sources within the watershed (i.e., anthropogenic background) and should therefore inform any cleanup goals that are established now...For this reason, the NPS contracted for the performance of a study to collect and analyze bottom sediment samples from the five major tributaries to the Anacostia River, provided that the DOEE agreed to incorporate the associated data into the Remedial Investigation / Feasibility Study (RI/FS)...The use of the NPS background data could make a significant difference in the cleanup goals for the site..."	Background	Y
221	NPS	Please add the NPS Tributary Study as a companion report – it is currently missing.	Background	N
230	NPS	"The ARSP surface water model results indicate that the tributaries are the primary source of sediment (94.5 percent) and total PBC congener mass (98.5 percent of total PCB congeners) inputs to the study area." The NPS tributary study also indicates PCB contamination in bottom sediments of the tributaries. This is critical data that should be included in this document. NPS study should be referenced in this text and the study results (what was found in the bottom sediment) should be summarized.	Background	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
233	NPS	NPS considers inclusion of discussion regarding how background values were established critical. Even if none of the PRGs default to background some parties are certain to argue that the background number based solely on the Potomac River locations does not adequately represent regional background, is too low, and that the PRGs may have been set at background if background had been properly established. The FS needs to be transparent as to the methods used to establish background. To provide a technically supported determination of background levels, NPS believes inclusion of concentrations of COCs reported from bottom sediment samples collected from the tidal Anacostia River tributaries is critical to include in determination of appropriate background levels for the tidal Anacostia River.	Background	N
263	NPS	The NPS tributary study should be added to list of supporting studies.	Background	N
275	NPS	NPS believes it is important to use data NPS collected as part of the NPS tributary study to inform development of appropriate background concentration to ensure background is defensible.	Background	N
303	USFWS	First two para. And bullets: The authors need to show a good match between the size and species collected in the non-tidal Anacostia tributaries and those collected in the tidal river. Otherwise, the comparisons are flawed. The use of composite samples that cross species is not reproducible and does not yield meaningful results or those that can be easily replicated to evaluate trends over time. The Anacostia is tidal all the way until it branches into the Northeast and Northwest Branches so the term “non-tidal Anscostia River’ is incorrect. The extent of contamination in the tributaries varies greatly as has been shown in whole body mummichogs and killifish reported by Pinkney (2019) with very high PCB concentrations in Lower Beaverdam Creek fish and lower concentrations in those from the Northwest and Northeast Branch. There is likely movement of many fish species between the tributaries and into the tidal Anacostia areas. Just as the authors do not want to use the Potomac River gamefish as a background sample (because of fish movement and other contaminant sources), I disagree with the use of the non-tidal Anacostia as a fish tissue background data set. This comment applies to many other sections of the report where this data set is discussed.	Background	N
311	USFWS	Bottom half of page:	Background	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
312	USFWS	Potomac River Fillet Samples: I agree that they should not be considered as background because the species are mobile and move in and out of the Anacostia. These same considerations apply to the "non-tidal Anacostia" as discussed in comment RI-1.	Background	N
313	USFWS	First whole para.: This sentence refers to the Potomac River reference area. Other parts of the report state that the Potomac River is only used as a reference area for sediment. Please clarify.	Background	N
592	Pepco & WG	The background sediment data collected in the Potomac River are neither appropriate nor representative of background conditions for the lower Anacostia River. As a result, the background sediment concentrations calculated by DOEE for the Potomac River are unrealistic and not attainable for potential remedial objectives when considering the range of detected concentrations and projected sediment loads from upstream tributaries to the Lower Anacostia River. At a minimum, the background levels need to be re-calculated based on the results of the Anacostia Tributary studies. DOEE should state its clear intention to revisit the calculation of background threshold values for sediment using data from multiple background areas to bracket background uncertainties and concentration ranges, and to use the results of the revised background calculations in setting sediment remedial goals. DOEE should revisit derivation of the background concentrations for fish tissue and incorporate the recent fish tissue data for the Potomac River. BTVs for fish tissue should be based on multiple datasets available throughout the region, including tissue data from the Potomac River and nontidal Anacostia River, to better bracket and reduce uncertainties related to regional fish tissue concentrations	Background	Y
537	CSX	DOEE's source assessment simply considers the presence of a contaminant when identifying potential upland sources, not the concentrations measured in the uplands. Spatial patterns in sediment concentration data can be used to preliminarily identify potential contaminant sources to a system (as was done in the RI) because the highest concentrations typically occur at a source location and decline with distance from the source. However, this also applies to the upland's soils - a potential source's upland soils should contain higher concentrations of chemicals than any proximal River sediments if it is to be considered a source of those chemicals in the River. Therefore, consideration of upland datasets is critical in the evaluation of sources to the River, yet these data have not been utilized in DOEE's assessments, as explained in our comments herein.	Background	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
576	Pepco & WG	DOEE established background threshold values (BTVs) for sediment and fish tissue, which are used to set lower bounds on cleanup levels. In developing the BTVs, however, DOEE relied on inconsistent background areas for sediment versus fish tissue. The sediment BTVs were based exclusively on Upper Potomac River sampling data, which are not fairly representative of background sediment conditions in the lower Anacostia River, whereas DOEE looked only to non-tidal upper Anacostia River data in setting the fish tissue BTVs. DOEE developed the BTVs for both sediment and fish tissue using unnecessarily limited datasets, declining to use relevant data from the Potomac River for the fish tissue BTVs or from the upper Anacostia River and its tributaries for the sediment BTVs. It is arbitrary to ignore these available and relevant data sources, which would provide a more accurate representation of the broad range of land uses and river conditions throughout the ARSP study area. DOEE should reevaluate the BTVs using the additional data identified in the attached detailed comments.	Background	N
599	Pepco & WG	In addition, use of the UCL to represent the wide range of tissue concentrations, especially for gamefish, is not supported and overestimates contaminant levels for most gamefish (see Figure 1 below). The box and whisker plots present the range of concentrations in forage fish and gamefish tissue samples throughout the whole river. The asterisks represent elevated concentrations relative to the rest of the data set and the orange and blue dashed lines indicate the UCLs used in the river-wide BMF calculation2 . The UCL for gamefish is strongly influenced by the four elevated concentrations and falls well above the 75thpercentile (top of the box). Consequently, DOEE's approach results in overestimated concentrations for most gamefish tissue samples. Had DOEE used the median forage fish and gamefish tissue concentrations, which would be more representative of the range of river-wide concentrations, the BMF for total PCB congeners would be 63% of DOEE's BMF and increase the sediment PRG by over 150%	Background	Y
593	Pepco & WG	DOEE should state its clear intention to revisit the calculation of background threshold values for sediment using data from multiple background areas to bracket background uncertainties and concentration ranges, and to use the results of the revised background calculations in setting sediment remedial goals.	Background	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
594	Pepco & WG	DOEE should revisit derivation of the background concentrations for fish tissue and incorporate the recent fish tissue data for the Potomac River. BTVs for fish tissue should be based on multiple datasets available throughout the region, including tissue data from the Potomac River and nontidal Anacostia River, to better bracket and reduce uncertainties related to regional fish tissue concentrations.	Background	Y
538	CSX	National Park Service ("NPS") sediment data in non-tidal tributaries should be considered. The results of the USGS Tributary Study demonstrate the importance of further characterization of the non-tidal tributaries to the River with respect to contaminant background levels, potential active upstream sources, and potential recontamination. The USGS Tributary Study found that upstream non-tidal tributaries are major sources of PCBs to the Anacostia River. The NPS has also collected sediment chemical concentration data for five upstream, non-tidal tributaries to the River and published these data in a draft report issued in July 2019 (Johnson Company, 2019. Draft NPS Tributary Sediment Sampling Study Report, Anacostia River (Sediment Project Site, National Capital Region, Prepared for the NPS)). DOEE did not provide this report for review here and it is unclear whether DOEE considered this report in its analyses. The results of the report should be used to characterize the tributaries and discussed in the RI and modeling reports.	Background	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
50	Navy	"Model calibration was based in part on the cesium core sedimentation rate data, specifically regarding the extrapolation of trends in sedimentation rates to recent sediments . . . The model . . . honors the observed overall downward trend in sedimentation rates observed throughout the study area in the Cs-137-derived sedimentation trends." Although not explicitly stated, it appears that the differences between the 1954- and 1963-based sedimentation rates were interpreted as two points on a linear trend. While it is reasonable to conclude that sedimentation rates overall were higher in the past because of urban development, no data are provided to support the assumption of a linear trend (the USGS stream gauge data analysis appears to only demonstrate that sediment loads in the Northeast and Northwest Branches were higher in 1959-1961 than in 2014-2015). The modeled sedimentation rates for the lower Anacostia River are very low and substantially different than rates derived from geochronology studies. Additional data collection efforts should be considered to reduce uncertainty related to present-day sedimentation rates so that the role of monitored natural recovery in the overall management strategy for the river can be more reliably assessed. Section 4.3.1 indicates that bathymetric surveys will be a component of the baseline monitoring program; consider developing additional lines of evidence related to sediment deposition rates to offset potential uncertainties in bathymetric survey data comparisons.	Characterization	N
51	Navy	The text describes the comparison of model-derived and core-derived sedimentation rates for the upstream and midsection of the Main Stem as favorable, but does not mention the comparison for the lower section of the river. The text should be revised to also discuss the substantial discrepancy between the model-derived rate (<0.5 cm/year) and the core-derived rates (3.0 - 3.5 cm/year) for location P2-R2-CS2.	Characterization	N
52	Navy	"Reach 123 rates range from 0.6 to 1.0 cm/year with rates locally ranging up to 1.6 cm/year." The color shading shown on Figure 2.9 indicates that model-derived sedimentation rates in R123 are primarily between -0.1 to 0.6 cm/year and the single geochronology core indicates rates of 3.0-3.5 cm/year. These inconsistencies should be resolved. In addition, why are negative sedimentation rates shown in Figure 2.9?	Characterization	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
64	Navy	The baseline monitoring program should also include collection of data to refine the CSM as needed to support adaptive management decision-making for the river. For example, consider adding collection of data to reduce uncertainties in the calibration and performance of the surface water model (e.g., water levels, suspended sediment concentrations) and to better understand present-day sedimentation rates in the Lower Anacostia River.	Characterization	N
145	Navy	Recommend collection of time-series suspended sediment data to improve the sediment transport model calibration.	Characterization	N
382	AWCAC	Has the project team determined rate of sedimentation? At what internals have river depth been measured? Is this information available to the public? Who may citizens contact for answers to questions which arise during the comment period?	Characterization	N
754	Anonymous	Because of the anaerobic process that is happening can you or do you know the levels of methan gas being released and the associated carbon emissions?	Characterization	N
353	Anacostia Watershed Community Advisory Committee	Accumulation of sediment in areas important for river use needs to be tracked and sources identified. This an important aspect of continuous monitoring. Average deposition of sediment over the entire river is meaningless for river use. Devices should be strategically placed so that the accumulation of sediment in specific areas can be tracked. Stewards can be engaged in this effort.	Characterization	N
447	DC Appleseed	Five geochronology cores seems like an insufficiently small number for a 9-mile long system. The limitations of this very small dataset should be acknowledged here.	Characterization	N
814	Anonymous	What is the deposition/erosive situation in the Channel?	Characterization	N
167	NPS	State what was done to determine nature and extent. For example: XX samples from XX media collected over XX years…Summarize nature and extent for the COCs. In addition, where it states, “Concentrations of PCBs and other COCs that exceed risk levels in sediment overlap to a great extent”, should be shown on a figure. NPS has mapped the EAAs against the portions of the river that exceed the PRG for chlordane and the vast majority of areas where chlordane exceeds the PRG is outside of the EAA. In other words, while PCBs and chlordane appear to be largely collocated on a river-wide basis, that is not true with respect to the EAAs, which could become recontaminated by chlordane and other COCs from surrounding areas.	Characterization	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
806	Anonymous	1) Has sedimentation rate been determined for the upper anacostia? Presumably CSX bridge is border between upper and lower - is that correct? 2) What is acceptable level of contamination?	Characterization	N
753	Anonymous	Do you know how deep the sediment is for all the sections of the river?	Characterization	N
524	Sierra Club	Overall, the selected remedies seem adequate on their faces. However, the Remedial Investigation completed in 2018 (for which Sierra Club provided comment) did not adequately characterize contamination in the surface water, which makes this Proposed Plan for Early Action Areas questionable overall. While it is notable that the remedies selected will lead to a 90% risk reduction, the meaning behind that number is not well-explained. The entire plan could have provided more information explaining the necessary concentrations in all environmental media to achieve the target beneficial uses of swimming and fishing, and whether or not - and how - the proposed remedies will meet these concentrations. The presence of debris can exacerbate the fate and transport impacts of contaminants of concern and should be removed. All remedies should be designed to account for additional stressors, such as increased frequency and intensity of storms, due to climate change.	Characterization	N
749	WG	DOEE has identified three PEC sites where an RI/FS has been or will be prepared pursuant to existing consent decrees, including East Station, the Washington Navy Yard, and Pepco. DOEE has appropriately determined that at those sites, it is more efficacious for any further investigation, clean up goals or remedial work to be conducted pursuant to existing Consent Decrees or under the oversight of the agencies overseeing those sites. At those sites, the data are far more dense than on the river as a whole, and much more is known about river contaminants and background (Washington Gas Draft Technical Memorandum 6, Washington Navy Yard Final OU2 Remedial Investigation Phase 1 Data Report, Final OU2 Remedial Investigation Report, and Final OU2 Feasibility Study Data Report – Near shore Sediment, and Pepco Benning Road Draft Final Remedial Investigation Report.) Thus, DOEE has recognized that the goals, remedies, and background levels for those sites should be determined based on the data generated for those sites	Coordination with PECSes	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
29	Navy	"DOEE intends for remedies ultimately selected for the PECSes and for other contaminant sources to be aligned with remedies selected for the ARSP study area." The meaning of this statement is unclear. The Navy agrees that the PECS remedy at WNY should be consistent with the the broader objectives of the ASRP but does not agree that the remedy selected for the PECSes should be the same as the remedy selected for the river-wide hot spots because site-specific factors will influence the remedial alternative development, evaluation and selection process. Please clarify the meaning of "aligned with remedies selected for the ARSP study area."	Coordination with PECSes	N
39	Navy	" . . . DOEE expects that the work performed at the Hot Spot PECSes will support the selection of appropriate remedies, including remedies or response actions for hot spots." Please clarify this statement given that the river-wide hot spot remedies will be selected prior to initiation of cleanup work at the PECSes hot spots.	Coordination with PECSes	N
183	NPS	Please add text about when a ROD can be expected for these PECSes	Coordination with PECSes	N
347	Anacostia Watershed Community Advisory Committee	This report has been provided in a form very digestible by the general public. However - it is difficult for us to see the whole picture of clean-up efforts on the Anacostia without knowledge of other efforts being undertaken to remove toxics - ie by PEPCO, Washington Gas Light, National Park Service. Please include brief chapters, annotations, references, links, diagrams with notes, summaries or other means to provide a full picture of remediation efforts.	Coordination with PECSes	N
348	Anacostia Watershed Community Advisory Committee	Please indicate location and extent of PECS – simple diagram. This document could be a very good simple reference document, the basis for a living document which the public can use to track the project. When a new document is created at every stage, it is difficult to provide continuity and track progress.	Coordination with PECSes	N
361	Anacostia Watershed Society	What information can you share about the updated list of PRPs, like site, COCs, etc?	Coordination with PECSes	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
363	Anacostia Watershed Society	While, we understand the strategy of having the PECS sites take action at their hotspots, that "Strategy" has been the problem for the last 40 years: that these entities do not accept complete responsibility for hot spots potentially located at or near their sites and do not want to start any remediation until they receive clear guidance for their responsibility. The WNY placed a test cap on a Hot Spot in the River nearly 20 years ago but they are loath to continue any remediation due to the joint and several liability requiring them to continue to remediate to completion and seek reimbursement from other responsible parties.	Coordination with PECSes	N
366	Anacostia Watershed Society	It reads like the 3 mentioned PECS sites are completely responsible. NPS and DC need to be mentioned as PRPs as well. DC is a Responsible Party. Which entity of DC? DC Water? General Services? DOEE? DPW? Is there a consent decree or formal recognition of DC's role and transgressions? Is there a standard that DC will be held to that is different from WNY, NPS, WGL and Pepco? When the calculations start, how will the allocation for DC's part be made? Is there an estimate for total remedial expense attributable to DC?	Coordination with PECSes	N
370	Anacostia Watershed Society	The list of Responsible Parties has matured and includes companies but no more information has been provided as to particular sites that may have contributed to the overall river sediment contamination. Are these DC Brownfields sites? What is the COCs? How was the determination made to include these sites?	Coordination with PECSes	N
371	Anacostia Watershed Society	Is there any thought to including Monsanto as a Responsible Party?	Coordination with PECSes	N
372	Anacostia Watershed Society	The main Responsible Parties should be identified in the Proposed plan or Focused FS with scale of attributed responsibility. This important to communicate the lines of responsibility to the public. Specifically, such a table would show the federal government responsible for 50-80% of the total remediation investigation/feasibility/remediation/long-term monitoring.	Coordination with PECSes	N
377	Audubon Naturalist Soc	The need to consider whether the Proposed Plan achieves the PRG is highlighted by the fact that all the proposed remediation methods only partially meet the criterion of "reduction of toxicity, mobility, or volume through treatment	Coordination with PECSes	Y
379	Audubon Naturalist Soc	When planning for dredging, treatment, and disposal of contaminated sediment, DOEE should ensure that sediment does not go to a landfill or treatment facility located in an Environmental Justice Community.3Plans for disposal should be made public before remediation begins	Coordination with PECSes	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
425	DC Appleseed	Rationale should be provided for focusing on just 3 of 15 PECSes. Are the other PECSes not potential sources of contamination to the study area?	Coordination with PECSes	N
464	DC Appleseed	Regarding DOEE's expectation for cleanup at the PECS hot spot sites, the site-specific background concentrations are likely much less than the hot-spot RAL of 600 µg/kg, so it would more accurate to say that DOEE expects the RAL for these sites to be equivalent to the site-specific background concentration. Is this a likely outcome for these sites?	Coordination with PECSes	N
527	William Brakel ICPRB Commissioner	Back in the 1990s, Greenpeace referred to the Navy Yard's contamination of the river with PCBs as a "dishonorable discharge." Have the Navy formally and officially committed to a full clean up / remediation of the area? You mentioned a consent decree - can you tell us more?	Coordination with PECSes	N
808	Anonymous	NRDA is an important part of the resolution of the contamination of the Anacostia. Will this process be coordinatd with remediation activities? Future river use may influence remediation methods because final depth is critical to planned uses. Who will be involved in the NRDA process?	Coordination with PECSes	N
824	David Colbert	How is the clean up being financed by 1) federal 2) District 3) PRPs? How long will the clean up take?	Coordination with PECSes	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
587	Pepco & WG	"...Under the Proposed Plan, remedial investigation and cleanup efforts at three of the so-called PEC sites identified in connection with the ARSP—Pepco's Benning Road Facility, Washington Gas's East Station, and the U.S. Navy's Navy Yard— will continue to proceed independently pursuant to their respective court-approved consent decrees. Consistent with that approach, DOEE should not attempt to impose on the PEC sites the specific cleanup targets or remedial goals developed for the ARSP. The potentially responsible parties for the PEC sites have been working for years to study the specific conditions at each site and have developed data sets that are substantially more extensive than the data developed by DOEE for most other areas of the river. The potentially responsible parties should be allowed to work with the oversight agencies (including DOEE) to set cleanup levels and implement remedial decisions tailored to each site, based on the sampling, risk assessment, and other evaluation work they have conducted at each site. Any other approach would arbitrarily render moot the major investments that the parties have made in investigating and performing risk assessments for the sites under their individual legal agreements. Moreover, USEPA and the National Park Service are the lead oversight agencies, respectively, for the Washington Navy Yard and Washington Gas East Station sites. DOEE cannot presume to constrain the decision-making authority of those agencies by imposing sediment cleanup standards to be applied uniformly at all areas of the river. Allowing the work at the PEC sites to proceed in parallel with, but independent of, the ARSP not only avoids disrupting the parties' rights under their site-specific agreements but will allow for more finely tuned and more effective remedial actions at these PECS..."	Coordination with PECSes	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
573	Pepco & WG	Under the Proposed Plan, remedial investigation and cleanup efforts at three of the so-called potential environmental cleanup (PEC) sites identified within the ARSP—Pepco's Benning Road Facility, Washington Gas's East Station, and the U.S. Navy's Washington Navy Yard— will continue to proceed independently pursuant to their respective court-approved Consent Decrees. The companies fully endorse this approach. The responsible parties for PEC sites have been working for years to study the specific conditions at each site and have developed data sets that are substantially more extensive than the data currently available for the ARSP as a whole. The responsible parties should be allowed to work with the oversight agencies (including DOEE) to set cleanup levels and implement remedial decisions tailored to each site. Allowing the cleanup programs at the PEC sites to proceed in parallel with, but independent of, the ARSP not only avoids unnecessarily wasteful and duplicative expenditure of resources and potential disruption the parties' rights under their site-specific agreements, but will allow for more finely tuned and more effective remedial actions at these PEC sites that will likely better satisfy the criteria under the National Contingency Plan. Some of RI/FS documents for the ARSP nevertheless contain language purporting to characterize conditions at the PECS and to set specific cleanup standards and remedial action time frames for these sites. These statements are inconsistent with DOEE's well-justified determination that the three PEC sites should proceed independently from the ARSP in light of the extensive data available for the three PEC sites, the separate and advanced work at those sites pursuant to existing consent decrees, and the already existing regulatory oversight at those sites. As a result, these statements are arbitrary, and they should not be carried forward to the Interim ROD.	Coordination with PECSes	N
43	Navy	"Three PECS hot spot sites are defined within the Main Stem OU." Figure 2.2 shows four: PEPCO, Washington Gas, Washington Navy Yard, and the Southeast Federal Center (SEFC). The Federal Facility Agreement (FFA) for Washington Navy Yard does not include SEFC. The bulleted list on page 9 does not identify SEFC as a PECS hot spot site. Please correct Figure 2.2 to change the shading color for SEFC from orange to gray.	Coordination with PECSes	N
759	Anonymous	Will the city receive funds from sources other than taxes for this project? Will reparations be sough for damages incurred from so many years of discharge of toxics?	Coordination with PECSes	N
777	Anonymous	How will the city pay for the project?	Coordination with PECSes	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
528	William Brakel ICPRB Commissioner	You mentioned that DOEE is coordinating closely with the National Park Service (which has jurisdiction over the bottom). Will NPS conduct it's own public hearings, essentially duplicating the DOEE outreach effort.	Coordination with PECSes	N
797	Anonymous	Who will pay for the remedial actions? Is the funding already secured?	Coordination with PECSes	N
774	Anonymous	Who will pay for the cleanup - the taxpayers or the polluters?	Coordination with PECSes	N
790	Anonymous	Will PRPs choose 600 ppb as their PRGs?	Coordination with PECSes	N
799	Anonymous	Please talk a bit about work for which the park service is responsible	Coordination with PECSes	N
756	Anonymous	How can DC lead this effort when the city is a responsible party? Isn't that an inherent conflict of interest?	Coordination with PECSes	N
844	Stacy Baker	The Potentially Responsible Parties are not "free money." Regardless of whether Pepco, DC Water, the Navy, City, or others are on the hook, as a DC taxpayer I know I'll wind up paying for whatever they fork out anyway. Costs will come to me as utility, federal, or district tax increases.	Coordination with PECSes	N
771	Anonymous	Dir. Wells mentioned an effort to ID proximate responsible parties. As a concerned taxpayer, how aggressive is DC pursuing that obligation? How are you? What efforts?	Coordination with PECSes	N
796	Anonymous	Do you anticipate that the PRPs who already have consent decrees in place (PEPCO, Washington Gas, etc) will help pay for this remediation as well as the remediation already legally required?	Coordination with PECSes	N
748	WG	"...Figures in the Focused Feasibility Study (FFS) erroneously report PCBs at over 600 micrograms per kilogram (ug/kg) in sediment adjacent to East Station (FFS Figure 1.2: Reach 123; and Proposed Plan (PP), Figure 2 Anacostia River Sediment Project Study Area, which is somewhat illegible). (Final ARSP Remedial Investigation Report, December 2019; Tables 4.2, 4.3, 4.8, 4.9 and 4.10). The table below shows the correct surface sediment data for the area adjacent to East Station. As noted, sampling undertaken during the East Station RI/FS has shown that Washington Gas is not a source of PCBs..."	EAA Definition	Y
65	Navy	"DOEE expects that PECS hot spot sites . . . will be remediated to the lower of the site-specific background concentration applicable to each site or the river-wide hot spot cleanup level (600 ug/kg total PCB congeners) adopted by DOEE." This expectation is consistent with the approach developed in the WNY OU2 FS.	EAA Definition	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
401	DC Appleseed	In spite of the section title, there is no explanation of how the 600 µg/kg RAL was derived. Simply saying that it was derived from the river-wide RAL is insufficient. Ideally a series of hypothetical RALs should have been evaluated, considering costs and benefits and the evaluation presented so it is clear how the 600 µg/kg value was selected.	EAA Definition	N
429	DC Appleseed	Additional detail should be provided for why the 600 µg/kg RAL was considered optimal. This is a critical technical decision that is not adequately explained in a single sentence. Your February 21, 2020 letter to DC Appleseed provides additional rationale using metrics of remediation cost and risk reduction. However, the risk reduction metric is technically flawed (see next comment).	EAA Definition	N
571	CSX	Third, DOEE defined “hot spot” EAAs by geospatial kriging (a method of interpolation) using both subsurface and surface River sediment concentrations and comparing these interpolated values to the hot spot Remedial Action Level (“RAL”), which was developed using only surface sediment concentrations. The inclusion of subsurface sediment concentrations in the kriging analysis is inappropriate for two reasons: 1) Since the hot spot RAL was developed using surface sediment concentration data, the kriging analysis used to identify areas of the River that exceed this RAL should also be based on surface sediment concentrations. 2) The use of subsurface sediment concentrations in the kriging analysis falsely assigned concentrations to surface sediment where no data were collected. This, in turn, results in EAAs that are larger than what the surface sediment concentration data support.	EAA Definition	N
766	Anonymous	Is the 90% reduction only the EAA area or total of the operation units?	EAA Definition	N
2	MDE	"...it appears that the sampling density in several of these Early Action Areas (EAAs) is not adequate to define the area that will be dredged, specifically areas RW-HS-456a (6.4 acres), RW-HS-FNC-456d (2.1 acres), RW-HS-123a (8.4 acres), RW-HS-123c (5.4 acres), and RW-HS-FNC-123d (7.5 acres). Perhaps additional data exists that the Department is not aware of and, if so, it should be clearly represented in the supporting figures as plans are developed further. If not, our collective experience with significant removal actions within sediments, as well as soils, would lead us to recommend additional characterization efforts prior to implementation of dredging activities due to the limitations associated with kriging..."	EAA Definition	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
25	Navy	In the Interim ROD, consider adding a line under "Early Action" for "Remedial Design" so that the reader understands that the boundaries of the hot spot areas may change based on pre-design surface sediment sampling.	EAA Definition	N
54	Navy	The Navy reiterates our concerns about the contoured representations of surface sediment COC concentrations used in the RI/FS. While not explicitly stated, it appears that the total PCB contour map (Figure 2.14) was used to identify hot spots in the Focused FS Report and to represent surface sediment PCB concentrations in the Surface Water Model Report. Our concern is that if the contoured representation of total PCB concentration is not supported by the data, then the accuracy of all the analyses based on the representation is called into question. The revised documentation of the geospatial kriging methods in Appendix L of the RI does not include the necessary information to assess the accuracy of the interpolated data, but review of Figure 2.14 indicates that the interpolation is not supported by the data. Specific technical concerns with the kriging methodology and results are provided in Attachment 1. Please provide the full variogram analysis used to develop the contour maps.	EAA Definition	Y
63	Navy	The kriging interpolation used to depict the total PCB concentrations in surface sediment has signfiicant uncertainties and should not be used to identify hot spots for early action (additional comments about the kriging representation are provided in the comments on the Focused FS Report). The PECS hot spots shown in green should be removed from this map because they are being developed separately. Instead, dashed lines could be used to demarcate the approximate area to be addressed by remedial action at the PECS.	EAA Definition	N
66	Navy	"Areas for additional sediment remediation may be informed by the forensic footprint associated with each PECS and areas previously addressed as hot spots." Note that remediation, monitoring and 5-year reviews at the WNY OU2 will be conducted under the CERCLA ROD, which is a separate but parallel process. Recommend deleting this sentence as it is not critical to the description of the river-wide adaptive management process and raises a number of associated questions and issues.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
75	Navy	The kriging interpolation used to depict the total PCB concentrations in surface sediment has signfiicant uncertainties and should not be used to identify hot spots for early action. There are several instances where the hot spots are not supported by the actual surface sediment data (e.g., RW-HS-123c; see Attachment 1 and 2 to these comments). Recommend using the Thiessen polygon map provided in Figure A.3.3.1 of the River-wide FS as a more reliable basis for identifying early action hot spot areas.	EAA Definition	Y
76	Navy	In addition, the PECS hot spots shown in green should be removed from these maps because they are being developed separately, as acknowledged in the text ("The EAAs defined in this FFS exclude sediments adjacent to the [PECS] because DOEE expects that each site will complete their own remedial actions . . ."). Instead, dashed lines could be used to demarcate the approximate area to be addressed by remedial action at the PECS.	EAA Definition	N
77	Navy	The identification of early action hot spot areas should reference and build directly on the SWAC-RAL analysis provided in Appendix A Attachment 3 of the River-wide FS report by 1) identifying sample locations with PCB concentrations above the selected RAL (600 ug/kg) using the Total PCB congener SWAC and RAL calculation tables and delineating the hot spot boundaries using the Thiessen polygon map (Figure A.3.3.1). The boundaries of the hot spots identified in this manner could then be refined based on considerations such as size. The post-EAA SWAC could then be calculated using the same spreadsheet and methods used in the river-wide FS.	EAA Definition	N
78	Navy	Recommend explaining that the hot spot boundaries will be refined based on additional surface sediment sampling in remedial design.	EAA Definition	N
79	Navy	The highest PCB concentration shown for each early action area appears to be based on the interpolated PCB concentrations and not actual sample data, which is misleading and introduces additional uncertainty into projections of EAA effectiveness. Measured sample results should be used to identify the highest PCB concentration associated with each early action area.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
359	Anacostia Watershed Society	Hot spots were defined as sediments exceeding a PCB concentration of 600 µg/kg. The hot spot RAL (600 ug/kg total PCBs) was judged to be the optimal cleanup level for achieving substantial risk reduction while maintaining consistency within the adaptive management decision framework. All areas not close to a PECS where PCB concentrations in sediment were greater than 600 µg/kg were defined as EAAs. I am opposed to not doing all the hot spots together. This decision to separate the 11 EAAs seems based solely on "who will pay for them?". All hot spots should be done at roughly the same time to be able to monitor the effect on contaminant reduction without concern for recontaminating or mixing cleaned areas. Figure 1.3 shows the EAAs in mainstem. THe Hot spots in front of WNY, WGL and Pepco are being attributed to those PECS sites. EAA RW-HS-456c could be attributed to the Landfill as the Pepco cove could be attributed to DC and NPS (A stretch I agree) but we need to focus on the process of removing the hot spots not find efficiencies in the mobilization, placement of material and engineering then consider allocation of cost.	EAA Definition	N
417	DC Appleseed	This figure shows several small areas, shown in green, with PCBs > 600 µg/kg, that are not particularly close to a PECS even though they are designated as PECS hot spots. The process by which these hot spots were attributed to PECSes should be described.	EAA Definition	N
450	DC Appleseed	SWACs were calculated using Thiessen polygons, according to the text. COC distributions were also mapped using kriging, which can yield very different results than Thiessen polygons. Kriging is usually thought of as a more technically valid method. A comparison of SWACs calculated using the two methods should be made. If the results are similar, then the calculation method is less important. If significant differences are found, then the implications for the project are greater and additional statistical analysis should be conducted to aid in the selection of the most appropriate method.	EAA Definition	N
485	DC Appleseed	It's not clear how these acreage estimates were made. For example, for the 10-5 column, are there 633 acres that are greater than the PCB RALs specified in Table 3.2? What RALs were used for the 10-4 and 10-6 calculations?	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
494	DC Audubon Society	We are also pleased that Kingman Lake has been identified as an Early Action Area. Kingman Lake and the surrounding shoreline is recognized as a DC Conservation Opportunity Area, and the Lake is immediately adjacent to DC's only Critical Wildlife Area. As such, Kingman Lake is an important area of habitat and riparian buffer, providing great benefit to wildlife and the community.	EAA Definition	N
531	CSX	DOEE defined "hot spot" EAAs by geospatial kriging (a method of interpolation) using both subsurface and surface River sediment concentrations and comparing these interpolated values to the hot spot Remedial Action Level ("RAL"), which was developed using only surface sediment concentrations. The inclusion of subsurface sediment concentrations in the kriging analysis is inappropriate for two reasons: 1) Since the hot spot RAL was developed using surface sediment concentration data, the kriging analysis used to identify areas of the River that exceed this RAL should also be based on surface sediment concentrations.	EAA Definition	Y
26	Navy	In the Interim ROD, recommend removing the green-shaded PECS hot spot areas because they are being developed separately and are unlikely to correspond with what is shown on this figure. Instead, dashed lines could demarcate the approximate areas to be addressed by the PECS cleanup actions.	EAA Definition	N
27	Navy	The locations of the river-wide hot spots should be revisited using the Thiessen polygon map rather than the interpolated map of surface sediment PCB concentrations because of uncertainties associated with the interpolation methods and results.	EAA Definition	N
28	Navy	"Figure 2 also shows areas where PCB levels and levels of other contaminants of concern (COCs) are elevated in the rest of the river that are not addressed in today's Proposed Plan, including areas near Potential Environmental Cleanup Sites (PECSes) and locations that serve as contaminant sources to the ARSP study area." This statement is incorrect. Figure 2 does not currently identify locations that serve as contaminant sources to the ARSP study area (other than PECSes); associated text in the Interim ROD should be revised accordingly.	EAA Definition	N
38	Navy	"As the nature and extent of contamination are still being characterized at these PECSes, the precise definition of PECS Hot Spot areas will remain undetermined for the purposes of this FS and the Interim ROD." The PECS Hot Spot area developed for WNY OU2 will be presented in the OU2 FS Report and therefore should be removed from the maps in the ARSP Focused Feasibility Study Report.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
165	NPS	Please use a different color for PECs hot spots, it is currently the same color as the Main Stem OU. Currently looks like there are no hot spots adjacent to PECs. This figure also does not show the entire study area.	EAA Definition	N
362	Anacostia Watershed Society	First Sentence sounds like ALL river EAAs but its only about half of the 25 identified areas This is a miscommunication that has been carried through 4 community meetings and will become fact by constantly being repeated. The public will believe that if this these 11 sites are completed the final ROD will be the end of the river sediment contamination. This is a mischaracterization at best. A better statement would be along the lines of " DOEE is being proactive in attempting to remediate 11 of the 25 hot posts in the river sediment but should explain in detail how all Hot Spots will be remediated and when. No monitoring can really begin until all Hot spots are controlled.	EAA Definition	N
404	DC Appleseed	There are 14 EAAs in this table, not 11 as stated in the text.	EAA Definition	N
405	DC Appleseed	Additional statistics should be provided for the EAAs, such as the average PCB concentration (as a SWAC) and the number of sampling locations included in the EAA. These statistics would provide a more complete picture of the potential scope and outcome of remedial design sampling. Some additional narrative description of each EAA would also be appropriate, including potential relevant info such as water depth, nearest potential sources of contamination, and their location relative to recognizable landmarks such as bridges, marinas, or parks.	EAA Definition	N
421	DC Appleseed	PCBs are not mentioned anywhere in this figure, although the 600 µg/kg threshold provided in the figure is specific to PCBs. All graphics and tables referring to Remedial Action Levels should explicitly identify PCBs as the driver.	EAA Definition	N
422	DC Appleseed	It would be helpful to identify or number the EAAs on this figure. There are more than 11 discrete areas shown in red, even though the text refers to 11 EAAs.	EAA Definition	N
423	DC Appleseed	The EAA areas for each OU (28.2, 5.9, 33.8 acres) total 67.9 acres, less than the 70.6 acre total provided near the top of this section.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
461	DC Appleseed	Figure 4.1, referenced in this section, is not found in the river-wide FS document. Without this figure, it is not possible to assess how the RAL of 600 µg/kg was selected. An evaluation of a range of potential RALs should be presented. For each hypothetical RAL, the acreage, remediation cost, and assumed benefits of the remedial action should be presented. Your February 21, 2020 letter to DC Appleseed provides additional rationale using metrics of remediation cost and risk reduction. However, the risk reduction metric is technical flawed (see next comment).	EAA Definition	N
579	Pepco & WG	To extrapolate from its limited dataset of contaminant concentrations in sediments, DOEE conducted a geostatistical analysis called "kriging" in order to determine estimated distributions and concentrations of sediment contamination in the ARSP. DOEE relied heavily on this kriging analysis, among other purposes, to identify the proposed Early Action areas. The analysis is significantly flawed, however, due to DOEE's unconventional and unsupported methodologies. For example, the use of significantly skewed and inappropriate model parameters not only contradicts sound science but defies common sense (e.g., modeling a vertical range of 1,139 feet for PCB congeners for a river that is only 37 feet deep at its deepest point, which causes subsurface sediment data to have an outsized influence in areas without surface sediments sampling data). In order to compensate for insufficient surface sediment data, DOEE also inappropriately relied on projected concentrations of subsurface data to estimate contaminant distribution, despite subsurface concentrations not being relevant to risk. Such problematic approaches bear on the ultimate determination of what areas of the river are deemed to exceed DOEE's proposed Early Action cleanup threshold, and thus must be addressed and corrected before any such remedial action proceeds	EAA Definition	N
811	Anonymous	1) Chlordane is not safe at any level. Where has this been found? How will it be remediated? 2)What is considered an acceptable/safe level for other toxics? If an "unacceptable" level of contaminants exists at a "non early action area" will these be addressed upon completion of "early action."	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
611	Pepco & WG	"...DOEE's kriging employs unconventional and unsupported methodologies that result in areas over the Early Action RAL that are larger than warranted based on actual concentrations. The range used in the spatial model for polychlorinated biphenyl (PCB) congeners, which quantifies the extent to which an observation influences predictions made by the kriging procedure across space, is too high. As the range increases, the sampling data with few neighboring points will have a higher 'influence' on predictions across larger distances. This is especially important in areas with sparse or no data or areas with subsurface observations only. DOEE's PCB congeners model uses a range of 56,971 feet in the horizontal direction, and a horizontal to vertical anisotropy factor of 50, which means the influence of observations on predictions in the vertical (surface to subsurface and vice versa) was 'decreased' to a range of 1,139 feet. The assumption of using such an anisotropy factor in the vertical direction is that sediment properties differ more drastically in a vertical direction across different deposits than in a horizontal direction across the same layer. However, the depths of the river are such that, the subsurface observations will still dominate the predictions at the surface directly 'above', even with this anisotropy factor that limits the influence of observations on predictions in the vertical direction. The 3-dimensionsal kriging projects predictions in all directions from point observations, so if there are observations below the surface but no observations above them at the surface, the observations below will still strongly influence surface predictions, especially with such a high range, despite the anisotropy factor (vertical range is still 1,139 feet with that anisotropy factor: no samples are vertically removed by 1,139 feet in the dataset)..."	EAA Definition	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
612	Pepco & WG	DOEE used the combined subsurface and surface sediment datasets to estimate 3-dimensionsal distribution of each contaminant. In this process, the subsurface data are projected to the surface layer to define the extent of areas over the Early Action RAL. Many of these areas do not reflect actual surface sediment data and rely on projected concentrations. It appears that the footprint of areas over the Early Action RAL so obtained was then subjected to Thiessen polygon analysis, which is interpolation of the interpolated data. This process adds multiple levels of uncertainties resulting in underestimation or overestimation of the areas over the Early Action RAL. Therefore, to verify the true surface sediment concentrations and establish accurate boundaries for the areas over the Early Action RAL, it would be necessary to collect additional surface sediment data in areas with sparse or no observations, so that kriging predictions would be better constrained by observed data. Some candidate areas for additional surface sediment sampling include the Main Stem downstream from the Pepco investigation area (RW-HS456b), Main Stem south of the confluence of Kingman Lake and the Main Stem (RW-FNC-HS456d), and Main Stem south of Washington Gas (RW-HS-123a). If surface sediment samples are indeed 'cleaner' than the subsurface, the areas over the Early Action RAL will diminish after another round of 3D kriging. But the data collected are insufficient to accurately delineate the vertical and horizontal dimension of the areas over the Early Action RAL. The use of subsurface datasets to determine surface sediment areas over the Early Action RAL is not appropriate. Subsurface concentrations at depth are not relevant to risk, as stated in the RI (with respect to ecological risks, section ES.3.1: "chemicals were identified as ecological risk drivers in the study area based on comparison of surface sediment concentrations"; with respect to human risks, section ES.3.2.1: "risks to [sic] sediment were assessed by considering only surface sediment in shallow water"). Therefore, it is not appropriate to use the subsurface data to define surface areas over the Early Action RAL. Any conclusions reached from kriging at this point are arbitrary for these and the other reasons stated in these comments.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
613	Pepco & WG	While the Proposed Plan and Focused Feasibility Study (FFS) acknowledge that site-specific remedies will be selected for each of the three PEC Sites with consent decrees (Pepco, Washington Gas, and the U.S. Navy Yard) based on site-specific information, the FFS nonetheless presents areas over the Early Action RAL footprints at PEC Sites (Figures 1-3 and 1-4). It is inappropriate for DOEE to be presenting this information and characterizing these areas as "hot spots," given that the three PEC Sites noted above are undergoing their own RI/FS process to determine investigation and cleanup needs under the oversight of the National Park Service (Washington Gas), DOEE (Pepco and Washington Gas), and the United States Environmental Protection Agency (Navy Yard). The process at each PEC site will also include the identification of a remediation footprint if appropriate, based on the risks and other issues identified at that site, taking account of background. Because PEC Sites are not part of the Proposed Plan, the Interim Record of Decision (ROD) and the FFS and River-wide FS should exclude any presentation of kriging estimates adjacent to each of the three PEC Sites. Moreover, there is far more data for those specific sites than for other portions of the River, making it arbitrary not to handle those sites on a site-specific basis	EAA Definition	N
158	NPS	The use of PCB concentrations alone to delineate the boundaries of the eleven early action areas (EAAs) assumes that PCBs are collocated with other COCs in the river sediments, and that addressing areas with elevated concentrations of PCBs will address areas contaminated by those other COCs as well. The FS Report states that 90 percent of the areas where chlordane exceeds its PRG are located in areas where PCBs and other COCs also exceed their applicable PRGs. In other words, this suggests that remediating human health COCs will also address exceedances of chlordane. However, NPS has mapped the EAAs against the portions of the river that exceed the PRG for chlordane, and the vast majority of areas where chlordane exceeds the PRG are outside of the EAAs. That map is attached to this letter for inclusion in the administrative record (Attachment E). In other words, while PCBs and chlordane appear to be largely collocated on a river-wide basis, that is not true with respect to the EAAs, which could become re-contaminated by chlordane and other COCs from surrounding areas.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
179	NPS	DOEE asserts that "Completion of the interim remedial action outlined in this FFS will significantly reduce the average concentration of PCBs and other contaminants in surface sediment and the risks associated with these contaminants". NPS disagrees with this assertion. NPS has mapped (see the figure attached to the end of this document) the EAAs against the portions of the river that exceed the PRG for chlordane and the vast majority of areas where chlordane exceeds the PRG is outside of the EAA. While PCBs and chlordane appear to be largely collocated on a river-wide basis, that is not true with respect to the EAAs, which could become recontaminated by chlordane and other COCs from surrounding areas. This is repeated in Section 1.2, page 4, first paragraph. The executive summary also needs to clearly state what the COCs are.	EAA Definition	N
186	NPS	NPS disagrees with dropping BaPE and chlordane from further consideration. NPS does not concur that dropping BAPE from further evaluation where it exceeds risk levels is warranted and disagrees that the EAA established using PCB concentrations will address chlordane hot spots (see previous comments on this).	EAA Definition	N
211	NPS	"More than 90 percent of the area where chlordane exceeds the PRG is collocated with COCs that exceed human health PRGs." Please reference the figure that presents this information. The NPS prepared a map that did not show this to be the case (see attached figure). "Residual uncertainties associated with ecological risk will be addressed during Interim ROD implementation" Please provide examples of these uncertainties and how they will be addressed.	EAA Definition	N
228	NPS	"More than 90 percent of the area where chlordane exceeds the PRG are collocated with COCs that exceed human health PRGs." Please add figure reference, our mapping did not show this to be the case (see attached figure)	EAA Definition	N
232	NPS	"The aggregate area targeted for remediation base" on human health RAOs includes more than 90 percent of the area where chlordane exceeds the ecological PRG, as shown in Figure 3.1." This appears to be the wrong figure reference; this figure does not show what the text claims.	EAA Definition	N
289	USFWS	Second para.: Please explain why BaPE is not included in the discussion in the first sentence.	EAA Definition	N
292	USFWS	Last para.: Discuss whether or not PAHs are included.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
355	Anacostia Watershed Community Advisory Committee	Chlordane is not safe at any level. Chlordane must be completely removed wherever it is found.	EAA Definition	N
374	Audubon Naturalist Soc	Currently, the Proposed Plan only identifies a remedial action level (RAL), a preliminary remediation goal (PRG), and an estimated risk reduction for PCBs. We hope that future documentation will indicate how the proposed plans meet safety levels for all five COCs and the associated risk reduction.	EAA Definition	Y
516	Sierra Club	Why is the hot spot RAL 3 times greater than the river-wide RAL? Is the implication here that in these locations, a remedy will not occur unless the concentration is at least 600 micrograms/kg total PCBs, where for the rest of the river remediation will occur even though the concentration is 200 micrograms/kilograms total PCBs? This needs to be clarified and/or reexamined to ensure that the hot spots are cleaned up not just to the point where PCB contamination is reduced in the fish, but to the point where PCB contamination does not pose a threat due to direct contact or contact with soil or sediment on the shore. The RAL should also be low enough to minimize PCB contamination in groundwater, which is not discussed in the proposed plan.	EAA Definition	N
532	CSX	2) The use of subsurface sediment concentrations in the kriging analysis falsely assigned concentrations to surface sediment where no data were collected. This, in turn, results in EAAs that are larger than what the surface sediment concentration data support.	EAA Definition	Y
778	Anonymous	How were the hotspot areas on maps 1.2, 1.3 & 1.4 drawn? How the kriging used? Were both surface and subsurface concentrations used from kriging? Do you plan to use any treatability studies?	EAA Definition	N
8	MDE	The PP and FFS state that the removal of sediments exceeding the hot spot Remedial Action Level (RAL) of 600 micrograms per kilogram total PCBs will reduce the risk to humans from ingesting PCB-contaminated fish by approximately 90 percent. Does this calculation assume that the sediment exceeding the hot spot RAL associated with PECSes along the Main Stem are also removed (or contained)? How is the risk reduction affected by lack of action (or delays in action) at the PECSes?	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
31	Navy	The plan states that "cleanup to the 600 ug/kg is estimated to reduce risk to humans from ingesting PCB-contaminated fish by approximately 90 percent." This statement is misleading because it is appears to assume that 1) PCB concentrations in remediated EAAs will remain below the analytical detection limit, and 2) reductions in surface sediment PCB concentrations will result in corresponding reductions in fish tissue PCB concentrations. The first assumption does not take into account the deposition of suspended sediment with PCB concentrations greater than the analytical detection limit on the remediated surfaces. The second assumption implies that the relationship between PCB concentrations in sediment and fish tissue are well understood, which is not the case. While the EAAs are expected to reduce risks, a quantitative estimate of risk reduction may lead to unrealistic expectations. Recommend discussing these uncertainties in greater detail in the interim ROD.	EAA Definition	N
80	Navy	The discussion of estimated risk reduction appears to be based on the assumption that PCB concentrations in remediated areas will remain below detection; however, this will not be the case in areas where suspended sediments from upstream continue to be deposited. The discussion in this section should explicitly consider recontamination from upstream sources after the hot spots are remediated. While it is reasonable to estimate post-EAA PCB concentrations in surface sediment, associated risk reduction is difficult to predict because of the uncertainties related to source control effectiveness and sediment-fish tissue relationships. Consider removing the risk reduction estimates.	EAA Definition	N
190	NPS	“Reductions in the SWAC and estimated risk will be achieved when the EAAs evaluated in this FFS exhibit total PCB concentrations below the analytical method detection limit (i.e., post-remediation concentrations in the EAA are non-detects). Cleanup to the hot spot RAL (600 ug/kg) is expected to achieve risk reductions across the Main Stem, Kingman Lake, and Washington Channel OUs by an estimated 90, 89, and 94 percent, respectively.” This wording is unclear, are EAAs being cleaned up to ND, or are they being cleaned up to 600 ppb? Please clarify.	EAA Definition	N
319	Anacostia Riverkeeper	What measurable fish tissue concentrations will determine that the 90% reduction of risk to human health has been achieved? What is the contingency plan if the sediment is decreasing in PCB concentration but the fish tissues show little to no change, or is decreasing at an unexpectedly slow rate?	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
323	Anacostia Riverkeeper	Note that the estimated risk reduction is not explained and does not outline the risk reduction for "other viable protective alternatives" compared to "preferred alternatives". How can we weigh which would be more health protective. The risk reduction is sorely lacking any explanation and should be spelled out more as to how this was calculated, as that is the metric we are most concerned about.	EAA Definition	N
381	Audubon Naturalist Soc	We hope that as the Proposed Plan and public comment are reviewed, that DOEE and the National Park Service (NPS) will use Enhanced Natural Monitoring and Recovery (EMNR) and Beneficial Uses to restore the shores of the Anacostia. ENMR and Beneficial Uses should be paired with removal of the seawall and wetland restoration.	EAA Definition	Y
387	DC Appleseed	"...DOEE's February 21, 2020 letter to DC Appleseed, now part of the Plan, provided the calculation method for the assumed risk reduction percentages. Although we now understand the calculation, we believe it is a flawed method that does not provide sufficient or accurate information for distinguishing between alternative RALs..."	EAA Definition	Y
392	DC Appleseed	Additional details should be provided on the risk reduction calculations and assumptions. As noted, in a comment below, we believe the risk reduction calculations you have used are technically flawed and should not be used to differentiate between remedial alternatives or RALs.	EAA Definition	N
398	DC Appleseed	Given the uncertainties associated with the sediment-fish tissue relationship, and the fish consumption pathway and associated risks, stating that remediation of the EAAs will achieve significant near-term risk reduction seems like a bit of an overstatement. That is certainly the hope and estimates to that effect may have been made, but they are just estimates with a high degree of uncertainty.	EAA Definition	N
402	DC Appleseed	The methods for estimating post-remediation risks should be provided here. Your February 21, 2020 letter to DC Appleseed provided the calculation method for the assumed risk reduction percentages. Although we now understand the calculation, we believe it is a flawed method that does not provide sufficient or accurate information for distinguishing between alternative RALs. The narrative comments attached to this spreadsheet provide the rationale for this conclusion.	EAA Definition	N
403	DC Appleseed	As noted in the above comment, the "substantial risk reduction" associated with the hot-spot RAL of 600 µg/kg is based on a flawed calculation method.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
430	DC Appleseed	The methods for estimating post-remediation risks should be provided here. Your February 21, 2020 letter to DC Appleseed provided the calculation method for the assumed risk reduction percentages. Although we now understand the calculation, we believe it is a flawed method that does not provide sufficient or accurate information for distinguishing between alternative RALs. The narrative comments attached to this spreadsheet provide the rationale for this conclusion.	EAA Definition	N
437	DC Appleseed	Note 3 should provide some details on how risk reduction was estimated. It should also be made clear over what spatial scale the risk reduction applies. As noted above, we believe the risk reduction calculations DOEE has made are technically flawed.	EAA Definition	N
462	DC Appleseed	The methods for estimating post-remediation risks should be provided here. Your February 21, 2020 letter to DC Appleseed provided the calculation method for the assumed risk reduction percentages. Although we now understand the calculation, we believe it is a flawed method that does not provide sufficient or accurate information for distinguishing between alternative RALs. The narrative comments attached to this spreadsheet provide the rationale for this conclusion.	EAA Definition	N
478	DC Appleseed	The methods for estimating percent risk reduction should be briefly described in a footnote. As indicated above, we believe the risk reduction calculation method you have used is technically flawed.	EAA Definition	N
533	CSX	The kriging analysis is also technically flawed because it does not account for the physical conditions in the River. Specifically, it projects sediment concentrations over dry land (e.g., Kingman Island), which serves as a natural physical barrier to sediment and contaminant transport in the River. In other words, the kriging analysis ignores the fact that Kingman Island exists and interpolates sediment concentrations from one side of the island to the other, which is physically unrealistic.	EAA Definition	N
544	CSX	As explained in our comments above, kriging incorrectly generated the EAAs, including RW-HS-FNC-456d. The “highest PCB concentration” listed for this EAA (1,644.7 µg/kg) appears to be an artifact of this flawed kriging. The flawed kriging approach also inaccurately generated hotspot RW-HS-FNC-456b, where the highest PCB concentration is also indicated as 1,644.7 µg/kg. It is unclear what sample DOEE is utilizing with this concentration in these EAAs.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
189	NPS	Was a sensitivity analysis done during SWAC derivation? The analysis should be run and the range of SWACs determined using different assumptions (weighting methods) should be discussed. At a minimum confidence limits for the SWAC established here should be discussed	EAA Definition	N
276	NPS	"Calculations of SWACs using Thiessen polygon networks and remedial action levels (RALs) were conducted for each river reach." Was a sensitivity analysis done during SWAC development, or was Thiessen polygons the only weighting method assessed? Should include discussion of confidence limits for SWACs. This seems to be missing in Attachment 3.	EAA Definition	N
316	Anacostia Riverkeeper	This plan is to decrease the human health risk by 90% but there is no outline for how the levels will eventually get to the river-wide sediment goal of 65 ug/kg. After millions are put into these early action plans now to reduce risk by 90%, how will DOEE get PCBs down to the river-wide goal? Why not invest more now into more certain measures (KLHS-4 and WCHS-5)?	EAA Definition	N
354	Anacostia Watershed Community Advisory Committee	The risk reduction strategy seems to imply that, if the aggregated risk is averaged over the entire river – including contaminated and uncontaminated areas – achieving a reduction of 90% in the early action areas will achieve the desired outcomes. This is not acceptable. The average concentration must be reduced to a safe level at all areas likely to be used by humans.	EAA Definition	N
391	DC Appleseed	The text states that remedial actions are expected to reduce PCB concentrations by 30% within the EAAs. We think the reduction would be for the entire operable unit, not just the EAAs. Presumably the reduction within the EAAs would be much greater.	EAA Definition	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
849	UMBC	Table 1: It is not clear how 90% reduction in risk can be achieved through the proposed actions in only the early action areas. As reported in the UMBC/USFWS study, a major contribution of dissolved PCBs to the river comes from the Lower Beaverdam Creek. It is likely that the ongoing input from Lower Beaverdam Creek will be need to be controlled to achieve the target risk reduction in the Anacostia River. Perhaps the Estimated Risk Reduction in Table 1 needs to be explained better. Even in the Focusses Feasibility Study Report, the Anticipated Risk Reductions not explained well. For example, in Section 1.2.2 in the FFS, it is stated that "Reductions in the SWAC and estimated risk will be achieved when the EAAs evaluated in this FFS exhibit total PCB concentrations below the analytical method detection limit (i.e., post-remediation concentrations in the EAA are non-detects)." This approach makes risk reduction a function of chosen analytical method for PCB analysis and does not appear correct. I would suggest the following on the risk reduction issue: i) overall risk reduction needs to take into account PCB sources from sediment as well as ongoing inputs, ii) in the absence of a robust model that links PCB concentrations in sediment and water to fish and resulting human health risk, it may be advisable to look at reductions in pathways of exposure such as porewater concentrations in sediments as targets for reduction resulting from a sediment early action. Both AC amendment and sand cap placement will result in reductions of surface sediment porewater concentrations.	EAA Definition	N
591	Pepco & WG	The BERA did not find significant correlations between ecological risk drivers (or other chemicals) and adverse impacts in sediment toxicity testing conducted throughout the river. Due to the lack of any correlations between chemicals and adverse ecological impacts, DOEE was not able to derive site-specific sediment PRGs and instead used literature-based ecological screening values (ESVs) as ecologically-based PRGs. The use of ESVs as PRGs is not recommended or appropriate based on USEPA guidance (USEPA, 2005, 2018) and DOEE itself states that "ESVs are not cleanup goals" in the River-wide FS (Section 3.3.2.1 page 41) in clear contradiction of its reliance on ESVs to set sediment PRGs. In addition, the use of bulk sediment ESVs as PRGs does not account for site-specific conditions that limit bioavailability and thereby reduce exposure risk. The results of the BERA indicate that cleanup actions are not warranted for sediment based on ecological risk and as such, the ecological PRGs derived from screening levels should be removed from the River-wide FS.	Ecological Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
308	USFWS	No. 8: The use of mixed species is not reproducible (see comment RI-1) and adds great uncertainty. A mass requirement of 200 grams seems excessive.	Ecological Risk Assessment	N
309	USFWS	Top of page: The use of MDLs or ½ MDLs for non-detects is not recommended by statisticians (such as D. Helsel, USGS).	Ecological Risk Assessment	N
310	USFWS	Top half of page: Comment RI-1 applies to this discussion. If there is a good match in species and size, that should be described in a table.	Ecological Risk Assessment	N
744	WG	"...The draft Baseline Ecological Risk Assessment (BERA) and in turn the draft River-wide Feasibility Study (FS) both relied on centrifugation for the analysis of PAHs in pore water samples. This was inappropriate. It is well established that centrifugation is unsuited to the analysis of PAHs, and passive sampling devices should be used instead..."	Ecological Risk Assessment	Y
53	Navy	The Navy does not concur with some of the ARSP ecological risk assessment conclusions (per Navy comments on the ARSP remedial investigation report) although we agree that human health risk drives the development of the remedial alternatives.	Ecological Risk Assessment	N
187	NPS	"Residual uncertainties associated with ecological risk will be addressed during Interim ROD implementation". Please be specific to what the uncertainties are.	Ecological Risk Assessment	N
286	USFWS	Need to check the ERA to determine if any chemicals were defined as COCs. If so, then PAHs are probably described as total PAHs, PAHs, or high and low molecular weight PAHs.	Ecological Risk Assessment	N
314	USFWS	Last para.: Although statistical tests can be used to determine differences in concentrations, that does not establish that the populations are independent.	Ecological Risk Assessment	N
315	USFWS	First full para.: Please provide details of the Critical Body Residue Approach. The most recent paper for PCBs is Berninger, J.P. and Tillitt, D.E. 2019. Polychlorinated biphenyl tissue-concentration thresholds for survival, growth, and reproduction in fish. Environmental toxicology and chemistry 38:712-736.	Ecological Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
317	Anacostia Riverkeeper	The summary of site risk should mention that a significant portion of the claim of no or minimal harm to vertebrates were based on modeling, rather than sampling. For some reason the literature survey did not include papers including six that directly measured residues of PCBs and other toxics in the tissue of ospreys and their eggs. Anacostia Riverkeeper became aware of thsose papers during the comment period and sent them to TetraTech in late February. We are eager to receive a response indicating how the results of those papers compare to the modeling performed. Secondly, if the agency is serious in casting doubt on the relationship between chemicals in the sediment and the tumors documented in native catfish, then it must also be noted that should those tumors and lesions not be related to the COCs, the agency should shift the threshold for harm by COCs down due to the need to then consider the COCs' cumulative effect in conjunction with whatever did cause the lesions and tumors.	Ecological Risk Assessment	N
496	DC Audubon Society	In general, DCAS wishes to see protection and enhancement of Kingman Lake and the surrounding shoreline, such that there is a net benefit to the habitat and ecology of the system. We agree with and appreciate the prioritization of reducing PCB concentrations in the sediment and mitigating risk of human exposure. However, the protection and nurturing of this important and sensitive habitat is a valuable objective that is complimentary to the reduction of human risk. Therefore, DCAS would like to encourage that the following measures be considered and implemented to the maximum extent possible as ARSP and DOEE develop the Interim Record of Decision, and begin to move forward towards action in the project:	Ecological Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
575	Pepco & WG	DOEE's assessment of potential human health and ecological risks informs the establishment of the preliminary remediation goals (PRGs) and evaluation of remedial alternatives and, ultimately, influences the proposed early remedial actions. The Human Health Risk Assessment (HHRA) is based on outdated data regarding fish tissue concentrations and unsupported assumptions regarding the amount of fish actually consumed from the Anacostia River, leading to inflated risk findings. DOEE should update the HHRA using sampling data from 2017-2018, rather than continue to rely on data from 2013. The 2017-18 data show substantial reductions in fish tissue concentrations since 2013, which means that estimated human health risks associated with fish consumption have decreased. DOEE also should update the HHRA using fish consumption rates based on information from a recent in-depth angler survey focused on the Anacostia River. This survey shows that DOEE's assumed consumption rate, which was based on an earlier study that suffered from several methodological deficiencies, is overstated by nearly 40 percent, resulting in a corresponding overstatement of the risk. In addition, DOEE misapplies the results of its own Baseline Ecological Risk Assessment (BERA), which demonstrated no significant correlations between ecological risk drivers and adverse ecological impacts. Despite the results of the BERA, which indicate that cleanup actions are not warranted for sediment due to ecological risk, DOEE nonetheless proposed to establish ecologically-based remediation goals by inappropriately applying ecological screening values obtained from literature. No cleanup goal is required at this time based on ecological impacts, and in any event USEPA guidance makes clear that screening values should not be used as cleanup goals.	Ecological Risk Assessment	N
124	Navy	Data from the Lower Duwamish waterway were used to empirically adjust sediment-porewater partition coefficients for PCBs. Why not use the site-specific data for the Anacostia River associated with the passive sampler work performed by University of Maryland Baltimore County?	Ecological Risk Assessment	N
344	Anacostia Watershed Community Advisory Committee	This important diagram is very small. Please included in the document as a fold out page.	Editorial	N
295	USFWS	First full para.: The sentence about the Ghosh et al. 2020 study is vague and should be rewritten to be more specific as to what will be done in 2020.	Editorial	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
298	USFWS	Second full para.: Include the Ghosh et al. 2020 as one of the studies.	Editorial	N
291	USFWS	Second para.: for RAO 1: add "tributaries" after "such as"	Editorial	N
23	Navy	". . .that will substantially reduce threats from contaminated sediments in EAAs." In the Interim ROD, recommend changing "will" to "are expected to" because the amount of risk reduction that will be achieved in terms of reduced PCB concentrations in fish tissue is uncertain.	Editorial	N
33	Navy	The definitions of the symbols used in this table are unclear. The first two criteria are threshold criteria and either met or not met. The next five criteria are "balancing" criteria and the alternatives should be ranked or rated with respect to how well they meet these criteria (rather than classified as "partially meets criterion" or "fully meets criterion"). Recommend revising this table for inclusion in the Interim ROD to better support the selection of the preferred alternative.	Editorial	N
42	Navy	"The Washington DC portion of the study area is bordered by Anacostia Park . . ." Please insert "in part" before "by Anacostia Park."	Editorial	N
44	Navy	Why is PEPCO referred to as a PECS Hot Spot Site whereas Washington Gas and WNY are referred to as a sub-operable units? What is the difference?	Editorial	N
45	Navy	The Yards marina should be added to Section 2.3.2 and Figure 2.6.	Editorial	N
46	Navy	"Deep draft dredging by the USACE stopped when manufacturing operations at WNY and WGL East Station ended . . ." WNY should be deleted from this sentence because waterfront operations at WNY ended in the 1960s and USACE dredging continued in the federal channel in is area until the mid-1980s.	Editorial	N
47	Navy	The top of this page describes the proposed changes in authorized depth but not the proposed changes in width. The proposed changes in width should also be described and added to Figure 2.8 or shown on a new figure.	Editorial	N
48	Navy	"Sediment remediation in the study area will involve a mix of dredging and capping." "Will" should be changed to "may" because the remedy hasn't been selected yet.	Editorial	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
49	Navy	Recommend changing "managed natural attenuation" to "monitored natural recovery" for clarity.	Editorial	N
60	Navy	"The PRGs were applied on a SWAC basis within each of the six reaches . . " For clarity, consider the following revision: "The PRGs were compared to the SWAC calculated for each of the six reaches . . ."	Editorial	N
61	Navy	"The polgyons with concentrations greater than the total PCB congener PRG of 65 ug/kg would be selected first for remediation." Shouldn't this sentence state "polygons with concentrations greater than the RAL would be selected first for remediation"?	Editorial	N
69	Navy	The first paragraph references source control in the upstream watershed. Recommend deleting "upstream" because it could be interpreted as source control in the non- tidal Anacostia River only.	Editorial	N
70	Navy	"The River-wide FS Report established river-wide cleanup goals that will eliminate, reduce, or control these risks and attain ARARs." Recommend that this paragraph explain that the river-wide cleanup goals cannot be achieved at this point in time because the contaminant sources have not been fully controlled, and the ability to meet the cleanup goals in the future will depend on the effectiveness of the planned source control activities.	Editorial	N
71	Navy	Second paragraph - recommend changing "managed natural recovery" to "monitored natural recovery."	Editorial	N
73	Navy	"Implementation of the interim remedial action . . . will achieve significant near-term reduction in risk . . . " Recommend changing "will" to "is expected to." Given the uncertainty in the relationship between COC concentrations in sediment and fish tissue, it is not certain that reductions in sediment PCB concentrations will result in commesurate reductions in fish tissue PCB concentrations.	Editorial	N
74	Navy	"Future changes to the width and depth of the channel . . ." Recommend inserting "federal navigation" before "channel."	Editorial	N
81	Navy	Institutional controls - recommend changing "will substantially reduce risk" to "is expected to reduce risk" given the uncertainty about the effectiveness of the EAAs. In addition, recommend revising the text to clarify that fish consumption advisories are based on fish tissue concentrations, not on sediment concentrations.	Editorial	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
82	Navy	In our opinion, the placement of activated carbon alone without a thin-layer cap is considered in situ treatment rather than enhanced monitored natural recovery. Recommend describing and screening in situ treatment separately from EMNR.	Editorial	N
91	Navy	Recommend clarifying what is meant by "river could be returned to full use prior to the overall completion of the alternative".	Editorial	N
94	Navy	Recommend including a reference to the appendix with the cost estimates.	Editorial	N
113	Navy	The first full paragraph states that "NPDES 09 and NPDES 013 are near the Southeast Federal Center and Washington Navy Yard". NPDES 09 is in the O Street Outfall area and NPDES 13 is in front of SEFC. Neither outfall is in front of the Navy Yard.	Editorial	N
114	Navy	Recommend including a map that illustrates the extent of the drainage basins for the different CSS and MS4 sewersheds (see example in Attachments 3 and 4 of these comments). Several of the figures in the later portion of the report show portions of the CSO sewersheds, but not all of them. The size of the sewershed is a critical piece of the context that appears to be missing from this report.	Editorial	Y
116	Navy	Please clarify the bullet "Confirm or modify the existing COI list".	Editorial	N
117	Navy	Consider further explaining how the rationale for the ranking on page 37 related to earlier statements in the document that the sediment collected from the manholes is likely to be less contaminated than what is present in the suspended flow that is deposited elsewhere.	Editorial	N
120	Navy	"Two sample locations adjacent to the Navy Yard . . . exhibitged strongly-elevated Factor 3 scores." Based on Figure 4.6 only one of these samples is located next to Washington Navy Yard. The other is located adjacent to the O Street outfalls. Please correct the text accordingly.	Editorial	N
144	Navy	The Navy Yard (2004) reference is not provided in the reference list, but is assumed to be "Results of Geochronological Analyses of Anacostia River Multicores" (Chan and Bentley, 2004). This work was performed by Louisiana State, not the Navy. These three cores were collected adjacent to the O Street outfalls prior to the pilot capping project and the locations should be shown on a map for clarity.	Editorial	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
160	NPS	This document is lacking in detail throughout. Please review proposed plans from other sediment sites (like Hudson or Berry's Creek) for examples on the appropriate level of detail to be included.	Editorial	N
161	NPS	Please add text about what makes the Anacostia a valuable resource, and the current uses of the river (recreation, ecological resources, etc.)	Editorial	N
162	NPS	Please explain in more detail why the FS will be updated after the early actions and what the update will include.	Editorial	N
168	NPS	Last sentence of paragraph says "three EAAs", this should be eleven.	Editorial	N
170	NPS	Heading states "Early Action Area" but lists OUs. Are these sediment concentrations for only the EAAs within each OU, or the OU is a whole?	Editorial	N
181	NPS	"Concurrently, DOEE will continue to investigate upstream contaminant sources (for example, sources of contamination to the Tidal Basin [a tributary to the study area] and in locations upstream from municipal separate storm sewer system (MS4) outfalls, and tributaries)." It is unclear why the tidal basin mentioned first when the tidal basin has not been mentioned before when discussing source control. The emphasis should be on the five major tributaries that dominate flow to the tidal Anacostia and that have been the subject of multiple studies.	Editorial	N
185	NPS	Need to be clear that these are the COCs at 10-5 risk level.	Editorial	N
191	NPS	Are the concentrations here for surface sediment? Please add note specifying.	Editorial	N
206	NPS	"These potential hot spots, posing elevated levels of risk, hereinafter referred to as "PECS Hot Spots," would comprise discrete areas of contaminated sediments that are proximate to the WNY, the WGL East Station, and the Pepco Benning Road Facility PECSes. These potential PECS Hot Spots are areas..." Why are these PECS hot spots called potential hot spots? The "PECS hot spot site" term is used throughout the document, which is repetitive since PECS already includes the term site. Define PECS hot spot site.	Editorial	N
207	NPS	"A principal objective of the ARSP is to ease or remove existing use restrictions on the Anacostia River." It seems that the primary objective is to remove existing use restrictions for a fishable and swimmable Anacostia not to ease or remove restrictions by itself.	Editorial	N
210	NPS	The fourth footnote is redundant with the following paragraph.	Editorial	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
214	NPS	“DOEE developed a framework that will be used to adaptively manage decision-making during Interim ROD implementation” Please clarify what is meant by this statement. The current text does not offer an explanation	Editorial	N
220	NPS	“A key component of adaptive management is the recurring collection of data, systematically evaluated to uncertainty over time to support decision-making.” This sentence is not clear. The NPS assumes that the work “reduce” is missing so that the sentence is “reduce uncertainty over time ….”. The NPS suggests revising the sentence to clearly indicate the point of collecting data is to determine effectiveness of the early actions and determine need for additional actions.	Editorial	N
222	NPS	The other PECS should have their own subsection and not be listed under the hot spot subsection. Suggest nesting the PECS Hot Spots section under a PECS Section. Inclusion of the PECS Hot Spot Sites is redundant. DOEE should consider the removal of the word “Sites” from PECS Hot Spots references throughout document. Note that the bullets for Washington Gas and Navy Yard on pages 10 and 11, respectively, currently say “Sub-Operable Unit” rather than “PECS Hot Spot”.	Editorial	N
229	NPS	Please edit paragraph to include the following text to clarify status of cleanup: “At several of the other PECSes (e.g. Southeast Federal Center, Kenilworth Park Landfill, Poplar Point, CSX Benning Road) additional environmental investigations have been conducted or are in the process of being conducted. At others, however, minimal or no environmental investigations are currently being conducted to characterize potentially contaminated sediment in the adjacent river”.	Editorial	N
231	NPS	Please change the following sentence “Of particular significance to the ARSP remedy evaluation process is the NPS “non-impairment” ARAR mentioned above. Compliance with the non-impairment ARAR is required of any response action selected and implemented at a national park.” to “For example, compliance with the non-impairment ARAR is required of any response action selected and implemented on land managed by NPS.”	Editorial	N
234	NPS	“Setting numerical cleanup goals at levels below background is impractical because of potential for recontamination from sources unrelated to the site and considerations of cost effectiveness and implementability” This statement is problematic because it documents the concerns related with relying solely on the Potomac River as an appropriate background area while not considering the upstream tributaries. Suggest including NPS data collected from bottom sediment in upstream tributaries.	Editorial	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
240	NPS	"For example, an extreme influence of contaminants in the Potomac River or the Anacostia River tributaries on..." This is alluding to issues with background. Should be clearer that in this instance the PRG recalculation would be because background has been recalculated.	Editorial	N
241	NPS	"tributaries and outfalls will support adaptive management analyses…" This phrase "support adaptive management analyses" is confusing. What is DOEE's intention?	Editorial	N
262	NPS	Include a reference where the model report can be accessed.	Editorial	N
265	NPS	The Johnson Company 2012 reference was not referenced in the FS and should be removed. The Johnson Company 2019 referenced report is now Final with a September date. Please update.	Editorial	N
270	NPS	"The RME scenarios evaluated consisted of fish ingestion by recreational and subsistence adult, adolescent, and child,". This should say "anglers" after child.	Editorial	N
280	USFWS	The remedial action levels are introduced for the first time here. The authors should add a sentence that defines the RALs.	Editorial	N
281	USFWS	Change comma to period before "The framework" in para. 1. The shorthand definition of the RAOs is incomplete; somewhere the words concentrations of COCs should be included.	Editorial	N
293	USFWS	Top line. The reference should be EPA Region 4 (2018). EPA (2018) is the Navy Yard investigation.	Editorial	N
299	USFWS	Make reference titles consistent with regard to use of italics.	Editorial	N
300	USFWS	Replace Ghosh U., Lombard N., Bokare M., 2019. Passive Samplers and Mussels Deployment, Monitoring, and Sampling for Organic Constituents in Anacostia River Tributaries: 2016-2018 Year 1 Report (May 2019) with Ghosh, U., N. Lombard, M. Bokare, A. Pinkney, L. Yonkos, and R. Harrison. 2020. Passive samplers and mussel deployment, monitoring, and sampling for organic constituents in Anacostia River tributaries: 2016-2018. Year 2 Final Report (January 2020). University of Maryland Baltimore County, U.S. Fish and Wildlife Service, University of Maryland College Park. Report to DOEE.	Editorial	N
307	USFWS	Second from last para.: A reference should be added to the last sentence before "Section 10.1" to make it clear that the non-tidal data are not from Pinkney (2014).	Editorial	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
350	Anacostia Watershed Community Advisory Committee	Please clarify the statement "Sediments that comprise the bottoms of the ARSP study area range from less than 3 feet thick in the upstream limit of the study area to more than 30 feet in the Main Stem OU."	Editorial	N
393	DC Appleseed	Where the 11 EAAs are first mentioned, it would be helpful to define the operable units and to indicate EAA acreage within each OU.	Editorial	N
394	DC Appleseed	The text refers to the "other four COCs", but they have not yet been identified at this point in the document. They should be listed.	Editorial	N
411	DC Appleseed	Under the Long-Term Effectiveness header, Table 1.1 does not provide SWAC and risk reductions, as stated. The correct table reference is Table 1.2.	Editorial	N
412	DC Appleseed	The longer paragraph under Short-Term Effectiveness should be divided into separate paragraphs describing worker and in-water exposure. For in-water exposure, even with BMPs such as turbidity curtains, dredging residuals may cause short-term spikes in contaminant concentrations that may in turn increase the concentrations in fish that come in contact with these residuals. The possibility of this outcome should be acknowledged in this section.	Editorial	N
416	DC Appleseed	The intro to the Washington Channel Balancing Criteria Evaluation section only includes WC-3 and WC-4. Alternative WC-5 should also be included. The full name of the alternatives should include HS to be consistent with other instances. However, it would be less cumbersome to eliminate the HS portion of the alternative names entirely, for all alternatives.	Editorial	N
418	DC Appleseed	This figure depicts the dredging area relative to an elevation below mean lower low water. It would be helpful to also indicate the range of sediment thicknesses this dredging depth represents. Same comment for Figure 3.2	Editorial	N
427	DC Appleseed	The first sentence uses "risk" as a threshold. Risk is a continuum, not a bright line, so suggest using "unacceptable risk" or something similar.	Editorial	N
428	DC Appleseed	In the second sentence, it's the areas that overlap, not the concentrations.	Editorial	N
432	DC Appleseed	The last sentence refers to three EAAs. This should be either three OUs or eleven EAAs.	Editorial	N
442	DC Appleseed	This table would be more accessible to a lay audience if scientific notation was not used. There is really no need for it, particularly if dioxin-like PCBs are also reported in units of ng/kg. This comment also applies to a similar presentations in Table 3.2 and Appendix Table A.3.1.1	Editorial	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
443	DC Appleseed	Since this is the first mention of the "NCP risk range", it should be explained in more detail. It is an important concept that is not served well by using just the shorthand phrase. A lay audience will not understand what this means without additional explanation.	Editorial	N
444	DC Appleseed	In addition to the key indicators listed, consider also repeating at least some of the source characterization sampling that have previously occurred. Such data would aid in assessing the degree to which recontamination has happened, or is likely to happen in the future.	Editorial	N
445	DC Appleseed	Three types of potential follow-up actions are described, but there is no indication of what circumstances would lead to any particular action. Additional details should be provided.	Editorial	N
446	DC Appleseed	It would be helpful to provide section numbers in parentheses where each of the bulleted FS objectives are addressed.	Editorial	N
466	DC Appleseed	The text indicates that sedimentation rates of 12 or 6 inches within a 20-year timeframe are necessary for MNR and EMNR, respectively. Since the sedimentation rates from the analysis of geochronology cores and the surface water model are presented in units of cm/yr in this document, the 12 and 6 inch thresholds should also be reported in those units here.	Editorial	N
472	DC Appleseed	This figure shows Southeast Federal Center as one of the PECS hot-spot sites, but it is not identified as such in the text.	Editorial	N
473	DC Appleseed	Several of the transportation bridges on this figure are unlabeled.	Editorial	N
474	DC Appleseed	The "No change" designation in the legend is presumably intended to indicate areas that meet the legislated federal channel depths. If so, the legend should edited to say this more clearly.	Editorial	N
476	DC Appleseed	The ecological risk assessment results should be removed from this table. They are reported on Table 2.6.	Editorial	N
484	DC Appleseed	Although cancer risks are typically presented in scientific notation, hazard quotients are not and there is no reason to do so here. Doing so makes it more difficult to see which values are above one.	Editorial	N
760	Anonymous	In some areas of the river bed sediment is so unstable that is cannot support the weight of a person. This could make portions of the river unsafe for swimming and wading. Will these hazards be considered in planning for remediation?	End Use Objectives	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
580	Pepco & WG	"...DOEE assumes that certain depths and widths of the Main Stem navigation channel will be needed in the future to support recreational boating. DOEE also proposes to establish these assumed depths and widths through reauthorization of the federally authorized navigation channel, instead of simply pursuing complete de-authorization of the federal channel given the admitted disappearance of the industrial and commercial conditions that originally justified the channel. DOEE's assumptions about channel depths and widths play a critical role in determining the extent to which sediment dredging and disposal may be required either in lieu of capping or as an antecedent to capping as part of the remedy in certain areas. Therefore, the depth and width assumptions have a huge impact on the scope and cost of the sediment remedy, and it is critical that these assumptions be grounded in known facts concerning the current and reasonably anticipated future uses of the river..."	End Use Objectives	Y
819	Catherine Plaisant	I am strongly in favor of this project and hope that most (and hopefully ALL) the problems areas identified will be addressed quickly. In addition I hope that the project will return once-wetland areas to their original wetland status, a well understood method to naturally improve water quality, restore wildlife habitat and eventually improve recreational and learning opportunities for local citizens and their children, who have for too long paid the price for historic mismanagement of the river. I am looking forward to being able to enjoy the river without fear of why lies below. Thank you for cleaning our river!	End Use Objectives	N
616	Pepco & WG	"...DOEE conducted what it referred to as an "Anacostia River Use Survey" in early (January to March) 2018. The interim survey results were presented to the Anacostia River Leadership Council on March 8, 2018 and the results of the survey were posted to the administrative record in January 2020, well after the start of the public comment period. This survey consisted of 13 questions, only two of which concerned river depth. One question asked: "Based on your experience, is the river currently deep enough to support your recreational boating use?" The second question asked: "How deep would the river need to be to support your current and future boating needs." The survey results posted to the administrative record provided only summary information. This summary did not provide sufficient information to evaluate the validity or applicability of any aspect of the responses, including what portions of the river specific types of vessels transited..."	End Use Objectives	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
617	Pepco & WG	The December 27, 2019 DOEE memorandum refers to a discussion in the JCO Vessel and Swimming Depth Memorandum (JCO, 2017) of river depths at certain locations where swimming platforms were installed or are proposed to be installed in rivers. That discussion is wholly irrelevant to the issue of current or future water depths in the navigation channel, as neither DOEE nor anyone else would construct a swimming structure in or near the channel; such uses are entirely incompatible. The discussion is also irrelevant to the issue of current or future water depths in locations distant from the navigation channel, as any swimming platform would be located in a relatively small and discrete area and sediment removal would occur solely as needed to install the specific structure. The feasibility of installing any such structures in the Anacostia River, including the cost of sediment removal and disposal for that purpose (given the current shallow water depths along the edges of the river in many locations as a result of historical siltation), has not been investigated. It would be arbitrary for DOEE to assume any particular future navigation channel or river depth based on the possibility of future swimming platforms somewhere along the edge of the river	End Use Objectives	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
618	Pepco & WG	The December 27, 2019 DOEE memorandum suggests that District and NPS planning documents anticipate a future increase in recreational boating and other river uses, "warranting a federal channel depth sufficient to support such activities." The various planning documents referenced in the DOEE memorandum do not, however, support any particular channel depth, nor do they demonstrate that any public or private entity will undertake dredging of the channel (or other areas) to deepen the current water depths of the river. As noted above, the Parsons Brinkerhoff report specifically found that, while future developments along the Anacostia River (including those described in the administrative record for the ARSP) are expected to increase the number of recreational craft using the Anacostia, the additional craft are expected to follow the same distribution of vessel sizes as the vessel population currently using the River. The language of the various planning documents in the administrative record supports that conclusion; as described in the December 27 DOEE memorandum, the hoped-for types of future aquatic activities consist of recreational uses such as canoeing, kayaking, rowing, and fishing Pepco and Washington Gas understand that some historical boat clubs and marinas may be located in places along the river that have suffered from years of siltation as a result of watershed erosion and sediment transport. The operational challenges that they face, however, do not provide a basis for assuming a water depth in the river that is substantially different from what exists today, unless DOEE has evidence that a major investment will be made, apart from any remediation project, to deepen the river throughout the relevant reach.	End Use Objectives	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
619	Pepco & WG	The December 27, 2019 DOEE memorandum discusses the Lower Passaic River federal channel de-authorization that is occurring as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) project in that river. As would be the case with the Anacostia River, the Lower Passaic de-authorization is supported by a lack of commercial river use. While the DOEE memorandum notes that U.S. Environmental Protection Agency (USEPA) selected a remedy based on a shallower water depth in the stretch of the river that is subject to current and future recreational use (and will be pursuing de-authorization consistent with that shallower depth), DOEE notably omitted the water depth that USEPA, after extensive investigation, determined was the appropriate water depth to support substantial current and reasonably anticipated future recreational uses, including recreational boating and fishing. The selected depth is 10 feet below MLLW over a designated 200-foot width (narrower in the most upstream area). (USEPA Record of Decision (ROD), Lower 8.3 Miles of the Lower Passaic River, New Jersey, March 2016.) This is substantially less than the 15-foot depth that DOEE, after virtually no investigation, is assuming for the navigation channel between the 11thStreet Bridge and the CSX Bridge. The Lower Passaic River ROD provides additional support for an assumed future water depth no greater than 10 feet to support recreational uses.	End Use Objectives	Y
97	Navy	Recommend clarifying how "supporing the long-term use objectives" cited in the effectiveness discussion for Alternative KLHS-4 is explicitly a CERCLA criteria.	End Use Objectives	N
506	Kristen Dillon, Capital Rowing	For current activities on the river like boating, please try to coordinate your activities with other disruptions like South Cap / Fred Douglass bridge construction + users to manage impact on current users.	End Use Objectives	N
510	Paul Blackburn, Capital Rowing	Please make sure to retain sufficient depths for rowing and paddling. Thank you.	End Use Objectives	N
512	Seafarers Yacht Club	We are memebers of the Seafarers Yacht Club. We are in desperate need of dredging. Is this part of your plans?	End Use Objectives	N
788	Anonymous	Will dredging happen in both areas of FNC that exceeds PRG?	End Use Objectives	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
820	Chantal Worzala	I was recently introduced to the joys of the Anacostia by boat, thanks to the Washington Rowing School. I am very happy to hear that this important project is moving forward. I have observed that use of the river is much greater than I had anticipated, and there are frequently many large rowing boats in the water at the same time (early in the morning and in the late afternoon). Please be sure that use of the river for boating, both current and future, be considered when setting depth of the river. This includes removal of existing hazards to boating - both sandbars and objects - into the project - work to be done by USACE and coordinated with ARSP. Unfortunately, I have personal experience in running into submerged trees and sandbars. Boaters (and fish) need sufficient depth to use the river safely.	End Use Objectives	N
822	Chris Melendez	I have enjoyed the Anacostia by boat for 10 years and am very happy to hear that this important project is moving forward. I have observed that use of the river has increased in the years I have been rowing/boating/fishing here. I request of the project team that use of the river for boating, both current and future, be considered when setting depth of the river. I request that the project team incorporate removal of existing hazards to boating - both sandbars and objects - into the project - work to be done by USACE and coordinated with ARSP.	End Use Objectives	N
825	Eva Sullivan	Hello, As a longtime rower on the Anacostia River, I am happy to learn about this Sediment Project. However, I am concerned that the interests of the most active daily users of the river are not being heard. I have been rowing and coaching out of Bladensburg Waterfront Park since 2006, and have seen the sport of rowing increase dramatically since then. I would like to request that your project team consider the needs of current and future rowing community members when setting the depth of the river. I would also like to request that current boating hazards be removed - including sandbars and objects - and that this removal be incorporated into the project work to be completed by USACE and coordinated with ARSP. Thank you for considering the needs of the boating community	End Use Objectives	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
157	NPS	"...The remedial alternatives evaluated in the FS Report and the FFS Report are based on the assumption that the federal navigational channel will be partially deauthorized in accordance with the DOEE's preferred depths for the channel. The reports seem to place significant emphasis on the fact that the U.S. Army Corps of Engineers (USACE) does not oppose the proposed partial deauthorization and has no current plans to dredge the channel to its currently authorized depth in the future. But any deauthorization of the channel would require congressional action, which is always uncertain and could take significant time to achieve even if there is an agreement with the USACE and consensus among the other stakeholders. If the channel is not deauthorized, the scope and cost of the remedial alternatives could change significantly. Furthermore, the Rivers and Harbors Act of 1899 has been identified as an applicable or relevant and appropriate requirement ("ARAR") for this site, and the USACE has informed the DOEE that the placement of a cap above the currently authorized depth would violate that law..."	End Use Objectives	Y
184	NPS	Suggest that additional text be added to this paragraph to state what the current navigational channel is and what is being proposed. Navigation channel should be discussed and what is being proposed needs to be more clearly articulated.	End Use Objectives	N
198	NPS	"The final sediment elevation in RW-HS-FNC-456d is -8.0 feet (MLLW)…". These depths are associated with the "new" navigational channel. This should have been explained in more detail in the Site Description section.	End Use Objectives	N
224	NPS	"As discussed below, DOEE has requested that USACE Baltimore District permit partial de-authorization of the federal navigation to depths that support reasonably anticipated future uses of the river". This section should clarify that the action to de-authorize the channel requires congressional action and is not a decision that the USACE can make.	End Use Objectives	N
333	Anacostia Watershed Community Advisory Committee	Coordinate means and location of remediation work with river use plans. Location, materials, final depth and configuration of the river bottom should be dictated by anticipated use. The Anacostia will not be "swimmable" if locations for safe swimming are not provided and identified. NRDA fund is a potential source for additional work. This work can go on simultaneously with remediation of hotspots.	End Use Objectives	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
334	Anacostia Watershed Community Advisory Committee	Use of the river for boating, both current and future, must be considered when setting final depth of the river.	End Use Objectives	N
335	Anacostia Watershed Community Advisory Committee	Incorporate removal of existing hazards to boating - both sandbars and objects - into the project - work to be done by USACE and coordinated with ARSP.	End Use Objectives	N
345	Anacostia Watershed Community Advisory Committee	River depth is of interest. An accurate, usable diagram, like a topo of the river bottom, should be included in this document.	End Use Objectives	N
346	Anacostia Watershed Community Advisory Committee	Whether or not commerce is conducted on the river is a matter of opinion. Several businesses depend on the river. If ferry use and water taxis become more common, the Anacostia could be a viable transportation route. Do not let USACE off the hook for dredging.	End Use Objectives	N
349	Anacostia Watershed Community Advisory Committee	Please list the parameters of the channel and provide a simple diagram, or include on a figure already contained in the document.	End Use Objectives	N
351	Anacostia Watershed Community Advisory Committee	The tidal range often exceeds 3 feet. Also, the range from the lowest low tide of the year to the highest high of the year is well in excess of 3 feet – perhaps more than 4 feet. This information is critical to determine minimum usable water depth.	End Use Objectives	N
352	Anacostia Watershed Community Advisory Committee	Tidal gages should be placed in the main stem of the upper Anacostia and added to the USGS data reporting system.	End Use Objectives	N
505	J. Quarterman, Seafarers Yacht Club	Where does the federal channel end?	End Use Objectives	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
614	Pepco & WG	"...In a October 7, 2019 letter that is in the administrative record, USACE acknowledged that the nature of waterfront development along the Anacostia River has “transitioned away from its historic commercial/industrial use,” and USACE agreed that “the current vessel usage of the Anacostia River may not warrant channel depths and widths that it had when the project was originally authorized.” USACE representatives also have indicated informally on several occasions that they do not foresee any future maintenance dredging of the federally authorized navigation channel in the Anacostia River; funding of such dredging would depend on the value to the nation of doing so, and currently there is no driver for USACE to undertake such dredging. USACE representatives have also indicated that USACE does not need any dredging to support its current operations in the Anacostia River; eight to ten feet of water depth is sufficient. (Personal communications from K. Brennan, et al., USACE, to M. Rooney, et al., Washington Gas, in July 2018, May 2019, and November 2019.) Pepco and Washington Gas are unaware of any current or planned future commercial or industrial activity upstream of the 11thStreet Bridge that might create an economic justification (as needed for any benefit-cost analysis performed by USACE to support a federal water project) for future maintenance dredging by USACE..."	End Use Objectives	Y
615	Pepco & WG	"...As part of the Frederick Douglass Memorial Bridge replacement project, on behalf of the District Department of Transportation, Parsons Brinckerhoff conducted a navigation evaluation of river use in the area of the Frederick Douglass Memorial Bridge (Parsons Brinckerhoff, 2014). This study was focused on vessel heights, in view of the proposed change from a moveable span bridge to a fixed span bridge. The survey does, however, provide some information on vessel usage and drafts. The following table was prepared by JCO, a consultant to the NPS, based on their review of the Parsons Brinckerhoff study (JCO, 2017). The table was intended to provide examples of “the larger boat types included” in the types of vessels documented in the Parsons Brinckerhoff report. Neither the Parson Brinckerhoff report nor the JCO memorandum provides information on what portions of the river specific vessels transited...Absent a reasonable basis to assume that some entity will fund navigational dredging of the channel north of the 11thStreet Bridge, for DOEE to assume any future water depth other than the current water depth (or some shallower depth due to ongoing sedimentation) would be unfounded and arbitrary..."	End Use Objectives	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
731	Steuart Investment Co.	As the FFS recognizes, sediment levels are already higher than their use assumptions would allow. FFS at 14. Even under an amended use assumption where the required federal shipping channel is 8 feet instead of 24 feet, the U.S. Army Corps of Engineers ("USACE") has not maintained the federal shipping channel since its current depth to sediment is substantially less than 8 feet. As a result, the Focused Feasibility Study's remedy would provide for dredging that was already required of the USACE. USACE should conduct the dredging that it is statutorily required to provide for the federal shipping channel. It would be inconsistent with the National Contingency Plan ("NCP") to use CERCLA to shift responsibility to the ARSP for any of this dredging. Any sediment that remains after the USACE dredging may be evaluated under CERCLA to determine if further excavation or capping of sediment is warranted under the NCP.	End Use Objectives	N
816	Beth Hall	Support dredging as preferred approach to Washington Channel.	End Use Objectives	N
499	DC Audubon Society	We recommend prioritizing the preservation of existing wetlands and riparian vegetation to every extent feasible. Where such habitat must be removed, we recommend that it be replaced at a 2:1 ratio to provide a net benefit in habitat area and the associated ecosystem services described above.	End Use Objectives	N
750	Alfonzo Gasaway, Seafarers Yacht Club	Process for dredging Kingman Lake or anywhere on the river to continue along to seafarers yacht club and so on. As well can there be some kind buffer constructed to lesson the amoung of debris and sediment coming down the river?	End Use Objectives	N
793	Anonymous	Came in late, my question might be irrelevent. Please explain map of Kingman Lake. Will animals in addition to fish lose habitat?	End Use Objectives	N
830	Paul Heaton	The report [proposed plan] on page 5 says " Commercial traffic no longer uses the Anacostia River." That statement is not true. With the development of the Nationals Stadium and Navy Yard, there has been a marked increase in commercial traffic, such as sightseeing cruises and water taxis, in the last 18 months.	End Use Objectives	N
752	Andrew Irving	Please assure that the depth of the river is adequate for the needs of rowers and other boaters, current and future. As part of the project, please remove all obstacles to river use wherever possible, including sandbars, old piers, docks, and other hazards.	End Use Objectives	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
827	Lizbeth Marie Reilly	I have enjoyed the Anacostia by boat for three years and am very happy to hear that this important project is moving forward. I have observed that use of the river has increased in the years I have been rowing/boating here. request of the project team that use of the river for boating, both current and future, be considered when setting depth of the river. request that the project team incorporate removal of existing hazards to boating - both sandbars and objects - into the project - work to be done by USACE and coordinated with ARSP.	End Use Objectives	N
829	Ned Wood	I'm very happy to hear about the efforts to make the Anacostia River more accessible to recreation, and I want to voice my support for this important project. I moved to Washington DC last fall, and therefore have had limited time on the Anacostia River. My wife's job brought my family to DC, and I wouldn't have agreed to make the move here if it weren't for the existence of good rowing programs on the Anacostia and Potomac Rivers. I've been involved in crew as a rower and coach for over 50 years in a variety of places (Boston, Providence RI, Asunción Paraguay, Iowa City, St. Louis), and my daughter and I are passionate about this activity. I began my rowing career when the Charles River in Boston was so contaminated that there was little recreational use of the river except for crews and sailboats. I recall that one afternoon when I was in high school I tipped over and needed to call my doctor about getting a tetanus shot. Since then, Boston has done a wonderful job of cleaning the banks and waters and increasing access to the river. The days of the dirty "banks of the River Charles" have passed, and it is now an essential part of the soul of Boston; not only does it pass right through the heart of the city, but it provides a beauty and an energy that make Boston such an attractive and vibrant city. It is a tremendous resource, and fortunately years ago the city had the foresight to commit to making it so. In October and November I had some delightful rows on the Anacostia. Upstream from the railroad bridge, the river becomes surprisingly secluded as it passes by Kingman Island and between the Arboretum and the Kenilworth Park. My favorite stretch on the river is above the New York Avenue bridge, which is accessed primarily by the Washington Rowing School in Bladensburg. It's incredible that such a secluded area exists so close to a major metropolitan area, and the area would benefit by making it accessible to all who ae interested.	End Use Objectives	N
813	Anonymous	What is the planned future use of Ft. McNair?	End Use Objectives	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
306	USFWS	First bullet near the bottom of the page: The EPA Region 3 BTAG numbers are screening values, not criteria.	ERA	N
487	DC Appleseed	It isn't accurate to say that the trophic transfer relationship is known. At best, such a relationship was estimated with high uncertainty.	ERA	N
305	USFWS	Last two bullet points: See comment RI-1 on background. See the later comment on the use of whole fish data for human health risk assessment.	Human Health Risk Assessment	N
574	Pepco & WG	DOEE's assessment of potential human health and ecological risks informs the establishment of the preliminary remediation goals (PRGs) and evaluation of remedial alternatives and, ultimately, influences the proposed early remedial actions. The Human Health Risk Assessment (HHRA) is based on outdated data regarding fish tissue concentrations and unsupported assumptions regarding the amount of fish actually consumed from the Anacostia River, leading to inflated risk findings. DOEE should update the HHRA using sampling data from 2017-2018, rather than continue to rely on data from 2013. The 2017-18 data show substantial reductions in fish tissue concentrations since 2013, which means that estimated human health risks associated with fish consumption have decreased. DOEE also should update the HHRA using fish consumption rates based on information from a recent in-depth angler survey focused on the Anacostia River. This survey shows that DOEE's assumed consumption rate, which was based on an earlier study that suffered from several methodological deficiencies, is overstated by nearly 40 percent, resulting in a corresponding overstatement of the risk. In addition, DOEE misapplies the results of its own Baseline Ecological Risk Assessment (BERA), which demonstrated no significant correlations between ecological risk drivers and adverse ecological impacts. Despite the results of the BERA, which indicate that cleanup actions are not warranted for sediment due to ecological risk, DOEE nonetheless proposed to establish ecologically-based remediation goals by inappropriately applying ecological screening values obtained from literature. No cleanup goal is required at this time based on ecological impacts, and in any event USEPA guidance makes clear that screening values should not be used as cleanup goals.	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
590	Pepco & WG	"...AECOM has calculated potential cancer risks and noncancer hazards for subsistence anglers and current recreational anglers using the 2017-2018 fish tissue data (Pinkney, 2018) and fish consumption rates based on the 2019 Anacostia River CAS. Values from the ARSP HHRA were used for all other exposure assumptions, dose-response values, and cooking loss factors (presented in Attachment 2-C to this document). Risks were estimated for both reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. The RME provides an estimate of the upper range of exposure in a population (the 90th percentile or greater of expected exposure). The intent of the CTE is to provide an estimate of the average exposure in a population (USEPA, 1989, 1995, 2004, 2011). While USEPA uses the RME for setting remedial goals, CTE estimates are an important risk management tool along with RME results to inform remedial decision-making under an adaptive management framework..."	Human Health Risk Assessment	Y
842	Stacy Baker	Drop the #2 goal of reducing harm from human contact with surface sediment from communications and consideration, for now. The public meetings convinced me this is a very distant second, compared to reducing human health risks from fish consumption. It didn't seem to get much credence from expert speakers, given the current shoreline structure and limited likelihood of frequent wading in contact for recreational use without skin protection.	Human Health Risk Assessment	N
794	Anonymous	Was ingestion of sediment, especially by young children considered in the FS? How much more risk stems from exposure as a child than the same exposure as an adult?	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
566	CSX	The reasonable maximum exposure (“RME”) Fish Ingestion Rates (“FIRs”) used for subsistence anglers (current/future adult, adolescent, and child) should only be used in combination with a fraction ingested (“FI”) term less than 1. The Chesapeake Bay Angler Interviews report (Gibson and McClafferty, 2005) serves as the basis for FIRs for the current and future subsistence angler receptors evaluated in the HHRA. This report includes survey data for anglers that caught fish in the Anacostia River, the Washington Channel, and the Potomac River in the Washington D.C. area. The breakdown of the survey respondents was 12.6% (31/247) from the Anacostia River, 35.2% (87/247) for the Washington Channel, and the remining 52.2% (129/247) from the Potomac River. Considering the close proximity of these waterbodies in the Washington, DC area, local anglers can move to different locations with relative ease. This information suggests that the FI of 1 used in the exposure calculations for RME receptors is overly conservative. This is acknowledged on page J-213. Use of extremely conservative FIR values for subsistence anglers along with an FI of 1 is the most significant driver of risk and hazard presented in the HHRA. An FI term of 0.5 is used for the CTE subsistence angler exposure scenarios, but the CTE scenarios are unlikely to be used to develop remedial goals that inform remedial decision making. Thus, the unchecked retention and use of such conservative assumptions in the development of sediment remedial goals will increase remedial scope and costs.	Human Health Risk Assessment	N
589	Pepco & WG	"...The ARSP HHRA used a fish consumption rate of 65 grams per day (g/day) to represent consumption of Anacostia River fish by adult subsistence anglers (Tetra Tech, 2019b). The rate was calculated based on the Gibson and McClafferty (2005) survey of Washington, D.C., anglers, and represents the 98thpercentile (2% of the anglers reported consuming self-caught fish more than twice per week). The Gibson and McClafferty survey asked about consumption and sharing habits related to “self-caught” fish from the Washington, D.C. area, although not specific to the Anacostia River. Population statistics were not generated, and sampling weights were not provided. The data were collected in warm weather months and assumed to represent year-round consumption. These aspects of the Gibson and McClafferty survey tend to overstate the rate of consumption of self-caught fish in the Anacostia River, and thus inappropriately inflated the fish consumption rate used in the ARSP HHRA, leading to PRGs that are too low..."	Human Health Risk Assessment	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
745	WG	"...As noted in the FS, based on risk evaluation, benzo(a)pyrene equivalent (BaPE) was eliminated from the final list of chemicals of concern (COCs) for which preliminary remediation goal (PRGs) were developed (page 40), and all sediment direct contact COCs were eliminated. Inconsistent with this, however, the FS also identifies BaPE as a COC (Page 23) and sets aremedial action objective (RAO) (RAO 2) for direct contact with sediment (Page 37). This is all done without explanation (page 23, 37)..."	Human Health Risk Assessment	Y
152	NPS	..."the DOEE has adopted a fish ingestion rate of 65 g/day. The NPS believes that this rate underestimates the amount of fish consumed by subsistence anglers on the Anacostia River because it is based on surveys skewed toward recreational anglers on the Potomac River, who do not represent the target population for this site.13Under the NCP, cleanup goals designed to protect human health must be based on reasonable, but conservative, assumptions about exposure to hazardous substances. For this site, the subsistence angler represents the reasonable maximum exposure scenario.14The NPS and the DOEE agree that subsistence anglers are the appropriate target population in this case, but the available information suggests that the rate proposed by the NPS is a better estimate of the amount of fish that subsistence anglers on the Anacostia River actually eat..."	Human Health Risk Assessment	Y
209	NPS	NPS has significant concerns that the analysis NPS prepared to determine appropriate fish consumption rate for the subsistence angler was not considered in these calculations.	Human Health Risk Assessment	N
273	NPS	The NPS has significant concerns that the analysis the NPS prepared supporting a different fish ingestion rate to protect the subsistence fisher population was not considered in these calculations. Recent information collected by NPS to support the subsistence fishing ethnographic research study conducted on the Anacostia and Potomac further supports the subsistence fish ingestion rates proposed by NPS.	Human Health Risk Assessment	N
304	USFWS	First whole para.: The authors should merge the Pinkney (2014) and Pinkney (2018) fish tissue data to have a larger data set with more recent data. This would to reduce some of the uncertainty in relying on such a small number of composite fish samples for the risk assessment. This comment applies to the other sections of the document where this data set is used.	Human Health Risk Assessment	N
169	NPS	Should lay out all receptors and whether a risk was determined, and what that risk is.	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
342	Anacostia Watershed Community Advisory Committee	Project team stated that it would require 8 hours of exposure for humans to be harmed by contact with contaminated sediments. Sediment becomes trapped on the body, particularly under toenails and in clothing when a person wades into the river. The extent of risk due to sustained contact exposure must be identified.	Human Health Risk Assessment	N
368	Anacostia Watershed Society	SUMMARY OF SITE RISK Please emphasize that touching the sediment does not directly result in exposure. The following sentence does not seem to make that crystal clear. The main ways people may be exposed to potentially harmful COCs in the study area is by direct contact with or incidental ingestion of contaminated sediment while wading, swimming, or fishing (collectively referred to as direct contact sediment exposure) and by eating contaminated fish tissue.	Human Health Risk Assessment	N
433	DC Appleseed	When discussing risk probability, it should be made clear the HHRA results are based on excess or incremental risk specifically related to the site, beyond the risk of developing cancer based on other exposures.	Human Health Risk Assessment	N
434	DC Appleseed	The "risk range" should be defined relative to what EPA considers safe. The two concepts are both included in the first paragraph, but are never directly linked. A distinction should be made here between safe and acceptable risks. It should also be made clear where DOEE stands on this issue, since there appears to be a difference between DOEE and EPA on what is considered an acceptable risk level.	Human Health Risk Assessment	N
477	DC Appleseed	The rationale for including or excluding dioxin-like PCBs (presumably to avoid double-counting of PCB risks) should be explained in the footnotes.	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
588	Pepco & WG	"...The River-wide FS (Section 2.6.2.1) and the Proposed Plan summarize potential cancer risks and noncancer hazards based on the results of the ARSP HHRA (Tetra Tech, 2019b, Appendix J). Human consumption of fish is the primary exposure pathway of concern and the basis for the sediment PRGs identified in the River-wide FS. As noted, however, the potential risks and hazards summarized in the River-wide FS are not based on the most recent data. Those risks are based on fish fillet data collected by the DOEE in 2013 and reported by the United States Fish and Wildlife Service (USFWS) (Pinkney, 2014). More recent data, collected in 2017-2018 by DOEE and reported by USFWS (Pinkney, 2018), are available (provided in Attachment 2-A). While the River-wide FS acknowledges the availability of the 2017-2018 data and provides some comparisons (River-wide FS Appendix A, page 56-57), there is no discussion of the significance of the 2017-2018 data, particularly as related to exposure or risk. The ARSP HHRA also acknowledges the data (page J-ES-10, page J-209), referring to the 2017-2018 data as "the 2018 fish consumption advisory dataset" while characterizing the 2013 data as the "site-specific data collected for the ARSP." The 2013 data are not site-specific data collected for the ARSP, and in fact were collected for exactly the same purpose (to support the fish consumption advisory) using the same sampling protocol as the 2017-2018 data. The distinction that DOEE attempts to draw between these data sets is factually unsupported, and DOEE therefore cannot rely on this purported distinction to discount the 2017-2018 data. The failure to update the HHRA based on the 2017-2018 data would not just be erroneous, but arbitrary..."	Human Health Risk Assessment	Y
837	Stacy Baker	Four things I support: 2 The primacy of the #1 goal to "reduce potential harm to humans from the consumption of fish." The risk is unacceptable and must be reduced to meet standards. I see a lot of fishing along the Anacostia Main Stem banks and Washington Channel, particularly anglers from communities of color. One local man told me he only stopped eating fish after he got "really sick" for more than a year from eating too many fish caught from the river--almost every day..	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
567	CSX	The HHRA uses an inappropriate threshold of 10-6 (the low end of the acceptable risk range of 10-6 to 10-4 under the NCP) to identify chemicals of concern ("COCs"). CSX and other stakeholders provided comments on this issue in the previous draft HHRA Report. Additional language from several EPA guidance documents has been added to this version of the HHRA report to justify the use of the 10-6 threshold. Nevertheless, this methodology is not consistent with standard practice within the EPA Superfund Program and EPA Region 3 in particular, where a risk exceeding 10-4 for a receptor/exposure medium is used as a trigger that prompts the identification of COCs. Further, a common practice recommended by EPA Region 3 risk assessment personnel is to identify COCs by the stepwise removal of the chemicals of potential concern ("COPCs") contributing most significantly to risk for a given receptor until the cumulative risk falls below 10-4. Only the COPCs removed to reach that threshold are retained as COCs and carried into the FS. To maintain consistency with the NCP and the standard practice within the Superfund Program, no COCs should be identified where total risks are below 10-4 (or the hazard index is below 1).	Human Health Risk Assessment	N
151	NPS	"...DOEE has adopted cleanup goals based on a target risk level of 1x10-5(or 1 in 100,000). The purported reasons for this deviation from the point of departure are: (1) compliance with U.S. Environmental Protection Agency (EPA) guidance; (2) the technical feasibility of achieving protective sediment concentrations; (3) the timeliness of remediation; and (4) cost. The NPS is concerned that these reasons do not provide an adequate rationale for increasing the target risk level. First, the FS Report states that the DOEE increased the target risk level based in part on "compliance with EPA guidance."6The DOEE further explains this statement in an appendix to the FS Report, noting that a 2017 EPA Directive counsels against setting cleanup goals that are "unachievable."7The NPS agrees with this principle, but does not see sufficient evidence in the administrative record to support the conclusion that cleanup levels based on the 1x10-6target risk level would be unachievable. Moreover, the guidance cited in support of the heightened risk level focuses on the need to set realistic expectations about the timeline for achievement of the cleanup goals, the usefulness of interim measures such as fish consumption advisories until the cleanup goals are met, and the importance of setting appropriate background levels to prevent recontamination..."	Human Health Risk Assessment	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

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208	NPS	"For purposes of PRG development, DOEE selected the cancer risk level of 1E-05 (Section 3.3), which represents the midpoint of the EPA defined range of acceptable risk (1E-04 – 1E-06)." As noted in NPS comments to draft FS, as explained by the preamble to the NCP, "preliminary remediation goals for carcinogens are set at a 10-6 excess cancer risk as a point of departure, but may be revised to a different risk level within the acceptable risk range based on the consideration of appropriate factors including, but not limited to, exposure factors, uncertainty factors, and technical factors. … The final selection of the appropriate risk level is made when the remedy is selected based on the balancing of criteria." (55 Fed Reg at 8717 (March 8, 1990)). The FS proposes a cancer risk target of 10-5 but does not explain this decision other than to say that this "represents the midpoint of the EPA-defined range of acceptable risk." As discussed above, the NCP states that a risk target of 10-6 should be used in setting cleanup goals unless there is a basis established for why this risk target cannot be achieved or otherwise is inappropriate. NPS believes that the FS should include a comparison of the 10-5 and 10-6 standards, and a discussion of how the list of COCs and the footprint of the remedial action would differ based on the standard adopted.	Human Health Risk Assessment	N
227	NPS	"Review of the BHHRA results at the 1E-05 human cancer risk level and hazard level of 1 (Section 3.3) and review of the BERA results identified five COCs that pose risks to human and/or ecological receptors in surface sediment. The five COCs identified based on the 1E-05 risk level and the weight of evidence from the BHHRA and BERA include the following". Three comments: 1) The FS should develop alternatives for cleanup to 10-5 and 10-6 to show the relative cost vs risk reduction; 10-6 is the point of departure and should the initial goal; 2) Setting the Hazard Quotient to 1 is inappropriate: an HQ equal to or greater than 1 will be exceeded by the presence of two COCs. Setting the RBC to an HQ=0.1 will account for negative impacts on the same target organ or system; and 3) In the PRG memo BaP drops out. If the FS doesn't address the COC then it shouldn't be treated as a COC that is being addressed in the FS. Same goes for chlordane, pockets of which will remain in place above the PRG according to this FS. What is the potential for recontamination?	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

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235	NPS	In this paragraph DOEE explains why the 10-5 risk level was selected. This is not adequate reasoning to move away from point of departure established by the NCP. This is a list of reasons, but there is no discussion of why 10-5 rather than 10-6 would result in (1) better compliance with EPA guidance; (2) how it is more technically feasibility; (3) how it would affect the timeframe of the remediation; and (4) how it would affect costs.	Human Health Risk Assessment	N
271	NPS	Discussion in paragraphs 3 and 4 appear to provide justification for using the 10-5 risk level by stating that “DOEEs preliminary calculations showed that a cleanup that would meet the PCB PRG for a cancer risk level of 1E-06 would require removing or treating about 34 percent more sediment than the 1E-05 risk level, as shown below”. DOEE asserts that the smaller area above PRGs at the 10-5 risk level increases technical feasibility and decreases time to achieve desired reduction in risk. The NCP states that a risk target of 10-6 should be used in setting cleanup goals unless there is a basis established for why this risk target cannot be achieved or otherwise is inappropriate. NPS does not believe adequate justification has been given for moving away from the 10-6 risk level; the fact that more area would need to be remediated does not have bearing on whether it is technically infeasible to remediate that additional area, and the justification does not speak to whether the PRGs at 10-6 are achievable. Keep in mind that the NPS background study indicated that an appropriate background concentration for PCBs would be 85 ppb, which the PCB cleanup level would default to if the 10-6 risk level is carried forward. This section goes on to say that “The periodic reviews will include a reevaluation of the target risk level and an analysis of the feasibility of implementing additional remedial actions to further reduce risk to the 1E-06 level”; NPS believes that this process should be done in reverse (and in accordance with the NCP), by starting at the 10-6 risk level and only moving away from that risk level if it is not technically feasible to achieve.	Human Health Risk Assessment	N
274	NPS	“BaPE posed a small risk in Reach 123 at the risk level of 1E-06 as presented in the HHRA. At the risk level 1E-05 all direct sediment contact COCs were eliminated”. NPS does not concur that dropping BAPE from further evaluation where it exceeds risk levels is warranted.	Human Health Risk Assessment	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
321	Anacostia Riverkeeper	Why choose the cancer risk factor of 1 x 10-5 and not 10-6 for PRGs? While the EPA guidance does state 10-4 to 10-6 is an acceptable cancer risk level, they have other guidence suggesting 10-6 should be used as a point of departure for hazardous waste sites in particular. EPA guidance for Regional Screening Levels at CERCLA sites from November 2019 says "carcinogens based on a target risk of 10-6 for general site screening purposes is normally adequate to address cumulative risk" and the HHRA Draft Document from 2017 for EPA Region 4 "Region 4 recommends the use of the RSLs (based on carcinogenic risk of 1x10-6 or HQ of 1) as PRGs". PRGs in this case are preliminary remediation goals, and the ARSP has already documented the co-occurrence of multiple COCs, as well as other toxic compounds that did not merit targeting on their own but which do still contribute to cumulative risk. In general, there should be more emphasis on cancer risk values greater than 10-6, as it is still a concerning health risk level. Also, the average of 90% risk reduction refers to cancer risk from the level of PCBs in the Main Stem being lowered to 2.3 x 10-5, being lowered to 2.8 x 10-5 in Kingman Lake, and 1.3 x 10-5 in Washington Channel (post remedy risk) (FS pages 5-6). These risk levels are still high and the 90% risk reduction is misleading, as the target risk for individuals shouldn't be more than 1 x 10-5 for individual COCs (Gowanus ROD). Lower Paissiac human health PRGs were 10-6 for "that would allow adult anglers to eat self-caught fish or crab from the lower 8.3 miles of the Lower Passaic River at a 10-6 cancer risk level" for sediment concentrations of the COCs (including PCBs) (Page 42, Record of Decision). This is the same for the sediment clean up levels PRG in the Record of Decison of the Lower Duwamish Waterway, another clean-up DOEE based their remediation action off of. (for individual contaminants, in this case looking at PCB lowering as the hallmark so it could be considered an individual contaminant). The risk reduction should be more clearly laid out as what the "goal risk" for human health is planned to be. As it is now with the 90% risk reduction, it is still not down what it should be at 1x10-6 risk ideally, or even 1x10-5 risk. EPA Sources: https://www.epa.gov/sites/production/files/2015	Human Health Risk Assessment	N
400	DC Appleseed	The text indicates that the cancer risk threshold (10-5 currently) used to develop the river-wide PRG and RAL may be modified before the final remedy is selected. It is not clear whether the "final remedy" refers to remedial actions in the interim ROD or the final ROD. Given the importance of the cancer risk threshold for defining project success, it should made clear here what factors could influence a change to the current risk threshold.	Human Health Risk Assessment	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
453	DC Appleseed	The text provides four reasons for selecting the 10-5 target risk level, but it is not entirely clear how these reasons were balanced against each other. Given the importance of this decision, it would be helpful to explicitly discuss each of these reasons for a variety of possible risk targets, such as 10-4, 10-5, and 10-6. This could done in table format, similar to how remedial alternatives are compared using the nine criteria.	Human Health Risk Assessment	N
568	CSX	The BERA presents a spatial evaluation of COPC concentrations in whole body fish tissue that should be replicated to the extent possible in the HHRA. The data presented in Table I.3.36 indicate there is a significant relationship between concentration of several COPCs in whole body fish tissue and distance from the mouth of the Anacostia River. This is further developed in Table I.3.38 with an ANOVA analysis to test for differences in largemouth bass whole body tissue concentrations in different River reaches. The analysis indicates that there are reach specific differences in fish tissue concentrations of COPCs. Taken together, the data presented in these tables suggest that species of fish commonly targeted by human anglers may have tissue concentration differences related to their location in the Anacostia River. No analysis of this type was conducted in the HHRA to evaluate potential differences in risk among different River reaches. More importantly, this information appears to contradict the overly simplistic bioaccumulation assumptions used in the Remedial Action Objectives and Preliminary Remediation Goal Memorandum.	Human Health Risk Assessment	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
623	Pepco & WG	4. The sediment transport calibration ignored the available bathymetric survey data.The sediment transport calibration is based on comparisons to sedimentation rates developed from sediment core cesium profiles. The SMW report notes correctly that the sediment rate likely changes over the profile. Therefore, the estimation of current sediment rates from the cesium data are subject to expert judgement and interpretation, and includes an unknown level of uncertainty. However, there are bathymetric survey data for recent years (USACE 2015 Conditions Survey and surveys performed at Washington Navy Yard in 2006, Washington Gas in 2016 and 2017, and Pepco in 2013) that would provide additional estimates of current sedimentation rates along the river. For example, in the Anacostia River adjacent to the Washington Gas East Station site, a comparison of the sediment elevations between the 2013 DOEE ARSP and the Washington Gas 2017 survey shows a sediment accumulation rate between 2 and 5 inches per year (Draft Technical Memorandum 6, page 9-2). The SWM predicts for reach 123, the reach where WGL is located, between 0.03 and 0.2 inches per year, with rates locally ranging up to 5 inches per year (page 48). The modeled range of 0.03 to 0.2 is at least a 10-fold difference in the sediment accumulation rate. To not calibrate the model using this information knowing there is a 10-fold difference is unacceptable, especially given the remedial decisions that are being made based on this model. This and similar comparisons at the other Potential Environmental Cleanup (PEC) Sites would provide additional information on sedimentation rates that should be incorporated into the SWM. The SWM calibration made no mention of this bathymetric data or why it were not used. Using the available bathymetric data provides continuous data over a specific and recent time period and is therefore a superior basis for calibration than a calibration to sedimentation rates inferred from limited cesium profiles. Furthermore, the calibration to sedimentation based on bathymetric surveys eliminates concerns with disturbances to the cesium profiles due to dredging. DOEE should incorporate the recent the	Modeling	N
365	Anacostia Watershed Society	The Study Area seems to have been determined before data that indicated possible sources outside the study area, specifically the Potomac River. In more recent reports a Mass Balance indicated PCBs moving freely back and forth from the Potomac to the Anacostia. Could there be additional Hot spots in the Potomac that influence the Anacostia? The Naval Research Laboratory in Southeast DC is one such potential source. Is there any data showing results of sediment sampling from areas of the Potomac that tidally influence the Anacostia?	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
367	Anacostia Watershed Society	River OU should include into the Potomac based on PCB mass balance indicating movement of PCBs into and out of the Anacostia into the Potomac. There may well be a Hot Spot in the Potomac such as NRL, Torpedo Factory, or former power plant in Alexandria. 4000 grams back and forth is more than ongoing sources upstream.	Modeling	N
135	Navy	Please provide details about how bed sediment PCB concentrations were assigned using the RI surface sediment sampling results. The map provided as Figure 12.1 suggests that the interpolated total PCB congener concentrations were used. As documented in comments on the River-wide FS, we have concerns about the methods used to perform the interpolation and question the accuracy of this representation. These uncertainties will carry over into the modeling predictions.	Modeling	N
146	Navy	Was the EFDC contaminant transport model actually calibrated? If so, what model parameters were adjusted to optimize the match between observed and predicted data?	Modeling	N
147	Navy	"As can be Seen, the EFDC model represents PCB congeners in water column well, and the predictions are equivalent to the observations." Only one observation is available for each calibration station for the period from 2014-2017, which is insufficient to conclude that model overall is performing well. By definition, aren't the predictions equivalent to the observations since the observations were used to calibrate the model?	Modeling	N
558	CSX	Total PCB congeners were modeled as opposed to homolog groups. The different PCB homolog groups can have very different fate and transport properties, which should have been taken into account. Given the historical contaminant sources here, it is important to account for the variable degradation rates of PCBs.	Modeling	N
132	Navy	It appears that the upstream boundary conditions for the hydrodynamic component of the EFDC model are represented by LPSC model results, and the downstream boundary conditions are represented by predicted Potomac River water levels based on data from a water level gauge in the Washington Channel. Recommend collection of water level data from both of these locations to more reliably set the boundary conditions.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
133	Navy	The top of page 35 indicates that tidal preductions from one NOAA and one USGS station on the Potomac River were used to set the boundary flow conditions for the EFDC model, but Section 9.1 states that tidal data from a monitoring station in the Washington Channel was used to estimate water levels for the downstream boundary conditions. Which is correct?	Modeling	N
134	Navy	The top of page 35 indicates that monitoring data from a USGS station at Chain Bridge were used to set the suspended sediment downstream boundary conditions, but Section 10.3 states that a constant value of 21 mg/L was assumed. Which is correct?	Modeling	N
136	Navy	Please clarify the EFDC hydrodynamic model calibration process. The first paragraph implies that the model was calibrated for water surface elevation, current velocities, temperature and "water quality" but the only data sets used for calibration are water surface elevation and temperature from a NOAA gauge in the Washington Channel. What model parameters were adjusted to achieve optimal agreement between observed and model results?	Modeling	N
137	Navy	Recommend collection of site-specific water level and current velocity data to improve the calibration of the hydrodynamic model.	Modeling	N
138	Navy	"Tidal data are available for a long-term monitoring station in the Washington Channel, which is used for calibration as well as to estimate water levels at Alexandria, VA. The same data set should not be used to both set the open boundary conditions and calibrate the model.	Modeling	N
475	DC Appleseed	We understand this table to say that the average sediment load and PCB load is much greater for the 2014-2017 than for 2017 alone (3X and 10X, respectively). If that is what the table says, what is the rationale for focusing on 2017 specifically when estimates of sediment and PCB transport are well below average values?	Modeling	N
148	Navy	" . . . Higher rates are calculated for the main stem . . . In the vicinity of the Washington Gas Light Wast Station and the Washington Navy Yard." This statement seems to be inconsistent with Figure 11.3, which shows low sedimentation rates downstream of RM 4.	Modeling	N
225	NPS	The size of the symbol makes it difficult to ascertain which surface water grid cell the cesium core sedimentation rate is being compared to. Please include information to compare to the modeled sedimentation rate	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
620	Pepco & WG	1. The presentation of the model calibration results for sediment deposition is in a flawed format that makes it difficult to evaluate. The documentation of the model sediment transport calibration is not sufficient for an independent review or for public comment. The primary evaluation consists of a figure comparing sedimentation rates along the Anacostia River to measured rates developed from cesium profiles in sediment cores (Figure 11.3). The figures showing the comparisons of the EFDC model simulations of sediment transport are extremely hard to read, as the vertical scale has a range much larger than the data – putting all the results near the bottom axis. If the vertical scale were adjusted to improve the comparison between the simulated rates and the sediment rates derived from the cesium profiles, it would facilitate independent evaluation. From what can be inferred from the calibration plot, the model does not appear to reproduce the increased trend in sedimentation in the lower reaches of the Anacostia River. An explanation for this result is not provided. DOEE should revise the presentation of the model calibration for sedimentation in a graphical form that enables the information to be read and evaluated. Adjusting the vertical scale will provide an improved graphical presentation and allow for a quantitative comparison. Currently the information is presented in a way that precludes a reviewer from evaluating it sufficiently. Compounding this, DOEE provided inadequate time for commenting that would have allowed for the provision of such information and timely comment on it. We also request that a quantitative approach be implemented to evaluate for the sediment transport calibration.	Modeling	N
150	Navy	The modeled bottom shear stresses in the area of WNY OU2 during an extreme event are consistent with the scenario modeled for the OU2 RI. However, the assumed critical shear stresses based on literature values for silt are an order of magnitude lower than the values directly measured using Sedflume analysis as part of the WNY OU2 RI. Nevertheless, Figure 2.5 shows that no scour would occur adjacent to the WNY, even under superstorm conditons.	Modeling	N
140	Navy	Please explain how the initial distribution of bed sediment grain size (19% clay, 36% silt, 45% sand) was specified. Was the interpolated grain size distribution map included in the RI and River-wide FS reports used? Note that the interpolation is influenced by the biased RI sample design that provides more data in nearshore areas than central channel areas.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
139	Navy	Please add a table summarizing the assumed values for the input parameters used to configure the sediment transport model, along with references.	Modeling	N
141	Navy	Please clarify the EFDC sediment transport calibration process. The first paragraph implies that the model was calibrated for SSC, bed morphology changes, and net sediment flux at selected locations, but the text only describes comparison of model-predicted sedimentation rates with Cs-137 data from five cores. Was the model actually calibrated, and if so, what model parameters were adjusted in the calibration process?	Modeling	N
142	Navy	The last paragraph describes the Cs-137 core results as indicating "sediment depostion is higher in the upper and lower reaches of the main stem, with less deposition in the middle reaches adjacent to Kingman Lake." The top of page 41 states that "The EFDC model simulates the distribution of sediment deposition in the tidal Anacostia reasonably consistent with the observed data." This is clearly not the case, as shown in Figure 11.3. The model predicts minimal sediment deposition in the lower river, which is not supported by the Cs-137 data.	Modeling	N
143	Navy	Although not explicitly stated, it appears that the differences between the 1954- and 1963-based sedimentation rates were interpreted as two points on a linear trend. While is reasonable to conclude that sedimentation rates overall were higher in the past because of urban development, no data are provided to support the assumption of a linear downward trend (the USGS stream gauge data analysis appears to only demonstrate that sediment loads in the Northeast and Northwest Branches were higher in 1959-1961 than in 2014-2015).	Modeling	N
149	Navy	Please compare the rates shown here to the Figure 2.9 in the River-wide FS to verify that the same results are shown (the color shading is hard to match with the legends).	Modeling	N
559	CSX	DOEE has not made the model files available for review, including model input parameters that are key to the modeling. For example, it is unclear how the bathymetry in Figure 8.1 was interpolated and what the resulting degree of uncertainty is. Further, it is unclear how the custom tables of storage-overflow relationships were developed for the DC Water CSS system and how the initial flow, TSS and PCB values were selected and adjusted to calibrate CSS contributions. It is also unclear whether the results of the Manhole Sediment Investigation Report were utilized for the modeling.	Modeling	N

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621	Pepco & WG	2. The sediment calibration over-estimates the sedimentation rates in the upper reaches, and severely underestimates the sedimentation rates in the lower reaches. Despite the poor representation of the sediment transport model calibration, it can be inferred from the plot displaying the sedimentation calibration results that the SWM over-predicts sedimentation in the upper reaches and severely under-predicts the sedimentation in the lower reaches. In the upper reaches it is inferred that the calibrated model over-predicts the sedimentation rates by a factor of two or three. In the lower reaches, the differences are much more difficult to discern due to the plotting technique (see previous comment) but it does appear that the calibrated model is under-predicting the sedimentation by at least an order of magnitude, and possibly more. These calibration results cast significant doubt on any remedy evaluations based on the SWM. This applies to estimates of future sedimentation and PCB concentrations. A discussion of the deficiencies in the sediment transport calibration was not provided in the SWM report (2019a) nor any of the other site documents. Clearly these deficiencies need to be addressed, and their impact on model predictions used in evaluation alternative remedies in the feasibility study need to be quantified.	Modeling	N
646	Steuart Investment Co.	The AT123D-AT model in which the groundwater contamination travels directly and solely, to the river isnot appropriate. Based on the 2017-2019 Quarterly Monitoring Reports, prepared by ECC for DOEE DCthe flow direction at the Site is not directly south-east towards the river. The Site is situated on agroundwater divide, and flow from the source area is mostly north-west/south-west.	Modeling	N
647	Steuart Investment Co.	A tidal model to account for the tidally influenced aquifer would be more accurate for the Site, to simulate potential groundwater contamination migration to the river. East of the groundwater divide, a tidal model will show that tidal fluctuation causes the exit concentration levels to be significantly diluted toward the river as compared with a model that does not consider tidal influence and would slow migration of a plume toward the river.	Modeling	N
648	Steuart Investment Co.	The Benzene source was overestimated, and not calibrated based on Site-specific data. The AT123D-AT model shows concentrations in the source are higher than the highest Benzene measured at the Site. Therefore, the simulated Benzene concentrations at the riverbank are too high and inaccurate.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
561	CSX	The model calibration statistics (fit between modeled and actual data) appear to be poor. For example, net sedimentation rate data do not show a significant longitudinal trend, while model results do show a clear longitudinal trend, with net sedimentation rate decreasing moving downstream. As such, results overpredict sedimentation in upstream areas (RM 7-9) and underpredict sedimentation in downstream areas (RM 1-4). Further, Nash Sutcliffe Efficiency for the LSPC model for all sites except Hickey Run miss the targets specified in Table 5.2, and Watts Branch volume and high flow statistics are particularly poor. There also appear to be model calibration issues with TSS as well as tributary sediment load (modeled load is significantly lower than the estimate from the USGS Tributary Study for the Northwest Branch). The model calibration should be improved and the implications for lack of good calibration should be discussed.	Modeling	N
562	CSX	The Groundwater Modeling Report contains multiple speculative statements that are not supported by data and are biased negatively toward CSX. As an example, DOEE states: “The mass of PAHs in Anacostia River sediment attributable to this PECS is likely much larger [than modeled] but is indeterminable based on available data.” The model performed was a dissolved phase contaminant transport model for groundwater. Yet DOEE makes biased, speculative statements regarding the mass of PAHs likely contributed to the Anacostia River sediment from the Benning Yard facility without any supporting analysis of how the dissolved phase groundwater contamination correlates to sediment contamination. This also conflicts with the USGS Tributary Report that indicates Fort Dupont Creek is a negligible source of contaminants to the River. As another example, DOEE states as a modeling assumption “the Benning Facility included a one-million gallon capacity AST.” CSX notes that a one-million gallon capacity AST has not been documented at the facility, nor do historic aerial photographs or historical maps support a tank of this size ever being present on the property. Further, the results from one monitoring well appear to be missing (there is no MW-2 in Table 6.2), and the model parameters in Table 6.5 are based on unverified assumptions (e.g., for half-life, effective porosity).	Modeling	N
563	CSX	"The model is based on inadequate calibrations (e.g., horizontal hydraulic conductivity, mean residual value near zero)."	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
697	Steuart Investment Co.	The Groundwater Modeling Report does not adequately explain why the solubility and mobility of benzene make it an appropriate surrogate for PCBs, dioxin, benzo(a)pyrene, and chlordane. Since modeling of benzene fate and transport is not adequately justified as a surrogate for the chemicals of concern in the Anacostia River Sediment Project feasibility studies, modeling of benzene as a surrogate should be removed. If this section is not removed, DOEE should include a sentence recognizing that solubility and mobility of benzene are not representative of the contaminants of concern in the River-wide and Focused Feasibility Studies.	Modeling	N
698	Steuart Investment Co.	Due to the presence of a groundwater divide between MW-24, MW-26, and MW-29 and the Anacostia River, the hydraulic gradient for the model should not have been calculated as the average gradient between each of these wells and the river. Groundwater elevation has been characterized in the quarterly monitoring reports submitted to DOEE for this property in LUST Case 87-012. Because groundwater elevation data does not support the assumed flow in the AT123D-AT model, SIC requests that the discussion of groundwater modeling for the Former Gulf/Steuart Property be removed. If it is not removed in its entirety, DOEE should include a sentence that groundwater flow in monitoring reports for the property is shown generally to the west (away from the river).	Modeling	N
699	Steuart Investment Co.	The report incorrectly states that the concentration level for benzene was set equal to the effective solubility of benzene (17,000 µg/L). This is not reflected in the modeling output file, which includes concentrations above 300,000 µg/L. Because modeling for the Former Gulf Terminal did not reflect the intent of the Groundwater Modeling Report and was not calibrated to available monitoring data, SIC requests that the modeling of the Former Gulf/Steuart Property be removed from the Groundwater Modeling Report. If it is not removed in its entirety, this section should state that source concentrations were not limited to the solubility of benzene, limiting the value of this model as a line of evidence of benzene transport at the Former Gulf/Steuart Property.	Modeling	N
564	CSX	The use of benzene as a surrogate contaminant for all other contaminants over a 30-year modeling timeframe is inappropriate. Benzene is not a COC for the River and it absorbs differently to carbon than other contaminants.	Modeling	N

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565	CSX	Most PAHs adsorb readily to organic carbon and are not transported easily through groundwater. The assumption that the retardation factor is zero for PAHs likely underestimates the aggregate retardation of PAHs in the groundwater and therefore results in an overestimation of total PAH mass released to the River.	Modeling	N
125	Navy	The initial LPSC model hydrologic calibration focused on the period from 2005-2015, but the Figures 5-2 through 5-7 and the error statistics provided in Table 5-3 only report results for the 2014-2017 time frame. Please report the error statistics for the longer time period as they may be a better indication of performance over a wider range of flow conditions.	Modeling	N
126	Navy	" . . . An NSE of 0.75 or greater on monthly flows constitutes a good modeling fit for watershed applications." Table 5-3 indicates that the NSEs for five of the six calibration stations range from 0.595 to 0.693; however, these results are not discussed in the text. Please expand the discussion to address the potential impact of these calibration results on the reliability of the model (i.e., Section 7.2 notes that uncertainty in the flow simulations propagates into the water quality simulations).	Modeling	N
130	Navy	These figures are difficult to interpret - how was "visual inspection" used to evaluate these results? Please provide figures of observed versus modeled PCB concentrations along with a summary of the linear regression parameters, similar to what is shown for the hydrologic calibration.	Modeling	N
131	Navy	"The use of point-in-time observations of . . . PCB concentrations in suspended sediment to support the calibration of a continuous model simulation of that variable presents challenges." Given the numerous complexities and challenges discussed in this paragraph, is the contaminant transport component of the module likely to produce sufficiently accurate forecasts of future conditions, or should this component of the model be discontinued?	Modeling	N
127	Navy	"The LPSC model provided a good match with the observed values at all six locations . . " What is the operational definition of "a good match"? Please provide figures of observed versus modeled TSS concentrations along with a summary of the linear regression parameters, similar to what is shown for the hydrologic calibration.	Modeling	N

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128	Navy	"Owing to the challenges in quantifying the surface water concentrations of hydrophobic constituents such as PCBs, the calibration dataset for contaminant concentrations consists of only the small number of direct measurements obtained during the USGS Tributary Study." Please clarify whether the USGS Tributary Study was the only attempt to collect surface water samples from the tributaries for PCB analysis, or whether other sampling efforts were attempted but did not yield useable data for model calibration.	Modeling	N
129	Navy	The FS Data Gaps Report for WNY OU2 provides results for surface sediment samples. The report does not include PCB data for upland soils. The PCB concentrations in surface sediment adjacent to WNY are influenced primarily by deposition of suspended sediments from upstream and are not representative of surface soils at the Navy Yard.	Modeling	N
122	Navy	In "Understanding the Use of Models in Predicting the Effectiveness of Proposed Remedial Actions at Superfund Sediment Sites" (EPA, 2009), EPA describes standard model calibration and validation procedures. Many of the ARSP surface water model components appear to be insufficiently calibrated and none appear to have been validated using data sets other than the ones used for calibration. The model may be a useful tool for the objectives described in the report if it is supported by additional site- specific field data and undergoes a more rigorous calibration and validation process. Recommend incorporating these activities into the overall adaptive management plan for the ARSP (if they aren't already).	Modeling	N
123	Navy	The surface water model report would benefit from a dedicated section that discusses model uncertainty; including model assumptions, limitations, and the results of all sensitivity and uncertainty analyses.	Modeling	N

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622	Pepco & WG	3. Insufficient calibration data were collected. ARSP sampling over the 9-mile study area included the collection of 13 cores for cesium analysis with only five cores having useable cesium profiles (page 40). Typically for a CERCLA investigation of an urban waterway many more cores for radiochemistry analysis (e.g., Beryllium-7, Cesium-137, Lead-210, Potassium-40) would be collected. For example, at the Lower Passaic River over the 17.4-mile study area over 200 stations were sampled for radiochemistry analysis (LPR RI, 2019). If the same number of samples per mile were collected for the ARSP 9-mile study area, approximately 100 stations would have been sampled. The SWM, and in particular, the quality of sediment transport calibration is critical to the selection of the optimal remedies, yet very little data are available from the radiochemistry analysis data to provide a robust calibration. Not only does it impact the decisions based on deposition rates when evaluating MNR and EMNR but also calls into question any decisions related to PCB concentrations, as their fate and transport is closely tied to sediment transport.	Modeling	N
581	Pepco & WG	DOEE constructed a surface water model for the ARSP in order to estimate future deposition and erosion of sediments and contaminant levels in both the sediments and the water column. That information influenced DOEE’s evaluation of the appropriateness of certain remedial alternatives. Because of critical shortcomings in the surface water model, such as relying on very limited data despite the availability of additional relevant data, DOEE is prematurely ruling out remedies such as monitored natural recovery and enhanced monitored natural recovery in locations where they would be appropriate remedial approaches under the NCP and provide net benefits to the public. Poorly documented or explained aspects of the surface water model, however, prevent a fulsome independent review of DOEE’s analysis and conclusions. Accordingly, DOEE should gather additional sedimentation data and revise the surface water model to address the issues identified in the enclosed comments.	Modeling	N

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625	Pepco & WG	6. There is no model validation or uncertainty analysis conducted for the sediment transport model. It is a standard practice to apply a model validation or uncertainty analysis to quantify the reliability and confidence in the result of model. Validation and uncertainty analysis helps stakeholders understand the limitation of the results and be better informed in choosing which remedies to support. While an uncertainty analysis has been completed for the model simulations of PCB concentrations, there is no documentation of an analysis being completed for the model sediment transport calibration. An uncertainty analysis should be completed for the model sediment transport simulations, and circulated to the public for comment.	Modeling	N
624	Pepco & WG	5. There is no rationale provided for the 10-year forecasting period used for alternatives evaluations.The River-wide Feasibility Study Report (Tetra-Tech, 2019b) describes results from the modeling analysis to support the evaluation of remedial options. However, the details of the supporting modeling analysis, specifically the basis of the 10-year period used to assess the no action and Monitored Natural Attenuation (MNA) remedial alternatives, have not been provided. It is standard practice to demonstrate that the time period used to evaluate the alternatives correctly represents the appropriate meteorological and environmental conditions. For instance, the range of rainfall, river flows and sediment loads used in the 10-year period should be representative of the range of conditions in the historical record. The SWM report does not include this information, however the information is necessary to support a reasonable opportunity to comment on the modeling. Without this documentation, it is not possible to determine if the results of the modeling evaluations are valid. DOEE should provide the details of the scenarios used for each application of the model discussed in the River-wide Feasibility Study Report (Tetra-Tech, 2019b). Specifically, the characteristics of the 10-year period used for evaluating the no-action and related MNA scenarios should be provided for comment and their suitability discussed. This includes demonstrating that the 10-year period has the same low, average, and high rainfall and discharge and load conditions as the historic records or other relevant periods.	Modeling	N
92	Navy	Recommend further describing the areas (or present a figure showing the areas) where here is potential for "substantial localized scouring".	Modeling	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
560	CSX	In many cases, insufficient documentation is provided regarding the model development and calibration process. For example, while there are tables (6-1 through 6-4) showing some key LSPC parameters used, final values used for the receiving water calibration parameters (such as critical shear stress and settling velocities selected for the three sediment classes) are not provided and should be. The final model input parameters that are key to the modeling should be provided.	Modeling	N
649	Steuart Investment Co.	The simulated Benzene concentrations exceeded the solubility level of 17,000 ug/L. This is not possible since the maximum Benzene concentrations in groundwater are limited by the solubility level. Therefore, the simulated Benzene concentrations at the riverbank are too high and inaccurate.	Modeling	N
650	Steuart Investment Co.	Two (2) of the most important fate and transport mechanisms, retardation and degradation, were not evaluated as part of the AT123D-AT model simulation. Retardation and degradation assist with plume depletion and would contribute to accurately simulated Benzene concentrations at the riverbank.	Modeling	N
651	Steuart Investment Co.	The AT123D-AT simulations for the scenario with no degradation do not accurately estimate Benzene concentrations in groundwater at the riverbank. There are three lines of evidence which could be used to justify the use of Benzene biodegradation for the Site: (1) measured Benzene concentrations in the source wells which show decreasing trends, (2) remediation via biodegradation enhancement, and (3) the tidal influences which will bring oxygen into the aquifer.	Modeling	N
652	Steuart Investment Co.	The AT123D-AT simulations for the scenario with degradation should be considered more representative for the Benzene fate and transport simulations at the Site. However, considering the assumptions used (i.e., source concentrations exceeding Benzene solubility levels, no retardation or degradation, and incorrect flow direction), the AT123D-AT modeling results for the scenario with degradation are still not accurate.	Modeling	N
691	Steuart Investment Co.	The Groundwater Modeling Report did not model contaminants of concern and should therefore not be used as a source identification for contaminants of concern. SIC requests that the Groundwater Modeling Report be removed from this list.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
701	Steuart Investment Co.	The Groundwater Modeling Report states that, for the no-biodegradation case, the maximum estimated surface sediment pore water concentration is greater than 20,000 µg/L. This states a concentration higher than the solubility of benzene and higher than the initial source concentration stated in Section 5.1.4. The cause of this extreme number is a series of errors in the groundwater modeling for the Former Gulf/Steuart Property, including incorrect assumptions regarding the direction and rate of groundwater flow, an unreasonable assumption of the amount of benzene remaining on the property after 1994, and a known flaw in the AT-123D model that resulted in source concentrations for the model far exceeding their intended limits. Because of these errors, SIC requests that the groundwater modeling for the Former Gulf/Steuart Property be removed. If it is not removed in its entirety, then a statement should be added to say that modeled results may not reflect reality due to limitations in the model and assumptions used for the Former Gulf/Steuart Property.	Modeling	N
702	Steuart Investment Co.	The Groundwater Modeling Report states that the absence of biodegradation is plausible for the Former Gulf/Steuart Property given that microorganism growth in response to the abundance of benzene would deplete oxygen levels. This statement does not reflect the fact that hydrogen peroxide injection was used at the site to enhance biodegradation, as reflected in the MACTEC Report and ECC Tri-Annual Groundwater Monitoring Report cited in the Groundwater Modeling Report. SIC requests that the last two sentences of this section be deleted and replaced with: "Given the use of hydrogen peroxide injection at this property, biodegradation is plausible."	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
703	Steuart Investment Co.	As discussed in SIC's general comments and specific comments for Section 5, the groundwater modeling for the Former Gulf/Steuart Property does not accurately reflect site conditions and so should be removed from the Groundwater Modeling Report. If the summary of estimated potential for adverse impacts to river media from the Former Gulf/Steuart Property are not removed in their entirety, then the conclusion should be revised to state "Results of this assessment suggest that the release of petroleum chemical constituents to shallow groundwater at the Gulf/Steuart property has likely not impacted pore water quality in surface sediment in the adjacent Anacostia River. Groundwater flow is generally to the west (away from the river). Even with analytical transport modeling using a hydraulic gradient toward the river and using benzene as a surrogate show that surface sediment pore water concentrations are not likely to be impacted unless it is assumed no degradation occurred. Given the use of hydrogen peroxide injection at the property to enhance biodegradation, it is likely that biodegradation occurred."	Modeling	N
704	Steuart Investment Co.	As discussed in SIC's general comments and specific comments for Section 5, the groundwater modeling for the Former Gulf/Steuart Property does not accurately reflect site conditions and should be removed from the Groundwater Modeling Report. If the conclusions for this property are not removed in their entirety, then the conclusion should be rewritten to state: "Results of this assessment suggest that the release of petroleum chemical constituents to shallow groundwater at the Former Gulf/Steuart Property have likely not impacted pore water quality in the Anacostia River surface sediment. Groundwater flow is generally to the west (away from the river). Even with analytical transport modeling using a hydraulic gradient toward the river and using benzene as a surrogate chemical show that surface sediment pore water concentrations are not likely to be impacted unless it is assumed no degradation occurred. Given the use of hydrogen peroxide injection at the property to enhance biodegradation, it is likely that biodegradation occurred."	Modeling	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
732	Steuart Investment Co.	"...For the Former Gulf Terminal, the GMR did not model groundwater flow. Instead, the GMR assumed a southeasterly flow of groundwater toward the river and then calculated a "representative groundwater velocity" based on water levels measured in three monitoring wells on August 2, 2004. GMR at 27. Comparing the groundwater monitoring wells to each other, however, shows that groundwater does not flow toward the southeast. This can be seen in the attached groundwater elevation data from the area used in the GMR (attached as Attachment A)8 and the report of Dr. Liliana Cecan (attached as Attachment B), which demonstrate that the site is situated on a groundwater divide and that groundwater flow from the source area modeled in the GMR is mostly north-west/south-west, away from the river. See Attachment B at 2-17. As shown by the contour map in Attachment A and in Dr. Cecan's report, the flow assumed by the GMR is impossible as it assumes groundwater would flow upgradient from the area being modeled. The 2005 MACTEC Phase I Environmental Site Assessment and Contaminated Materials. Management Report ("MACTEC Report") reached a similarly incompatible conclusion with the GMR's assumption of a southeast flow toward the river. See MACTEC Report at Table 1, Row 75 ("GW flow in monitoring reports is shown generally to the west (away from the river).") (attached as Attachment C). The MACTEC Report is cited as the basis for the information used in the GMR to model the Former Gulf Terminal, making MACTEC's assessment of groundwater flow from that same data particularly relevant. See GMR at 26 ("The MACTEC Report... served as the primary data source to support the groundwater modeling performed."). Because groundwater elevation data indicates that groundwater flow from the area modeled in the GMR is not toward the river, the GMR modeling based on that assumption should not be considered a line of evidence in the RFS, FFS, or CSA.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
735	Steuart Investment Co.	As discussed above, discharge to the river would require the groundwater to flow upgradient. Source removal using pump and treat technology removed available free product. Also the source cannot be greater than the effective solubility of benzene (17,000 pg/L), which is proven by measured concentrations in the source area that have been consistently and significantly below this concentration. Oxidation enhancements to the source area under DOEE oversight promote degradation and make it unreasonable for the model to assume no degradation of benzene as it disperses from the source area. Even with these flaws, the degradation version of the GMR predicts concentrations of benzene at the river that meet drinking water standards. The GMR does not support including the Former Gulf Terminal as a PECS for the ARSP.	Modeling	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
733	Steuart Investment Co.	The GMR states that “the concentration level for each source was set equal to the effective solubility of benzene (17,000 pg/L).” GMR at 28. There is no basis in the record for this assumption. To the contrary, monitoring data at the Former Gulf Terminal has never found benzene anywhere close to 17,000 pg/L. See Attachment B at 17. It is also unreasonable to assume a source concentration equal to the solubility of benzene. The mass rate should have been calibrated to measured site concentrations to avoid these unrealistic concentrations. The AT123D-AT model output file in the record also indicates that the modeling for the Former Gulf Terminal started at an even higher concentration than what was reported in the GMR. Due to a known flaw in the AT 123D model, the actual concentration modeled in the output file was more than 20 times the assumed concentration. See Attachment B at 17-18. Specifically, DOEE modeled a fictional input9 of over half a gram of benzene per day for a 40-year period to achieve a starting concentration of 17,000 pg/L. Rather than stop at 17,000 pg/L, however, the AT123D model continued to calculate a buildup of benzene without limit, resulting in a modeled concentration that far exceeded the solubility of benzene.10 Attachment B at 17. This is absurd. Groundwater cannot hold more than 17,000 pg/L of dissolved benzene. The model then assumes that this plume would move uniformly toward the river despite evidence that groundwater does not flow toward the river, and that there would be no retardation in the movement of the modeled groundwater plume. Attachment B at 2-17, 25. Finally, the GMR fails to use measured groundwater concentrations to calibrate the model, which would have clearly demonstrated that the assumptions were flawed and that modeled concentrations were several times higher than anything monitored at or around the property. Attachment B at 21. When adjusted to align with the measured concentrations, the model confirms that the Former Gulf Terminal is not a source of benzene in the river. Attachment B at 26.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
734	Steuart Investment Co.	Even given the assumed upgradient flow of groundwater and significant over-estimation of benzene at the Former Gulf Terminal, the GMR shows that “only if benzene degrades at a very slow rate (non-degradation simulation) will groundwater with appreciable benzene concentrations discharge into the Anacostia River. If a degradation half-life of 2 years (Borden et al., 1997) is assumed, model simulations indicate that the benzene plume will degrade to concentrations close to the detection limit prior to discharging into the Anacostia River." GMR at 28; see also GMR Figures 5.2 to 5.5. The GMR goes on to state that the “absence of biodegradation is plausible given that microorganism growth in response to the abundance of benzene would deplete oxygen levels in ground water” and that “[bjenzene degradation is much slower in groundwater under anaerobic conditions." GMR at 29. Assuming a non-degradation scenario for the Former Gulf Terminal, however, is inconsistent with the record. As discussed in SIC’s May 14, 2018 comments on the draft RIR (attached as Attachment D), not only was a pump-and-treat system installed in 1987 that removed free phase petroleum, but the site’s DOEE-approved Corrective Action Plan included in-situ introduction of oxidants into the monitoring wells to enhance natural biodegradation. Attachment D at 4 (citing ECC Phase I Environmental Site Assessment for Square 662, at 20 (May 19, 2017)). In addition, while groundwater in the area of the GMR model does not flow toward the river, groundwater further east would likely be under tidal influence, both slowing groundwater migration and increasing biodegradation. Attachment B at 17, 22, and 26. As a result, the GMR’s non-degradation modeling for the Former Gulf Terminal is inappropriate.	Modeling	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
627	Pepco & WG	"As discussed in the Proposed Plan, the District of Columbia Brownfields Revitalization Act (DBCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) require that the early remedial actions comply with applicable or relevant and appropriate requirements (ARARs) of federal, state, and local regulations unless a waiver can be justified. The Proposed Plan does not identify specific ARARs that are proposed for incorporation into the pending Interim ROD. However, the supporting FFS references the ARARs that are presented in the River-wide FS. It is important that the Interim ROD incorporate provisions from regulations and statutes that specifically apply to the Early Actions. Not all of the ARARs identified in the River-wide FS apply to the Early Actions. For instance, groundwater maximum contaminant levels appear inapplicable and irrelevant to the development of sediment remedial action levels for the Early Actions or evaluation of Early Action alternatives; such standards should not be included. Moreover, implying that particular requirements are ARARs when they are not may inadvertently prompt a need for future ARARs waivers. As a general matter, because ARARs should be a location- and action-specific determination, the ARARs listed in the River-wide FS are inappropriate, and Pepco and Washington Gas reserve the right to comment further on any proposed ARARs for future remedial action work."...	PRGs	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
582	Pepco & WG	The Focused Feasibility Study and River-wide Feasibility Study do not adequately address several key considerations, including evaluation of alternatives, identification of standards governing remedy selection and implementation, and cost. "The Focused FS and River-wide FS reflect many of the unaddressed uncertainties and technical concerns highlighted in the other topics addressed above and the attached detailed comments. DOEE also provides fundamentally deficient, and in places inconsistent, rationales in the Focused FS for the elimination of certain remedial alternatives, including monitored natural recovery, enhanced monitored natural recovery, and containment. The River-wide FS provides DOEE's views on the applicable or relevant and appropriate requirements (ARARs) with which remedial actions must comply. The Proposed Plan does not specify the ARARs for the proposed Early Actions, however, and the Focused FS merely refers to the ARARs addressed in the River-wide FS. This lack of specificity is problematic because not all of the ARARs identified in the Focused FS necessarily apply to the proposed Early Actions. In addition, the River-wide FS cites the National Park Service (NPS) Organic Act as a location-specific ARAR on which DOEE improperly relies to screen out Alternative Main Stem 3 (MS-3) (which includes Monitored Natural Recovery (MNR), Enhanced Monitored Natural Recovery (EMNR), and Containment)..."	PRGs	Y
607	Pepco & WG	3. If DOEE will not withdraw the sediment PRG, then (without waiving the point that this should be done): a. The fish tissue RBC should be re-calculated based on more up-to-date information regarding angler fish consumption (QuanTech 2020, AECOM, 2020a). The use of alternative consumption scenarios and/or CTE assumptions should be considered to provide a range of plausible RBCs for use in the adaptive management phase of the ARSP.	PRGs	N
608	Pepco & WG	b. The RBC should be bounded by background concentrations in fish (see Comment 3, Background, for recommended approach). The selected fish tissue concentration on which the PRG is based should not be below background fish tissue concentrations.	PRGs	N
609	Pepco & WG	c. The pending forage fish data recently collected by USFWS/DOEE, as well as monitoring data to be collected following implementation of Early Actions, should be evaluated and used to update the BMF/BSAF model.	PRGs	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
578	Pepco & WG	In the Proposed Plan, DOEE proposes to establish Preliminary Remediation Goals (PRGs) for the final sediment cleanup. As Pepco and Washington Gas have expressed before, establishing PRGs at this interim stage of the remedial process foregoes one of the principal benefits of the adaptive management framework, which is to allow decision-makers to reduce uncertainties through continued data collection and evaluation before setting long term numeric cleanup goals that are both necessary to reduce risk and achievable in practice. Pepco and Washington Gas thus strongly urge DOEE not to include any PRGs in the Interim ROD, and instead wait to develop PRGs in a subsequent decision document with the benefit of additional monitoring and data collection. If DOEE nonetheless decides to include PRGs in the Interim ROD, the proposed PRGs are flawed and need to be recalculated. In addition, any PRGs should be clearly presented as preliminary and subject to recalculation as the data evolve, contrary to DOEE's statement in the River-wide FS that re-evaluation of the PRGs will be "a last resort." As described in the detailed comments submitted with this letter, DOEE's derivation of the proposed PRGs suffers from serious methodological flaws and major data gaps. In particular, the PRGs are based on a "safe" level of fish tissue that was calculated using the same flawed assumptions from the HHRA that overstate the risk. In addition, the target fish tissue concentration of 22 part per billion (ppb) for PCBs is far below the background level of 75 ppb calculated by DOEE (which likely is understated as well). Attempting to clean up sediment to achieve fish tissue concentrations below background is a recipe for failure and a waste of resources. DOEE should address these issues and recalculate the PRGs accordingly prior to including them in the Interim ROD. DOEE also should commit to recalculating any proposed PRGs in the next phase of remedial decision-making after updating the risk assessment based on additional data to be collected.	PRGs	N
610	Pepco & WG	d. The Interim ROD should clearly state DOEE's intention to revisit sediment remediation goals as part of the adaptive management process.	PRGs	N
758	Anonymous	Would you please speak to the goal (65 ppb PCB) in consideration of other goals at other rivers around the country?	PRGs	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
10	MDE	The Preliminary Remediation Goal (PRG) for total PCBs in sediment is listed in the River-wide Feasibility Study (RFS) as 65 micrograms per kilogram (µg/kg). As previously noted by the Maryland Department of the Environment ("the Department"), the PRG for the entire river is calculated to ensure protectiveness of the subsistence angler. The stated PRG is quite low given the high degree of uncertainty of the strength of the dataset, the uncertainty regarding the number of subsistence anglers present that rely solely on the Anacostia, the range of such anglers within the watershed, the number of meals per year a subsistence angler consumes, and the size of the fillets that are regularly consumed. The data set and assumptions utilized to derive these PRGs are not supported in the literature or the administrative record and would require significant research to validate their use.	PRGs	N
40	Navy	"Such actions could include . . . re-evaluating sediment cleanup goals (as a last resort)." Recommend deleting the phrase "as a last resort." Sediment cleanup goals are based on an assumed relationship between COC concentrations in sediment and fish tissue developed using a limited fish tissue data set (addressed further in comments below). Additional sediment and fish tissue data (as well as other types of data) will be collected for the performance monitoring program, and these data should be used to reassess sediment-fish tissue relationships and associated sediment cleanup goals. The following sentence appears to indicate that this will be the case: " . . . DOEE expects to achieve greater certainty in defining . . . the appropriate cleanup goal for each COC."	PRGs	N
59	Navy	Note 4 indicates that the RBC is the lower of the 1E-05 cancer risk or hazard index of 1. Recommend revising this note to specifically state the basis for each PRG (1E-05 cancer risk or non-cancer HI of 1). This is difficult to determine from the supporting material provided in Appendix A. Appendix A Table 12 does not report RBCs corresponding to a HI of 1, and the total PCB RBCs for the 1E-05 and 1E-04 cancer risk levels are the same value. Please update Appendix A Table 12 to completely and correctly summarize all RBCs.	PRGs	N
72	Navy	" . . .re-evaluation of sediment cleanup goals (as a last resort)." Recommend deleting the phrase "as a last resort" as explained in the Navy's comments on the River- wide FS report.	PRGs	N

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154	NPS	"...In the FS Report, the DOEE suggests that it may refine the PRGs in the future based on changed conditions or new information. This is problematic for at least two reasons. First, the FS Report states that the PRGs may be changed due to "an adjustment to the upper bound of tolerable risk," which is essentially stating that the DOEE is willing to subject river users to more (or less) risk now than it will be in the future. In addition, the FS Report opines that the PRGs may need to be changed in the future due to uncertainty with respect to certain information that informs the calculation of the PRGs, such as fish tissue concentrations and upstream discharges of contaminants. This possibility raises a more fundamental issue, which is why the DOEE decided to finalize the FS Report at this time..."	PRGs	Y
239	NPS	"PRGs would be recalculated only when field data are available to establish a causal relationship between concentrations of COCs in sediment and fish tissue markedly different than what was anticipated in the FS." Why is DOEE establishing PRGs now if this relationship is not understood? This is the type of uncertainty the adaptive management framework is useful for.	PRGs	N
245	NPS	"The Interim ROD will be designed to reduce uncertainties in the RI sufficiently to support confident establishment of cleanup levels and remedial alternatives in the Final ROD." This seems to indicate that there are too many uncertainties to confidently establish cleanup levels now, as the FFS indicates will be done, and that they should be set in the Final ROD.	PRGs	N
266	NPS	"The final RAOs, remedial goals, cleanup levels, and selected remedy will be established in the Record of Decision (ROD) for the Site." Will they be established in the interim ROD, or the final ROD? Please specify.	PRGs	N
267	NPS	Does DOEE intend to complete site-specific targeted risk assessments for each of the PECSes?	PRGs	N
272	NPS	The PRGs based on the 1E-05 risk and HQ of 1 achieve the appropriate balance between protectiveness and achievability of a remedy". The RBCs should be set to an HQ of 0.1 instead of 1.0 to account for the cumulative affects of the multiple COC; using an HQ of 1 is appropriate when there is only 1 COC. Why was the HQ set to 1 rather than 0.1?	PRGs	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
277	NPS	"PRGs are designated "preliminary" because they are subject to refinement through the selection and implementation of the remedy. Such refinements can arise because of considerations such as an adjustment to the upper bound of tolerable risk or the introduction of additional data unavailable at the time when the PRGs were calculated." Is the term implementation referring to a potential technical infeasibility argument? This should be edited to more clearly indicate the intent. Regarding the sentence that says, "the upper bound of tolerable risk", is the suggestion here that DOEE is considering that there is more risk now than it will be in the future (or vice-versa) to people?	PRGs	N
278	NPS	The ECO PRGs in Table 11 do not seem to be carried forward to Table 12. Eco PRGs for dioxin-like PCBs and dioxin TEQ are an order of magnitude higher in Table 12 than Table 11. In Table 12, how is the PCB PRG the same for the 10-5 and 10-4 risk levels?	PRGs	N
290	USFWS	Second para.: Check whether the EPA Region 3 are criteria, I believe they are BTAG screening levels.	PRGs	N
301	USFWS	"Chemicals for which no District water quality standards are available are represented by the U.S. Environmental Protection Agency (EPA) Region 3 criteria, which have been formally vetted by the Biological Technical Assessment Group for adoption throughout Region 3." These are screening values not criteria.	PRGs	N
302	USFWS	"Fish representing species and sizes typically targeted by anglers and consumed as fillets (called "gamefish" in this memo) were collected from the tidal Anacostia River by the U.S. Fish and Wildlife Service as part of fish consumption advisory studies (Pinkney 2014)." There is a newer report (Pinkney 2018) that should be considered. Perhaps the two data sets should be merged and the analysis performed with this larger data base to add more confidence to the result. Pinkney (2018) was cited on p. 58 but apparently not used in the calculations.	PRGs	N
451	DC Appleseed	The first paragraph states that "sediment is considered the primary exposure medium for remediation." Two subjects, risk assessment and remediation, are improperly conflated. Sediment is clearly the target medium for remediation, but the exposure medium driving the remediation is fish tissue.	PRGs	N
454	DC Appleseed	Since the PRG is based on a SWAC, the statistical metric used to compare post-remediation site should also be a SWAC. The text indicates the metric will be a 95UCL, but it is not clear whether this is a 95UCL on an arithmetric or spatially-weighted mean.	PRGs	N

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456	DC Appleseed	It should be made clear that the PRG adjustment would be an increase to a less health-protective value. The circumstances under which such an adjustment would be made are described in Section 4.2.2, so that section should be referenced here.	PRGs	N
486	DC Appleseed	Most of the large sediment sites our consultant is familiar with have utilized a bioaccumulation model for deriving sediment PRGs for the protection of fish consumers. Such models utilize water and sediment chemistry data, and the food-web relationships between different fish species. Then the fish tissue data can be used to calibrate and potentially validate the model. This alternative should be briefly discussed here and a rationale provided for the simpler BSAF/BMF approach utilized instead.	PRGs	N
488	DC Appleseed	A discussion should be added here as to why calculated PRGs for pesticides and arsenic were not used in the FS.	PRGs	N
489	DC Appleseed	It's not clear why a 95UCL of COC concentration and a median whole river sediment TOC fraction were used to calculate TOC-normalized sediment concentrations. A SWAC for both COC and TOC would be more appropriate, accounting for spatially variability of sampling. At a minimum, multiple calculation methods should have been explored to evaluate the sensitivity of the results to these calculation method decisions.	PRGs	N
490	DC Appleseed	Another principal uncertainty is the degree to which COC concentrations in game fish filets represent COC concentrations in Anacostia sediment. Some of these fish species range outside the Anacostia.	PRGs	N
491	DC Appleseed	The text provides three reasons for why Method 2 should be preferred to other methods. The first reason refers to the "robust data set of fish tissue", but one of the calculation components of this method includes only 13 composite samples of game fish filet. The final result is only as good as the weakest portion of the calculation method. It is not clear why use of a 95UCL for COC concentrations is a suitable rationale. As pointed out in a comment above, a SWAC would be more technically defensible.	PRGs	N
492	DC Appleseed	This same exercise of calculating sediment PRGs for the protection of fish consumers has been undertaken at many large sediment sites. While the Anacostia environment is no doubt somewhat different than other river systems, the bioaccumulation dynamics are not likely to be radically different between sites. The presentation of the calculated PRGs should include a comparison to PRGs calculated for other systems, including those utilizing more sophisticated methods.	PRGs	N

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493	DC Appleseed	The 2017 fish tissue data were compared to the 2013 data using Method 1. This comparison should also have been made using Method 2, since this is the selected method. PCBs were 53% lower in 2017 compared to 2013, which has large implications for the PRG calculation. Keeping all the other data the same, a 53% reduction in fillet concentration would double the resulting PRG (to approximately 130 µg/kg). This in turn would result in much higher RALs.	PRGs	N
598	Pepco & WG	Almost half of the forage fish tissue samples (18 of 38) were collected in the uppermost reaches of the river north of the New York Avenue bridge (exposure unit [EU]-4 and EU-5) whereas between 3 and 9 samples were collected from each of the remaining EUs. In the BERA (Attachment I.8.1), DOEE calculated total PCB congener forage fish to gamefish BMFs for each EU that ranged from 1.6 (EU-4 and EU-6) to 10 (EU-1) in comparison to the river-wide BMF of 2.7. The lack of spatial representation of the forage fish data set and variability in the EU BMFs indicate that the use of river-wide BMFs to derive sediment PRGs is overly simplistic and inappropriate.	PRGs	Y
600	Pepco & WG	The BMF ratios assume 100% of predator fish body burden is from ingestion of local prey fish with no consideration of biokinetic factors (e.g., excretion, metabolism, etc.), fish migration, or non-linear relationships. Gobas et al. (1999) reported that the mechanisms of biomagnification are dependent upon the composition of the diet of the predator and the digestibility of the diet and that simple ratios can result in substantial error in estimating bioaccumulation. Instead of the overly simplistic assumptions used in PRG development, DOEE should collect site-specific data on trophic transfer in the aquatic food web by conducting fish gut content analysis, including stable isotope data, throughout the Anacostia River. Such studies have been used successfully at the Berry's Creek Study Area to assess the spatial variability in bioaccumulation and biomagnification (Berry's Creek Study Area Cooperating PRP Group, 2017).	PRGs	Y

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601	Pepco & WG	There are insufficient paired sediment and forage fish samples to provide a meaningful analysis. The lack of spatial coverage and upstream bias of the forage fish data noted above in the BMF comments also significantly diminish the suitability of the data set for deriving BSAFs. The forage fish to sediment BSAFs vary widely throughout the river; total PCB congener BSAFs calculated for each EU (presented in Tetra Tech 2019b, Appendix I, Attachment I.8.2) range over an order of magnitude (from 0.32 to 8.1). At a minimum, DOEE should evaluate the recently collected USFWS/DOEE forage fish data to improve the spatial representativeness of the analysis. Additional data should be reviewed when available.	PRGs	Y
602	Pepco & WG	The sediment to forage fish BSAFs assume a simplistic ratio when in fact the relationship between tissue and sediment is complicated and dependent upon a complex food web and biokinetics. The shape, or curve, of a relationship is often rate or concentration limited, meaning that organisms may accumulate faster at lower concentrations or slower at higher concentrations than a simple linear assumption would indicate by a simplistic ratio (Judd et al., 2013).	PRGs	Y
603	Pepco & WG	The BSAFs rely on bulk sediment concentrations, which are generally poor predictors of bioavailability and toxicology as demonstrated in the ARSP BERA (Tetra Tech, 2019b, Appendix I, Section I.4.1.2). DOEE concedes this point in the PRG derivation (Tetra Tech, 2019a, Appendix A of the FS): none of the direct toxicity endpoints yielded significant regressions with sediment chemistry. Pore water data provide a better measure of bioavailability, particularly for hydrophobic contaminants such as PCBs, and recent studies involving the collection and evaluation of pore water analytical data throughout the river such as Ghosh et al. (2019) should be included in an evaluation of contaminants detected in fish tissue. Passive sampling should be used, not centrifugation as employed by DOEE, as this distorts the results as to certain constituents, including PAHs. Site-specific river-wide BSAFs should be developed based on a synoptic study that collects many paired geographically representative samples of bulk sediment, porewater, and forage fish tissue. In addition, the gut content and isotopic analysis study recommended in the BMF section would provide important site-specific bioaccumulation information to justify selected BSAFs.	PRGs	Y

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
604	Pepco & WG	While DOEE's methodology for deriving PRGs is flawed and we disagree with it, AECOM has calculated for illustrative purposes theoretical sediment PRGs for sediment using the most stringent of the updated fish tissue RBCs (subsistence angler young child, noncancer) and DOEE's BTV for fish tissue to illustrate the impact of changing just this input variable. Other inputs, including BMF and BSAF, were set to the values used by DOEE in developing the PRGs (see Attachment 5-A). As indicated in Table 3, the impact of changing the RBC for fish tissue on the sediment PRGs is significant by itself. The theoretical sediment PRG calculated by AECOM of 103 µg/kg based on the updated fish tissue RBC is about 60% higher than DOEE's selected PRG of 65 µg/kg. When DOEE's fish tissue BTV is used to set the lower bound for the RBC (i.e., the lowest level actually achievable), the theoretical sediment PRG calculated by AECOM increases to 220 µg/kg.	PRGs	Y
605	Pepco & WG	1. Withdraw the PRG of 65 µg/kg PCBs in sediment presented in the Proposed Plan and supporting documents.	PRGs	N
606	Pepco & WG	2. Defer the derivation of PRGs to a supplemental FS focused on final remedial actions once new data collected as part of the adaptive management are available and key uncertainties are addressed.	PRGs	N
15	MDE	The Department reiterates a comment made on the previous version of the Feasibility Study, that RAOs should include concrete, numerical goals for reduction of PCBs in fish tissue.	PRGs	N
782	Anonymous	How does this clean up effort compare (in cost & scale) to other larger river cleanups in industrial / urban areas? i.e. Hudson River, Elizabeth River, etc	PRGs	N

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543	CSX	Biota-sediment accumulation factors ("BSAFs") are a critical input parameter in the derivation of sediment preliminary remediation goals ("PRGs") for COCs that are based on food-chain bioaccumulation from the sediment to fish and/or other aquatic organisms that are consumed by humans or upper-trophic level ecological receptors. BSAFs provide the critical predictive link between the COC concentrations in sediment and the COC concentrations in fish tissue. The BSAFs described in the Remedial Action Objectives and Preliminary Remediation Goal Memorandum and ultimately used in the Feasibility Study are based on overly simplistic calculation approaches and have high degree of uncertainty. These simplistic BSAFs and associated PRGs are not commensurate with the enormous scope of the remedial actions being considered for the Anacostia River. Dynamic bioaccumulation models represent the current state of the science for supporting remedial decision-making at complex sediment sites like the Anacostia River, which must consider the complex relationships between COC concentrations in sediment and surface water and tissue concentrations in a variety of fish and other aquatic organisms. Dynamic models of this kind have been applied at many contaminated sediment sites including Portland Harbor, Fox River, Hudson River, Housatonic River, and Grasse River. DOEE should utilize a more comprehensive bioaccumulation modeling approach to develop PRGs with less uncertainty and to evaluate the effects of different remedial alternatives.	PRGs	N
823	Cynthia Morton	Row 5, 3/10/2020 . Please continue the clean up that is so urgently needed and support the effort to eliminate toxic pollutants flowing into the waterway.	Public Communication	N
223	NPS	This section seems to be missing the community profile discussion. Demographic information should be included in the FS to provide a foundation for issues related to subsistence anglers and other groups who live along the river and may be disproportionately affected by hazardous substances in the river or the measures taken to address them.	Public Communication	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
569	CSX	First, the RI/FS process that DOEE has utilized for the ARSP has been rushed and failed to provide adequate time for stakeholders and the general public to review and comment on the multitude of documents that have been developed. The RI should inform the FS, and while the RI and FS can be done concurrently, there should be consensus amongst stakeholders on the results of the RI before the FS is completed, and the FS should incorporate those results. For the ARSP, however, there are statements about contributing sources and the selection of a remedy in the FS without consideration of all the data available during the RI process or consensus amongst stakeholders. This is inconsistent with the RI/FS process defined by Superfund and employed at other remediation sites throughout the country and results in stakeholder uncertainty and lack of confidence in DOEE's decision-making throughout the process.	Public Communication	N
420	DC Appleseed	This is the shortest Proposed Plan our experts have ever seen. We assume the intent is to provide a reader-friendly version, similar to a fact sheet. However, many technical details are left to other documents. We suggest including a statement to this effect in the introduction, so readers know they will need to review other documents to fully understand the proposal.	Public Communication	N
320	Anacostia Riverkeeper	How will the public stay involved in the progress of remediation? DOEE has stated there are quarterly LLCAR meetings and resources will be added to the ARSP website, but DOEE should release monthly or quarterly progress reports to the public-at-large. The Gowanus Canal had weekly updates while dredging that the contractor released (http://gowanussuperfund.com/resources/document-library/). While that frequency may not be necessary here, regular updates in a report or fact sheet form are.	Public Communication	N
331	Anacostia Riverkeeper	We want to note our appreciation of the agency's efforts in returning in-depth responses to our correspondence during this comment period. Thank you.	Public Communication	N

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364	Anacostia Watershed Society	AWS firmly believes that the best and most advantageous process to plan this complex effort is to have all parties collaborate through the LCCAR. There is a need to develop sampling plans, treatability studies, remediation plans, cost allocation plans and share information that impacts all of us. We need to agree on each milestone so that progress isn't hindered by reaction to what another entity did without agreement of the whole. For instance, the LCCAR was led to believe there would be two RODs, however recently it has been stated that there will only be one. Will an Interim ROD allow NPS to approve the remediation work in their sediment if it's not in an approved ROD which allows them to proceed without a NEPA EIS? DOEE has typically told us to "go ask NPS" yet is making plans for NPS controlled sediment and asking for comments.	Public Communication	N
389	DC Appleseed	"...As noted, we appreciate DOEE's responses to our several letters seeking clarification, and that they are easily accessible in the electronic record. However, we think it is important for DOEE to make a concerted effort to make the information from those letters, and from the Proposed Plan's supporting documents, available in one place, especially since those letters are part of the Plan. We commend DOEE for writing a Proposed Plan intended to be approachable for the general public, but think that a significant amount of greater detail is necessary for meaningful public participation by anyone who doesn't have the expertise or time to sort through several disparate documents. We also encourage DOEE to be as specific as possible regarding future opportunities for public participation – will the LCCAR meetings continue past their original expiration date? Will additional public meetings be held? Can the public expect to be kept abreast of milestones and measurements at those milestones as well as adjustments if a milestone measure is not met? Will the public be informed of this information via email list and/or the AnacostiaRiverSedimentProject.com website?..."	Public Communication	Y
503	DC Audubon Society	We offer ourselves as a resource in planning this exciting and important project and look forward to working with you. Thank you for your consideration, and for the chance to speak on behalf of our supporters	Public Communication	N
836	Stacy Baker	Four things I support: 1 The District's leadership to take action on river chemicals, even before other surrounding jurisdictions' commitments are solidified. We have to begin somewhere, and the plan does that.	Public Communication	N
841	Stacy Baker	Commit to communicate progress publicly, in lay-person language. Residents need to know whether future hotspot remediation decreases PCB levels river-wide, not just in the hotspot areas, and what that means for safe fish consumption.	Public Communication	N

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455	DC Appleseed	The distinction between PRGs and RALs should be made clearer. This is a confusing topic for many stakeholders. Given the importance of these two terms in the FS and proposed plan, a simple explanation devoid of technical jargon should be provided.	Public COmmunication	N
821	Charles Alexander	Row 8, 3/10/2020. I frequently visit D.C. and would sure like to see this great river, so close to the sights I love, be worthy of a great city.	Public Communication	N
845	Stacy Baker	So long as DoEE experts would propose these same solutions if DC taxpayers had to foot 100% of the bill, that's good enough for me.	Public Communication	N
781	Anonymous	What will be the response to comment process for the proposed plan?	Public Communication	N
529	CSX	The RI/FS process that DOEE has utilized for the ARSP has been rushed and failed to provide adequate time for stakeholders and the general public to review and comment on the multitude of documents that have been developed. The RI should inform the FS, and while the RI and FS can be done concurrently, there should be consensus amongst stakeholders on the results of the RI before the FS is completed, and the FS should incorporate those results. For the ARSP, however, there are statements about contributing sources and the selection of a remedy in the FS without consideration of all the data available during the RI process or consensus amongst stakeholders. This is inconsistent with the RI/FS process defined by Superfund and employed at other remediation sites throughout the country and results in stakeholder uncertainty and lack of confidence in DOEE's decision-making throughout the process.	Public Communication	N

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686	Steuart Investment Co.	"...SIC requests that DOEE extend the comment deadline by 90 days, to Monday, August 13, 2018. DOEE's remedial plan should be based on the best and most current information available. It is apparent from the Draft RI and the public record that DOEE has not had the opportunity to do this yet in at least two important respects. First, since the publication of the Phase I Remedial Investigation Report in March 2016, DOEE has issued at least 17 detailed requests for information to property owners along the Anacostia River requesting information for each property related to the "identification, nature, and quantity of materials that have been or are generated, treated, deposited, stored, disposed on, or transported to a facility" and the "nature or extent of a release or threatened release of hazardous substances at or from a facility."1 This information is clearly relevant to the express purpose of the Draft RI, which is to "[d]etermine the nature and extent of contaminated environmental media (surface water, surface sediment, subsurface sediment, groundwater seepage, and biota) in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") at 40 Code of Federal Regulations (CFR) Part 300 and applicable guidance and assess the associated risk to human health and the environment."2 Yet DOEE has not yet incorporated this information into the Draft RI or made it available in the Administrative Record files so that it can be considered by the public in submitting comments..."	Public Communication	Y
846	Tom A.	How many Anacostia River streams have active residential restoration organizations? Is there anyone with responsibility to support / educate / activate them?	Public Communication	N
517	Sierra Club	The RAOs do not address the risk of direct contact with contaminants, especially PCBs, in more upland material such as groundwater and soil.	RAOs	N
630	Pepco & WG	RAOs presented in the River-wide FS are focused on the broader site-wide remediation goals and not specific to the Early Actions which are the subject of the Interim ROD. The Interim ROD should incorporate RAOs that are focused on physical completion of the Early Actions and what the early remedial actions are intended to accomplish. DOEE should incorporate RAO language such as that discussed in the text above.	RAOs	N
269	NPS	Local requirements are not ARARs.	RAOs	N

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279	NPS	Not all of the comments NPS made previously related to ARARs have been addressed. (Please see email Donna Davies sent on 8/9/18 for comments (e.g. the 1918 statute that established Anacostia Park is missing, and solid waste disposal regs are listed as applicable instead of R&A).	RAOs	N
597	Pepco & WG	The River-wide FS, page 38 (Tetra Tech, 2019b), indicates that RAO 4 is needed to “reduce risks associated with COCs in surface sediment to levels protective of fish based on direct contact with, and ingestion of, surface water, sediment, and prey.” The FS also states that achievement of the RAO will be based on addressing risks to fish by reducing the concentrations of bioaccumulative chemicals of concern (COCs) in surface sediment. However, the baseline ecological risk assessment (BERA) did not identify unacceptable risks to fish due to exposure to bioaccumulative chemicals in sediment. The identification of chemicals of bioaccumulative concern in the BERA was based on biota-sediment accumulation factors and biomagnification factors, which the DOEE acknowledges is an indicator of exposure but not risk. The Preliminary Remediation Goal (PRG) memorandum (Appendix A of the FS) confirms that chemicals of bioaccumulative concern are not considered to be ecological risk drivers. Additionally, the Summary of Site Risk in the Proposed Plan states that “the concentrations of chemicals accumulated in the bodies of fish and invertebrates were found to pose little or no risk to these animals themselves.” While risks to fish were identified in the BERA for some reaches, this finding was based on direct exposure to sediments in toxicity tests (not bioaccumulation) and no correlations were identified between the test results and the presence of contaminants. Based on the findings of the BERA, risks to fish due to bioaccumulative COCs were not identified and RAO 4 is unsupported and arbitrary	RAOs	N
802	Anonymous	Does "fishable and swimmable" also mean "wade-able"? In any spot along the river post clean-up?	RAOs	N

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577	Pepco & WG	DOEE proposes four remedial action objectives (RAOs) to be achieved as part of the ARSP. The proposed RAOs focus predominantly on the eventual goals for site-wide remediation of the ARSP rather than on the proposed Early Actions. The Interim ROD should incorporate RAOs reflective of the intended goals for the Early Actions, to enable DOEE to better evaluate the success of the Early Actions. In addition, the proposed RAO aimed at reducing “risks associated with direct exposure of people to surface sediment in shallow water” is unsupported by the human health risk assessment, which identifies no unacceptable risks to human health through direct contact or associated incidental ingestion of sediment at the risk level DOEE adopted for the FS. Therefore, this RAO is unnecessary and inappropriate and should be excluded from the Interim ROD and any future RODs. Similarly, the RAO targeting a reduction in “risks associated with [contaminants of concern] in surface sediment to levels protective of fish based on direct contact with and ingestion of surface water, sediment, and prey,” which DOEE proposes to achieve via reduction of concentrations of bioaccumulative chemicals of concern in surface sediments, is not supported by DOEE’s technical analyses. DOEE did not identify unacceptable risks to fish from bioaccumulative chemicals in sediment in the baseline ecological risk assessment. As a result, the proposed RAO is misdirected and unwarranted and should be excluded from the Interim ROD and any future RODs.	RAOs	N
596	Pepco & WG	The River-wide FS, page 37 (Tetra Tech, 2019b), indicates that RAO 2 is needed to “Reduce risks associated with direct exposure of people to surface sediment in shallow water (fringe sediment) in the tidal Anacostia River.” RAO 2 is misleading and implies that there are unacceptable risks from direct contact with sediment that require remediation. The ARSP human health risk assessment (HHRA) (Tetra Tech, 2019c) estimated cancer risks greater than the threshold level of 1E-06 but below 1E-05 from direct contact and incidental sediment ingestion of sediments at the Site (Reaches 123 and 456 only). At the risk level of 1E-05 used in the FS, which is within the acceptable risk range defined by U.S. Environmental Protection Agency (USEPA) under the National Contingency Plan, no unacceptable risks were identified, and no remediation is proposed by DOEE to address direct contact exposure to sediment. Given the absence of actionable risk, RAO 2 is unwarranted and should be omitted.	RAOs	N

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16	MDE	The Remedial Action Objectives (RAOs) for the RFS are presented in §3.2, on pages 36-38. RAO 1 is to "reduce risks associated with the consumption of contaminants of concern in fish from the tidal Anacostia River by people with the highest potential exposure." Game fish have a much bigger range than just the tidal Anacostia River, and has been discussed at several Anacostia Leadership Council meetings, will continue to be exposed to sediments with elevated PCB levels in nearby water bodies, such as the Potomac River and the Chesapeake Bay. While reductions in PCB concentrations in tissue of local, small fish may be observed as a result of early actions, it may take decades for any observable change in PCB tissue concentrations in game fish. Please consider including language in the description of this RAO to address this uncertainty.	RAOs	N
17	MDE	RAO 2 is to Text in Table 4.1 and §2.6.2.1 states that RAO 2 ("Reduce risk associated with direct exposure of people to surface sediment in shallow water in the tidal Anacostia River") has already been met. It is unclear why this is listed as an RAO, if it has already been met. The risk assessment summary presented in §2.6.2.1 explains that there is no risk associated with direct exposure to surface sediment in shallow water, eliminating the need for this to be listed as an RAO. Please consider removing this as an RAO from the RFS in its entirety	RAOs	N
35	Navy	"All Preferred Alternatives are expected to achieve overall protection of human health and the environment by achieving or contributing progress toward achieving the river-wide RAOs." Consider rephrasing this statement as follows given the uncertainty about the level of risk reduction that will be achieved: "All Preferred Alternatives are expected to achieve or contribute progress toward achieving the river-wide RAOs."	RAOs	N
284	USFWS	Bulleted remedial action objectives should be described more completely. What does surface water mean as an RAO? See comment for page ES-6.	RAOs	N
397	DC Appleseed	It does not seem appropriate to assess achievement of the final ARSP RAOs at the scale of the EAAs, given their relatively small size compared to the entire study area. This is particularly for RAO 1 (fish consumption), which is most important driver of remediation.	RAOs	N
399	DC Appleseed	RAOs 1 and 2, related to human health risks, should include a reduction target, such as reducing risks to an acceptable level (which should be defined). A goal of simply reducing risks is insufficient.	RAOs	N

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436	DC Appleseed	RAOs 1 and 2, related to human health risks, should include a reduction target, such as reducing risks to an acceptable level (which should be defined). A goal of simply reducing risks is insufficient.	RAOs	N
452	DC Appleseed	Although the text indicates that RAOs are "meant to be as detailed as possible", RAO 1, focusing on fish consumption, does not include specific goals, other than reducing risk. This RAO should include a specific risk reduction target, such as reducing risk to acceptable levels, which should then be defined. The PRGs developed for the project are based on a specific risk target, so this target should be specified.	RAOs	N
595	Pepco & WG	The Proposed Plan (DOEE, 2019) and Focused Feasibility Study (FFS) (Tetra Tech, 2019a) incorporate the RAOs from the River-wide feasibility study (FS) (TetraTech, 2019b). The RAOs and River-wide FS focus on the broader site-wide remediation goals. The Proposed Plan and FFS should be revised, to incorporate (ultimately in the Interim Record of Decision [ROD]) RAOs that are focused on describing what the early remedial actions are intended to accomplish (i.e., the removal of contaminant concentrations to reduce exposure, limit potential contaminant transport, and accelerate recovery of sediments). Measurable, physical goals will allow for future demonstration that early actions were successfully completed as designed. For instance, one RAO should be the successful removal of sediment from areas identified based on results of the pre-design investigation, as exceeding the Remediation Action Level specified for the Early Actions	RAOs	N

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626	Pepco & WG	The Proposed Plan and FFS incorporate the RAOs from the River-wide FS which are focused on the broader site-wide remediation goals. The Interim Record of Decision (ROD) also should incorporate RAOs that are focused on describing what the early remedial actions are intended to accomplish (i.e., the removal of contaminants to reduce exposure, limitation of potential contaminant transport, and acceleration of f sediment recovery). Measurable, physical goals will allow for future demonstration that Early Actions were successfully completed as designed. For instance, one goal should focus on determining whether the remedy has remediated sediment in the areas identified from the results of the pre-design investigation as exceeding the specified Remedial Action Level (RAL) for the Early Actions. The following are suggested RAOs focused on the Early Actions: 1) Reduce exposure to and limit transport of chemical of concern (COCs) in the Main Stem Early ActionAreas by remediating sediments exceeding early action threshold concentrations 2) Reduce exposure to and limit transport of COCs in the Kingman Lake Operable Unit Early ActionAreas by remediating sediments exceeding early action threshold concentrations 3) Reduce exposure to and limit transport of COCs in the Washington Channel Early Action Areas byremediating sediments exceeding early action threshold concentrations	RAOs	N
583	Pepco & WG	..."DOEE includes cost estimates for the remedial alternatives addressed in both the River-wide FS and Focused FS. Both sets of cost estimates are significantly underestimated in light of inconsistencies and problematic assumptions. The inaccurate estimates are misleading to the public about the costs of the remedial alternatives. Although DOEE appropriately does not propose to implement the remedial alternatives discussed in the River-wide FS at this time, it is nonetheless important to ensure that accurate cost estimates are provided in both documents. DOEE should thus address the issues in its cost estimate development and revise the cost estimates based on the realities of the alternatives as demonstrated by actual costs at other sites and as calculated based on experience in the applicable fields.	Remedial Alternative Selection	Y
767	Anonymous	How stable are the hotspots, especially in construction areas like the new Douglass Bridge and The Wharf?	Remedial Alternative Selection	N
835	Stacy Baker	1) How will the proposed Washington Channel remediation affect channel depth & flood risks? 2) How will the proposed Kingman Lake enhanced monitoring action affect recreational access for kayakers, if at all?	Remedial Alternative Selection	N

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838	Stacy Baker	Four things I support: 3 The proposed Kingman Lake Solution: Enhanced Natural Monitored Recovery (EMNR) with Direct Application of Activated Carbon. This seems to balance outcomes with cost, and (bonus!) has the least disruption to my beloved kayaking access in this wildlife-rich area. I favor a good jumpstart that experts believe nature will heal in time.	Remedial Alternative Selection	N
327	Anacostia Riverkeeper	DOEE has included in the work that it will be doing during the December, 2020, through September, 2022, permitting. We want to be sure that DOEE is aware that under CERCLA Section 121(e)(1), 42 U.S.C. 9621(e)(1), “No federal, state or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section”. “This Section”, Section 121, simply embodies the basic “Cleanup Standards” with which any CERCLA (a/k/a “Superfund”) removal or remedial action, including the work covered by DOEE’s Proposed Plan, must comply. Thus, for example, no Clean Water Act Section 404 permit, or any other permit or license, is required for the dredging or capping or in-situ carbon treatment that is being proposed by DOEE.	Remedial Alternative Selection	N
155	NPS	"...The FS Report generally supports remedial alternatives that “beneficially re-use” contaminated sediment dredged from the river to create emergent wetlands along the banks of the main stem of the river and the Washington Channel. Although the FS Report effectively describes the environmental benefits associated with expanding the wetlands’ footprint in the river, there is little discussion of the potential for long-term risks (including environmental, financial, and legal) associated with leaving these contaminated sediments in the Anacostia River. The description and evaluation of this remedial alternative should address the potential risks from future extreme weather events or other circumstances that could cause the containment structures to fail, as well as the costs or risks related to maintenance, operational, or other requirements that might be necessary to protect these containment structures from failure over the long term..."	Remedial Alternative Selection	Y

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216	NPS	"Given that applicable quality guidelines are met, sediment dredged during remediation can be used for a range of beneficial purposes..." NPS has serious concerns that a technical rationale has not been provided to demonstrate that such "beneficial use" of contaminated sediments in the river will not pose long term risks in the event containment of such sediments is threatened by catastrophic floods or other factors. The FS report should be clear that the purpose of the beneficial use alternative (and all of the others) is to address unacceptable risks to human health and the environment, not to meet restoration objectives (although that would be an incidental benefit of the response action). The FS further needs to discuss long-term risk and maintenance requirements; EPA guidance makes it clear that remedies should assess resilience in the face of a changing climate (https://www.epa.gov/superfund/superfund-climate-resilience)	Remedial Alternative Selection	N
248	NPS	Regarding beneficial use, any placement of dredged sediment in the river must be approved by the NPS and determined to not violate the NPS solid waste disposal regulations ARAR before it would be allowed as part of a CERCLA remedy	Remedial Alternative Selection	N
249	NPS	Onsite bulleted list includes "Park Land or Constructed Island", but the ARSP Site does not include adjacent parkland	Remedial Alternative Selection	N
254	NPS	"Alternative MS-5 (MS-4 with Beneficial Use) would be equally effective as Alternative MS-4". The possibility for future failure of the areas in which dredged contaminated sediment is used due to effects of severe storms should be discussed as this issue goes to the long-term effectiveness/protectiveness of the beneficial use alternative.	Remedial Alternative Selection	N
255	NPS	The potential implications of long-term failure of the beneficial use infrastructure should be discussed and evaluated compared to the long-term effectiveness of off-site disposal.	Remedial Alternative Selection	N
258	NPS	"MS-5 will contain dredged sediment through beneficial use in the construction of emergent wetland (bulkhead contained or sill-based fringe wetlands) which will require some level of inspection and maintenance". The NPS believes that the long-term implications of consolidating and essentially storing contaminated sediments in the river should not be dismissed so lightly. The FS should be clear that based on a comparative evaluation of long-term effectiveness, MS 5 will not be as protective as MS-4 (storage of contaminated sediment in the river will inherently be less protective over the long term than offsite disposal). If this is not true, then the FS needs to include a detailed analysis of why in-river storage is just as protective as offsite disposal.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
259	NPS	"As with Alternative MS-4, Alternative MS-5 will require approval for construction of beneficial use areas…" Alternative MS-4 will not require approval for construction of beneficial use areas	Remedial Alternative Selection	N
261	NPS	"Maximizing the beneficial use capacity in the Washington Channel reduces the amount of sediment to be dredged and capped in this OU" This sentence is unclear. How will maximizing beneficial use capacity reduce the amount of sediment to be dredged?	Remedial Alternative Selection	N
264	NPS	Costs for WC-4 and WC-5 are switched in Table 9.3. However, the beneficial use option also contains a footnote with a major assumption that should be included here: WC5 assumes beneficial use alternatives are selected for Main Stem and Kingman Lake with sediment used along the south side of Washington Channel. If the beneficial use is not located in Washington Channel the approximate cost of WC5 is $45,900,000	Remedial Alternative Selection	N
338	Anacostia Watershed Community Advisory Committee	Add living shoreline to toolbox. Request adjacent landowners, like NPS, DC, MNCPPC to undertake these efforts. USACE should be charged with creating living shoreline to be coordinated with ARSP.	Remedial Alternative Selection	N
406	DC Appleseed	Another reason to not consider beneficial use of sediment from EAAs is that the chemical concentrations are likely high enough to make it unsuitable for that purpose.	Remedial Alternative Selection	N
498	DC Audubon Society	In conjunction with the remediation of contaminated sediment, we recommend identifying areas of the existing seawall that can be removed and replaced with living shoreline. Living shorelines create low-maintenance green space to the community while also providing ecosystem services such as water filtration, flood buffering, erosion control, and wildlife habitat. We support the use of any dredge spoils that are reasonably clean of PCBs or other contaminants for this purpose.	Remedial Alternative Selection	N
805	Anonymous	Re: Wash Post article on a plan to extend the H St Streetcar over the Benning Road Bridge to Minnesota Ave metro. DDOT will rehabilitate 3 bridges over the Anacostia River near Kingman Lake. How will DDOT coordinate with ARSP? Won't their construction inpact remediation and dredging needed to keep the river navigable?	Remedial Alternative Selection	N
523	Sierra Club	Each EAA should be considered individually - the assumption that EAAs in the same operable unit (OU) will be impacted by cleanup and will impact the river in the same way can lead to ineffective results.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
515	Sierra Club	If caps are chosen as remedies, their design must account for typical and tidal fluctuations in water levels, as well as river flow and any other potential source of erosion.	Remedial Alternative Selection	N
247	NPS	Climate resilience strategies should be added to the section and discussed for each alternative.	Remedial Alternative Selection	N
336	Anacostia Watershed Community Advisory Committee	Request that USACE be enlisted in resiliency planning to start immediately and coordinated with ARSP. This should be doable considering the “adaptive management” approach.	Remedial Alternative Selection	N
340	Anacostia Watershed Community Advisory Committee	Simultaneously with this effort, planning should be undertaken to identify all opportunities for restoration work and resiliency measures. This work should be coordinated with ARSP	Remedial Alternative Selection	N
526	Tom Kyle, Washington Marina	How the does the Long Bridge project impact clean up? [Expanding the bridge over the tidal basin outflow]	Remedial Alternative Selection	N
785	Anonymous	What cost/benefit analysis was done and what assumptions were used for this?	Remedial Alternative Selection	N
791	Anonymous	Where will dredge materials be deposited / disposed of? For enhanced monitored natural recovery: How often will activated carbon need to be added? What the life span of the activited carbon more needed to be added?	Remedial Alternative Selection	N
792	Anonymous	How does the sediment heal naturally? Is the contaminated sediment just moved down river and displaced by new sediment or is activated carbon used in this scenario as well? What are the environmental impacts (to the benthic habitats) of capping and dredging?	Remedial Alternative Selection	N
631	Pepco & WG	Not all of the ARARs identified in the River-wide FS necessarily apply to the early remedial actions, and some of the ARARs identified in the River-wide FS were inappropriately applied during the screening and analysis of remedial alternatives. In the FFS and Interim ROD, DOEE should identify only ARARs that apply to the Early Actions. In addition, DOEE should revise its ARARs discussions in the River-wide FS and any future FS consistent with these comments. Pepco and Washington Gas reserve the right to comment further on any proposed ARARs for future remedial action work.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
634	Pepco & WG	DOEE has stated that reviews should focus on Sections 1-6 of the River-wide FS and that Sections 7-10 are provided for informational purposes only. DOEE also noted that it will not be implementing the river-wide remedial alternatives discussed in the River-wide FS at this time but will revisit the analysis as part of an adaptive management process after implementing the remedial actions selected in the Interim ROD. Given the many inconsistencies in these sections, gross underestimation of costs, and uncertainty in the utility of the river-wide alternatives, the presentation of this information in the River-wide FS is confusing and misleading to the public. DOEE should at this point delete Sections 7-10 of the River-wide FS with a note that alternatives will be assembled and evaluated after the nterim ROD implementation and resolution of uncertainties. Pepco and Washington Gas also reserve the right to comment later on the alternatives set forth in the FS and any future alternatives that DOEE may consider, after the further analysis that DOEE has stated it will undertake.	Remedial Alternative Selection	N
513	Sierra Club	Any remedy should ideally remove the random fill. If fill of any kind must stay in the upland areas, or Kingman and/or Heritage Islands themselves, the fill should be replaced with clean and natural material. If caps are chosen as remedies, their design must account for typical and tidal fluctuations in water levels, as well as river flow and any other potential source of erosion.	Remedial Alternative Selection	N
755	Anonymous	Are there DC-based firms with the capacity to perform the proposed work or will the contracts have to go to out-of-state companies?	Remedial Alternative Selection	N
815	Pat Balin	What sort of budget overrun do these projects tyically have? What margin are you holding?	Remedial Alternative Selection	N
783	Anonymous	Capping withing the main stem will yield what water depth? How will capping be effected by future dredging and redistributing capped areas?	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
729	Steuart Investment Co.	"The lack of clear delineation of EAAs does not provide adequate notice of the intended remedial actions in these areas. DOEE has stated it intends to begin remediating the further upstream EAAs first. This seems logical and prudent since upstream remediation may move some contaminants downstream. However, to take public comment on these remedial actions requires that DOEE identify where the actions will take place. These activities will also be affected by the heavy sedimentation of the river and significant construction activity, including the South Capitol Street Bridge Project and DOEE's pending request for the U.S. Army Corps of Engineers to reconsider the federal shipping channel requirements for the Anacostia River. Given all of these contingencies, DOEE defers defining the location or scope of the more downstream EAAs, like Reach 123 near the Former Gulf Terminal and M Street Property. However, without defining location and scope, the FFS provides an insufficient basis on which to comment on the proposed remedial plan for the EAAs located in Reach 123 of the Main Stem..."	Remedial Alternative Selection	Y
789	Anonymous	Why not consider EMNR in the main stem?	Remedial Alternative Selection	N
832	Paul Heaton	While I know that dredging and disposal likely is the most expensive option, I would advocate strongly for removing as much of the contaminated material as possible. Capping/containing, to me, do not seem to be viable long-term solutions; they simply seem to be -- literally -- burying the problem. As a frequent user of the Anacostia, it is becoming increasingly shallow and difficult to navigate even recreational vessels, so I would hope that removal and dredging would make the river safer and more accessible for all.	Remedial Alternative Selection	N
804	Anonymous	If there is dredging and/or capping at Pepco and/or Kenilworth Park Landfill, how long might the process take?	Remedial Alternative Selection	N
807	Anonymous	IS there a resiliency plan for Hains Point? Could clean dridge spoil be used there is such a plan involves raising its grade? Or for wetlands around it?	Remedial Alternative Selection	N
818	Bill Irwin	you say the river is getting better. No argument, water quality is improving from recent mitigations. But does that "river getting better" statement proportionally mean river bottom also....or is the bulk of the impact in water quality?	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
831	Paul Heaton	You say on page 10 that MSHS-2 and MSHS-3 were ruled out in part because "Capping the existing sediment would decrease already shallow water depth, impairing future use and making maintenance of a cap more difficult." What is the difference between capping and containing? If I understand correctly the recommended alternative, MSHS-4 includes "containment with selective dredging and disposal." Is containment not the same as capping?	Remedial Alternative Selection	N
12	MDE	Section 1.1 (Page 4) references the Maryland-only jurisdictional costs, which are based on remediation to reach the PRG discussed in Comment #1. Given the concerns that the Department has surrounding selection of the PRG, and whether it is an appropriate value for the entire river, Maryland cannot commit to remediation in the Maryland portion of the tidal Anacostia River at this time. The Department believes that the introduction of clean sediments from tributaries within Maryland in combination with completion of the early actions presented in the Focused Feasibility Study and source control work within Maryland's tributaries will eliminate the need for sediment remediation in the Maryland portion of the tidal Anacostia River.	Remedial Alternative Selection	N
107	Navy	The presentation of two cost tables for the same remedy is confusing. Additionally, there are some costs (site restoration, LUCS, etc) that appear to be presented in both tables - does DOEE expect those costs will be incurred twice during the implementation.	Remedial Alternative Selection	N
108	Navy	Please provide the basis of estimate for the carbon costs (dosage assumed, tons of carbon needed, etc) as well as the back up for the 15,000/per acre placement costs. What equipment and time is assumed for placement.	Remedial Alternative Selection	N
109	Navy	Please provide the basis of estimate for the carbon costs (dosage assumed, tons of carbon needed, etc) as well as the back up for the 30,000/per acre placement costs. What equipment and time is assumed for placement. Why is this per acre cost double that of Kingman Lake?	Remedial Alternative Selection	N
110	Navy	Recommend providing the basis for the unit costs used (RS Means, incurred costs from similar work in the region, or vendor quotes are acceptable). Please verify the costs assumptions for T&D; the costs for waste T&D have increased markedly in many regions in the last several years.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
111	Navy	The discussion of the long-term effectiveness and permanance of all the near term actions needs to also acknowledge dependence on effective source controls, in addition to the institutional controls noted.	Remedial Alternative Selection	N
176	NPS	Will the areas that are capped outside of the navigation channel limit recreational use? It has never been established that dredging and disposal would be “extremely costly” as this was never costed out.	Remedial Alternative Selection	N
178	NPS	This document needs to include O&M cost, since cost is one of the criteria used to compare alternatives. The justification for not providing these costs provided in Section 6 is insufficient. The FFS should include a strategy for getting from the interim ROD to a final ROD and provide a timeframe for doing so. Text should be added to the introduction about this. Also, this document should be able to essentially stand alone. Assumptions made that impact the screening of alternatives (such as average dredging depth) should be included here rather than referencing the river-wide FS. If you must refer to the River-Wide FS refer to the specific section that the relevant information can be found.	Remedial Alternative Selection	N
196	NPS	Screening on costs is inadequate. You have the data from the FS and could easily cost out these alternatives for screening purposes (including O&M costs). Preliminary costs estimates should be included here so that the reader can understand your assumptions and costs.	Remedial Alternative Selection	N
200	NPS	What is the cost of $125 million based off of? Please include cost estimates.	Remedial Alternative Selection	N
204	NPS	As commented previously, the FFS needs to consider O&M costs. If DOEE disagrees that alternatives can be effectively compared without knowing these costs, then a disclaimer should be added to Sections 3, 4, and 5 stating that this analysis did not include O&M costs which are likely to significantly underestimate costs associated with capping.	Remedial Alternative Selection	N
205	NPS	“Since the objective of this FFS is the evaluation of interim remedial actions, long term O&M costs were not included in the screening”. How does this justify not including O&M costs? Cost is one of the metrics used to rank alternatives and O&M costs need to be included, particularly since DOEE is proposing the removal of all dredging alternatives due to excessive cost. There is a need to factor in O&M costs to get a real picture of relative costs of these alternatives.	Remedial Alternative Selection	N
252	NPS	“relative costs in this section are ranked as low, moderate, high, or very high, based on a comparison of preliminary cost estimates” Please provide these cost estimates. They were not done in the FFS.	Remedial Alternative Selection	N

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810	Anonymous	If you dredge and then use those materials for other uses, such as road material, would the products only be used in DC would you try to sell the products to other jurdisdictions or entities to offset the costs of dredging?	Remedial Alternative Selection	N
95	Navy	Recommend that the rationale for retaining MSHS-4 further expand on the size of the staging and dewatering areas assumed to be needed, along with an explanation of where candidate parcels are that could plausibly be utilized during construction.	Remedial Alternative Selection	N
103	Navy	Please explain why WCHS-5 is not evaluated against the balancing criteria if it met the threshold criteria.	Remedial Alternative Selection	N
173	NPS	“Dredging all the sediment that exceeds the RAL may not be physically or economically practicable.” As in the FFS, this text sounds like DOEE is precluding the potential of this option.. Capping everywhere sediment exceeds the PRG has the same issues, yet DOEE did not include that disclaimer for that option.	Remedial Alternative Selection	N
174	NPS	It is debatable if capping will satisfy long term effectiveness requirement. In addition, if armoring is required it will limit preferred habitat for benthic organisms. Also, regarding State acceptance, isn’t this DOEE?	Remedial Alternative Selection	N
175	NPS	Regarding where it says “None” under Other Viable Protective Alternatives: Dredging of all hotspots should be carried through to a detailed analysis, and O&M costs need to also be considered for all alternatives (particularly capping).	Remedial Alternative Selection	N
177	NPS	This paragraph does not address the WCHS-5 alternative. If WCHS-4 was screened out because cap placement would make the water shallower and impair future use, how would WCHS-3 (the selected remedy, containment) be any different?	Remedial Alternative Selection	N
195	NPS	What level would sediment be removed to? The 600-ppb level? This paragraph reads as if DOEE will be screening out removal before it is even introduced. Dredging of hot spots is a totally appropriate technology that should be evaluated in this FFS.	Remedial Alternative Selection	N
199	NPS	“However, due to the uncertainty associated with the extent of contamination in deeper sediments that may be exposed during dredging, this alternative may be difficult to implement.” But we know the depth of contamination; this is not a problem and would be worked out during the RD phase. It is the same for all the alternatives. We have to get all PCB concentration over 600 ppb out or covered.	Remedial Alternative Selection	N
201	NPS	How will this alternative impact the benthic community in the short and long term?	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
217	NPS	"The remaining alternatives and the No Action alternative were then screened against short- and long term effectiveness, implementability (including technical and administrative feasibility), and relative cost (capital and operation and maintenance [O&M]) in accordance with CERCLA, its implementing regulations, the NCP, and EPA guidance." Why are the alternatives being screened twice? This is not required by the NCP.	Remedial Alternative Selection	N
256	NPS	"Threshold Criteria. These criteria relate to statutory findings that ultimately are addressed by the ROD (EPA 1988). Assessing these criteria describes how each alternative meet or fails to meet each criterion. If an alternative does not meet these criteria, it cannot be selected without a waiver" The protectiveness criterion cannot be waived.	Remedial Alternative Selection	N
260	NPS	See the NPS's previous comments on the comparative differences in long term effectiveness between in-river storage and off-site disposal. This analysis should be taken into account in the scoring of the alternatives.	Remedial Alternative Selection	N
283	USFWS	The first whole paragraph should mention the 9 criteria used in feasibility studies or explain why this staged approach is consistent with CERCLA policy.	Remedial Alternative Selection	N
325	Anacostia Riverkeeper	Why did containment with selective dredging fail to fully satisfy the criterion for short-term effectiveness in kingman lake or the washington channel?	Remedial Alternative Selection	N
329	Anacostia Riverkeeper	Anacostia Riverkeeper vigorously encourages DOEE to adopt KLHS-4 and WCHS-5 as the increase is costs are minimal compared to other cleanups and because they will proved more absolute surety of long-term success in the future. We also remind DOEE in this comment that while the ARSP is primarily beholden to the considerations of CERCLA, DOEE and the entire District of Columbia government must also consider issues beyond those of CERCLA, including resiliency.	Remedial Alternative Selection	N
356	Anacostia Watershed Community Advisory Committee	Add these to Evaluation criteria on page 9 and to Table 2 Comparison of Alternatives: • Appropriateness of resulting conditions to planned or anticipated use of site. • Enhancement of site safety for human activities.	Remedial Alternative Selection	N
357	Anacostia Watershed Community Advisory Committee	Add: Enhancement of site safety for human users.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
369	Anacostia Watershed Society	It seems that alternative WCHS5 would provide a more sustainable solution for $1M more in cost. Removing all the material would reduce the need for long-term monitoring at this location, reduce the need for administrative controls, and permanently reduce the potential for damage to the cap in an area that is active with boaters and fishers.	Remedial Alternative Selection	N
396	DC Appleseed	It should be made more clear that the numbers in parentheses in the bulleted list of the highest ranked alternatives are scores.	Remedial Alternative Selection	N
414	DC Appleseed	Under Short-term Effectiveness, it is not reasonable to assume that risk reduction goals will be achieved at the end of the active remediation phase. For KLHS-4, dredging may contribute to a short-term spike in contaminants in the water column and/or as sediment residuals, potentially leading to increased bioaccumulation. Neither alternative is likely to immediately reduce concentrations in adult fish that might be consumed by people. Similar statements about short-term effectiveness made in other sections should also be reevaluated.	Remedial Alternative Selection	N
415	DC Appleseed	For Alternative WCHS-4, the 3x multiplier for activated carbon placement makes sense but the minimum product requirement is not specified. Therefore it is unclear what 3x on an unspecified amount represents. Similar multipliers should be considered for other capping alternatives, particularly those that include only 6-inch thick placements.	Remedial Alternative Selection	N
439	DC Appleseed	This table uses a partially-filled circle to indicate “partially meets criterion”. However, the word "partially" does not occur anywhere in the Focused Feasibility Study, so it’s not clear how this designation was determined. Specific examples below illustrate an inconsistent application of this designation. With respect to a comparison of MS-4, KL-4, and WC-5 (all include selective dredging), all require some sort of shore-based sediment handling facility, with associated increase in air emissions. They were all rated 3 in the FFS on a scale of 1-5 for short-term effectiveness, meaning “minimal” impacts. Generally, the criteria designated as fully meeting criterion scored at least a 4, so it is not clear why 3 would be designated as "fully meets criterion" for MS-4 but not for KL-4 and WC-5. It is also not clear how KL-3 (EMNR) could be designated as fully meeting criterion when WC-4 (also EMNR) was designated as partial. Both were rated 4 in the FFS and appear to be conceptually identical.	Remedial Alternative Selection	N

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440	DC Appleseed	The narrative comparison between alternatives does not discuss the differential risk reduction, focusing instead on cost and implement ability. These latter factors are appropriate, but they should be balanced against the assumed risk reduction. As noted above, we believe the risk reduction calculations DOEE has made are technically flawed, and we have provided some suggestions on alternate methods for comparing the hypothetical benefits of any particular remedial action.	Remedial Alternative Selection	N
522	Sierra Club	Dredging should be performed in a way to minimize potential exposure of buried contaminants.	Remedial Alternative Selection	N
780	Anonymous	Do yo plan to undertake additional sampling / study prior to beginning remedial work in the early action areas?	Remedial Alternative Selection	N
67	Navy	"Rates of accumulation of 12 or 6 inches within the 20-year timeframe are necessarly for MNR or EMNR, respectively, to be effective." Please explain the technical basis for the assumption that 12 inches of burial is required for MNR to be effective. The biologically-active zone in the Anacostia River is assumed to be on the order of 6 inches and the sediment bed in the lower Anacostia River has been shown to be stable. MNR and EMNR may be important components of a river-wide management strategy and should not be screened out over broad areas of the river (including all of Reaches 1 and 2 for a 20-year recovery time frame) based on overly conservative assumptions.	Remedial Alternative Selection	N
83	Navy	Containment - Armored Cap - "Most types of armoring would provide little to no opportunity for survival of benthic infauna, although biofilms, algae, and some invertebrates could attach to the armor material." This statement is based on the assumption that there would no to minimal deposition of finer-grained material in armor layer. Recommend clarifying this statement to indicate that the benthic habitat may be restored over time with ongoing deposition.	Remedial Alternative Selection	N
84	Navy	Containment - Reactive Cap - Many cap designs include the reactive component at the bottom of the cap (i.e., in contact with the sediment surface) or incorporated into the material, rather than on top of a cap. Recommend clarifying this description.	Remedial Alternative Selection	N
85	Navy	Consider revising the descriptions of mechanical and hydraulic dredging to discuss the size of the area needed for the upland dewatering and staging areas. Further, please verify the anticipated production rates cited (100 to 300 CY per HOUR) are achievable given water depth, equipment sizing, and dewatering and staging area limitations.	Remedial Alternative Selection	N

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86	Navy	The exclusion of thin layer capping (which in this FFS includes in situ treatment with activated carbon or other amendments) for the main stem, particularly in areas outside of the navigation channel boundaries is not well-justified. Recommend the FFS further explain why this option is eliminated from further consideration.	Remedial Alternative Selection	N
87	Navy	Recommend including a reference to the appendix with the cost estimates.	Remedial Alternative Selection	N
88	Navy	For all areas where removal alternatives are described, recommend clearly denoting on a map or table what the sediment removal thickness would be.	Remedial Alternative Selection	N
89	Navy	The alternative description should include the following elements: assumed cut depths, the anticipated staging area, assumptions related to backfill placement to manage grading issues and residuals, and a discussion of how the exposed dredge cut on the side slopes would be managed.	Remedial Alternative Selection	N
90	Navy	The alternative description should include the same elements recommended in the previous comment. The analysis of this alternative should also include some discussion on whether the deepened areas will also result in any channel instability that could result in exposing contaminated material - particularly from the side-slopes.	Remedial Alternative Selection	N
93	Navy	The management of the side slopes for Alternative 2 is a signfiicant implementability constraint and it is recommended this be discussed.	Remedial Alternative Selection	N
96	Navy	Recommend description of Alternative KLHS-2 address whether any backfilling would be assumed to address residuals or to manage potential changes in hydrodynamics.	Remedial Alternative Selection	N
98	Navy	Recommend clarifying the description of Alternative WCHS 4 to note what dosage of carbon was assumed and the basis for that dose (for example, 5 percent carbon in the top 6 inches of sediment, based on a specific in situ density). The reference to the 50 percent carbon appears to be referencing the carbon content of one of the commercially available carbon amendments, rather than an assumed dose.	Remedial Alternative Selection	N
99	Navy	Recommend providing additional explanation to support the statement that "The sediment surface in Washington channel may not allow mixing of the activated carbon as readily as the sediment in Kingman Lake".	Remedial Alternative Selection	N

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100	Navy	Previous comment applies to this section. Additionally, recommend stating what the currents are and whether there are currently documented issues of sediment resuspsenion due to marina activity	Remedial Alternative Selection	N
101	Navy	The implementability narrative for WCHS-3 cites concerns about "the lighter density of the carbon-containing pellets may cause this material to move outside the targeted areas." This issue can likely be readily addressed through discussions with different vendors to develop a formulation that will have a sufficient settling density to mitigate this concern.	Remedial Alternative Selection	N
102	Navy	Please verify the text indicating the placement of carbon (KLHS-3) will take a year is correct.	Remedial Alternative Selection	N
104	Navy	The implementability narrative states "cap placement will require approvals from the appropriate authorities" - why is this called out for this specific alternative and not the others?	Remedial Alternative Selection	N
105	Navy	Please verify the text indicating the placement of carbon (WCHS-3) will take a year is correct.	Remedial Alternative Selection	N
106	Navy	The previous comment on Section 3.3.2.2, page 21 related to the implementability of the carbon amendment is also applicable to this section.	Remedial Alternative Selection	N
337	Anacostia Watershed Community Advisory Committee	All work on the river must be coordinated with this project – docks, bridges, swimming facilities, development of parkland, shoreline.	Remedial Alternative Selection	N
358	Anacostia Watershed Community Advisory Committee	Where ever unstable soils are encountered, they should be compacted or replaced to remove possibility of entrapment. This must be part of the workplan for all areas to be remediated. This is particularly important in Kingman lake where the likelihood of human contact is great.	Remedial Alternative Selection	N
383	Charles Wilson, ANC-8B	Does plan include repair of existing bulkheads? How do you account for disturbed sediment?	Remedial Alternative Selection	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
497	DC Audubon Society	We recommend that an assessment be performed to identify potential ecological, environmental, and health and safety impacts of the discharge and transport of contaminated sediment downstream from the proposed cap and dredge locations, as well as an assessment of alternative approaches. Given the high concentrations of PCBs in the sediment in Washington Channel and the Main Stem, we are concerned that dredging of this material would mobilize harmful contaminants into the water column that would be carried downstream and negatively affect wildlife and habitat further in the drainage area. Therefore, we believe it is critical to strongly consider lower impact remediation techniques, such as EMNR, in these areas where higher flow velocities and high PCB concentration present a risk of downstream pollution. The discharge and transport of these contaminants could have significant negative consequences on wildlife, fish stock, and human health downstream, and it is therefore critical to consider alternative, lower risk approaches that limit the mobilization of sediment.	Remedial Alternative Selection	N
500	DC Audubon Society	We recommend that any areas disturbed due to project activities be restored using native plants in a manner that maximizes wildlife habitat value and carbon sequestration. Where feasible, we encourage the planting of riparian forest species that are native to the region. Where not possible, special care should be taken that whatever vegetation is planted is native to the region and will maximize habitat value.	Remedial Alternative Selection	N
501	DC Audubon Society	Given the above, we recommend and request that ARSP at the DOEE, in coordination with other DC Government entities and community stakeholders, conduct a cumulative impacts assessment, considering the various ecological considerations that affect this decision, as well as the multitude of other projects being considered in and along the Anacostia River. With proximity to DC Conservation Opportunity Areas and the City's only Critical Wildlife Area, the ARSP has an opportunity to lead by example as stewards of the environment in DC, generating new habitat, restoring degraded land, increase ecosystem services, and improving recreation, all while remediating the waters of the Anacostia.	Remedial Alternative Selection	N
502	DC Audubon Society	With that opportunity, there is a responsibility on the part of ARSP, DOEE, and your various partners in this project to understand and plan for the environmental costs and benefits, accounting for the many variables that will be affected as this important project is carried out.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
509	Pat, Washington Rowing Sch @ Bladensburg Waterfront Park	The NPS/DDOT is pushing a plan to build a bike/ped bridge connecting the Anacostia River trail from Kenilworth Park to US Arboretum. Bridge design drills piers into the river and Kenilworth Park where landfill remediation is to proceed. How can construction of bridge take place when it interferes with remediation along the "stem" / Kenilworth hot spot. Who has oversite / coordination.	Remedial Alternative Selection	N
511	Robbie O'Donnell, Anacostia Riverkeeper	How will the new Frederick Douglass Bridge effect the clean up of the EAAs nearby? Will it effect the timeline for clean up?	Remedial Alternative Selection	N
514	Sierra Club	"Figure 3 would be more helpful to the reader if at least one arrow was drawn that demonstrated the movement of contaminants between different environmental media. It should be noted that PCBs and other contaminants may have different biogeochemical cycles than what is depicted in the diagram."	Remedial Alternative Selection	N
525	Tamara Blair, ANC7D	Why implement a different method for Washington Channel from Kingman Lake? Is it based on difficulty of completing the work or size of the area that needs to be addressed or something else?	Remedial Alternative Selection	N
762	Anonymous	In a river that is losing half an inch or more average depth every year, how can DOEE consider capping and removing even more flow/depth from the river permanently, without dredging first?	Remedial Alternative Selection	N
779	Anonymous	Will confirmation sampling be used in dredging areas? How confident are you in volume estimates for dredging	Remedial Alternative Selection	N
795	Anonymous	Will Kingman Island be closed or access restricted during the remedial work?	Remedial Alternative Selection	N
800	Anonymous	How does EMNR in Kingman Lake give you logistical practice for dredging + containment.	Remedial Alternative Selection	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
159	NPS	The FFS Report does not adequately consider the long-term effectiveness and protectiveness of the capping alternative. There is inadequate discussion of how the proposed caps might be affected by future storms, how that alternative would affect boatability, or the long-term maintenance that would be required. Further, the detailed analysis of alternatives does not include estimated operation and maintenance costs associated with the capping alternative. For this reason, the cost estimates developed for that alternative are likely to be significantly lower than its actual cost. In addition, the DOEE should consider the extent to which the selection of the containment alternative for the EAAs would constrain its later decision on a final remedy. It seems that the placement of a cap would, at a minimum, bias the selection of a final remedy away from dredging alternatives and towards remedies that would leave the cap in place.	Remedial Alternative Selection	N
172	NPS	Text discussing cap maintenance should be added.	Remedial Alternative Selection	N
194	NPS	“The model assumed a 100-year storm isolated over the Anacostia River watershed and non-storm flow conditions in the Potomac River”. With the increasing frequency of 100-year storms it would be appropriate to model an even stronger storm scenario that is becoming more likely as the climate changes.	Remedial Alternative Selection	N
197	NPS	Should add discussion for each EAA about the presence or lack thereof of fringe sediment, and how boatability would be impacted by placement of cap in these areas and other shallow water areas. Fringe sediments overlap with the main stem EAAs and Kingman Lake EAAs. Also, please discuss the maintenance requirements of a cap, and the potential scour that could occur due to storms, in the long-term effectiveness discussions.	Remedial Alternative Selection	N
330	Anacostia Riverkeeper	All capping remedies must be designed to withstand stormflows more frequent and greater than what we have experienced heretofore, and they should be designed to eliminate COC migration via ebullition. The river frequently contains streams of bubbles of gas generated in the sediments, how will this be addressed in capping design?	Remedial Alternative Selection	N
339	Anacostia Watershed Community Advisory Committee	Depth of caps seems very shallow. Request that test installations be prepared and current river users be invited to test and provide comment/input.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
413	DC Appleseed	For Alternative KLHS-4, a 6-inch sand cap is proposed following dredging. In contrast, a 12-inch cap is proposed for Alternative MSHS-4. Presumably, the different cap thicknesses reflect different expectations of scour or other disturbance potential in the two areas. This assumption should be explained in the document. A 6-inch cap may not be an effective barrier to contaminant migration because it is likely that some areas would have even less, or perhaps none, sand given the potential variability in sand placement depths.	Remedial Alternative Selection	N
520	Sierra Club	Monitored Natural Recovery will need to be well proven in the Anacostia River - it is difficult to picture a natural cap forming over river sediment in a system in which water flows, undergoes normal and tidal water level fluctuations, and is impacted by navigation (even if it is currently only recreational navigation).	Remedial Alternative Selection	N
757	Anonymous	Where does the dredged material go? Including the charcoal filter material.	Remedial Alternative Selection	N
826	Jennifer Rellis	Will you be dredging and or capping on Kingman Lake? You slide says EMNR only.	Remedial Alternative Selection	N
3	MDE	"...Pilot studies and additional characterization of sediment at depth within the EAAs to determine the likelihood of mobilization of PCBs into and through a sand cap may already be underway by those leading the ongoing characterization efforts. If not, the Department recommends that a pilot study be conducted to evaluate whether mobilization of PCBs at depth is likely, and to evaluate whether enhancements to the proposed conventional sand cap (such as a carbon particulate material amendment to the sand cap matrix material) could reduce migration of porewater elevated in PCBs through the sand cap..."	Remedial Alternative Selection	Y
251	NPS	The NPS had requested that the all dredge option be preserved so that the range of alternatives required by CERCLA would be maintained. This is standard practice and is consistent with the RI/FS guidance which states that "one (alternative) that would eliminate or minimize to the extent feasible the need for long-term management (including monitoring)". The NPS also believes the all dredge option should be retained to fully document the consequences (e.g. effort, expense) of the all dredge option compared to other options.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
322	Anacostia Riverkeeper	A previous 2015 Washington Post article quoted estimates of the District paying $500 million- $1 billion for this project. If the District was prepared to spend this much money, why automatically discard alternatives that would contribute to the long-term success, such as dredging in more areas with high PCB contamination, if the estimated costs are about 14x - 27x lower than what was prepared for. (https://www.washingtonpost.com/local/a-swimmable-anacostia-river-something-to-look-forward-to-in-a-decade-or-more/2015/01/04/bd523758-70ff-11e4-893f-86bd390a3340_story.html)	Remedial Alternative Selection	N
378	Audubon Naturalist Soc	Furthermore, we hope that the PEC areas upland of the EAA hotspots are remediated so as not to waste money on EAA remediation while these spots are still receiving pollutant inputs from groundwater and upstream source	Remedial Alternative Selection	Y
521	Sierra Club	Capping is acceptable provided that the granular material and cap thickness is sized to be resilient to water level and flow fluctuations.	Remedial Alternative Selection	N
786	Anonymous	We heard that the EAAs may or may not be address simultaneously to the Leadership Council. Why would they not be addressed all at once as soon as possible, instead of sequentially?	Remedial Alternative Selection	N
202	NPS	Text states, “The activated carbon will remove PCBs desorbed into porewater from deeper contaminated sediment”, but the activated carbon won’t actually remove PCBs from the system. What are the effects of the thickness of the activated carbon on the potential to impact boatability?	Remedial Alternative Selection	N
203	NPS	“For Alternative WCHS-4, the application of activated carbon reduces the toxicity and mobility of the COCs in the surface sediment”. The PCBs will have the same toxicity, but they are no longer mobile in the system.	Remedial Alternative Selection	N
282	USFWS	After the words “total removal option” add Alternative 2 as described below to clarify which alternative is being discussed. Also for Washington Channel, why was EMNR not considered?	Remedial Alternative Selection	N
297	USFWS	Bullets for Washington Channel: The authors much later in the document explain that Enhanced Monitored Natural Recovery is not being considered for Washington Channel because of the low sedimentation rate. However, sediment amendments (such as activated carbon and activated carbon with bacteria) may still provide benefits and should be evaluated. This comment applies to the subsequent analysis of alternatives for Washington Channel.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
380	Audubon Naturalist Soc	In ensuring that the Anacostia River Sediment Project is carried out equitably, it is also important that the Potentially Responsible Parties (PRPs) are held fully accountable for project costs to the extent legally possible. The financial burden of remediation should not fall on District residents. We hope that there will continue to be transparency around use of taxpayer funds for the project and contributions from PRPs.	Remedial Alternative Selection	Y
407	DC Appleseed	The text indicates that the only EAAs suitable for EMNR are in Kingman Lake. However, EMNR is also included in one of the highest-ranked alternatives for Washington Channel EAAs (WCHS-4).	Remedial Alternative Selection	N
408	DC Appleseed	Dr. Ghosh has studied activation carbon extensively, but the report cited here does not discuss the application of activated carbon. There are many more suitable references. Perhaps the correct reference is not included in the reference list.	Remedial Alternative Selection	N
409	DC Appleseed	Why is MNR in Kingman Lake developed in more detail in the FFS compared to the river-wide FS?	Remedial Alternative Selection	N
495	DC Audubon Society	We strongly support the preferred alternative of Enhanced Monitored Natural Recovery (EMNR) using Activated Carbon and the minimally disruptive impact that the approach will have on the ecology, compared to other methods such as dredging or capping.	Remedial Alternative Selection	N
628	Pepco & WG	In the FFS, the scope of “selective dredging” is unclear. Table 3-1 indicates selective dredging will be conducted in navigation channels and “shallow areas” outside of the navigation channels. The need for dredging should be based on revised water depth assumptions as well as consideration of impact on public enjoyment and use of the river (discussed above). As a general matter, the FFS, the River-wide FS, and any future FS should clearly articulate the extent of dredging and the rationales for that extent. When describing the removal focused alternatives, both the River-wide FS and FFS make a number of confusing statements similar to the following: “The EAAs would be dredged until no exposed surface sediment exceeds the hot spot RAL.” Although it may be reasonable to assume that the RALs, as described, will be applied on an area basis and not point by point, statements like this need clarity on how the RAL will be applied in remedial design. The text does not provide the necessary level of detail and precision in describing how the actions are to be implemented. The description of the other alternatives, including the preferred alternative, is particularly vague with statements to the effect of:sediments exceeding the RAL will be selectively dredged and capped. Substantially more detail should be provided.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
629	Pepco & WG	The River-wide cost estimates are underestimated by a factor of 1.5 to 2 due to a number of inconsistencies and assumptions (or lack thereof) related to cost, quantity, and technical execution. Thus, they are arbitrary. For example: The unit rates used for many items are lower than average rates used on similar projects. Further, the unit rates do not appear to include a premium for the logistical challenges to be expected in DC, such as restrictions for working in/around residential areas, transportation/truck traffic restrictions, and protection of bridges and sea wall. Dewatering and water treatment will be required for the dredged sediment prior to beneficial reuse. However, this was not accounted for in main stem and Washington Channel alternatives (Table 8-5 and Table 8-16)...	Remedial Alternative Selection	Y
784	Anonymous	What is the estimated length of time that remediation activities will reduce or eliminate access to the river in areas currently used for recreation access?	Remedial Alternative Selection	N
833	Ridge Hall	Please discuss the pros and cons of the preferred option and the selective dredging option for the Washington Channel	Remedial Alternative Selection	N
250	NPS	"Institutional controls will be integral to implementation of the remedial alternative ultimately selected by DOEE" What would these institutional controls be, and would they comply with all location specific ARARs?	Remedial Alternative Selection	N
253	NPS	"Institutional controls would be implemented as necessary to maintain integrity of the beneficial use areas and the cap and prevent exposure to subsurface sediment." What are institutional controls being considered that would accomplish this? Please include a description in the document. What other controls would be put in place to protect against 500-year flood events or other circumstances that could result in the release of COCs from the beneficial use area? Please address the possible impact of potential sea level rise and severe storms.	Remedial Alternative Selection	N
257	NPS	"ICs would be implemented to maintain integrity of the cap material and prevent exposing underlying sediment exceeding PRGs." It's unclear what type of institutional control would be effective in maintaining cap integrity against natural forces (e.g., 500-year flood events or hurricanes).	Remedial Alternative Selection	N
192	NPS	"As discussed in the River-wide FS, results of the surface water model indicate that none of the EAAs are within areas suitable for MNR". What section is this discussed in the FS?	Remedial Alternative Selection	N
395	DC Appleseed	Why is MNR in Kingman Lake developed in more detail in the FFS compared to the river-wide FS?	Remedial Alternative Selection	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
438	DC Appleseed	Since EMNR was one of the alternatives considered for the Kingman Lake and Washington Channel OUs (but not the Main Stem OU), additional discussion should be added in the MNR paragraph to indicate when such an alternative would be appropriate.	Remedial Alternative Selection	N
465	DC Appleseed	What is the basis for 20 years to be considered a "reasonable timeframe" for natural recovery?	Remedial Alternative Selection	N
467	DC Appleseed	The assumption that 12 inches of sediment deposition is sufficiently protective has not been adequately demonstrated. The results from the surface water model include estimated scour depths during high-flow events, including a 100-yr "superstorm". Those results should be discussed in this document in the context of the proposed 12-inch threshold.	Remedial Alternative Selection	N
468	DC Appleseed	We don't necessarily disagree that biological and chemical degradation are unlikely to be effective technologies within an acceptable timeframe, but additional technical rationale should be provided. There is abundant technical literature on this topic.	Remedial Alternative Selection	N
519	Sierra Club	All alternatives should be designed for climate resilience. It should be assumed that storm events will increase in frequency and intensity over time.	Remedial Alternative Selection	N
787	Anonymous	How is flashier flow from more frequent and larger storms going to impact cap design?	Remedial Alternative Selection	N
469	DC Appleseed	Why did the 2004 pilot study focus on PAHs rather than PCBs? How applicable are the PAH results to the potential sequestration of PCBs? Any uncertainties in extrapolating these results to PCBs should be discussed here.	Remedial Alternative Selection	N
410	DC Appleseed	This intro section should describe how effectiveness was assessed, particularly risk reduction. The risk reduction trajectory is likely to differ between remedial technologies, so it may be appropriate to incorporate a temporal element to the evaluation.	Remedial Alternative Selection	N
761	Anonymous	Millions of dollars are donated for the American Eagles that feed from the river. Now some areas are dried up no water, no more food. Would it make more sense to dredge with some of that money?	Remedial Alternative Selection	N
834	Scott Dorn	Row 6, 3/10/2020. Don't remove the sediment. Sediment is contaminated in many places we have to accept what we did and move on. Doing other things like removing dams and replacing pavement that isn't permeable with permeable would be a much better use of the funds that will have positive legacy impacts on the health of the system. Using certain species of plants and wildlife have been shown to have a as positive of an impact as removal.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
534	CSX	DOEE inappropriately relies on subsurface sediment concentrations for its proposed remedy of capping for surface sediments. The proposed capping remedy for EAAs in the main stem should only consider total PCB congener concentrations above the RAL in the surface sediment, unless there is a mechanism that transports PCBs from deeper, subsurface sediments to the surface sediments. DOEE has not demonstrated that such mechanisms exist in the River and, therefore, the proposed spatial extent of surface sediment to be capped should be based only on the concentrations of total PCB congeners in surface sediment. Review of the total PCB congener surface sediment data (Figure 6.7 of the RI and Thiessen polygon figure [Figure 3.1 of the RW-FS]) does not support the spatial extent of capping proposed, as the extent of these areas appears to have been based on the flawed kriging results discussed in our comments above. The spatial extent of the EAAs should be revised to reflect the extent of total PCB congeners measured in surface sediment above the RAL.	Remedial Alternative Selection	N
798	Anonymous	Will concrete ruins @ north entrance of Kingman be removed? How about the structures @ south end of Heritage Island?	Remedial Alternative Selection	N
632	Pepco & WG	MNR and EMNR are categorically excluded from the Proposed Plan and FFS based on predictions from a surface water model that has key deficiencies associated with its development, calibration, and application, as detailed in a separate comment. Given the particularly limited data set currently available for the ARSP and the resulting prematurity of the surface water model, DOEE should maintain flexibility for the design of the Early Actions, and any subsequent remedial actions, to incorporate other remedial technologies, including MNR and EMNR as appropriate based on new data and a revised understanding of site conditions.	Remedial Alternative Selection	N
633	Pepco & WG	Inconsistencies were noted in the development and evaluation of alternatives in the FFS. These should be revised to facilitate future consideration of MNR and EMNR with all alternatives, clarifying the application of RALs and selective dredging references.	Remedial Alternative Selection	N
847	Tracey Katsouros	Row 3, 3/10/2020. Tell DOEE to make sure that pollutant levels are safe for even the most vulnerable among us. Protect the project from undue influence by the polluting parties. Consider increased flooding and erosion potential because of climate change when designing remedies to pollution.	Remedial Alternative Selection	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
848	UMBC	Table 1 indicates reduction of PCB concentrations in the sediments in each of the 3 early action areas. It is not clear how the selected remedies of in-situ treatment either with AC amendment or thin sand cap can reduce PCB concentrations in sediments. AC amendment reduces the porewater concentration in sediments through strong adsorption of the PCBs and reduced pollutant bioavailability and release into the water column. However, it does not reduce the actual concentration of PCBs in sediments. Similarly, a capping remedy reduces the release of PCBs from the contaminated sediments to the surface water, but does not change the concentration of PCBs in the native sediments. Perhaps the reductions are based on some surface weighted average concentrations with an assumed reduction equivalents for the EAAs. If so, this needs to be explained clearly to avoid misunderstanding.	Remedial Alternative Selection	N
850	UMBC	Looking at the alternatives evaluated for the Washington Channel, and the low flow conditions in the channel, I would suggest a careful review of the alternative WCHS-4. Implementability has been raised as an issue for application through a greater water depth compared to the Kingman Lake EAA. However, it is also important to note that the Washington Channel area has low water velocities, and thus, a pelletized application of activated carbon should be technically feasible. It may not be necessary to overdesign this alternative by adding 3 times larger dose of AC for contingency as indicated in the FFS. With the correct dose of activated carbon, the total cost of the technology will likely be much lower than the estimated $10M. Activated carbon material cost per acre is currently estimated to be 3 times higher for WCHS-4 (FFS Table 4.9) compared to KLHS-3 (FFS Table 4.5).	Remedial Alternative Selection	N
570	CSX	Second, DOEE has incorrectly implicated sources of contaminants in surface sediments in the River. This has occurred because, among other issues, DOEE has inappropriately relied on geographic proximity while not accounting for other more refined data and analyses. DOEE acknowledged in the RI Report that it relied upon geographic proximity as just “a first-cut approximation of the sources contributing contaminants to the river,” and that the “list of sources will be refined through the evaluation of the forensics data.” However, DOEE continues to rely upon geographic proximity to implicate sources of contaminants, while not accounting for the results of forensic and other studies already completed and available.	Source Delineation	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
584	Pepco & WG	The Contaminant Source Assessment Report (CSAR) attempts to bolster DOEE's efforts to identify sources of contaminants in Anacostia River sediments through statistical analysis of data from separate studies concerning surface sediments, tributaries, and manhole sediments. The CSAR is methodologically flawed, however, because, among other reasons, DOEE refused to evaluate data from potential environmental cleanup (PEC) Sites. The CSAR ultimately attributes sources of contamination based solely on proximity between particular areas of sediment and adjacent upland facilities, which is inappropriate given the multiplicity of sources even at a given location (such as combined sewer overflow outfalls), the nature of the River, its varying direction of flow based on tides, and upstream sources. A more complex analysis based on all relevant data was required, but not done. In addition, this deeply flawed source assessment is unnecessary at the current stage of remedial action for the ARSP and, based on the questionable methodologies relied upon, has no utility in any case. To the extent necessary, DOEE should conduct a more appropriate assessment to identify contaminant sources at a later date when it has additional information available to provide a sufficient dataset to achieve meaningful results. Any future analysis should make use of all the pertinent data, rather than exclude data from the PEC Sites.	Source Delineation	N
717	Steuart Investment Co.	As discussed in SIC's general comments and the specific comments above, the Former Gulf/Steuart Petroleum Terminal should not be identified as associated with Metals, PCBs, Alkylated PAHs, or PCB 206. These boxes should be removed.	Source Delineation	N
726	Steuart Investment Co.	The RFS' source identification implies incorrectly that several outfalls/tributaries are associated with the Former Gulf Terminal and M Street Property. As discussed in more detail below in SIC's comments on the Manhole Sediment Investigation, none of the data associated with the listed outfalls is connected to either the Former Gulf Terminal or the M Street Property, making the "Source Assessment Results" in Table 2.7 inaccurate as to both properties. These references should be removed.	Source Delineation	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
536	CSX	DOEE does not distinguish between active/current sources versus historic sources. DOEE acknowledges that recognizing active sources to the River is important given the potential for recontamination if these sources are not addressed. This raises the important distinction between active sources and historic sources, but this distinction is lost in DOEE's inventory of potential sources to the River in the Final RI (RI Tables ES-1 and 12.1) and RW-FS (Table 2.7). The newer forensic studies, including the CSA, the Tributary Study, and the Manhole Sediment Investigation, provide sufficient information to differentiate between active and historic sources of contamination to the River. Therefore, DOEE should make the distinction between active versus historic sources when discussing sources in the RW-FS and FFS.	Source Delineation	N
801	Anonymous	Will Watts Branch and Hickey Run be restored prior to or concurrently with the ARSP?	Source Delineation	N
751	Amanda Dewey	Row 7, 3/10/2020. The Anacostia River is an important part of our regions natural heritage. The people and wildlife who depend upon the river need pollutant levels that are safe. Please ensure that the river is not additionally contaminated.	Source Delineation	N
769	Anonymous	Did the derailment by CSX contribute to the contamination of the area near Seafarers Yacht Club?	Source Delineation	N
803	Anonymous	Did ARSP take samples at the 2 toxic sites adjacent to the Kenilworth Landfill / burning dump? Will efforts by NPS be coordinated with the ARSP work?	Source Delineation	N
375	Audubon Naturalist Soc	the Contaminant Source Assessment Report published by Tetra Tech in December 20191references the fact that the Feasibility Assessment (FA) does not include a complete dataset on contaminants from the Pepco Benning Road Facility. DOEE should obtain and publish these data, integrate them into the FA, and notify the public of this change	Source Delineation	Y
546	CSX	The PAH source assessment should not introduce or rely upon simple isomer ratios. Simple ratios among Priority Pollutant isomers (F/P, C/BaA, BaP/BFs; Table 4.5) are largely inadequate to distinguish specific sources of PAHs. Their use is normally limited to situations where only PAH isomer data are available, which is not the case in the MSI dataset wherein full PAH data, including alkylated PAHs, are available. DOEE should only cautiously propose that such simple isomer ratios can sometimes be used to distinguish PAH sources or delete Table 4.5, especially since these simple isomer ratios are not even used in the MSI's assessment of the data. The full PAH list/histograms are much more robust means to distinguish sources.	Source Delineation	N

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Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
547	CSX	The description of the Fort Dupont Creek Basin should be expanded to note that multiple downspouts from the I-295 overpass directly feed Fort Dupont Creek on the CSX Benning Yard property. Thus, I-295 road runoff should be noted as contributing PAHs and other contaminants directly to Fort Dupont Creek.	Source Delineation	N
550	CSX	In reference to Fort Dupont Creek being a potential source, the CSA states, "FDC was selected on elevated PCB factor scores in proximate main stem surface sediments." In other words, the Fort Dupont Creek bottom sediment data did not indicate Fort Dupont Creek to be a source but, nonetheless, because River sediments allegedly "proximate" to the Fort Dupont Creek outfall (see Comment below on Table 4.5 and Figs. 4.4-4.8) contained a relatively strong PCB fingerprint, Fort Dupont Creek was still "selected" (retained) as a potential source of PCBs (Table 4.5). Fort Dupont Creek was the only tributary, out of the seven evaluated, for which this special interpretation (based only upon proximity) was used. If the CSA had treated its factor analysis results for Fort Dupont Creek in the same manner as the other tributaries, Fort Dupont Creek could not be concluded to be a current potential source of PCBs. The DOEE should justify why the CSA treats Fort Dupont Creek differently from the other six tributaries, as the CSA otherwise demonstrates a bias in reaching the conclusion quoted above.	Source Delineation	N
551	CSX	The CSA states: "results of the USGS Tributary Study (Wilson 2019) indicated that, although loading rates vary significantly, the nine tributaries investigated were each sources of contaminants to the tidal river." This statement does not accurately represent the results of the Tributary Study, which concluded that Fort Dupont Creek and the other three ungauged tributaries studied (Nash Run, Pope's Branch, and Fort Stanton Creek) "provided extremely small amounts of contaminants of concern" (pg. 191) and "the loads [of PCBs, PAHs, and chlordane] supplied by the ungauged tributaries were negligible" (pg. 192). Further, among the four ungauged tributaries, "Nash Run dominat[ed] the load contributions" (pg. 191). The CSA statements concerning Fort Dupont Creek should be revised.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
552	CSX	The CSA's description of the CSX Benning Yard forensic sampling dataset is incorrect. The Benning Yard upland samples included: 15 surface soils (not 11, as stated in the CSA), 0 subsurface soils (not 5, as stated in the CSA), 9 sediments and two surface sheens from the Fort Dupont Creek drainage system (not mentioned in the CSA), and 2 NAPLs collected from MW-01 and MW-04 in December 2011 (not from MW-3 and MW-18 in 2014, as stated in the CSA). All of these CSX upland samples were analyzed for 209 PCB congeners and 51 alkylated PAHs, as well as TPH. Most of these upland samples were not analyzed for metals, except for the sediments from Fort Dupont Creek.	Source Delineation	N
553	CSX	The CSA states: "Consideration of parent and alkylated PAHs in the CSA is necessary to establish correlation among the chemical groups that reflect refined petroleum contamination." Parent and alkylated PAHs are useful for determining all sources of PAHs (e.g., combustion residues/soot found in urban runoff), and not just "refined petroleum contamination."	Source Delineation	N
554	CSX	The removal of any analyte with greater than 5 percent missing values followed by removal of any samples with one or more missing values significantly reduced the size of the dataset used as the input for the FA. This culling of the data resulted in the inclusion of only 15 PCB congeners out of the 162 congeners reported by Test America and raises concerns about the accuracy and precision of the FA.	Source Delineation	N
638	Pepco & WG	Section 4.1.1 regarding data preparation states that one half the detection limit was used for non-detect results for all analytes, except PCBs for which non-detects were set to zero. No proof is provided that these different pre-processing methods did not significantly bias the outcome of the analysis. It is left unclear how the zero value results for PCB congeners survived the natural log transformation which was the next step in data processing	Source Delineation	Y
639	Pepco & WG	Table 2.4 erroneously lists PCB-198 and PCB-201 as co-eluters for the TA-Knoxville PCB congener data set. This may be due to historical use of both Ballschmiter-Zell (BZ) and International Union of Pure and Applied Chemistry (IUPAC) numbering systems by the Knoxville lab in some reports. Review of the actual Chemical Abstracts Service (CAS) Registry Number® (cas_rn) and C qualifiers reported by the lab indicates the correct co-eluters in this pair are PCB-198 and PCB-199, which may be obscured by the assigned cas_rn of 'TTNUSA53' for the co-eluter. This error has limited impact on the reported R-mode FA because these congeners were excluded from the 15 used in the analysis; however, it may impact future FA assessments when more congeners are included.	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
640	Pepco & WG	Table 4.1 lists PCB-201 as a Priority List congener associated with Aroclor 1268, however as pointed out above this congener has been misidentified in the database. This congener is only a minor component of Aroclor 1268 (<1%). Errors in congener – Aroclor association could adversely impact future conclusions regarding source identification, especially when a restricted number of congeners is used in the data analysis	Source Delineation	Y
641	Pepco & WG	Table 4.1 attributes a congener subset to specific Aroclors, however some Aroclors are omitted from attribution. For example, PCB-52 and the coeluter group PCB-61/70/74/76 are omitted but they represent a significant component of Aroclor 1254. The overlap of congeners common to many different Aroclors is a significant issue in source assessment and prejudgments about the association of specific congeners with specific Aroclors could potentially bias the outcome on the analysis.	Source Delineation	Y
530	CSX	DOEE has incorrectly implicated sources of contaminants in surface sediments in the River. This has occurred because, among other issues, DOEE has inappropriately relied on geographic proximity while not accounting for other more refined data and analyses. DOEE acknowledged in the RI Report that it relied upon geographic proximity as just "a first-cut approximation of the sources contributing contaminants to the river," and that the "list of sources will be refined through the evaluation of the forensics data." However, DOEE continues to rely upon geographic proximity to implicate sources of contaminants, while not accounting for the results of forensic and other studies already completed and available. For example, the Tributary Report concludes based on sampling data that River loadings of PCBs, PAHs, and chlordane from the ungauged tributaries, including Fort Dupont Creek, were "negligible," yet the River-Wide Feasibility Study ("RW-FS") Report continues to identify Fort Dupont Creek as a "potential ongoing source" of PCBs and chlordane, based on proximity alone. Similarly, DOEE ignores the results of the 2013 forensic study at Benning Yard, which used chemical fingerprinting analysis to conclude that there is no evidence linking Benning Yard's operations to the hydrocarbon or PCB contamination in the River sediments. Although DOEE's "first-cut" proximity approximation has been superseded by these and other more refined data and analyses, DOEE is still relying on this "first-cut" approximation to identify sources of contaminants.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
542	CSX	On page 2 of 3 of Table 2.7, there are separate entries for Fort Dupont Creek and F-193-790, and although these are the same outfall there are different results reported for each. Further, the USGS Tributary Study Results are marked as a "line of evidence" for contamination from Fort Dupont Creek, notwithstanding that the Tributary Study found that contaminant loadings from Fort Dupont Creek were "negligible." In addition, the indicator constituents listed for both Fort Dupont Creek and F-193-790 (PCB Aroclors and chlordane) are also not supported by the Tributary Study or CSA. Specifically, the Tributary Study concluded any inputs of PCB Aroclors and chlordane, or any other contaminants, from Fort Dupont Creek were "negligible" and the CSA did not even include an assessment of Aroclors or chlordane sources. Additionally, Table 2.7 incorrectly associates outfall F-656-309 with CSX, as noted in an earlier comment. All of these listings in Table 2.7 should be corrected accordingly.	Source Delineation	N
743	Steuart Investment Co.	The property described as the "Former Steuart Petroleum Company Terminal adjacent to the Washington Gas Light Company (WGL) East Station Site" had a single release of fuel oil in 1992 that was promptly remediated under the direction and oversight of the U.S. Coast Guard with participation from DOEE and the National Parks Service. There is no evidence that this release 28 years ago is a source of any of the contaminants of concern currently in the river or that the property poses a risk of release of contaminants to the Anacostia River. The M Street Property also does not abut the Anacostia River. See Attachment G. While the property is near to the WGL East Station PECS, adjacency to a PECS should not be sufficient to make this property also a PECS. Because this property is not a source of potential contamination to the Anacostia River, SIC encourages DOEE to amend the RIR to remove this property from the list of PECSes.	Source Delineation	N
739	Steuart Investment Co.	The CSA describes two manhole samples that exhibited strongly elevated metals scores as being "near the Washington Navy Yard and the Former Hess and Gulf/Steuart Bulk Oil Facilities." CSA at 17. As discussed above in SIC's comments on the Manhole Sediment Investigation, no sampling was done from a manhole that would have received discharges from the Former Gulf Terminal or the M Street Property. As a result, the CSA's use of "proximate" manhole locations incorrectly associates the contamination found in these manholes to the Former Gulf Terminal and M Street Property. The CSA should be revised to remove manhole sediment from the multi-factor analysis for the Former Gulf Terminal and M Street Property.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
556	CSX	Inherent in the use of log transformed chemical concentration data is the fact that results are independent of absolute concentrations. DOEE accurately recognizes this, stating that doing so “ensures equal influence of all chemicals without distorting effects of varying concentration scales, magnitudes, and ranges” (p. 14). However, the FA results obtained from FA of log transformed data cannot, upon any subsequent interpretation, ignore the absolute concentrations of the samples. Just because FA determines that a sample’s analytes are strongly correlated and thereby potentially impacted does not mean the sample contains a high concentration of these chemicals. The FA’s preliminary results should have been further evaluated with respect to absolute concentration before any conclusions/syntheses were offered (Table 4.5).	Source Delineation	N
557	CSX	Figures 4.4 through 4.8 call into question DOEE’s use of proximity to identify CSX Benning Yard as a potential source (listed in Table 4.5). DOEE’s definition of “proximity” is unclear and appears arbitrary. For example, Figures 4.4 through 4.8 demonstrate that only one sediment sample (R4-13-SS) was proximate to the Fort Dupont Creek outfall (which is not a CSX outfall). This sediment sample was not identified in the CSA’s FA as exhibiting impacts of PAHs, metals, or PCBs. Despite these results, DOEE still identifies Benning Yard as a potential source of PAHs, metals, and PCBs in Table 4.5. Further, even if “proximate” were expanded to include two surface sediment samples located approximately 75 meters downstream of the Fort Dupont Creek outfall (R4-04-SS and R4-11-SS), only one of these two samples was determined by the CSA’s FA to be impacted with any of the five factors (R4-04-SS was identified as impacted with PAHs). Thus, none of the three River surface sediment samples located within 75 meters of the Fort Dupont Creek outfall were impacted with metals or PCBs, yet Table 4.5 still lists Benning Yard as a potential source of metals and PCBs. In fact, none of the 15 sediment samples throughout all of Reach 4 were identified as impacted with metals, and the closest sediment identified in all of Reach 4 to be impacted with PCBs is located approximately 500 meters downstream of the Fort Dupont Creek outfall. This appears to be another example of the CSA demonstrating a bias with respect to the conclusions reached about Fort Dupont Creek and CSX Benning Yard.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
747	WG	"...As part of the OU2 RI for East Station, Washington Gas, at the request of National Park Service (NPS), undertook testing to determine whether the East Station site was a source of polychlorinated biphenyls (PCBs). The data from this testing showed that Washington Gas was not a source of PCBs, as NPS acknowledged, with DOEE concurrence. (See the attached excerpt from the Mobilization 1 technical memorandum, which was approved by the NPS on April 1, 2016, and was submitted to DOEE.) Nevertheless, RI Report Table 6.8 incorrectly identifies Washington Gas as a potential source of PCBs. Washington Gas previously requested that DOEE correct this error but DOEE has not done so. DOEE should correct this error..."	Source Delineation	Y
817	Bill Irwin	1) Is there a fuel oil (other other) terminal on the Anacostia River west shore at Joint Base Bolling, just downstream of Douglass Bridge? I see fuel barges there. What the sediment status there? 2) Is there a way to measure ongoing impacts to the river from the now closed Kenilworth landfill?	Source Delineation	N
727	Steuart Investment Co.	As the RFS acknowledges, DOEE's source control strategy will look for active sources. RFS at 31. This investigation is in a very early stage and may not identify any additional active sources beyond the tributaries, "hot spot" PECSes, and outfalls already listed in the RFS. Id. Nonetheless, the RFS states that PECSes are "potentially active" sources of contamination. RFS at Table 2.7. This speculation is unsupported and inappropriately suggests responsibility before completing the evaluation of available evidence. See RFS at 49 (acknowledging that a final assessment will need to be based on an evaluation of long-term monitoring results and other available evidence). As a result, references to PECSes other than the "hot spot" PECSes being active sources should be removed from the RFS before it is finalized.	Source Delineation	N
642	Pepco & WG	Section 4.1.5 indicates the manhole and tributary datasets were processed separately from the surficial sediments, but nonetheless using the surface sediment matrix and loadings. This would appear to impose a 'latent' or underlying construct on the manhole/tributary datasets that is not an objective outcome of the R-mode FA. The manhole/tributary datasets were improperly processed	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
643	Pepco & WG	Section 3.1 states that only the bottom sediment samples from the tributary and manhole datasets were included in the FA. The DOEE Manhole Sediment Investigation Report points out that manhole sediment tends to be dominated by coarser grain size distribution and contains a smaller fraction of fine sediment and organic carbon which preferentially sorb metals and hydrophobic organic contaminants of interest. These fines are associated with the suspended sediment loading carried to the river outfalls and are the primary source of COIs in the river sediment. The suspended sediments were not adequately characterized by forensic analyses and this limitation on the ability of the analysis to connect upstream sources of COIs to river sediment contamination is inadequately discussed in the CSAR	Source Delineation	Y
644	Pepco & WG	This report did not evaluate data from PEC sites despite repeated requests to do so by Washington Gas and Pepco, but instead focused on only DOEE ARSP RI surface sediment, manhole sediment, and tributary sediments. The R-modeFA analysis presented did not and cannot link landside PEC site sources of contaminants to the contaminated river sediments, except by rough proximity as previously reported in the ARSP RI and other documents. The factor score-based source interpretation presented in Section 4.2.6 makes the assertion that PEC sites are "likely serving as active contaminant sources to tidal river surface sediment" based on an arbitrary criterion of scores greater than one standard deviation above the mean. These claims are unsupported by the R-mode FA results alone provided in the report, and require additional data analysis, as noted in the footnote on p.19 and the Section 5.2 recommendations, before scientifically valid conclusions can be reached	Source Delineation	Y
645	Pepco & WG	The factor analysis is seriously flawed. It utilized only 15 of the ~160 congeners identified in U.S. Environmental Protection Agency 1668 analytical data and is biased by both prejudicial assumptions about sources, including which Aroclors may be present and which congeners were most relevant, as well as the drastic reduction in the complexity of the PCB dataset prior to processing. The factor analysis should have included as many PCB congeners as possible and avoided prejudgments which make the	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
687	Steuart Investment Co.	"...The Draft RI identifies 14 sites bordering the tidal Anacostia River at which cleanup work is either completed, underway, or contemplated, and which the Draft RI identifies as "potential environmental cleanup sites" or "PECSes."4 One of these PECSes is the "Former Steuart Petroleum Company/Hess Oil Corporation (Hess)/Gulf Oil Corporation (Gulf) Petroleum Terminals." While all other PECSes identify a single facility, this PECS incorporates two wholly separate facilities: the former Hess facility located at 1620 S. Capitol Street SE and the former Gulf/Steuart Petroleum facility located at 1721 and 1724 S. Capitol Street SE.5 It is not clear from the Draft RI why the former Gulf/Steuart Petroleum facility was included in the Hess PECS, but it is clear from the supporting documentation and the additional information SIC submitted to DOEE in 2017 that it should not be included going forward..."	Source Delineation	Y
693	Steuart Investment Co.	As discussed in SIC's general comments, the proximate assessment presented in Section 12.2 of the RI Report did not identify potential sources. SIC requests that the paragraph stating that source identification for the FS builds on the proximate assessment be deleted.	Source Delineation	N
694	Steuart Investment Co.	For clarity, the name of the party that applied for the DOEE Voluntary Cleanup Program ("VCP") should be included to avoid the implication that Steuart Petroleum applies to the VCP for this property, or the first sentence in this entry should be deleted.	Source Delineation	N
728	Steuart Investment Co.	Table 2.1 states that the Former Steuart Petroleum Company applied to the VCP program. This is incorrect.SIC can confirm that the Steuart Petroleum Company never applied to the voluntary cleanup program ("VCP") at the M Street Property, contrary to the reference in Table 2.1 of the RFS. SIC cannot speak to whether the current owner has entered the property into the VCP program. The table should be corrected to either clarify that the M Street Property has not been entered into the VCP program, or it should identify the proper party that has applied for entry into the program.	Source delineation	N
695	Steuart Investment Co.	Table 2.7 combines the Former Hess Terminal and Former Gulf/Steuart Terminal. These are separate properties. SIC requests that the Former Gulf/Steuart Terminal be removed from Table 2.7. If the Former Gulf/Steuart Terminal is not removed, as discussed in SIC's general comments, the bullet for F-936-752 should be removed. This manhole is upgradient from the Former Gulf/Steuart Terminal. The bullet for PECS Proximate should also be deleted because the CSA relies on the erroneous information from the Manhole Sediment Investigation and other sources discussed in SIC's general comments for this conclusion.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
700	Steuart Investment Co.	The Groundwater Modeling Report misleadingly states that remediation efforts at the site have resulted in the recovery of more than 2,490 gallons of free product since 1987, which could be ready to imply that this free product has been on the property since 1987. As discussed in SIC's general comments and specific comments for Section 5.1.4 this section should be removed. If it is not removed, this sentence should be revised to state that "in 1987 a pump and treat remediation system was installed that reportedly removed 2,171 gallons of free product. In 1992, a package groundwater treatment system was installed to enhance free-product recovery, which operated through 1994 and recovered an additional 320 gallons of free product. Since 1994, free product recovery has been accomplished using hand bailing methods, and the source of free product appears to be essentially depleted. Residual contamination appears to be localized and not persistent throughout the vadose zone" to more accurately reflect the MACTEC Report cited in this section.	Source Delineation	N
740	Steuart Investment Co.	While DOEE recognized that the Former Gulf Terminal is distinct from the Former Hess Terminal in the final RI, the CSA does not adequately differentiate these properties. As a result, the CSA attributes a PCB sampling point adjacent to the Former Hess Terminal to both Hess and the Former Gulf Terminal CSA at 18. There is no correlation between operations at the Former Gulf Terminal and PCBs found in sediment adjacent to the Hess property. PCBs have never been identified as a contaminant of concern at the Former Gulf Terminal. As a result, this factor should be removed from the multi-factor analysis for the Former Gulf Terminal.	Source Delineation	N
115	Navy	The criteria that was established to limit the sampling to manholes with invert elevations of at least 3 feet MSL has limited the data set in several areas in Washington Channel and Reach 123 where surface sediment hot spots are clearly discernable in the data set. Surface sediment hot spots at sewer outfalls are typically indicative of recent or ongoing sources that can't necessarily be refuted becasue there is a lack of up-pipe manhole sediment to sample. Recommend future investigations also look more closely at these areas (specific examples include, but are not limited to NPDES 10 and 11a).	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
121	Navy	Additional explanation is needed to justify using only manhole samples that "scored greater than one standard deviation above the mean" for this exercise. The manhole study report states that COC concentrations in sediment collected from the manholes are likely to be less than what is present in the suspended flow that gets deposited elsewhere. The constraint for using samples with COC concentrations greater than one standard deviation may result in ignoring CSS and MS4 outfalls that could potentially be ongoing sources to the river, particularly where surface sediment present out an outfall indicates a potential ongoing source.	Source Delineation	N
768	Anonymous	Does is make sense to invest in the clean up if MD doesnt do their part in cleaning up before the end of DC's timeline?	Source Delineation	N
541	CSX	The RW-FS states that Fort Dupont Creek is a "potential ongoing source[] contribut[ing] to contamination in the Main Stem." This statement is contradicted by the results of the Manhole Sediment Investigation ("MSI") and the USGS Tributary Reports. The MSI did not identify Fort Dupont Creek as even a Rank 3 (let alone Rank 1 or 2) for any contaminants (see Table 4.19 in the MSI). Sediment from Fort Dupont Creek contained the lowest concentrations of PCB congeners and PAHs among all manhole sediments studied (see Table 4.8 in the MSI). Similarly, the Tributary Report concluded that the ungauged tributaries, including Fort Dupont Creek, "provided extremely small amounts of contaminants of concern" that were "negligible" (see pgs. 191-192 in the Tributary Report). These results appear to have been ignored in the RW-FS. This statement in the RW-FS is also contradicted by the groundwater modeling report in several locations: "Since groundwater contamination issues at CSX Benning Yard have been addressed through a recently completed corrective action, the contaminated groundwater discharge from this site is no longer a concern." (pg. ES-2); "Since groundwater contamination issues at CSX Benning Yard have been addressed through a recently completed corrective action (Geosyntec 2016), the impact of contaminated groundwater discharge from this PECS is currently not a concern." (pg. 3); "Since groundwater contamination issues at CSX Benning Yard have been addressed, the ongoing impact of contaminated groundwater discharge from this PECS is not a concern." (pg. 31).	Source Delineation	N
682	Steuart Investment Co.	The statement "surface sediment and subsurface sediment provide the greatest resolution for source delineation using this approach" has not been demonstrated in the Draft RI or confirmed in any cited reference. SIC requests that this statement be deleted.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
776	Anonymous	You mentioned that you want to prevent PCBs from flowing from MD into DC. How would you do that and what is the estimated cost?	Source Delineation	N
5	MDE	The “Ongoing Contamination” section on Page 5 of the PP states that “recent modeling shows that most sediment now comes from upstream tributaries.” It should be noted that recently completed studies of the tributaries to the Anacostia River demonstrate contaminant load is continually declining in recent years, and that the mass of PCBs in legacy sediments in the Anacostia River (from inputs from potential environmental cleanup sites (PECSes), Washington, D.C.’s Municipal Separate Storm Sewer System (MS4) and combined sewer system (CSS), as well as the tributaries to the tidal Anacostia River) represent the most significant percentage of the PCBs in the system, overwhelming the rather small ongoing loading from the tributaries.	Source Delineation	N
37	Navy	"These potential PECS Hot Spots are areas where contaminant levels could be reduced early-on in the Interim ROD period . . . without the areas becoming recontaminated by releases from active sources." How is "recontamination" defined in this context? For example, the Navy is responsible for controlling Navy-related sources of contamination and remediating riverbed sediment contamination above established cleanup levels adjacent to WNY. However, the remediated "hot spots" adjacent to WNY could be recontaminated by uncontrolled upstream non-Navy sources. However, given that the lower Anacostia River adjacent to the WNY is a net depositional environment, contaminant concentrations in newly-deposited surface sediments are expected to gradually decline over time as upstream sources are reduced or controlled, mitigating the potential impacts of any recontamination.	Source Delineation	N
746	WG	"...In its response to Washington Gas comment 1 on the draft RI, DOEE states incorrectly that “Washington Gas has identified the sewer pipe bedding associated with NPDES 016 as a potential preferential migration pathway for manufactured gas plant (MGP) waste to river sediments.” (See DOEE comment response table comments #225 and 274.)..."	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
725	Steuart Investment Co.	The RFS' discussion of source identification appears to determine that the Former Gulf Terminal and Former Steuart Petroleum Terminal are sources only by combining them with other adjacent PECSes. Table 2.7. While the Final Rl recognizes that the Former Gulf Terminal is not part of the Former Fless Terminal and that the M Street Property is not part of Washington Gas Light ("WGL"), the Report's source identification treats them as the same property for identifying "PECS Proximate" sources. This indicates that DOEE has not conformed the RFS to the changes it made to the Final Rl and is still improperly attributing discharges from the Former Hess Terminal and WGL to unassociated properties. The Former Gulf Terminal and the M Street Property should not be identified as PECSes simply because they are adjacent to PECSes.	Source Delineation	N
775	Anonymous	What actions are expected for PG + Mont County in Maryland to take to reduce the contamination coming from those areas?	Source Delineation	N
441	DC Appleseed	The last sentence on the page refers to PECSes not being recontaminated by releases from active sources. One of the stated benefits of the interim ROD approach is to provide additional time for source control. Given that PECS cleanups, and the hot spot cleanups described in the Focused Feasibility Study, will be conducted in the relatively near future, what is the basis for the statement that they won't be recontaminated? Presumably not all sources will be identified or controlled in the near future.	Source Delineation	N
164	NPS	This figure appears to show upstream source control as part of the Early Actions, but no upstream source control is mentioned in the FFS, and only a strategy (no actions) is provided in the river-wide FS	Source Delineation	N
219	NPS	"The Proposed Plan for the Interim ROD will define the aforementioned early action, river-wide hot spot sediment remedial alternatives (detailed in the FFS), source control, and monitoring activities that will be conducted in advance of FS refinement and establishment of the Final ROD." The Proposed Plan does not describe source control efforts or monitoring in any detail.	Source Delineation	N
226	NPS	"The influx of PCBs from the upstream watershed may contribute to the elevated concentrations in the tidal river such that RAOs may not be achieved or maintained following remediation" This is a significant point. Should add "if point sources in the tributaries are not addressed", The NPS tributary study, which supports this conclusion, should be discussed and included here.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
242	NPS	“Reducing uncertainty associated with contaminant sources is key to the establishment of a Final ROD for the ARSP” This is not clear – please explain what this means and indicate the uncertainty DOEE is referring to.	Source Delineation	N
243	NPS	“They are known to have used and stored hazardous materials or petroleum products on their premises, and to have released hazardous materials or petroleum” Why is petroleum relevant, it is not a COC? CERCLA also has a petroleum exclusion.	Source Delineation	N
244	NPS	“If downward trends in concentrations are sufficiently strong in a given OU, the remaining PECSes may be considered not to represent significant sources of COCs to the tidal river. However, if the weight of available evidence indicates that a given PECS is an active source of COCs to the river, DOEE would require investigation of that site regardless of OU-wide trends”. This text seems to indicate that DOEE is is disregarding the other PECs– please clarify what is meant by this.	Source Delineation	N
343	Anacostia Watershed Community Advisory Committee	Restoration/stabilization of streams is essential to the long-term effectiveness of work undertaken under the ARSP. Appropriate agencies must be engaged in this work.	Source Delineation	N
424	DC Appleseed	The text indicates that Figure 2 shows locations that serve as contaminant sources to the ARSP study area, but these areas are not explicitly identified on Figure 2.	Source Delineation	N
426	DC Appleseed	A figure showing the 14 tributary streams and the CSS and MS4 outfalls would be helpful.	Source Delineation	N
55	Navy	It is not clear why the source identification evaluation includes chemicals that are not identified as COCs for the river. No information is provided to establish that "indicator constituents" co-occur with the COCs, and a focus on source identification for non-risk driving chemicals may add unnecessary complexity to the source control strategy.	Source Delineation	N
56	Navy	The most significant hot spot on the Anacostia River is located adjacent to the O Street outfalls. Table 2.7 indicates that Outfalls NPDES 9-12 are the potential sources of the contaminants. While the contaminants may have been discharged from the outfalls, the concentrations in the hot spot sediments are much higher than what is typically found in urban stormwater discharges. Has DOEE considered the possibility that an unidentified PECS may have and may still be a source of these contaminants? Are any studies planned to further investigate this possibility?	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
57	Navy	"Given the small fraction of their contribution to contamination in the river and the substantial reduction of this contribution realized by ART capture, source tracking in CSS sewersheds is unlikely to yield substantial source reductions." How does DOEE plan to address the high levels of contamination that have already reached the river in the hot spot adjacent to the O Street outfalls given that source tracking in the sewershed of these outfalls has not been performed? An unidentified PECS may be responsible for historical (and potentially ongoing) discharges contributing to the formation of the hot spot near the O Street outfalls.	Source Delineation	N
287	USFWS	Please add a summary of the Ghosh et al. 2020 study.	Source Delineation	N
288	USFWS	As above. The Ghosh et al. 2020 study provides valuable data on tributary loadings of the COCs and should be discussed here.	Source Delineation	N
384	Corinne Irwin, Friends of Titanic Memorial Park	1) Do you consider the Washington Channel to tbe part of the Anacostia River / Watershed? 2) Can you provide more details specific to the Washington Channel: -sources of pollutions -remediation options -high level schedule	Source Delineation	N
448	DC Appleseed	The lines-of-evidence approach for source identification appears to be technically robust, but results from the surface water modeling are not included in the approach. The EFDC model used in this effort is capable of tracking the fate and transport of PCB-contaminated sediment. At some locations, PCBs found in surface sediment may reflect sediment transported from other locations. These results should be incorporated in the source identification strategy.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
535	CSX	DOEE's terminology with respect to "sources" overstates current findings. Throughout the documents, there is an inconsistent reference to "sources" of contamination. Specifically, sometimes these purported sources are referred to as "potential sources" or "likely sources," but other times just as "sources." The latter terminology ("sources") implies that a definitive conclusion has been established by DOEE, but we do not believe that is warranted, as explained in our comments herein. Accordingly, all references to "sources" throughout the documents should be qualified as "potential sources" or "suspected sources." Further, if the source assessment investigations (i.e., Tributary Report, Manhole Report, Contaminant Source Assessment ("CSA") Report) conclude that a "potential" or "suspected" source is not an active source or is a negligible source of a contaminant to the River, then those conclusions should supersede those from the preliminary proximity analysis and the RW-FS text and RW-FS Table 2.7 should be updated accordingly.	Source Delineation	N
539	CSX	The NPS parcel between CSX Benning Yard and the River should be a PECS. The RW-FS states: "Sources include potential environmental cleanup sites (PECS) that are currently operating or have historically operated along the banks of the river." DOEE has identified CSX Benning Yard as a PECS, but Benning Yard is located inland from the River and is connected to the River only through a subsurface pipe, open only at the CJA Area (~35 ft stretch). The NPS owns the land between Benning Yard and the River. This NPS land was constructed by historic dredging activities, and its uncharacterized soils may contain legacy contamination subject to direct runoff (a mechanism that DOEE acknowledges to be a potential source of contaminants to the River). The NPS parcel is not listed as a PECS despite being "along the banks of the river," potentially contaminated from historic dredging, and much more proximal to the River than Benning Yard. Accordingly, the NPS parcel should be listed as a PECS.	Source Delineation	N
540	CSX	The RW-FS attributes outfall F-656-309 to CSX in Table 2.7. However, this is not a CSX outfall. Rather, it is a municipal separate storm sewer system (MS4) outfall that drains residential neighborhoods north and east of the CSX Benning Yard property. CSX does not have any active discharges to outfall F-656-309. In the RI responses to comments, DOEE indicated that CSX had historical discharges to this outfall, however no evidence was provided of these discharges or of any connection between the CSX property and outfall F-656-309. CSX has no record of discharges to outfall F-656-309.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
545	CSX	The MSI Report notes that "sewer sediment upstream from 22 of the originally targeted 51 outfalls remains uncharacterized, including 15 MS4 and seven CSS outfalls." Does DOEE plan to sample and characterize these remaining 22 outfalls to understand how they may be impacting the River?	Source Delineation	N
548	CSX	Given the ubiquity of PCBs and PAHs in River sediments and the significant number of potential sources, source assessment in many locations may be improved by analysis of chemical fingerprints of specific chemical groups (e.g., PCBs or PAHs) on a site/source-specific level. The CSA's use of a single factor analysis ("FA") in only one mode (R-mode) simultaneously conducted on three different chemical groups (PCB congeners, PAHs, and metals) from different potential sources is insufficient to distinguish between different sources of these contaminants. The CSA's FA is a high-level, preliminary screening method that should be supplemented with more detailed assessment of chemical fingerprints, the effect of weathering on those fingerprints, and also the absolute chemical concentrations of those samples in identifying potential contaminant sources.	Source Delineation	N
549	CSX	It is unclear why metals are included in the CSA's FA, given that they do not pose a risk in the River's sediments, their occurrence and distribution within the River are distinct from the occurrence and distribution of PCBs and PAHs, and, as inorganic materials they are likely generated from different sources than PCBs and PAHs. Metals also do not likely share similar fate and transport histories or properties as organic contaminants, such as PCBs or PAHs. DOEE's decision to require metals in the datasets used in the FA resulted in the inappropriate exclusion of CSX's comprehensive upland dataset for PCB congeners and PAHs. The statement in the CSA that "elimination of metals from the FA altogether would substantially weaken the diagnostic power of the FA" (pg. 11) is unsubstantiated, as alternative FA results excluding metals were not presented in the CSA.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
555	CSX	The CSA states: "One half the detection limit was used for less-than-detect values, with the exception of PCB congeners. Individual PCB congeners for which concentrations were less than the detection limit were set to zero. The rationale to treat non-detects using the half-the-detection-limit was based on review of the dataset and professional judgement. Experience using this approach and alternate approaches on similar datasets indicates that the results of the analysis are generally not sensitive to the selected non-detect handling strategy." We disagree with treating non-detects as having half of the detection limit and believe that all non-detect values should be set to zero when, as here, low concentration samples are among those being analyzed. Giving non-detects a positive value in a similar range as detects, which happens in low concentration samples, distorts the fingerprint of the sample. Treating non-detect results for PAHs as having half of the detection limit in the sediment sample FTDUPONT-01, and not eliminating the sample (which has non-detect results for most of the PAHs) from analysis, incorrectly resulted in a high alkylated PAH factor score for this sample, resulting in the incorrect identification of Fort Dupont Creek as a potential source of alkylated PAHs. In fact, all individual PAHs most diagnostic of the alkylated PAH factor (i.e., PAHs with the highest loadings for factor 4) in FTDUPONT-01 are non-detect. Therefore, the conclusion that the analysis demonstrates this sample is a source of alkylated PAHs is flawed and should be rejected.	Source Delineation	N
653	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current Draft and stating in the first paragraph of this section that: "Sediments transported to the river from sewer systems, tributaries, and other sources were also characterized in support of the RI. The results for these potential sources of contamination to the tidal river will be documented when all information available to DOEE has been evaluated and integrated into the source characterization."	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
654	Steuart Investment Co.	DOEE should not publish a list of potential sources of contamination until it has evaluated all forensic data, including the information obtained from individual PECSes and others who received and responded to information collection requests. SIC therefore proposes that this section be deleted and replaced with the statement: "The RI included the identification of contaminant sources to surface and subsurface sediment based on the spatial evaluation of concentration distributions of selected indicator constituents and the correlation of elevated concentrations to potential sources, including PECSes, municipal separate storm sewer system (MS4) outfalls, combined sewer system (CSS) outfalls, and tributary streams. In addition to the review of the concentration distributions in surface and subsurface sediment, the source identification review also relied on the contaminant distributions in surface sediment pore water and surface water. This analysis will be refined through the evaluation of the forensics data collected during the RI and information and data obtained from the individual PECSes and others who have submitted data in response to DOEE information collection efforts. This forensics evaluation will be documented as an appendix to the FS Report or published separately."	Source Delineation	N
655	Steuart Investment Co.	SIC requests that this table be deleted. In the alternative, for the reasons discussed in SIC's general comments, SIC requests that the former Gulf/Steuart Petroleum properties be removed from the table since there is no evidence identifying these properties as potential proximate sources of environmental contamination in the Anacostia River.	Source Delineation	N
656	Steuart Investment Co.	"Former Steuart Petroleum Company/Hess Oil Corporation (Hess)/Gulf Oil Corporation (Gulf) Petroleum Terminals" should be changed to "Former Hess Oil Corporation (Hess) Petroleum Terminal."	Source Delineation	N
657	Steuart Investment Co.	"Former Steuart Petroleum Company/Hess Oil Corporation (Hess)/Gulf Oil Corporation (Gulf) Petroleum Terminals" should be changed to "Former Hess Oil Corporation (Hess) Petroleum Terminal."	Source Delineation	N
658	Steuart Investment Co.	"Former Steuart Petroleum Company/Hess Oil Corporation (Hess)/Gulf Oil Corporation (Gulf) Petroleum Terminals" should be changed to "Former Hess Oil Corporation (Hess) Petroleum Terminal." The second and third paragraphs of this section should be deleted.	Source Delineation	N
659	Steuart Investment Co.	"Former Hess/Gulf/Steuart Petroleum Terminals" should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N
660	Steuart Investment Co.	"Former Hess/Gulf/Steuart Petroleum Terminals" should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
661	Steuart Investment Co.	"Former Hess/Gulf/Steuart Petroleum Terminals" should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N
662	Steuart Investment Co.	"Former Hess/Gulf/Steuart Petroleum Terminals" should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N
663	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting all paragraphs from the paragraph starting "The broad areas where concentrations for each indicator exceed some low to moderate level represent . . . " though to the end of the section and replacing them with the statement: "The forensic sampling conducted during Phase 2 will be leveraged to evaluate these results for purposes of identifying potential sources of elevated concentrations. The results of this forensic data evaluation will be presented as an appendix to the FS report or separately."	Source Delineation	N
664	Steuart Investment Co.	The Draft RI does not determine sources of contamination and sources of contamination should not be assumed in the RI in the absence of a full analysis, particularly for the former Gulf/Steuart Petroleum properties, which are south (downriver) from the identified "contamination assumed from the proximate source." This figure should be deleted or redone to reflect ratios above the 95 % UCL background and should remove references to "differentiated and undifferentiated" sources, "proximate source" and "contamination assumed from the proximate source" and "contamination from undifferentiated sources."	Source Delineation	N
665	Steuart Investment Co.	former Hess/Gulf/Steuart Petroleum Terminals should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N
666	Steuart Investment Co.	former Hess/Gulf/Steuart Terminals should be changed to "Former Hess Petroleum Terminal." In addition to the reasons for removing the former Gulf/Stueart Petroleum properties from this PECS discussed in SIC's general comments, it is also inaccurate to state that sampling location R1-29 is adjacent to the former Gulf/Steuart Petroleum properties. As shown in Figure 6.28, R1-29 is adjacent to the northern end of the former Hess property and well north (upstream) of the former Gulf/Steuart Petroleum properties.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
667	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the paragraph starting "The above discussion identifies potential source(s) of surface dediment contamination . . . ." and replaced with the statement "Potential source(s) of this contamination will be evaluated and this evaluation presented as an appendix to the FS report or separately."	Source Delineation	N
668	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the paragraphs in this section from the paragraph starting "The broad areas where concentrations for each indicator exceed some low to moderate level represent . . . ." though the paragraph starting "This evaluation represents a first-cut approximation . . . ." and replacing them with the statement: "Potential source(s) of this contamination will be evaluated and this evaluation presented as an apendix to the FS report or separately."	Source Delineation	N
669	Steuart Investment Co.	"Hess/Gulf/Steuart terminals" should be changed to "Hess terminal." In addition to the reasons for removing the former Gulf/Stueart Petroleum properties from this PECS discussed in SIC's general comments, it is also inaccurate to state that MS4 outfall F494-187 is in the vinity of the former Gulf/Steuart Petroleum properties. As shown in Figure 2.14, F494-187 is located at the northeast edge of the Hess property at the South Capitol Street bridge, well north (upstream) of the former Gulf/Steuart Petroleum properties.	Source Delineation	N
670	Steuart Investment Co.	SIC requests that this table be deleted. In the alternative, for the reasons discussed in SIC's general comments, SIC requests that the former Gulf/Steuart Terminal be removed from the table since there is no evidence identifying this terminal as a potential proximate sources of environmental contamination in the Anacostia River.	Source Delineation	N
671	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the statement "discussed with the objective of identifying potential proximate sourcesin Section 7.3" and replacing it with "provided and will be used in the forensic evaluation of potential sources to be provided as an appendix to the FS report or reparately."	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9eJVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
672	Steuart Investment Co.	If the former Gulf/Steuart Petroleum properties are not removed from the Hess PECS, it is not accurate to state that "The cross sections focus on the 14 PECSes. . . ." As shown in Figure 7.5, the GSHL cross section includes the former Hess property but not the former Gulf/Steuart Petroleum properties.	Source Delineation	N
673	Steuart Investment Co.	If the former Gulf/Steuart Petroleum properties are not removed from the Hess PECS, it is not accurate to state that "The selected indicator chemicals . . . Are representative of chemicals that are likely constituents of concern at the various PECSes." As discussed in SIC's general comments, the identified representative chemicals include chemicals that have no documented association operations at either of the former Gulf/Steuart Petroleum properties, including PCBs and chlordane.	Source Delineation	N
674	Steuart Investment Co.	References to "Undifferentiated Sources" and "Proximate Sources" should be removed or replaced with specific ratios of 95% UCL to background.	Source Delineation	N
675	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting all paragraphs in this section from the paragraph starting "As was noted for suface sedimentin Section 6 . . . " though to the end of the section and replacing them with the statement: "The forensic sampling conducted during Phase 2 will be leveraged to evaluate these results for purposes of identifying potential sources of elevated concentrations. The results of this forensic data evaluation will be presented as an appendix to the FS report or separately."	Source Delineation	N
676	Steuart Investment Co.	Former Hess/Gulf/Steuart Petroleum Terminals should be changed to "Former Hess Petroleum Terminal."	Source Delineation	N
677	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data, particularly for the portion of the Anacostia River near the former Gulf/Steuart Petroleum properties, at which data reflected in the RI proximate source analysis does not accurately reflect contributing sources. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the references in this section to "proximate source threshold" and "undifferentiated sources."	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
678	Steuart Investment Co.	If the former Gulf/Steuart Petroleum properties are included in the former Hess PECS it is not accurate to state that "Figures 7.15 through 7.17 depict the levels of the indicator chemicals in subsurface sediment at this PECS." As shown in Figure 7.5, Figures 7.15 through 7.17 reflect analysis of the former Hess property but do not cover the former Gulf/Steuart Petroleum properties, which extend further downstream from point GSHL.	Source Delineation	N
679	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the paragraphs in this section from the paragraph starting "Spatial Distribution. . . . " through the end of the section and replacing them with the statement: "Potential source(s) of this contamination will be evaluated and this evaluation presented as an apendix to the FS report or separately."	Source Delineation	N
680	Steuart Investment Co.	SIC requests that this table be deleted. In the alternative, for the reasons discussed in SIC's general comments, SIC requests that the former Gulf/Steuart Terminal be removed from the table since there is no evidence identifying this terminal as a potential proximate sources of environmental contamination in the Anacostia River.	Source Delineation	N
681	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the statement "to identify sources based on proximity to observed elevated concentrations. Constituent-specific elevated concentration thresholds were defined to delimit sediment areas/depth horizons that are likely, in the absence of other information, attirbutable to a proximate source." and replace it with "to assist in a future evaluation of potential contaminant sources."	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
683	Steuart Investment Co.	As discussed in SIC's general comments, DOEE's source evaluation should be delayed until DOEE completes a full evaluation of sources using best available data. SIC therefore proposes deleting the discussions of proximate source contributions in the current draft. SIC proposes deleting the paragraphs in this section from the pragraph starting "Table 12.1 and Figure 12.1 document the results of the proximate source evaluation . . . ." through the paragraph starting "Active sourcing from seven other tributaries . . . ." and replace them with the statement "Active sourcing from seven tributaries (in addition to the Northeast Branch and Northwest Branch) is being characterized in the ongoing Tributary Study and will be used to refine the ARSP model calibration and support FS remediation evaluations. In addition, MS4 and CSS outfall contributions are being investigated in a manhole bottom sediment ivnestigations. Both of these investigations, as well as an evaluation of potential contributions from PECSes and other sources will be documented as appendices to teh FS Report or elsewhere."	Source Delineation	N
684	Steuart Investment Co.	SIC requests that this table be deleted. In the alternative, for the reasons discussed in SIC's general comments, SIC requests that the former Gulf/Steuart Petroleum properties be removed from the figure since there is no evidence identifying these properties as potential proximate sources of environmental contamination in the Anacostia River.	Source Delineation	N
685	Steuart Investment Co.	SIC requests that this table be deleted. In the alternative, for the reasons discussed in SIC's general comments, SIC requests that the former Gulf/Steuart Petroleum properties be removed from the table since there is no evidence identifying these properties as potential proximate sources of environmental contamination in the Anacostia River.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
688	Steuart Investment Co.	"...In light of the extensive data that has already been submitted to DOEE showing no risk of contribution from the former Gulf/Steuart Petroleum properties to contamination in the Anacostia River, SIC is deeply troubled by the proximate source analysis applied to the PECS that references Steuart Petroleum in the Draft RI. As noted in the Draft RI, “over large portions of the main stem, the general pattern of the various indicator constituent concentration distributions are relatively similar,” including “broad areas where concentrations are slightly to moderately elevated” and “localized areas where concentrations are highly elevated” within these broad areas.14 The Draft RI further notes that this can “result from the localized deposition of contaminated sediment originating from a remote, upstream source or sources.”15 While the Draft RI concludes that this is less plausible for highly elevated pockets of contamination, the Draft RI does not cite a basis for this conclusion, nor is it correct in the vicinity of the former Gulf/Steuart Petroleum properties..."	Source Delineation	Y
689	Steuart Investment Co.	"...The Draft RI’s Proximate Source Identification is also misleading because it does not reflect all of the data in DOEE’s possession relevant to these determinations. DOEE purports to attribute elevated concentrations of indicator constituents to identified proximate sources.22 However, SIC and at least 16 other parties have submitted information to DOEE on the “identification, nature, and quantity of materials that have been or are generated, treated, deposited, stored, disposed on, or transported to a facility” and the “nature or extent of a release or threatened release of hazardous substances at or from a facility,” in addition to other information, that is not included in the Draft RI analysis. This information is central to the task of attributing current river contamination to current and historic sources, including tributaries, storm sewers, and adjacent properties..."	Source Delineation	Y
690	Steuart Investment Co.	As discussed in SIC's general comments, neither the Former Steuart Petroleum Company Terminal adjacent to the WGL East Station Site (Reach 123) nor the Former Gulf Oil Corporation (Gulf)/Steuart Petroleum Corporation Petroleum Terminal (Reach 123) should be listed as PECSes. SIC requests that they be deleted from the list of PECSes.	Source Delineation	N
692	Steuart Investment Co.	Table 2.7 does not identify potentially active source. The phrase "potentially active" should be deleted.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
696	Steuart Investment Co.	The Former Steuart Petroleum Property should not be a PECS and should be removed from Table 2.7. If the Former Steuart Petroleum Property is not removed, the bullets for F-336-622, F-758-282, and Source Assessment Results should be removed as the two outfalls are not associated with the Former Steuart Petroleum property.	Source Delineation	N
705	Steuart Investment Co.	As discussed in SIC's general comments, the Former Gulf Terminal is not connected to the sewer line running underneath S Street. SIC requests that the line running from the Former Gulf Terminal to M-424-783 in Figure 3.30 be removed.	Source Delineation	N
706	Steuart Investment Co.	As discussed in SIC's general comments, a number of sources west of the Former Gulf Terminal are connected to the sewer running underneath S Street at points upgradient to M-424-783, including PEPCO Buzzard Point, Super Salvage, and the DC Soccer Stadium, as indicated in the DC Water map attached as Attachment E to SIC's general comments. Figure 3.30 should be expanded to include these sources.	Source Delineation	N
707	Steuart Investment Co.	Steuart Petroleum and Washington Gas Light Company are identified as the sample location description for outfall NDPES 017. As discussed in SIC's general comments, the sample location for Outfall NPDES 017 is not associated with former Steuart Petroleum property. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N
708	Steuart Investment Co.	Steuart Petroleum and Washington Gas Light Company are identified as the sample location description for Outfall F-405-220. As can be seen in Figure 3.16, the sample location for Outfall F-405-220 is upriver from, and therefore is not associated with the former Steuart Petroleum property. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N
709	Steuart Investment Co.	Steuart Petroleum and Washington Gas Light Company are identified as the sample location description for outfall NDPES 017. As discussed in SIC's general comments, the sample location for Outfall NPDES 017 is not associated with Steuart Petroleum. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N
710	Steuart Investment Co.	Steuart Petroleum and Washington Gas Light Company are identified as the sample location description for Outfall F-405-220. As can be seen in Figure 3.16, the sample location for Outfall F-405-220 is upriver from, and therefore is not associated with the former Steuart Petroleum property. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
711	Steuart Investment Co.	Washington Gas and Steuart Petroleum are identified as the sample location description for outfall NDPES 017. As discussed in SIC's general comments, the sample location for Outfall NPDES 017 is not associated with Steuart Petroleum. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N
712	Steuart Investment Co.	Washington Gas and Steuart Petroleum are identified as the sample location description for Outfall F-405-220. As can be seen in Figure 3.16, the sample location for Outfall F-405-220 is upriver from, and therefore is not associated with the former Steuart Petroleum property. Steuart Petroleum should be removed from the sample location description.	Source Delineation	N
713	Steuart Investment Co.	This section describes a sample location adjacent to the former Gulf/Steuart Bulk Oil Facility that exhibited strongly elevated Factor 3 scores. As discussed in SIC's general comments, no sampling was done from a location associated with the Former Gulf Terminal. The reference to the former Gulf/Steuart Bulk Oil Facility should be removed.	Source Delineation	N
714	Steuart Investment Co.	This section describes samples in the vicinity of the former Gulf/Steuart Bulk Oil Facility that were intermediately elevated. As discussed in SIC's general comments, no sampling was done from a location associated with the Former Gulf Terminal. The reference to the former Gulf/Steuart Bulk Oil Facility should be removed.	Source Delineation	N
715	Steuart Investment Co.	This section describes samples in the vicinity of the former Gulf/Steuart Bulk Oil Facility for which Factor 5 was elevated. As discussed in SIC's general comments, no sampling was done from a location associated with the Former Gulf Terminal. The reference to the former Gulf/Steuart Bulk Oil Facility should be removed.	Source Delineation	N
716	Steuart Investment Co.	The table states that the Former Steuart Petroleum Company applied for DOEE Voluntary Cleanup Program as of 11/21/2016. The Steuart Petroleum Company did not apply for DOEE Voluntary Cleanup Program status for the property at 1333 M Street SE. The table should be corrected with the name of the party that applied for VCP status.	Source Delineation	N
718	Steuart Investment Co.	As discussed in SIC's general comments, the Former Steuart Petroleum Company Terminal adjacent to the Washington Gas Light (WGL) Former East Station Site Manufactured Gas Plant (Reach 123) and the Former Gulf Oil Corporation/Steuart Oil Company former petroleum terminal (Reach123) should not be identified as PECSes. These sites should be removed from the list of PECSes in this report.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
719	Steuart Investment Co.	This section describes two manhole samples that exhibited strongly elevated metals scores as being "near the Washington Navy Yard and the Former Hess and Gulf/Steuart Bulk Oil Facilities." As discussed in SIC's general comments, no sampling was done from a manhole that would have received discharges from the Former Gulf Terminal. The reference in this section to the Gulf/Steuart Bulk Oil Facility should be deleted.	Source Delineation	N
720	Steuart Investment Co.	As discussed in SIC's general comments, the Former Steuart Petroleum Company Terminal adjacent to the Washington Gas Light (WGL) Former East Station Site and the Former Steuart Petroleum Company/Gulf Oil Corporation (Gulf) Terminals should not be identified as PECSes. These sites should be removed from the list of PECSes in this report.	Source Delineation	N
722	Steuart Investment Co.	"...The RFS identifies 15 potential environmental cleanup sites ("PECSes"), including a former Gulf petroleum terminal located at 1721 S. Capital Street (the "Former Gulf Terminal") and a former petroleum terminal located at 1333 M Street (the "M Street Property").3 Neither of these properties should be identified as a PECS. The RFS describes PECSes as "potential sources of contamination to the study area." RFS at 10. The RFS states that the PECSes are: (1) "known to have released hazardous substances or petroleum"4 and (2) are "likely active contaminant sources."5 It should not be enough for a source to be a PECS because it has had an on-site release of petroleum that could not be a source of contaminants of concern and does not impact cleanup of the Anacostia River. If the contaminants of concern are limited to five classes of chemicals, then PECSes should be limited to sources of those chemicals in the Anacostia River. Otherwise, there is no reasonable connection between a PECS and the remedial activities planned for a site, which would be arbitrary and capricious..."	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
723	Steuart Investment Co.	If the RFS includes the Former Gulf Terminal and M Street Property as PECSes only because they are “sites where current or historical activities have included the storage, handling, use, or potential release of hazardous substances or petroleum products,” RFS at 9, then the RFS’ list of PECSes is significantly under-inclusive. The Anacostia River study area includes an historically industrialized river valley containing numerous sites where current or historical activities have included the storage, handling, use, or potential release of hazardous substance or petroleum products. Without adequate justification, the inclusion of some properties and the exclusion of others makes the RFS' analysis of PECSes arbitrary and capricious.6 Even if the definition is limited to “upland sites that abut the tidal river,” RFS at 7, most of the property abutting the nine- mile Anacostia River study area would fall within the definition of a PECS.7 As a result, if the Former Gulf Terminal and M Street Property are not removed from the list of PECSes in the RFS then the list must be expanded to include all properties where current or historical activities have included the storage, handling, use, or potential release of hazardous substances or petroleum products at any point during the history of the property; this would bring into the RFS virtually every property in the study area. DOEE is right to use reasonable criteria to bring in only those properties for which there is evidence of current contributions of contaminants of concern to the river. Based on those criteria both the Former Gulf Terminal and the M Street Property should be removed from the RFS.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
724	Steuart Investment Co.	The RFS states that its source identification "builds on the proximate assessment presented in Section 12.2 of the Rl Report." RFS at 29. The cited discussion in the draft and final Remedial Investigation Report does not support source identification. It only identifies which, of a predetermined list of sources, is within a certain distance to river sediment identified as having elevated levels of certain contaminants. The reasons why the Remedial Investigation Report's discussion of which properties were "proximate" to contamination cannot be used to meaningfully support a source identification are discussed in more detail in SIC's comments on the draft Remedial Investigation Report, which are incorporated by reference herein. The RFS' reliance on groundwater modeling from the Groundwater Modeling Report is also inappropriate. As discussed in more detail below, the groundwater modeling conducted by Tetra Tech in the Groundwater Modeling Report supports the conclusion that the Former Gulf Terminal is not a source of river sediment contamination. More generally, however, the Groundwater Modeling Report does not provide a line of evidence to support source identification for the contaminants of concern in the RFS. As the Groundwater Modeling Report acknowledges, it models the transport of contaminants of concern that would not behave similarly to benzene in groundwater. See Groundwater Modeling Report at 1.	Source Delineation	N
736	Steuart Investment Co.	"...Figure 3.30 in the MSI identifies outfall F-936-752 as connected to a storm sewer line running along S Street SW and accessed by manholes M-533-781 and M-424-783, which are located immediately upstream from the outfall in S Street at the intersection of S Street and Water Street SW. Figure 3.30 further indicates two tie-ins from the Former Gulf Terminal to the S Street sewer line, one at M-424-783 and one further downstream at the intersection with South Capitol Street. The field reports from the MSI indicate that manhole M-424-783 was field identified in S Street on July 11, 2017, and sampled on August 1, 2017. This is not possible. Manhole M-424-783 and the associated sewer line were removed in 2016 during the construction of Audi Field. This can be seen from the current DC Water map (attached as Attachment E), which does not show either M-533-781 or M-424-783. A new sewer line was put in its place, with manholes M- 320-820 and M-410-820 in the approximate locations of former manholes M-533-781 and M-424- 783. See Attachment E, Current DC Water map. This suggests that the manhole sediment sample was actually collected from M-410-820 not M-424-783..."	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
737	Steuart Investment Co.	Figure 3.30 not only improperly connects sediment in the S Street sewer line to the Former Gulf Terminal, it also misleadingly indicates no other connections to the sewer line. As can be seen in the current DC Water map, however, the sewer line receives flow from numerous sources west of the Former Gulf Terminal, including likely sources of PCBs, such as the Potomac Electric Power Company Buzzard Point Station,11 Super Salvage, and the Combined DC Soccer Stadium site (VCP Case 2015-031).12 Figure 3.30 should be revised to include the sources that are upgradient from the sampled manhole, including sites to the west that are potential sources of contaminants of concern for the RFS and FFS.	Source Delineation	N
738	Steuart Investment Co.	Table 4.17 describes NPDES 017 as an outfall associated with "Washington Gas" and "Steuart Petroleum," indicating that DOEE is attributing sediment sampled for this outfall to the WGL and the M Street Property. The sampling point identified in the report, however (MH-017- 434-323), is several blocks upgradient from the M Street Property. As shown in Figure 3.16, the sampling point for NPDES 017 was on Ives Place SE, approximately 1,000 feet northeast of the M Street Property. See also Attachment G (showing location of the M Street Property relative to Figure 3.16). As a result, the M Street Property could not reasonably have contributed to the contamination found in this sediment sample. Because there was no sediment sample for outfall NPDES 017 taken from a sewer line downgradient from the M Street Property, the sampling results for outfall NPDES 017 cannot be attributed to the M Street Property and this line of evidence should be removed from the RFS, FFS, and CSA.	Source Delineation	N
741	Steuart Investment Co.	The draft RIR identified 14 sites bordering the tidal Anacostia River at which cleanup work was either completed, underway, or contemplated, and which the draft RIR identified as PECSes. One was a combination of two separate and unrelated facilities: the "Former Steuart Petroleum Company/Hess Oil Corporation (Hess)/Gulf Oil Corporation (Gulf) Petroleum Terminals." In the current RIR, these facilities are separated into the "Former Hess Oil Corporation (Hess) Petroleum Terminal" and the "Former Steuart Petroleum Company/Gulf Oil Corporation (Gulf) Terminals." SIC appreciates removal of the former Steuart Petroleum/Gulf Oil terminal from the Hess PECS.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
742	Steuart Investment Co.	"The former Gulf/Steuart Petroleum facility consists of two properties, neither of which is a potential source of contamination in the Anacostia River. The first property, located at 1721 S. Capitol Street SE, is not adjacent to the Anacostia River. The District's own environmental consultant concluded that, for this property, "GW flow in monitoring reports is shown generally to the west (away from the river)."15 The property has also been remediated, including the installation of a pump-and-treat system in 1987 and a packaged groundwater treatment system in 1997, which was discontinued with agency approval after completion of the free phase petroleum recovery process.16 A tenant at the property currently operates a state-of-the-art stormwater retention system. In the same MACTEC Report that is cited in the RIR, MACTEC reported that "[rjesidual contamination appears to be localized and not persistent throughout the vadose zone." The site has been extensively monitored since 2005 with no data indicating the potential to contribute to contamination of the Anacostia River, and enhanced attenuation of remaining contaminants is ongoing, consistent with a DOEE-approved Corrective Action Plan that includes ongoing monitoring and in-situ introduction of oxidants into monitoring wells to enhance natural biodegradation..."	Source Delineation	Y
112	Navy	Consider focusing future investigations on risk-driving chemicals only to better support development of an effective source control strategy.	Source Delineation	N
119	Navy	The source ID analysis is based on a different set of chemicals than the ones identified as risk drivers, with the exception of PCB congeners. The report states that "understanding the sources of indicator (non-risk driving) chemicals can inform the identification of the soures of the risk-driving chemicals." However, the report does not explain how the results do in fact inform the identification of sources for risk-driving chemicals. It seems that a much simpler analysis of contaminant concentration gradients in surface sediment for risk-driving chemicals only and differentiation of hot spots as distinct from the overall urban background signature in surface sediment would provide more useful information for developing a source control strategy.	Source Delineation	N
635	Pepco & WG	Section 4.1 p. 12: The CSAR states that "the R-Mode analysis is purely objective" however the restriction in COIs evaluated is not fully explained. The limitations in COIs evaluated in the R-mode factor analysis are prejudgments which affect the outcome of the analysis and reduce its overall objectivity	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
636	Pepco & WG	Section 2.3: Potentially risk driving COIs such as pesticides and dioxins were excluded from the R-mode FA, and no explanation was provided for their exclusion. These COIs were identified as among the five contaminants of concern (COCs) of Section 1.2 of the FS and in the ARSP baseline human health and ecological risk assessments. Dioxins were carried forward in the FS analysis but excluded in the FA. Although chlordane was excluded based on presumed co-location with PCBs in the FS, this should be confirmed in the FA analysis as another line of evidence.	Source Delineation	Y
637	Pepco & WG	Section 4.1.1 regarding data preparation states the list of PCB congeners processed was initially restricted to 19 congeners (from the laboratory reported 160 unique congeners or co-eluter congeners) that were regarded as “reasonably representative” of the “PCB Aroclors typically observed in the ARSP Study area sediment.” This assumption is questionable without further evidence that analysis was appropriate for the separately processed manhole and tributary sediment datasets, which may include other sources of PCBs. These other PCB sources could include both Aroclors not presumed to be present, and non-Aroclor manufacturing by-product PCB congeners. Only 15 congeners or co-eluting congeners were used in the final data matrix, which represents just 9% of the 160 congeners or co-eluting congeners reported by the laboratory. This drastic reduction in complexity of the dataset processed may have significantly impacted the R-mode FA output, especially given that only 7% of the variance was captured in Factor 3 (PCBs). The reduced congener set complexity certainly would be insufficient for future Q-mode analysis of source pattern end member identification. The CSAR lacks validity unless the impact of this drastic dataset reduction is explored by additional data processing and sensitivity analysis.	Source Delineation	Y

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
9	MDE	The Source Control Strategy (SCS) is defined in the RFS, which will only be implemented if the actions of the PP/FFS are unsuccessful in achieving the RAOs. The Department recommends including language in the PP/FFS describing the source control efforts that are already underway. For example, the Department has already begun the process of identifying and controlling PCB sources within the Maryland portion of the Anacostia River watershed. This is being done in coordination with the counties through Phase I MS4 implementation, Department-led source track-down efforts, and other State regulatory mechanisms. Maryland will continue to coordinate with Washington, D.C. and provide updates on progress through reporting and presentations to the Anacostia Leadership Council and Source Control Workgroup.	Source Delineation	N
13	MDE	Section 2.7.2 (“Source Control Strategy) states that the Source Control Strategy (SCS) will be developed in coordination with other federal, state, and local environmental agencies. This section outlines a framework that will require the development of a governing workplan and sub-basin prioritization strategy, as well as supporting documentation for laboratory analyses and field sampling. The Department has already initiated its source control efforts and is fully committed to coordinating their efforts with DOEE. At this moment, the agency cannot commit to the detailed framework described in the RFS, as it seems specific to source control efforts in Washington, D.C. The Department suggests that the RFS describe the SCS in less specific terms.	Source Delineation	N
118	Navy	Recommend that source tracking is not limited to areas upstream of manholes that yielded sediment with elevated concentrations. Additional source identification work should consider proximity to river sediment hotspots and data gaps where mutliple manholes were not sampled due to elevation relative to MSL.	Source Delineation	N
326	Anacostia Riverkeeper	The Focused Feasibility Study Report (TetraTech Dec. 2019) issued by DOEE in support of the Early Action Proposed Plan states at p. ES-1 that DOEE’s “interim ROD approach” will include, in addition to the specified early actions, “source control activities”. These are essential to prevent recontamination, but they are not identified in the Proposed Plan. Informal discussions with DOEE staff, including with Dev Murali at the February 4, 2020, public meeting, indicated that DOEE plans to initiate such source control measures at known active PCB source areas such as Lower Beaverdam Creek, soon after issuance of the Early Action ROD. That ROD should specify what those source control measures will be, and the time frame under which they will be initiated and carried out.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

Comment Number	Stakeholder Name	Comment Text Sample (All or Abridged)	Comment Theme Assignment	Abridged (Y/N)
341	Anacostia Watershed Community Advisory Committee	In order to achieve the goals of this project, complimentary work needs to be carried out in the Maryland portion of the river. Please document and publish efforts to enlist cooperation/collaboration of efforts with Prince George's County, Montgomery County, the State of Maryland.	Source Delineation	N
449	DC Appleseed	A preliminary schedule should be provided for both the Source Control Strategy document itself, and the individual sub-basin work plans. The sub-basins for which the sub-basins will be developed should also be identified, along with a preliminary indication of their relative priorities.	Source Delineation	N

Complete stakeholder comments: www.dropbox.com/sh/8pztasr6y1976u7/AACK9ejVrWrLeW7mBfpuC_kWa?dl=0

APPENDIX B. RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

PROPOSED PLAN FOR EARLY ACTION AREAS IN THE MAIN STEM, KINGMAN LAKE, AND WASHINGTON CHANNEL

ANACOSTIA RIVER SEDIMENT PROJECT, WASHINGTON, DC

SEPTEMBER 30, 2020

ANACOSTIA RIVER SEDIMENT PROJECT
DEPARTMENT OF ENERGY AND ENVIRONMENT

DEPARTMENT OF ENERGY & ENVIRONMENT

GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

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ABBREVIATIONS AND ACRONYMS

AST	Aboveground storage tank
ADCP	Acoustic Doppler Current Profiler
IR	Aerial infra-red
ARSP	Anacostia River Sediment Project
ART	Anacostia River Tunnel
AWCAC	Anacostia Watershed Community Advisory Committee
ARAR	Applicable or Relevant and Appropriate Requirement
BTV	Background threshold value
BERA	Baseline Ecological Risk Assessment
BaPE	Benzo(a)pyrene equivalent
CSS	Combined sewer system
CAGs	Community Advisory Groups
CA	Community Ambassador
CIP	Community Involvement Plan
CERCLA	Comprehensive Environmental Recovery, Compensation, and Liability Act
CSM	Conceptual site model
COCs	Constituents of concern
CWG	Consultative Work Group
CSAR	Contaminant Source Assessment Report
CAS	Creel/angler survey
CBR	Critical body residue
CSX	CSX Transportation, Inc
DCA	DC Appleseed
Navy	Department of the Navy
DOEE	District Department of the Environment
DCBRA	District of Columbia Brownfields Revitalization Act
NRA	DOEE Natural Resources Administration
EAA	Early action area
RAL_{EAA}	Early action remedial action level
EPBC	Eastern Power Boat Club
ESV	Ecological screening values
EMNA	Enhanced managed natural attenuation
EMNR	Enhanced managed natural recovery
FA	Factor analysis
FS	Feasibility study
FNC	Federal navigation channel
FIR	Fish tissue ingestion rate
FI	Fraction ingested
Foc	Fraction Organic Carbon
G	Gram
g/day	grams per day
HHRA	Human health risk assessment

ICs	Institutional controls
LCCAR	Leadership Council for a Cleaner Anacostia River
LNAPL	Light non-aqueous phase liquid
MNA	Managed natural attenuation
MNR	Managed natural recovery
MDE	Maryland Department of the Environment
MDL	Method detection limit
µg/kg	Microgram per kilogram
M	million
ng/L	Nanogram per liter
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
NGO	Non-governmental organization
OU	Operable unit
O&M	Operation and maintenance
Foc	Organic carbon fraction
PMWP	Performance monitoring work plan
PCB	Polychlorinated biphenyls
PAH	Polycyclic aromatic hydrocarbons
PECS	Potential Environmental Cleanup Sites
PRP	Potentially responsible parties
PRG	Preliminary remediation goal
PG County	Prince George’s County, MD
ROD	Record of Decision
RAL	Remedial action level
RAO	Remedial action objectives
RI	Remedial investigation
RAL_{RW}	River-wide remedial action level
SIC	Steuart Investment Company
SWAC	Surface-weighted average concentration
TEQ	Toxic equivalent
USACE	U.S. Army Corps of Engineers
EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UMD	University of Maryland
UMBC	University of Maryland Baltimore County
WGL	Washington Gas Light
WNY	Washington Navy Yard
WSCC	Washington Suburban Sanitary Commission
WRDA	Water Resources Development Act of 2020

B.1.0 OVERVIEW

This responsiveness summary, the third component of the Anacostia River Sediment Project (ARSP) Interim Record of Decision (ROD), summarizes information about the views of the public, and the responses of the District Department of Energy and the Environment (DOEE), regarding the Preferred Alternative selected for early action sediment remediation in the ARSP study area. A responsiveness summary is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 C.F.R. § 300.430(f)(3)(F). Members of the public submitted comments on the Preferred Alternative during the public comment period. This responsiveness summary documents how DOEE considered the public comments and how they were integrated into the decision-making process.

B.1.1 SITE DESCRIPTION

The ARSP includes the lower, approximately 9-mile tidal portion of the Anacostia River. The tidal river watershed (the adjacent upland area around the river) encompasses approximately 176 square miles in the District of Columbia and two Maryland counties (Montgomery and Prince George's) (**Figure B.1.1**). **Figure B.1.2** shows the portion of the study area that contains the 11 early action areas (EAAs) that are the subject of this remedy. Collectively, the 11 EAAs encompass 77.2 acres of the 815-acre study area. Three operable units (OUs) are defined in the study area and include the Main Stem OU, Kingman Lake OU, and Washington Channel OU. Two EAAs (26.9 acres) are in the Washington Channel OU, three EAAs (6.2 acres) are in the Kingman Lake OU, and six EAAs (44.1 acres) are in the Main Stem OU.

Potential Environmental Cleanup Sites. Figure B.1.2 shows the Potential Environmental Cleanup Sites (PECSes) which could potentially have areas of contaminated sediment in the river in proximity to their property boundaries. A PECS is defined as an upland site that abuts one of the study area waterbodies and is a site where current or historical activities include or included the storage, handling, use, or potential release of hazardous substances or petroleum products. Currently, 15 PECSes have been identified within the ARSP study area, but DOEE may identify and add more sites as information becomes available.

Environmental investigations and/or cleanups are being performed under existing legal agreements (separate from the ARSP) at three PECSes in the Main Stem OU: Pepco Benning Road Facility (Pepco), Washington Gas Light East Station (WGL), and Washington Navy Yard (WNY). A fourth PECS (CSX Transportation, Inc [CSX] Benning Yard) is also being cleaned up under separate agreement. DOEE is in negotiations with CSX regarding additional sediment investigations at this site. DOEE, the National Park Service (NPS), and the U.S. Environmental Protection Agency Region 3 (EPA) have lead or support agency authority over these cleanups. These PECSes (and the other 12 identified PECSes) are potential sources of contamination to the study area. DOEE intends for remedies ultimately selected for all PECSes and for other contaminant sources to be aligned with remedies selected for the ARSP study area. No remedial decisions have been made yet for contaminated river media impacted by the Pepco, WGL, and the WNY sites. DOEE has, is currently, and will continue to evaluate the investigative findings at these sites under their respective agreements, in its capacity as lead and/or support regulatory agency. DOEE will take steps to ensure that appropriate remedies are selected for these sites, whether under their respective agreements, under the ARSP Interim ROD or eventual ARSP Final ROD, or the foregoing in combination.

Tributaries and Outfalls: Water and sediment flow into the study area from 14 tributary streams and many municipal outfalls. The three largest tributaries are Northwest Branch, Northeast Branch, and Lower Beaverdam Creek, which together contribute 94 percent of the total flow of the Anacostia River. In addition to the tributaries, 16 combined sewer system (CSS) outfalls and 136 municipal separate storm sewer system outfalls contribute or have contributed previously to water and sediment to the river. Two industrial outfalls regulated via the EPA national pollution discharge elimination system are active in the study area and include an outfall at the Pepco Benning Road PECS and an outfall at the WNY PECS. Outfall inputs are the subject of ongoing investigations of their influence on long-term remediation and management of the Anacostia River. The objectives of these investigations are the identification and management of contaminant sources in the upstream watershed. In addition, as part of the Long Term Control Plan developed in accordance with the 2005 consent decree between the U.S. Government, the DC Water and Sewer Authority (DC Water), and the District, DC Water completed construction in March 2018 of a tunnel and pumping system that substantially reduces CSS outfall discharges by collecting and storing excess storm water flows for treatment at the DC Water Blue Plains Advanced Wastewater Treatment Plant. With the startup of the Clean Rivers Project Anacostia River Tunnel (ART) in March 2018, the DC Water estimates that discharges from the 16 CSS outfalls to the Anacostia River have been reduced thus far by more than 90 percent.

Federal Navigation Channel: The existing federal navigation channel (FNC) extends through the Main Stem and Washington Channel OUs. The U.S. Army Corps of Engineers (USACE) has been responsible for authorizing and maintaining the depth and width of the channel so that commercial river traffic, defined as river traffic associated with commodity production, could move freely. Commercial traffic associated with commodity production no longer uses the Anacostia River, and the USACE has informed DOEE that it no longer intends to actively dredge the channel. In the context of the ARSP, DOEE has worked with the office of Congresswoman Eleanor Homes Norton (D-DC), the USACE (Baltimore Section and Headquarters), the DC Office of Federal and Regional Affairs, and stakeholders to develop a proposal for partial deauthorization that modifies a portion of the FNC. As a result of the July 2020 U.S. House version of the Water Resources Development Act of 2020 (WRDA of 2020), the proposed modification of the FNC in the Anacostia River is as follows:

Location (Reach)	Final Dimensions	Previous Dimensions
Buzzard Point to 11th Street Bridge	15 feet deep/ 300 feet wide	24 feet deep/400 – 800 feet wide
11th Street Bridge to 200 meters downstream of Sousa Bridge (Station 0+000)	15 feet deep/ 200 feet wide	24 feet deep/200 - 600 feet wide

Areas of the FNC where the authorized depth will remain unchanged include:

- The Washington Channel (24 feet deep/200 feet wide)
- The mouth of the Anacostia River to Buzzard Point (24 feet deep/400 feet wide)
- The area 200 meters downstream from the Sousa Bridge (Station 0+000) to Bladensburg, Maryland (8 feet deep/60 feet wide)

Site History and Ongoing Contamination: The contaminated sediment deposited in the Anacostia River originated from many sources over the years. Recent modeling shows that most sediment now comes from upstream tributaries, with smaller loads from municipal storm sewer and combined sewer outfalls into the river. Contaminants may also be transported in groundwater seeping into the river from adjacent upland properties, such as the PECSes identified above. DOEE is currently investigating the transport of groundwater-borne contamination into river sediment. **Figure B.1.3** provides the conceptual site model for the ARSP, which illustrates the physical, chemical, and biological processes that govern the movement of contaminants and their potential exposure routes to various human or ecological receptors.

B.1.2 NATURE AND EXTENT OF CONTAMINATION

The baseline human health and ecological risk assessments, documented in the ARSP RI Report (Tetra Tech 2019a), identified contamination that posed risks to people and ecological receptors. For the Interim ROD early actions, DOEE defined the human health target risk level at 1E-05 (one-in-one hundred thousand), which represents the midpoint of the EPA-defined range of acceptable risk (1E-04 to 1E-06). DOEE selected 1E-05 as the target risk level for several reasons: (1) compliance with EPA guidance; (2) technical feasibility of achieving protective sediment concentrations; (3) timeliness of remediation; (4) control of contaminant migration into lower contaminant concentration areas, and (5) costs. The ecological risk level was defined by consensus based probable effect concentrations in sediment. Four constituents of concern (COC) were identified for purposes of the Interim ROD: total polychlorinated biphenyl (PCB) congeners (human health), dioxin-like PCBs (human health and ecological), and dioxin TEQ (ecological), and chlordane (ecological).

Although the Interim ROD EAAs are designed to address the risk to human health from PCBs, risks are posed to ecological receptors by chlordane. Cleaning up to human health RALs would address the more limited risk to ecological receptors associated with dioxin-like PCBs and dioxin TEQ, as well as much of the chlordane (which is not strongly collocated with other COCs). Although chlordane is not a risk-driver for human health at the 1E-05 risk level, the early action will reduce risk posed by chlordane to ecological receptors in the Main Stem and in Kingman Lake OUs. In Washington Channel, which already met the chlordane preliminary remediation goal (PRG), the early action will reduce the chlordane surface weighted average concentration (SWAC). The anticipated reductions in chlordane concentrations throughout the tidal Anacostia River will be confirmed during the post-remediation baseline monitoring and long-term performance monitoring, which will include measures to refine DOEE's understanding of chlordane's residual effect on benthic and aquatic invertebrates. Post-remediation baseline monitoring and long-term performance monitoring sample collection, sampling approaches, laboratory analyses, and environmental media considered will be documented in the Performance Monitoring Work Plan, discussed in **Section B.3.1** of this document.

The 11 EAAs that are covered by the Interim ROD were defined as sediments exceeding a total PCB congener concentration of 600 µg/kg. DOEE selected this remedial action level (RAL) by determining the acreage of river bottom that would be included at cleanup to various concentrations (or remedial action levels [RALs]) and considering the amount of incremental risk reduction that theoretically would be achieved at each RAL. Specifically, cleaning up to an RAL less than 600 µg/kg resulted in only a negligible increase in risk reduction (please see additional discussion in **Section B.3.6.6**).

B.1.3 PREFERRED ALTERNATIVE

The various remedial alternatives evaluated in DOEE's selection of the Preferred Alternative are described in the Decision Summary (Part 2 of this document), which includes a summary of the remedial screening process. The EAAs are distributed throughout each of the three OUs. The Preferred Alternative for each OU is as follows:

- Main Stem (six EAAs totaling 44.1 acres): Containment with Selective Dredging and Disposal
- Washington Channel (two EAAs totaling 26.9 acres): Containment
- Kingman Lake (three EAAs totaling 6.2 acres): Containment by TLCP with Selective Dredging and Disposal

The Preferred Alternative for each EAA meets the nine NCP threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. DOEE expects the Preferred Alternative to satisfy the following statutory requirements of the District of Columbia Brownfields Revitalization Act (DCBRA) § 8-634.01 and the statutory requirements of the Comprehensive Environmental Recovery, Compensation, and Liability Act (CERCLA) §121: (1) be protective of human health and the environment; (2) comply with Applicable or Relevant and Appropriate Requirements (ARARs) (or justify a waiver); (3) be cost-effective; (4) use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element or explain why the preference for treatment will not be met. In addition, the Preferred Alternatives for the 11 EAAs are consistent and will not preclude implementation of the final remedy selected for the ARSP study area.

B.1.4 LEVEL OF COMMUNITY SUPPORT FOR THE PREFERRED ALTERNATIVE

A broad range of stakeholders including commercial entities, governmental agencies, non-governmental organizations, and private citizens provided comments on the Proposed Plan and related documents. Overall, stakeholders agree with the Interim ROD approach consisting of early action sediment remediation (i.e., the Preferred Alternative in each OU) coupled with source control and post-early action remedy data collection driving an adaptive management decision framework. Most agree that the uncertainties identified in the conceptual site model are better addressed through the adaptive management decision framework.

The public expressed a strong desire for protection and enhancement of wildlife habitat and wetlands while also indicating a desire for increased water depth for recreational boating. Stakeholders indicated approval that EAAs are defined in Kingman Lake, which they indicate is an important area of habitat and riparian buffer, providing benefit to wildlife and the community. They regard the protection and nurturing of this important and sensitive habitat as a valuable objective that is complimentary to the reduction of human risk. In addition, they note that areas disturbed in any of the three OUs due to project activities should be restored using native plants in a manner that maximizes wildlife habitat value and carbon sequestration.

B.1.5 CHANGES TO THE PREFERRED ALTERNATIVE

DOEE identified the Preferred Alternative ("preferred alternative" here refers to the alternatives defined separately for each OU) by following the CERCLA process for detailed screening of the various remedial alternatives developed in the River-wide FS. In the Proposed Plan, DOEE presented the Preferred Alternative, which was selected through evaluations of the alternatives against seven of the nine NCP criteria. These seven criteria are the threshold and balancing criteria defined in the Decision Summary (Part 2). Alternative assessment regarding the final two criteria (i.e., the modifying criteria) requires public feedback on the Preferred Alternative. This feedback was provided in written stakeholder comments and verbally at public meetings. **Section B.2.2** summarizes DOEE's interaction with the public throughout the ARSP as the Proposed Plan was developed.

Since releasing the Proposed Plan, DOEE elected to change the preferred alternative for Kingman Lake from KLHS-3 (EMNR with Direct Application of Activated Carbon) to KLHS-4 (Containment by TLCP with Selective Dredging and Disposal). DOEE is making this change after completing a review of the requirements for various District natural resource restoration projects that are either underway or are in the planning phase for Kingman Lake, and consideration of public comment. Some of these projects require an increase in the lake's water depth, which is inconsistent with KLHS-3 but can be accommodated by KLHS-4.

The change in alternative selection for Kingman Lake is consistent with public comments (DC Audubon Society, private citizens, Anacostia Riverkeeper, and Sierra Club) received on the Proposed Plan. As noted in the previous section, in the public comments DOEE received on the Proposed Plan, a strong desire was expressed for the protection and enhancement of wildlife habitat and wetlands and for increased water depth for recreational boating. The DOEE Natural Resources Administration (NRA) is engaged in several projects focused on restoring various environmental resources related to the surface water bodies in the District including the three OUs that comprise the ARSP study area. The projects include wetland preservation and restoration, shoreline restoration, re-establishment of mussels, expansion of submerged aquatic vegetation, and restoration of natural habitat for a range of animal species. In addition, in July 2017, the District published a proposal for development of Kingman Island and Heritage Island to include the construction of outdoor classroom platforms, boat docks, boardwalks, channels, and habitat restoration areas in Kingman Lake. Effective habitat restoration and facilitating access to the restoration areas through channel construction will require localized increases in the water depth of Kingman Lake.

DOEE's consideration of the objectives for the restoration projects planned for Kingman Lake necessitated the reconsideration of the selected remedy for this OU. Placement of carbon amendment in the EAAs in accordance with KLHS-3, although effective in addressing the presence of elevated PCB concentrations, would not be compatible with the planned channels which will be installed in the same general areas as the EAAs. To avoid installing a remedy that could need to be removed to accommodate future use requirements, DOEE changed the remedy to KLHS-4. KLHS-4 was evaluated in the detailed analysis of alternatives in the Focused Feasibility Study and was determined to meet the threshold requirements of protection of human health and the environment and compliance with requirements determined to be applicable or relevant and appropriate to its actions. KLHS-4 was also determined to provide an adequate balance between the NCP criteria of long- and short-term effectiveness and implementability in proportion to its cost and was included as an alternative in the Proposed Plan. Therefore, KLHS-4 meets the criteria for selection as an interim remedy. Since the dredging included in KLHS-4 can be done to ensure consistency of the remedy with the water depth objectives of the Kingman Island and Heritage Island project, KLHS-4 is the preferred remedy. The portions of the EAAs that could be traversed by future channels can be dredged to 6 feet or other specified depth and the remaining portions of the EAAs dredged to a 2-foot depth consistent with KLHS-4. Making sure that the selected Kingman Lake OU remedy is in harmony with future use objectives avoids restricting future uses and/or potential disruption to the remedy.

B.2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Information regarding the community living in proximity to the ARSP study area is provided in this section. The Proposed Plan comment period and DOEE's engagement with stakeholders during the public comment period are also discussed.

B.2.1 COMMUNITY PROFILE

Four of the eight wards that comprise the District of Columbia border the study area. **Figure B.2.1** shows the locations of Wards 5, 6, 7, and 8 and the various land uses in the vicinity of the river. Land use includes many forms of urban and suburban uses. Wards 5 and 7 are located proximate to the upstream portion of the river and are more commercial and residential with some green space while Wards 6 and 8 are downstream and are more densely urbanized with less green space. In addition to bordering the river, Ward 6 also borders the western shoreline of Washington Channel.

The Anacostia River watershed in the District includes stakeholders of diverse socio-economic backgrounds. The total District of Columbia population (2020 data) is approximately 717,189 residents (DC Health Matters 2020[16]). **Table B.2.1** provides community profile information for Wards 5, 6, 7, and 8. Residents in Wards 5 and 6 tend to be older and wealthier than those in Wards 7 and 8. The percentages of residents younger than 18 are 19 and 17 percent in Wards 5 and 6 while residents in this age group make up 27 and 29 percent in Wards 7 and 8. With regard to mean household income, Wards 5 and 6 residents earn on average approximately $127,000 and $147,000, respectively. In comparison, the average incomes in Wards 7 and 8 are $62,300 and $50,000, respectively.

The fish tissue consumption rate for people who catch and consume fish from the Anacostia River is an important parameter considered in urban river cleanups (**Section B.3.9**). An ethnographic study by the University of Maryland (UMD) and NPS (UMD/NPS 2019) defines subsistence anglers as those who "consume and share" their catch, as compared to non-subsistence or recreational anglers who practice "catch and release." As noted in the UMD/NPS study, the predominantly African American wards (Ward 7 and Ward 8) of the District were referred to as "east of the river [Anacostia River]." In particular, the Ward 7 and Ward 8 neighborhoods in the vicinity of the river (Anacostia Community) represent the most historic and largest African American community in the District. The concentration of African Americans east of the Anacostia River is "a cumulative result of historic and contemporary policies, segregation, local and national programs, and forces of economic development including real estate markets"

16 www.dchealthmatters.org/?module=demographicdata&controller=index&action=index&id=130951&sectionId=935

(UMD/NPS 2019). African Americans represent the majority, likely a large majority, of the subsistence anglers (the subject receptor used to derive human health sediment PRGs) present along the Anacostia River (including Washington Channel).

B.2.2 COMMUNITY INVOLVEMENT ACTIVITIES BEFORE ISSUING THE PROPOSED PLAN

Community involvement activities for the ARSP are governed by the ARSP Community Involvement Plan, the latest version of which was released in December 2016 (DOEE 2016). Since the inception of the ARSP in 2013, DOEE's community involvement activities have consisted of releases of factsheets and information online, coordination of meetings with stakeholder groups, enlisting the services of Community Ambassadors, and provision of opportunities to the public for review of key project documents.

B.2.2.1 GENERAL INVOLVEMENT ACTIVITIES

Periodically, DOEE releases factsheets (as website posts, social media posts [Facebook and Twitter], or as handouts at meetings) and other similar materials to keep the public informed regarding general project status, progress achieved, and any significant developments. DOEE maintains a dedicated website (www.anacostiasedimentproject.com) for posting public meeting announcements and general information, soliciting public input and feedback (e.g., public surveys), and providing the repository for the documents comprising the administrative record for the project.

B.2.2.2 MEETINGS

Throughout the project, DOEE seeks public engagement by periodically convening public meetings with various groups of stakeholders and the general public. The meetings include project status meetings for the general public, Leadership Council for a Cleaner Anacostia River (LCCAR) meetings with LCCAR members and concerned governmental and nongovernmental organizations (selected by the office of the Mayor with DOEE consultation), and Consultative Work Group (CWG) meetings with the various governmental and private entities associated with the PECSes.

Meetings with the General Public. At key milestones prior to issuance of the Proposed Plan, DOEE convened ARSP public meetings to inform the general public of the current status and the timeline for completing the RI/FS, establishing the ROD, and overall cleanup of the river. The ARSP public meetings, held between 2014 and 2018, took place in venues close to metro stations and in the communities near the river. Each meeting was announced via the ARSP website, social media, and email notices to all stakeholders.

LCCAR Meetings. Established in 2015 by Mayor Muriel Bowser, the LCCAR serves as a multi-jurisdictional advisory group for the project. The council consists of 20 members comprised of officials from federal, state, and local government, representatives from environmental and other nongovernmental organizations, and representatives of communities adjacent to the Anacostia River. The council meets approximately quarterly beginning in September 2014 and is continuing to meet each quarter.

DOEE provided grant funding to a nongovernmental organization for document review, following the model of U.S. EPA funding for Community Advisory Groups (CAGs) at CERCLA sites. The purpose of this funding was to provide nongovernmental organizations and the general public with the appropriate technical expertise to review the technical documents developed in support on the ARSP Proposed Plan. DC Appleseed was awarded a document review grant in February 2018 to hire one or more technical consultant(s) to help DC Appleseed, as well as environmental and community organizations and the general public, to better understand the various technical documents being prepared under the ARSP. This grant enabled DC Appleseed to access technical expertise through the establishment of the Interim ROD. This approach is consistent with EPA's process of supporting CAGs in their review of highly technical documents. To further assist DOEE to fulfill some of its community engagement goals under the ARSP, an amendment to this grant was issued in May 2019 that requested DC Appleseed to increase outreach to Anacostia Corridor residents in Wards 7 and 8, so that residents better understand the various technical documents being prepared under the ARSP and heighten their awareness of the restoration planned for the Anacostia River. DC Appleseed engaged Community Ambassadors to assist with outreach around the ARSP.

CWG Meetings. In September 2016, DOEE and the National Park Service (NPS) launched the CWG consisting of DOEE, NPS, and various PECS parties that chose to participate. The principal participating members are Pepco, the Department of the Navy (Navy), DC Water and Sewer Authority (DC Water), Washington Gas Light (WGL), Washington Suburban Sanitary Commission (WSSC), and Prince George's County, Maryland (PG County). The purpose of the CWG was to provide a forum for sharing technical information and viewpoints pertaining to the RI/FS, coordinate efforts to identify additional PECS parties, and initiate a process for allocating costs. The CWG meetings, which in some cases were day-long sessions, provided the opportunity for DOEE to engage with the PECS parties and their consultants in detailed discussions of sampling results, data evaluation approaches, and technical conclusions. From these meetings, DOEE provided clarifications regarding data collection, analyses, and interpretation. In addition, the PECS parties, NPS, and DOEE shared views on various technical issues. The ascertainment of general acceptance by CWG members of the adaptive management approach for implementing site remedies was a key outcome from these discussions. Twelve CWG meetings occurred between September 2016 and August 2018. Beginning in late 2018, to ensure consistency in the information disseminated to the two stakeholder groups, DOEE opened the LCCAR meetings to the CWG. CWG meeting attendees had no formal speaking role. At present, CWG members continue to attend the LCCAR meetings, which continue quarterly.

Federal Partners Meetings. Following the issuance of the Draft FS Report (later, to become the River-wide FS Report) in April 2019, DOEE convened a series of approximately monthly meetings from May through October 2019, separate from the LCCAR and CWG meetings, for federal stakeholders to discuss implementing an adaptive management approach for the ARSP. The "federal partner" meetings included representatives from DOEE and various federal partners including EPA, NPS, USFWS, the Navy, and the National Oceanic and Atmospheric Administration (NOAA). These entities are either responsible for a PECS (Navy and NPS), oversee or assist in regulatory oversight of a PECS cleanup (EPA and NPS), or provide support to DOEE regarding remedial investigation and natural resource damage assessment at several PECSes (NOAA and USFWS). The additional purpose of the federal partners meetings was to facilitate coordination among these federal entities regarding PECS risk assessments, background concentration evaluations, and the establishment of preliminary remedial goals (PRGs). The topics covered in these meetings included the Interim ROD approach, results of the NPS background investigation (The Johnson Company [JCO] 2019), and various remedial action levels for total PCB congeners. Based in part upon consideration of these discussions, DOEE selected the Interim ROD approach consisting of early remedial actions, source control, and post remedial performance monitoring to inform an adaptive management decision framework.

B.2.2.3 PUBLIC DOCUMENT REVIEW BEFORE ISSUANCE OF THE PROPOSED PLAN

The process of public review and comment on ARSP documents is an important component of the project. Each review involves a broad range of stakeholders, including private citizens, non-governmental and governmental organizations, and commercial entities. DOEE solicited public feedback on the following documents before issuance of the Proposed Plan.

- Work Plan: public review from February – March 2014
- Phase 1 RI Report: public review from March – April 2016
- Draft RI Report: public review from March – April 2018

In addition to the above reviews, DOEE released the Draft FS Report (revised later to become the River-wide FS Report) for LCCAR and CWG comment at a special LCCAR meeting held on April 8, 2019. DOEE solicited high-level comments on the document from assembled stakeholders and combined the comments received into a series of comment themes. DOEE then convened LCCAR meetings on May 21, June 13, and August 2, 2019 for an open discussion of each of the comment themes. The themes included the following: adaptive management, Interim ROD/early action, river use/federal navigation channel (FNC), living shorelines/sediment reuse, Natural Resource Damage Assessment (NRDA), surface water model, ongoing sources/sub-operable units, reactive capping, background, fish consumption rate, and incomplete data. Views were aired regarding each of these topics. DOEE's decision for an Interim ROD approach was shared with the stakeholders at the August 2, 2019 LCCAR meeting and was proposed to the general public with the release of the Proposed Plan.

B.2.2.4 COMMUNITY INVOLVEMENT ACTIVITIES AFTER ISSUING THE PROPOSED PLAN

The Proposed Plan and supporting documents including the Focused FS Report, River-wide FS Report, Final RI Report, Surface Water Model Report, Manhole Sediment Investigation Report, Contaminant Source Assessment Report, and Groundwater Modeling Report were made available to the public on December 27, 2019. Access to each of these documents was established (and is currently maintained) in the project Administrative Record. Also, on December 27, 2019, hard copy versions of these documents were made available at two public libraries, Francis A. Gregory Neighborhood Library (Ward 7) and Rosedale Neighborhood Library (Ward 6).

A public comment period was held from December 27, 2019 until March 2, 2020. In addition, DOEE convened four public meetings to present the Proposed Plan, explain the Interim ROD approach, and answer stakeholder questions. The meetings occurred between January 23 and February 4, 2020, with one held in each of the four wards bordering the Anacostia River and Washington Channel. In all, more than 200 persons attended the Proposed Plan public meetings. Each meeting was electronically documented (video and/or audio recordings). Representatives from DOEE addressed stakeholder questions, which covered a range of topics including, but not limited to, early action area delineations, risk reduction, adaptive management, the Interim ROD approach, and end use of the study area following remediation. Verbal and written comments were collected during the public comment period. DOEE's responses to the comments received were sorted by theme (**Appendix A**) and are included in this Responsiveness Summary, which is part of this Interim ROD.

B.3.0 COMPREHENSIVE SUMMARY OF MAJOR QUESTIONS, COMMENTS, AND CONCERNS AND DOEE RESPONSES

In total, the District Department of Energy and Environment (DOEE) received 850 (exact total) comments from 23 individual stakeholders and 32 stakeholder groups during the Proposed Plan public comment period. Private citizens and non-governmental organizations accounted for the majority of stakeholders (84 percent) while commercial entities and government agencies jointly accounted for 14 percent.

To efficiently present and respond to the comments received, DOEE classified the comments into themes. The following 15 such themes capture the issues and concerns that were raised by stakeholders. A description of each theme follows.

- **Adaptive Management**. Covers the relationship between Interim Record of Decision (ROD) and the Final ROD, uncertainties addressed by adaptive management, schedule for performing the Preferred Alternative, baseline monitoring, performance monitoring, circumstances requiring a change in one or more preliminary remediation goals (PRGs), and the anticipated cleanup timeframe.
- **Background**. Covers the selected source for sediment background, implications of tributary surface sediment sampling conducted in the upstream, non-tidal watershed, selection of the background fish tissue dataset for the project, and consideration of the Potomac River fish tissue dataset as background.
- **Characterization**. Addresses questions regarding the dataset generated during the Anacostia River Sediment Project (ARSP) remedial investigation (RI) including sufficiency of the radiometric core and bathymetry datasets.
- **Ecological Risk Assessment**. Covers comments pertaining to sediment toxicity results and bioavailability results and general questions regarding methodology, protectiveness, and uncertainties identified in the ecological risk assessment.
- **Coordination with Potential Environmental Cleanup Sites.** Comments relating to National Contingency Plan (NCP) context for the relationship between the ARSP and the potential environmental cleanup sites (PECSes), varying regulatory frameworks, responsibility, and funding.
- **Early Action Area Delineation**. Provides a comparison of early action areas (EAAs) defined using kriging with EAAs defined using Thiessen polygons, total polychlorinated biphenyl (PCB) congeners as a surrogate for all constituents of concern (COCs), selection of the EAA cleanup level, role of estimated risk reduction, and application of kriging in defining the EAAs.
- **Modeling**. Covers comments received on the surface water model (watershed and receiving water models) and on the PECS groundwater modeling reports.
- **End Use Objectives**. Addresses stakeholder’s concerns and questions regarding future end uses of the study area water bodies. DOEE’s vision for water depths and the timeline for deauthorization of the federal navigation channel (FNC) are also discussed.

- **Human Health Risk Assessment**. Covers comments received on the angler survey used for the human fish tissue ingestion rate (FIR) used in calculating PRGs for the study area, the fish tissue dataset used to approximate background conditions, the selection of the target risk level of 1E-05, and general questions regarding HHRA processes and assumptions.
- **Source Delineation.** Addresses stakeholder comments pertaining to the lines of evidence approach used for the identification of contaminant sources, the general approach and assumptions regarding PECS identification, and coordination with other jurisdictions. In addition, Source Delineation covers comments received regarding the Contaminant Source Assessment Report (CSAR).
- **Preliminary Remedial Goals.** Discusses responses to stakeholder comments regarding the relationship between PRGs and remedial action levels (RALs), the selected target risk level, and the consideration of alternative FIRs.
- **Remedial Action Objectives.** Addresses the potential for modification of remedial action objectives (RAOs) during the Interim ROD, potential risks from contaminants present in fringe sediment, questions regarding the capability to protect fish through the remediation of bioaccumulative chemicals, and comments on the identification of Applicable or Relevant and Appropriate Requirements (ARARs).
- **Public Communication.** Covers the ongoing interactions DOEE maintains with stakeholders, questions regarding the review period for the Proposed Plan and supporting documents, and the actions taken to foster community involvement.
- **Remedial Alternative Selection.** Addresses comments pertaining generally to the remedial action screening performed with additional focus on managed natural attenuation (MNA), enhanced managed natural attenuation (EMNA), and dredging. In addition, comments regarding alternative costing and beneficial use alternative are considered.
- **Editorial.** The types of comments considered to be editorial are summarized and the approach for addressing these comments is provided.

Individual stakeholder comments are provided in the Stakeholder Comment Matrix provided as Appendix A of the Interim Record of Decision. The Stakeholder Comment Matrix provides the identity of the group or individual making each comment, the text of the comment (in full or abbreviated form), and a cross reference to which of the above 15 themes the comment was grouped. All comments are reproduced in their entirety in the Administrative Record[17] and in the attachment to this document (electronic format only). Throughout the following sections, each numbered theme and subtheme section is followed by a summary of the stakeholder comments, then a response to comments.

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[17] www.anacostiasedimentproject.com/library

B.3.1 ADAPTIVE MANAGEMENT

The Interim ROD is designed to make substantial progress toward cleanup of the ARSP study area, but it marks only the beginning of a comprehensive cleanup process. Following sediment remediation in the EAAs in each OU, a post-remediation monitoring program (defined in **Section B.3.1.8**) will be implemented. Using the data generated by this monitoring program, an adaptive management-based decision framework will guide the path forward from the early actions defined in this Interim ROD to the issuance of a Final ROD. This path forward will include other sediment cleanup actions at the PECSes specifically and potentially elsewhere in the study area, as appropriate.

EPA (2018b) (https://semspub.epa.gov/work/HQ/100001630.pdf) defines adaptive management as a formal and systematic site or project management approach centered on rigorous site planning and a firm understanding of site conditions and uncertainties. A useful discussion of adaptive management (in the context of uncertainty management during the implementation of water resources projects by USACE) is also available from the National Research Council (2004). Rooted in the sound use of science and technology, adaptive management encourages continuous re-evaluation and management prioritization of site activities to account for new information and changing site conditions (EPA 2018b). Through intentional learning or “learning by doing,” careful monitoring of decision outcomes advances the understanding of system variability and the achievement of desired outcomes. Following DOEE’s establishment of the Interim ROD and before the Final ROD can be issued, the adaptive management decision framework (defined in the River-wide Feasibility Study (FS) Report Section 4 and presented in **Section B.3.1.8**) will address site uncertainties in support of establishing the Final ROD. The adaptive management theme covers the implementation of the adaptive management decision framework and the related topics, including post-remedy performance monitoring, conditions under which PRG modifications would be considered, timeframe for the cleanup to be completed, and the relationship between the Interim ROD and Final ROD.

B.3.1.1 RELATIONSHIP BETWEEN ADAPTIVE MANAGEMENT AND THE INTERIM ROD

Most governmental, nongovernmental organization (NGO), and most commercial stakeholders agreed that an adaptively managed, Interim ROD approach as outlined in the Proposed Plan is appropriate for the cleanup of the Anacostia River. However, some stakeholders (various governmental agencies and NGO groups) stated that the adaptive management approach should be more clearly defined with regard to the application to the early actions and source mitigation as defined in the Proposed Plan. They requested clarification of how adaptive management is integrated into the evaluation of cleanup progress during the Interim ROD phase of the cleanup and how DOEE would determine that additional early actions are needed. Others (Sierra Club) interpreted the Proposed Plan’s suggestion that additional remediation may be needed implies the early actions and PECS cleanups will not achieve the PRGs.

RESPONSE

Given the complexity of contaminated sediments remediation and the need to identify and address active sources, DOEE has adopted an Interim ROD approach for the ARSP. **Figure B.3.1.1** overviews the role of the Interim ROD in the overall decision process from the RI/FS phase through to the Final ROD. In the selected Interim ROD approach, site uncertainties are actively managed through early sediment remediation actions, source control activities, and monitoring to assess the progress achieved from these efforts. In the context of the Interim ROD, adaptive management refers to defining as necessary early actions in a limited number of discrete hot spot areas; evaluating the appropriate extent and effectiveness of source control in the upstream, non-tidal watershed; and the review and interpretation of post-early action cleanup monitoring data via an adaptive management decision framework to assess progress toward a Final ROD. DOEE is currently actively engaged in the identification of sources in the upstream, nontidal watershed. DOEE's efforts in source tracking include a recently completed (2020) aerial infra-red (IR) survey of the study area and the Lower Beaverdam Creek watershed (see **Section B.3.10.3**) and participation in the Source Control Group, a multi-agency working group to track contaminant sources in the watershed (**Section B.3.10.4**). Source identification and mitigation efforts should speed progress toward the Final ROD as indicated by accelerating concentration reductions in study area environmental media (i.e., reduced contributions from upstream sources will reduce concentrations in site surface sediment and other media).

DOEE, in consultation with stakeholders, will define the "acceptable" timeframe and media-based contaminant percent reductions for assessing whether sufficient progress is being made toward achieving RAOs (see **Section B.3.1.8**). Based on the adaptive management decision framework and the DOEE/stakeholder-defined parameters (acceptable timeframe and media-specific contaminant percent reductions DOEE will evaluate each new round of monitoring data in concert with previous data to determine the appropriate path forward. Specifically, once enough data has been collected to meaningfully assess trends, DOEE may opt to continue data collection to confirm such trends. Alternatively, DOEE may opt to undertake additional early action cleanups, re-calculate one or more PRGs (see **Section B.3.1.12**), or move toward issuance of the Final ROD. The Interim ROD defines the initial set of early cleanup actions to be undertaken and identifies performance monitoring data collection and evaluation. Actions to be undertaken between the issuance of the Interim ROD and establishment of the Final ROD (i.e., the Interim ROD period) will be determined in the context of adaptive management.

B.3.1.2 UNCERTAINTIES ADDRESSED BY ADAPTIVE MANAGEMENT

The objective of DOEE's adaptive management approach is to reduce site uncertainties to support final remedy selection. NPS indicated that the specific uncertainties that are to be addressed by adaptive management should be more clearly articulated, while Maryland Department of the Environment (MDE) expressed specific concerns regarding outfall contributions and associated recontamination following sediment remediation.

RESPONSE

The uncertainties that prompted DOEE to select the adaptive management approach for the ARSP were largely identified and discussed in the series of Leadership Council for a Cleaner Anacostia River (LCCAR) and Consultative Work Group (CWG) meetings held during the spring and summer of 2019. DOEE posted a Draft FS Report (later revised to, and posted, as a draft River-wide FS Report) for LCCAR review in April 2019. In the LCCAR meetings held on 5/21/19, 6/13/19, and 8/2/19, stakeholders discussed their feedback on the Draft FS Report and identified significant unknowns that might limit the effectiveness of a River-wide cleanup effort. To address NPS' request for more specific discussion of the uncertainties addressed by the adaptive management approach, these uncertainties as discussed in the spring/summer 2019 stakeholder meetings largely included, but were not limited to, potential refinements to urban background concentrations for the study area if necessary,[18] identification of the locations and strength of upstream contaminant sources, the Potomac River as source of contaminated sediment, sedimentation rates in the study area, the linkage (if any) between contaminant concentrations in the study area and the concentrations of these contaminants in fish tissue, and the effects of potential increased flooding resulting from climate change. In response to MDE's concerns regarding recontamination from the upstream watershed, the spring/summer LCCAR meetings included discussions regarding the relative importance of outfalls and tributaries as sources of contaminants to the river. The relative effectiveness of source control is one of the variables that adaptive management will consider. Specifically, it is uncertain how effective source identification and mitigation efforts will be. As stated in **Section B.3.1.1**, such efforts would be expected to speed progress toward the Final ROD by accelerating concentration reductions in study area environmental media (i.e., reduced contributions from upstream sources will reduce concentrations in site surface sediment and other media). However, if the reductions achieved are insufficiently robust, adaptive management provides the approach for responding to this situation based on the available source control data amassed and experience gained. Possible outcomes might be that more comprehensive source control measures are warranted or that a refocusing of source control resources may be needed.

B.3.1.3 EFFECTIVENESS OF CLEANUP THROUGH EARLY ACTIONS

Many private citizens and some organized stakeholder groups (Anacostia Watershed Community Advisory Committee [AWCAC] and Fairlawn Citizens Association) expressed concern that the planned early actions will be ineffectual in supporting overall cleanup of the Anacostia River. They doubt that cleaning up only defined hot spots covering a limited area will improve the overall condition of the river.

RESPONSE

Early actions address areas with the most elevated concentrations and thereby are expected to achieve significant risk reduction. In a memorandum dated August 23, 2019, the U.S. EPA (EPA 2019a) encouraged the use of early actions as part of an overall site strategy to reduce risks to human health and the environment. The agency considered such early actions to be an important component in complex cleanups such as a river sediment site. For example, early action cleanups and source control in the Lower Duwamish Waterway in Seattle, Washington have resulted in an approximately 50 percent reduction in PCB concentrations in surface sediments (EPA 2019b). DOEE calculated that the planned early actions will have significant impact on reducing the sitewide average PCB concentrations in surface sediment in each operable unit (OU). As documented in **Section B.3.6** of this responsiveness summary,

[18] The determination of anthropogenic background concentrations for contaminants for any cleanup site, including the background contaminant concentrations DOEE determined for the ARSP, are estimates that are subject to potential refinements as additional data are generated.

concentration reductions on a surface-wide average basis were 47 µg/kg for the Main Stem (pre- and post-remediation concentrations were 207 and 160 µg/kg, respectively), 86 µg/kg for Kingman Lake (pre- and post-remediation concentrations were 270 and 184 µg/kg), and 222 µg/kg for Washington Channel (pre- and post-remediation concentrations are 306 and 84 µg/kg, respectively). It should be noted that these reductions do not consider the additional reductions that will be realized by cleanups conducted at the PECSes. Over time, all these reductions will potentially lead to reduced contaminant concentrations in biota tissue and eventually associated reduced risks to people consuming fish caught from the river. Within the adaptive management framework, DOEE will collect, evaluate, and interpret baseline and monitoring data to identify the type and sequence of actions that will best move the site toward the Final ROD. Further details are in **Section B.3.1.8**.

B.3.1.4 SELECTION OF THE EARLY ACTION REMEDIAL ACTION LEVEL

DC Appleseed and a number of private citizens requested additional detail regarding the derivation of the early action remedial action level of 600 µg/kg total PCBs. Some believe that this level is too high and question how it is consistent with the adaptive management approach for remedy implementation.

RESPONSE

The early action remedial action level (RAL_{EAA}) used in the Proposed Plan (600 µg/kg total PCBs) was selected to address portions of the study area where the most elevated concentrations (total PCB congeners) are observed. The 600 µg/kg level was determined to achieve substantial incremental risk reduction compared to the risk reduction achieved by lower cleanup levels (which would define larger cleanup areas). The Interim ROD is designed to make substantial progress toward cleanup of the ARSP study area, but it is not the final step. The first set of early actions (defined in this Interim ROD) will be followed by the implementation of a comprehensive remedy performance monitoring program (defined in **Section B.3.8.1**). Using the data generated by the monitoring program, an adaptive management-based decision framework will guide the path forward from the early actions defined in the Interim ROD to the issuance of a Final ROD.

The RAL_{EAA} is the surface sediment concentration level that the EAA cleanups are intended to achieve. The extent of the area within which the early cleanup actions will be performed is therefore a direct function of the selected RAL used to delineate the area. The 600 µg/kg RAL_{EAA} was selected as the appropriate multiple (3x) of the river-wide RAL (RAL_{RW}, 200 µg/kg). Key to understanding the genesis of the RAL_{EAA} is understanding the derivation of (1) the SWAC for a river reach, (2) the RAL from the SWAC, (3) the RAL_{RW} from the individual reach RALs, and (4) the RAL_{EAA} from the RAL_{RW}.

The six ARSP river reaches are shown on **Figure B.1.3** of the Decision Summary and include Reach 123, Reach 456, Reach 67, Reach 7, Kingman Lake, and Washington Channel. An RAL is defined as the river reach-specific concentration at which the post-cleanup SWAC is at or below the PRG. RALs, therefore, represent the maximum post-cleanup concentration that can remain in a river reach while still achieving the PRG in that reach. SWACs were calculated using the Thiessen polygon method, in which polygons are established within the area of interest (reach) with a sampling point at the center of each polygon. In calculating the SWAC for the reach, the polygon area then is used to weight the concentration for each surface sampling point.

The RAL for each COC and river reach is a function of the PRG, the concentration distribution of the COC in the reach, and the spatial distribution of the sampling points in the reach. **Table B.3.1.1** shows for total PCB congeners (PRG equal to 65 µg/kg), the reach-specific RALs, the average RAL across the six reaches, and the associated RAL_{RW}. As shown in the table, the average RAL was 176 µg/kg, which was rounded to 200 µg/kg to produce the RAL_{RW}. The maximum reach-based RAL was 220 (in Reach 123) and the minimum reach-based RAL was 74 (in Reach 7).

Risk reduction is calculated by determining the risk associated with the pre- and post-remediation SWAC concentrations and then subtracting the post-remediation risk from the pre-remediation risk. With regard to PCBs, DOEE calculated risk levels associated with each SWAC by dividing the SWAC by the modeled fish-to-sediment adult subsistence angler PRG for PCBs at the target risk level of 1E-05 (65 µg/kg) and then multiplying this quotient by the target risk level (1E-05). This approach for risk reduction estimation assumes the following:

- The early action remedies will render PCBs non-detect or non-bioavailable in the EAAs (a simplifying assumption; following carbon amendment application, benthic organism uptake of hydrophobic contaminants is reduced by 70 to 90 percent [Patmont 2014])
- Source control in the upstream, non-tidal watershed will be effective
- The early action remedies will reduce PCB concentrations in pore water in surface sediment
- The concentration reductions achieved in the OU are based on the existing dataset and are accurately reflected in the calculated post-remediation SWAC.

Determining the most appropriate size of the area addressed by the early actions was not formulaic, but rather required a scenario-based review of a range of potential RALs. DOEE evaluated RALs defined as 2x, 3x, 4x, 5x, 6x, and 10x the 200 µg/kg PCB RAL_{RW}. **Figure B.3.1.2** compares the results from this evaluation by plotting for each RAL (1) risk reduction, (2) cleanup area, and (3) cost. Although the estimated risk reduction is subject to a number of assumptions and substantial uncertainty, the risk reduction calculation can be used as a net estimate of risk reduction achieved by a given RAL. **Figure B.3.1.2** shows a steady increase in risk reduction from 6x to 5x to 4x to 3x the RAL. However, between 3x to 2x the RAL, essentially no additional risk reduction is achieved. At the same time, with the decrease in multiplier, the cleanup area and associated cost steadily increases at an increasing rate. The plot shows that the additional expense associated with any decrease in the cleanup RAL below 600 µg/kg is not justified by a commensurate reduction in risk. The plot supports the selection of 600 µg/kg PCBs as a reasonable and appropriate EAA cleanup level. It should be noted that these calculations do not account for the additional risk reduction that will occur as the result of cleanups at the PECSes.

B.3.1.5 ADAPTIVE MANAGEMENT IS INAPPROPRIATE FOR THE ARSP

One stakeholder (Steuart Investment Company [SIC]) indicated the adaptive management strategy is inappropriate because it bases future remedial decisions on monitoring data and information that has not yet been collected. In noting this, SIC indicated that the Proposed Plan should define early actions only in the upstream EAAs since, in this stakeholder's view, "remedial actions are reasonably well defined" and "contingencies are limited." SIC believes that remediation of the downstream EAAs, including those in Reach 123, should be conducted only after the upstream areas are remediated.

RESPONSE

DOEE and a clear majority of ARSP stakeholders believe that the adaptive management approach is necessary to guide cleanup decisions during the Interim ROD period. In addition, as noted previously (**Section B.3.1.3**), the adaptive management approach is consistent with EPA guidance for the cleanup of complex sediment sites such as the Anacostia River and the associated water bodies of Kingman Lake and Washington Channel. The EAAs defined in the Interim ROD are located in Reaches 123, 456, Kingman Lake, and Washington Channel. The commenter is conceptually correct that, in a general sense, cleanup of sediment in a river should proceed from upstream to downstream. However, decisions regarding the sequence in which a cleanup progresses for any given river project are site-specific and can depend on consideration of a broad range of conditions, including technical (expected effectiveness of remedial technologies), logistical (potential access restrictions), environmental (hydrodynamics or the potential for upstream flow to cause recontamination), and any number of other conditions unique to the given site. The ROD for the lower 8 miles of the Passaic River is an example of a river cleanup beginning downstream with the anticipation that additional remediation will be needed in the portion of the river upstream from the cleanup (EPA 2016). For the ARSP, DOEE will base decisions on the appropriate sequence in which the EAAs will be cleaned up on all available data and the knowledge obtained and lessons learned. Presently, DOEE tentatively expects that the Interim ROD early actions will begin in Kingman Lake (a preliminary project schedule is discussed below in **Section B.3.1.6**). DOEE will determine the appropriate sequencing of the early actions as the cleanup progresses. Following each of the planned early actions, DOEE will assess the efficacy of remedial actions in each reach as described in the forthcoming performance monitoring work plan (PMWP).

B.3.1.6 SCHEDULE FOR PERFORMING THE PROPOSED ACTIONS

Many stakeholders (e.g., DC Appleseed, NPS, MDE, and several private citizens) indicated that the Proposed Plan should include a detailed schedule, the estimated timeframe for River-wide cleanup, and more details regarding how the public will be updated on the progress achieved during the Interim ROD period. DC Appleseed questions why a nine-month period (the period of time beginning with the release of the Proposed Plan in late December 2019 and ending with the scheduled release of the Interim ROD in September 2020) is needed to address stakeholder comments and why work on the OUs cannot progress in parallel with the work of preparing the Interim ROD

RESPONSE

A preliminary, high-level schedule for the early actions, baseline, and performance monitoring under the Interim ROD, and associated supporting activities is shown below.

- Fall 2020: Issue Interim ROD
- Winter 2020 – 2021: Prepare PMWP
- Winter 2020 – 2021: Stakeholder consultation and DOEE finalization of Draft PMWP
- Spring 2021: Collect data for EAA boundary refinement and baseline monitoring
- Fall 2021: Design and permit EAA remedies for each OU (examples of such permits include permits from USACE for work in the river, from adjacent landowners for access of shoreline areas, etc.)
- Fall 2022: Implement EAA remedies
- Spring 2023: Begin performance monitoring data collection as set forth in the PMWP. Post remedy performance monitoring will continue at an appropriate interval in accordance with the PMWP, and also integrated into a 5-year review report(s).

The Proposed Plan was issued for public comment in late December 2019 and the Interim ROD will issue on September 30, 2020. The intervening nine-month period is necessary for conducting public meetings and receiving public feedback on the Proposed Plan and preparing the responsiveness summary component and other parts of the Interim ROD document, which must meet various legal and regulatory requirements (EPA 1999a). When the cleanup begins, work may begin in Kingman Lake and then could progress sequentially to Washington Channel and then to the Main Stem to allow the lessons learned from one OU to be applied to the others. Alternatively, the work in Washington Channel and the Main Stem or in all three OUs could progress in parallel. As discussed in **Section B.3.1.5**, the choice of how to sequence the work in each of the three OUs and at the EAAs within each OU will depend on a broad range of factors (technical, logistical, environmental, and others).

Following issuance of the Interim ROD in September 2020, DOEE will issue the PMWP for stakeholder consultation in Winter 2020 – 2021. Performance monitoring will occur in accordance with the PMWP. During the Interim ROD period, DOEE will continue to routinely update stakeholders regarding PMWP monitoring results and data interpretation through regularly scheduled public meetings (for example, the quarterly LCCAR meetings convened by DOEE), creation of fact sheets, and periodic web-based data reporting. At least annually, DOEE will post project updates via the project Administrative Record maintained at www.anacostiasedimentproject.com/library.

In addition to stakeholder communication through direct meetings, fact sheets, and web postings, a standard DCBRA and CERCLA 5-year review (EPA 1999b) will be conducted for each OU, which will include evaluation of the performance monitoring data collected in accordance with the PMWP. DOEE will issue a 5-year review report(s) (either for each OU individually or a single report covering the three OUs collectively) that will document the sampling performed, analysis results, data evaluation, and interpretation. The report will make recommendations for additional early action(s), as warranted, within the adaptive management decision framework (see **Section B.3.1.8**). The 5-year reviews will assess observed progress toward achieving RAOs in each OU and evaluate the potential for transition to the Final ROD. DOEE will determine how the Final ROD will be structured (either as a single ROD for the three OUs or as a separate ROD for each OU) as performance monitoring data are collected, evaluated, and interpreted.

B.3.1.7 BASELINE MONITORING TO SUPPORT ADAPTIVE MANAGEMENT DECISION FRAMEWORK

Stakeholders (for example, DC Appleseed and MDE) requested additional information regarding the baseline monitoring that will be performed prior to implementation of the early action cleanups. Specific comments included clarifying how this monitoring would balance the need to be comprehensive against the need for focusing on specific target areas, how the specific sampling locations will be selected, and which fish species will be targeted for tissue characterization.

RESPONSE

Baseline monitoring of various environmental media throughout the study area before active remediation work begins is an essential component of any sediment site cleanup. The objective of baseline monitoring is the documentation of starting conditions in the study area before any active cleanup actions occur. The existing RI dataset was collected over a period of 3 years (2014 – 2016) (other independent supporting studies by Ghosh et al. [2019] were also conducted between 2015 and 2019 and by NPS in 2018 [JCO 2019]) and, although sufficient to support this Interim ROD, is not the current, study area-wide snapshot needed to establish baseline cleanup progress. Broadly distributed, baseline monitoring will establish this synoptic concentration dataset for surface sediment, surface sediment pore water, surface water, and various biota tissues; remedy-induced reductions in concentrations of COCs in each of these media will be determined relative to baseline levels. In addition, baseline data collection may include a sitewide bathymetric survey. Baseline bathymetry can provide a physical reference against which DOEE can compare to the previous site-wide 2013 bathymetric survey (and the available historical bathymetric surveys completed by USACE) to measure on (a gross level) sediment scour and deposition in the study area.

DOEE’s selection of baseline sampling locations will balance the need to be comprehensive against the need for focusing on specific target areas. Baseline sampling locations may be grid-based with a tighter spacing maintained near selected target areas. Specific sampling locations will be defined in the PMWP (discussed **Section B.3.1.8**) in which DOEE will leverage the existing RI dataset to target areas where a greater sampling density might be appropriate. In addition to surface water, surface sediment, surface sediment pore water, and benthic invertebrate tissue media, forage fish and game fish tissue concentrations will also be baselined. The specific game fish and forage fish to be included in baseline sampling will be defined in the PMWP.

B.3.1.8 PMWP MONITORING TO SUPPORT ADAPTIVE MANAGEMENT FRAMEWORK

Stakeholders (DC Appleseed, Anacostia Riverkeeper, NPS, MDE, and U.S. Fish and Wildlife Service [USFWS]) requested clarification on DOEE’s plan for performance monitoring in accordance with the PMWP. Stakeholders inquired about the content of the PMWP and timing in which this document will be available for public review. DC Appleseed and NPS request that DOEE issue the PMWP for public review before finalizing the Interim ROD.

RESPONSE

To assess the effectiveness of the early actions defined in this Interim ROD, a comprehensive, multimedia post remedy monitoring program will be established. Baseline and post-remedy performance monitoring will provide the data that will support the project's adaptive management decision framework defined in **Table B.3.1.2** (taken from Section 4 of the River-wide FS Report). Data collection for the PMWP is targeted to resolve the uncertainties discussed in **Section B.3.1.2**. Specifically, the framework incorporates the following five elements (**Table B.3.1.2**):

- Key indicators (e.g., game fish fillet tissue, surface water, forage fish whole body or organ tissue, benthic invertebrate tissue, surface sediment pore water, and surface sediment) relevant for assessing progress toward ARSP remedial action objectives (RAOs)
- Monitoring sampling activities
- Data interpretation methods
- Trigger criteria that will indicate progress toward attainment/nonattainment of an RAO. The trigger criteria will include direct comparison to project-specific criteria (for example, ARSP surface sediment RALs), benchmark-type criteria (for example, Washington, D.C. fish tissue advisory concentration limits, national consensus ecological effects levels), and percent reductions in measured COC concentrations (defined later in this section)
- Potential follow-up actions (i.e., continued monitoring, consideration of additional sediment remediation, re-focusing of source control efforts, etc.)

The PMWP will document the specific data quality objectives, sampling approaches, laboratory analyses, data validation, and data evaluation methods that DOEE will use to implement the adaptive management decision framework and support adaptive decision making.

Performance monitoring will include a broad range of laboratory analyses. Evaluations of these data will help reduce uncertainties regarding the link between the concentrations of contaminants in sediment and fish tissue. Baseline and performance monitoring may incorporate analysis of chemicals in sediment and pore water not identified as COCs (e.g., polycyclic aromatic hydrocarbons [PAHs] and benzene) to the extent necessary to support evaluation and interpretation of observed toxicity to ecological receptors.

Although post-remedial monitoring is an essential component in any CERCLA site cleanup (the ARSP study area is not a CERCLA site but the ARSP is patterned on the CERCLA process), a post-remedy monitoring work plan is typically not issued concurrently with the issuance of the CERCLA site ROD. However, EPA (2004) states that information such as RAOs and PRGs specified in remedy decision documents such as RODs can provide the basis for developing the performance monitoring plan for a site. DOEE is in the process of developing the PMWP, which will be issued for stakeholder consultation subsequent to issuance of this Interim ROD.

Key parameters that will be defined in the PMWP are the expected post-remediation time required to achieve the RAOs and the metrics (e.g., percent reduction of COC concentrations in surface sediment or pore water, mean tissue concentrations of COCs in various fish tissues) that will determine that a final ROD can be issued. The *acceptable timeframe* for achievement varies by RAO. For example, bulk sediment or pore water concentrations may show the desired percent reduction within one or two years of the remediation. Concentrations of COCs in game fish fillets is expected to take longer, on the order of ten or more years.

As managers of the ARSP, DOEE will select acceptable timeframes and percent reduction metrics in their role in consultation with stakeholders. Based on results of similar river sediment remediation projects and technical literature on remediation successes and failures, DOEE will develop appropriate methods and acceptable timeframes for the ARSP interim actions within the adaptive management framework. The acceptable timeframes will take into account what is known of tributary loading; sedimentation rates in the various EAAs; life cycle parameters of game fish, forage fish, and invertebrate prey; and other site-specific factors. The PMWP will define the acceptable timeframe and percent reduction for each performance metric, as some parameters (e.g., concentrations of COCs in sediment and pore water) are expected to respond more quickly than others (e.g., concentrations of COCs in game fish). Based on empirical data from other river sediment remediation projects, such as the Lower Duwamish, reduced concentrations of COCs in sediment and pore water are expected to be measurable within one to three years of completion of the remedial action, whereas reductions in concentrations of COCs in large game fish will likely take more than a decade. The acceptable time frame for detecting changes in concentrations of COCs in whole forage fish will be intermediate between those established for sediment and game fish. Within the adaptive management framework, the timeframes may be revised following analysis of baseline concentrations of COCs in selected media.

The data generated over multiple performance monitoring events will be tested statistically for indicators of trends, which will influence the time required to achieve the RAOs. Likewise, baseline sampling and multiple monitoring events will allow DOEE to calculate and compare observed percent reduction of COC concentrations with expectations in the PMWP. DOEE will use the trend analysis to compare the anticipated duration of cleanup to the acceptable timeframe established in the PMWP. Based on these evaluations, DOEE will use the adaptive management decision framework to assess the appropriate path forward (**Table B.3.1.2**). If RAOs are not achieved in the acceptable timeframe established in the PMWP, DOEE has options ranging from relatively limited (for example, continuation of performance monitoring, institutional controls) to moderate (for example, additional cleanup actions) to extreme (for example, recalculation of PRGs). If necessary, performance monitoring will be modified to fill data gaps revealed by the trend analyses. Continued monitoring will provide the data necessary to detect and confirm trends and percent reduction of COC concentrations in various media.

Concerns voiced by the large and varied stakeholder groups for the ARSP will be considered in the specification of the acceptable timeframe and percent reduction. DOEE will develop the PMWP in accordance with state-of-the-science methods and best industry practices and will include stakeholder consultation. DOEE anticipates a draft PMWP will be available for stakeholder review in Winter 2020 – 2021.publicstakeholder consultation review and comment in late 2020.

B.3.1.9 POST REMEDIATION PERFORMANCE MONITORING DATA COLLECTION FREQUENCY

Stakeholders (DC Appleseed, MDE, NPS, USFWS, Audubon Naturalist Society) indicated greater detail is needed regarding the data collection frequencies and evaluation approaches that will be used for performance monitoring. Stakeholders questioned the data collection interval and length of time that would be needed for statistically significant assessment of concentration trends. Specifically, for the game fish tissue medium, DC Appleseed observed that the 3 year sampling interval and the stated requirement for eight independent samples for statistically significant trend assessment, as defined in the River-wide FS Report, equates to a period of 24 years for assessing cleanup progress— “an unacceptably long time.” DC Appleseed, Pepco, and Washington Gas questioned how DOEE will evaluate performance monitoring data for statistically significant trends.

RESPONSE

The PMWP will define the acceptable timeframe and percent reduction and the data collection, analysis, and evaluation procedures that will be used in combination with these parameters to assess cleanup progress. The concentration of PCBs in in game fish fillets is the metric expected to take the longest time to achieve the RAO; other metrics for gauging the success of the remediation can be evaluated more quickly. The regression analyses used to determine statistically significant trends and percent reductions in concentrations of COCs in game fish fillets require independent samples that are free of autocorrelation effects (the similarity of samples as a function of sampling interval). Following sediment remediation, natural physical, chemical, and microbial processes will become re-established in the EAAs and organisms will return to the disturbed areas. Any fish that are hatched in the river after the remediation will reflect exposure only to the post-remediation conditions. Older fish that were exposed to COCs prior to the remediation will still occur in the river, but their tissue concentrations will reflect combined exposure to pre- and post-remediation conditions. Over time, concentrations of COCs in game fish will become more representative of post-remediation exposure conditions in two ways: older fish may either reach the natural end of their lives and no longer appear in samples, or they may rid their tissues of COCs accumulated before the cleanup and thus carry lower burdens of COCs. Female fish, in particular, may pass body burdens of COCs to their eggs, resulting in lower concentrations in their own tissues. All of these processes take time, however, as fish species vary in the rate of bioaccumulation and elimination of COCs and in the length of time they live in the river. For these reasons, longer-lived game fish should be sampled at an interval suitable for revealing measurable changes in tissue concentration. One component of the forthcoming PMWP is the empirical testing of the processes assumed to influence COC concentrations in game fish fillets, such as concentrations of COCs in sediment, pore water, and surface water; bioaccumulation rates; food chain transfer, and others. Refinement of these parameters through targeted studies will support the trend analysis of concentrations in game fish fillets so that the success of the remediation can be predicted more rigorously.

Selecting the appropriate interval for sampling game fish tissue requires selecting the appropriate fish species for monitoring and knowledge of the life cycles of these species. Given its relatively small home range, DOEE is considering the brown bullhead catfish as a key species for monitoring changes in tissue concentrations in game fish, as discussed in the River-wide FS Report. A three-year sampling interval is expected to ensure that samples are independent, however, interim sampling may be warranted during early post-remediation monitoring so the most appropriate interval can be determined by the site-specific results. As suggested by some stakeholders, annual sampling of shorter-lived fish and invertebrate prey species will be considered. As mentioned previously, the PMWP will be implemented within an adaptive management framework, which allows for modifications based on science-based evidence.

DOEE will analyze whole body forage fish, whole body benthic invertebrates, surface water, surface sediment pore water, and surface sediment to monitor changes in concentrations of COCs reflecting the efficacy of the remedy. Because these metrics are likely to respond more quickly to the remedial actions and be less autocorrelated than game fish tissue concentrations, forage fish samples will be collected more often than game fish samples. The trending of these data can provide early indications of improving conditions after cleanup and corroborating lines of evidence for reductions in concentrations of COCs in game fish tissue. The PMWP will establish initial sampling frequencies for each indicator medium and the decision process for adjusting the sampling frequencies.

B.3.1.10 TIMING OF PERFORMANCE MONITORING FOLLOWING THE EARLY ACTIONS

Several stakeholders including Anacostia Riverkeeper, DC Appleseed, Navy, and private citizens requested greater detail regarding how performance monitoring would be timed with the conduct of early actions at the PECSes (and in each OU more generally). Questions were also raised about the estimated timeframe in which performance monitoring will confirm progress achieved via enhanced managed natural recovery (EMNR), and the overall schedule for performance monitoring once the early actions are completed.

RESPONSE

DOEE will commence performance monitoring once baseline monitoring and the “first round” of early actions are completed in a given OU. In addition, although DOEE will consider the schedule for PECS early actions when initiating performance monitoring in an OU, performance monitoring will generally proceed independently of the PECS early actions. Regarding EMNR, Section 6.1 of the River-wide FS Report defined the sediment deposition rate conditions necessary for managed natural recovery (MNR) and EMNR (greater than 1 or 0.5 feet over 20 years for MNR and EMNR, respectively). Based on these criteria, the report defines the portions of the ARSP study area where these technologies are appropriate. Performance monitoring conducted in accordance with the PMWP will provide the metrics for measuring and confirming progress achieved by any implemented technology, including EMNR. Integral to remedy progress assessment is the comparison of indicator media trends with DOEE-defined concentration reduction and acceptable timeframe targets for the completion of the cleanup. Regarding overall schedule, DOEE will conduct performance monitoring following the baseline characterization sampling in accordance with the PMWP. The decision to end performance monitoring will be driven by the data collected and evaluated in accordance with the PMWP and the adaptive management decision framework defined in **Section B.3.1.8**.

B.3.1.11 REASSESSMENT OF BACKGROUND CONCENTRATIONS

NPS, Navy, University of Maryland Baltimore County (UMBC) and other stakeholders expressed a concern regarding the potential for recontamination of the areas cleaned up through early actions from the input of contaminated sediment from upstream tributaries and outfalls. Stakeholders questioned how this situation would be considered in the adaptive management decision framework.

RESPONSE

Performance monitoring data collection over time is expected to reflect the positive impact (reduced COC concentrations) of sediment remediation and upstream source control actions. Concentrations of COCs in surface sediment are expected to trend toward anthropogenic background levels. The best available estimate for anthropogenic background concentrations of PCBs in sediment was estimated from samples in the Potomac River, as documented in the ARSP RI. The ARSP background threshold value (BTV) (17 µg/kg) is comparable to a recent NPS estimate of background (19 µg/kg) in the Anacostia watershed based on the three tributaries responsible for approximately 95 percent of the water and sediment entering the study area (JCO 2019), based on field-collected samples and hypothetical removal of point sources in these tributaries. All background concentrations of COCs at river sediment sites are calculated estimates (EPA 2018), which can change over time as new information becomes available from field studies and source tracking efforts.

Plateauing of surface sediment concentration at a more elevated level, as indicated by the stakeholders contributing to this subtheme, would suggest that some refinement of the background estimate may be necessary. DOEE will use the additional data collected from the upstream, non-tidal tributaries (bottom sediment and suspended sediment) generated during source control activities and other tributary studies to assess the need for potential modifications to the river-wide background concentrations. The ARSP surface water model will continue to serve as a tool to assess recontamination potential. DOEE will refine the ARSP surface water model calibration with the data collected in accordance with the PMWP, the data collected during the NPS Tributary Study (JCO 2019), and with new data the U.S. Geological Survey (USGS) is collecting in a second phase of the USGS Tributary Study, which is currently underway. A work plan for the USGS study is in preparation and will be posted to the Administrative Record when available.

B.3.1.12 POTENTIAL CHANGES TO CONSTITUENT PRGS

Some stakeholders (Pepco and WGL, and NPS) questioned the appropriateness of an Interim ROD to include PRGs. These stakeholders expressed opinions regarding the statement in the adaptive management decision framework (**Table B.3.1.2**) that project PRGs may be adjusted based on indicator parameter data collection and interpretation in accordance with the PMWP. Some stakeholders requested more detail regarding the specific conditions that would prompt DOEE to recalculate the PRGs. Some believe that PRGs should only be decreased (Anacostia

Riverkeeper) while others suggest that the priority should be to increase PRGs (Pepco and Washington Gas).

RESPONSE

PRGs are an essential component of the Interim ROD because they provide the basis for establishing the early action cleanup level. This response discusses how PRGs are considered within the adaptive management framework; responses to comments on the assumptions and calculations used to derive the ARSP PRGs are provided in **Section B.3.11**). Specifically, the early action RAL of 600 µg/kg for total PCB congeners was derived from the river-wide RAL (200 µg/kg) which, in turn, derives from the reach-specific RALs that correspond to remediation satisfying the PRG (on a SWAC basis). Other river projects for which an Interim ROD approach is used and included PRGs are the Lower Duwamish and Lower Passaic Rivers. Similar to the ARSP, the PRGs defined for these projects were used as first cut target concentration levels for cleaning up sediment to meet RAOs.

DOEE will consider recalculating one or more sediment PRGs only if the available data indicate that the COC concentrations and/or COC percent concentration reductions have plateaued or exhibit trends that signal RAO achievement within the acceptable timeframe is unlikely. The human health PRGs are based on relationships between sediment concentrations and exposure risks related to bioavailability and tissue concentrations. If concentrations in future monitoring indicate that the relationship is different than what was used to develop the PRGs then that would lead to a reevaluation of those relationships and therefore the PRGs derived from those relationships. DOEE would consider a PRG change only on a River-wide basis and only after the full range of early cleanup actions in the Proposed Plan EAAs and at the PECSes were completed and source control measures were implemented. Examples of trends that could trigger a reevaluation of PRGs include, monitoring results that indicate an unexpected causal relationship between concentrations of COCs in sediment and fish tissue different from that assumed in the FS; or evidence that sediment in the Potomac River or other area outside DOEE's purview have unduly large influences on concentrations of COCs in game fish tissue or sediment in the study area.

Stakeholders offered varying views on PRG adjustment. Some comments (Anacostia Riverkeeper) indicated that such refinements should be made only to make PRGs more protective. Several other stakeholders (Pepco, Washington Gas, Navy) maintain that PRG changes should not be considered an extreme or unlikely action and should be considered a primary objective as the remedy is adaptively managed during the Interim ROD period. Although the data collected during performance monitoring may support decreasing one or more COC PRGs, resolution of site technical challenges (achieving effective source control in the upstream watershed, understanding the linkage between sediment and fish tissue concentrations, accurate quantification of background COC concentrations in the watershed) will tend to increase rather than decrease cleanup goals. Conditions that would tend to increase PRGs include stronger, more widespread contaminant sourcing than anticipated, discovery that reducing sediment concentrations does not result in fish tissue concentration reductions after an appropriate period of time, or the determination that anthropogenic background concentrations are greater than estimated. A condition that could decrease the PRG for a COC would be the evidence that the true anthropogenic background concentration of a COC is lower than the current estimates.

In response, DOEE notes that the currently defined PRGs are based on the robust, site-specific dataset amassed for the ARSP and that the PRGs determined using this data are consistent with state-of-the-science, industry standard methods and procedures. The PRGs were developed using site-specific data and included evaluation of risks by multiple methods that included contaminant transfer through trophic levels to receptors. Consideration of uncertainties was included in the PRG evaluations as recommended by EPA ERA, HHRA, and sediment remediation guidance (Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, EPA-540-R-05-012, 2005). Therefore, only significant challenges to one or more of the assumptions underlying the PRG calculations would prompt DOEE to reconsider a PRG. DOEE believes it is unlikely that the performance monitoring dataset will pose such a challenge. One stakeholder (DC Appleseed) suggested that any change in a PRG should require a calibrated and validated mechanistic bioaccumulation model. As noted in the River-wide FS Report, consideration of changes to a COC PRG is a last resort and will be driven by performance monitoring data collection and interpretation via the adaptive management decision framework. DOEE agrees that quantitative data evaluations such as the mechanistic bioaccumulation modeling suggested by the commenter would be a reasonable element in a reassessment of PRGs.

B.3.1.13 ESTIMATION OF CLEANUP TIMEFRAME

NGO stakeholders (Anacostia Riverkeeper and DC Appleseed) and governmental stakeholders (NPS and MDE) requested clarification on how DOEE will determine the timeframe for the remediation approach defined in the Interim ROD to achieve RAOs. NPS, Navy, and other stakeholders disagree with the statement in the Proposed Plan that the current early actions defined in the plan coupled with actions at the PECSes and source control may be sufficient to meet RAOs.

RESPONSE

The selection of the appropriate acceptable timeframe and percent reduction in contaminant concentrations in site media are management decisions that will be made by DOEE in consultation with stakeholders, as discussed in **Section B.3.1.8**. The data generated over multiple performance monitoring events will be examined statistically for trends during the performance monitoring period. From the trends determined, running estimates for when the cleanup will be completed will be calculated and compared to the acceptable timeframe established by DOEE. Trends from the data will also support calculation of the observed percent reduction in contaminant concentrations which will be evaluated against the targeted percent reduction defined by DOEE. Based on these comparisons, DOEE will use the adaptive management decision framework to assess the appropriate path forward (**Table B.3.1.2**).

The cleanup timeframe will be driven by the PMWP-based collection and evaluation of performance monitoring data. Early action cleanups and source control actions are expected to reduce concentrations of COCs in sediment and other media, as discussed in **Section B.3.1.8**. The Proposed Plan and associated documents appropriately acknowledge that the combined effects of the proposed actions, cleanups planned at the Washington Navy Yard, Pepco Benning Road facility, and Washington Gas East Station, and MDE and DOEE-administered source control could potentially be sufficient to meet RAOs. However, the monitoring data collected over time via the PMWP will determine whether these actions are sufficient. If performance monitoring results indicate that these actions alone are not leading to the anticipated reductions in concentrations of COCs, DOEE will likely propose additional actions, subject to public review and comment.

B.3.1.14 RELATIONSHIP BETWEEN THE INTERIM ROD AND THE FINAL ROD

Government stakeholders (MDE, NPS, and the Navy) questioned how the Interim ROD will relate to the Final ROD and whether the transition from interim to final will require an update to the River-wide FS Report.

RESPONSE

The Interim ROD will serve as the governing document in the near-term for cleanup actions performed in the Washington D.C. portion of the tidal Anacostia River. The river cleanup will transition from Interim ROD to Final ROD status when the observed downward trends in concentrations of COCs in indicator media are sufficiently robust to support confident identification of the final remedial measures necessary to meet RAOs. The Interim ROD identifies DOEE's early actions (revised since the Proposed Plan was issued), references actions planned at Washington Navy Yard, Pepco Benning Road Facility, Washington Gas East Station, and CSX Benning Yard (if determined necessary) and establishes the framework for performance monitoring. The Interim ROD also describes the source control strategy in Washington, D.C. and Maryland.

The Final ROD will govern the implementation of the final cleanup actions necessary to meet project RAOs. It will summarize the progress achieved by the cleanup actions and source control measures performed under the Interim ROD; finalize the PRGs for the study area in Washington, D.C.; document the identification, screening, and costing of any additional remedial alternatives necessary to meet RAOs; and (if necessary) indicate the selected alternative. The River-wide FS Report will be updated to support the Final ROD. The Final ROD will indicate how the ARSP River-wide cleanup relates to the independent cleanups at the Washington Navy Yard, Washington Gas East Station, Pepco Benning Road Facility, and CSX Benning Yard (if independent cleanup at this PECS is performed). It will also reference the ongoing source control monitoring activities being implemented to guard against recontamination of the study area.

B.3.2 BACKGROUND

The background theme includes comments from federal, state, and industry stakeholders on the establishment and use of sediment and fish tissue background threshold values (BTVs) to derive sediment PRGs. Sediment background concentrations were established in the RI Report through the calculation of BTVs in surface sediment from the Potomac River north of Key Bridge. Fish tissue BTVs were established in the RI Report using fish collected at least four kilometers upstream of the confluence of the Northeast and Northwest Branches with the Anacostia River. Some reviewers commented on uncertainty in the selected BTVs and suggested that other sources of background concentrations be considered in the selection of PRGs and development of the Proposed Plan. One common concern was the relative influence of uncontrolled contaminant sources in the tributaries and landside properties on the tidal Anacostia and the Potomac River background area.

B.3.2.1 POTOMAC RIVER SEDIMENT BACKGROUND

The Navy, NPS, Pepco and WGL disagreed with DOEE's selection of the Potomac River as representative of background sediment concentrations. NPS suggested that background concentrations in the Anacostia tributaries would better represent diffuse non-point sources in the river. Pepco and WGL argued that the Potomac River background area differs from the tidal Anacostia River in land use and physical characteristics and recommended that the Anacostia River tributaries be considered in the sediment BTV dataset. However, the Navy noted that the selection of the Potomac River BTVs does not preclude implementation of the adaptive management strategy described in the Proposed Plan and Interim ROD.

RESPONSE

The suitability of the Potomac River background area for the ARSP was discussed at numerous LCCAR and CWG meetings, presented at length in the RI Report (Tetra Tech 2019a), and further explained in responses to comments on the RI Work Plan, RI Report, and other documents. DOEE discussed the challenges with identifying an ideal background location for the ARSP during early development of the RI Work Plan, noting that the combination of dense urban populations, legacy contaminant releases, and ongoing upstream sources in the non-tidal Anacostia River made it unsuitable as a background area. The Potomac River was selected as the background sediment location after extensive analysis of sediment particle size distribution, depositional characteristics, locations of known point and non-point sources in the Anacostia and Potomac Rivers, and other factors documented in reports and meeting notes. The section of the Potomac River chosen to represent sediment background closely matches the grain size and hydrology of the main stem of the Anacostia River. The Potomac background area was subsequently confirmed as a suitable background reach based on concentrations of PCBs in forage fish (Pinkney and Perry 2020).

In 2018, NPS conducted a separate evaluation of background sediment conditions in the five major tributaries to the tidal Anacostia River. NPS used sampling and analytical methods comparable to the ARSP RI (e.g., depth, sampling protocols, analytical method). The NPS report identified sediment locations likely impacted by a point source and estimated potential anthropogenic background concentrations in the five tributaries (JCO 2019).

DOEE's selection of the Potomac River rather than the upper Anacostia River as the background sediment area reflects concern about the uncharacterized and uncontrolled sources in the Anacostia River tributaries. DOEE's extensive investigations of sediment, pore water, fish, and caged mussels from the non-tidal upstream Anacostia River identified several tributaries as sources of contaminants to the tidal Anacostia River. The suitability of each tributary as a background area is a function of both chemical sources and water/sediment flow. For example, the Northwest and Northeast Branches contribute most of the water and sediment to the tidal river and are considerably less contaminated than Lower Beaverdam Creek (Wilson 2019). The high concentrations of PCBs in Lower Beaverdam Creek make it less suitable as a background area until sources are removed. The NPS developed hypothetical background concentrations of PCBs in the three primary tributaries (Northeast Branch, Northwest Branch, and Lower Beaverdam Creek) with sources removed to demonstrate the potential for the future use of the tributaries as sediment background areas, after sources are controlled. The PCB BTV calculated using the hypothetical future source-controlled tributaries was 19 µg/kg, essentially equal to the Potomac River PCB BTV of 17 µg/kg.

DOEE's continued efforts to understand tributaries as ongoing sources of contaminants is further discussed in **Section B.3.2.2**. DOEE agrees with many stakeholders that remediation of the EAAs should proceed rather than be delayed until all sources in the upper watershed are removed.

The NPS Tributary Study (JCO 2019) was evaluated during the RI, as discussed in **Section B.3.2.3**. DOEE will continue to monitor the effect of source control and other factors on background sediment concentrations through performance monitoring to inform site managers responsible for implementing adaptive management strategies.

It is not unusual to define separate background sediment and fish tissue concentrations outside of a target watershed to accommodate concerns about ongoing contaminant sources within watersheds. For example, the Lower Duwamish relied on non-urban areas of Puget Sound as background sediment areas (EPA 2014a). The background dataset for the Middle River Complex RI included the Upper Chesapeake Bay (Tetra Tech 2013). These examples demonstrate the interaction of regional and site-specific influences on background datasets. The NPS Tributary Study suggests that once sources of PCBs in the three main tributaries are controlled, the sediment PCB BTV in those tributaries would be comparable to the sediment PCB BTV in the Potomac River.

A recent study by the U.S. Fish and Wildlife Service (USFWS) (Pinkney and Perry 2020) on forage fish collected within the Anacostia and Potomac Rivers supports the use of the Potomac River as a background area for sediment. Forage fish have small home ranges and live in direct contact with surface sediment throughout their lives. Samples of forage fish from the Potomac River had substantially lower concentrations of PCB congeners than samples of forage fish from the Anacostia River (Pinkney and Perry 2020), mirroring PCB sediment concentrations. The report indicated that the Potomac River background area was appropriate for use in establishing the PCB BTV for the Anacostia River RI.

B.3.2.2 ONGOING SOURCE CONTROL CONCERNS

The Navy commented that the post-remedy average sediment concentrations presented in the Proposed Plan do not account for recontamination by ongoing sources. NPS suggested that some discrete sources of contamination in the Anacostia watershed can be identified and addressed as part of the source control strategy. The Navy requested additional discussion of the influence of urban runoff on achieving final cleanup goals. CSX commented that concentrations of contaminants be considered when identifying potential upland sources.

RESPONSE

DOEE, the Source Control Work Group (convened by the Council of Governments under the Anacostia Watershed Management Committee), and federal, state, and industry stakeholders agree that ongoing sources should be identified and controlled to the extent practicable before a final remedial action is implemented in the study area. The Source Control Work Group brings together local government agencies such as DOEE, Maryland Department of Environment, and Prince George's County, to report on ongoing investigations and discuss solutions in the watershed. DOEE will review and incorporate, as warranted, the findings of the Source Control Work Group investigations of uncontrolled sources in the upper watershed as part of the performance monitoring. As discussed in the Proposed Plan, the Interim ROD acknowledges these ongoing sources and promotes an adaptive management framework to monitor the influence of ongoing sources on the achievements of the early actions. DOEE's Performance Monitoring Plan will integrate studies of sediment, surface water, and fish to document baseline (pre-remediation) conditions, refine EAA boundaries, track and control upstream sources (including upland), and monitor changes to risk levels in preparation for issuing the Final ROD.

B.3.2.3 OTHER STUDIES TO SUPPORT SEDIMENT BACKGROUND CONCENTRATIONS

Pepco, WGL, NPS, and CSX commented that the NPS sediment background study (JCO 2019) and USGS tributary study (Wilson 2019) should be considered in establishing instream background sediment concentrations. These reviewers requested that the NPS Report be made a part of the Administrative Record, used to characterize tributaries, and discussed in DOEE ARSP reports.

RESPONSE

DOEE considered the NPS Tributary Sediment Sampling Study Report (JCO 2019) and other available datasets during preparation of the River-wide FS Report, Focused FS, Proposed Plan, and Interim ROD. Each of these reports are available for review in the ARSP Administrative File (anacostiasedimentproject.com).

The USGS Tributary Study (Wilson 2019) conducted on behalf of DOEE was designed to support the ARSP Surface Water Model by estimating contaminant loads in suspended sediment from the tributaries. The USGS study (Wilson 2019) was reviewed and incorporated into the RI/FS. The objective of the USGS study was not to estimate background concentrations in the Anacostia tributaries but to establish a basis for measuring contaminant loading from the tributaries to the Study Area. The USGS results are congruent with other data sources, including JCO (2019) and the ARSP surface water model (Tetra Tech 2019b), that document high concentrations of PCBs in Lower Beaverdam Creek, further supporting the selection of the Potomac River as a background area.

The NPS Tributary Study measured concentrations of PCBs and other chemicals in surface sediment and identified potential point sources in the five major tributaries to the Anacostia River (Northeast Branch, Northwest Branch, Lower Beaverdam Creek, Watts Branch, and Hickey Run). NPS calculated a range of sediment BTVs by varying the number of tributaries in the dataset. By removing point sources from the datasets, the hypothetical total PCB BTVs ranged from 19 µg/kg (for the combined NEB, NWB, and LBDC) to 84 µg/kg for all five tributaries combined. The estimated BTV based on the five tributaries treated all five tributaries as equal contributors of sediment, water, and contaminants to the tidal Anacostia River, despite extensive field results demonstrating substantial differences among them. Hickey Run and Watts Branch together contribute just three percent of the inflow to the Anacostia River, resulting in a gross overestimate of their contribution to the BTV. DOEE agrees with the NPS approach of estimating hypothetical BTVs that exclude upstream sources but disagrees with the NPS method of calculating BTVs that equally weights the contribution of the five tributaries. DOEE recommended that NPS calculate flow weighted BTVs to represent upstream sources more accurately. DOEE and many stakeholders also disagree with the NPS recommendation that remediation of the EAAs should be delayed until all sources in the upper watershed are controlled (JCO 2019).

The NPS PCB BTV based on the five unweighted tributaries (84 µg/kg) is not an accurate or representative background sediment concentration because it overestimates the contributions of several of the tributaries. The hypothetical PCB BTV based on the three major contributing tributaries with point sources removed (19 µg/kg) point sources is comparable to the ARSP BTV (17 µg/kg) based on the Potomac River (JCO 2019, Tetra Tech 2019a). The use of the NPS five-tributary unweighted BTV is not representative of upstream background, exceeds the ARSP PRG protective of humans consuming fish (65 µg/kg), and would not support a remedial action protective of human health or the environment.

B.3.2.4 NON-TIDAL ANACOSTIA RIVER FISH BACKGROUND

USFWS objected to the location of the background fish tissue sampling for the establishment of background concentrations of COCs in game fish, expressing concern that the populations of fish in the non-tidal tributaries and the tidal Anacostia River may not be fully separated. USFWS requested that DOEE provide a comparison of species and sizes of fish collected in the tributaries and tidal river. USFWS also noted concern that contaminants in Lower Beaverdam Creek could influence fish tissue concentrations.

RESPONSE

USFWS commented that the area where the background fish tissue samples were collected was tidal because the river remains tidal to the confluence of the Northwest and Northeast Branches. This was a misconception about the location of background fish sampling; the background fish samples were collected from non-tidal waters in the Northwest and Northwest Branches at least four kilometers above their confluence with the Anacostia River. Concerns with PCB concentrations in Lower Beaverdam Creek are not pertinent to the background fish samples because they were collected well upstream of Lower Beaverdam Creek. Conversely, the Northwest and Northeast Branches have the lowest concentrations of PCBs among all tributaries studied, as discussed in **Section B.3.2.3**.

In a recent USFWS study with collection sites in the tributaries, tidal Anacostia River, and Potomac River, concentrations of PCBs in forage fish from the Northwest and Northeast Branches were among the lowest reported and comparable to the Potomac River (less than 100 µg/kg); forage fish from the smaller tributaries had substantially higher concentrations of PCBs (Pinkney and Perry 2020). The authors concluded low PCB concentrations in banded killifish from the Potomac River and the Northwest and Northeast Branches suggest that these areas represent suitable background for PCBs in forage fish (Pinkney and Perry 2020). DOEE continues to support the forage fish study and other field investigations of the tributaries to inform the PMWP and support the adaptive management approach to remediation.

DOEE agrees with USFWS that game fish may move between the Potomac and Anacostia Rivers, making the Potomac River unsuitable for use as background for game fish tissue concentrations. The use of the non-tidal portion of the Anacostia River as the basis for the background fish tissue dataset where the populations are more clearly physically separate is preferred. Game fish species typically eaten by people and sampled for in DOEE's fish consumption advisory (Pinkney 2014) were targeted in the tidal and non-tidal Anacostia River to support the HHRA. The tidal and non-tidal datasets had seven species in common (Table B.3.2.1). Catfish, which are preferred game fish in the tidal Anacostia River, were unfortunately not observed in the Northwest or Northeast Branches. Median lengths of the seven game fish species collected for the HHRA are given in Table B.3.2.1. The median length of most species was smaller in the non-tidal sampling areas than in the tidal Anacostia River or the Potomac River. In general, concentrations of PCBs and other bioaccumulating chemicals tend to be greater in larger (older) fish. However, the size differences in these samples were not substantial given natural variability within species (for example life stage), and the concentrations of COCs in fish from non-tidal areas were not consistently lower than those from the tidal river. In addition, the analysis of the concentrations of fish tissue as presented in detail in the RI Report (Table I.3.31 to Table I.3.36), indicate that despite the presence of point sources, fish are exposed to larger areas and are less affected by point source contamination. The fish tissue data from the non-tidal river does not show the same trends of point sources in the upper watershed that the NPS sediment data demonstrated. The collection of additional data in pre-remedy sampling will help to reduce uncertainty in the differences between the two datasets.

Table B.3.2.1. Median Length of Game Fish Samples

Common Name	Median Fish Length [millimeter]			
	Tidal Anacostia River 2014	Tidal Anacostia River 2013	Potomac River 2013	Non-Tidal Anacostia River 2016
Smallmouth bass	318		327	231
Largemouth bass	287	340	382	223
Redbreast sunfish	86	155*	148**	223
Pumpkinseed	93	155*	140**	101
Bluegill	99	155*	140**	134
Striped bass	460		585	198
Northern snakehead	658	594	635	609

*Sunfish species; **Three sunfish species combined

B.3.2.5 POTOMAC RIVER FISH BACKGROUND

USFWS commented that the Potomac River game fish should not be considered as background because most species are mobile and may move in and out of the Anacostia River. Pepco and WGL recommended that multiple fish datasets be used to establish background fish tissue concentrations and urged DOEE to include data from the newest fish consumption advisory report (Pinkney 2018) in its background fish calculations.

RESPONSE

DOEE has evaluated all available and relevant data for consideration in characterizing background concentrations in fish tissue for human consumption. DOEE determined that the fish species collected from the Potomac River for fish consumption advisories (Pinkney 2014, Pinkney 2018) were unsuitable for use as background samples in the ARSP because these long-lived game fish range over large distances; USFWS noted that most game fish likely move between the Anacostia River and the Potomac River (Pinkney and Perry 2020). As discussed in the RI report and in **Section B.3.2.4** above, DOEE considers the BTVs established with game fish samples from the non-tidal Northwest and Northeast Branches based on the greater separation of these fish from the tidal Anacostia River populations.

PCB concentrations reported for most game fish in the recent fish advisory dataset from the Potomac River exceed the PCB BTV (75 µg/kg) estimated using concentrations in fish from the non-tidal Anacostia (Pinkney 2018). DOEE does not support using game fish from the Potomac River to establish background fish tissue BTVs for the ARSP. Discussion of the fish tissue BTVs relative to sediment PRGs is in **Section B.3.11.2**.

The District will continue sampling game fish to support regional fish consumption advisories and will incorporate the data into the ARSP post-remediation performance monitoring metrics as appropriate. However, the fish consumption advisory protocols are not designed to address site-specific bioaccumulation of COCs in the tidal Anacostia River. The PMWP will include site-specific measures of tissue concentrations in game fish, forage fish, and invertebrate prey to document changes in bioaccumulation in the tidal Anacostia and non-tidal background locations (**Section B.3.1**). Data acquired during baseline and post-remediation monitoring will be analyzed and interpreted within the context of adaptive management framework to support DOEE's long-term goals to make the Anacostia fishable and swimmable, as described in the River-wide FS and **Section B.3.1.8** above.

B.3.3 CHARACTERIZATION

A characterization dataset refers to data and other information describing the physical properties and contaminant concentrations in the environmental media comprising a project area. A primary objective of the ARSP RI was to characterize conditions in the study area with a focus on the nature and extent of hazardous chemicals and petroleum-related constituents. Stakeholders raised general questions about the adequacy of the characterization dataset to support the project conceptual site model (CSM) and several questions on other topics.

B.3.3.1 RESIDUAL CSM UNCERTAINTIES

The Navy and others suggested that additional data (e.g., water level, suspended sediment concentration, suspended sediment time series, bathymetric data) were needed to refine the project CSM. The Sierra Club indicated that the concentration levels of contaminants in surface water were not adequately measured.

RESPONSE

The ARSP RI Report (Tetra Tech 2019a) documents the dataset collected to characterize conditions in the study area to support the Focused FS and the Interim ROD. The dataset includes approximately 3,000 samples of sediment, sediment pore water, whole fish and fish fillet tissue, benthic invertebrate tissue, surface water (including the data generated at Washington Gas Light (WGL) East Station, CSX Benning Yard, Pepco Benning Road Facility, and Washington Navy Yard (WNY). The ARSP RI dataset also includes laboratory toxicity tests with benthic invertebrates and larval fish as well as sediment bioaccumulation tests using aquatic earthworms (oligochaetes). Additional studies that supplement the RI dataset (performed under separate planning documents) include Ghosh et al. (2019), which characterized pore water and surface water concentrations of project constituents in tributaries and the Anacostia River, and Pinkney and Perry (2020), which measured concentrations of constituents in forage fish in the study area, tributaries, and Potomac River background area. Ghosh et al. (2019) also reported on bioaccumulation of project constituents in caged mussels in the river and tributaries. In addition, the USGS (Wilson 2019) characterized bottom and suspended sediment concentrations of PCBs, pesticides, and metals under storm and low flow conditions in five major and four minor tributaries.

As is true for any major urban river cleanup project, uncertainties remain even when characterization of the study area is underpinned by robust dataset like the ARSP dataset. Despite residual uncertainties, the RI dataset and supporting studies are sufficiently comprehensive to support the development, screening, and costing of the remedial alternatives presented in the River-wide FS Report and the Focused FS Report.

EPA defines six CSM stages common to most environmental cleanup projects (EPA 2011). They include the preliminary, baseline, characterization, design, remediation/mitigation, and post remedy CSM stages. At each of these stages, the CSM is refined through identifying remaining data gaps and uncertainties, addressing these data gaps and uncertainties through sampling or other data collection and analyses, reassessing site conditions, and evaluating additional data needs to advance the site to the next level. As noted in RI Report Section 12, with the completion of the ARSP RI and the initial phases of the supplemental studies (Ghosh et al. [2019] and Pinkney et al. [2019]), the site CSM was advanced to characterization status and was sufficient to support an FS. However, in selecting the Interim ROD approach supported by an adaptive management framework, DOEE agrees that additional data collection is needed to resolve remaining uncertainties as discussed in **Section B.3.1.2** of this responsiveness summary. Specifically, post-remedial, time-series data for multiple media consisting of surface sediment, surface sediment pore water (including additional characterization work by Ghosh et al. [2019]), benthic invertebrate tissue, forage fish tissue (including additional sampling conducted by Pinkney et al. [2019]), and game fish tissue (including periodic sampling conducted to support the District's fish advisories) will be collected in conjunction with the PMWP (**Section B.3.1.8**). A comprehensive baseline dataset (**Section B.3.1.7**) also will be generated to document conditions in each OU prior to beginning the early actions and predesign sampling will be performed to refine the extent of each EAA.

Sierra Club commented that the surface water concentrations were inadequately characterized to support the Focused FS and Proposed Plan. In response, surface water concentrations were characterized during two phases of sampling for the RI. Surface water concentrations were also characterized via passive sampling conducted in a separate investigation (Ghosh et al. 2019). The results of these sampling activities are summarized below.

DOEE collected surface water samples in a single dry season monitoring event (14 samples distributed throughout the study area) in summer, 2014 and in four events (wet and dry period samples collected in spring/summer 2016 and fall/winter 2016) at 24 locations distributed throughout the study area. Samples were analyzed for total (representing mass colloidally sorbed combined with the dissolved mass) concentrations for a broad range of constituents (metals, mercury, semi-volatile organic compounds, pesticides, PCB Aroclors, PCB congeners, dioxins and furans, common ions, organic carbon [total and dissolved], and total suspended solids) and for filtered (dissolved) metals. Both sampling efforts are documented in Section 12 of the ARSP RI Report (Tetra Tech 2019a). The 2016 surface water samples from the four separate sampling events confirmed that the upstream-to-downstream concentration pattern detected from the Phase 1 sampling was reproducible and tentatively identified several mid-section-of-main-stem tributaries as likely contaminant sources.

Ghosh et al. (2019) used passive sampling methods to characterize surface water concentrations of PCBs, pesticides, and PAHs at six locations in study area water bodies and in 10 tributaries. The sampling was conducted between 2016 and 2019. Ghosh et al. (2019) found that total PCB congener concentrations measured in all tributary surface water samples were above the EPA ambient water quality criteria for the protection of human health via fish consumption, associated with a cancer risk of 1E-06. Two mid-section tributaries (Lower Beaverdam Creek and Watts Branch) exhibited concentrations that exceeded the 1E-05 risk level, corroborating the sampling results from the RI. Concentrations of pesticides and PAHs were also generally found to be elevated in the tributaries sampled. PCB concentrations in the Main Stem, Kingman Lake, and Washington Channel were above the EPA ambient water quality criteria at a cancer risk of 1E-05. Pesticides were also elevated in the study area water bodies; PAH concentrations were found to be comparable to the tributaries.

B.3.3.2 DEPTH OF SEDIMENT VARIATIONS IN THE STUDY AREA

A private citizen inquired about the variations in the depth of sediment throughout the study area.

RESPONSE

Collection of the characterization dataset for the RI included the collection of 259 sediment cores distributed throughout the Main Stem, Kingman Lake, and Washington Channel. Coring proceeded to refusal (i.e., a subsurface obstruction or more lithified, resistant strata was encountered) or to a maximum depth of 20 feet (the depth limit of the coring equipment). The geologic cross sections provided in Section 7.1 of the ARSP RI Report (Tetra Tech 2019a) show the bottom of the alluvial sediments that comprise the bottom sediments of the Main Stem, Kingman Lake, and Washington Channel. The bottom boundary of each section approximates the base of alluvial sediment and was determined using the lithologic data collected during the field coring effort and cross sections from previous investigations (Hydro-Terra 1999; Koterba, Dieter, & Miller 2010) that approximate the depth of the alluvium in the portions of the river relevant to those investigations. Alluvial sediment thicknesses up to approximately 25 feet are encountered in Reach 123 and the lower portion of Washington Channel. In the upper half of Washington Channel, Kingman Lake, and the Main Stem upstream from the CSX Railroad Bridge, the typical thickness of alluvial sediment is 10 to 15 feet.

B.3.3.3 ADDITIONAL SEDIMENTATION RATE DATA IS NEEDED

DC Appleseed expressed concern that the dataset describing sedimentation rates is insufficient to support the Focused FS and Proposed Plan. The Navy suggested that project-determined sedimentation rates in the lower Anacostia River required confirmation through additional characterization data collection. The Anacostia Watershed Community Advisory Committee (AWCAC) inquired if sedimentation rates had been measured during the RI. Private citizens also inquired whether sedimentation rates had been measured, specifically above and below the CSX Railroad Bridge, and also whether the distribution of depositional and erosional conditions had been determined.

RESPONSE

Sedimentation rates have been evaluated through multiple lines of evidence including sediment core age dating, bathymetric data collected in the study area, and surface water modeling. Five of 12 radiochemical cores collected during the RI provided usable data for sediment age dating. The five usable cores were well distributed spatially in the study area to support the evaluation of sedimentation rates over broad areas (one core was in Reach 67, three were in Reach 456, and one was in Reach 123). The cores were located within an area spanning approximately 7 miles of the 9-mile Main Stem portion of the study area. Additional targeted radiochemical core data may be useful in confirming recent sedimentation trends. As discussed in the ARSP Surface Water Model Report (Tetra Tech 2019b), the surface water model calibration independently corroborates the radiochemistry core-derived sedimentation rates by integrating this information with direct measurements of water flow and sediment input from the upstream tributaries to the tidal river.

The ARSP RI included a study-area-wide bathymetric survey performed in October 2013. Additional, targeted bathymetric surveys have been conducted at some PECSes (e.g., Washington Navy Yard and Washington Gas East Station) by the PECS parties and in portions of Reach 123 and Washington Channel by the USACE to evaluate potential changes in depth in the federal navigation channel. Baseline data collection prior to implementation of the Proposed Plan early actions a will consider a re-survey of the ARSP study area. The evaluation of the bathymetry from these various surveys will provide a direct measure over time of the portions of the study area dominated by gross sedimentation or scour.

DOEE is planning to conduct a Phase II of the USGS Tributary Study documented in Wilson (2019). The Phase II work plan is currently in preparation; field work is planned for the summer of 2020. This study will include the installation of USGS gauging station at Buzzard Point at the lower portion of Reach 123. In addition, the inflows to the Main Stem will also be measured at the USGS gauging stations already established in the major tributaries (Northeast Branch, Northwest Branch, and Lower Beaverdam Creek). At both the Buzzard Point and the tributary gauging stations, suspended sediment concentrations will also be characterized. The measured sediment input from the tributaries will be compared against the Buzzard Point data to evaluate the amount of sediment deposition in the Anacostia River. Additional radiometric core collection for sediment age dating is also being considered for Phase II.

Phase II study will also include the measurement of water-column velocities in areas of the Lower Anacostia River. The velocity data will be used to determine the shear stresses and other hydrodynamic conditions at the water-sediment interface under a range of discharge conditions. Acoustic Doppler Current Profiler (ADCP) platforms will be deployed to measure the velocity profile upwards from the riverbed; these data will be combined with physical properties of the bed sediment and used to define the conditions under which sediment remobilization (erosion) occurs. Acoustic backscatter and turbidity are used as supporting evidence of sediment remobilization.

B.3.3.4 METHANE PRESENCE IN STUDY AREA SEDIMENT

A private citizen inquired about the availability of data describing the oxidation state of sediments below the river bottom. Specifically, this individual believes that the river sediment is anaerobic resulting in the generation and discharge of methane from the river bottom.

RESPONSE

Methane is generated naturally through the deposition of sediments that include organic matter (e.g., plant detritus). Gelesh et al. (2016) indicate that methane in estuarine waters such as the Anacostia River comes from microbial production in sediments that fluxes to the water column, microbial production in wetlands, and in situ microbial production from the sediment column. Gelesh et al. (2016) studied methane genesis in the Chesapeake Bay and indicate that methane bubbles are present in uppermost sediment layers and methane release from bay sediments is greatest during the summer months when bay waters experience low oxygen levels. The ARSP did not include the direct measurement of methane in sediment samples collected at the site. However, methane is observed in subsurface sediment in similarly depositional water bodies in the mid-Atlantic region such as Baltimore Harbor (D. Andreasen, Maryland Geological Survey, personal communication, 2002). Follow-up sampling for the 2004 experimental capping project performed in Reach 123 and led by Dr. Danny Reible (**Section 2.1** of the Decision Summary) revealed the buildup of methane in the sediments beneath several of the caps. These results will be considered during the design phase for the early actions documented in the Interim ROD.

B.3.4 ECOLOGICAL RISK ASSESSMENT

The Proposed Plan was designed to address risk to both human and ecological receptors exposed to contaminants in the Anacostia River. The Proposed Plan and Interim ROD are thus focused on achieving sediment concentrations protective of human health. At DOEE's selected risk range of 1E-05, remediating sediment to achieve human health PRGs will also reduce exposure of ecological receptors to PCBs, including dioxin-like PCBs. Although chlordane is not a risk-driver for human health, the early action will reduce risk to ecological receptors posed by chlordane in the Main Stem of the river to less than five times the ecological PRG (18 µg/kg), and in Kingman Lake to approximately 2.6 times the PRG. In Washington Channel, which already met the chlordane PRG, the early action will reduce the chlordane SWAC by approximately 40 percent (see **Table B.3.4.1**). Given the inherent uncertainty in analytical results for this legacy pesticide, and the preponderance of evidence indicating widespread nonpoint sources to the river, DOEE considers the substantial reduction in chlordane concentrations in sediment a protective response action for benthic and aquatic invertebrates. The anticipated reductions in chlordane concentrations throughout the tidal Anacostia River will be confirmed during the post-remediation baseline monitoring and long-term performance monitoring, which will include measures to refine DOEE's understanding of the effects of residual chlordane on benthic and aquatic invertebrates and fish.

Table B.3.4.1 Effects of Early Action on Chlordane Risk to Ecological Receptors

River Region	Pre-Remedy SWAC (·g/kg)	Post Remedy SWAC (·g/kg)	Percent Reduction SWAC	OU-wide Post-Remedy HQ (SWAC/PRG)
Main Stem (456 +123) OU	110	86.4	21	4.8
Kingman Lake OU	60	46.5	23	2.6
Washington Channel OU	11	6.4	40	NA

DOEE has developed a comprehensive array of studies by independent professionals from the federal government, state universities, and the private sector to examine the need for sediment remediation in the tidal Anacostia River. Findings of the RI/FS and these additional DOEE studies provide numerous lines of evidence to support the Proposed Plan and Interim ROD. In addition to data collected for the ARSP RI/FS, DOEE supported studies of transport of contaminants associated with surface water, suspended sediment, and bed sediment from the tributaries (Ghosh et al. 2019, Wilson 2019) and bioavailability of contaminants in caged mussels (Ghosh et al. 2019) and forage fish (Pinkney and Perry 2020). Because these studies were conducted on a different schedule and under different QAPPs than the RI/FS, DOEE issued the results in separate reports (see Administrative Record[19]). Together, the ARSP RI/FS and the tributary studies support the Proposed Plan and Interim ROD.

[19] www.anacostiasedimentproject.com/library

B.3.4.1 REMEDIATION SHOULD BE BASED ON RISK TO HUMAN HEALTH

The Navy agreed that remedial actions presented in the Focused FS Report and Proposed Plan are appropriately based on risk to human health. However, the Navy did not concur with all DOEE's conclusions in the Baseline Ecological Risk Assessment (BERA) or the development of ecological PRGs, as reflected in **Section B.3.4.3** below.

RESPONSE

Sediment PRGs for the consumption of fish by most vulnerable anglers were lower than PRGs for ecological receptors. Therefore, the River-wide FS Report and Focused FS Report are appropriately designed to address human health risk drivers, which will incidentally reduce risk to ecological receptors in the tidal Anacostia River.

B.3.4.2 SINGLE SPECIES WHOLE FISH SAMPLES ARE PREFERRED OVER COMPOSITE SAMPLES

USFWS commented that combining more than one fish species in a sample is not reproducible and adds great uncertainty. An additional comment suggested that a 200-gram mass requirement for laboratory analyses seemed excessive.

RESPONSE

The 2014 composite samples including more than one fish species was not intended to provide baseline concentrations for long-term trend analysis. As stated in the Work Plan and the BERA, whole fish samples were collected for estimating dietary intake of birds and mammals in the Anacostia River. The analytical laboratory required 200 grams per sample to analyze for the full suite of 580 chemicals included in the RI. Because none of the target receptors (e.g., green heron, belted kingfisher, river otter) specialize in a single prey species, fish were grouped by size rather than species to represent the opportunistic dietary intake typical of these predators. These samples also provided evidence of bioavailability of chemicals in the tidal Anacostia River, as reported in the RI and BERA. The sampling and analyses were conducted in accordance with the Work Plan and Field Sampling Plan and are not subject to revision at this stage of the project. The composite fish samples met their intended use in the RI, and subsequently the results were compared with forage fish samples collected by USFWS, as described below.

To further investigate the association between sediment and whole fish tissue concentrations, DOEE supported a separate study by USFWS focused on whole body concentrations of two species of forage fish (mummichog and banded killifish), both of which were included in the ARSP whole forage fish composite samples (RI Table I.2.13). Pinkney and Perry (2020) noted variability in PCB concentrations in forage fish between species, sampling locations, and years. Five of the USFWS sample locations were within the ARSP Study Area (the rest were in tributaries outside the RI boundaries). A comparison of the mean concentrations of total PCBs, chlordane, and DDX in the USFWS samples with the ARSP forage fish samples is in **Table B.3.4.2** and summarized below.

Total PCB concentrations in USFWS single-species fish samples ranged from 214 to 420 µg/kg (banded killifish) and 199 to 486 µg/kg (mummichog). The range was broader in modeled composite samples of banded killifish and mummichog combined (157 to 552 µg/kg). Concentrations of total PCBs in ARSP forage fish samples in these same areas (EU-2, EU-3, and Kingman Lake) were within the range reported by USFWS, although less variable (310 to 360 µg/kg). Concentrations of PCBs in banded killifish from the Potomac River and the Northwest and Northeast Branches were less than 100 µg/kg, confirming their use as background locations for the ARSP (Pinkney and Perry 2020).

Whole fish tissue concentrations of PCBs, chlordane , and DDTs in mummichog, banded killifish, and the two species combined (Pinkney and Perry 2020), were comparable to whole body concentrations in composite forage fish samples reported in the BERA from locations within the same exposure unit (EU) (see **Table B.3.4.2**). Results of the mixed species composite samples of forage fish collected for the BERA are comparable to those reported by USFWS. The concentration ranges of total PCBs, chlordane, and total DDx in mummichog, banded killifish, and the combined species overlapped with concentrations in ARSP forage fish (**Table B.3.4.3**). Mean concentrations of PCBs were similar in the two studies. Chlordane concentrations were generally higher in ARSP samples, although the ranges reported in the tow datasets overlapped and the maximum concentration was in a USFWS banded killifish sample. Mean total DDTs in the ARSP composite samples were lower than in USFWS single species samples. These comparisons indicate that the ARSP and USFWS forage fish studies yielded similar results despite the differences in collection methods. Moreover, the same risk estimates of PCB body burdens in forage fish were derived from both studies (see **Section B.3.4.4** for further discussion).

Table B.3.4.2 Chemical Concentrations in Single Species and Composite Forage Fish Samples

USFWS Location	ARSP EU	USFWS species	Total PCBs (g/kg)		Total Chlordane (g/kg)		Total DDx (g/kg)	
			USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]
11A	EU2	BK	214	310	93	117	37	29.9
11A	EU2	MC	--	310	--	117	--	29.9
11A	EU2	Combo	157	310	64	117	36	29.9
A1	EU2	BK	420	310	194	117	69	29.9
A1	EU2	MC	--	310	--	117	--	29.9
A1	EU2	Combo	370	310	184	117	67	29.9
A2	EU3	BK	278	348	93	190	54	33.1
A2	EU3	MC	199	348	58	190	44	33.1
A2	EU3	Combo	238	348	78	190	49	33.1
PC18	EU3	BK	--	348	--	190	--	33.1
PC18	EU3	MC	486	348	65	190	34	33.1
PC18	EU3	Combo	552	348	89	190	34	33.1
PC19	EU3	BK	309	348	56	190	27	33.1
PC19	EU3	MC	278	348	67	190	27	33.1

USFWS Location	ARSP EU	USFWS species	Total PCBs (g/kg)		Total Chlordane (g/kg)		Total DDx (g/kg)	
			USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]
PC19	EU3	Combo	296	348	65	190	26	33.1
KL	EU6	BK	312	360	75	172	52	31.7
KL	EU6	MC	250	360	60	172	36	31.7
KL	EU6	Combo	303	360	81	172	40	31.7

Notes and Abbreviations

1 Concentrations in whole body fish samples from Pinkney and Perry (2020); n=6
2 Concentrations in whole body fish samples (ARSP BERA Table I.3.23); n=3

--	no value (no sample collected)
µg/kg	microgram per kilogram (part per billion)
ARSP	Anacostia River Sediment Project
BK	banded killifish
Combo	combined species
MC	mummichog
PCB	polychlorinated biphenyl
DDx	Sum of 4,4'-DDD, 4,4'-DDE, and 4,4'- 4,4'-DDT
USFWS	U.S. Fish and Wildlife Service

Table B.3.4.3 Chemical Concentrations in Single Species and Composite Fish Samples

USFWS Sample	ARSP Exposure Unit (EU)	Total PCBs (g/kg)		tChlordane (g/kg)		tDDT (g/kg)	
		USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]
USFWS Banded Killifish							
11A	EU2	214	310	93	117	37	29.9
A1	EU2	420	310	194	117	69	29.9
A2	EU3	278	348	93	190	54	33.1
PC18	EU3	--	348	--	190	--	33.1
PC19	EU3	309	348	56	190	27	33.1
KL	EU6	312	360	75	172	52	31.7
Mean concentrations		306.6	339.3	102.2	159.7	47.8	31.6
USFWS Mummichog							
11A	EU2	--	310	--	117	--	29.9
A1	EU2	--	310	--	117	--	29.9
A2	EU3	199	348	58	190	44	33.1
PC18	EU3	486	348	65	190	34	33.1
PC19	EU3	278	348	67	190	27	33.1
KL	EU6	250	360	60	172	36	31.7
Mean concentrations		303.3	339.3	62.5	159.7	35.3	31.6

USFWS Sample	ARSP Exposure Unit (EU)	Total PCBs (g/kg)		tChlordane (g/kg)		tDDT (g/kg)	
		USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]	USFWS[1]	ARSP[2]
USFWS Combined Banded Killifish and Mummichog (modeled)							
11A	EU2	157	310	64	117	36	29.9
A1	EU2	370	310	184	117	67	29.9
A2	EU3	238	348	78	190	49	33.1
PC18	EU3	552	348	89	190	34	33.1
PC19	EU3	296	348	65	190	26	33.1
KL	EU6	303	360	81	172	40	31.7
Mean concentrations		319.3	339.3	93.5	159.7	42.0	31.6

Notes and Acronyms

1 Concentrations in whole body fish samples from Pinkney and Perry (2020); n=6
2 Concentrations in whole body fish samples (ARSP BERA Table I.3.23); n=3
µg/kg microgram per kilogram
ARSP Anacostia River Sediment Project
PCB polychlorinated biphenyl
tChlordane total chlordane
tDDT total Dichlorodiphenyltrichloroethane
USFWS U.S. Fish and Wildlife Service

B.3.4.3 SIZE AND SPECIES OF WHOLE FISH SAMPLES IN THE TIDAL ANACOSTIA RIVER AND NONTIDAL TRIBUTARIES

USFWS requested more details on the species and sizes of fish in the whole fish samples. In a separate comment, USFWS stated that statistical tests can be used to determine differences in concentrations, but that does not establish that the populations are independent. USFWS also questioned the use of the non-tidal fish samples as background for fish in the tidal Anacostia River. However, a recent work by USFWS (Pinkney and Perry 2020) provided evidence that the suitability of the Potomac River as sediment background for the ARSP was supported by the whole fish concentrations in forage fish. Whole body concentrations of PCBs in forage fish from both the Potomac River and the nontidal upstream sampling locations used in the ARSP (Northwest Branch) were similar at approximately 100 µg/kg PCBs; this value was suggested as a reasonable background concentration in whole forage fish (Pinkney and Perry 2020).

RESPONSE

DOEE compared whole fish chemical concentrations in fish from the tidal and nontidal Anacostia River to test assumptions about independence of the populations of fish in the two regions. DOEE acknowledges that individual fish may move between the two areas; however, the chemical concentrations were significantly different. Concentrations of most COCs in whole largemouth bass and *Lepomis* spp. from the tidal Anacostia River were statistically different from concentrations in the same species from the nontidal upstream background Anacostia River ($p < 0.05$). Only chlordane was not significantly different in the two datasets ($p = 0.09$). The RI concluded that the nontidal samples were reasonably representative of fish body burdens that were not attributable to the tidal Anacostia River. The size ranges of fish that made up the samples were similar, as shown in **Table B.3.4.4**. Species composition and analytical results of each sample are in Attachment I.10 of the BERA.

Table B.3.4.4 Comparison of Fish Sizes in Samples from Northwest Branch and Tidal Anacostia River

Location	Parameter	Mid Trophic Level Fish	Top Predator Fish
Tidal Anacostia River (2014)	mean length	116 mm	291 mm
	range (length)	75 – 160 mm	110 – 684 mm
	sample number	25	28
Nontidal Northwest Branch (2016)	mean length	125 mm	245 mm
	range (length)	88 – 152 mm	186 – 278 m
	sample number	20	18

mm: millimeter

B.3.4.4 PROVIDE DETAILS OF THE CRITICAL BODY RESIDUE APPROACH AND ADD INFORMATION ON PCB EFFECT LEVELS

USFWS requested details on the critical body residue (CBR) approach used in the BERA and suggested that the recent paper on PCB tissue effect levels in fish be reviewed and incorporated into the BERA (Berninger and Tillitt 2019).

RESPONSE

The CBR is discussed in BERA Section Attachment I of the ARSP RI Report (Tetra Tech 2019a). USFWS provided newly published data on the association of concentrations of PCBs in fish (whole body) with reduced survival, growth, and reproduction (Berninger and Tillitt 2019). Concentrations of total PCB congeners in mummichog and banded killifish samples from the Main Stem of the Anacostia River, Kingman Lake, and several tributaries exceeded recently published adverse effect levels on mortality, growth, and reproduction based on meta-analysis of 31 species of fish (Berninger and Tillett 2019). Whole-body concentrations of PCBs in ARSP forage fish samples from the tidal Anacostia (139 to 360 µg/kg) were associated with up to a 12.6 percent effect on mortality, between 9.2 and 14.5 percent effect on growth, and between 31.7 and 38.1 percent reduction in reproduction, according to effect levels in Berninger and Tillitt (2019). Most USFWS forage fish samples from the tidal Anacostia were also within this range of effects. One USFWS sample at Pepco Cove exceeded these effect levels (444 µg/kg). The background concentration of 100 µg/kg total PCBs in forage fish from the Potomac River (Pinkney and Perry 2020) predicts a 27 percent reduction in reproductive success and a 6 percent decrease in growth, according to effect levels in Berninger and Tillitt (2019).

Concentrations of PCBs and other organic chemicals in forage fish from the tributaries are congruent with passive sampling and caged mussel studies (Ghosh et al. 2019) and sediment loading (Wilson 2019) that identified some but not all tributaries as sources of PCBs in the tidal Anacostia River. For example, total PCB concentrations in forage fish from the Northwest and

Northeast Branch were lower, indicating that these inputs to the river do not contain substantial loads of PCBs (Pinkney and Perry 2020). DOEE intends to continue supporting studies such as this as they develop baseline and post-remediation performance monitoring of fish tissue concentrations within the Anacostia River and its tributaries.

B.3.4.5 BERA RESULTS DO NOT INDICATE NEED FOR REMEDIATION; NO ECOLOGICAL PRGS ARE NECESSARY; BIOACCUMULATION WAS NOT ACCOUNTED FOR

Pepco and WGL disagreed with DOEE's interpretation of the risk results in the BERA, stating that a lack of significant correlation between bulk chemical concentrations and toxicity test results indicates the absence of risk to ecological receptors. These reviewers further stated that that DOEE inappropriately applied ecological screening values (ESV) as cleanup goals and did not account for site-specific bioavailability of chemicals.

RESPONSE

The reviewers have mischaracterized DOEE's interpretation of the BERA and subsequent development of ecological PRGs. DOEE considered multiple lines of evidence to characterize ecological risk in the context of the daily, seasonal, annual, and longer-term variability that naturally occurs in a complex ecosystem like the Anacostia River. Lines of evidence included concentrations of chemicals in sediment, pore water, surface water; direct toxicity to amphipods, chironomids, oligochaetes, and larval fish exposed to sediments under controlled laboratory conditions; bioaccumulation of chemicals in oligochaetes exposed to sediment from the study area, and bioaccumulation in free-living clams, snails, crayfish, forage fish, and higher-trophic-level fish; dietary intake of contaminants by birds and mammals using food-chain modeling based on samples from the Study Area; analysis of biochemical parameters affecting availability and toxicity of chemicals (e.g., AVS/SEM, alkylated PAHs, TOC). Sediment concentrations were more than twice the probable effect concentration for dioxin-like PCBs, dioxin TEQ, and chlordane in some areas of the river. Pore water and surface water HQs up to 200 indicated risk of PAHs to aquatic organisms. Chronic potency factors indicate potential toxicity of PAHs in sediment in more than 50 percent of the sediment samples in EU-2 and EU-6.

Given the dynamic physical processes of a tidal river, the intense human influence on the watershed, the limits of empirical data in large river systems, and the numerous uncertainties in exposure and effects, DOEE developed a reasonable and protective approach to characterizing ecological risk. Taken together, these lines of evidence are best interpreted as indicating risk to benthic and aquatic invertebrates. In the absence of regression-based PRGs, DOEE derived ecological PRGs using consensus-based *probable* effect concentrations, which are considered reliable indicators of toxicity to benthic invertebrates by both EPA (2018a) and NPS (2018a). Moreover, numerous chemicals were shown to be bioavailable to organisms in the river, as indicated by bioaccumulation in tissues of field-collected invertebrates, fish, and turtles and laboratory-exposed oligochaetes. Additional comparison of concentrations of PCBs in whole fish with recently published tissue effect levels in more than 31 species of fish demonstrate that PCBs in all feeding guilds of fish sampled in the tidal Anacostia contain amounts of PCBs that can cause adverse effects in fish (see **Section B.3.4.2** above).

DOEE has supported numerous studies since 2014 to measure the bioavailability of chemicals to ecological and human receptors exposed to sediment, surface water, and contaminated organisms in the Anacostia River. In the RI, bioavailability and bioaccumulation were evaluated directly by measuring concentrations of chemicals in organisms collected from the river, including fish, clams, snails, and crayfish. The BERA also included laboratory tests of bioavailability and bioaccumulation in which invertebrates and fish were exposed to sediment from the river under controlled conditions. DOEE has funded work on the incidence of tumors in brown bullhead (catfish) in the Anacostia River (Pinkney et al. 2019), as discussed in **Section B.3.4.12**. Additionally, DOEE investigated bioavailability and bioaccumulation of chemicals outside the ARSP Study Area. DOEE funded scientists from UMBC and USFWS to implement a 2-year study of freely-dissolved concentrations of PCBs, pesticides, and PAHs in surface water and suspended sediment using passive samplers and bioaccumulation in caged mussels in the main tributaries to the tidal Anacostia River. Both the 90-day mussel bioaccumulation study and the passive sampler results identified Lower Beaverdam Creek as the source of the highest freely-dissolved concentrations of PCBs (Ghosh et al. 2019). A Phase II study is planned for later in 2020 to replicate the initial work and corroborate the findings. Measures of bioavailability will be included in the baseline and post-remediation performance monitoring, as described in the forthcoming PMWP.

DOEE also collected dozens of fish samples as lines of evidence for various aspects of the BERA. Both the BERA and the human health risk assessment (HHRA) included analyses of fish samples that reflected the type of exposure pathway appropriate for the receptor being evaluated. For example, mixed samples of similarly sized whole fish were collected to represent the prey consumed by small, medium, and large animal predators. For the HHRA, fish were collected and prepared to reflect the typical exposure of people eating fish from the river. In the non-tidal river, DOEE maximized the value of the samples by analyzing the fillets and the remaining carcass separately to provide measures of the edible muscle typically consumed by people and the reconstituted “whole fish” for comparison with existing samples. All data and calculations are provided in the RI. DOEE is currently funding a study by USFWS comparing concentrations of PCBs and other organic compounds in forage fishes with small home ranges to evaluate variability between species and locations (Pinkney and Perry 2020). This ongoing study is discussed in greater detail in **Sections 3.4.2, 3.4.4, and 3.11**.

B.3.4.6 INTERPRETATION OF SEDIMENT TOXICITY RESULTS

Pepco and WGL commented that the BERA did not find significant correlations between ecological risk drivers (or other chemicals) and adverse impacts in sediment toxicity testing conducted throughout the river.

RESPONSE

The lack of correlation with chemical concentrations in sediment does not eliminate or minimize the observed toxic effects on survival, growth, and reproduction of test organisms, which serve as surrogates for all benthic and aquatic invertebrates in the river. Dioxin-like PCBs, dioxin TEQ, and chlordane exceed ecological probable effect concentrations in the tidal Anacostia River, and numerous organochlorine pesticides are present and bioavailable in sediment. Several contaminants in surface water and pore water, including PAHs, exceeded ecological chronic water quality criteria.

Sediment toxicity was demonstrated by adverse effects on several endpoints in an amphipod, midge, oligochaete, and larval fish. Bulk sediment concentrations exceeded probable effect concentrations for PCBs, and other chemicals. Uncertainty in the precise mechanisms of toxicity is acknowledged, but such uncertainty does not eliminate the existence of the toxicity. Poor correlation between toxicity test results and bulk sediment concentrations are not uncommon when sediments contain complex mixtures of contaminants. Focused toxicity tests will be conducted during baseline and performance monitoring, as described in the forthcoming PMWP.

B.3.4.7 PASSIVE SAMPLING OF PORE WATER IS PREFERABLE TO CENTRIFUGATION

Pepco and WG state that sediment pore water should not be extracted using centrifugation, especially for PAHs.

RESPONSE

Pepco and WGL assert that PAHs in porewater are overestimated in pore water that has been extracted using active centrifugation relative to estimates obtained through passive sampling. Centrifugation is a standard commercial and regulatory method for extracting pore water from sediment. At the time the Work Plan was finalized, and field work was beginning in 2014, centrifugation was regarded as the primary, established method for sampling pore water while passive sampling was still relatively new. To remove any particulate contribution to the total chemical concentration, the centrifuged sample is filtered to remove particles larger than 0.45 microns. The dissolved concentration was used in the BERA. Centrifugation of pore water for analysis of organic chemicals is a well-established method compared with the relatively new passive sampling approaches for which standardized laboratory procedures are still under development.

Concurrent with developing the RI and River-wide FS, DOEE launched a separate study of uptake of organic contaminants by time-integrated passive samplers to measure freely-dissolved concentrations of organic contaminants in sediment pore water, surface water, and air as well as bioaccumulation in caged mussels (Ghosh et al. 2019). Most of the samples were in the tributaries, but 10 sediment samples were analyzed using ex situ passive sampling techniques to measure PAH in pore water.

The Ghosh et al. (2019) laboratory passive sampling methods for sediment pore water differed substantially from the standard centrifugation method used in the ARSP. The passive sampling occurred several years after the ARSP field sampling at locations within the ARSP Study Area but not tightly collocated with the ARSP samples. Despite these differences, the mean PAH concentrations in both datasets were within an order of magnitude of one another. These two methods of measuring concentrations of chemicals in pore water represent different routes of exposure, both of which have value in risk assessment. In general, the mean ARSP pore water PAH concentrations in the corresponding EUs were higher than the single passive samples; in Reach 7 (EU-4), the concentration in the passive sample was greater (**Table B. 3.4.5**). Total

PAHs in pore water collected during the ARSP exceeded chronic water quality criteria in pore water (and surface water).

Table B.3.4.5 Comparison of Total PAH Concentrations in Sediment Pore Water by Centrifugation and Passive Sampling

Ghosh et al. (2019) Sediment Location	ARSP Sediment Sample Location	Total PAH[a] Concentration in Pore Water (ng/L) (passive)	Total PAH[a] Concentration in EU (mean, ng/L) (centrifuged)
WC-37	EU-1	300	548
WC-29	EU-1	400	548
R3-28	EU-2	950	5,050/1,190[b]
R3-51	EU-2	1,000	5,050/1,190[b]
R3-53	EU-2	750	5,050/1,190[a]
R4-30	EU-3	1,800	2,120
KL-26	EU-6	950	1,270
R6-31	EU-3	800	2,120
R6-32	EU-3	1,000	2,120
R7-28	EU-4	1,200	580

Notes
[a] Total PAHs are the sum of all parent and alkylated PAHs
[b] one outlier identified using ProUCL v5.1and removed
ng/L = nanogram per liter

Ghosh et al. (2019) properly used the same EPA methods and the same passive sampling materials reported in the QAPP for the Lower Duwamish project. However, as discussed in **Section B.3.4.5**, the Ghosh et al. (2019) study was not intended for use in making a post-hoc adjustment to empirical ARSP pore water results. The ex-situ passive sampler results and the ARSP pore water results were based on non-collocated samples collected at least two years apart. Only two of the ten samples analyzed with passive samplers were within 25 feet of an ARSP pore water sample (both in Reach 6); the others were up to 1,000 feet from an ARSP pore water sample location. One of the two proximate samples pairs (R6-31 [Ghosh]/R6-19 [ARSP]) produced similar PAH results (800 nanograms per liter [ng/L] [Ghosh] [ARSP]). Results of the other pair varied by a factor of seven (1,000 ng/L at R6-32 [Ghosh] v. 7,500 ng/L at R6-21 [ARSP]). Given the temporal and spatial differences in the two sampling events and the seasonally variable concentrations of contaminants in surface water samples reported in both studies, congruence between the 2014 ARSP centrifuged pore water samples and the 2016 ex-situ passive samples would be surprising. Variability and repeatability of both methods of pore water characterization will be evaluated during baseline monitoring to determine the most appropriate and accurate methods to be used in long-term performance monitoring.

B.3.4.8 TREATMENT OF NON-DETECTS IN STATISTICAL CALCULATIONS

USFWS commented that the use of method detection limits (MDLs) or ½ MDLs for non-detects is not recommended by statisticians (such as D. Helsel, USGS).

RESPONSE

In general, non-detects were treated as zero in calculated total concentrations of chemical groups (such as total PCB congeners). Estimates of whole fish concentrations that were calculated by adding filet and carcass results of the same sample used a weighted average MDL rather than zero in cases where a chemical was not detected in either the filet or the carcass. As stated in RI Section 4.9.1, the calculation of "whole fish" concentrations posed unique challenges associated with combining two separate datasets, especially regarding non-detect (ND) results. Each ND result had to be assigned a specific value to be combined with the result of the corresponding tissue type (fillet or carcass). EPA's ProUCL statistics program recommends identifying ND results with the MDL (or reporting limit) and a "U" qualifier. These ND results are then handled by ProUCL as appropriate based on various statistical metrics (EPA 2015). This topic was addressed in the Work Plans and Field Sampling Plans that governed the RI and explained in detail in Appendix K.

B.3.4.9 VERIFY ERA DEFINED ALL APPROPRIATE CHEMICALS AS COCS

USFWS commented in the River-wide FS Report that that the identification of PAHs as ecological COCs should be checked.

RESPONSE

Some PAHs (e.g., BaP) were identified as risk drivers in the human health risk assessment but not in the BERA. Concentrations of total PAHs in sediment did not exceed the consensus probable effect concentration for benthic invertebrates. Nor were PAHs indicated in risk to birds or mammals. However, tumors in brown bullhead have been linked with PAHs in sediment, as reported in Pinkney et al. (2009, 2011, 2014, and 2019)**.** Please see **Section B.3.4.12** for additional information.

B.3.4.10 THE DISCUSSION OF RESIDUAL UNCERTAINTY IN THE BERA SHOULD BE EXPANDED

NPS requested more discussion on the nature of residual uncertainties associated with ecological risk.

RESPONSE

Residual uncertainties discussed in Section 6 of the BERA include natural cycles (for example, tidal dynamics, tributary inputs, seasonal changes in rainfall, day length, temperature, migrations of animals, life stages of aquatic organisms, and others). Because these parameters cannot be controlled in an empirical study, they introduce uncertainty to measurements and interpretation of site-specific data. The typical method of reducing such natural variability is to conduct long-term regional studies that allow site-specific conditions to be interpreted within the context of broader patterns. While such a study would reduce sources of uncertainty, it would cause a delay in achieving DOEE's fundamental commitment to make the Anacostia River fishable and swimmable.

Concurrent with developing the RI and Focused FS, DOEE launched a separate two-year study of uptake of organic contaminants by time-integrated passive samplers to measure freely-dissolved concentrations of organic contaminants in sediment pore water, surface water, and air as well as bioaccumulation in caged mussels (Ghosh et al. 2019). An investigation of bioaccumulation of PCBs and organochlorine pesticides in forage fish with small home ranges at selected locations in the Anacostia River and Potomac River not only confirmed evidence of bioaccumulation in fishes collected during the RI (Pinkney and Perry 2020), but also serves as a pilot study to support the design of the PMWP. Uncertainties that are amenable to empirical studies include measures of bioaccumulation and toxicity, which will be incorporated into the pre-remediation baseline and post-remediation performance monitoring described in the forthcoming PMWP. DOEE will replicate some studies conducted previously, with refinements representing knowledge gained since the original studies, and initiate other studies to address questions that are not resolved. Study topics include (1) more detailed analyses of movement of contaminants between sediment, pore water, and surface water, building on the initial work reported in Ghosh et al. (2019); (2) DOEE accumulation of chemicals into live organisms (e.g., caged mussels, snails, clams, crayfish, and forage fish) (building on work begun in the ARSP RI and furthered by Pinkney and Perry 2020); (3) game fish sampling aimed specifically at supporting evaluation of risk to subsistence anglers; (4) refinement of upstream background fish concentrations in the non-tidal Northwest and Northeast Branches; and (5) controlled experiments on the effects of PAHs in sediment to brown bullhead or other resident demersal fish.

B.3.4.11 RISK ESTIMATE FOR BIRDS AND MAMMALS WAS BASED ON MODELING

Anacostia Riverkeeper requested that the results and conclusions of the food chain modeling for the osprey be compared with published literature that reported concentrations of chemicals in eggs and adult tissues in the field.

RESPONSE

The most common and well-studied piscivorous bird in the Anacostia River is the osprey, which has been the focus of long-term studies in the Anacostia River and surrounding area. Risk to the osprey (and other birds) was evaluated using food chain modeling in which concentrations of chemicals ingested from the tidal Anacostia River were compared with ingested doses reported to cause toxicity to birds. The estimated dose, using the highest concentration measured in any whole fish sample in the tidal Anacostia River, was lower than the dose reported to cause adverse effects on the osprey. This finding is corroborated by a comprehensive USGS and USFWS study of ospreys focused on contaminant exposure and reproductive success in the Anacostia River and the surrounding area over more than a decade (Lazarus et al. 2015, 2016). Concentrations of PCBs and DDE in eggs from the Anacostia River population of ospreys were historically linked with reproductive impacts (Henny et al. 2009). By 2011, however, concentrations of both contaminants had dropped below adverse effect levels for the osprey. The most recent USGS summary report on this topic reviewed long-term data trends and concluded that the Chesapeake Bay osprey population was in recovery and demonstrated no effect of legacy pollutants (Rattner 2020). Given these data, it was not appropriate to collect blood or eggs from these birds.

B.3.4.12 ACKNOWLEDGE EFFECT OF SEDIMENT CONTAMINANTS ON TUMORS IN BROWN BULLHEAD

Anacostia Riverkeeper requested that DOEE acknowledge the relationship between sediment contaminants and adverse effects on brown bullhead and include tumors and lesions as an indicator of risk in the BERA.

RESPONSE

Tumors in resident fish have been causally linked to PAHs in river sediments (Pinkney et al. 2009, 2011, 2014, and 2019), although recent studies report that the incidence of tumors in brown bullhead in the Anacostia River has declined (Pinkney et al. 2019). The selection of critical body residue concentrations used in the BERA included tumors and lesions as relevant endpoints, although the incidence of tumors in fish collected as part of the ARSP RI was low. Measures of sublethal effects of residual contaminants on fish is being considered during the development of the forthcoming PMWP.

B.3.5 COORDINATION WITH PECSES

The interim actions described and selected in the Proposed Plan will be implemented as part of an overall plan for the ARSP. The alternatives that DOEE selected (after considering public comment) in the Interim ROD will address OUs within the ARSP study area. However, remedial action may be needed in other areas, such as Lower Beaverdam Creek in Maryland and at some PECSes. Extensive summaries of the 15 PECSes thus far identified in the study area are available in Section 2.6.1 of the ARSP RI Report.

Discussion of the remedial actions in these additional PECSes was not within the scope of the Proposed Plan for the Interim ROD. Nevertheless, many comments on the Proposed Plan suggested the need for more detail on the larger overall cleanup of the Anacostia River.

Several comments came from organizations that were responsible for or associated with the PECSes, including Washington Gas Light (WGL) and Potomac Electric Power Company (Pepco). The comments highlighted the alleged problems created by selecting and implementing interim actions when all the data and evaluations for the entire Anacostia River watershed are not complete. In addition, these reviewers questioned the authority of the DOEE to take early actions and set precedents regarding remedial cleanup standards, without considering other documents (such as Consent Decrees) and ongoing work at the PECSes.

Generally, stakeholders from community groups felt the Proposed Plan did not clearly identify who the potentially responsible parties (PRPs) were for the ARSP and what their roles were with respect to the interim remedial action. The commenters raised questions about funding of the interim actions and future remedial actions. There were concerns about potential conflicts of interest among the government and private party PRPs.

RESPONSE

In choosing to implement an Interim ROD at the ARSP, the DOEE is following the three program management principles of the National Contingency Plan (NCP) for the remedial process [40 CFR 300.430(a)(I)(ii)(A)]. They are:

(A) Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup.

(B) Operable units, including interim action operable units, should not be inconsistent with nor preclude implementation of the expected final remedy.

(C) Site-specific data needs, the evaluation of alternatives, and the documentation of the selected remedy should reflect the scope and complexity of the site problems being addressed.

In the Proposed Plan, DOEE explained how the selected remedy will follow these principles, which are also discussed in the Interim ROD. The Interim ROD is only a subset of what may be a number of future actions that will be needed to completely remediate the Anacostia River. The complete cleanup will possibly include remedial actions at the PECSes. DOEE expects to participate in any future remedial action selection processes for these sites. This may happen through various roles, for example as stakeholder or reviewer or in the case of Pepco, as lead regulatory agency. DOEE intends to work with stakeholders at these sites so that overall remediation objectives will align with the objectives in the ARSP, including in the Interim ROD.

Through the adaptive management process of early action, performance monitoring, and remedy review, DOEE will continue to review the protectiveness of the selected remedy and cleanup standards and will consider whether further action is needed for the EAAs described in this Interim ROD. Although DOEE will consider the schedule for PECS actions, DOEE cleanup action implementation and associated performance monitoring will generally proceed independently of the PECS actions. DOEE will also ensure coordination regarding remedial objectives and cleanup standards with the other parties responsible for performing actions elsewhere within the Anacostia River, particularly those responsible for the PECSes. This coordination will fulfill the second program management principle: for early actions to be not inconsistent with nor preclude implementation of the final remedy. More detailed discussion of the adaptive management process is included in **Section B.3.1**.

The ARSP is a complex, multi-site cleanup project. In selecting the interim remedial action, DOEE considered results and findings from ongoing remedial investigations at PECSes and technical input from the responsible organizations at PECSes and other sites. When final technical documents for these sites were considered or relied upon in selecting the interim action, DOEE has included them in the Administrative Record for the decision. Work continues at PECSes and cleanup standards have yet to be finalized at many of the sites, some of which are proceeding under Consent Decrees. But at the sites covered by this Interim ROD, DOEE has determined it is appropriate to take action where risk mitigation was required and interim remedial objectives would result in cleanup progress. In **Sections B.3.1, B.3.6 and B.3.11**, more detail is provided about how the early action remedial action objectives were determined and their relationship to future cleanup actions, such as at PECSes.

Several stakeholders, particularly those representing impacted communities and conservation groups, questioned who is responsible for cleaning up the various contaminated areas and where the funds to complete the cleanups will come from. The Proposed Plan and the Interim ROD are not designed to include determinations of who is responsible for the presence of hazardous substances in the ARSP study area nor who will pay for their cleanup. Once the final Interim ROD is issued, DOEE expects that it will proceed to address these questions. These actions will follow their own public processes and stakeholders can monitor and participate in these processes.

Meanwhile, the Interim ROD contains a discussion of the site history and associated enforcement activity, such as current Consent Decrees and administrative actions. This more detailed discussion is drawn from the ARSP Administrative Record documents and includes any new information that was developed after the Proposed Plan was released.

B.3.6 EAA DEFINITION

The Interim ROD is designed to make substantial progress toward cleanup of the ARSP study area, but it marks only the beginning of a comprehensive cleanup process. Following sediment remediation in the EAAs in each OU, a post-remediation monitoring program (defined in **Section B.3.1.8**) will be implemented. Using the data generated by this monitoring program, an adaptive management-based decision framework will guide the path forward from the early actions defined in this Interim ROD to the issuance of a Final ROD. This path forward will include other sediment cleanup actions, at the PECSes specifically and potentially elsewhere in the study area, as appropriate.

The EAA Definition Theme encompasses the subset of comments on how the portions of the study area that will be subjected to remediation in the Proposed Plan were defined and the predicted benefits derived from this remediation. Among the subthemes covered, this theme discusses the application of kriging in defining the EAAs, use of total PCB congeners as a surrogate for the cleanup of other COCs, selection of the EAA cleanup level, and calculation and role of estimated risk reduction in defining the cleanup level.

B.3.6.1 COMPARISON OF EAAS DEFINED BY KRIGING AND THIESSEN POLYGONS

Several stakeholders (Navy and DC Appleseed) suggest that EAAs should be determined using the Thiessen polygon method or, at minimum, EAAs determined using both kriging and the Thiessen polygon methods should be compared.

RESPONSE

Based on the interpolated total PCB congener concentration distribution measured in study area sediment, the Proposed Plan presented the 11 areas for early action cleanup in Proposed Plan Figure 2. The kriging approach documented in Appendix L of the ARSP RI Report was used to perform the interpolation. To address stakeholder questions and concerns that the kriging interpolation approach inaccurately defined the early action areas, **Figures 3.6.1 and 3.6.2** were created to clarify EAA locations and sizes. EAAs based on the Thiessen polygon method are shown in **Figure B.3.6.1**. The Thiessen polygon method consists of the division of each river reach into a series of polygons. Each polygon is centered on a surface sediment sampling location, which represents a chemical concentration measurement point and is weighted according to the corresponding polygon area for that point. **Figure B.3.6.1** shows the subset of Thiessen polygons that represent the portion of the study area with total PCB congener concentrations in surface sediment equal to or greater than the early action RAL of 600 µg/kg. For comparison, the kriging based EAAs from the Proposed Plan are shown in **Figure B.3.6.2**. Some EAAs are composites of two or more small hot spots in close proximity. The EAAs determined using Thiessen polygons are based solely on surface sediment (top 6 inches) concentrations while the kriging based EAAs incorporate the interpolated effects of subsurface sediment based on the recognition that river bottom sediment is a three-dimensional medium (kriging details are provided in ARSP RI Report Appendix L). Kriging model anisotropy and the incorporation of the influence of subsurface sediment concentrations on the surface sediment kriged contaminant distribution are discussed **Section B.3.6.2**.

Tables B.3.6.1 and B.3.6.2 list the EAAs defined using kriging and the EAAs defined using Thiessen polygons, respectively. **Table B.3.6.2** shows the correct kriging-defined areas and acreages (correcting a discrepancy that existed between the Proposed Plan and the Focused FS regarding the numbers of EAAs and total EAA area).

For the kriging approach, **Figure B.3.6.2 and Table B.3.6.1** show the final EAAs and their respective areas; the total EAA area is 77.2 acres distributed across 11 EAAs. The total acreage in **Table B.3.6.1** (77.2 acres) includes “buffering” that “boxes” around each EAA (polygons that approximate the curved contours defining EAAs) to support remedy costing. However, **Figure B.3.6.2** shows each EAA directly as defined by kriging without buffering. As determined directly by kriging without adding the buffering area, the kriging based EAA total area is 52 acres (**Table B.3.6.1**).

Since the EAAs in **Figure B.3.6.1 and 3.6.2** are defined using different approaches and methods, differences exist in the number the resulting EAAs, but the size of the total area determined by each method is quite comparable. The raw kriging-determined area (52 acres, no buffering) is similar to the Thiessen polygon area (51.6 acres) since it is also unbuffered. If used for costing purposes, buffering would need to be applied to the Thiessen polygon areas, as was done for the kriged areas. **Table B.3.6.2** shows the correspondence between the unbuffered kriging-based EAAs and the Thiessen polygon-based EAAs. The Thiessen polygon derived area is 51.6 acres, within 1 acre of the unbuffered area from kriging.

The remedy identification and screening results documented in the Interim ROD are based on kriging since, as noted in a comment on the Focused FS Report by DC Appleseed, the kriging approach is more robust technically than the Thiessen polygon approach. The robustness of the kriging approach results from fundamental differences between the two methods. The Thiessen polygon approach is a simple to use, objective approach for spatial data interpretation and SWAC calculation. However, since sample points are typically not uniformly distributed, a wide range of polygon sizes often results. Points represented by very small polygons may not have as much influence as they should (to accurately reflect the “true” concentration distribution) while the converse is true for large-polygon points. Kriging is based on defining a dataset-specific semivariogram, which quantitatively represents the maximum spacing over which different sampling points in the dataset can be correlated and the “shape” of the curve defining this correlation. Kriging, therefore, is not subject to over- or under-representation of any single concentration because of the size of its associated polygon.

The final area to be subjected to remediation will be carefully refined via sediment sampling conducted during the pre-design and design phases of the early action remedy. Each EAA was defined using the sediment dataset generated during the RI. Pre-design sampling will be performed to confirm and refine the size of each EAA as necessary before remedy implementation. This sampling will, therefore, accurately resolve questions regarding the true area with greater-than RAL (600 µg/kg) concentrations requiring remediation.

B.3.6.2 APPLICATION OF GEOSPATIAL KRIGING FOR EAA DEFINITION

The Navy, Pepco and WGL, and CSX expressed concerns regarding the geospatial kriging analysis performed to define the EAAs addressed in the Proposed Plan. They indicated that the analysis was inconsistent with standard procedures for the industry, was inappropriately influenced by subsurface samples, was unsuccessful in satisfactorily matching observed concentrations, and was insufficiently documented by DOEE.

RESPONSE

As described in Appendix L to the ARSP RI Report, Earth Volumetric Studio (EVS) software by C Tech Development Corporation was used for the kriging analysis. EVS is the industry standard for the interpolation and visualization of environmental datasets. Based on a technology review of EVS, the U.S. EPA determined that the software is an appropriate tool for generating “reliable and useful analyses for evaluating environmental contamination problems” (EPA 2000a).

In the kriging interpolation approach, the correlation between sample results is described using a semivariogram. In this analysis, a spherical semivariogram model was defined, reviewed, and refined to ensure that the final model reasonably matched the observed spatial variability of the concentration dataset for each constituent modeled. **Figure B.3.6.3** shows the resulting horizontal (XY space) semivariogram for total PCB congeners. The spherical model includes a range and a sill. The range is the maximum distance within which the correlation of sample values exists; the sill is the semivariogram value for samples spaced apart at distances greater than the distance at which samples become independent of each other. The sill is an estimate of the true variance between samples (Clark 1979). The spherical model is defined mathematically by the following equation:

$$\gamma(h) = C\left(\frac{3}{2}\frac{h}{a} - \frac{1}{2}\frac{h^3}{a^3}\right) \text{where } h \le a$$
$$= C \qquad\qquad \text{where } h \ge a$$

Where:

h = Spacing between samples with measured concentrations

a = Range of the semivariogram (the sample spacing above which samples become independent of each other)

C = Sill of the semivariogram (value of semivariogram for samples spaced apart beyond the spacing at which samples become independent of each other)

Anisotropy describes the directional dependence of the variability between concentration measurements. For data characterizing constituent concentrations in fluvial sediment deposits, concentrations are expected, for the same measurement distance, to exhibit lower variability in the horizontal as compared to the vertical dimension. An anisotropy factor of 50 was used to account for greater horizontal versus vertical comparability of the concentration data. In EVS, an anisotropy factor of 50 is applied in the model by defining the vertical semivariogram range as equal to the horizontal semivariogram range divided by 50.

Pepco and WGL objected to the ranges defined in the semivariograms (presented in Appendix L of the ARSP RI Report) and suggested an alternative approach for semivariogram development that imposed constraints based on the river's length and thickness of bottom sediment. Although the approach suggested by this stakeholder is a possible "rule of thumb" used by some practitioners, the spherical model equation is independent of the total length, width, or depth of the area of application. Specifically, the spherical model equation contains no terms defining the dimensions of the study area. The range and sill of a spherical model depend only on the shape and form of sample pair differences (differences in the measured sample results that are being interpolated) with increasing spacing between sample pairs. It should be noted that other semivariogram models, such as the linear model that is the default model in many contouring applications, has no range or sill. DOEE's determination of the appropriate semivariogram model for the total PCB congener dataset was based on an objective evaluation of the data without any imposed external constraints such as the "rule of thumb" suggested by Pepco and WGL. Typographical errors regarding the semivariogram parameters for various constituents were identified in the December 2019 version of RI Report Appendix L. The correct semivariogram parameters are shown in **Table B.3.6.3**.

Several stakeholders (Pepco and WGL, CSX, Navy) objected to including the influence of subsurface samples in the estimation of the extent of river bottom in each EAA where total PCB congener concentrations exceed the early action RAL of 600 µg/kg. They also state that the degree to which the kriging-interpolated concentrations match observed concentrations is insufficient. In addition, stakeholders requested additional explanation regarding the use of control points. For the purposes of the ARSP kriging analysis, control points are defined as manually-specified, low (effectively zero) concentration points intentionally placed to improve model interpolated concentrations in low concentration areas. Control points were added to the ARSP kriging model to ensure that the model results were spatially consistent with measured observations.

Subsurface sediment samples were included in the kriging interpolation to augment the available surface sediment sample density in each EAA. Including both surface and subsurface sediment samples in the kriging interpolation resulted in a 3D concentration distribution for the entire sediment body below the river bottom. From this 3D distribution, the top 6-inches were then isolated and used to delineate areas greater than the early action RAL of 600 µg/kg. Including the influence of the subsurface sediment samples in this analysis, therefore, provided additional “fill-in” concentration interpolation capability in areas with no surface sediment samples. Cross-validation was used to assess the capability of the kriging analysis to reproduce measured concentrations to support semivariogram determinations. Cross-validation is the process by which each measured concentration is removed from the dataset and the semivariogram model is used to estimate the missing value at that location. In theory, the cross-validation statistics generated from the procedure should have mean of 0.0 and a standard deviation of 1.0 (Clark 1979). The mean and standard deviation for total PCB congeners kriging analysis were 0.28 and 1.05, which are reasonably close to the theoretical values of 0.0 and 1.0. The cross-validation analysis did not include the control points. Dataset summary statistics, semivariogram parameters, and data for the grid summary for kriging analysis are included in **Table B.3.6.3**.

DOEE collected surface sediment samples for the ARSP to support multiple objectives, including chemical characterization, toxicity assessment, pore water characterization, and physical parameter characterization to support the FS. Consisting of 472 surface sediment samples, the ARSP dataset was sufficiently dense and robust to achieve these objectives and support the identification, screening, and costing of remedial alternatives and the issuance of a Proposed Plan. As is true for any major river project, before the implementation of the early actions, additional surface sediment sampling in the pre-design and full design phases of the project will be necessary to more accurately define the extent of greater-than RAL total PCB congener concentrations in each EAA.

B.3.6.3 AGREEMENT BETWEEN KRIGED AND MEASURED CONCENTRATIONS

CSX and Pepco and WGL believe that the level of agreement between the kriging-based concentration distributions and the associated measured concentrations in surface sediment was insufficiently robust for EAA definition. CSX contends that the kriging performed does not account for the physical conditions in the river since CSX believes that the mapped concentrations did not account for the presence of Kingman Island. Specifically, CSX indicated that elevated concentrations in Kingman Lake are not supported by data but are the result of the inappropriate extrapolation by kriging of elevated concentrations in the Main Stem on the opposite side of Kingman Island.

RESPONSE

To illustrate the ability of the kriging model to match observed sample results, the kriged distribution for total PCB congeners is shown for two EAAs in **Figures B.3.6.4 and B.3.6.5.** Posted on the figures are total PCB congener concentrations from surface sediment samples located in each area. The figures show that the kriged total PCB congener distribution reasonably matches the observed concentrations. Similar results were obtained in the other nine EAAs.

The comment from CSX incorrectly suggests that the kriging concentrations in Kingman Island are not supported by data. Figure 6.7 from the ARSP RI Report shows total PCB congener concentrations in study area water bodies. Close agreement exists between measured and interpolated concentrations in both the Main Stem and Kingman Lake. Any elevated concentrations in Kingman Lake proximate to the Kingman Island shoreline are supported by the measured total PCB congener concentrations at sampling locations.

B.3.6.4 PRESENTATION OF GREATER-THAN-600 µG/KG AREAS IN THE INTERIM ROD

The Navy and Pepco and WGL stated that figures in the Proposed Plan and Interim ROD should not show the above-cleanup level (600 µg/kg for total PCB congeners) portions of the study area that are not being addressed through the early actions defined in these documents. Others (NPS, DC Appleseed) indicated that all greater than 600 µg/kg areas need to be shown in the Proposed Plan and Interim ROD and that these areas need to be more clearly shown on the appropriate figures.

RESPONSE

The Interim ROD shows all portions of the study area where surface sediment concentrations are estimated to exceed the Interim ROD RAL of 600 µg/kg. Showing all areas including the areas proximate to PECSes with greater-than-600 µg/kg concentrations is necessary to provide a complete, consistent understanding of elevated contaminant concentrations in the study area, even though it is recognized that, as cleanup investigations continue at each PECS, the PECS parties themselves may further refine the concentration distributions adjacent to their sites. **Figure B.3.6.6** shows the EAAs addressed by the Interim ROD shaded in red. PECS areas with greater-than-600 µg/kg PCB concentrations in surface sediment not addressed by the Interim ROD are shaded in blue.

B.3.6.5 TOTAL PCB CONGENERS AS A SURROGATE FOR EAA DEFINITION

Some commenters (NPS, Anacostia Watershed Community Advisory Committee, and USFWS) indicated a concern that EAAs defined based on total PCB congeners will not adequately address the risks to people posed by dioxin-like PCBs and dioxin toxic equivalent (TEQ). Concern also was expressed that the defined EAAs do not account for benzo(a)pyrene equivalent (BaPE) which is a risk driver at the 1E-06 level in some portions of the study area (but not at the 1E-05 target risk level). Specifically, stakeholders requested clarification regarding the evaluation of BaPE and chlordane in the HHRA and Focused FS. In addition, stakeholders expressed concern that the early actions will not address the ecological risks posed by chlordane.

RESPONSE

All human health-related direct sediment contact (and other pathways) risks for BaPE and chlordane are less than the selected risk level for the Interim ROD early actions (for discussion regarding the selection of the 1E-05 excess cancer risk target risk level, please see **Section B.3.9**). Therefore, BaPE and chlordane are not human health COCs for purposes of this Interim ROD. The Interim ROD (**Section 5.2**) and Responsiveness Summary (**Sections B.3.9 and B.3.4, respectively)** address the risk posed by BaPE to humans from direct contact, and the ecological risk posed by chlordane.

The FS (both the Focused FS and River-wide FS) focused on human health COCs associated with ingestion of fish. Since elevated sediment concentrations of total PCB congeners, dioxin-like PCBs, and dioxin TEQ largely co-occur, designing the EAA footprints based on concentrations of total PCB congeners also addresses risk-based concentrations of the other COCs (please see Figures 2.14 through 2.16 of the River-wide FS Report). As discussed in **Section 3.4**, the EAA footprints defined for PCBs encompass some but not all areas where chlordane exceeds the ecological sediment PRG. The early action will reduce risk to ecological receptors posed by chlordane in the Main Stem of the river to less than five times the ecological PRG (18 µg/kg), and in Kingman Lake to 2.6 times the PRG. In Washington Channel, which already met the chlordane PRG, the early action will reduce the chlordane SWAC by 40 percent (see **Table B.3.4.1**). The anticipated reductions in chlordane concentrations throughout the tidal Anacostia River will be confirmed during the post-remediation baseline monitoring and long-term performance monitoring (**Section B.3.1.8**), which will include measures to refine DOEE's understanding of chlordane's residual effect on benthic and aquatic invertebrates.

B.3.6.6 SELECTION OF THE 600 µG/KG EAA RAL FOR TOTAL PCB CONGENERS

DC Appleseed, the Navy, and NPS suggest that the Proposed Plan and the supporting documents lacked sufficient clarity regarding the derivation of the 600 µg/kg PCB EAA remedial action level. They request that DOEE quantitatively evaluate the cost and assumed benefits derived for a range of RALs. Pepco and WG question DOEE's use of two methods for interpolating concentrations in surface sediment, the Thiessen polygon calculations method for SWAC calculations and kriging for EAA delineation.

RESPONSE

The early action remedial action level (RAL_{EAA}) used in the Proposed Plan (600 µg/kg) was selected to address portions of the study area where the most elevated concentrations (total PCB congeners) are observed. The 600 µg/kg level was determined to achieve a substantial incremental increase in risk reduction compared to that achieved by lower cleanup levels (which would define larger cleanup areas). The Interim ROD is designed to make substantial progress toward cleanup of the ARSP study area. A post-remediation monitoring program (defined in **Section B.3.1.8**) will follow up the Interim ROD cleanup actions. Using the data generated by this monitoring program, an adaptive management-based decision framework will guide the path forward from the early actions defined in this Interim ROD to the issuance of the Final ROD. This path forward will include other sediment cleanup actions, at the PECSes specifically and potentially elsewhere in the study area, as appropriate.

The RAL_{EAA} is the surface sediment concentration level that the EAA cleanups are intended to achieve. The extent of the area within which the early cleanup actions will be performed is therefore a direct function of the selected RAL used to delineate the area. The 600 µg/kg RAL_{EAA} was selected as the appropriate multiple (3x) of the river-wide RAL (RAL_{RW}, 200 µg/kg) to define the EAAs. Key to understanding the genesis of the RAL_{EAA} is understanding the derivation of (1) the SWAC for a river reach, (2) the RAL from the SWAC, (3) the RAL_{RW} from the individual reach RALs, and (4) the RAL_{EAA} from the RAL_{RW}.

The six ARSP river reaches are shown on **Figure 1.4** of the Decision Summary and include Reach 123, Reach 456, Reach 67, Reach 7, Kingman Lake, and Washington Channel. An RAL is defined as the river reach-specific concentration at which the post-cleanup SWAC is at or below the PRG. RALs, therefore, represent the maximum post-cleanup concentration that can remain in a river reach while still achieving the PRG in that reach. SWACs were calculated using the Thiessen polygon method, in which polygons are established within the area of interest (reach) with a sampling point at the center of each polygon. In calculating the SWAC for the reach, the polygon area then is used to weight the concentration for each surface sampling point. NPS suggested that a sensitivity analysis of the SWACs determined using the Thiessen polygon method is necessary. However, the Thiessen polygon method is deterministic, meaning that no randomness exists in the inputs for calculating a SWAC by this method. Since all inputs to the calculation are explicitly defined, a sensitivity analysis cannot be performed.

The RAL for each COC and river reach is a function of the PRG, the concentration distribution of the COC in the reach, and the spatial distribution of the sampling points in the reach. **Table B.3.1.1** shows for total PCB congeners (PRG equal to 65 µg/kg), the reach-specific RALs, the average RAL across the six reaches, and the associated RAL_{RW}. As shown in the table, the average RAL was 176 µg/kg, which was rounded to 200 µg/kg to produce the RAL_{RW}. The maximum reach-based RAL was 220 (in Reach 123) and the minimum reach-based RAL was 74 (in Reach 7).

Risk reduction is calculated by determining the risk associated with the pre- and post-remediation SWAC concentrations and then subtracting the post-remediation risk from the pre-remediation risk. With regard to PCBs, DOEE calculated risk levels associated with each PCB SWAC by dividing the SWAC by the modeled fish-to-sediment adult subsistence angler PRG for PCBs at the target risk level of 1E-05 (65 µg/kg) and then multiplying this quotient by the target risk level (1E-05). This approach for risk reduction estimation assumes the following:

- The early action remedies will render PCBs non-detect or non-bioavailable in the EAAs (a simplifying assumption; following carbon amendment application, benthic organism uptake of hydrophobic contaminants is reduced by 70 to 90 percent [Patmont 2014])
- Source control in the upstream, non-tidal watershed will be effective
- The early action remedies will reduce PCB concentrations in pore water in surface sediment
- The concentration reductions achieved in the OU are based on the existing dataset and are accurately reflected in the calculated post-remediation SWAC for each OU.

Determining the most appropriate size of the area addressed by the early actions was not formulaic, but rather required a scenario-based review of a range of potential RALs. DOEE evaluated RALs defined as 2x, 3x, 4x, 5x, 6x, and 10x the 200 ug/kg RALrw (**Table B.3.6.4**). **Figure B.3.1.2** compares the results from this evaluation by plotting for each RAL (1) risk reduction, (2) cleanup area, and (3) cost. Although the estimated risk reduction is subject to a number of assumptions and substantial uncertainty, the risk reduction calculation can be used as a net estimate of risk reduction achieved by a given RAL. **Figure B.3.1.2** shows a steady incremental increase in risk reduction from 6x to 5x to 4x to 3x the RAL. However, between 3x to 2x the RAL, essentially no additional risk reduction is achieved. At the same time, with the decrease in multiplier, the cleanup area and associated cost steadily increases at an increasing rate. The plot shows that the additional expense associated with any decrease in the cleanup RAL below 600 µg/kg is not justified by a commensurate reduction in risk. The plot supports the selection of 600 µg/kg PCBs as a reasonable and appropriate EAA cleanup level. It should be noted that these calculations do not account for the additional risk reduction that will occur as the result of cleanups at the PECSes.

The selected level of 600 µg/kg allows for a more focused, efficient, and effective implementation of sediment cleanup actions. As stated previously, the Interim ROD may or may not be the final cleanup action; as noted in **Section B.3.1.8**, data generated by a comprehensive post remediation performance monitoring program will be evaluated through an adaptive management decision framework. Given enough monitoring to establish concentration trends in site media, the outcome from this framework will determine the appropriate path forward to establish the Final ROD. By first addressing hot spots as (represented by the EAAs), the efficient expenditure of resources is fostered (i.e., avoidance of over-remediation), since cleaning up the EAAs may result in substantial progress toward achieving RAOs and will provide important input to the identification of any follow-up cleanup actions that might be needed. Cleanup in the EAAs will also prevent contaminant migration from these areas.

With respect to the Pepco and WG question regarding the use of the Thiessen polygon method for SWAC calculations while also using kriging for EAA delineation, each interpolation method was selected as most appropriate for the specific need it was used to address. As explained earlier in this subtheme response, Thiessen polygon analyses of total PCB congener surface sediment data were used to determine the SWAC-based RALs for each reach, which then led to the determination of the RAL_{RW}. The RAL_{RW} thus determined was used to define various EAA RALs evaluated in this subtheme. The Thiessen method is the method of choice for condensing aerially-distributed concentration data into a single area-weighted average – the SWAC. SWACs were thus calculated for each potential RAL which were, in turn, used in the risk reduction calculations. The Thiessen method is, as indicated previously, deterministic – given a specific set of concentrations and associated sample locations, only one SWAC can be calculated using Thiessen polygons. The Thiessen method was therefore used for SWACs to maintain the consistency and objectivity in the SWAC calculations.

The cleanup area for the selected RAL (as discussed in **Section B.3.6.1**) was calculated using kriging because, as noted in **Section B.3.6.1**, kriging is less subject to the geometric idiosyncrasies inherent in any sediment dataset (i.e., irregular placement of samples). Specifically, since sample points are typically not uniformly distributed (i.e., grid-based), a wide range of polygon sizes often results. Points represented by very small polygons may not have as much influence as they should while the converse is true for large-polygon points. To avoid the distortive effects of Thiessen polygons in mapping the areas of the EAAs, kriging was used to define the EAAs. Kriging is based on defining a dataset-specific semivariogram which quantitatively represents the maximum spacing over which different sampling points in the dataset can be correlated and the “shape” of the curve defining the correlation. Kriging, therefore, is not subject to over- or under-representation of any single concentration because of the size of its associated polygon.

B.3.6.7 ROLE OF ESTIMATED RISK REDUCTION IN DEFINING THE EAAS

The Proposed Plan estimated that up to a 90 percent risk reduction theoretically could be achieved across each OU as a result of the planned EAA remediation. Although DC Appleseed states in many of its comments that the calculations underpinning the 90 percent estimate are "flawed," the specific technical criticism made by this stakeholder (as stated in the cover letter accompanying their comments on the Proposed Plan) is that it is "insensitive, not sufficiently reliable, and lacks the appropriate level of detail" in the Proposed Plan and supporting documents. In its text-specific comments, DC Appleseed further states that the calculation does not provide sufficient or accurate information for distinguishing between alternative RALs. MDE and others questioned how to interpret the predicted 90 percent risk reduction and the amount of uncertainty associated with this prediction. Specifically, these stakeholders were uncertain whether the predicted reduction applied to EAAs or more broadly to the three study-area OUs.

RESPONSE

To help support appropriate sizing of the early action cleanup areas, DOEE estimated the risk reduction that would be achieved from these actions. The calculated risk reductions are based on OU-based SWACs and therefore apply across each OU (Main Stem, Kingman Lake, and Washington Channel) in their entirety. Stakeholders requested clarification regarding how the risk reduction calculations were performed. DOEE estimated an average risk reduction of up to 90 percent across the three OUs that comprise the study area (see Table 1, Proposed Plan). DOEE calculated post-EAA risk levels for PCBs by dividing the post-EAA SWAC by the modeled fish-to-sediment adult subsistence angler PRG for PCBs at the target risk level of 1E-05 (65 µg/kg) and then multiplying this quotient by the target risk level (1E-05). The assumptions inherent in this approach are summarized in **Section B.3.6.6** and are repeated below:

- The early action remedies will render PCBs non-detect or non-bioavailable in the EAAs (a simplifying assumption; following carbon amendment application, benthic organism uptake of hydrophobic contaminants is reduced by 70 to 90 percent [Patmont 2014])
- Source control in the upstream, non-tidal watershed will be effective
- The early action remedies will reduce PCB concentrations in pore water in surface sediment
- The concentration reductions achieved in the OU are based on the existing dataset and are accurately reflected in the calculated post-remediation SWAC for each OU.

Regarding the first assumption, risk reduction is calculated on an OU-wide basis. Since risk-driving concentrations exist in each OU outside of the EAAs, risk-driving concentrations will remain in each OU after remediation is performed in the EAAs. The average pre- and post-remediation risk across the three OUs was 2.37E-04 and 2.13E-05, respectively resulting in an average risk reduction for the study area of 90 percent. It should be noted that this reduction does not account for additional risk reduction that would be achieved from PECS cleanup actions.

For details on PRG calculation, please see the discussion of Method 2 (Direct Analysis of Forage Fish Modeled to Game fish) in Appendix A of the River-wide FS Report. DC Appleseed asserts that the risk reduction calculation discussed above is flawed, insensitive, and not sufficiently reliable for comparing the estimated risk reduction for different RALs. Although the estimated risk reduction is subject to a number of assumptions (stated above) and substantial uncertainty, the risk reduction calculation is valid and can be used as a net estimate of risk reduction achieved by a given RAL. The calculation's limitations stem from its dependence on the representativeness of the real concentration distribution by a finite number of sampling locations (i.e., the limitations associated with the Thiessen polygon method). Specifically, the calculation can be insensitive in the evaluation of some RALs because of the distorting effects of the Thiessen polygons (please see additional discussion in **Section B.3.6.1**). Because the risk calculation is based on a straight-forward expression of the risk represented by a given SWAC (i.e., relating SWAC to a specific target risk level, calculating the risk levels before and after remediation, and then calculating the percent difference), no basis exists for asserting this calculation is "flawed." Rather, the calculation is entirely appropriate (bearing in mind the underlying assumptions indicated above) for the net estimation of the potential risk reduction that might be achieved for a given RAL.

Other stakeholders (Sierra Club and Anacostia Watershed Community Advisory Committee) are concerned that cleaning up only to the 600 µg/kg RAL will result in concentrations that although less than 600 µg/kg, are too elevated to remain in place. In response, comprehensive, multimedia post-early action cleanup data collection (via the PMWP discussed in **Section B.3.1.8**) and evaluation via the adaptive management decision framework will directly measure the protection achieved from the cleanup and will drive decisions regarding the need for additional cleanup actions. Via this adaptive management framework, DOEE will compare (once enough sampling data has been collected to allow the calculation of concentration trends) concentration reductions and estimated cleanup timeframes with the DOEE-defined acceptable timeframe documented in the PMWP. This monitoring will also capture any concentration reductions achieved over time through the natural deposition of new sediment in the study area. The ARSP Surface Water Model (Tetra Tech 2019b) and direct sampling of tributary sediment by the USGS (Wilson 2019) indicate that, for the most part, new sediment deposited in study area water bodies will have PCB concentrations less than the PCB PRG (65 µg/kg). The ARSP Surface Water Model calibration included the elevated concentrations observed in the USGS study. In addition, the calibration included the data from the USGS study reflecting the low concentrations and high volume of sediment input by the principle tributaries to the study area (Northeast Branch and Northwest Branch). Over time, the model predicts that surface sediment concentrations will decrease from current levels over nearly all of the study area.

B.3.7 MODELING

The Modeling Theme captures the subset of stakeholder comments that pertain to either the ARSP Surface Water Model (construction, calibration, and application) or to the groundwater modeling conducted to assess potential groundwater-borne impacts from selected PECSes to river media. In the following summary, surface water model comments are summarized followed by comments pertaining to groundwater modeling. The ARSP surface water model is documented in the ARSP Surface Water Model Report (Tetra Tech 2019b); the groundwater modeling conducted to support the ARSP is presented in the ARSP Groundwater Modeling Report (Tetra Tech 2019c). The ARSP surface water model consists of a Loading Simulation Program in C++ (LSPC) (EPA 2009) watershed model linked to Environmental Fluid Dynamics Code (EFDC)[20] receiving water body model, which simulates conditions in the tidal Anacostia River.

The ARSP surface water model comprehensively models the watershed, the tidal receiving water bodies that comprise the study area, and the interaction between the watershed and the receiving water bodies. The model code for the watershed (LSPC) and the receiving water model (EFDC) are state-of-the-art modeling codes developed by U.S. EPA. Model calibration utilized data generated from the 2016 – 2017 USGS Tributary Study (Wilson 2019) and was subjected to independent review by the USGS authors. The USGS is conducting a Phase II of the Tributary Study to confirm sediment and associated contaminant mass fluxes determined from the 2016 – 2017 sampling and will include the quantification of river stage and flow at Buzzard Point near the river's mouth. The results from this study will used to confirm and, if necessary, refine the ARSP surface water model calibrations. Comment responses are provided below in three broad and somewhat overlapping sections covering the LSPC watershed model, the EFDC receiving water model, and model results.

Groundwater modeling was conducted at five sites to assess whether and to what degree contaminated groundwater is adversely impacting the river. The five sites include Pepco Benning Road Facility, CSX Benning Yard, Former Steuart/Gulf Petroleum Terminal, Former Hess Petroleum Terminal, and a former gas station facility at Fort McNair. Comments were provided on the modeling completed at two of these sites: Former Steuart/Gulf Petroleum Terminal and CSX Benning Yard. In general, the comments indicated disagreement or sought justification for assumptions and methodologies. Any changes associated with these comments to the modeling performed would not result in changes to the remedies defined in the Proposed Plan.

Sections B.3.7.1 through B.3.7.8 provide the comment subthemes and responses for the LSPC model. EFDC subthemes and responses are in **Sections B.3.7.9 through B.3.7.15**. Groundwater model subthemes and responses can be found in **Sections B.3.7.16 through B.3.7.19**.

B.3.7.1 PECS CHARACTERIZATION IN THE LSPC MODEL

The Navy requested that the ARSP Surface Water Model Report more clearly differentiate between surface sediment samples adjacent to WNY and surface soils at this PECS, suggesting that surface sediments adjacent to this PECS originate from upstream.

[20] www.epa.gov/ceam/environmental-fluid-dynamics-code-efdc

RESPONSE

Bed sediment characteristics adjacent to the WNY were obtained from observed data obtained from the ARSP RI database, and serve as input data, or a starting point for the model simulation. Observed soil characteristic data from PECS site characterization reports were used to support PCB loading to the Anacostia River. Sediment and PCB contributions from the WNY as well as other, upstream PECSes are simulated using the LSPC watershed model, and PCB fate and transport is estimated by the EFDC hydrodynamic model. Table 7.2 of the ARSP Surface Water Model Report documents the information sources for characterizing upland soil contaminant concentrations at the various sites. PCB concentrations in non-PECS areas were defined based on literature values obtained from the Agency for Toxic Substances and Disease Registry, the Chesapeake Bay Basin Toxics Loading and Release Inventory, and the U.S. Geologic Survey's National Water Information System. It should be clarified that the modeling system was not used to estimate initial bed sediment and soil concentrations of PCBs as these were obtained from the data and information sources cited above.

B.3.7.2 LSPC MODEL SENSITIVITY

The Navy suggested that a sensitivity analysis be performed and requested additional discussion of model uncertainties, assumptions, and limitations. Pepco and WGL indicate that the ARSP Surface Water Model Report or other documents submitted did not include a discussion of model weaknesses.

RESPONSE

Assumptions are noted throughout the ARSP Surface Water Model Report and limitations are also indicated. A sensitivity analysis was not performed. An uncertainty/weaknesses assessment, however, was provided as Attachment 3 to the ARSP Surface Water Model Report. This assessment included an evaluation of model uncertainties associated with model simulation results of stream hydrology and sediment generation.

B.3.7.3 ADEQUACY OF MODEL CALIBRATION DATASET

Several stakeholders (Navy, CSX, Pepco, and WGL) question whether or not sufficient data exists to calibrate the model sufficiently for the accurate prediction of inflows of sediment and contaminants to the study area water bodies. Stakeholders suggest that additional data collection to support the model is needed.

RESPONSE

DOEE believes, as documented in the ARSP Surface Water Model Report, that the model is sufficiently calibrated and the underlying dataset sufficiently supportive to allow the model to be used to evaluate the early action remedial alternatives in the river-wide FS and to assess applicability of the Interim ROD approach. Specifically, the model reasonably matches measured sediment inputs and contaminant mass fluxes from the major tributaries.

Sediment calibration datasets included grab samples of TSS in-stream, as well as annual loading study estimates generated by DOEE for nine tributaries to the tidal Anacostia River (USGS Tributary Study [Wilson 2019]). Watershed sediment calibration results are discussed further in Section 6 of the ARSP Surface Water Model Report. Observed sediment data to support EFDC calibration consisted of the data collected by DOEE and others and amassed into the project database to support the ARSP RI. Cesium isotope data from sediment cores collected by DOEE in July 2016 were of primary use in EFDC model calibration of sediment transport and deposition and are described in detail in ARSP Surface Water Model Report Section 11.

Visual inspection and statistical evaluations comparing observed and modeled PCB data were used to calibrate the LSPC model for the simulation of contaminants (total PCBs) in surface water. EFDC water column and bed sediment results were calibrated to data collected at selected surface sediment stations in the tidal Anacostia River as provided in the ARSP RI database.

B.3.7.4 UPDATING THE ARSP SURFACE WATER MODEL

The Navy and DC Appleseed recommended that the model be updated as additional data are generated to support the adaptive management decision framework.

RESPONSE

DOEE agrees that as a component of the adaptive management plan, the model calibration should be updated as additional data become available during the Interim ROD period. The surface water model is designed to incorporate new data for use in characterizing the system (input data), as well as to ensure the model results are representative (calibration data).

B.3.7.5 LSPC MODEL SIMULATION TIME SHOULD BE EXTENDED

Several comments were received regarding the hydrology calibration of the LSPC model. The calibration period for the modeling system was defined to coincide with the bulk of the data collection (bathymetric survey, surface sediment sampling, USGS tributary study sampling, etc.) performed for the ARSP RI (late 2013 through summer 2017). The Navy requested a longer time period be used in the presentation of the LSPC calibration statistics. Commenters also questioned that, although initial data evaluation focused on the period from 2005 to 2015, the ARSP Surface Water Model Report only presents observed versus simulated streamflow results for the late 2013 to 2017 calibration period.

RESPONSE

The report presents 2014 – 2017 results consistent with the defined calibration period for the LSPC and EFDC models. This time period was selected based on a number of factors. The primary factor was the availability of data required for characterization of the modeling study area, and for calibration of the model. In addition, the time period selected represents a range of flow conditions, which influence sediment and contaminant fate and transport. The higher precipitation patterns experienced in 2014-2015, and the relatively dry conditions experienced in 2016-2017 allow for the incorporation of varied flow regimes and helps to reduce uncertainty. Comparison of simulated flows to observed streamflow for the period prior to 2014 can be considered in a future version of the report. With the future availability of additional tributary and tidal river data from source tracking efforts (**Section B.3.10.4**), baseline monitoring (**Section B.3.1.7**), and performance monitoring (**Section B.3.1.8**), DOEE anticipates that the model calibration will be updated and also documented in a future version of the report.

B.3.7.6 LSPC CALIBRATION STATISTICS FOR SMALLER TRIBUTARIES

Commenters requested additional discussion regarding gauging stations where the model fit efficiency to observed data was low. CSX and the Navy requested additional discussion of stations where the match to observed results is marginal (Nash-Sutcliffe coefficient of model fit efficiency is less than 0.75). The Navy requested that the visual inspection process used for LSPC model calibration be more clearly defined and the final calibration parameters tabulated.

RESPONSE

The model represents the entire Anacostia River watershed, and the gauging stations referenced by commenters are on small streams subject to highly localized hydrology. Features including culverts, sewer inlet booms, and debris blockages may impact these gauges but cannot be represented in a larger watershed model. Calibration errors at smaller streams do not have a significant effect on tidal Anacostia hydrodynamics. Table 5.3 from the ARSP Surface Water Model Report is shown as **Table B.3.7.1** below.

Table B.3.7.1. Summary Flow Statistics for All LSPC Calibration Stations

Watershed	NE Branch	NW Branch	Paint Branch	Sligo Creek	Watts Branch	Hickey Run
Time Period	1/1/2014-	1/1/2014-	1/1/2014-	1/1/2014-	1/1/2014-	1/1/2014-
	12/31/2017	12/31/2017	12/31/2017	12/31/2017	12/31/2017	12/31/2017
Errors (Simulated-Observed)	Error Statistics					
Error in total volume	-4.89	-3.23	3.1	-0.33	23.88	13.21
Error in 50% lowest flows:	-9.11	-4.9	-8.43	-15.82	-3.95	-13.6
Error in 10% highest flows:	-11.64	-14.36	1.54	-1.14	26.75	12.81
Seasonal volume error – Summer:	11.41	-3.82	26.22	-17.63	39.68	11.41
Seasonal volume error – Fall:	-14.49	-7.33	-10.11	-7.35	10.14	10.31
Seasonal volume error – Winter:	-2.58	12.13	12.2	25.43	15.26	27.46
Seasonal volume error – Spring:	-10.9	-13.07	-9.29	-2.59	30.1	5.98
Error in storm volumes:	-15.95	-19.37	-2.85	-3.78	26.62	12.18
Error in summer storm volumes:	-4.4	-28.46	19.99	-24.78	37.55	18.23
Nash-Sutcliffe Coefficient of	0.693	0.651	0.663	0.609	0.595	0.782
Efficiency, E:	0.506	0.483	0.405	0.468	0.474	0.594

In the model calibration, Hickey Run yielded a Nash-Sutcliffe coefficient greater than 0.75 (0.782). Hickey Run flows are slightly overestimated by 13 percent overall, and as also indicated in **Table B.3.7.1**, winter flows are isolated as a causal factor in the overestimation. Hickey Run represents less than 1 percent of the contributing area of the Anacostia watershed.

B.3.7.7 USE OF POINT IN TIME SUSPENDED SEDIMENT DATA FOR CALIBRATING TRIBUTARIES

Citing the complexity of PCB transport simulation, the Navy suggested that the PCB component of the modeling system be removed. The Navy also requested clarification regarding the source of the tributary surface water PCB concentration dataset used for LSPC model calibration.

RESPONSE

The primary tributary data source available to support ARSP surface water model development and calibration was the tributary study conducted by the USGS (Wilson 2019), which characterized both suspended sediment (the principal medium that transports PCBs to the tidal river) and bottom sediment. Model development and bottom sediment setup began in 2016 and Anacostia Surface Water Model Report preparation was completed in December 2019. Additional bottom sediment quality data were generated by NPS (JCO 2019) but were not made available in time for incorporation in the model. Although the modeling system was finalized prior to NPS data becoming available, this data and the data generated in other tributary characterization studies will be incorporated into future calibration refinements. The NPS study did not include the collection of suspended sediment samples.

Although the suspended sediment dataset collected by the USGS (Wilson 2019) is somewhat small, it is sufficiently robust to support model calibration. The USGS dataset includes measurement of total PCB congener concentrations in 37 suspended sediment samples distributed among the five major tributaries to the Anacostia River (average of six measurements per tributary). Owing to the challenges inherent in collecting suspended sediment for chemical analyses (that is, large volumes of stream water must be collected to obtain enough sample mass for analysis), suspended sediment data is normally unavailable in many surface water modeling calibration efforts. Incorporation of the USGS tributary study data set and other ARSP project data (that is, the ARSP RI datasets for sediment, sediment pore water, and surface water; manhole sediment investigation dataset describing outfall sediment quality) in the ARSP surface water model calibration ensures that model forecasts are sufficiently accurate to support remedy evaluation for the Proposed Plan.

B.3.7.8 LSPC CALIBRATION PROCESS

Stakeholders requested clarifying information on the visual process used for LSPC model calibration. The Navy requested additional information regarding the calibration processes and results of the LSPC watershed model. Other commenters (Pepco, WGL, and CSX) indicate that the calibration documentation provided in the ARSP Surface Water Model Report is insufficient. They requested additional calibration plots for suspended sediment to support the report's assertion that a good calibration was achieved.

RESPONSE

A visual inspection process was performed to document the variability of PCB concentrations in the observed dataset. Given the discrete measurements available for the calibration, the time series format is appropriate for showing the simulated concentrations against the variability of the discrete measurements. With regard to tabulation of the final selected calibration parameters, ranges, and final values for PCB calibration in LSPC are provided in Tables 7.3 and 7.4 of the ARSP Surface Water Model Report. Overall, multiple lines of evidence were used to assess sediment calibration in the watershed and receiving water model components. Section 6.1 of the ARSP Surface Water Model Report describes the LSPC calibration process and how suspended sediment as well as annual loading rates estimates were used in the calibration. Section 11.2 of the report describes how cesium isotope data collected from subsurface sediment cores in the tidal Anacostia River were used to support EFDC model calibration.

B.3.7.9 EFDC SIMULATION OF INTERACTIONS WITH THE POTOMAC RIVER

Commenters inquired about the EFDC receiving water model setup and datasets. The Anacostia Watershed Society commenter questioned the simulation of the Potomac River portion of the model area with regard to the presence of potential contaminant sources. In addition, the commenter noted potential PCB sourcing from the Potomac River upstream and downstream from the model area.

RESPONSE

The EFDC model represents the Potomac River between Little Falls and Alexandria, Virginia, with boundary conditions specified at the upstream (Little Falls) and downstream (Alexandria) ends of this portion of the river. Upstream and downstream inflows were assigned a PCB concentration of 0.001 µg/L, and bed sediment concentrations were assigned a PCB concentration of 0.0057 milligrams per kilogram, which is based on a median value of bed sediment samples collected from the Potomac River in 2015 as a component of the RI (surface sediment sampling for Anacostia River background estimation). Although Potomac bed sediment concentrations varied between 0.3 and 26 µg/kg, the data were collected from an area upstream from major outfalls and former industrial areas along the Georgetown and Alexandria waterfronts. To some extent, the samples could possibly represent some influence from one hazardous waste site (David Taylor Research Center [Navy]) in the Maryland upland area bordering the Potomac River floodplain; however, the Chesapeake and Ohio Canal (located in the floodplain between the river and the upland area) may intercept surface drainage from this facility (thus minimizing any potential impact of facility releases to the Potomac River). Even through the C&O Canal eventually discharges to the Potomac River, flow velocities in the canal are low and any potentially contaminated sediment from the David Taylor Research Center is expected to be deposited in the canal. Downstream facilities such as the Blue Plains Advanced Wastewater Treatment Plant in the District and sites in Alexandria such as the former torpedo factory and the former Pepco power plant may not be captured by the Potomac River background samples. The result would be that the ARSP Surface Water Model boundary would not reflect contributions from these potential contaminant sources. As shown in the ARSP Surface Water Model Report (Table 14.1), the Potomac River consistently contributed sediment as well as PCBs to the Anacostia River, given the specified Potomac River boundary conditions (noted above) during the 2014-2017 calibration period. Additional assessment of the appropriate boundary conditions needed to accurately represent the Potomac River in the model may be conducted during future refinement of the model.

B.3.7.10 EFDC RIVER BOTTOM GRAIN SIZE SPECIFICATION

The Navy inquired as to how percentages of sand, silt and clay were derived and input to the model. The observed bed sediment PCB concentrations measured during the RI and the method in which observed bed sediment PCB concentrations were interpolated to characterize PBCs in the model.

RESPONSE

In establishing the proportions of clay, silt, and sand, surface sediment grain size data obtained from sampling conducted for the RI were averaged across the Anacostia River study area. Stakeholders also requested clarification on how PCB concentrations were assigned to study area surface sediment. To represent spatial variability of sediment PCB concentrations, surface sediment PCB concentrations from the ARSP database were mapped to the model grid using ArcGIS spatial interpolation tools.

B.3.7.11 EFDC SIMULATION OF PCBS AS HOMOLOGUES

Stakeholders generally agreed with focusing on PCBs in the calibration of the contaminant fate and transport components of the LSPC and EFDC models. However, CSX indicated that simulating total PCB congeners (as was done in the EFDC calibration) is inappropriate. In order to capture the range of fate and transport properties of PCBs with various levels of chlorination, they suggested focusing the calibration on PCB homologs.

RESPONSE

DOEE agrees that homolog simulation could provide additional insights into the fate and transport of PCBs in the watershed and tidal river. However, the RAL is defined for total PCB congeners in the River-wide FS, Focused FS, and Proposed Plan. Model calibration and predictive simulations, therefore, focused on total PCB congeners. During the Interim ROD period (as discussed in **Section B.3.1.8**, the duration of the Interim ROD period will be determined based on the collection and evaluation of performance monitoring data), sediment sampling in the upstream, nontidal tributaries and post-early action performance monitoring in the study area OUs will provide data to support potential future model calibration efforts focused on individual PCB homolog groups and other constituents.

B.3.7.12 EFDC MODEL CALIBRATION PROCESS

Commenters (Navy, CSX, and Pepco and WGL) requested additional information regarding the calibration of the EFDC receiving water model. Commenters requested a description of the calibration process and the input parameters used. Specifically, inquiries were made regarding how measured water surface elevation data are applied in both hydrodynamic calibration and boundary condition development. The time period for calibration and investigation of results was also questioned. Comments on calibration pertained to reporting the parameter values used, and how they were selected and adjusted during calibration. NPS, Navy, and Pepco and WGL indicated that deficiencies in ARSP Surface Water Model Report graphics prevented effective comparison of modeled sedimentation rates with observed data from cesium cores.

RESPONSE

The calibration period was defined to coincide with the bulk of the data collection (bathymetric survey, surface sediment sampling, USGS tributary study sampling, etc.) performed for the ARSP RI (late 2013 through summer 2017). The 2014-2017 calibration time period was selected due to data availability as well as the availability of recent public GIS-based datasets to characterize the Anacostia River watershed. Bathymetry data sources are described in Section 8.1 of the ARSP Surface Water Model Report. Model calibration consists of the process of adjusting model parameters, within expected ranges, to provide a match to observed conditions. The EFDC hydrodynamic model was calibrated for water surface elevation, river velocities, salinity, and temperature. Hydrodynamic calibration was based on comparison of model predicted flows, water surface elevation, current velocity, water temperature, and water quality to the available data. The main hydrodynamic data source for these parameters was the data collected from the DOEE sampling locations defined in the RI. Adjustable parameters and forcing functions for the hydrodynamic model include open boundary water surface elevations and salinities, atmospheric conditions, bottom roughness, and downstream freshwater flows (upstream flows were accounted for by the watershed model).

In response to stakeholder's difficulties in interpreting the figures depicting the EFDC calibration results, future iterations of the model report will include improved graphics with appropriate axis scaling to show the subject information. The next revision of the report will be released following the collection of and availability of additional data from source tracking efforts (**Section B.3.10.4**), baseline monitoring (**Section B.3.1.7**), and performance monitoring (**Section B.3.1.8**).

B.3.7.13 EFDC CALIBRATION AND ADDITIONAL RADIOMETRIC CORES

Some stakeholders believe that additional characterization data, specifically additional sediment radiometric age-dating data, are needed to underpin the model calibration. Some reviewers suggested that the model did not adequately match cesium cores at some locations in the river. They also suggested that targeted bathymetric survey data collected through time could help to confirm predicted sedimentation patterns throughout the system.

RESPONSE

Five of 12 radiochemical cores collected during the RI provided usable data for sediment age dating. The five usable cores were appropriately distributed spatially in the study area to support model calibration (one was in Reach 67, three were in Reach 456, and one was in Reach 123). The cores were located within an area spanning approximately 7 miles of the 9-mile Main Stem portion of the study area. The model results favorably compare to the existing sediment core data, representing both the high deposition rate historical period and the lower deposition rate current period. Care must be taken in interpreting cesium core results and projecting historical rates to current conditions. The model honors the downward trend in the sedimentation rate, as discussed in Section 11.2 of the ARSP Surface Water Model Report. Additional targeted radiochemical core data may be collected during the Phase II Tributary Study being performed by USGS in the Buzzard Point area. This additional core data along with recently acquired historical USACE bathymetry data will be used to confirm and adjust the model calibration as appropriate.

The October 2013 bathymetric dataset collected for the ARSP was used to define the river bottom elevation for each grid of the 2,000+ grid cell model domain. In addition to the study area water bodies (tidal Anacostia River, Washington Channel, and Kingman Lake), the model domain includes the Potomac River from the upstream boundary (at Little Falls) to the downstream boundary (at Alexandria). Several commenters noted that more recent bathymetry data collected since the 2013 ARSP bathymetric survey is available for portions of Reach 123 and Washington Channel and should be considered in the ARSP surface water model. Comparison of the ARSP 2013 dataset to a 2017 bathymetric dataset collected in proximity to the Washington Gas East Station shows that, although some deposition and scour has occurred between these two surveys, the sediment surface contours are similar over broad areas. This additional bathymetric data will be considered during future model refinement. Similarly, multiple bathymetric datasets collected by USACE over the past 10 years have also be acquired and will be used to ascertain deposition and scour in the study area.

B.3.7.14 MODEL SIMULATION TIMEFRAME

Pepco and WGL stated the 10-year timeframe for assessing long-term sediment accumulation and quality was not adequately justified in the ARSP Surface Water Model Report or other documents reviewed in conjunction with the Proposed Plan.

RESPONSE

Development of the time period used to investigate remedial alternatives is described in the ARSP Surface Water Model Report (Section 15). DOEE agrees with the comments made by Pepco and WGL that an extended simulation period to represent seasonality through both wet and dry conditions is desired when predicting future pollutant loading. To extend the model timeframe to predict future conditions, the meteorological data (precipitation) must be estimated for the future period. The period selected to represent the future must incorporated a range of wet and dry years and, if possible, capture long term trends in rainfall related to climate change. Based on a review of the observed rainfall records for 1946 to 2017, the existing 4-year modeling period from 2014 to 2017 was extended by another 6 years using data from 2000 to 2005. As can be seen in **Figure B.3.7.1**, the resulting rainfall dataset included a range of observed wet and dry conditions. The 10-year period included an extremely wet year (2003) and a dry year (2001). With the availability of additional data, the model calibration will be refined and will reflect rainfall data from the years following 2017.

B.3.7.15 100-YEAR STORM SIMULATION RESULTS

NPS commented that the 100-year storm event does not sufficiently capture the impacts of a severe storm given that, as a result of climate change, storm intensity and frequency are expected to increase. The Navy requested a figure and/or description of areas that may be subject to “substantial local scouring.”

RESPONSE

The ARSP surface water model was used to assess potential impacts from a severe storm event. Shear stress and potential scour areas as a result of a superstorm, or 100-year flow scenario, are shown in Figure 2.5 of Attachment 2 to the ARSP Surface Water Model Report. The simulation was a gross estimation of the potential for scour disturbances to the river bottom during an extreme flow event. The 100-year storm scenario documented in Attachment 2 represented extreme flows in a conservative approach that intentionally underestimates floodplain effects and channelizes flow. The estimated stresses are higher than what would be expected from a 100-year storm due to this channelization. This modeling performed was sufficient to support remedy evaluations for the River-wide FS. The Navy indicated that the storm modeling results obtained in Reach 123 were consistent with sediment stability analyses performed for WNY. Refinements of the model's representation of the floodplain can be made in the future to more accurately evaluate severe storms.

B.3.7.16 GROUNDWATER MODEL SETUP AND DATASETS, FORMER STEUART/GULF PETROLEUM TERMINAL

SIC inquired about the groundwater model setup and datasets at the Former Steuart/Gulf Petroleum Terminal PECS. SIC reviewers cite the limited dataset DOEE used to support the modeling effort at this PECS.

RESPONSE

At the Former Steuart/Gulf Petroleum Terminal only a very limited dataset was available to support this modeling effort. Most of the comments received regarding the modeling conducted at this site pertained to inaccuracies resulting from the use of this limited dataset. Steuart Investment Company, in preparing their comments on the Proposed Plan and related documents, provided several references (Environmental Consultants and Contractors [ECC] [2017 – 2019] and ECC [2004]) pertinent to the Former Steuart/Gulf Petroleum Terminal. Based on this additional information, DOEE intends to revise and document the model for the Former Steuart/Gulf Petroleum Terminal in a future version of the ARSP Groundwater Modeling Report. Specifically, the 2018 Groundwater Modeling Work Plan (Tetra Tech 2018a) indicates that groundwater modeling is necessary at 11 PECSes. The December 2019 Groundwater Modeling Report presented results from five sites. Groundwater modeling for the remaining six sites and updated results for the Former Steuart/Gulf Petroleum Terminal will be provided in a future version of the groundwater modeling report.

B.3.7.17 USE OF BENZENE AS A SURROGATE IN THE GROUNDWATER MODEL, SOURCE CONCENTRATION, AND CHOICE OF HALF-LIFE, FORMER STEUART/GULF PETROLEUM TERMINAL

SIC reviewers commented on the use of benzene as a surrogate COC, the source concentration, and the retardation factor used. Reviewers questioned the range of the degradation half-lives that was used for addressing uncertainty in degradation rates at the site and the performance of the no-degradation scenario.

RESPONSE

In response to these comments, DOEE offers the following clarifications and additional explanation regarding the model input and results.

The remedial actions described in the Proposed Plan and Interim ROD will effectively reduce concentrations of COCs in sediment; however, other contaminants not identified as COCs in sediment may be dissolved in groundwater and discharged to the river. In contrast to the hydrophobic sediment COCs, which are generally not present in groundwater, more soluble chemicals such as benzene can contaminate sediment pore water and cause toxicity to ecological receptors. DOEE water quality criteria define screening thresholds for adverse impact to benthic and aquatic organisms: DOEE water quality standards (2013) (Table 2: 4-day average values) (DOEE 2020).

A SIC reviewer of the modeling at the Former Steuart/Gulf Petroleum Terminal noted that the effective source concentration for benzene specified in the AT123D model was 17,000 µg/L and questioned the 300,000 µg/L benzene concentrations calculated by the model in some portions of the model domain. In response, the source (based the effective solubility of benzene from a light non-aqueous phase liquid source [Cline et al. 1991]) is supplying benzene mass to the surficial aquifer at a rate greater than the aquifer (based on hydraulic conductivity of the aquifer material and the hydraulic gradient) can discharge the mass resulting in a buildup (reflected by increased concentrations) at some locations. The net effect is that concentrations in groundwater in proximity to the source increase to a level greater than the source concentration. It should also be noted that all concentrations (the specified source concentration and the concentrations simulated by AT123D) are well below the aqueous solubility of benzene (1,780,000 µg/L) (Fetter 1988). Questions were also raised regarding the benzene degradation half-life used in the model and the retardation factor. A representative degradation half-life of 2 years was used in the modeling based on field studies conducted on a benzene plume in a coastal plain aquifer in North Carolina. The selected half-life was based on a literature search and is considered to be reasonably comparable to site conditions. Other degradation values, if proposed by outside reviewers, may have merit and will be evaluated for potential use in the revised groundwater model.

B.3.7.18 CONSIDERATION OF TIDAL FLUCTUATIONS IN THE GROUNDWATER MODEL, FORMER STEUART/GULF PETROLEUM TERMINAL

SIC further commented that the model did not account for the potential effects of tidal fluctuations on contaminant concentrations in groundwater. SIC indicated that the simulated hydraulic gradient and groundwater flow direction in the model was inconsistent with site documents. The review comments concluded with a request to more thoroughly document the assumptions and limitations of the model in the ARSP Groundwater Modeling Report.

RESPONSE

DOEE offers the following additional explanation regarding the treatment of tidal fluctuations in the groundwater model. The tidal fluctuation of the Anacostia River at the site is approximately 3 feet. The limited data available when the Former Steuart/Gulf Petroleum Terminal groundwater model was prepared (**Section B.3.7.16**) prevented analysis of potential tide-driven groundwater level fluctuations at the site. In the absence of other data, the gradient used for the model was assumed to be representative of the effective net average gradient toward the river. Assuming the above-referenced additional data (i.e., data from [ECC] [2017 – 2019] and ECC [2004]) will be sufficient to support such an analysis, an assessment of tidal influence will be conducted when the revised modeling of the Steuart/Gulf Former Petroleum Terminal is performed.

B.3.7.19 MODEL SETUP AND DATASETS, CSX BENNING YARD

CSX reviewers inquired about the groundwater model setup and datasets at the CSX Benning Yard PECS. They contend that site assumptions used to estimate the source release rate are inconsistent with available site documents and that some data from the site was not considered. Similar to the comments by SIC, CSX questioned the use of benzene as a surrogate compound for assessing impacts from the site and contend that various model parameter values (for example, half-life, effective porosity) were not adequately justified. CSX also questioned the 30-year simulation period of the release and suggest that text in the report indicating that the model results are speculative and biased.

RESPONSE

In response to these comments, DOEE offers the following clarifications and additional explanation regarding the model input and results.

A historical diesel release from this site resulted in the discharge of light non-aqueous phase liquid (LNAPL) and benzene to Fort Dupont Creek and the Anacostia River. Questions were raised regarding the simulation time of the release and source term specified in the model. As documented in the groundwater report, information regarding the size of the above-ground storage tank (AST) used to store the diesel fuel and the historical fueling frequency and operational procedures were unavailable. To develop a source term for the model, conservative (low volume) fuel dispensing assumptions were therefore required. Conrail Railroad (predecessor to CSX) fueling facilities such as the Enola Yard in near Harrisburg, Pennsylvania were equipped with one-million-gallon storage tanks. In response to a commenter's view that source assumptions are inconsistent with site documents, available aerial photographs were consulted and show that the Benning Yard fueling former fueling area is partially obscured by the Interstate 295 overpass which could hide the presence of a large diesel storage tank.

The fueling facility operated from 1951 to the mid-1980s. LNAPL spillage is assumed to have begun in the shortly after startup and continued until approximately 1985 when fixed-based fueling operations at Benning Yard ceased. The 33-year period for LNAPL release from the facility is the period shortly after the facility began fueling operations (1952) until operations ceased (1985). Given that fuel capacity of a locomotive is 6,000 gallons and conservatively assuming that the Benning facility fueled, on average, at least two locomotives per day, 12,000 gallons is assumed to have been dispensed from the facility on a daily basis. A conservatively low daily spillage rate of 0.1 percent (12 gallons) out of the total volume of fuel dispensed on a daily basis is assumed in the model. Additional discussion of the assumed source term is provided in the report.

Various modeling parameter values including the assumed degradation half-life for benzene and effective porosity for the aquifer material were also questioned. As stated in the above response to comments on the Steuart/Gulf Former Petroleum Terminal model, the selected half-life determined from benzene plume in a North Carolina coastal plain aquifer is reasonably comparable to the Benning Yard coastal plain aquifer. Other degradation values, if proposed by outside reviewers, may have merit and will be evaluated for potential use in the revised groundwater model. The effective porosity specified in the model is consistent with site lithologic logs which reflect the presence of sand, silt, and clay. Effective porosity of 0.25 is appropriate (De Marsily 1986) for an aquifer composed of the clastic lithologies comprising the aquifer material at the CSX Benning Yard.

B.3.8 END USE OBJECTIVES

When a contaminated area is going to be cleaned up, the potential future uses of the land or water within the area are a major concern for stakeholders. Comments pertaining to the end use objectives considered during the remedy selection process are addressed in this section. This section includes a subtheme of comments that are specific to jurisdictional issues related to the Federal Navigational Channel administered by the USACE.

B.3.8.1 CERCLA PROJECT SCOPE

The majority of the comments about end use objectives were from community and citizen stakeholders who were interested in the positive or negative impact of the interim remedial action on several physical features such as the river depth in the early action areas, the resulting river uses, the overall river health and habitat, improvements to river navigation, and overall river aesthetics. One recurring subject was that stakeholders wanted the remedial action to upgrade or improve areas not impacted by contamination. Examples include requesting that boating hazards be removed and shorelines be aesthetically restored. Other commenters wanted to see construction of the remedial action coordinated with other major projects in the area to minimize disruptions such as habitat loss or unacceptable water turbidity.

RESPONSE

The CERCLA response program was specifically designed to select remedies that address human or ecological risk from hazardous substances in the environment. Generally, funds slated for hazardous substance response are to be used principally for human health or environmental risk reduction. Dredging of marinas, removal of river debris, and improving recreational river opportunities are not part of the ARSP scope or funding program.

While hazardous response funding does not extend to improving non-impacted areas, DOEE notes that the selection of the remedial action did include consideration of the future uses of the river. The DOEE was guided by the National Contingency Plan (NCP) preamble which states that both current and future land uses should be evaluated in assessing risks, with “[t]he exposure analysis for current land use conditions [being] used to determine whether a human health or environmental threat may be posed” and “[t]he analysis for potential exposures under future land use conditions [being] used to provide decision-makers with an understanding of exposures that may potentially occur in the future.”

In December 2005, EPA issued “Contaminated Sediment Remediation Guidance for Hazardous Waste Sites” (OSWER 9355.0-85). This 2005 guidance notes that “[t]here are additional factors the project manager should include in considering anticipated future uses for aquatic sites … such as whether the site is likely to attract more recreational, subsistence, and cultural uses, including fishing, swimming, and boating.” The 2005 Guidance further notes that recreational navigation is an important component of reasonably anticipated future uses of a waterway” and EPA’s 2017 clarification of the 2005 Guidance states that “future use of a waterbody” is relevant in developing remediation alternatives at CERCLA sediment sites.” DOEE considered all of this guidance in determining the selected remedial actions selected in the proposed plan and documented in the Interim ROD. The specific timeframes for lifting advisories and restrictions on various recreational activities such as fishing and swimming will be driven by monitoring results.

DOEE intends to coordinate implementing this Interim ROD as much as possible with other river improvement programs, such as planned or expanded future development and recreational areas. It is entirely possible that river improvement projects could be completed contemporaneously with the selected interim action. However, the remedial action objectives will be focused on risk reduction. The Interim ROD contains explanations of these limits of CERCLA actions to improve the ARSP beyond the boundaries of the early actions. As much as possible, completed interim actions will be designed to be consistent with the “reasonably anticipated land use” as specified in the National Contingency Plan and the corresponding EPA-issued guidance “Land Use in the CERCLA Remedy Selection Process,” (OSWER Directive 9355.7-04, May 25, 1995).

An example of this intent is the significant change of the Kingman Lake remedial action from KLHS-3 to KLHS-4 (described in **Section 15** of the Decision Summary) after the Proposed Plan was issued and stakeholder comments were received. DOEE determined that both remedial alternatives meet the criteria of the NCP and are candidates for selection because they address the risk at the EAAs. However, the future use of the Kingman Lake and Heritage Island areas for educational, environmental, and recreational purposes prompted a reconsideration of the relative impacts of the two remedial designs. DOEE selected KLHS-4 as the alternative that best supports the future use objectives because once implemented, the remedy would not be disrupted by improvement projects.

B.3.8.2 FEDERAL NAVIGATION CHANNEL

Comments from stakeholders about the federal navigation channel subtheme highlighted the current uncertainty associated with the fact that USACE Federal Navigation Channel depths may be outdated and may conflict with planned river projects as well as the Interim ROD. In addition, the dredging and capping elements of the Interim ROD could be constrained by the existing authorized channel depths. Without an adjustment of the official channel depths or “deauthorization” in some parts of the early action areas, the cost and scope of the Interim ROD might expand prohibitively. In addition, commenters observed that planned river projects unrelated to the Interim ROD could impact remedy implementation. The reviewers noted that implementation of the Interim ROD should proceed only after the navigation channel issues were settled. In particular, the National Park Service noted that deauthorization of the Federal Navigation Channel was administratively difficult and would require Congressional action.

Citizens and community groups asked for more clarity on how the future use of the river(s) would be integrated with decisions on the ultimate depth and boundaries of the Federal Navigation Channel. Many of the commenters want to see final dredging depths that are based on their preferred future land uses, not just the depths that solve the contamination problem.

In their Proposed Plan comments, Pepco and WGL suggest alternative FNC depths relative to those identified by DOEE as necessary to meeting future use needs. While acknowledging that partial or full deauthorization of the FNC is appropriate, Pepco and WGL propose depths for portions of the FNC that are shallower than those selected by DOEE. Specifically, Pepco and WGL advocate for a shallower FNC depth (10 feet) between 11th Street Bridge and 15th Street SE and a depth of 8 feet between 15th Street and the CSX Railroad Bridge. Pepco and WGL suggest complete FNC deauthorization upstream from the CSX Railroad Bridge with no planned dimensions.

RESPONSE

The scope and costing of the remedial alternatives presented in the Proposed Plan assumed that the FNC would be partially deauthorized. Partial deauthorization consists of changing the width and/or depth of the existing channel, which requires Congressional action.

Since the publication of the Proposed Plan, the DOEE has worked with the office of Congresswoman Eleanor Homes Norton (D-DC), the USACE (Baltimore Section and Headquarters), the DC Office of Federal and Regional Affairs, and stakeholders to develop a proposal for partial deauthorization of the Federal Navigation Channel in the Anacostia River. As a result of the July 2020 U.S. House version of the WRDA, the proposed modification of the FNC in the Anacostia River is as follows:

Location (Reach)	Final Dimensions	Previous Dimensions
Buzzard Point to 11th Street Bridge	15 feet deep/ 300 feet wide	24 feet deep/400 – 800 feet wide
11th Street Bridge to 200 meters downstream of Sousa Bridge (Station 0+000)[21]	15 feet deep/ 200 feet wide	24 feet deep/200 - 600 feet wide

Areas of the FNC where the authorized depth will remain unchanged include:

- The Washington Channel (24 feet deep/200 feet wide)
- The mouth of the Anacostia River to Buzzard Point (24 feet deep/400 feet wide)
- The area 200 meters downstream from the Sousa Bridge (Station 0+000) to Bladensburg, Maryland (8 feet deep/60 feet wide)

[21] Station 0+000 is also referred to as 15th Street SE.

The unchanged areas of the FNC will also continue to be subject to ARARs for the Interim ROD. The above FNC dimensions will be incorporated in the design of the remedial actions, such as dredging and containment, because the dimensions support the reasonably anticipated land use of the EAAs (Decision Summary **Section 6** provides additional discussion). An additional ARAR considered by DOEE in selecting the early actions and modifying the dimensions of the FNC through partial deauthorization is Section 10 of the Rivers and Harbors Appropriation Act of 1899 (Rivers and Harbors Act). The Rivers and Harbors Act prohibits obstructing the navigable capacity of any waters of the United States. Specifically, Section 10 states, "[T]he creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States, is prohibited" (33 U.S.C. § 403). Further, the statute prohibits excavating or filling any "channel or any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army prior to beginning the same."

With partial deauthorization, the remedial actions selected in the Interim ROD can be designed and implemented in accordance with the NCP. In addition, the uncertainty identified by commenters over the cost, scope, and schedule of other river projects in the area, including any future remedial actions, has been reduced.

B.3.9 HUMAN HEALTH RISK ASSESSMENT

The purpose of the human health risk assessment (HHRA) is to determine the risks that contaminants in the study area pose to people. The HHRA was prepared consistent with U.S. EPA guidance and methodologies and DOEE studies and criteria (for example, drinking water criteria). The comments received on the HHRA fell into four broad categories: fish ingestion rate (FIR), fish fillet dataset, selected risk level, and a range of other comments principally related to the documentation of processes and assumptions.

B.3.9.1 FISH INGESTION RATE (FIR)

Stakeholders (NPS, CSX, Pepco, and WGL) commented on the FIR surveys used in the HHRA, particularly the adult subsistence FIR (65 grams/day), stating this FIR is inappropriate for use in the ARSP because of the following shortcomings identified in the angler survey on which it is based: (1) the survey focused on recreational anglers; (2) the Anacostia River represented only a part of the total area considered in the survey; (3) the survey underrepresented minority anglers which constitute the largest subgroup among all subsistence anglers; and (4) the survey was conducted during warm weather and may be unrepresentative of (overestimate) year-round angling. Two commenters (NPS and Pepco and WGL [Pepco and WGL submitted a combined set of comments]) developed alternative FIRs. The alternative FIR proposed by NPS of 107.2 grams per day (g/day) was significantly more conservative (increase of fish ingestion rate of approximately 60 percent). In their comments on the Proposed Plan and supporting documents, NPS commented that this higher FIR was not considered in the Focused FS or Proposed Plan. AECOM completed (for Pepco and WGL) its own, in-depth angler survey in the fall of 2019. This survey focused more directly on "consuming anglers" fishing in the Anacostia River. Pepco and WGL commented that the subsistence angler FIR used in the Proposed Plan and Focused FS was too high, in comparison to the results from its recent survey.

RESPONSE

The ARSP HHRA documented in the Proposed Plan and supporting documents assumed an adult subsistence angler FIR of 65 g/day, which was calculated from data generated by the Gibson and McClafferty (2005) angler survey of Washington, D.C. anglers. In 2018, NPS developed a subsistence angler FIR estimate of 107.2 g/day based on a 2015 angler survey of Anacostia River anglers and a national estimate of fish ingestion issued by EPA (NPS 2018b). In 2020, NPS updated the basis for, but maintained their numerical FIR recommendation of 107.2 g/day, based on consideration of the 2020 AECOM study discussed below and a 2019 ethnographic study jointly prepared with the University of Maryland (UMD) (UMD/NPS 2019). During late summer and fall of 2019, QuanTech, Inc., under contract to AECOM, conducted a creel/angler survey (CAS) of Anacostia River anglers on behalf of Pepco and WGL (QuanTech 2020). Using the QuanTech data, AECOM calculated a “consuming angler” FIR of 41 g/day (98th percentile [the 98th percentile represents the value below which 98 percent of the FIRs fall]); a 90th percentile FIR of 12.4 g/day was also calculated, however, the 90th percentile FIR was judged to be insufficiently health protective and is not discussed further in this response (AECOM 2020). It should be noted that NPS memorandum (NPS 2020) notes that the 2019 ethnographic study (UMD/NPS 2019) defines subsistence anglers as those who keep fish to consume and to pass on to others and recreational anglers as those who are more likely to practice catch and release. It is apparent that the anglers interviewed by AECOM were both intending to consume the fish they retained in their creels and, in some cases, share their catch with others. This indicates that at least some of the anglers interviewed by AECOM are likely to be subsistence anglers. Other FIR estimates exist, but only these three are based on site-specific survey results relevant to the angler population in Washington, D.C. It should be noted that on-going efforts to reduce contaminants entering (for example from sewer outfalls and tributaries) and cleaning the Anacostia River are expected to affect the behavior (for example, fishing duration and frequency) of subsistence anglers much less than that of recreational anglers. Subsistence anglers are anticipated to fish regularly enough to supplement their diets as necessary despite the condition of the river.

The ARSP HHRA relied on the Gibson and McClafferty (2005) survey results for characterizing the risks to people consuming fish caught in the Anacostia River, which was the best available study at the time the ARSP HHRA was performed (2018). The NPS and QuanTech/AECOM surveys were both released in 2020. The three surveys have specific merits; however, they also have limitations. As discussed below, after carefully reviewing the QuanTech/AECOM and NPS FIRs, DOEE has determined that, although both provide valuable insights to Anacostia River angler exposure to contaminated fish tissue, the additional angler survey information that underpins each of these FIRs does not warrant changing the FIRs that are assumed in the HHRA and Proposed Plan.

The FIR based on the Gibson and McClafferty (2005) survey was chosen after multiple rounds of public stakeholder review and comment on draft versions of the ARSP RI Report and HHRA. Specifically, the Gibson and McClafferty (2005) angler survey was used to identify the 98th percentile FIR of two fish meals per week for the entire year; this FIR was applied to a receptor-specific exposure duration of 26 years (Note: the FIR represents the average amount of fish caught in the Anacostia River and consumed). Each meal was assumed to be 8 ounces (227 grams) in size, based on the fish meal size assumed for the Washington, D.C.'s fish consumption advisory. Consistent with U.S. EPA guidance, the FS incorporated the assumptions and conclusions from the HHRA, including the adult subsistence angler FIR of 65 g/day.

It is important to keep in mind that exposure via fish ingestion was not based entirely on FIR. Rather, as detailed in the HHRA, exposure via fish ingestion by anglers was calculated considering both FIR and fraction ingested (FI). The HHRA (and in turn the River-wide FS and the Focused FS) considered the FIR along with an FI value of 1. That is, all fish consumed by anglers (including the adult subsistence angler used to calculate the PRG) was assumed to come from the Anacostia River. The assumption of an FI value of 1 is a conservative, health-protective assumption based on the relative strength and robustness of the fish population found in the Anacostia River.

The NPS initially recommended an adult subsistence angler FIR of 142 g/day based on outdated EPA guidance (NPS 2020). The NPS revised their recommended FIR in 2018 to 107.2 g/day based on a national fish ingestion rate for total fish consumed by a "non-Hispanic black" population (NPS 2018b). In 2020, NPS retained their numeric FIR recommendation of 107.2 g/day but revised the basis for this recommendation to consideration of the AECOM (2020) study (see below), a joint ethnographic study prepared with the UMD (UMD/NPS 2019), and a variety of FIRs applied to other Superfund sites. The recommended NPS adult subsistence angler FIR of 107.2 g/day is about 65 percent higher than the 65 g/day assumed in the HHRA) and falls within the range of 97 g/day (assumed year-round ingestion of three 8-ounce fish fillets per week) to 130 g/day (assumed year-round ingestion of four 8-ounce fish fillets per week) which NPS describes as "a reasonable consumption rate for subsistence anglers on the Anacostia River" (NPS 2020). NPS calculated this range based on 35 interviews of presumably subsistence anglers ("recreational anglers were filtered out on initial contact") on the Potomac and Anacostia Rivers (NPS 2016); two of nine survey locations in this study are located in Washington Channel -- East Potomac Park/Hains Point and Water Street Marina.

In support of their recommended FIR, NPS calculated alternate FIRs based on modifications to the AECOM data set. Two primary modifications were to (1) eliminate survey results from AECOM survey locations 4 (East Potomac Park) and 5 (Titanic Memorial) and (2) add back in fish removed by AECOM from their calculations because these fish were to be given away. NPS states that survey results from locations 4 and 5 were eliminated because these locations do not represent the subsistence angler population due primarily to income levels and demographics. It is acknowledged that these two locations are near areas of higher property values and several tourist attractions. However, the decision to eliminate the survey results from locations 4 (East Potomac Park) and 5 (Titanic Memorial) is problematic for a variety of reasons: (1) these locations, particularly East Potomac Park, represent almost 75 percent of the AECOM survey results, (2) these locations are close by two locations where presumably subsistence anglers were interviewed in 2016 – East Potomac River/Hains Point and Water Street Marina (NPS 2016), (3) Hains Point has historically been and remains a park frequented primarily by African Americans (NPS 2016) – in order to reach Hains Point, anglers would need to pass through

East Potomac Park, (4) 69 percent of the interviewees at these locations were African Americans - considered along the UMD/NPS (2019) Ethnographic Study, these results suggest that non-wealthy anglers frequent these locations and (5) location 5, Titanic Memorial, is easily accessible via public transportation. Without consideration of the survey results from locations 4 and 5, the alternate NPS FIRs are not considered supportable.

Also, NPS did not consider another parameter, FI in conjunction with its proposed FIR value (107 g/day). As stated in the HHRA, studies have shown that setting as few as a single exposure parameter to an upper-end value, may result in the overall exposure representing an upper-end result (Burmaster and Harris 1993, Cullen 1994). Setting more than one exposure parameter to an upper-end value may result in an exposure estimate that is overly conservative and not representative of RME conditions. As noted above, the value of FI is set to 1 (the highest value) in the HHRA (and for the purposes of setting a sediment PRG based on fish ingestion). This is conservative and assumes that subsistence anglers never consume fish from other water bodies, such as the nearby Potomac River. Increasing the FIR while maintaining an FI of 1 is likely to result in overestimating subsistence angler exposure via fish ingestion. It is noted that reduction of the FI to a slightly less conservative value of 0.8 (assuming 80 percent of consumed fish come from the Anacostia River) results in a net fish intake of 74 g/day (92 g/day [calculated by NPS based on unweighted AECOM data from all 5 locations; that is, data from locations 4 and 5 were included] [NPS 2020] x 0.8). This FIR is 11 percent higher than the adult subsistence FIR of 65 g/day used in the HHRA. Assuming an FI value of 70 percent results in a net fish intake of 64 g/day. Therefore, even assuming a FI of about 75 percent and the unweighted FIR of 92 g/day results in a net fish intake (69 g/day) similar to the proposed intake of 65 g/day (65 g/day x 1).

The AECOM study (which did not consider FI) likely underestimates the FIR for four primary reasons: (1) data were weighted toward recreational-like anglers and away from subsistence anglers, (2) fish saved to give to others were removed when determining the mass of fish that may be consumed by “consuming anglers”, (3) fish observed in the QuanTech CAS survey may be undersized, and (4) the survey was conducted during off-peak conditions. Each of these reasons is summarized below.

AECOM weighted data from anglers making fewer trips more heavily and data from anglers making more frequent trips were weighted less. However, studies show that avid anglers make up a majority of subsistence anglers. Therefore, AECOM’s approach in this instance underweights data from probable subsistence anglers.

Fish that were identified as being saved by anglers to share with others were removed from the total mass (or harvest) of fish consumed by anglers when calculating the FIR. Subsistence anglers are known to share their fish with others, including family members. Excluding potentially shared fish underestimates the harvest. It should be noted, however, that AECOM did consider those to whom fish were potentially shared when computing the number of persons who consume harvested fish. Increasing the denominator of the equation in this way, while also reducing the harvest, leads to an underestimation of FIR.

As noted by NPS, the size of fish caught during the QuanTech CAS may be undersized. As an example, the average catfish caught during the AECOM survey weighed 1,804 grams (g). In contrast, the average blue catfish reported in the 2019 ethnographic study weighed between 2,722 and 22,680 g, with an approximate overall average weight of about 11,339 g. However, the ethnographic study reported the average weight of channel catfish ranged from 2,268 to 3,629 g (with an approximate average of 2,948 g). These results are not definitive or complete but are suggestive that fish reported in the QuanTech CAS may be undersized, thereby underestimating the harvest and as a result, the FIR as calculated by AECOM.

Finally, the majority of the data collection period for the QuanTech survey was off-peak, during the fall season when fishing in Washington, D.C. is expected to be less common. The QuanTech CAS was conducted on the Anacostia River from late August through the end of November 2019 (QuanTech 2020). AECOM identified an adult subsistence angler FIR of 41.1 g/day (based on the 98th percentile ingestion rate – similar to the Gibson and McClafferty [2005] study), as the best approximate adult subsistence angler FIR for the study area. This FIR (41.1 g/day) is about 37 percent lower than the 65 g/day assumed in the HHRA. However, the CAS likely does not reflect increased angling success typical for the peak fishing (late spring and summer) season. As noted above, review of the data and assumptions underpinning AECOM's FIR suggests that it is biased low.

An alternative interpretation of the QuanTech (2020) survey data results in a FIR similar to the rate calculated from the Gibson and McClafferty (2005) survey data. Using the QuanTech dataset, AECOM calculated a FIR using an equation including harvest mass (often estimated based on reported species preferences), exposure frequency, and a factor describing the "trip success rate" (the percentage of fishing trips resulting in caught fish). AECOM's FIR of (41.1 g/day) is based on the straight average of angling success (40 percent) for all anglers during the survey period. The QuanTech CAS included anglers that made a range of fishing trips. As noted above, avid anglers (those making more fishing trips) make up a majority of subsistence anglers. Based on professional judgment and common sense, it is expected that subsistence anglers, through a combination of skill and persistence, will consistently achieve more than average success (as measured by the presence of fish in an angler's creel at the end of the day), given that subsistence anglers are fishing, in part, to sustain a protein source for their diet. In other words, it is entirely reasonable to assume that persons who need to catch and consume fish to supplement their diets will, on average, do just that bit more to actually catch a fish, than a recreational angler who in large part may fish for the sport/experience and not primarily to catch and consume fish and are assumed to often practice catch and release. For the purposes of comparison, it is noted that if the angling success rate is increased from 40 to 67 percent (fish are caught in two out of every three fishing trips) in the equation AECOM used, the FIR increases to 68 g/day, an FIR very similar to the 65 g/day used in the HHRA. AECOM included the FIR calculated assuming the 67 percent trip success rate in a sensitivity analysis documented in the Pepco and Washington Gas comment document to the Proposed Plan. AECOM did not provide a specific basis for the choice of 67 percent trip success rate (AECOM 2020).

The QuanTech/AECOM FIR is based on a CAS of Anacostia River anglers, while the Gibson and McClafferty (2005) and UMD/NPS (2019 studies were based on interviews of anglers on the Anacostia and Potomac Rivers. However, it should be noted that the Potomac River interview locations are four miles or less from the Anacostia River HHRA study area. Even acknowledging the differences in angler locations, there is no reason to believe that subsistence angling tendencies, including FIR, are likely to be substantially different for the Anacostia River by itself as compared to the wider Washington, D.C. area. It is acknowledged that D.C. has a high level of income inequality. However, there is no reason to believe that lower income persons will not have access to or will be excluded from any areas of the Anacostia or Potomac Rivers other than private property (e.g., marinas, industrial operations, etc.). The end goal is the calculation and use a single sediment PRG based on a reasonable maximum exposure (RME) adult subsistence angler for use throughout the river. DOEE believes that the use of an adult subsistence FIR of 65 g/day, coupled with an FI of 1, is representative of an RME subsistence angler exposure via fish ingestion throughout the Anacostia River.

An additional criticism of the Gibson and McClafferty (2005) study is that it focused more on recreational anglers rather than truly subsistence anglers. By comparison, the joint UMD/NPS ethnographic study focused on Hains Point and interviewed primarily lower income, minority anglers (UMD/NPS 2019). However, for the purposes of the HHRA and the FS, the numerical definition of subsistence anglers is based on the quantity of fish consumed and not on a stated or perceived basis for why fish are caught and consumed. That is, while there may be a population that identifies as subsistence anglers (NPS 2016), there is no clear distinction between a “recreational” angler who consumes a large quantity of fish and a “subsistence” angler with a similar FIR. It is acknowledged that the Gibson and McClafferty (2005) study conducted interviews during peak season (spring and summer). It is possible that this interview time period produced an FIR estimate that is higher than the average year-round fish consumption rate from the Anacostia River. However, DOEE considers the use of survey results based on peak season to be a reasonably health-protective approach.

The Gibson and McClafferty (2005) study noted a difference in fishing location among anglers based on household income levels. The poorest anglers fished exclusively from shore, while about 50 percent of the most affluent anglers fished from boats. The percentage of anglers fishing from boats was found to be positively correlated to household income level. However, DOEE notes that 75 percent of surveyed D.C. anglers were fishing from shore. Therefore, the FIR based on the Gibson and McClafferty (2005) study is judged to be driven by anglers fishing from shore and unlikely to be substantially lowered by boating anglers. An appropriate FIR is intended to represent an RME subsistence angler regardless of household income level. Also, the use of an FI value of 1 (in other words, assuming all fish ingested comes from the Anacostia River) along with the chosen FIR helps to mitigate any potential underestimation based on the inclusion of wealthier anglers in the Gibson and McClafferty (2005) study.

The 65 g/day FIR used in the HHRA is the median value for the three FIRs considered and consistent with national subsistence angler FIR published by U.S. EPA (2014b) (61 g/day) and with rates from other urban areas such as San Diego, California (73.3 g/day), as shown in **Table B.3.9.1**. The QuanTech survey results yield a similar rate (68 g/day) if the data are interpreted using a trip success rate possibly more appropriate for a subsistence angler as documented in the AECOM calculations provided in Pepco and Washington Gas comment documents. Based on these considerations, DOEE judges that use of an FIR of 65 g/day is both health-protective and reasonable.

B.3.9.2 FISH FILLET DATA SET

Several stakeholders (Pepco and WGL; USFWS) commented that the 2013 fish tissue dataset used in the HHRA is outdated or is too small. Pepco and WGL commented that the 2013 dataset should be replaced by the 2017/2018 dataset, while USFWS commented that the 2013 and 2017/2018 fish tissue datasets should be combined. Pepco and WGL commented that the 2017/2018 data set should be discussed in detail in the River-wide FS, focusing on lower fish tissue concentrations in the 2017/2018 data set relative to the 2013 dataset. This reviewer then suggested that the associated impact on exposures and risks relative to those presented in the HHRA should be assessed. Pepco and WGL requested explanation for the HHRA's reference to the 2013 fish tissue data set as "site-specific data collected for the ARSP" and the HHRA's reference to the 2017/2018 fish tissue data set as "the 2018 fish consumption advisory dataset." Without elaboration, USFWS expressed concerns regarding the use of whole fish samples in the HHRA.

USFWS commented that the HHRA background fish tissue dataset collected from the "upper, non-tidal" portion of the Anacostia River is inappropriate for use as a background fish tissue dataset (see also comments on **Section B.3.2.4**). This stakeholder further objected to referring to this dataset as representing the non-tidal river. Believing that the background fish tissue concentrations used in the HHRA to be too low, Pepco and WGL presented a survey of PCB concentrations in fish fillets from Washington, D.C. area markets and grocery stores in effort to provide context for interpreting PCB concentrations in fish fillets from the Anacostia River.

RESPONSE

The HHRA relied on the 2013 fish fillet data set collected by Pinkney (2014) to support the Washington, D.C. fish consumption advisory. Additional fish fillet samples were collected in 2017/2018 in support of the Washington, D.C. fish consumption advisory as the HHRA was being finalized (Pinkney 2018). The HHRA acknowledged the 2017/2018 fish fillet data set, noting that this more recent data set was similar in sample size to the 2013 data set, but chemical concentrations were lower in some fish species and higher in other species.

It is important to note that replacing the 2013 fish fillet results with the 2017/2018 fish fillet results will not change the overall results and conclusions of the HHRA, including identification of COCs. Total fish ingestion risks will remain within the EPA risk range of 1E-06 to 1E-04 and would remain greater than 1E-04 for the adult subsistence angler based on RME assumptions. As noted in the FIR discussion (above), human health risk and hazard results, as well as risk to ecological receptors, establish the need for remediation in the Anacostia River. The COCs for protection of human health (primarily total PCBs and several pesticides) remain largely the same (the differences are associated primarily with the identification of which pesticides and metals are considered to be COCs). In particular, PCBs remain a fish ingestion COC in the 2017/2018 dataset. The 2017/2018 dataset and subsequent fish fillet datasets will help inform post-early action performance monitoring and will be evaluated along with the other performance monitoring data collected via the adaptive management decision framework (**Section B.3.1**). Although chlordane and dioxin TEQ are not human health COCs at a target risk level of 1E-05, remediation in the EAAs will reduce concentrations of these ecological COCs in sediment and further diminish potential receptor-specific direct contact risks.

The use of fish tissue samples collected from the Northwest Branch and Northeast Branch as the background fish tissue dataset has been commented upon and discussed with stakeholders in previous drafts of the ARSP RI Report and other project documents. The HHRA refers to the collection areas for the background fish tissue samples as the upper, non-tidal portion of the river because the tidal influence of the Anacostia River does not extend into these areas. However, fish fillet results from the upper, non-tidal portion of the Anacostia River represent an adequate background data set, as discussed in **Section B.3.2** and in detail in the uncertainty assessment in the HHRA. In particular, COC concentrations in fish from the upper, non-tidal tidal watershed are statistically distinct from the concentrations in the same species in the tidal river, indicating that these two fish populations are not being exposed to the same sediment concentrations or food prey items. Some stakeholders believe that fish fillet samples from the Potomac River in Washington, D.C. are appropriate as an alternative background dataset for fish tissue. However, most fish collected from the upper Potomac River have sufficiently large home ranges to suggest they are likely to have either spent time in the Anacostia River or have been exposed to contaminants originating from the Anacostia River. As a result, game fish tissue samples collected from the Potomac River are likely inappropriate for background characterization.

On behalf of Pepco, AECOM (2020) conducted a study of the levels of PCBs in commercial fish sold in markets and grocery stores in Washington, D.C. The objective of the AECOM study is to provide a comparison of the risk-based PCB concentrations used in the ARSP HHRA in defining acceptable levels of the risks to human health resulting from the consumption of fish caught in the Anacostia River to the PCB concentrations in fish from local market sources. This study shows that fish purchased commercially in Washington, D.C. markets may be contaminated with PCBs. Such information can help consumers shop wisely to limit their exposure to any contamination. Market fish which may come from anywhere in the U.S. or the world are not representative of Washington, D.C. water bodies and so cannot be considered to represent unimpacted background conditions. Although market surveys may be informative for consumers, such surveys are not directly relevant to establishing cleanup objectives in the Anacostia River.

B.3.9.3 SELECTED RISK AND HAZARD LEVELS

NPS, DC Appleseed, and Anacostia Watershed Society expressed concern over the selection and use of a target risk level of 1E-05 rather than 1E-06 as the basis for sediment PRGs. These reviewers commented that the rationale for selecting a risk level should include comparison of (1) the level of protection of human health, (2) the list of chemicals of potential concern (COPC), and (3) the footprint and feasibility of potential remediation for multiple potential TRs (1E-06, 1E-05, and 1E-04). NPS stated that the use of a target hazard index (THI) of 1 should be changed to 0.1 to address the potential for multiple COPCs to affect the same target organ or system. In addition, CSX requested that DOEE compare the selected risk level to EPA's interpretation of the risk range defined in the National Contingency Plan (1E-06 – 1E-04). NPS expressed concern regarding the statement in the River-wide FS of "periodic reevaluation of the target risk level." NPS advocated for (1) use of an initial risk level of 1E-06 with potential increase in the future, (2) discussion of specific factors that could influence a change from the current risk level, and (3) clarification of whether reevaluation at the time of "final remedy" refers to the Interim ROD or the Final ROD.

RESPONSE

EPA's risk range of 1E-06 to 1E-04 was established as part of the NCP (EPA 1990). Risks less than 1E-06 (one excess cancer in an exposed population of one million) are considered insignificant and do not require remedial action. Risks greater than 1E-04 (one excess cancer in an exposed population of 10,000) are unacceptable and require remedial action. Risks within the risk range may require remediation, at the discretion of risk managers. The HHRA identified COCs using the low end (1E-06) of EPA's risk range (referred to as the "point of departure"). This was primarily to give risk managers the full list of potential COCs that could require remediation based on their potential to cause cancer in exposed receptors. Initially, the Focused FS considered using the low end of target risk range; however, preliminary analyses indicated that the associated sediment cleanup level (based on uptake of chemicals into fish and subsequent human fish ingestion) required to achieve the 1E-06 level of 6.96 µg/kg of PCBs was less than the background threshold value of 17 µg/kgs of PCBs (based on sediment concentrations in the upper Potomac River). EPA recommends not establishing remedial cleanup goals below background levels (EPA 2017). Also, remediating to a background concentration was found to be substantially more expensive than remediating to a target risk level of 1E-05. Generally, costs were found to be linearly and positively correlated with the estimated size of the area of sediment to be remediated and linearly and negatively correlated with risk level (that is, the lower the risk level, the greater the cost). Specifically, river-wide remediation costs were estimated to be about $50 million (M) less assuming selective dredging and $230 M less including dredging of the Federal Channel when a target risk level of 1E-05 rather than 1E-06 was used. Cost is one of the nine criteria used to choose a remedy and demonstrate that a selected remedy is considered to be health protective and cost effective consistent with the NCP expectations (40 CFR 300.430(a)(I)(iii)). As stated in Appendix A to the River-wide FS, DOEE's preliminary calculations indicate that cleanup to meet the PCB PRG for a cancer risk of 1E-06 would require removing or treating about 34 percent more sediment than the 1E-05 risk level (847 acres [target risk level=1E-06] and 633 acres [target risk level=1E-05]). Costs increase commensurate with the increase in remediated area.

In addition to cost, achieving and maintaining a cleanup level based on a target risk of 1E-06 is unlikely to be cost-effective based on the impact of several sources of uncertainty including (1) potential upstream sources of PCBs, (2) the background sediment PCB concentrations, and (3) the potential for mechanism(s), and magnitude of contaminant uptake from sediment into fish. The cumulative impact of these sources of uncertainty mean that for the purposes of the Focused FS, given the realities of an urban, tidal river, the achievement of a target risk of 1E-06 may be unachievable or alternatively, cost-ineffective, whereas a target risk of 1E-05 is considered health-protective, cost-effective, and achievable. Therefore, DOEE selected a target risk level of 1E-05 (the midpoint of EPA’s risk range) which is health protective and appropriate to the identified PCB background levels from the upper-Potomac River. This target risk level complies with the NCP as it is within EPA’s risk range.

Also, this is the same target risk used by Washington, D.C. to develop the Anacostia River fish consumption advisory recommendations. It should be noted that the COC identified based on target risks of 1E-05 and 1E-06 are similar, as discussed in the River-wide FS. The primary difference is the addition of several pesticides and PAHs at the 1E-06 target risk. Total PCBs is the primary risk driver at both risk levels.

A target hazard index (THI) of 1 was selected consistent with U.S. EPA guidance (EPA 1990). A THI of 0.1 is used for the purpose of selecting chemicals of potential concern (COPC) in the HHRA to acknowledge the potential for multiple chemicals to impact the same target bodily organ or system consistent with EPA’s “Risk Assessment Guidance for Superfund” guidance (EPA 1989) and “Regional Screening Levels (RSLs) - User's Guide” (EPA 2020). However, for the purpose of defining COCs and the location and extent of remediation, a THI of 1 is routinely applied. Further, as shown in the HHRA, fish ingestion hazards are driven by potential exposure to PCBs. Therefore, given that the remedial footprint for all COC is dominated by PCBs, it is unnecessary to employ a THI of 0.1 and it is expected that a sediment cleanup level based on a THI of 1 for PCBs will provide adequate protection of human health.

The Proposed Plan mentions an approximate 90 percent reduction in risks based using the selected target risk level (1E-05) and THI (1). This approximation cannot and should not be considered a precise result. The primary purpose of the approximation was to confirm and show that the selected remediation is expected to result in a reduced risk from ingestion of fish potentially contaminated based on direct and indirect exposure to contaminated sediment. Consistent with EPA methodology, the target risk level and THI is applied to each sediment COC. Therefore, after remediation of the EAAs, risks and hazards associated with each sediment COC is expected to be less than or equal to the target risk level of 1E-05 and the THI of 1, respectively. Total risks to receptors may exceed 1E-05 but will not exceed EPA’s risk range. Similarly, the total hazard to receptors may exceed 1, but will be substantially reduced from pre-remediation levels.

Post-remedial data reviews by DOEE following initiation of the early actions will occur at a minimum 5-year interval per NCP guidance. The interval begins when initiation of the remedial action begins. Each review will include a reevaluation of the target risk level and an analysis of the feasibility of implementing additional remedial actions to further reduce risk to the 1E-06 level for the Final ROD. A reduction of the target risk level from 1E-05 to 1E-06 may result in lower PRGs for the four identified COCs (dioxin-like PCBs, total PCB congeners, dioxin TEQ, and chlordane). Also, 11 additional human health COCs would be introduced: 4,’4-DDD; 4,4’-DDE; aldrin; alpha-BHC; dieldrin; heptachlor epoxide; arsenic; benzo(a)pyrene; BaPE; and dibenzo(a,h)anthracene. Such a re-evaluation would require a revision of the Focused FS.

B.3.9.4 HHRA PROCESSES AND ASSUMPTIONS

Stakeholders provided a number of comments regarding how the results of the HHRA were summarized and presented in the River-wide FS. NPS commented that the HHRA summary in the River-wide FS should discuss all receptors considered in the assessment and the related risks and hazards for each. DC Appleseed requested a clearer explanation of the distinction between excess or incremental site-related risks and general risks for developing cancer from other non-site-related exposures.

CSX, Pepco and WGL stressed the importance of considering central tendency exposure (CTE) risk and hazard results in addition to reasonable maximum exposure (RME) results when interpreting the HHRA. DC Appleseed requested better explanation of the rationale for including/excluding dioxin-like polychlorinated biphenyls (PCB). Also, CSX noted that the use of a “fraction ingested” (FI) of 1 for ingestion of fish from the Anacostia River is overly conservative and with the FIR selected for the HHRA (which the stakeholder believes is extremely conservative) combine to result in remedial goals that are too low and associated remedial costs that are too high. CSX also contends that the identification in the baseline HHRA of COCs that pose a risk greater than the target risk of 1E-06 is inconsistent with EPA’s Superfund Program and EPA Region 3 guidance and methods.

NPS indicated that the Proposed Plan and supporting documents inadequately explain the retention of benzo(a)pyrene equivalents (BaPE) and chlordane and the associated development of PRGs based on direct sediment exposure.

RESPONSE

The HHRA focused on the excess or incremental cancer risks associated with site-related contamination in the study area. Consistent with guidance and standard practices, general risks associated with other non-site-related exposures such as ingestion of foods not originating from the Anacostia River, inhalation of air pollution related to living in a large metropolitan area, or overexposure to ambient sunlight were not considered. The determination of the need for remediation, the COC driving that remediation, and the location and extent of proposed remediation were all based on the excess or incremental site-related risks and hazards calculated in the HHRA. The Focused FS and River-wide FS, as well as the Proposed Plan, summarized the HHRA risks and hazards, while citing the HHRA Report as the source document for these analyses. Stakeholders should refer to the ARSP HHRA Report for the full range of receptor-specific risks and hazards considered and the results of those analyses.

The NCP states that the lead agency shall “conduct a site-specific baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants . . . the results of the baseline risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives in the FS” (U.S. EPA 1990). EPA’s “Risk Assessment Guidance for Superfund” (RAGS) Part A states, “For Superfund exposure assessments, intake variable values for a given pathway should be selected so that the combination of all intake variables results in an estimate of the reasonable maximum exposure for that pathway” (U.S. EPA 1989). The HHRA calculated receptor-specific exposures, risks, and hazards are based on both reasonable maximum exposure (RME) and central tendency exposure (CTE) conditions. The RME condition is intended to represent the maximum exposure that may reasonably occur while the CTE condition is intended to represent an average exposure. Consistent with EPA's recommendation in RAGS and ensure the selected remediation is sufficiently health-protective, site remedial decisions were based on the RME results. As noted in the HHRA, the river-wide FS, the Focused FS, and the Proposed Plan, the total risks were identified for anglers and persons who may consume fish caught from the Anacostia River. Various surveys (OpinionWorks 2012, NPS 2018b, etc.) have established that subsistence level fishing is occurring in the Washington, D.C. metropolitan area, including the Anacostia River. Therefore, while the CTE results from the risk assessment were presented and considered, RME results and the subsistence angler scenario were used in the interpretation of the HHRA and the preparation of the various FS documents and the Proposed Plan.

The HHRA (and by extension the River-wide FS, the Focused FS, and the Proposed Plan) evaluated a subsistence angler FIR and an FI of 1. It is acknowledged that the combination of these two assumptions provides a conservative characterization of fish ingestion risks and hazards. However, as noted, subsistence fish consumption has been established in Washington, D.C., and, specifically, along the Anacostia River. The choice of an FI of 1 reflects the productivity of the Anacostia River and the regularity of angling visits to the river. Specifically, productivity in this context refers to the diversity and number of fish (including game fish) present in the river. It thus represents a health-protective choice (along with the selected FIR), representing subsistence anglers who catch and consume entirely or primarily fish from the Anacostia River. Remedial costs associated with these assumptions are greater than costs reflective of less conservative assumptions. The FIR and FI used in the HHRA are health protective and representative of actual conditions along the Anacostia River.

The fish fillet data set considered in the HHRA (2013/2014 Pinkney data) were sorted and evaluated as upper and lower Anacostia River (using the CSX Bridge as the boundary). This organization matches the source document for this data. It is not known where in each section (upper or lower) of the Anacostia River each fish was caught. Therefore, it was not possible to check whether or not a correlation existed between the location of each fish and the concentration of contaminants in the fillets of that fish. However, the HHRA does identify and discuss some general differences in contaminant levels in fish fillets from the two sections of the river. For example, in the upper Anacostia River, risks associated with exposure via ingestion of total PCBs are higher than for ingestion of dioxin-like PCBs. In contrast, in the lower Anacostia River, risks associated with exposure via ingestion of dioxin-like PCBs are higher than for ingestion of total PCBs. Fish ingestion-specific and total risks associated with the two different sections of the river are clearly identified to facilitate risk manager and stakeholder review and consideration of risks and hazards associated with potential exposures in the upper and lower Anacostia River.

The NCP allows for risk management decisions and does not mandate selection of either extreme of EPA's risk range. The COCs are defined on the basis of the selected target risk. For the Focused FS, the River-wide FS, and the Proposed Plan, the target risk of 1E-05 was selected. Therefore, consistent with EPA guidance, some COCs initially identified in the HHRA based on a baseline 1E-06 risk level are not identified as COCs at the target risk level of 1E-05.

As discussed in Section 1.2 of the Focused FS, the exposure point concentration (EPC) of BaPE exceeded the sediment PRG and exhibited risk between 1E-06 and 1E-05 in a small area of the fringe sediment in Reaches 123 and 456. BaPE was not identified as a human health COC at a target risk of 1E-05 associated with potential direct sediment contact for the following reasons: (1) limited spatial extent of these exposure area and (2) 95 upper confidence level (UCL) on the mean concentration of BaPE in the relevant portions of the main stem are less than the PRG. BaPE was never identified a human health COC based on fish ingestion.

The Proposed Plan was designed to address risk to both human and ecological receptors exposed to contaminants in the Anacostia River, and the Interim ROD is focused on achieving sediment concentrations protective of human health and ecological receptors. Comparison of the list of COCs at 1E-06 (Section 12 of the ARSP RI Report) with the list of COCs at 1E-05 (Appendix A of the River-wide FS report) shows that, at 1E-05, the total PCBs account for most of the risk to human health. At DOEE's selected target risk of 1E-05, remediating sediment to achieve human health PRGs will also reduce exposure of ecological receptors to ecological COCs (dioxin-like PCBs, dioxin TEQ, and chlordane). Cleaning up to human health RALs would address the more limited risk to ecological receptors associated with PCBs, as well as much of the chlordane. Although chlordane is not a risk driver for human health, the early action will reduce risk posed by chlordane in the Main Stem of the river to less than five times the ecological PRG (18 µg/kg), and in Kingman Lake about one-half as much. In Washington Channel, which already met the chlordane PRG, the early action will reduce the chlordane surface weighted average concentration (SWAC) by about 40 percent (see **Table B.3.4.1**). Given the inherent uncertainty in analytical results for this legacy pesticide, and the preponderance of evidence indicating widespread nonpoint sources to the river, DOEE considers the substantial reduction in chlordane concentrations in sediment a protective response action for benthic and aquatic invertebrates. The anticipated reductions in chlordane concentrations throughout the tidal Anacostia River will be confirmed during the post-remediation baseline monitoring and long-term performance monitoring, which will include measures to refine DOEE's understanding of chlordane's residual effect on benthic and aquatic invertebrates.

B.3.9.5 DIRECT SEDIMENT CONTACT AND EXPOSURE

Anacostia Watershed Society, and a member of the general public, commented that the potential for sustained sediment contact/exposure should be more clearly summarized, including a better explanation that contacting sediment does not directly result in significant exposure, particularly among child receptors.

RESPONSE

Potential exposure to contaminants in fringe sediments via long-term incidental ingestion and direct contact were quantified for all human health receptors considered in the HHRA. Shoreline workers were evaluated as adults only, while all other receptors (waders, swimmers, and anglers) were evaluated as children, adolescents, and adults. Receptor-specific exposure assumptions, including number of days per year, amount of skin contact, and adherence rate of sediment to skin are detailed in the human health risk assessment (Appendix J) to the RI. Generally, risks for children associated with potential direct sediment contact were about twice as high as those calculated for adults within the same type of receptor. No sediment COCs were identified with risks greater than or equal to a target risk of 1E-05 and a hazard of 1 for any receptor.

B.3.10 SOURCE DELINEATION

The Source Delineation Theme covers stakeholder comments on the ARSP's identification of sources that are currently contributing or have historically contributed contaminants to the study area water bodies. Specific subthemes include the lines of evidence approach used for the identification of sources, the general approach and assumptions regarding PECS identification, and coordination with other jurisdictions in source tracking efforts. In addition, the Source Delineation Theme covers stakeholder comments on the Contaminant Source Assessment (CSA) documented in the CSA Report (CSAR, Tetra Tech 2019d).

B.3.10.1 LINES OF EVIDENCE APPROACH FOR SOURCE IDENTIFICATION

Commercial stakeholders (CSX and SIC) commented that the multiple lines-of-evidence approach used to identify potential active sources was applied inconsistently and was ineffective. Concern was indicated by the Navy, CSX, and others that the analysis relied on the proximity of observed contamination to a potential source, included some non-risk driving chemicals, and failed to consider all data made available to DOEE by the PECS parties. In addition, CSX believed that the potential source identification approach needed to make greater use of forensic data. DC Appleseed commented that, although the lines of evidence approach for potential source identification was technically robust, it should be revised to include the results from the surface water model. CSX suggests that the Proposed Plan and supporting reports should refer to only "potential sources" and should more clearly distinguish between active and historical potential sources. CSX also suggests that if a supporting ARSP source investigation study (e.g., manhole sediment or tributary investigation) concludes that a potential source is not active or is having a negligible impact, those conclusions should supersede any potential sourcing conclusions based on proximity.

RESPONSE

The ARSP source characterization approach is documented in Section 2.7 of the River-wide FS Report (Tetra Tech 2019f). The RI Report discusses the hydrologic regimes present in the study area. The Main Stem is comprised of four river reaches (Reach 7, 67, 456, and 123). In general, the PECS facilities identified in the ARSP abut the Main Stem. Reaches 67, 456, and 123 (particularly the downstream end of Reach 456 and all of Reach 123) are relatively low energy and collectively are a zone characterized by fine-grained sediment deposition. Mostly coarser-grained sediment is deposited in Reach 7. Reaches 67, 456, and 123 trap greater quantities of fine-grained sediment, while Reach 7 traps less. Owing to high surface area, organic carbon content, and electrical charge, fine-grained sediments typically exhibit elevated concentrations of the hydrophobic chemicals that are the risk drivers for the ARSP. In a depositional environment such as exists in the Main Stem, contaminant concentrations typically increase near a contaminant source, and decline with distance as the source material is mixed with (and diluted by) uncontaminated material downstream from the source. In general, therefore, contaminant concentrations are highest near (or proximate to) a source and decline with distance downstream.

DOEE performed or supported separate independent investigations to identify sources of contaminants to the study area. These investigations included the proximity analysis documented in the ARSP RI Report (included surface sediment, subsurface sediment, surface sediment pore water, and surface water) (Tetra Tech 2019a), the Manhole Sediment Investigation (MSI) (Tetra Tech 2019e), and the USGS-led Tributary Study (Wilson 2019). In addition to these three investigations, the Contaminant Source Assessment (CSA) is a separate, independent source identification analysis. The CSA considered chemical concentration data from multiple media (surface sediment, tributary bottom sediment, and manhole sediment) in a mathematical context to objectively identify potentially active sources of contaminants to the Anacostia River.

Convergence (or consilience) of evidence is the principle that investigatory conclusions are more credible when lines of independent investigations "converge" or support those conclusions. EPA recommends incorporating the lines of evidence approach in environmental investigations (EPA 2018c). Consistent with this principle, DOEE employed a multiple lines of evidence approach to assess whether one or more potential sources was a current, ongoing source of contamination to surface sediment in the ARSP study area. In short, the more investigation results (lines of evidence) pointing to a particular potential source, the greater the likelihood that that source is contributor of contaminants to the river. To avoid identification of a negligible source or source conclusions based solely on proximity, DOEE considered the source investigation studies collectively; a single positive indication (investigation result) that a potential source is active carried less weight than multiple indications. Results of the lines of evidence source identification analysis is documented in Section 2.7.1 of the River-wide FS Report.

The multiple lines of evidence approach identified various tributaries as the most significant new sources of contaminants to the study area. Other studies, completed since the analysis documented in the River-wide FS report, continue to inform source tracking efforts in the Anacostia River watershed. For example, an independent passive-sampler-based investigation (Ghosh et al. 2019) of the five major tributaries to the tidal Anacostia River and select locations within the Anacostia River largely corroborates the results from the ARSP lines-of-evidence results. Another line evidence pursued by Ghosh et al. (2019) consisted of the deployment of mussels for more than 90 days, exposing them to sediments in tributaries and analyzing their tissue for contaminants (PCB congeners, PAHs, and pesticides). Results were used to determine the impacts of contaminants in the tributaries and corresponding bioaccumulation of chemicals (Ghosh et al. 2019). NPS (JCO 2019) characterized contaminant concentrations in bottom sediments of five upstream, non-tidal tributaries to the tidal Anacostia River. This study correlated concentrations in bottom sediment with potential point sources in the watershed.

MDE referenced previous sampling (described as “recent” though no dates for the sampling were noted in the comment) of District sources showing PECS releases, MS4 outfalls, and CSS outfalls were the primary sources of river contaminants. DOEE is engaged in on-going source characterization efforts of the outfalls and tributaries in the District.

DOEE is planning expansions to the MSI and the USGS tributary study that will further characterize MS4, CSS, and tributary sources. DOEE is also exploring options to evaluate outfalls that were not previously sampled due to the lack of sediment as well as expanding sampling to include tidally influenced manholes (i.e., manholes accessing sewer lines lower than 3 ft MSL). However, based on the existing characterization data from manholes and tributaries coupled with large flow and sediment contributions from the tributaries in comparison to the outfalls, the available evidence suggests that the tributaries are the dominant active sources of new contaminants to study area media. It should be noted that MDE is conducting source tracking investigations in the Lower Beaverdam Creek tributary (a source of PCB contamination identified from the RI proximity analysis, USGS tributary study (Wilson, 2019), and confirmed by Ghosh et al [2019]). MDE recently issued a draft report summarizing sampling results from the Lower Beaverdam Creek investigation (MDE 2020).

The ARSP Surface Water Model was developed by DOEE to support remedial alternative evaluations for the FS. The available contaminant source characterization data from manholes, tributaries, sediment, and PECSes were used to support model calibration. DOEE agrees with DC Appleseed that the model could be used to further support efforts to identify potentially active sources. With the data generated by MDE's efforts in Lower Beaverdam Creek, the data from the NPS study (JCO 2019), and the new data from baseline and predesign sampling and from performance monitoring (discussed in **Section B.3.1** of this responsiveness summary), DOEE plans to continually update the ARSP Surface Water Model and fully integrate it into future source identification and tracking efforts.

B.3.10.2 APPROACH FOR PECS IDENTIFICATION

Commercial stakeholders felt that DOEE's approach for identifying a site as a PECS is inconsistent and was deficient with regard to characterizing PECS contributions to municipal outfalls. SIC indicated that DOEE's definition of a PECS as any site abutting the river where a hazardous material or petroleum release occurred (or potentially occurred) historically or where these materials were stored, used, or handled is too broad and is inconsistently applied. This reviewer believes that the designation of PECSes as potentially active sources of contamination is speculative and inappropriately suggests responsibility. SIC also questioned DOEE's criteria and process for identifying a property abutting the river as a PECS. In addition, SIC objected to designating a petroleum storage and handling facility as a PECS since no petroleum-related chemicals were determined to be risk-driving constituents.

RESPONSE

DOEE believes that the identification of the 15 PECSes defined in the ARSP RI Report and supporting documents is appropriate given the importance of source control to the success of any early action and any final remedy selected for the Anacostia River. DOEE defines a PECS as a site abutting the river where hazardous chemicals or petroleum products are or have historically been stored, used, or handled and potentially released to the environment. Since these facilities are situated at water's edge and have long histories of the use, storage, and handling of hazardous chemicals or petroleum products, any current or historical impact they are having or have had on river media requires DOEE's consideration in the cleanup of the Anacostia River and associated water bodies.

DOEE agrees that petroleum storage sites are generally not sources of (currently defined) risk-driving constituents for purposes of this Interim ROD, and also agrees that refined petroleum product releases are specifically excluded from regulation under CERCLA. However, petroleum releases (refined and other) are covered by other District and federal laws and regulations. In addition, PAHs and other petroleum related compounds (e.g., benzene, methyl tert-butyl ether [MTBE], tetraethyllead [TEL]) are potential COCs that can pose unacceptable risk to human health and the environment. Groundwater-borne benzene (and other soluble chemicals found in petroleum products) from these facilities can threaten the success of remedial actions targeting surface sediment contaminants by making surface sediment pore water toxic to benthic invertebrates. Published surface water quality criteria for benzene and other chemicals define concentrations that are harmful to benthic invertebrates (DOEE 2020).

B.3.10.3 SPECIFIC SOURCES (PECS, OUTFALL, OR TRIBUTARY)

MDE commented that, although surface water modeling may indicate that the upstream tributaries are sources of most sediment deposited in the tidal river, recent studies show that PECSes, MS4 outfalls, and CSS outfalls are the primary sources of PCBs and other contaminants. Several stakeholders (SIC, CSX, WGL, Navy) expressed views about the significance of a specific PECS as a source of contamination, whether or not a specific PECS discharged to a specific outfall, or the general significance of a specific outfall to the observed contamination in river media. CSX indicated concern that, of the 51 outfalls targeted by the manhole sediment investigation, a sufficient amount of sediment for sampling existed at only 29, leaving the remaining 22 targeted outfalls unsampled. The Navy indicated that any additional outfall sampling should include manholes associated with sewer lines that are lower than 3 feet MSL where they discharge to an outfall (i.e., are tidally influenced).

RESPONSE

DOEE is engaged in ongoing active source identification activities (additional manhole and tributary sediment investigations) and is committed to resolving any potential source characterization inaccuracies identified by stakeholders. DOEE will also consider the ongoing source tracking studies being conducted by MDE (**Section B.3.10.1**). Such resolution of a specific characterization of a specific PECS, outfall, or tributary will have no impact on the early actions defined in the Proposed Plan. However, these comments highlight the need for potential source delineation refinements that can improve source tracking in the upstream watershed, simulation of sources in the ARSP Surface Water Model, and use of more advanced chemical fingerprinting analyses to aid in confirming contributions from individual sources (i.e., outfalls, tributaries, and specific PECSes). Additionally, DOEE conducted an airborne infrared survey in April 2020 of the tidal Anacostia River shoreline in the District in Lower Beaverdam Creek in Maryland. The infrared survey provides a first cut, high level survey of anomalies that may represent active seeps to each water body. The results of the infrared survey will serve as the basis for follow-up field checking of the anomalies and, potentially, the collection of field samples.

B.3.10.4 POTENTIAL FOR RECONTAMINATION FROM UPSTREAM SOURCES

Significant concern was expressed by DC Appleseed and the Navy (and is shared by DOEE) regarding the potential for study area recontamination from active sources in the upstream, non-tidal watershed after the completion of cleanup actions in the study area water bodies. Upstream source identification and control is a key component of DOEE's Interim ROD process. Concern among some reviewers (NPS and DC Appleseed) was that absent from the Proposed Plan and associated documents was a discussion of the specific source control efforts that are needed to avoid recontamination of study area media and the uncertainties associated with source control. Some stakeholders (Anacostia Watershed Community Advisory Committee and private citizens) observed that cleanup of the river will require the cooperation of MDE and the governments of Montgomery and Prince George's counties and that efforts to enlist this cooperation should be made public. NPS noted that current or planned source control efforts are not discussed in the Proposed Plan. DC Appleseed also requests that DOEE include the schedule showing when specific source control actions defined in the source control strategy will be completed. MDE inaccurately noted that the source control strategy would only be implemented if post-early action monitoring data indicated RAOs would not be met.

RESPONSE

It is DOEE's intention to implement source control and this implementation is not contingent on monitoring results (i.e., it will be implemented even if post-early action monitoring data indicated that RAOs were locally being met in some portions of the study area). Successful source control will require close cooperation between DOEE, MDE, and the governments of Prince George's and Montgomery counties, since most of the upstream, nontidal watershed is in Maryland. DOEE, in cooperation with the Council of Governments (COG), established a Source Control Workgroup in April 2019. The members include DOEE, MDE, COG, NPS, USFWS, NOAA, USGS, UMBC, Montgomery County, Maryland National Park & Planning Commission, Prince George's County and supporting consultants. MDE noted that it is unable to commit to the source control strategy defined in Section 2.7 of the River-wide FS Report. However, DOEE meets regularly with MDE and Prince George's County Department of Environment technical staff and is coordinating with both agencies on source control strategy. DOEE plans to routinely update stakeholders regarding source control activities and the progress achieved from these efforts through periodic web postings, social media postings, stakeholder meetings (e.g., the ongoing quarterly meetings of the LCCAR [**Section B.2.2.2**]), and 5-year review reports.

B.3.10.5 CSA APPROACH

DOEE performed the contaminant source assessment (CSA) (documented in the CSAR, Tetra Tech 2019]) to identify potentially active sources of contaminants to surface sediments in the Anacostia River, a critical determination in support of the FS. The CSA targeted currently active sources that may potentially warrant further evaluation. In the future, the CSA may be expanded and supplemented with additional data as it becomes available, and/or analytical methods, to increase the diagnostic power of the analysis. A significant portion of Source Delineation theme comments DOEE received pertained to the CSAR. A number of stakeholders (Pepco, WGL, CSX) questioned the approach for performing the CSA and the validity of its conclusions. Specifically, the commenters disagreed with the use of factor analysis as an exploratory approach to identify currently active sources, the use of indicator chemicals in the analysis that are not risk-driving, and the pre-judgement of which chemicals to include in the analysis.

RESPONSE

As an exploratory data analysis tool, the CSA identified potentially active sources of contaminants to surface sediments in the Anacostia River. Successful source identification depends on sampling locations and sample collection, chemical analyses of the samples, evaluation of the resulting chemical data, and knowledge of the current and historical industrial processes in the study area. On a complicated river sediment site such as the Anacostia River, where multiple sources contribute similar types of contaminants, a key objective is to link the distributions of contaminants and related chemicals to individual sources. Often this is done through an analysis of multiple project variables and hierarchical application of advanced multivariate statistical methods for chemical fingerprinting and identification of sources.

The objective of the CSA was to identify current, active sources of contamination which, if not curtailed, could cause recontamination of any remediated area, by analyzing surface sediment and other media data to derive groups of indicator chemicals that correlate or tend to spatially occur together in the Anacostia River. Co-occurrence of an indicator chemical group suggests further investigation of the potential associated sources may be appropriate. The CSA successfully identified five such chemical groups of which three exhibited strong correlations and two were moderately correlated. The chemical groups selected to include in the analysis were not chosen by “pre-judgement” but because of necessity, as they were the only chemical groups available across all datasets. By design, the CSA can be supplemented with additional data (including site-specific PCES data) as it becomes available and can also be expanded to increase the capability to identify chemical signatures of sources and to establish the relative source contributions in samples.

B.3.10.6 METHODOLOGY USED IN CSA

Stakeholders expressed both support and disagreement with DOEE’s selection of the multivariate methods used to conduct the contaminant source assessment. CSX characterized the factor analysis as a high-level, preliminary screening method that should be supplemented with a more detailed assessment for identifying potential contaminant sources. Pepco and WGL believe the CSAR is methodologically flawed. CSX, Pepco, and WGL believe that the use of alternative, more sophisticated methods would improve the analysis.

RESPONSE

DOEE agrees with stakeholders that a range of multivariate statistical methods (including advanced receptor modeling) are available to support source determination. However, environmental forensics involves analysis of complex chemical data sets obtained from multiple sites, often with complicated industrial histories. As such, it is prudent to employ exploratory methods (e.g., multivariate statistics) in a hierarchical approach, where the initial phase(s) minimizes *a priori* assumptions of data distributions and source fingerprints and focuses effort on identifying the presence of contaminants throughout the study area. If the initial exploratory phase identifies the presence of correlated contaminant fingerprints that tend to spatially occur together, it may then be appropriate to focus on advanced methods to help resolve compositional questions related to contaminant fingerprints and, potentially, related source contributions.

DOEE agrees that source assessment with site-specific source data is generally desirable over a proximity-based assessment. However, for the CSA, site specific source data were not available for most PECSes. To achieve the broad objective of identifying current sources, DOEE conducted an R-Mode factor analysis (FA) for the initial exploratory data analysis phase because the primary interest was to develop an objective understanding of the spatial distribution of chemical mixtures (groups) that tend to be correlated with each other in areas along the Anacostia River. The benefits of the R-Mode FA are that it requires few critical assumptions and is also robust to variations in data preprocessing decisions (i.e., treatment of non-detects, data normalization, etc.). As indicated in the Introduction of the CSAR, the DOEE FA was designed to be as objective ("hands-off") as possible to allow the FA to identify whether the factors (calculated for each chemical group) suggest whether or not any proximal relationship to a PECS, tributary, or outfall exists. This analysis is separate and distinct from the "proximity analysis" presented in the RI Report, which relied on visual inspection of the spatial distribution of contaminant concentrations. The R-Mode FA is an objective exploratory screening tool, whereas more advanced multivariate methods, used to identify chemical composition and related contributions, require more hands-on data handling/preprocessing and need chemical composition information of source materials. The R-Mode FA is primarily a descriptive technique and is not intended to provide a basis to resolve chemical compositional questions or to differentiate sources based on mass.

While DOEE agrees with stakeholders regarding the potential utility of advanced multivariate statistical methods, DOEE believes use of the advanced multivariate methods on the datasets available to DOEE at the time the CSA was performed would have been premature. By design, the CSA can be updated with new data as additional PECS data and other data (study area media, outfall, and tributary data, etc.) become available.

B.3.10.7 CONSTITUENTS OF CONCERN IN CSA

CSX expressed concern that the CSA relied on chemicals that did not drive risk (similar to a comment on the lines-of-evidence identification of potential sources). Pepco and WGL also expressed this concern stating that the CSAR limited the list of COCs and excluded potential risk driving COCs (e.g., pesticides and dioxins) without providing justification. CSX questioned including metals in the CSA since they likely have different sourcing and fate and transport histories in comparison to organic constituents such as PAHs and PCBs.

RESPONSE

The CSA reported on three broad indicator chemical groups (based on fate and transport characteristics such as hydrophobicity, etc.) consisting of PCB congeners, parent and alkylated PAHs, and metals. These chemical groups included indicator compounds common across Anacostia River sampling locations and considered suitable (that is, unbiased and consistent in available datasets) for use in the R-Mode FA. By necessity, the FA list of indicator chemicals overlaps, but need not be confined to the list of risk driving COCs for the Anacostia River. It would not have been possible to conduct a robust FA had the list of chemicals been constrained to the limited number of risk-driving COCs (total PCB congeners, dioxin-like PCBs, dioxin TEQ, and chlordane). Constraining the dataset to just the risk driving COCs limits the diagnostic power of the FA to identify meaningful chemical signature correlations between samples.

Although these indicator chemical groups do not fully overlap with the RI COCs defined for Anacostia River sediment, they nonetheless represent the classes of compounds useful to explore which sources are active (and potentially likely to contribute to risk based COCs). With regard to including metals, the types of metals present at a PECS and their concentration profiles can vary substantially between the different sites and thus including metals increases the diagnostic power of the analysis.

B.3.10.8 PECS DATASETS SHOULD HAVE BEEN USED IN THE CSA

Pepco and WGL expressed agreement with the CSAR recommendation (Section 5.2 of the CSAR) that stated that any future analysis should include all pertinent PECS data, rather than exclude this data. CSX commented that the CSA should use the complete PECS datasets.

RESPONSE

The FA methodology that the CSA relied on requires a fully populated data matrix and that relevant potential sources are comparatively represented by the list of indicator chemicals, to the extent possible. While the integration of PECS data and site-specific data is preferred, this was not possible at the time FA was conducted. All available Anacostia River PECS datasets that DOEE had in possession at the time of the FA were reviewed for consistency and comparability. This was done to ensure that samples were analyzed under a common set of data quality objectives (DQO) and laboratory data quality assurance (QA) and quality control (QC). With the exception of one PECS dataset (Pepco), the remaining PECS datasets (available when the CSA was performed in 2018) were either missing (unavailable to DOEE), incomplete (e.g., missing dioxin data, missing pesticide data, limited metals data, etc.), or inconsistent (e.g., metals data but missing dioxin data) across the indicator compound groups. In addition to the RI surface sediment data, PECS-specific outfall and tributary datasets were reviewed by DOEE but could not be integrated in the FA because the PECS datasets were also either missing (not provided to DOEE), incomplete, or inconsistent across the indicator chemical groups. As such, using partial datasets would inappropriately introduce systematic bias to the FA.

B.3.10.9 PECS DATASETS SHOULD HAVE INCLUDED SUSPENDED SEDIMENT

Several Stakeholders (Navy, Pepco, and WGL) wanted DOEE to include suspended sediments data in the CSA and suggested the absence of these data limits the CSA's ability to adequately characterize potential sources, including upstream sources of COCs to river sediments.

RESPONSE

DOEE agrees that the suspended sediment data from the USGS Tributary Study (Wilson 2019) could have been included in the FA. However, since the FA is making comparisons to tidal river bottom sediment, integrating tributary bottom sediment was the more appropriate medium for comparison to surface sediments from the Anacostia River, but DOEE acknowledges the FA could be expanded to include suspended sediment. If this were done, however, the results of the CSA (list of potentially active sources identified) would not likely change by inclusion of suspended sediment data. Similarly, the ARSP Manhole Sediment Investigation Report documented that both grain size and organic carbon fraction (foc) were weak to moderately correlated with respect to concentrations of metals, alkylated PAHs, and PCBs. Based on this lack of correlation, including grain size and foc in the FA would likely have limited value and not change the results of the analysis.

B.3.10.10 CSA DATASET PREPROCESSING

Concern was expressed by stakeholders regarding the data preparation and preprocessing necessary for performing the FA. CSX suggested that culling of the dataset to remove chemicals with greater-than five percent non-detects (as was done in the CSAR analysis) resulted in underrepresentation of PCBs. Some concern was expressed by stakeholders regarding preprocessing assumptions. Specifically, CSX questioned why less than detection level results were treated differently for total PCB congeners in comparison to the other chemicals considered in the analysis. Pepco and WGL disagreed with the CSAR text stating that the approach used to develop the indicator list of PCB congeners based on Frame et al. 1996 is “reasonably representative” of the PCB Aroclors. In addition, Pepco and WGL disagreed with DOEE’s treatment of non-detects and wanted proof that the choice of different preprocessing methods would not significantly bias the outcome of the analysis.

RESPONSE

Data preprocessing involves the systematic transformation of raw environmental data into a unified, coherent, and usable format for data analysis. Real-world environmental data is often variable in terms of environmental risk (some constituents useful for diagnostic purposes have low toxicity) and reporting consistency (e.g., analytical method, reported compounds, reporting units, range of concentrations, detection limits, etc.). Data preprocessing is a standard statistical practice and is a necessary and proven method for resolving such issues prior to systematic data analysis.

As previously discussed, the FA requires a fully populated data matrix (no missing chemical results). Missing values were eliminated by first removing chemicals with greater than 5 percent missing values (chemicals infrequently analyzed) and then removing any rows with one or more missing values (samples with no reported chemical results). The resulting final data matrix included 203 rows samples and 73 columns (i.e., 203 surface sediment samples and 73 indicator chemicals) including 15 PCB congeners, 23 metals, 20 parent PAHs, and 15 alkylated PAHs.

One half the detection limit was used for less-than-detection level values for PAHs and metals. For any of the 209 individual PCB congeners that were less than the detection limit, however, the concentration was set to zero. The rationale for this approach was based on DOEE’s review of the dataset and broad project experience with similar datasets. Specifically, using one half the detection limit for individual non-detect PCB congeners introduces low end distortion in data signatures that artificially obscure the ability to identify real chemical fingerprints and correlated relationships. DOEE opted for the specification of zero for any of the 209 PCB congeners that were non-detect to avoid this distortion in performing the CSA.

The natural log transformation was then applied followed by normalization of the data for each chemical by calculating the mean concentration, subtracting the mean from the concentration in the given matrix cell, and dividing the result by the standard deviation (commonly known in statistics as the “Z transformation”). The Z transformation is an industry-standard practice to avoid the distorting effects of varying concentration scales, magnitudes, and ranges. Without this step (i.e., centering and scaling), chemicals detected at trace level concentrations, but important in the identification of unique groups of chemicals, would be masked by other chemicals detected at high concentrations, but that are of no toxicological relevance (i.e., common metals like iron or calcium).

DOEE accepts that the CSA could benefit from a sensitivity analysis that summarizes the effects of different preprocessing assumptions on the outcome of the FA. However, based on professional experience, if these data were subjected to other reasonable preprocessing assumptions, as suggested by some reviewers, the results would vary little for this type of descriptive analysis. As noted above, DOEE selected R-Mode FA for the CSA because it is an objective (i.e., "hands-off"), purely statistical exploratory screening tool as compared to other source identification approaches that involve manually identifying elevated concentrations for selected constituents and the trends in concentration for these constituents in proximity to potential sources.

B.3.10.11 CSA CONCLUSIONS REGARDING PECS CONTAMINATION IN RIVER SEDIMENT

Pepco and WGL commented that the R-mode FA forming the basis of the CSA did not and cannot link landside PECS sources of contaminants to contaminated river sediments except by proximity.

RESPONSE

It is important to point out that the CSA by design, is an exploratory data analysis tool used to identify potentially active contaminant source areas that, if not prioritized and mitigated as part of an early action, could prevent long term attainment of the project RAOs. The CSA identified atypical areas, relative to the average condition of the Anacostia River surface sediments that were suggestive of areas with a potentially active source(s) that may warrant further investigation. The CSA did not explicitly identify whether any specific outfall, tributary, or PECS is a confirmed source. Additionally, the multiple lines of evidence approach successfully converged with the CSA results on the general set of observations related to the identification of potentially active sources that warrant further confirmatory evaluations through the early actions phase of the site cleanup. When appropriate, the CSA can be expanded to integrate new data (PECS investigation, MDE tributary (MDE 2020), NPS tributary (JCO 2019), etc.), integrate surface water modeling results, and augment the current analysis for purposes including advanced chemical fingerprinting and contaminant source tracking.

B.3.11 PRELIMINARY REMEDIATION GOALS

River-wide sediment PRGs were developed using the comprehensive ARSP dataset, including concentrations of chemicals in fish fillets, whole fish, and surface sediment as well as measures of bioaccumulation by invertebrates and fish at various trophic levels. Establishment of numeric PRGs was foundational to the development of the ARSP Focused FS and Proposed Plan, as remedial action levels (RALs) serve to demarcate early action areas for remediation. A data-driven remediation approach requires the use of numeric PRGs to monitor the remedial progress.

B.3.11.1 PREFERENCE FOR NON-NUMERIC PRGS AND TIMING OF ESTABLISHMENT OF PRGS

NPS, and Pepco and WGL recommend that DOEE not include numeric PRGs in the Interim ROD because decision- makers should reduce uncertainty through continued data collection before establishing PRGs. Conversely, MDE supported the use of numeric goals for reduction of PCBs in fish tissue.

RESPONSE

DOEE acknowledges that final action levels in the Final ROD will be informed by additional data. The function of the adaptive management framework established in the FS is to support data-based decisions with by targeted performance monitoring before, during, and after early actions are implemented. Numeric PRGs were calculated to provide a context within which early actions could be designed and alternatives evaluated; PRGs will also serve as metrics during performance monitoring of achievement of RAOs. The exclusion of numeric PRGs from the Interim ROD would weaken the data-based decision framework that is essential to a successful remediation.

B.3.11.2 PRGS ARE CONSIDERED UNACHIEVABLE

MDE, and Pepco and WGL commented that the selected PRGs are too low to be achieved. Pepco and WGL further noted that the PCB BTV for fish tissue from the non-tidal Anacostia River (75 µg/kg) is higher than the risk-based concentration (RBC) in game fish used to calculate the sediment PRG (22 µg/kg). Pepco and WGL suggested that it is inappropriate and irrational to set sediment PRGs lower than background fish tissue concentrations (based on fish consumption) because regional anthropogenic sources of contaminants other than sediment may be contributing to background concentrations in fish.

RESPONSE

As discussed in **Section B.3.6**, the PRGs provide the basis for delineating the EAAs presented in the Proposed Plan and Focused FS. DOEE calculated RALs in several ways to evaluate how the PRGs influence the total area to be remedied and the resulting reduction in risk. These calculations identified a sediment concentration of 600 µg/kg PCBs as the optimal level at which risk is reduced and the remedial goal is achievable. As discussed in **Section B.3.1.12** of this responsiveness summary, the evaluation of whether the defined PRGs should be revised following the early actions defined in the Proposed Plan is one of the objectives of the adaptive management decision framework described in that section.

The sediment PRGs were derived using site-specific data and a food chain model that incorporates the uptake of a COC from sediment to fish. The fish tissue risk-based concentration (RBC) of 22 µg/kg was calculated using standard EPA exposure parameters at a risk level of 1E-05 and a hazard of 1, assuming consumption of the edible portion of the fish. The lowest RBC for all receptors was used to calculate PRGs for each exposure scenario, consistent with EPA guidance. The PCB RBC is based on a child subsistence angler non-cancer hazard with an ingestion rate of 21.7 grams per day. Concentrations of PCBs in game fish samples from the upper and lower tidal Anacostia River exceeded the non-tidal background concentration.

DOEE considers the PRGs (the basis of the early action levels) to be achievable. Regional ambient concentrations of COCs are accounted for in background samples. DOEE identified an error in the background fish tissue PCB concentration; the USL for total PCBs (75 µg/kg) is based on a lognormal distribution, which results in an overestimated USL that exceeds the maximum detected concentration. EPA guidance recommends avoiding such lognormal distributions when computing upper limits (EPA 2015). Table M-3 of Appendix M of the RI report correctly defaults to the maximum concentration 54 µg/kg as the fish BTV for PCBs. The selection of the maximum concentration as a BTV introduces uncertainty in the dataset. The mean and median PCB concentrations of the fish fillet samples from the non-tidal Anacostia are 26 and 23 µg/kg, respectively, suggesting that the true BTV may likely be lower. This uncertainty will be further evaluated and addressed by collecting additional fish samples throughout the Anacostia River and its tributaries.

B.3.11.3 SELECTION OF RISK LEVEL AND HAZARD QUOTIENT

NPS stated a preference for the use of an HQ of 0.1 to account for cumulative effects of multiple COCs. NPS and Navy requested further information on the PRGs presented in Table 12 of Appendix A of the River-wide FS (Tetra Tech 2019f).

RESPONSE

Section B.3.9.3 of this responsiveness summary (Human Health Risk Assessment Theme) provides the basis for the use of an HQ of 0.1. Hazards associated with fish ingestion are driven by potential exposure to PCBs. Given that the remedial footprint for all COC is dominated by PCBs, it is unnecessary to employ a THI of 0.1.

DOEE has discussed the development of PRGs and considered concerns raised by stakeholders in numerous meetings of the LCCAR, CWG, Federal Partners, and the general public, and in written responses to comments on the RI Report and other ARSP documents, as well as in other sections of this document. Draft PRGs were considered and recalculated several times based on stakeholder requests that DOEE consider alternative risk levels, fish ingestion rates, and other parameters. The lowest calculated RBC was selected for each receptor group based on cancer risk and non-cancer hazard. For the subsistence angler, the basis of the lowest RBC shifts from cancer to non-cancer at a risk level greater than 1E-06 and is instead based on the hazard of 1.

B.3.11.4 UNCERTAINTY ASSOCIATED WITH PRG DATA AND CALCULATION METHODS

NPS, CSX, Pepco and WGL, and DC Appleseed requested clarification of several inputs. CSX and DC Appleseed recommended the use of dynamic bioaccumulation models for the derivation of PRGs. Pepco and Washington Gas calculated a series of alternative PRGs based on alternative inputs for the basis of the PRGs including the RBC for fish ingestion set to fish tissue BTV. They also suggested the collection of additional data to reduce uncertainty related to the bioaccumulation and biomagnification estimates in the RI.

RESPONSE

DOEE collected and analyzed hundreds of samples to develop a comprehensive dataset for the ARSP RI. DOEE maintains that use of these data to derive sediment PRGs is appropriate and supported by the technical literature on the influence of site-specific factors on bioaccumulation. An alternative approach, which DOEE considered and rejected, is to characterize bioaccumulation in the Anacostia River using data derived from other locations with different physical, chemical, and biological properties and reported piecemeal in the literature. Reliance on non-site-specific literature-based data to estimate sediment PRGs introduces numerous sources of uncertainty relative to using purposefully collected data from the study area. Site-specific bioaccumulation results were used to calculate PRGs and incorporate the unique physical, chemical, and biological conditions in the tidal Anacostia River and thus are more representative than the default values typically used in desktop studies. DOEE established sediment PRGs at a risk level of 1E-05 consistent with the established fish consumption advisory, as discussed in **Section B.3.9**. All sediment PRGs calculated at the 1E-05 risk level are higher than the sediment BTVs calculated from the Potomac River, ensuring that DOEE recommends remediation only for sediment with concentrations of COCs greater than the BTVs. At a more conservative risk level of 1E-06, the current total PCB PRG (65 µg/kg) would default to the ARSP Potomac sediment BTV (17 µg/kg) or to an alternative non-tidal Anacostia sediment BTV (19 µg/kg), estimated in the NPS Tributary Study based on hypothetical concentrations in the for the three primary tributaries [NEB, NWB, LBC] with point sources removed). Please see the background theme response (**Section B.3.2**) for additional discussion.

DC Appleseed incorrectly commented that PRGs are based on SWACs; the opposite is true. PRGs form the basis for the maximum SWACs that define remedial action levels and early action areas as presented in Appendix A to the River-wide FS. The most rigorous statistical results were used for calculating PRGs, limits of the dataset did not allow for the use of 95 UCLs for all inputs. The basis of the Method 2 PRG calculations was not the 13 fillet samples from the 2014 fish consumption advisory (Pinkney 2014) but is based instead on the approximately 40 locations where fish tissue was collected in the Anacostia River in 2014 (Tetra Tech 2019a).

Pepco and WGL suggested that the median rather than the 95 UCL is the appropriate statistic for defining game fish tissue concentrations in the sediment PRG calculations. DOEE supports the use of the 95 UCL because it is consistent with EPA standard risk calculations for human health based on consumption of many species of fish over a lifetime. The median concentration is a narrow and unrepresentative representation of consumption of a single game fish species over a person's lifetime.

Pepco and WGL suggested that DOEE use alternative PRGs based on fish ingestion rates reported in a recently completed angler survey (QuanTech 2020) and a fish tissue RBC equal to the BTV for fish. As discussed in **Section B.3.9**, DOEE selected a 65 g/day adult subsistence angler FIR to reflect local angler surveys (Gibson and McClafferty 2005). Pepco and WGL calculated a PRG based on an FIR of 41.1 g/day. NPS suggested an FIR of 107 g/day. DOEE evaluated the merits of alternative FIRs, RBCs, and angler studies suggested by stakeholders at meetings of the LCCAR, CWG, and Federal Partners meetings. As discussed in **Section B.3.11.2,** Pepco and WGL suggested that the PCB sediment PRG be recalculated by substituting the fish tissue BTV (54 µg/kg) for the fish tissue RBC. DOEE compared the suggested alternatives with the method used in the ARSP RI, as shown in **Table B.3.11.1** below. DOEE's selected sediment PRG (65 µg/kg) is supported by both the EPA calculator and the background fish concentration data; use of the site-specific fish ingestion rate further strengthens this selection.

Table B.3.11.1 Range of PCB Sediment PRGs Considered

Report	Risk Based Concentration (g/kg)	Notes on Calculation of RBC	Fish Ingestion Rate (g/day)	Fish Ingestion Rate Reference	PRG (g/kg)
AECOM (2020)	13.7	RBC estimated using EPA calculator	41.1	Quantec (2019)	104
Tetra Tech (2018)	54	Maximum background concentration in game fish substituted for RBC	65	Gibson and McCafferty (2005)	157
Tetra Tech (2018)	22	RBC estimated using EPA calculator; median and mean background game fish concentrations are 26 and 23 µg/kg, respectively	65	Gibson and McCafferty (2005)	65
NPS (2016)	35.7	RBC estimated using EPA calculator	107	NPS (2016)	40

Notes

µg/kg microgram per kilogram
g/day gram per day
PRG Preliminary remediation goal
RBC Risk based concentration

Sources of uncertainty in the back-calculated sediment PRGs result from measures of bioaccumulation and biomagnification. Rather than rely on generic literature-based values and modeled simulations of bioaccumulation, DOEE collected field samples and conducted in-situ studies to measure bioavailability and bioaccumulation potential in invertebrates and fish. Field studies integrate numerous site-specific variables and provide a higher degree of confidence in the sediment PRGs. As discussed throughout the River-wide FS and Proposed Plan, these sources of uncertainty will continue to be refined during the post-remediation monitoring (via the PMWP discussed in **Section B.3.1**) governed by an adaptive management framework. DOEE is supporting ongoing studies to reduce uncertainties associated with the transfer of contaminants from sediment to fish. The baseline and performance monitoring studies described in **Section B.3.1** will support real-time data-driven decisions on future remedial actions.

B.3.11.5 INCORPORATION OF NEW DATA INTO PRG CALCULATIONS

USFWS and DC Appleseed recommended the inclusion of the 2018 fish consumption advisory study (Pinkney 2018) in the calculation of PRGs. Pepco and WGL recommended revision of PRGs using alternative FIRs and forage fish data collected by USFWS (Pinkney et al. 2020).

RESPONSE

DOEE evaluated the effect of including the 2018 fish consumption advisory dataset on the HHRA and PRGs, as discussed in **Section B.3.9.2**. The inclusion of the 2018 data did not change the overall risk conclusion that unacceptable human health risk is associated with consumption of fish contaminated with PCBs. The PRG calculations incorporate measures of bioaccumulation in fish from the tidal Anacostia River, not regional game fish fillet concentrations. Because the PRGs are not derived from concentrations of COCs in game fish fillets, inclusion of the newer fillet dataset does not lead to changes in the Focused FS or Proposed Plan. Game fish fillet concentrations in samples collected from the tidal Anacostia River were evaluated in the HHRA. Whole body fish tissue concentrations and fillet-to-carcass ratios of fish from the non-tidal Anacostia River were used to support sediment PRG calculations. DOEE also evaluated the merits of alternative angler surveys, as discussed in **Section B.3.11.4**. Results of the forage fish whole-body study (Pinkney and Perry 2020), which became available after the Focused FS and Proposed Plan were issued, will be considered during the baseline and post-remediation performance monitoring, as described in the forthcoming PMWP.

B.3.11.6 REVISION OF SEDIMENT PRGS

The Navy recommended deleting the phrase re-evaluation of sediment cleanup goals “as a last resort.” Pepco and WGL noted that the Interim ROD should clearly state DOEE’s intention to revise sediment remediation goals as part of adaptive management.

RESPONSE

Sediment PRGs established in the River-wide FS Report may be updated as new results become available from baseline, confirmatory, and performance monitoring studies to be performed in accordance with DOEE’s forthcoming PMWP. DOEE will evaluate the effectiveness of the early actions and subsequent remediation using an adaptive management framework to measure progress toward RAOs. PRGs may be adjusted at a later date, if warranted by changes in site-specific conditions or assumptions underlying the RAOs. Please see **Section B.3.1** (Adaptive Management Theme) for additional discussion.

B.3.11.7 COMPARABILITY TO OTHER SEDIMENT PROJECTS

DC Appleseed and several members of the public requested a comparison of ARSP sediment PRGs with cleanup levels established for other river sediment projects.

RESPONSE

DOEE’s selection of 65 µg/kg PCBs as the sediment PRG is within the range of cleanup levels established at other large sediment sites across the country. Sediment PRGs and cleanup levels for large river remediation projects range widely, reflecting highly varied site-specific conditions that influence bioavailability of COCs, exposure to humans via fish consumption, and risk. For example, the tribal subsistence angling population evaluated in the Lower Duwamish has a higher than average seafood consumption rate, driving the sediment PRG lower (EPA 2014a). At Portland Harbor, EPA proposed tissue PRGs as the most direct measure of risk to resident consumers of fish and shellfish, establishing cleanup levels for adults based on a 1E-05 target risk level. At this site, background concentrations of PCBs in fish require consumption advisories. Numerical sediment PRGs from other large river sites are shown in **Table B.3.11.2**.

Table B.3.11.2 PCB Cleanup Levels at Other River Sediment Sites

Site	Sediment PRG/Cleanup Level (·g/kg)	Basis of Sediment PRG/Cleanup Level	Reference
ARSP	65	Consumption of fish (65 g/day)	Interim ROD (2020)
Portland Harbor, OR	9	Background	ROD (EPA 2017)
Lower Passaic, NJ	50	Consumption of 56 fish meals per year	ROD (EPA 2016)
Lower Duwamish, WA	2	Background, 95 UCL, Puget Sound, USACE Study	ROD (EPA 2014a)
Middle River, MD	195	Background, Upper Chesapeake Bay site wide average	Tetra Tech (2013)
Grasse River	1,000	Action level for capping sediment; fish consumption remedial goal of 10 µg/kg in edible fish for Mohawk Community	EPA (2013)
Fox River- OU1, OU2	250 250-1,000	Post Remedy SWAC based on sediment quality threshold RAL- specific to river reaches	ROD (WDNR EPA 2002)

Notes

µg/kg microgram per kilogram
g/day grams per day
OU Operable unit
RAL Remedial action level
SWAC Surface weighted average concentration

As discussed in the River-wide FS, Proposed Plan, and previous sections of this document, the sediment PRGs derived for the ARSP are supported by site-specific data and the proposed remedial alternative is protective of human health and the environment. The remedy will reduce SWAC concentrations of COCs in sediments in the study area, which is expected to reduce site-related risk to less than 1E-05. DOEE will evaluate the effectiveness of the remedy through performance monitoring and propose additional actions, as warranted, within the adaptive management framework.

B.3.12 REMEDIAL ACTION OBJECTIVES

RAOs serve as the design basis for the remedial alternatives evaluated in the River-wide FS and Focused FS. RAOs are meant to be as detailed as possible without limiting the range of possible remedial alternatives. The same set of RAOs defined in the River-wide FS also apply to the early actions documented in the Proposed Plan. The RAO Theme addresses the potential for modification of RAOs during the Interim ROD, the potential risks from contaminants present in fringe sediment, questions regarding the capability to protect fish through the remediation of bioaccumulative chemicals, and comments on the identification of Applicable or Relevant and Appropriate Requirements (ARARs).

B.3.12.1 DEGREE OF SPECIFICITY IN RAOS FOR THE INTERIM ROD

DC Appleseed commented that the goal of reducing risk was insufficient and that RAOs should define the level of risk DOEE considers acceptable (for example, 1E-05) as presented in the River-wide FS.

The Navy recommended incorporating uncertainty more directly into statements about how remedial alternatives are expected to satisfy the RAOs without specifying a numerical target. The Navy also suggested that uncertainty be reflected in the expectation that all preferred alternatives described in the Proposed Plan are expected to achieve or contribute progress toward achieving river-wide RAOs.

MDE suggested that numerical goals for PCB concentrations in fish filets be added to the RAOs and that the anticipated time lag between remediation and reduction in fish tissue concentrations be acknowledged. The reviewer pointed out that PCB concentrations may be reduced in small resident fish as a result of early actions, but observable reduction in PCB concentrations in game fish may take decades.

USFWS requested clarification on the role of surface water in the RAOs.

RESPONSE

Stakeholder opinions on the appropriate degree of specificity in RAOs differed widely. RAOs provide a general description of what the cleanup will accomplish and serve as the design basis for the remedial alternatives developed in the River-wide FS. The rationale and specificity of the RAOs were discussed with stakeholders during numerous meetings of the LCCAR, CWG, and Federal Partners Meetings, and at several community meetings open to the general public. The RAOs were presented and discussed in written exchanges of comments and responses on the River-wide FS and Focused FS Reports. DOEE developed RAOs in accordance with EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA 1988), which specifies that RAOs should be as detailed as possible without limiting the range of possible remedial alternatives. RAOs are medium-specific or site-specific goals designed to protect human health and the environment. Numeric PRGs (presented in Appendix A to the River-wide FS) provided the technical foundation for the Focused FS, the Proposed Plan, and the Interim ROD, and are considered sufficiently specific and consistent with guidance. DOEE agrees with MDE and others that game fish tissue concentrations are unlikely to respond immediately to sediment remediation. Long-term post-remediation performance monitoring will be designed to track changes in fish tissue concentrations so that achievement of the RAO can be evaluated within the context of natural life cycles of fish and their prey in the wild.

Although surface water will not be remediated directly, it is one of the key indicators for assessing progress toward the RAOs, along with game fish fillet tissue, forage fish whole body, benthic invertebrate tissue, surface sediment pore water, and surface sediment. DOEE studies and models have shown that contaminants are in flux between bed sediment, pore water, suspended sediment, surface water, and animal tissues in the study area, as expected, based on other general models and empirical data reported in the literature.

B.3.12.2 SUITABILITY OF RIVER-WIDE RAOS FOR THE FOCUSED FS AND INTERIM ROD

Pepco and WGL commented that measurable, physical RAOs specific to the early actions should be developed for the Focused FS to demonstrate that early actions were successfully completed as designed. Suggestions included reducing exposure and contaminant transport in a specific EAA.

DC Appleseed commented that study-area-wide achievement of the river-wide RAOs, particularly RAO 1 (fish consumption), cannot be assessed given the limited extent of the early actions. MDE made a similar comment about concentrations of PCBs in game fish filets.

RESPONSE

DOEE considered the widely divergent viewpoints of numerous stakeholder groups during the development of the RAOs in the River-wide FS, which were then appropriately applied to the Focused FS and Proposed Plan. Although the spatial extent of the early actions is limited, the actions are designed to make progress toward DOEE's overall goals of reducing contaminant concentrations in sediment and fish so that the tidal Anacostia River is fishable and swimmable. As described in **Section B.3.1** (Adaptive Management), DOEE's Performance Monitoring Plan will integrate studies of sediment, surface water, and fish to document baseline (pre-remediation) conditions, refine EAA boundaries, track and control upstream sources, and monitor changes to risk levels in preparation for issuing the Final ROD. Interim actions are not required to meet the final RAOs identified for the entire site, but the interim actions should not be inconsistent with or preclude implementation of the final remedy. RAOs may be adjusted as necessary to reflect changing conditions at a site, consideration of additional data, and other new information.

The HHRA identified risk to people who eat contaminated fish from the tidal Anacostia River, which reinforced the results of the regional fish consumption advisory that has been in place in the District since 1980. Concentrations of harmful chemicals in fish can be reduced by limiting the amount of chemicals in their environment (sediment, water, and prey). The early actions described in the Proposed Plan are designed to reduce the exposure of fish to harmful concentrations of bioaccumulating chemicals in the sediment. Additionally, the aquatic invertebrates and smaller fish that are eaten by game fish bioaccumulate contaminants from the sediment in the Anacostia River. The remedial actions in the Proposed Plan will reduce sediment concentrations of PCBs and other bioaccumulating chemicals in the EAAs, thus reducing the amounts of contaminants available to the invertebrates and forage fish that the game fish eat. The movement of contaminants from sediments through prey to game fish is complex and influenced by many environmental variables (movement of fish in and out of the Anacostia River, life span of game fish, seasonal availability of prey types, contaminant fluxes caused by sediment disturbance, seasonal and annual variability in inputs from tributaries and outfalls, etc.). Therefore, DOEE acknowledges that it may take some time for the cumulative effects of source control and sediment remediation to become evident in game fish tissue concentrations, as discussed in **Section B.3.12.1**. DOEE is currently supporting independent studies of the processes of bioaccumulation in forage fish and mussels to better describe these contaminant transport mechanisms in the study area. Concurrently, DOEE is actively working to control sources of new contaminants to the tidal Anacostia River.

B.3.12.3 RISK OF EXPOSURE TO FRINGE SEDIMENT

MDE and other reviewers pointed out that the RAO addressing human contact with fringe sediment has already been met at the 1E-05 risk level and suggested that RAO 2 be eliminated from the Focused FS and Proposed Plan.

RESPONSE

Human contact with fringe sediment does not pose a risk at the 1E-05 risk level; therefore, RAO 2 was eliminated from the Interim ROD.

B.3.12.4 SUGGESTED CHANGES TO RAO 4 – RISK TO FISH

Pepco and WGL commented that RAO 4 (protection of fish) was not necessary because no direct link to risk from bioaccumulative chemicals was presented in the BERA.

Conversely, USFWS commented that risk to fish was underestimated in the BERA and recommended incorporation of a new study on the toxicity of PCB body residues in fish (Berninger and Tillitt 2019).

Anacostia Riverkeeper commented that the BERA should more thoroughly incorporate existing data on the relationship of fish tumors to sediment contamination in the tidal Anacostia River.

RESPONSE

DOEE has considered the comments of stakeholders with diverse perspectives on the relevance of bioaccumulating COCs to the health of fish in the Anacostia River. As discussed above, fish are exposed to contaminants within a dynamic tidal and seasonal environment where bioavailability of chemicals in sediment, water, and prey are highly variable over time and location in the river. The ARSP RI documented bioaccumulation of COCs in invertebrates and fish in the tidal Anacostia River and risk to people consuming game fish from the river.

Achievement of RAO 4 is based on addressing risks to humans from fish consumption by reducing the concentrations of COCs in surface sediment that were demonstrated to bioaccumulate in fish. Based on data reported in Berninger and Tillitt (2019), concentrations of PCBs in whole fish indicate the potential for adverse effects on survival, growth, and reproduction (see **Section B.3.4.4**). Additionally, tumors in resident brown bullhead have been causally linked to PAHs in river sediments (see **Section B.3.4.13**). Other COCs identified in the RI co-occur with PCBs in surface sediments in specific locations in the river. Therefore, early actions in the Proposed Plan focus directly on reducing exposure of fish to PCBs in the EAAs while concurrently reducing exposure of fish and invertebrates to other bioaccumulating chemicals.

B.3.12.5 ARARS

NPS requested that solid waste disposal regulations be changed from "applicable" to "relevant and appropriate." NPS requested that the 1918 statute that established Anacostia Park be added.

Pepco and WGL noted that some of the ARARs in the River-wide FS do not apply to the early action and that the Proposed Plan should include ARARs specific to the proposed early actions. For example, the NPS Organic Act should not be used to screen out remedial action alternatives in the Main Stem (Alternative 3).

RESPONSE

The early actions selected in the Interim ROD include off-site disposal at a disposal facility. Since disposal of the waste will occur off-site, ARARs are not identified (ARARs apply to on-site actions). Off-site actions must comply with all independently applicable requirements. Independently applicable requirements cannot be waived, and the remedy must comply with all components (both substantive and procedural) of the independently applicable requirements.

DOEE has selected several NPS requirements as ARARs and TBCs, including the NPS Organic Act, the General Authorities Act, and the NPS Management Policies 2006. DOEE also will include the 1918 Act (Pub. L. No. 65-208) in the Location-Specific ARARs table as an ARAR.

DOEE agrees that some of the potential ARARs identified in the River-wide FS do not apply to the early action. ARARs that were pertinent to the early action are selected and included in the Interim ROD.

B.3.12.6 STUDY AREA BOUNDARY

The Sierra Club commented on the boundaries of the RI/FS, noting that the ARSP excluded groundwater and soil. This reviewer also suggested that DOEE undertake additional analyses of contaminant fate and transport in the river system to measure attainment of beneficial uses of the river.

A member of the public asked whether wading will be considered along with swimming and fishing in the evaluation of post-remediation uses that are safe for the public.

RESPONSE

The ARSP study area was set during the development of the initial Work Plan in 2014. The study area extends from bank to bank of the tidal Anacostia River, excluding groundwater and soil, because these landside areas are addressed largely by other parties under separate investigatory programs reviewed and/or led by DOEE. As part of their review, DOEE recommends that methods and interpretive protocols at the landside sites be consistent and integrated with the ARSP to the extent practicable. DOEE has undertaken separate studies of contaminant sources in the watershed outside the borders of the study area (e.g., USGS Tributary Study [Wilson 2019], passive sampler and mussel study [Ghosh et al. 2019]) and reviewed studies by other parties (e.g., JCO 2019) to provide an interpretive framework for the ARSP RI/FS. Post-remediation monitoring studies may include analyses of fate and transport of

COCs in the river system and bioaccumulation studies, as appropriate. DOEE's overarching goal is to make the tidal Anacostia River fishable and swimmable, which includes wading, kayaking, and other forms of direct contact with the river. Wading in the tidal Anacostia River currently poses no unacceptable risk or health hazards.

B.3.12.7 FUTURE RESTORATION

DC Audubon Society commented that Kingman Lake and surrounding shoreline should be remediated and restored beyond what is envisioned in the Focused FS and Proposed Plan.

RESPONSE

Following implementation of the Final ROD, Kingman Lake and the surrounding shoreline is expected to be suitable for restoration activities and will be evaluated under the Natural Resource Damage Assessment (NRDA) process for the Anacostia River. DOEE has already implemented several restoration projects in Kingman Lake (e.g., mussel restoration, wetlands restoration) and is developing additional restoration plans. While the Interim and Final ROD are focused on remediation, DOEE is working with stakeholders to implement post-remediation restoration efforts. DOEE welcomes the opportunity to discuss future restoration plans with environmental stewards and stakeholders.

B.3.13 PUBLIC COMMUNICATION

The public communication theme addresses comments related to public meetings and outreach, stakeholder engagement, and the public comment process itself. The public communication theme includes the subset of comments that pertain to DOEE's interactions with the public regarding progress achieved, technical challenges encountered, and decisions made for the ARSP.

B.3.13.1 COMMITMENT TO CLEANUP

Stakeholders expressed appreciation for DOEE's commitment to involving the public in the RI/FS and the development of the Proposed Plan. Three members of the public expressed appreciation and support for DOEE moving forward with cleanup of the Anacostia River, which was described as a great river and one that is urgently in need of cleanup. Another stakeholder, who requested additional information about ARSP documents during the public comment period, was appreciative of the level of detail received in responses prior to the end of the comment period.

RESPONSE

DOEE is committed to continued community engagement and involvement in the ARSP and, more immediately, development of the Proposed Plan and Interim ROD. Stakeholders in the project are critical to the success of the ARSP. In accordance with the National Contingency Plan (40 CFR 300.430(c), DOEE has prepared and updated a Community Involvement Plan (CIP)for the ARSP. The CIP can be found in the ARSP Administrative Record [22] and describes

[22] www.anacostiasedimentproject.com/library

the community involvement activities that DOEE planned for the ARSP such as posting this Responsiveness Summary on the ARSP website, releasing periodic factsheets about the project for the public, and updating the ARSP website and the Administrative Record with project milestones.

B.3.13.2 FUTURE PUBLIC PARTICIPATION

Several stakeholders indicated that additional time beyond that allotted by DOEE was needed to review the March 2018 RI Report, the December 2019 resubmission of the RI Report, and the Proposed Plan and supporting documents. Multiple commenters requested that DOEE continue public participation via future Leadership Council for a Cleaner Anacostia River (LCCAR) meetings and public updates for project milestones (whether via meetings, email, or the website). Several members of the general public made recommendations for future public participation in the remediation process through residential restoration organizations and public outreach about topics like fish consumption and hotspot remediation. Another member of the public asked about the response to comment process and whether there will be future opportunities for comment.

RESPONSE

DOEE has demonstrated a commitment to community involvement since the outset of the ARSP and will continue to engage with the public by providing updates to the Community Involvement Plan, the ARSP website,[23] and the Administrative Record. DOEE will continue to provide updates to these resources to ensure the public is informed throughout the process. Once the Interim ROD has been completed, updates will be made to community outreach documents to ensure that they are consistent with the Interim ROD. DOEE will make resources and information available to the public and community organizations at key project milestones and decision points, such as any possible future ROD Amendments.

In response to requests for additional time for the public review period for the Proposed Plan, DOEE extended the review period from 30 days to 64 days as specified in the NCP [40 CFR § 300.430(f)(3)(i)(C)]. In addition, updates to the Administrative Record have been made to include documentation requested by commenters during the public comment period.[24] After this Interim ROD is signed and the selected remedy is constructed, DOEE will continue to implement the actions in the CIP as well as continue to share information with the Leadership Council for a Cleaner Anacostia River.

[23] www.anacostiasedimentproject.com

[24] DOEE responses to DC Appleseed and Washington Gas-Pepco are available in www.anacostiasedimentproject.com/library.

B.3.13.3 CONSIDERATION OF COSTS

One member of the general public recommended that the costs of cleanup should be carefully considered because of the potential for increased expense shared by Washington, D.C. residents.

RESPONSE

The River-wide FS provides estimated cost information for each of the remedial alternatives, with the intent that cost of the selected remedy is weighed alongside other factors affecting the river and the community.

B.3.13.4 RECOMMENDATIONS FOR ADDITIONAL LEVEL OF DETAIL

Several commenters requested specific changes or additions to ARSP documents. One commenter recommended incorporating into the River-wide FS Report a discussion about community demographic information and the impacts of hazardous substances in the river on potentially vulnerable populations. Another stakeholder commented that the Proposed Plan was too high-level and did not go into the technical detail needed to meaningfully inform the public. A recommendation was made by one commenter to update the Proposed Plan to include information in the introduction to direct readers to other relevant documents where additional detail and discussion of relevant supporting topics could be found. Another group requested that the River-wide FS report be updated to include a clearer distinction between the PRGs and remedial action levels RALs.

RESPONSE

DOEE has incorporated stakeholder input during the development of ARSP technical documents. DOEE has considered suggested revisions and analysis, such as the specific demographic profile of Anacostia River neighborhoods and the impact of the river on vulnerable populations. The RI/FS has followed the CERCLA process and incorporated human health risk analysis for the key receptors and populations. While discussion of additional topics of concern are important to DOEE and its community partners and the public, the documentation included in the RI/FS and incorporated into the Administrative Record complies with the CERCLA process.

So that environmental stakeholders would have better access to expertise when evaluating the many very technical documents developed in support on the ARSP Proposed Plan, DOEE provided grant funding for document review, following the model of U.S. EPA funding for Community Advisory Groups (CAGs) at CERCLA sites. DC Appleseed[25] (DCA) was awarded a document review grant in February 2018 to hire one or more technical consultant(s) to help DCA, as well as environmental and community organizations and the general public, to better understand the various technical documents being prepared under the ARSP. This grant has enabled DCA to access technical expertise until at least the Interim ROD is released. To further

[25] https://www.dcappleseed.com/

assist DOEE in fulfilling some of its community engagement goals under the ARSP, an amendment to this grant was issued in May 2019 that requested DCA engage with the general public in difficult to reach neighborhoods in the Anacostia Corridor. DCA engaged Community Ambassadors (CAs) to assist with outreach around the ARSP.

In accordance with CERCLA, the Proposed Plan is intended to be a high-level summary of the path forward and is not intended to provide comprehensive technical detail related to the plan. The River-wide FS and the Focused FS provide the analysis of remedial technologies and costs for consideration by stakeholders and the public. Specific clarification of key points, such as the distinction between PRGs and RALs, is available in this documentation and were addressed by DOEE technical staff during public meetings such as those held in January and February 2020.

B.3.13.5 ADHERENCE TO CERCLA PROCESS

Another commenter expressed concern that the RI/FS process followed by DOEE is not consistent with Superfund, because the results of the RI did not reach consensus among stakeholders prior to the completion of the FS. This commenter further expressed concern that data collected for the RI may not have been considered fully. One community stakeholder group expressed concern that confusion among stakeholders exists regarding the relationship between the Interim and Final RODs, and whether a Final ROD would eventually be issued.

RESPONSE

DOEE will continue to follow the CERCLA process through the construction of the remedy selected in the Interim ROD. Using adaptive management and the performance monitoring process described in **Section B.3.1.8**, the DOEE will determine whether additional remedial action will be needed. If so, DOEE will repeat this process of community involvement described in the Community Involvement Plan in that future decision.

B.3.13.6 UPDATES TO ADMINISTRATIVE RECORD

A stakeholder requested that responses to comments made before the end of the public comment period be included as part of the ARSP Administrative Record.

RESPONSE

In coordination with the Interim ROD, DOEE will issue a public notice through the Administrative Record and announcements to the local media and project stakeholders. In addition, DOEE plans to continue prioritizing community and stakeholder involvement in the project through the following activities (among others):

1. The Administrative Record will stay open and will be updated with future remedial action decisions.
2. Updates on how the interim remedy is progressing will be posted to the Administrative Record at anacostiasedimentproject.com/library.
3. The website will be regularly updated regarding future actions by PECSes and other project stakeholders.

B.3.14 REMEDIAL ALTERNATIVE SELECTION

The purpose of the remedial alternative selection process is to identify, screen, and evaluate remedial alternatives to address sediment exceeding the RAL for either the project area in its entirety or the EAAs discussed in the Focused FS and documented in the Interim ROD. The remedial action screening process was prepared consistent with EPA and DOEE guidance and methodologies. The comments received on remedial action selection fall into eight general categories: general comments regarding remedial screening, institutional controls (ICs), MNR alternative evaluation, EMNR alternative evaluation, sediment caps, consideration of dredging in remedial alternative identification and screening, costing of alternatives, and beneficial use. Stakeholder comments on the development, screening, and costing of remedial alternatives for the ARSP study area as a whole (as documented in the River-wide FS Report) and for the subset of the study area represented by the EAAs (as documented in the Focused FS Report) are included in this theme.

B.3.14.1 GENERAL COMMENTS REGARDING REMEDIAL SCREENING

Several commenters (Navy, NPS, Anacostia Watershed Society and others) requested additional details pertaining to the River-wide FS and Focused FS. Such details included defining locations of staging areas, accounting for potential climate change-related changes, and considering other infrastructure projects within the immediate project area that could influence screening and evaluation results. A number of private citizens requested that the Focused FS consider the appropriateness of post-remedial conditions for the future use of the site.

RESPONSE

Staging areas are available for dewatering and dredged materials management for the remedial scenarios evaluated in the River-wide FS and the Focused FS. The Focused FS remedies generally require less land area for staging than the River-wide scenarios because of their limited scope. Most of the available land area in proximity to the planned work areas is owned by public entities such as the District or the NPS. At this time, no areas are known to be inaccessible. However, DOEE expects that access negotiations will be required and that these negotiations will occur during the design phase.

Federal, state, and local permits will be required to implement the selected remedial action. These permits would address activities such as the placement of fill (cap material) in the river, construction in a floodway, removal and replacement of wetland areas, and discharge of treated water generated from sediment dewatering activities. The permit application process will occur during the design phase.

The remedial screening process in the River-wide FS included an evaluation of climate change and its impacts on the long-term performance of the remedial alternatives (see the ARSP Surface Water Model Report, Attachment 2 [“100-Year Storm Conditions”], Section 2.3 [Tetra Tech 2019b]). The evaluation focused on severe storm potential to resuspend sediment and to disturb capping, ENMR, and beneficial use remedies. Additional discussion of the storm conditions considered in the River-wide FS is provided in the **Section B.3.7.15**. The results did not identify significant degradation of any of the proposed remedies in any OU due to climateinduced extremes. The ARSP Surface Water Model (Tetra Tech 2019b), which was developed in tandem with the River-wide FS, also evaluated ambient sedimentation rates and the potential for re-contamination of remediated areas in the Main Stem, Kingman Lake, and Washington Channel. Annual sedimentation rates were determined from the model and then assigned to the Thiessen polygons developed during the RI to evaluate natural sequestration as remedial alternative component. Sedimentation thickness was then developed in Section 6 of the River-wide FS Report and evaluated at the 10, 20, and 30-year periods. Since sedimentation rates are subject to some uncertainty, the early cleanup actions and adaptive management process documented in the Interim ROD will foster remedy refinement, which will effectively address this uncertainty. In the Focused FS, a thickness of 12 inches was selected as sufficient to provide a biologically active layer as well as account for loss from erosion and bioturbation. Areas with scour would not be considered suitable for either MNR or EMNR.

As noted above, the ARSP Surface Water Model evaluated severe weather event impacts on remedial alternatives, particularly the capping and beneficial use options. The results showed no significant degradation in alternative effectiveness with minimal changes in the sediment elevation after the storm event. Additional, more refined modeling and analysis will be conducted for the selected remedy during the design phase to confirm long term remedial alternative performance under a range of expected site conditions.

Infrastructure in proximity to planned remedial activities will be considered during the remedial design process and the design will include infrastructure protection and coordination with future development. Site-specific requirements such as minimum water depths in high use areas, such as near The Wharf (a development located along the eastern shoreline of Washington Channel), will be refined with local stakeholder input during the design phase. This coordination may result in modest adjustments to a remedial design, such as additional dredging to maintain minimum depths or modifying the cap layers to limit disturbance from vessels. The scope for the Interim ROD early actions does not include any improvements to existing infrastructure, such as the seawalls along the Anacostia River or Washington Channel. Seawall modification and replacement is evaluated in the River-wide FS as part of the beneficial use alternatives. Beneficial use of the dredged materials was discussed in the River-wide FS and proposed beneficial use areas were identified based on the anticipated volume of dredged material and nearby available space (beneficial use is not currently considered for the Interim ROD early actions). For future actions that include beneficial use, sediment identified for beneficial use will be characterized to confirm it meets the physical and chemical requirements to the intended use. If capacity for beneficial use becomes limited, some sediment may have to be redirected either to beneficial use in other, more non-site-related areas or to off-site disposal.

All remedial alternatives were evaluated against seven of the nine NCP evaluation criteria. The two modifying criteria, state acceptance and community acceptance, are addressed through the consideration of public feedback provided during the public comment period. Although some commenters requested additional evaluation criteria, no additional categories can be added to the NCP criteria. DC Appleseed requested additional discussion on how risk reduction was considered. Risk reduction was considered in the short-term and long-term effectiveness evaluation categories and is described in the Focused FS, proposed plan, and the Interim ROD. Selection of the target risk for the interim actions is discussed in **Section B.3.9.3**.

The evaluation of the same remedial alternative may vary between areas in the River-wide FS or the Focused FS because of site-specific conditions, such as site access, volumes of materials required or generated, and contaminant concentrations. Several commenters (DC Audubon Society, Pepco and WGL, and several private citizens) noted confusing text in the evaluation of WC alternatives in the Focused FS. The text that was the source of this confusion was clarified in the Interim ROD.

The River-wide FS describes the scope and cost of a river-wide cleanup based on the best currently available data to achieve RAOs on a river-wide basis. The River-wide FS will serve as a baseline during the performance of interim measures within the adaptive management process. Combined with data gathered during execution of the Proposed Plan cleanup actions, the results of the River-wide FS will be used to inform any subsequent actions to maintain a holistic approach to achieving the sediment RAOs.

B.3.14.2 INSTITUTIONAL CONTROLS

NPS provided several comments questioning the role institutional controls would play during the Interim ROD period (after the early actions but before implementation of the remedy defined in the Final ROD) and whether the ability to maintain or manage these controls may influence screening and selection of one or more remedies. NPS provided several comments requesting more detail on the types of ICs to be used in conjunction with the primary remedial measures evaluated in the ARSP OUs. NPS also requested confirmation that the ICs evaluated comply with applicable ARARs and would not impede the ability of NPS to manage NPS property peripheral to the study area for its intended use.

RESPONSE

As defined in EPA’s guidance on institutional controls (OSWER Directive 9355.0-89, December 2012), ICs are typically administrative or legal restrictions and they “help to minimize the potential for exposure to contamination and/or protect the integrity of a response action.” For this Interim ROD, the objective of ICs will be to minimize disturbance to a remedy from human activity. For example, the final remedial design may require prohibitions on dredging or may delineate reduced wake areas. Institutional controls may also be implemented to reduce other potential contaminant sources to the ARSP study area and mitigate the potential for re-contamination of remediated areas. Examples could include the implementation of ordinances, regulations, or advisories that minimize the releases from potential contaminant sources. Procedures for maintaining and managing ICs are well-established for CERCLA sites and are documented in Institutional Control Implementation and Assurance Plans (ICIAP) written as part of the remedial action plan. In this case, the ICs included as part of the remedial alternatives do not adversely change the remedy screening and selection process.

ICs reduce the potential for human exposure to contamination by establishing appropriate land or resource use. Both CERCLA and the NCP support the use of institutional controls as part of the remedial alternative at sites as necessary to protect human health. The objective of administrative ICs is the maintenance of existing and installed engineering controls in good condition, limitation as necessary of future land or water uses that could impair the engineering controls, and prevention of human and biota exposure to residual surface and subsurface hazards. These objectives can be accomplished by updating the District land use plan to restrict land or on-water uses that may interfere with remedies such as sediment caps. The District would also work closely with NPS and USACE since each agency has regulatory authority in the study area. ICs will not impair the use of federal park land bordering the study area or use of the FNC.

B.3.14.3 MNR EVALUATION

Comments pertaining to MNR focused on how DOEE determined which river locations benefited the most from applying MNR to reduce risk. Comments (from the Navy and DC Appleseed) questioned the application of the MNR and EMNR (discussed in next section) design criteria, specifically the selection of the proposed 12-inch cap for MNR areas.

The reviewers requested additional details justifying the selection of the thickness threshold. Some believe that the screening threshold is too thick while others commented that it is too thin. Several stakeholders (Pepco and WGL) questioned whether the surface water model was sufficiently calibrated to support MNR and EMNR evaluations.

RESPONSE

A critical factor that DOEE considered when choosing MNR for a particular area was the amount of clean (natural) sediment that could be expected to cover the affected area and the rate at which the sediment will build up. Areas with a predicted deposition of 12 inches of natural sediment over a 20-year period were considered viable locations to use MNR. A 20-year planning horizon was selected as reasonable for sediment accumulation (based on the Anacostia River Surface Water Model) and for evaluation through adaptive management. The analysis also looked at deposition at 10 and 30-years, with less area considered viable for MNR at 10 years and more at 30 years. The default thickness of 12 inches is equivalent to the thickness of the actively placed sediment cap. As additional information is gathered concerning sedimentation during the adaptive management process, the assumptions and relative feasibility of MNR versus other alternatives will be re-evaluated in future phases of work on the Anacostia River after implementation of the interim measures proposed in the Interim ROD.

As discussed in **Section B.3.7**, the ARSP Surface Water Model was sufficiently calibrated to support the evaluation of remedial alternatives in the River-wide FS and the Focused FS. Sedimentation rates in the Main Stem, Kingman Lake, and Washington Channel were assessed using the model concurrently with the performance of the River-wide FS. Annual sedimentation rates were then used to evaluate MNR and EMNR as remedial alternatives. Thin sand caps were eliminated from consideration in the Main Stem or Washington Channel because the low predicted rates of natural sedimentation would limit the ability of this alternative to meet the remedial objective. Using hypothetical time periods of 10, 20 and 30 years, sedimentation thicknesses were also evaluated in the various areas of the ARSP to determine if sediment scouring would occur in the area. Areas with scour would not be considered suitable for either MNR or EMNR.

Areas where MNR is used will be monitored to verify the anticipated natural processes are working as anticipated.

B.3.14.4 EMNR EVALUATION

Comments pertaining to EMNR technologies focused on how DOEE determined which river locations benefited the most from applying this technology to reduce risk. As with MNR, commenters questioned EMNR design criteria, specifically the selection of the 6-inch thick cap for EMNR areas.

RESPONSE

For areas where ENMR was deemed suitable, the River-wide FS evaluated the placement of sand supplemented by natural sedimentation. Sand covers have been used extensively to address sites with sediment contamination comparable to the Anacostia River including the Fox River in Wisconsin and the Middle River in Maryland. A sand cover should be adequate to sequester contaminants in most areas of the ARSP exceeding the site wide RAL, but this will be confirmed during the design phase using results from pre-design sampling. Field studies completed by the University of Maryland Baltimore County concurrent with the feasibility study indicate the potential for PCBs in site sediment to desorb from sediment to sediment pore water. Additional pre-design sampling will be conducted in each area to better characterize this desorption.

As discussed in both the River-wide FS and the Focused FS, amendments such as activated carbon or organoclay may be added to cap material to remove PCBs from sediment pore water. Activated carbon contains pores that absorb chemicals from the water. Organoclay is a chemically altered bentonite clay with a surface that attracts chemicals from the water. Organoclay is more expensive than activated carbon but is more effective in areas with higher concentrations of NAPL such as petroleum products. Activated carbon products considered in the Focused FS assumed a material with 50 percent activated carbon. The specific carbon requirement necessary to achieve the RAO will be refined in the design phase as will the delivery method to achieve placement in targeted areas. Specific thicknesses, lateral extents, and scour protections will also be confirmed during the design process to address site-specific conditions.

As discussed in EPA’s Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA, 2005), placement of activated carbon is a proven remedial alternative. The elevated PCB concentrations in the EAAs may require activated carbon amendments to ensure that higher contaminant concentrations are addressed. The Focused FS included direct placement of carbon as a component of the EMNR option. Both Kingman Lake and Washington Channel were identified in the Focused FS as potential candidates for activated carbon application. Discussion of carbon placement in Washington Channel was inadvertently omitted from the Focused FS. Within Washington Channel, direct placement of carbon would be similar to the process discussed in Kingman Lake. Site specific conditions, primarily greater water depth and water currents will require more material per unit area than will be needed in Kingman Lake to account for potential loss during placement. Carbon placement is not expected to increase the bottom elevations in shallow EAAs (such as those in Kingman Lake) because the carbon will mix into the upper layer of sediment. The carbon renders the PCBs less bioavailable and hence reduces the toxicity to potential receptors.

In addition to evaluating sedimentation rates, the ARSP surface water model was used to evaluate the potential for severe weather event impacts such as scour in the sand cover or carbon placement areas. As discussed above, the conservative model results predict no significant widespread degradation in alternative effectiveness due to severe storms. However, localized scour was predicted in these preliminary simulations and will be further evaluated with additional, more detailed modeling and analysis during design.

B.3.14.5 SEDIMENT CAPS

Comments on capping as a remedial alternative focused on implementation challenges, the ability of caps to both sequester contaminants and promote restoration of benthic life, and the ability of caps to maintain long term effectiveness in the face of climate change. In high scour areas, NPS expressed the preference for dredging an area rather than capping and armoring since an armored surface is less conducive to benthic growth. A Navy comment inferred that continued sedimentation would mitigate this effect. Several commenters questioned the composition of the reactive caps proposed as well as the criteria used to determine where to use a reactive sand cap versus a non-reactive sand cap.

Comments from many respondents addressed various aspects of cap design, placement, and maintenance. MDE recommended additional sediment characterization and pilot studies be conducted to verify cap design including any required amendments. Sediment cap components were mentioned by several commenters including the Navy and NPS. Cap component issues include thickness, amendments added to the sand cap, and armoring. A diverse group of stakeholders including NPS, commercial interests, and local recreationists expressed concern regarding the impact of cap placement on water depth and the associated ramifications on boating and other uses. NPS was among several commenters to inquire about how the effects of climate change resulting in future more serious storm events would impact cap life span. NPS also requested more detail on routine cap maintenance requirements as well as cap placement constraints within the federal navigation channel.

RESPONSE

Sediment caps were evaluated for use in areas not suitable for either MNR or EMNR. Sediment caps, either sand or sand mixed with other material such as larger stone or amendments (e.g., activated carbon, organoclay), have been used extensively at contaminated sediment sites across the country over the last 20 years. Some of the first pilot scale tests to evaluate cap designs were completed in the Anacostia river (2004 experimental capping project discussed in **Section 2.1** of the Decision Summary). For areas where sediment caps are the preferred remedy, additional characterization would be conducted to address several aspects in the pre-design phase. Surface sediment samples will be collected and analyzed to further characterize surface sediment and pore water in the area to be capped. The objective of this characterization would be to determine if sand alone is sufficient to protect human health and the environment, or an amendment such as activated carbon is needed to absorb contaminants percolating up through the cap from the sediment and pore water underneath. The shear strength of the existing sediment will be measured to confirm the sediment will support the weight of the cap so that the cap material doesn't sink through the sediment requiring capping. Gas generation potential within the existing sediment will also be measured to determine if gas bubbles below a cap cause gas ebullition that can carry contaminants through the cap or could cause the cap to rupture. As noted in **Section B.3.3.4**, follow-up sampling for the 2004 experimental capping project performed in Reach 123 (**Section 2.1** of the Decision Summary) revealed the buildup of methane in the sediments beneath several of the caps. These results will be considered during the design phase for the early actions documented in the Interim ROD.

Once the area to be capped is adequately characterized, computer models and laboratory-based and field-based physical tests are used to evaluate different cap designs. The modeling and testing will evaluate a range of cap configurations including various thicknesses and mixtures of materials to address the range of site conditions that exist across the ARSP. The River-wide FS and Focused FS assumed a 12-inch sediment cap as a default thickness. This thickness assumes several inches to address the underlying contaminated sediment and additional thickness to account for cap loss from erosion, prop wash, and disturbance by fish and other animals that live in the river. A 12-inch sand cap is likely required for the EAAs in the Main Stem because the model-predicted natural sediment accumulation thickness is inadequate to support thin layer cap placement.

Because the ARSP study area is relatively large with varied conditions that must be considered during cap design, a range of sediment cap designs will be needed to meet the sediment RAOs. The River-wide FS anticipated the need for amendments to be added to sand caps in some areas where sand alone would not be sufficient to isolate the underlying contaminants, although these areas will not be confirmed until additional site characterization is completed. Amendments may include activated carbon or organoclay (defined in **Section B.3.14.4**). Both are common cap amendments that are readily available. Activated carbon is less expensive and used in applications to remove lower concentrations of contaminants. Organoclay is more expensive but is more suitable in areas with higher concentrations of NAPL products in the pore water.

In addition to amendments, protecting the cap from erosion will also be evaluated using computer models and field testing if necessary. In areas with higher scour potential, coarser-grained material (potentially larger stone size material) is used on the top of the cap to armor and protect the cap material in contact with the contaminated sediment. Over time, spaces in the larger stone matrix will infill with finer grain, naturally-deposited sediment which will provide habitat for benthic organisms.

Cap resiliency will also be assessed during cap design. For the purposes of the River-wide FS and Focused FS, potential cap damage from a severe storm event was evaluated using the ARSP Surface Water Model. During the design phase, additional more refined modeling will be used to evaluate cap resiliency.

Placing sand and other cap materials into a surface water body will reduce water depth. The cap design process will include an assessment of the current and planned future uses of the water body where the caps are proposed, so that the minimum required water depth is maintained. Water depth can be maintained by dredging existing sediment before cap placement so that the final sediment cap height does not exceed the current or target sediment elevation thus maintaining the desired water depth for that area. In areas where water depth after capping is too shallow for some uses, signage and other measures may be used to restrict such uses so that sediment cap performance and integrity are ensured.

The Navy questioned why WCHS-3 would require a full year for implementation. In response, the one-year implementation period is a maximum duration that accounts for anticipated complications that will arise from the placement of remediation materials beneath and in proximity to the large marinas and docking facilities that are located in the Washington Channel EAAs.

Cap maintenance will primarily rely on routine inspections of the condition of the cap. Inspections will identify any erosion or localized disturbance that could expose the underlying sediment. A bathymetric survey will be performed to compare the original cap elevation with the current elevation, thus providing a direct measurement of any thickness changes. The cap thickness will include several inches of extra material beyond the minimum necessary to isolate the contaminated sediment, so that a modest loss of material would not compromise the cap. Cap areas that may become impaired through the loss of material will be monitored more closely to determine if natural sedimentation is adequate to replace lost material or active measures (i.e., local placement of larger grain size material) are needed to maintain cap integrity. Since much of Kingman Lake and the lower Main Stem experience surplus sedimentation, monitoring and maintenance activities will focus on other portions of the study area (primarily the upper Main Stem) that are more susceptible to scour, or areas where end uses such as boating may adversely impact the sediment cap. As discussed in **Section B.3.14.2**, administrative controls will also be used in conjunction with a routine monitoring and maintenance plan to mitigate cap loss.

B.3.14.6 CONSIDERATION OF DREDGING IN REMEDIAL ALTERNATIVE IDENTIFICATION AND SCREENING

DC Audubon Society and other stakeholders believe the short-term impacts from dredging should be avoided by limiting dredging as much as possible. Conversely, NPS indicated that detailed remedy evaluation should consider the alternative that includes dredging all sediment exceeding the RAL throughout the ARSP. A number of private citizens requested more clarity on the required water depth in various locations in the project area. They indicated that the river is too shallow and requires dredging. Other stakeholders (Pepco and WGL) believe that dredging is unnecessary to meet RAOs. The Navy and NPS questioned the applicability of various dredging technologies and the stability of steep slopes that may result from Main Stem Dredging.

RESPONSE

The River-wide FS did not include detailed screening of the “dredge all” remedial alternative which would remove all sediments with greater-than-RAL levels and dispose of them offsite. This was because the estimated cost was significantly higher than other feasible options without a comparable increase in effectiveness, a conclusion consistent with the NCP (40 CFR 300.430(e)(7)(iii). In the remedy comparative analysis, dredging was assigned a lower score for short-term effectiveness because of issues associated with removal and management of sediment.

Selective dredging was considered to accomplish several objectives developed and evaluated in the River-wide FS and Focused FS. Specifically, selective dredging would be used to attain post-remedy water depth. Selective dredging would also mitigate potential impairments caused by implementation of another technology. For example, selective dredging in shallow areas prior to cap placement could achieve minimum water depth while avoiding impairment of the current river use. It would also reduce the potential for erosion. DOEE is in the final stages of obtaining Congressional approval for changes to the depths of the FNC in the study area. The finalized depths of the FNC are summarized **Section B.3.8.2**.

Based on public comments received on the Proposed Plan and a review of the District's restoration objectives, a better understanding of future uses anticipated for Kingman Lake was obtained. The preferred alternative for this OU was changed from KLHS-3 EMNR with Direct Application of Activated Carbon to KLHS-4 Containment by Thin Layer Cap Placement (TLCP) with Selective Dredging and Disposal. This change accommodates dredging already planned for the area to facilitate development of outdoor classroom facilities and natural resources in the lake area. This development requires the installation of channels as well as installation of subaqueous and emergent wetland areas. The Focused FS assume an average dredge depth of 2 to 3 feet across the EAA areas. Although the actual dredge depths may vary, overall dredge volume and associated cost is not expected to exceed to estimated quantities provided in the Focused FS.

Dredging will be accomplished using mechanical or hydraulic methods. Selection of the appropriate dredging technology will depend upon river access, material solids content, and the volume of sediment to be dredged, among other factors. Dredge material will be staged in the vicinity of the dredging activity to allow for dewatering and loading for off-site disposal. Parcels have been tentatively identified, but specific access agreements have not been secured for any parcel. Several of these parcels are on NPS property because of their proximity to the Anacostia River and Washington Channel. Interim dredging of Kingman Lake under alternative KLHS-2 requires removal of all sediment exceeding the early action RAL and off-site disposal.

The District is currently evaluating water depth options in the project area, both inside and outside the federal navigation channel. In 2019, DOEE surveyed stakeholders such as city residents, individuals currently engaged in using the river, and commercial entities for feedback on appropriate water depths for the Anacostia River, Washington Channel, and Kingman Lake. The survey results are discussed in a December 27, 2019 DOEE memo that is in the Administrative Record for this Interim ROD. As previously noted, **Section B.3.8.2** discusses the water depths for the FNC in the study area. Final dredging depths will be confirmed with USACE during design. Evaluation of dredging alternatives requires consideration of side slope stability and management of deeper sediment exposed during dredging. The final design of the remedy will specify elements such as cut depths and backfill placement and will result in dredge cut side slopes that will remain stable. The cost of dredging evaluated in the Focused FS and Proposed Plan is significantly less than the cost outlined in the River-wide FS. This is because the volume of removed sediment in the Focused FS is far less. Any dredging will include controls to limit the resuspension of contaminated sediment and any remaining sediment exceeding the RAL will be isolated beneath a sand cap.

The Anacostia Watershed Society recommended selection of interim remedy WCHS-5 because of the apparent elimination of long-term monitoring and maintenance that would be needed. In response, although maintenance costs would be less, other undesirable impacts including disruption of existing infrastructure, management of dredged materials, and the required monitoring of areas proximate to the EAAs were identified in the comparative analysis. These undesirable impacts outweighed the benefits of complete dredging the EAAs in Washington Channel.

B.3.14.7 ALTERNATIVE COSTS

Pepco and WGL commented on the remedial action costs. They indicated that the cost estimates for the early actions presented in the Proposed Plan and the Focused FS are too low, citing unit rates that are too low based on their experience with other projects. NPS requested that quantitative cost estimates be provided as part of the remedial alternative screening rather than a qualitative (low, medium, high) assessment as is recommended in EPA guidance (EPA 1988). In addition, NPS requested that, rather than deferring monitoring cost estimation until the development of the Performance Monitoring Work Plan (**Section B.3.2**), monitoring and other operations and maintenance (O&M) costs should be included as a part of the overall cost for evaluation of the early actions documented in the Proposed Plan and the Focused FS. Based on concerns that the selected PRG may not be appropriate for the entire river, MDE questioned the cost estimate for the Maryland portion of the river-wide remedy. The Navy found the cost estimates split between the Maryland and District portions of the Main Stem to be confusing.

RESPONSE

Estimation of remedial action costs was completed in accordance with EPA guidance. Specifically, DOEE relied on “A Guide to Developing and Documenting Costs Estimates During the Feasibility Study,” (OSWER Directive 9355.0-75, EPA 2000b) to guide the development of the cost estimates for the Focused FS. Assumptions used in this guidance allow for relative comparisons with other similar CERCLA remedial actions. Although, the resulting costs may be higher or lower than cost estimates developed using other common estimating methods, cost should be within a -30 percent to +50 percent range per EPA guidance. The incorporation of these cost estimates into the remedy selection process is in accordance with “The Role of Cost in the Superfund Remedy Selection Process,” (EPA OSWER Directive 9200.3-23FS, September 1996).

Remedial task unit rates are primarily based on unit rates and overall costs for similar projects in Maryland, New York, New England, and the Great Lakes region completed in the last 5 years. Vendor quotes from construction contractors working in the Mid-Atlantic region as well as local landfills near the project area were also used to supplement and adjust unit rates. The cost of direct placement of carbon is based on a February 2016 Cost and Performance report prepared by the U.S. Department of Defense (U.S. Department of Defense 2016) and was adjusted for specific site conditions in the ARSP. However, vendor quotes for carbon placement varied widely and ranged up to $750,000 per acre. Costs may increase due to future logistical challenges along the Anacostia River, such as upland residential or commercial development that eliminates potential staging areas. Any evolving logistical challenges and associated costs will ultimately be considered adaptively during remedy design. Costs for Main Stem alternatives were estimated separately for the DC and Maryland portions of the river to facilitate accurate consideration of remedial costs by decision-makers in each jurisdiction.

The NPS commented that O&M costs should be included within the cost estimate for the interim remedy. In response, as discussed in **Section B.3.1** of this responsiveness summary, comprehensive post-early action monitoring (in accordance with the PMWP) will be conducted and evaluated using the adaptive management decision framework defined in **Section B.3.1.8.** Key elements of this monitoring are unknown and will only be decided when the PMWP is finalized. PMWP preparation is underway and will be completed according to a separate schedule from the schedule for establishing the Interim ROD. Owing to the significant unknowns in the monitoring component of the O&M cost estimate, O&M costs are not included in the Focused FS and Interim ROD but will be provided when the PMWP is finalized. The addition of O&M costs within the cost estimate for each alternative would not be expected to change the outcome of the comparative evaluation since all of the active alternatives include similar containment or EMNR remedies with roughly equivalent levels of O&M.

B.3.14.8 BENEFICIAL USE

NPS provided comments on the beneficial use of dredged sediment as proposed in the River-wide FS. Specifically, NPS raised concerns about the regulatory status of the beneficial use of the sediment or whether the sediment was too contaminated to place in areas that were not designated as regulated disposal units, such as the shoreline restoration areas supported by beneficially used sediment. NPS expressed concern, for example, that beneficially managed sediment would wash back into the river during storm events. Other stakeholders supported beneficial use for both early actions and in the long-term restoration effort.

RESPONSE

Beneficial use of dredged sediments is a technology that was considered for inclusion in remedial actions for several broad areas in the River-wide FS. This technology is not considered in the Interim ROD early actions because the amount of material generated by the early actions is too small to justify the added cost of beneficially reusing the dredged material. For remediation efforts that do generate sufficient quantities of material, beneficial use of sediment within the project area provides an alternative to off-site disposal. It would include safeguards to minimize long-term dispersal of sediment back into the river. Since the sediment used beneficially is not exposed to the environment, concerns regarding the presence of contaminants are mitigated in the evaluation of this alternative.

With respect to NPS' concerns about the regulatory status of the dredged materials, the remedial action will comply with the applicable or relevant and appropriate requirements (ARARs) identified in the River-wide FS. For example, while the dredged material may be a solid waste, determining how it is characterized with respect to management or disposal will be dictated by hazardous waste characterization rules found in 40 CFR 261. The waste characterization process will be completed during the remedial design step and management of the dredged materials will be based on the results.

The beneficial use areas were evaluated with respect to severe storm conditions (See the ARSP Surface Water Model Report, Attachment 2 ["Implementation of Beneficial Use of Dredged Sediment"], Section 2.4 [Tetra Tech 2019b]) and no adverse impact or potential release of material to the environment was revealed by this modeling. Placement of the sediment as proposed in the beneficial use areas is not inherently less protective than other long-term management options such as off-site disposal. The beneficial use of sediment achieves project RAOs while supporting the complementary stakeholder objective to increase wetland habitat along the Anacostia River. Since these wetland areas are located over sediment that would otherwise require removal in a dredging option, the volume of dredged sediment is reduced.

B.3.15 EDITORIAL

Several stakeholders provided comments that noted editorial issues or typographical errors in technical documents that formed the Administrative Record for the Proposed Plan and Interim ROD. The major technical documents that received these comments included the River-wide FS, the Focused FS and the Proposed Plan itself. While it is true that many stakeholders have been involved in the development of these technical documents from inception and have provided input to the DOEE throughout the process, the Proposed Plan comment period is the first opportunity for all stakeholders to submit formal comments on the documents. This section addresses items raised by commenters that impact only the documents' layout, language, or clarity. For example, some of the comments recommended alternative ways to phrase sentences or explain technical concepts. Other commenters made suggestions on improving the clarity of figures and tables.

RESPONSE

All the editorial comments were reviewed in the context of the specific document to which they related. In general, editorial comments on technical documents already in the Administrative Record will not be applied retroactively to those specific documents. One exception might be if DOEE decides to issue an addendum to a particular technical document and the editorial comment is pertinent to that addendum. As required by CERCLA and the NCP, this responsiveness summary and any technical addendums will become part of the final Administrative Record for the Interim ROD.

Similarly, editorial comments pertaining to the Proposed Plan will not be directly addressed because the Proposed Plan will not be issued again. Its sole purpose was to explain the DOEE's selected remedy and to elicit the stakeholder comments, which are the subject of this Responsiveness Summary. However, stakeholders should expect to see some of the editorial comments pertaining to the Proposed Plan, the River-wide FS and the Focused FS addressed in the Interim ROD. Many of the editorial comments were quite helpful to the DOEE in planning the scope of the Interim ROD and identifying technical subjects that may require added detail and clarity.

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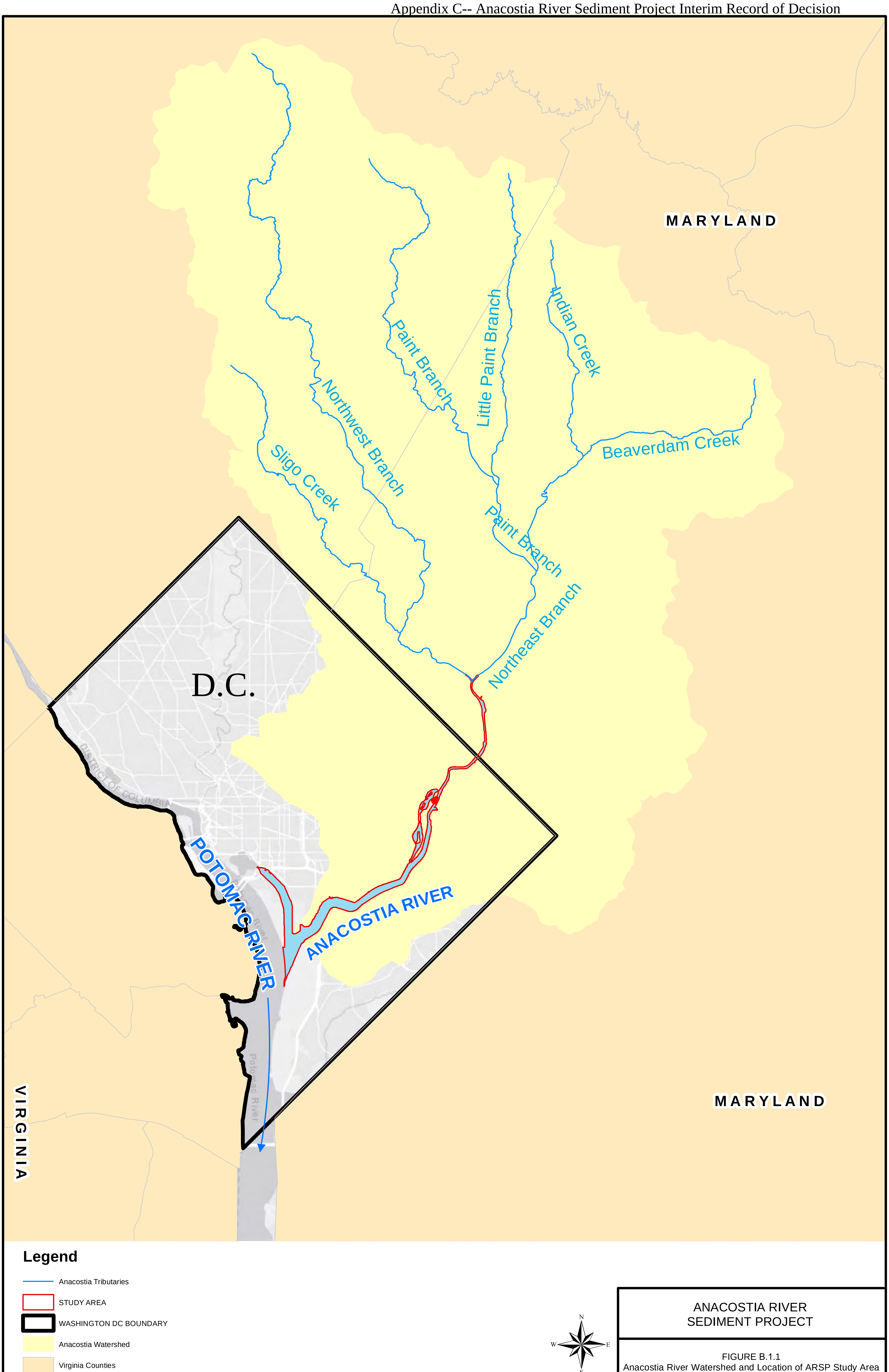
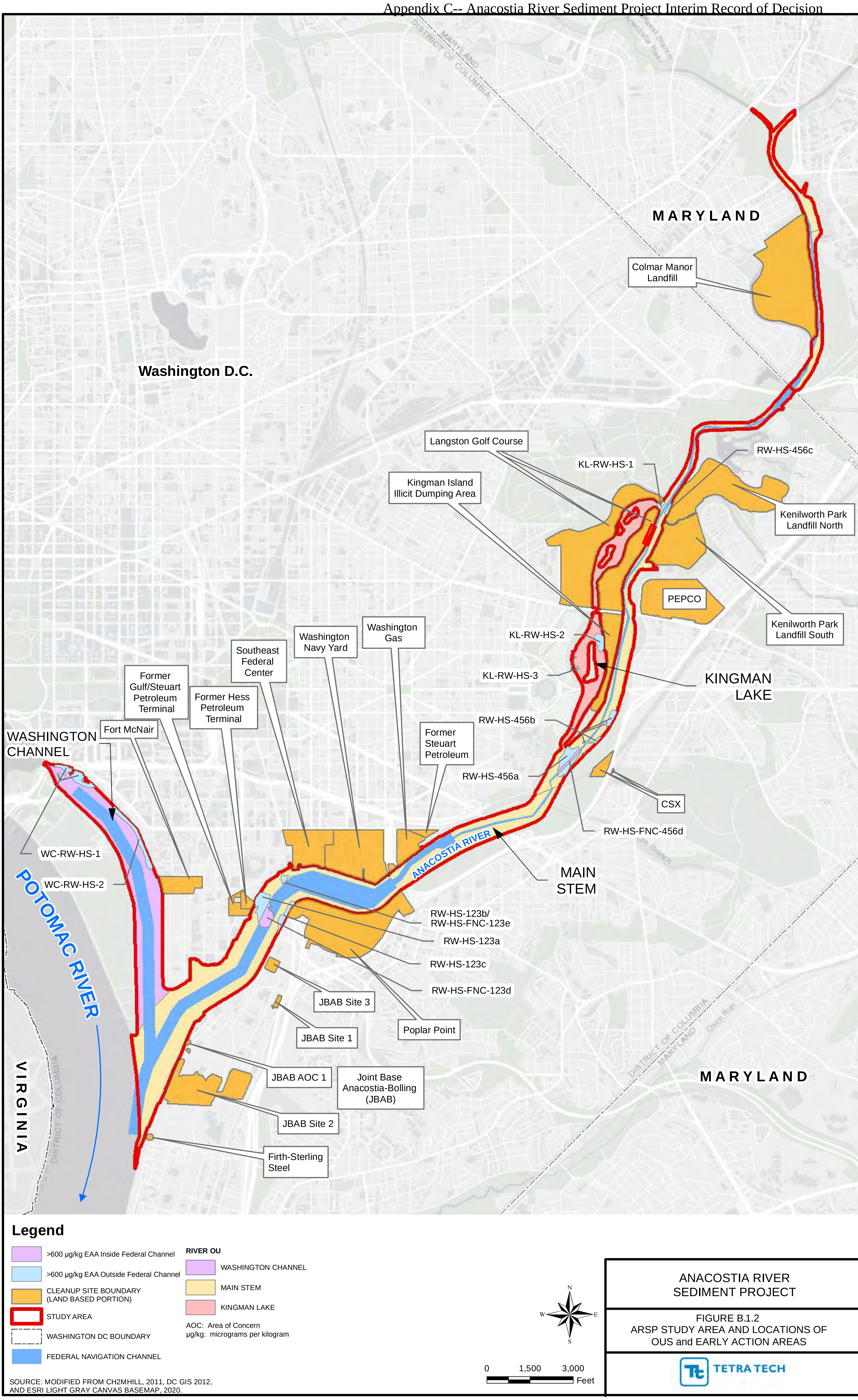
FIGURES



ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.1.1
Anacostia River Watershed and Location of ARSP Study Area

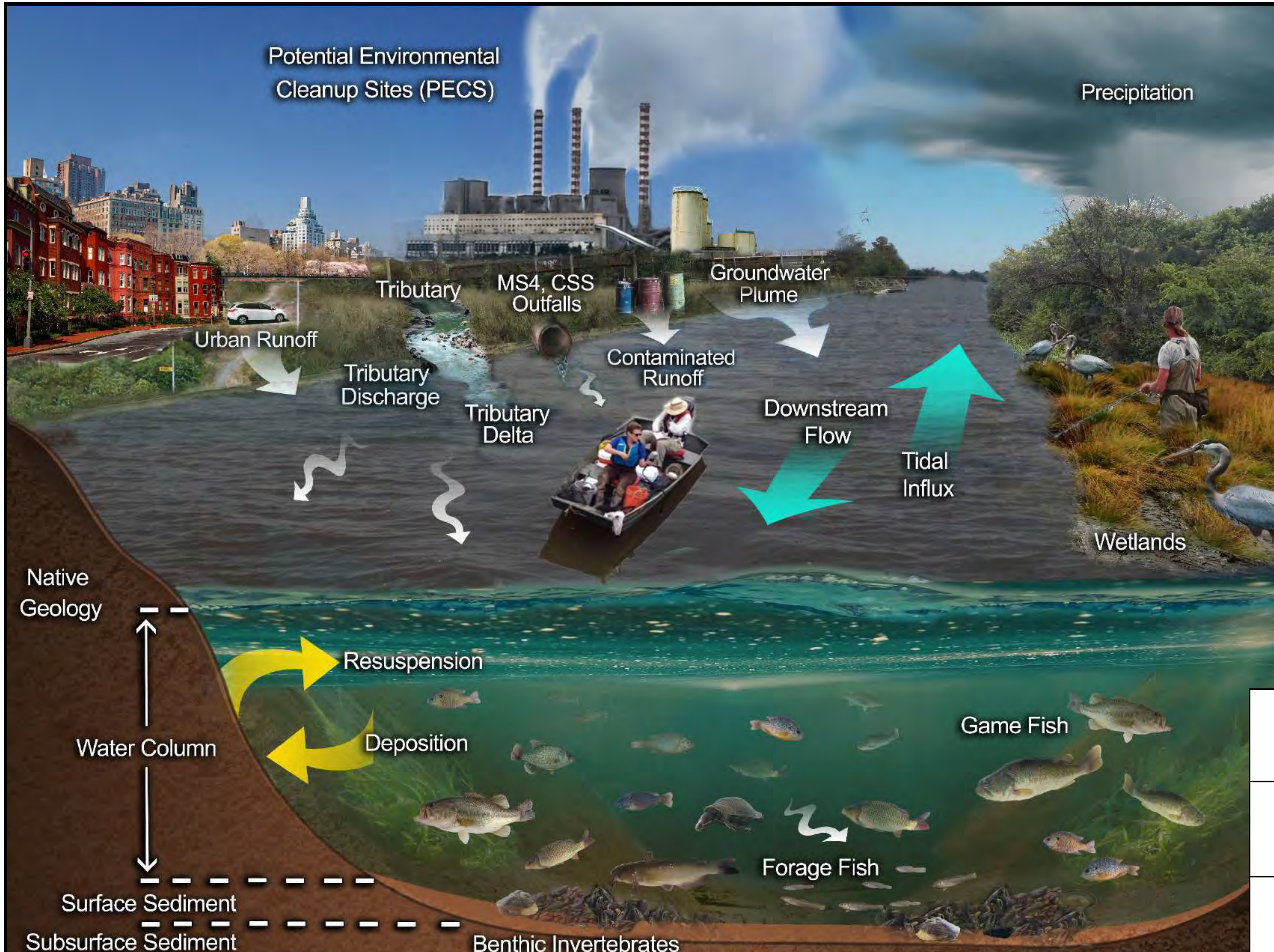
TETRA TECH



ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.1.2
ARSP STUDY AREA AND LOCATIONS OF
OUS and EARLY ACTION AREAS

TETRA TECH



LEGEND

RESUSPENSION

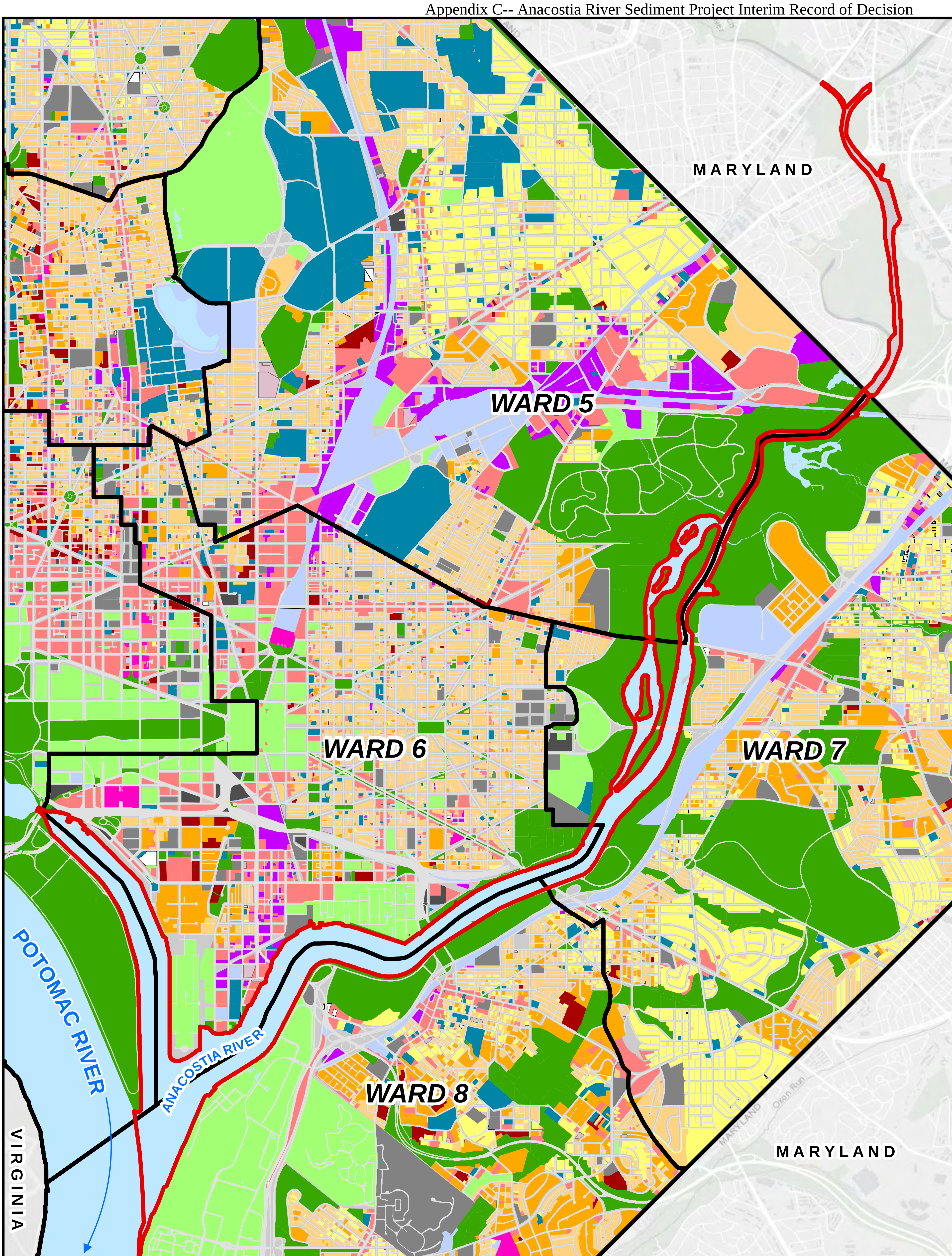
DEPOSITION

SUSPENDED SEDIMENT

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.1.3
CONCEPTUAL SITE
MODEL

TETRA TECH



Legend

- SEDIMENT STUDY AREA
- WARD BOUNDARY
- LOW DENSITY RESIDENTIAL
- LOW-MEDIUM DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- COMMERCIAL
- TRANSPORT, COMMUNICATION, UTILITIES
- INDUSTRIAL
- MIXED USE
- ROADS, ALLEYS, MEDIAN
- FEDERAL PUBLIC
- LOCAL PUBLIC
- PARKING
- PUBLIC, QUASI-PUBLIC, INSTITUTIONAL
- PARKS AND OPEN SPACE
- INSTITUTIONAL
- TRANSPORTATION RIGHT OF WAY
- WATER
- UNDETERMINED

N
W E
S

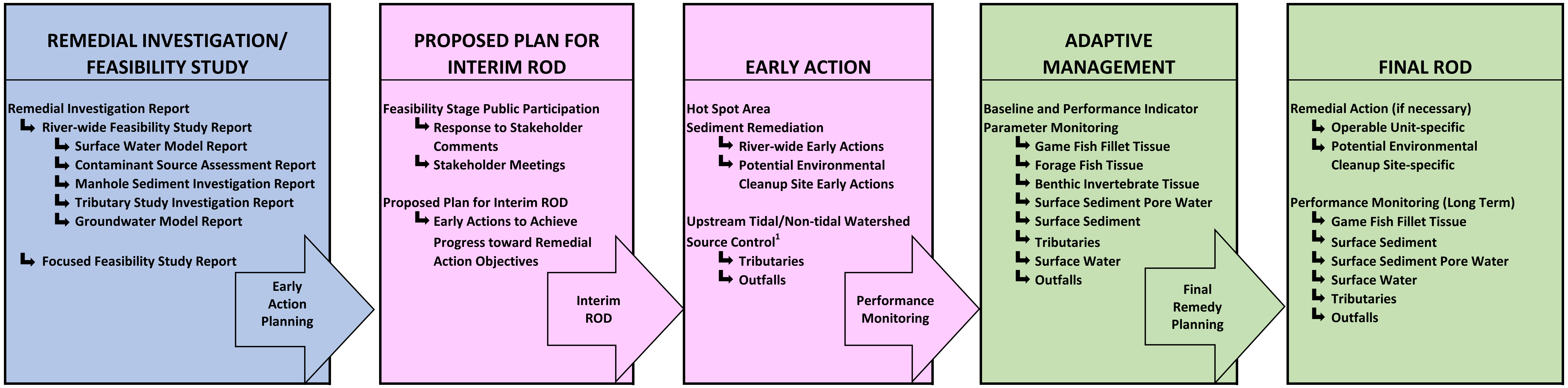
0 1,500 3,000
Feet

ANACOSTIA RIVER
SEDIMENT PROJECT - FEASIBILITY STUDY

FIGURE B.2.1
WARDS PROXIMATE TO SITE AND LAND USE

TETRA TECH

SOURCE: MODIFIED FROM DC GIS, 2005, DC GIS, 2012,
AND ESRI LIGHT GRAY CANVAS BASEMAP, 2018.



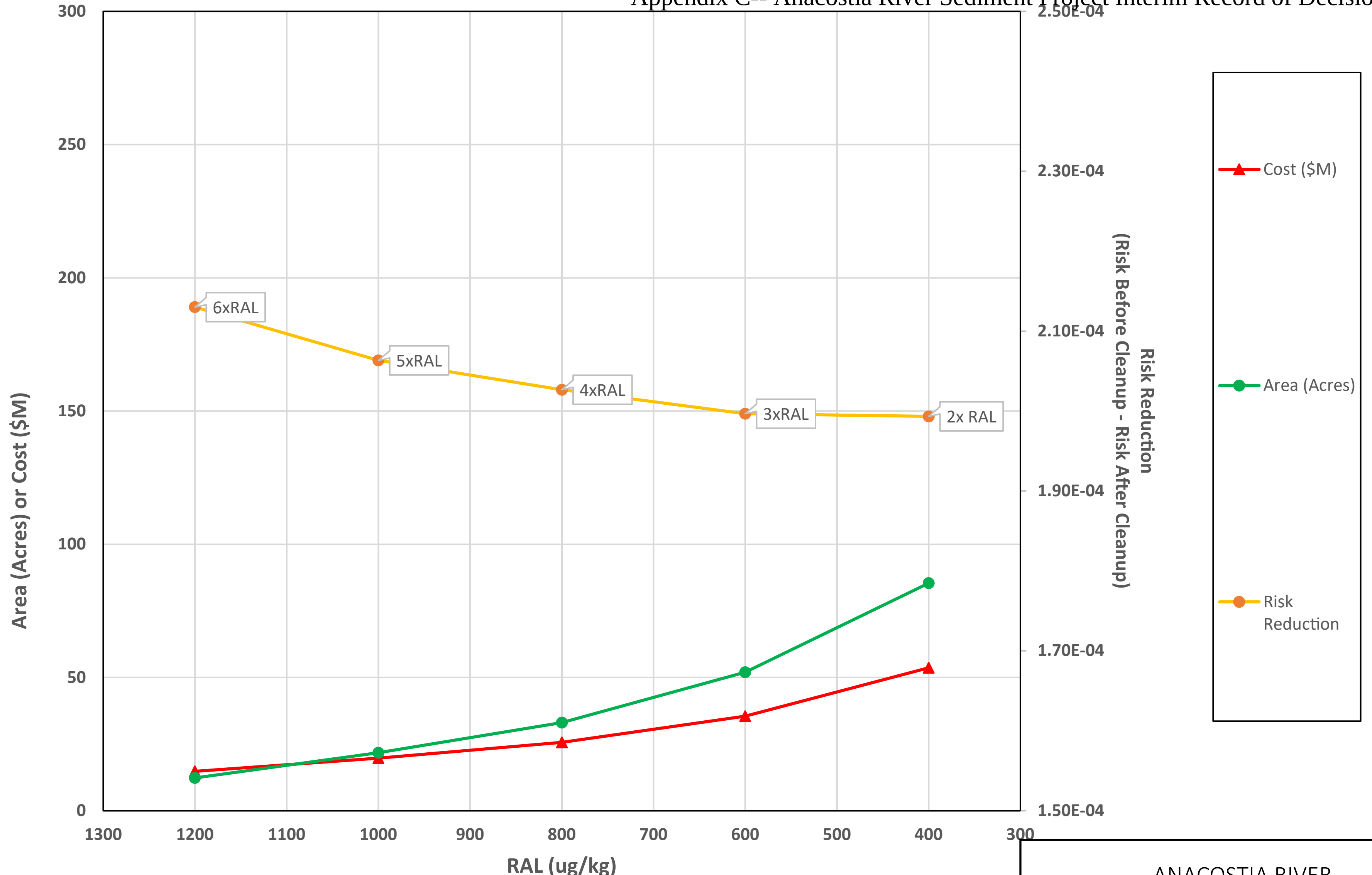
Notes

1 Early actions for hot spots are covered in this IROD and other tributary actions will be ongoing but are not described in this ROD.

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.1.1
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY TO INTERIM AND FINAL RECORD OF DECISION PROCESS

TETRA TECH

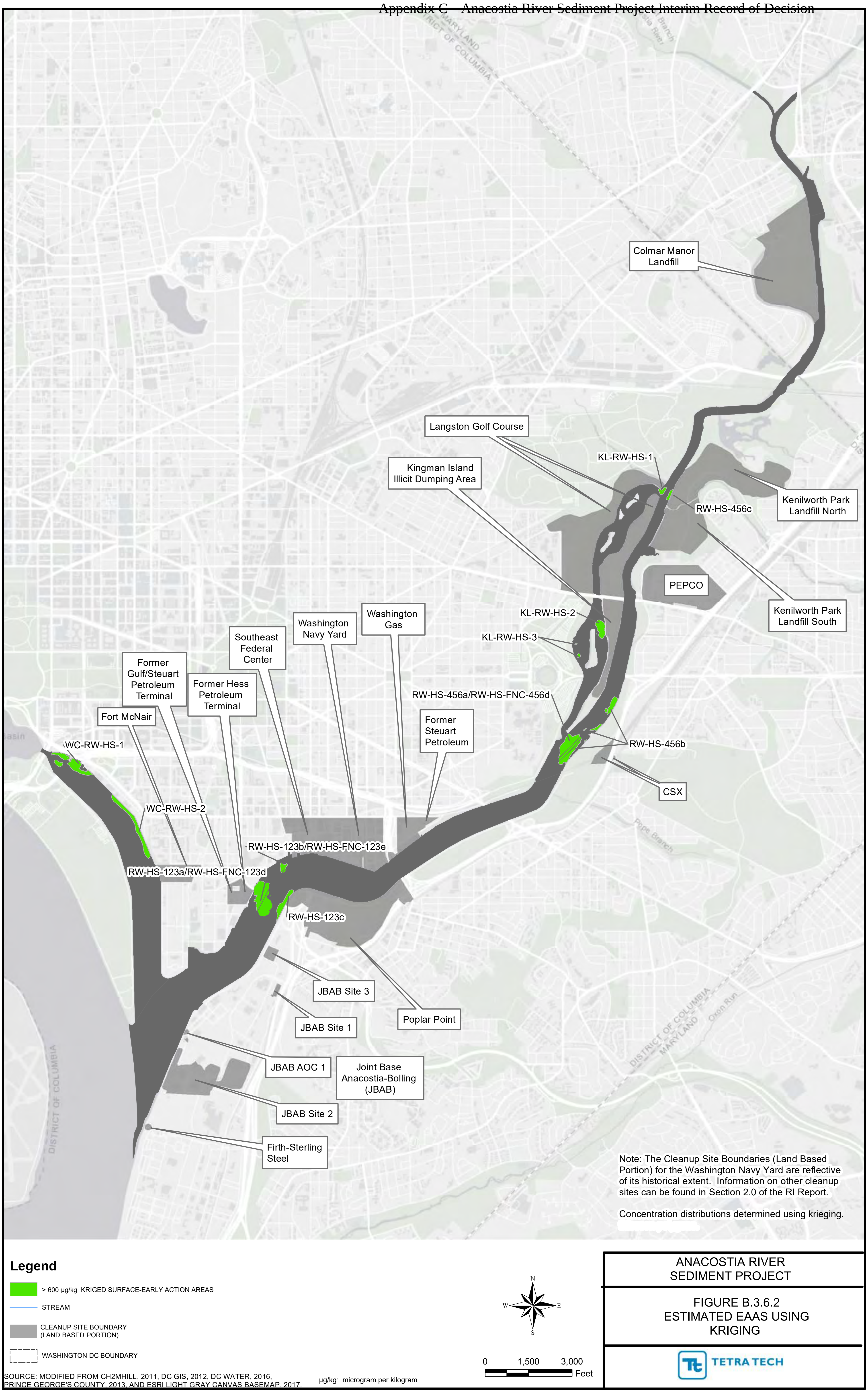


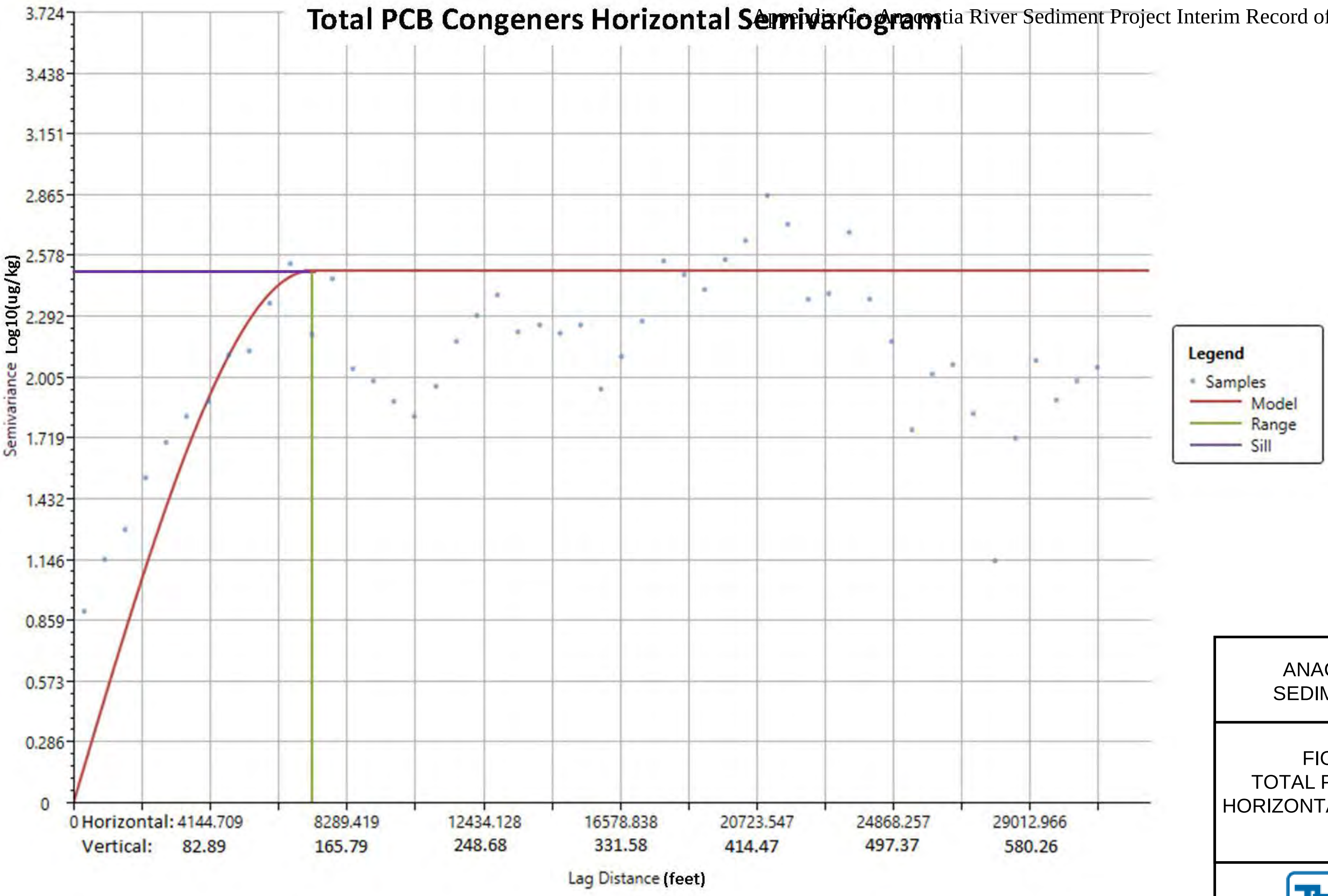
ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.1.2.
PLOT OF RAL VERSUS COST,
AREA SIZE, AND RISK REDUCTION

TETRA TECH


Colmar Manor
Landfill
Langston Golf Course
TP-KL-EAA-01
Kingman Island
Illicit Dumping Area
Kenilworth Park
Landfill North
PEPCO
Kenilworth Park
Landfill South
TP-KL-EAA-02
TP-KL-EAA-03
Washington
Gas
Washington
Navy Yard
Southeast
Federal
Center
Former
Gulf/Steuart
Petroleum
Terminal
Former Hess
Petroleum
Terminal
Fort McNair
TP-WC-EAA-01
TP-WC-EAA-02
TP-WC-EAA-03
Former
Steuart
Petroleum
TP-456-EAA-01
CSX
TP-123-EAA-01
TP-123-EAA-02
JBAB Site 3
JBAB Site 1
Poplar Point
JBAB AOC 1
Joint Base
Anacostia-Bolling
(JBAB)
JBAB Site 2
Firth-Sterling
Steel
Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.
Concentration distributions determined using thiessen polygons.
Legend
>600 µg/kg THIESSEN POLYGON- EARLY ACTION AREA
STREAM
CLEANUP SITE BOUNDARY
(LAND BASED PORTION)
WASHINGTON DC BOUNDARY
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016,
PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.
AOC: Area of Concern
µg/kg: microgram per kilogram
N
W
E
S
0
1,500
3,000
Feet
ANACOSTIA RIVER
SEDIMENT PROJECT
FIGURE B.3.6.1
ESTIMATED EAAS USING
THIESSEN POLYGONS
TETRA TECH

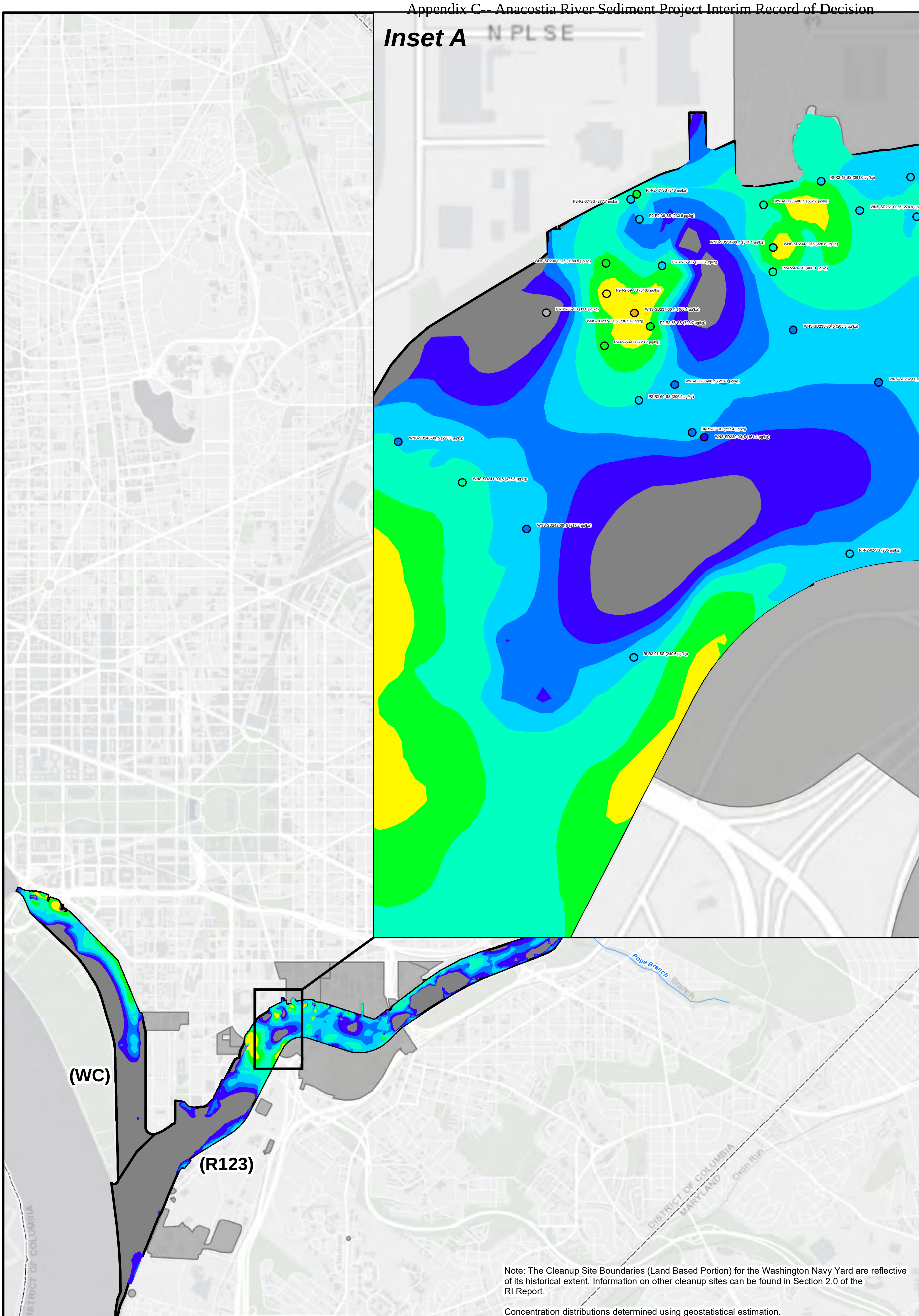

Colmar Manor Landfill
Langston Golf Course
Kingman Island Illicit Dumping Area
KL-RW-HS-1
RW-HS-456c
Kenilworth Park Landfill North
PEPCO
Kenilworth Park Landfill South
KL-RW-HS-2
KL-RW-HS-3
Washington Gas
Washington Navy Yard
Southeast Federal Center
Former Gulf/Steuart Petroleum Terminal
Former Hess Petroleum Terminal
Fort McNair
RW-HS-456a/RW-HS-FNC-456d
Former Steuart Petroleum
RW-HS-456b
CSX
WC-RW-HS-1
WC-RW-HS-2
RW-HS-123b/RW-HS-FNC-123e
RW-HS-123a/RW-HS-FNC-123d
RW-HS-123c
JBAB Site 3
JBAB Site 1
Poplar Point
JBAB AOC 1
Joint Base Anacostia-Bolling (JBAB)
JBAB Site 2
Firth-Sterling Steel
Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.
Concentration distributions determined using krieging.
Legend
> 600 µg/kg KRIGED SURFACE-EARLY ACTION AREAS
STREAM
CLEANUP SITE BOUNDARY (LAND BASED PORTION)
WASHINGTON DC BOUNDARY
SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.
µg/kg: microgram per kilogram
0 1,500 3,000 Feet
ANACOSTIA RIVER SEDIMENT PROJECT
FIGURE B.3.6.2
ESTIMATED EAAS USING KRIGING
TETRA TECH



ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.6.3
TOTAL PCB CONGENERS
HORIZONTAL SEMIVARIOGRAM

TETRA TECH



Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.

Concentration distributions determined using geostatistical estimation.

Legend

- STREAM
- RIVER REACH
- *CLEANUP SITE BOUNDARY (LAND BASED PORTION)*
- WASHINGTON DC BOUNDARY

TOTAL PCB CONGENERS (µg/kg)
(PRG = 65.0 µg/kg)

- ≤ 65 µg/kg
- 65 µg/kg to 130 µg/kg
- 130 µg/kg to 195 µg/kg
- 195 µg/kg to 325 µg/kg
- 325 µg/kg to 650 µg/kg
- 650 µg/kg to 1,300 µg/kg
- 1,300 µg/kg to 1,950 µg/kg
- 1,950 µg/kg to 6,500 µg/kg
- 6,500 µg/kg to 32,500 µg/kg

µg/kg: microgram per kilogram

0 1,500 3,000 Feet

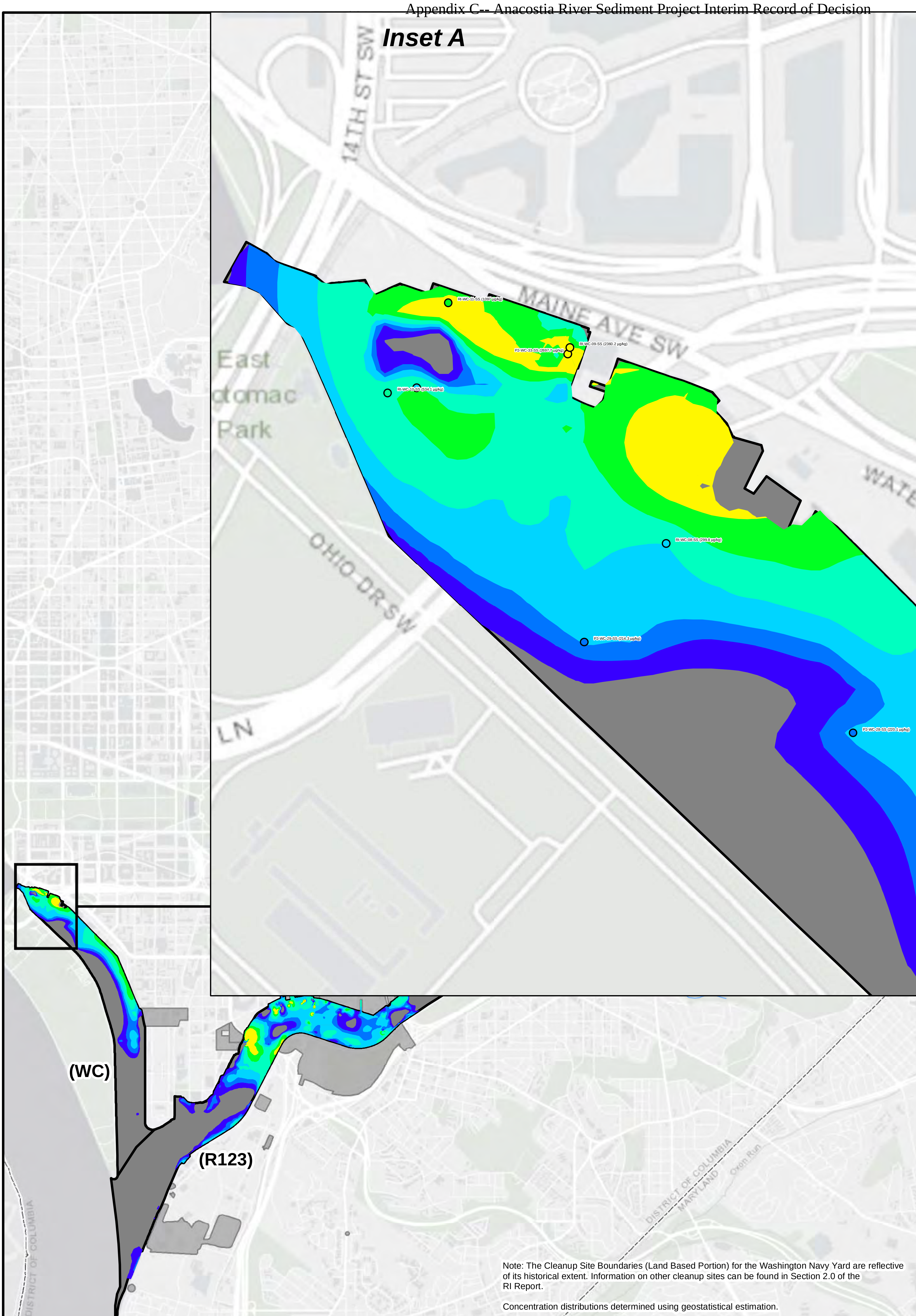
N E S W

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

ANACOSTIA RIVER SEDIMENT PROJECT

FIGURE B.3.6.4
Comparison of Kriged and Measured Surface Sediment Concentrations, EAA RW-HS-123b/RW-HS-FNC-123e Area

TETRA TECH



Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.

Concentration distributions determined using geostatistical estimation.

Legend

- STREAM
- RIVER REACH
- *CLEANUP SITE BOUNDARY (LAND BASED PORTION)*
- WASHINGTON DC BOUNDARY

TOTAL PCB CONGENERS (µg/kg)
(PRG = 65.0 µg/kg)

- ≤ 65 µg/kg
- 65 µg/kg to 130 µg/kg
- 130 µg/kg to 195 µg/kg
- 195 µg/kg to 325 µg/kg
- 325 µg/kg to 650 µg/kg
- 650 µg/kg to 1,300 µg/kg
- 1,300 µg/kg to 1,950 µg/kg
- 1,950 µg/kg to 6,500 µg/kg
- 6,500 µg/kg to 32,500 µg/kg

N W E S

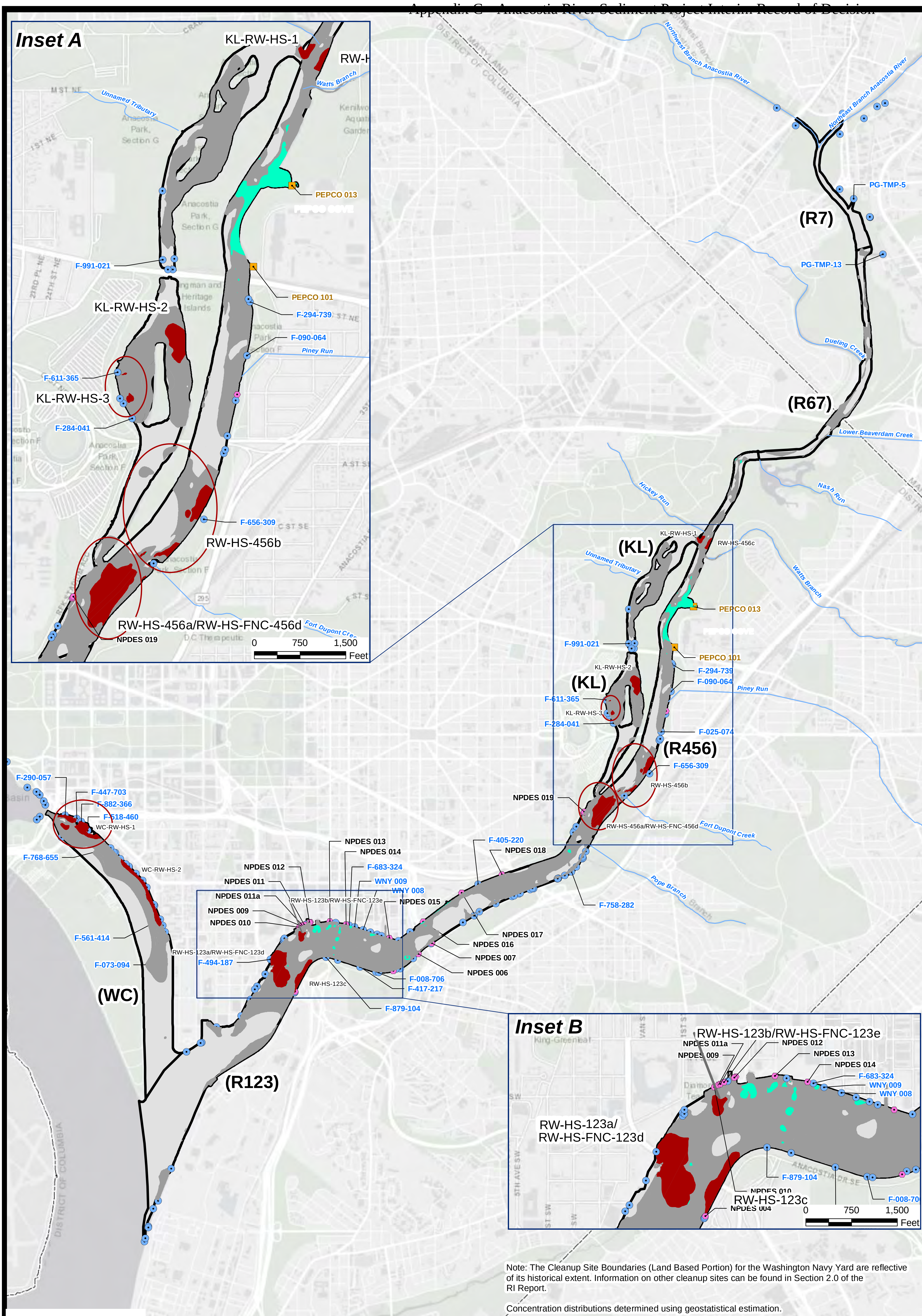
0 1,500 3,000 Feet

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017.

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.6.5
Comparison of Kriged and Measured Surface Sediment Concentrations, EAA WC-RW-HS-1 Area

TETRA TECH



Note: The Cleanup Site Boundaries (Land Based Portion) for the Washington Navy Yard are reflective of its historical extent. Information on other cleanup sites can be found in Section 2.0 of the RI Report.

Concentration distributions determined using geostatistical estimation.

Legend

- CSS OUTFALL
- MS4 OUTFALL
- INDUSTRIAL OUTFALL
- STREAM
- RIVER REACH
- WASHINGTON DC BOUNDARY

TOTAL PCB CONGENERS
PRG (65 µg/kg) VS EAA (600 µg/kg)

- ≥ PRG
- Other area above 600 µg/kg
- EAA (above 600 µg/kg) addressed by the Interim ROD
- Grouped areas with same EAA identifier

SOURCE: MODIFIED FROM CH2MHILL, 2011, DC GIS, 2012, DC WATER, 2016, PRINCE GEORGE'S COUNTY, 2013, AND ESRI LIGHT GRAY CANVAS BASEMAP, 2017

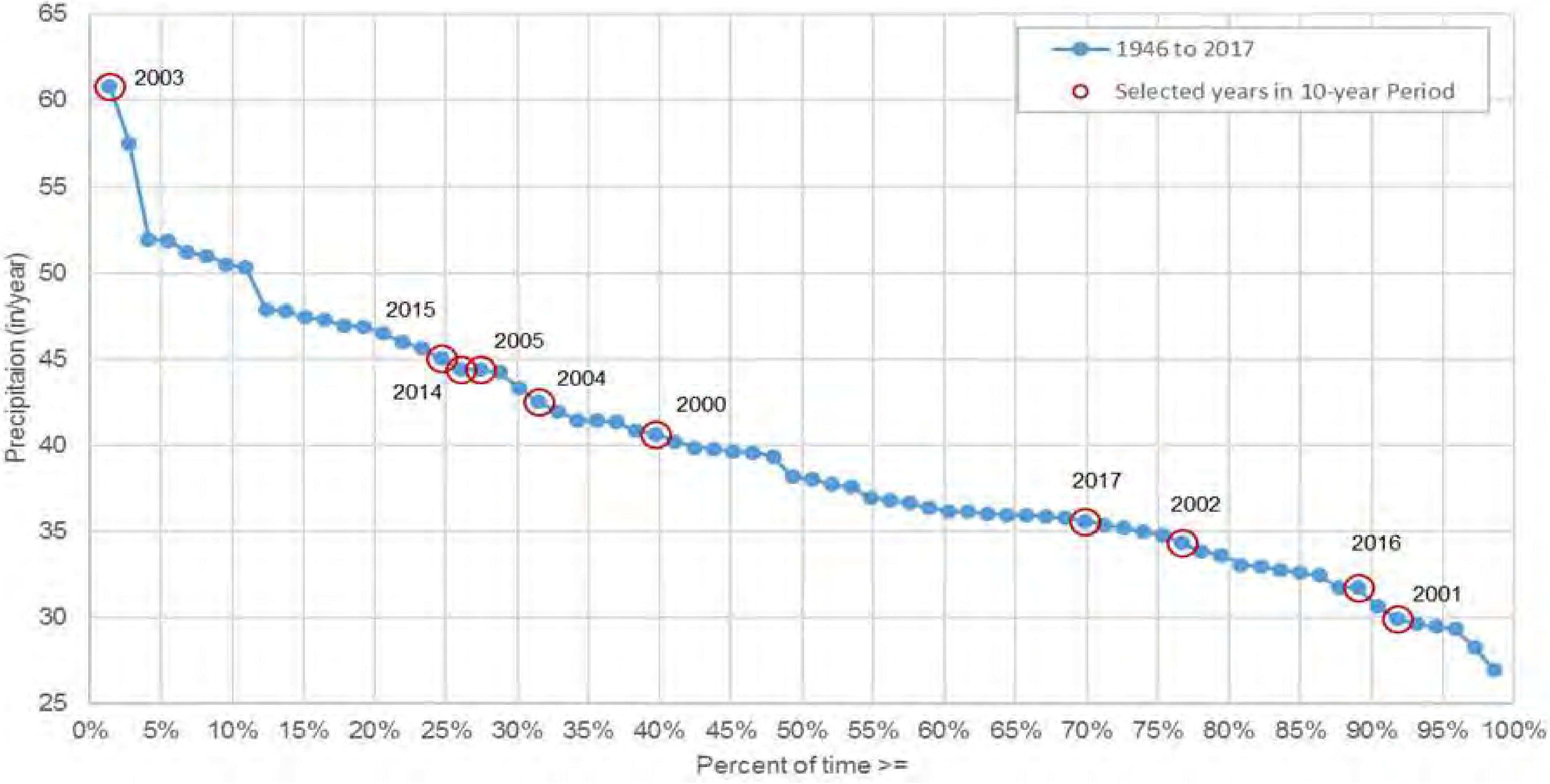
µg/kg: microgram per kilogram

0 1,500 3,000 Feet

ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.6.6
TOTAL PCB CONGENER CONCENTRATIONS
(>600 µg/kg AND >65 µg/kg)

TETRA TECH



ANACOSTIA RIVER
SEDIMENT PROJECT

FIGURE B.3.7.1
RAINFALL RECORDS FOR
WASHINGTON NATIONAL
AIRPORT, 1946-2017

TETRA TECH

TABLES

Table B.2.1
Community Profile Data for D.C. Wards Bordering the Anacostia River (2020 Data), Page 1 of 1

Ward Number	Ward 5	Ward 6	Ward 7	Ward 8
Total Population	90,479	103,316	80,951	80,552
Younger than 18	19.2%	16.6%	26.8%	29.1%
Older than 65	15.5%	11.5%	12.8%	10.8%
Black or African American	56.5%	39.7%	92.1%	92.1%
Hispanic or Latino	11.4%	8.2%	4.0%	3.0%
White	30.5%	48.9%	3.0%	4.2%
Mean Household Income	$126,591	$146,616	$62,472	$50,467

Source: DC Health Matters
(https://www.dchealthmatters.org/?module=demographicdata&controller=index&action=index&id=131495&sectionId=935)

TABLE B.3.1.1

Reach-specific RALs and Site-wide RAL, Total PCB Congeners, Page 1 of 1

Chemical of Concern	Units	PRG	RALs						
			Reach 7	Reach 67	Reach 456	Reach 123	Kingman Lake OU	Washington Channel OU	River-wide RAL[1]
Total PCB Congeners	µg/kg	65	74	160	170	210	220	220	200

1. Average RAL for the six reaches is 174 µg/kg which is rounded up to 200 µg/kg for the River-wide RAL

Acronyms and Abbreviations:

OU	Operable Unit
PCB	Polychlorinated biphenyls
PRG	Preliminary Remediation Goals
RAL	Remedial Action Levels
µg/kg	Micrograms per kilogram

Table B.3.1.2
Preliminary Adaptive Management Decision Framework, Page 1 of 2

Remedial Action Objective	Potential Indicator[1]	Decision Framework			
		Sampling Activity	Interpretation	Trigger Criteria	Potential Actions
RAO1 - Reduce Human Fish Consumption Risk[2]	GFFT	Fillet samples of game fish species with small home range (e.g., brown bullhead)	Compare sample concentrations to fish advisory criteria and project-specific risk based criteria; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in game fish fillets will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm trends ● Implement institutional controls ● Conduct additional early targeted action sediment remediation ● Conduct additional targeted source control ● Revise PRG
	SW	Passive sampling of surface water in each OU	Compare sample concentrations to selected effect levels; explore multivariate correlations among all indicators, with focus on game fish fillets	Game fish fillets are the primary indicator; other indicators will be used as supporting lines of evidence	
	FFT	Forage fish whole body and/or organ samples			
	BT	Benthic organism tissue samples			
	SSPW	Passive sampling of surface sediment pore water			
	SS	Surface sediment	Compare sample concentrations with reach and river-wide remedial action levels; explore multivariate correlations among all indicators, with focus on game fish fillets		
RAO2 - Reduce Human Exposure to Sediment Risk[3]	At 1E-05 risk level, this RAO is satisfied and therefore is not considered further in the adaptive management decision process.				
RAO3 - Protect Benthic and Aquatic Invertebrates[4]	SS	Surface sediment	Compare sample concentrations to probable effect concentrations; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in sediment will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm temporal trends ● Characterize geographic extent of impairment and conduct focused sediment remediation based on toxicity test results ● Revise PRG
	SW	Passive sampling of surface water in each OU	Compare sample concentrations to selected chronic effect concentrations; explore multivariate correlations among all indicators	Primary medium is surface sediment; other indicators will be used as supporting lines of evidence	
	SSPW	Passive sampling of surface sediment pore water			
	BT	Benthic organism tissue samples			

Table B.3.1.2
Preliminary Adaptive Management Decision Framework, Page 2 of 2

Remedial Action Objective	Potential Indicator[1]	Decision Framework			
		Sampling Activity	Interpretation	Trigger Criteria	Potential Actions
RAO4 - Protect Fish[5]	GFFT	Fillet, whole fish, and/or organ samples of game fish species with small home range (e.g., brown bullhead)	Compare sample concentrations to effect levels; calculate temporal trends and projected timeframe for achieving acceptable concentrations	Temporal trend analysis indicates that concentrations in sediment will not achieve the RAO within the target timeframe	The path forward could include one or a combination of the following actions: ● Continue monitoring to confirm temporal trends ● Characterize geographic extent of impairment and conduct focused sediment remediation based on direct bioaccumulation in fish ● Revise PRG
	FFT	Forage fish whole body and/or organ samples of species with small home			
	BT	Benthic organism tissue samples	Compare sample concentrations to selected chronic effect concentrations; explore multivariate correlations among all indicators	Primary medium is forage and game fish tissue; other indicators will be used as supporting lines of evidence	
	SW	Passive sampling of surface water in each OU			
	SSPW	Passive sampling of surface sediment pore water			
	SS	Surface sediment			

Notes:

1. Selection of indicators, sampling activities, and actions will be based on scientific data within an adaptive management framework.
2. RAO1: Reduce risks associated with the consumption of COCs in fish from the tidal Anacostia River by people with the highest potential exposure.
3. RAO2: Reduce risks associated with direct exposure of people to surface sediment in shallow water (fringe sediment) in the tidal Anacostia River.
4. RAO3: Reduce risks associated with COCs in sediment to levels protective of benthic and aquatic invertebrates based on direct chronic exposure to surface sediment and surface water.
5. RAO4: Reduce risks associated with COCs in surface sediment to levels protective of fish based on direct contact with and ingestion of surface water, sediment, and prey.

Acronyms and Abbreviations:

BT	Benthic Invertebrate Tissue	RAO	Remedial Action Objective
FFT	Forage Fish Tissue	SS	Surface Sediment SWAC
GFFT	Game Fish Fillet Tissue	SSPW	Surface Sediment Pore Water
OU	Operable Unit	SW	Surface Water

Table B.3.6.1
Early Action Areas Defined Using Kriging, Page 1 of 1

Operable Unit	Reach	Early Action Area	Maximum Total PCB Congener Surface Sediment Concentration (µg/kg)	EAA Early Action Surface Area with Buffering (Acres)	EAA Early Action Surface Area No Buffering (Acres)
Main Stem	123	RW-HS-123a/RW-HS-FNC-123d	2601	15.9	12.8
		RW-HS-123b/FW-HS-FNC-123e	7368	2.5	1.8
		RW-HS-123c	250	5.4	3.5
	456	RW-HS-456a/RW-HS-FNC-456d	168	8.7	7.6
		RW-HS-456b	791	10.6	6.2
		RW-HS-456c	52	1	0.8
Kingman Lake	KL	KL-RW-HS-1	874	1.3	0.9
		KL-RW-HS-2	999		3.4
		KL-RW-HS-3	662	0.6	0.4
Washington Channel	WC	WC-RW-HS-1	2698	15	7.3
		WC-RW-HS-2	752	11.9	7.0
Total				**72.9**	**51.6**

Acronyms:
EAA: Early Action Areas
PCB: Polychlorinated biphenyls
µg/kg: Micrograms per kilogram

Table B.3.6.2

Early Action Areas Defined Using Thiessen Polygons, Page 1 of 1

Operable Unit	Reach	EAA	EAA Area (Acres)	Total EAA Area in OU (Acres)	Number Sampling Points	Maximum Total PCB Congener Surface Sediment Concentration (µg/kg)	Corresponding EAAs Defined Using Kriging
Kingman Lake	KL	TP-KL-EAA-01	1.9	9.2	1	874	KL-RW-HS-1
		TP-KL-EAA-02	2.8		1	999	KL-RW-HS-2
		TP-KL-EAA-03	4.4		1	662	KL-RW-HS-3
Main Stem	123	TP-123-EAA-02	5.2	8.1	4	2601	RW-HS-123a/RW-HS-FNC-123d
		TP-123-EAA-01	2.9		7	7368	RW-HS-123b/FW-HS-FNC-123e
	456	TP-456-EAA-01	1.7	1.7	1	791	RW-HS-456-b
Washington Channel	WC	TP-WC-EAA-01	5.0	31.2	3	2698	WC-RW-HS-1
		TP-WC-EAA-03	15.5		2	1063	WC-RW-HS-3
		TP-WC-EAA-02	10.8		1	752	WC-RW-HS-2
Total				**50.2**			

Acronyms:

EAA: Early Action Areas

OU: Operable Unit

PCB: Polychlorinated biphenyls

µg/kg: Micrograms per kilogram

Table B.3.6.3

Dataset Summary Statistics, Semivariogram Parameters, and Grid Summary Data for the Nature Extent Kriging Analysis, Page 1 of 1

Constituent	Parameter	Units	Total PCB Congeners	Total PCB Aroclors	Dioxin Equiv. PCB TEQ	Dioxin TEQ	TPAH	HPAH	LPAH	Chlordane	Lead	Arsenic
Dataset Statistics	Mean	Log_{10}(concentration[1])	2.21	0.99	2.52	1.09	3.2	3.06	2.33	0.70	1.98	0.77
	Median	Log_{10}(concentration)	2.36	1.92	-2.17	1.21	3.6	3.51	2.77	0.48	2.04	0.82
	Minimum	Log_{10}(concentration)	-4	-3	-7.29	-1.73	-3	1.65	1.69	1.02	0.52	0.31
	Maximum	Log_{10}(concentration)	4.62	4.62	0.382	2.85	6.47	-3.00	-3.00	-1.14	-0.80	-0.72
	Range (DS)[2]	Log_{10}(concentration)	8.62	8.62	7.67	4.58	9.47	5.97	6.31	3.68	4.88	1.79
Semivariogram Parameters	Range (SV)[3]	Feet	7213	18166	23580	23579	24604	18166	18166	23621	8123	23582
	Sill	$(Log_{10}(concentration))^2$	2.51	4.57	0.58	2.04	2.89	4.68	4.16	2.5	2.61	0.64
	Nugget	Log_{10}(concentration)	0	0	0	0	0	0	0	0	0	0
	Anisotropy	Unitless	50	50	50	50	50	50	50	50	50	50
Cross Validation Results	Error Mean	Log_{10}(concentration)	0.28	NA[4]	-0.03	0.19	0.19	NA	NA	NA	NA	NA
	Error St. Dev.	Log_{10}(concentration)	1.05	NA	1.16	0.78	1.14	NA	NA	NA	NA	NA
	RMSE	Log_{10}(concentration)	1.08	NA	1.19	0.8	1.33	NA	NA	NA	NA	NA
	p-value	Unitless	< 0.001	NA	<0.001	<0.001	<0.001	NA	NA	NA	NA	NA

Notes

1. Concentrations are in µg/kg for all constituents except lead; lead concentrations are in mg/kg
2. Range (DS): range of the dataset
3. Range (SV): semivariogram range

Acronyms and Abbreviations

HPAH: High molecular weight PAHs (10) summed, excluding non-detect data
LPAH: Low molecular weight PAHs (6) summed, excluding non-detect data
mg/kg: Milligrams per kilogram
NA: Not Analyzed
PCB: Polychlorinated biphenyls
TEQ : Toxicity equivalency concentration
TPAH: All 16 PAHs summed, excluding non-detect data
µg/kg: Micrograms per kilogram

Table B.3.6.4

Reach-specific and Site-wide Cleanup Acreages for 2x, 3x, 4x, 5x, 6x, and 10x the Site-wide RAL (200 ug/kg) for Total PCB Congeners, Page 1 of 1

Operable Unit	Reach	Early Action Area	10x RAL (2000 µg/kg) (Acres)	6x RAL (1200 µg/kg) (Acres)	5x RAL (1000 µg/kg) (Acres)	4x RAL (800 µg/kg) (Acres)	3x RAL (600 µg/kg) (Acres)	2x RAL (400 µg/kg) (Acres)
Main Stem	123	RW-HS-123a/RW-HS-FNC-123d	2.4	6.3	7.7	9.7	12.8	26.0
		RW-HS-123b/FW-HS-FNC-123e	0.0	0.6	0.8	1.0	1.8	2.2
		RW-HS-123c	0.1	1.0	1.5	2.2	3.5	0.0
	456	RW-HS-456a/RW-HS-FNC-456d	0.0	0.2	4.6	7.2	7.6	15.6
		RW-HS-456b	0.0	0.2	0.7	1.9	6.2	4.6
		RW-HS-456c	0.0	0.0	0.2	0.5	0.8	1.3
Kingman Lake	KL	KL-RW-HS-1	0.0	0.1	0.3	0.5	0.9	1.5
		KL-RW-HS-2	0.0	1.0	1.6	2.4	3.4	5.4
		KL-RW-HS-3	0.0	0.0	0.0	0.1	0.4	1.5
Washington Channel	WC	WC-RW-HS-1	0.8	3.0	4.2	5.1	7.3	11.8
		WC-RW-HS-2	0.0	0.0	0.1	2.5	7.0	14.0
Totals (Acres)			**3**	**12**	**22**	**33**	**52**	**84**

Acronyms:

PCB: Polychlorinated biphenyls

RAL: Remedial Action Levels

µg/kg: Micrograms per kilogram

Table B.3.9.1
Comparison of Human Fish Ingestion Rate Surveys Relevant to the ARSP Study Area, Page 1 of 1

							Resulting Cleanup Levels				
Survey	Dates for Data Collection	Target Population	Area Surveyed	Calculation Approach	Fish Ingestion Rate Percentile	Fish Ingestion Rate (g/day)	PRG (ug/kg)	River-wide RAL (ug/kg)	EAA RAL (ug/kg)	Cleanup Area (acres)	Notes
QuanTech (2019)/ AECOM (2020)	August 22 - November 30, 2019	All adult anglers (313 interviews)	Anacostia River	Individual consumption rates based on equation including harvest mass (often estimated based on reported species preferences), exposure freq., and successful trip factor; then applied weighting scheme to obtain population estimates	98	41.1	104	200 (242)	900	35.2	Interviews conducted during Fall period (late August - November). Interview data indicate late spring/summer is a time of greater fishing effort/activity. Only off-peak period (Fall) represented by actual catch observance. Also, FIR calculation assumes successful trip fraction was the same for all anglers (40%); if successful trip fraction set to 67% (possibly more realistic for the subsistence angler fraction), FIR = 68 g/day.
Gibson and McCafferty (2005)/ Tetra Tech (2018)	June 1 - August 11, 2005	All adult anglers (247 interviews)	Anacostia and Potomac Rivers	Based on 98 percentile FIR from Gibson and McCafferty (2005) of two fish meals each week for entire year and 227 g per fish meal (from D.C. fish advisory) which equate to 64.7 g/day.	98	65	65	200 (175)	600	72.9	Near prime period represented (summer). Results indicate that 12.5% of interviews were conducted on the Anacostia River; remaining interviews in the D.C. area were less than 4 miles from the Anacostia River (representative of D.C. area anglers). Most respondents appeared to be recreational anglers. However, for purposes of HHRA the distinction between recreational and subsistence anglers is based on FIR, not on stated or perceived basis for catching and consuming fish. Angler demographics may not be representative of subsistence anglers along the Anacostia River.
National Park Service (2016)	2015 - 2017	All adult anglers (35 interviews)	Anacostia River and Potomac Rivers	Estimated based on EPA (2014) data and 2015 survey results	99	107	40	200 (156)	600	72.9	Results indicate that 11.4% of respondents fish four or more times per week year round. FIR (107 g/day) is based on total fish consumption (i.e., fish caught locally and fish purchased at a store or restaurant [EPA, 2014]) and therefore is very conservative.
Opinion Works (2012)	2011	All adult anglers (111 interviews)	Anacostia River	No FIR calculated	NA	NA	NA	NA	NA	NA	Survey was qualitative (no FIR calculated); minorities represented 94% of survey respondents; subsistence fishing population documented (7% of respondents).
EPA (2014)	2003 - 2010	Anglers of all ages (FIR based on adult responses)	Nation-wide (FIR based on consumption of finfish and shellfish from freshwater and estuarine locations)	FIR based on questions regarding how often participants consumed various fish in the last 30 days.	99	61.1	70	200 (175)	600	72.9	FIR based on National Health and Nutrition Examination Survey (NHANES) results from 2003 - 2010. While focused on consumption of finfish and shellfish from freshwater and estuarine sources, the FIR is a nation-wide average and not specific to the D.C. area.
San Diego Bay Consumption Study (March 2017)	(May 1, 2015 –April 30, 2016)	All adult anglers (age 18 and older; 1549 interviews)	San Diego Bay	Based on 98th percentile of FIR determined from questions regarding how often participants consumed various fish in the last 30 days. Overall consumption rates varied from 0 to 212.6 g/day (Table 6). Consumption rates high for anglers who fish every week.	99	73.7	Not calculated but assumed very similar to results for 65 g/day FIR				Objective of this year-long study was to fill in data gaps and provide comprehensive information to fully assess risk and to inform management decisions. Subsistence consumption rate is based on 99th percentile from 468 anglers that provided sufficient information to calculate consumption rates. Survey included pier, boat, and shoreline anglers.

Acronyms and Abbreviations

ARSP: Anacostia River Sediment Project
EPA: Environmental Protection Agency
D.C.: District of Columbia
FIR: Fish Ingestion Rate
HHRA: Human Health Risk Assessment
g: Grams
NA: Not applicable
NHANES: National Health and Nutrition Examination Survey
PRG: Preliminary remedation goal
RAL: Remedial action level
EAA: Early action area
ug/kg: Micrograms per Kilograms

ATTACHMENT
STAKEHOLDER COMMENTS

Full text of stakeholder comments are available electronically from the Administrative Record (www.anacostiasedimentproject.com/library) or by viewing the enclosed DVD-ROM.

APPENDIX C. U.S. EPA LETTER OF SUPPORT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Tommy Wells
Director
Department of Energy & Environment
Government of the District of Columbia
1200 First Street NE
Washington, DC 20002

Dear Mr. Wells,

Thank you for all of your leadership on the Anacostia. We have reviewed the Anacostia River Sediment Project - Early Action Areas in the Main Stem, Kingman Lake, and Washington Channel Interim Record of Decision (ROD) and support the Department of Energy & Environment's (DOEE) remedy and approach to the response actions at the 11 early action areas identified in this interim ROD.

The continued cooperation of EPA Region 3 and DOEE to implement the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program is an essential element of the success of the Anacostia River Sediment Project. EPA is committed to this partnership and implementation and will continue to assist DOEE in making the necessary cleanup decisions to protect public health and the environment.

If you have any questions, please contact Yazmine J. Yap-Deffler, Chief of the Site Assessment Section at (215) 814-3369.

Sincerely,

PAUL LEONARD Digitally signed by PAUL LEONARD
Date: 2020.09.21 08:19:42 -04'00'

Paul Leonard
Director
Superfund and Emergency
Management Division
USEPA Region 3