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Via Electronc Mail

June 8, 2023

Mr. Christopher Smith
EPA Project Manager
U.S. Environmental Protection Agency
New England Region
Five Post Office Square, Suite 100
Boston, MA 02109

Re: GE-Pittsfield/Housatonic River Site
Rest of River (GECD850)
Vernal Pool Pilot Study Work Plan

Dear Mr. Smith:

In accordance with Section 4.2.4 of GE's *Final Revised Rest of River Statement of Work* and EPA's February 8, 2023 conditional approval letter for GE's *Vernal Pool Pilot Study Selection Proposal*, enclosed for EPA's review and approval is GE's initial *Vernal Pool Pilot Study Work Plan*.

Please let me know if you have any questions about this work plan or if you would like to discuss it.

Very truly yours,

Kevin G. Mooney
Senior Project Manager – Environmental Remediation

Enclosure

Cc: (via electronic mail)
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June 2023
GE-Pittsfield/Housatonic River Site

ANCHOR QEA
AECOM

Vernal Pool Pilot Study Work Plan

June 2023
GE-Pittsfield/Housatonic River Site

Vernal Pool Pilot Study Work Plan

Prepared for
General Electric Company
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Prepared by
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Project Number: **170469-01.01**

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ABBREVIATIONS

AC	activated carbon
CD	Consent Decree
cm	centimeter
DQO	data quality objective
EA	Exposure Area
EC_{20}	20% effects concentration
EPA	U.S. Environmental Protection Agency
ERA	*Ecological Risk Assessment for General Electric (GE)/Housatonic River Site, Rest of River*
Final Revised SOW	*Final Revised Rest of River Statement of Work*
Final Revised VP Pilot Work Plan	*Final Revised Vernal Pool Pilot Study Work Plan*
Final Vernal Pool Report	*Final Report on Potential Vernal Pool Investigations*
GAC	granular activated carbon
GE	General Electric Company
K_{oc}	organic carbon-porewater partitioning coefficient
MassDFW	Massachusetts Division of Fisheries and Wildlife
mg/kg	milligram per kilogram
μm	micrometer
NHESP	Natural Heritage and Endangered Species Program
OC	organic carbon
PAC	powdered activated carbon
PCB	polychlorinated biphenyl
PDI	pre-design investigation
RD/RA	Remedial Design/Remedial Action
Revised Final Permit	*Revised Final Permit Modification to the 2016 Reissued RCRA Permit and Selection of CERCLA Remedial Action and Operation & Maintenance for Rest of River*
ROR	Rest of River
Selection Proposal	*Vernal Pool Pilot Study Selection Proposal*
SOP	standard operating procedure
SPME	solid-phase microextraction
SWAC	spatially weighted average concentration
TOC	total organic carbon

1 Introduction and Overview

1.1 Background

On December 16, 2020, pursuant to the 2000 Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site, the U.S. Environmental Protection Agency (EPA) issued to the General Electric Company (GE) a final revised modification of GE's Resource Conservation and Recovery Act (RCRA) Corrective Action Permit (Revised Final Permit) for the Housatonic Rest of River (ROR) (EPA 2020). The ROR is defined as that portion of the Housatonic River and its backwaters and floodplain (excluding Actual/Potential Lawns as defined in the CD) located downstream of the confluence of the East and West branches of the Housatonic River (the Confluence). The Revised Final Permit set forth a Remedial Action selected by EPA to address polychlorinated biphenyls (PCBs) in the ROR.

The Revised Final Permit required GE to develop and submit a Statement of Work specifying the deliverables and activities that GE will conduct to design and implement the ROR Remedial Action. In accordance with that requirement, after receipt of EPA's comments on an earlier version, GE submitted a *Final Revised Rest of River Statement of Work* (Final Revised SOW) on September 14, 2021 (Anchor QEA et al. 2021), and EPA approved it on September 16, 2021.

Section II.B.3.b of the Revised Final Permit and Section 4.2.4 of the Final Revised SOW require GE to conduct a pilot study to evaluate the use of both traditional excavation/restoration techniques and amendments, such as activated carbon (AC), for the remediation of vernal pools. They provide further that the first step in the pilot study process is for GE to submit a plan proposing up to 10 specific vernal pools to be included in the pilot study. On November 23, 2022, GE submitted a *Vernal Pool Pilot Study Selection Proposal* (Selection Proposal) (Anchor QEA and AECOM 2022), proposing 10 vernal pools in Reach 5A for inclusion in the pilot study and presenting the rationale for that selection. That submittal also identified which pools would be subject to traditional excavation/restoration methods and which would be subject to placement of an amendment. Following that submittal, EPA requested additional information to support its review of GE's Selection Proposal, and GE provided a supplemental information package to EPA via email on December 15, 2022. On February 8, 2023, EPA issued a conditional approval letter for GE's Selection Proposal.

The Final Revised SOW provides that, following EPA approval of the Selection Proposal, GE will submit a Vernal Pool Pilot Study Work Plan that contains design information related to pilot study activities to be conducted in each of the ten selected pools. This document constitutes an initial version of that work plan, as described further in Section 1.6.

1.2 Summary of Vernal Pool Requirements in Revised Final Permit

Section II.B.3 of the Revised Final Permit sets forth the Performance Standards and other requirements for ROR floodplain soil and vernal pools. It requires remediation of any vernal pool where PCB concentrations in the soil/sediment[1] exceed a spatially weighted average total PCB concentration of 3.3 milligrams per kilogram (mg/kg) (Section II.B.3.b.(1)(a)). This is in addition to any remediation required in the vernal pools to meet the Performance Standards for floodplain soils described in Section II.B.3.a.(1). The Revised Final Permit requires GE to conduct sampling of vernal pools to generate baseline data on the concentrations of total PCBs in soil so as to identify vernal pools that exceed the numerical performance standard (Section II.B.3.b.(2)(b)).

For vernal pools having a spatial average total PCB concentration exceeding 3.3 mg/kg in soil, the Revised Final Permit requires remediation by either: (1) excavation and backfill to pre-excavation elevations to achieve a spatially weighted average concentration of 3.3 mg/kg (removal-based remediation); or (2) placement of an amendment, such as AC or another comparable amendment, in the vernal pool to reduce the bioavailability of PCBs in soil to a level less than or equal to the bioavailability of PCBs associated with the 3.3 mg/kg performance standard (amendment-based remediation) (Section II.B.3.b.(1)(b)).

The Revised Final Permit requires a pilot study to be conducted on no more than 10 vernal pools as a means of evaluating the two approaches for vernal pool remediation (Sections II.B.3.b.(1)(b) & (2)(d)). The Revised Final Permit also calls for the submission of a Pilot Study Work Plan that identifies the methods to be used for the study and the criteria for success (Section II.B.3.b.(2)(d)). The criteria for success must consider the methods for evaluating the reductions in bioavailability achieved by the amendment-based alternative, as well as the impact of such amendments on the ecology of the vernal pools (Section II.B.3.b.(2)(e)).

The results of the pilot study are to be documented in a report describing the effectiveness of both the removal-based and amendment-based remediation in achieving the vernal pool performance standards, as well as the ecological effects of the amendment-based remediation (Sections II.B.3.b.(2)(f) &(2)(g)). Based on the results of the pilot study, EPA will determine the preferred method for remediation and restoration of the remaining vernal pools, considering the Core Area habitat restrictions specified in the Revised Final Permit (Sections II.B.3.b.(1)(b)(iii) & (2)(h)).

1.3 Summary of Existing Vernal Pool Data

GE's *Final Report on Potential Vernal Pool Investigations* (Final Vernal Pool Report) (AECOM 2020) stated that a total of 68 vernal pools had been identified in Reach 5A and were determined to meet both the biological and physical criteria for certification of vernal pools issued by the Massachusetts

[1] In this work plan, the terms soil and sediment are used interchangeably for the substrate in vernal pools.

Division of Fisheries and Wildlife (MassDFW) Natural Heritage and Endangered Species Program (NHESP). After receipt of comments from NHESP, GE revised its evaluation and noted that nine of those 68 pools did not, in fact, meet the applicable vernal pool criteria, leaving 59 identified vernal pools in the Reach 5A floodplain (GE 2021). EPA approved that revised evaluation on March 9, 2021. In addition, EPA directed GE to investigate one additional vernal pool located outside the floodplain east of 5A-VP-24A (identified as 5A-VP-24B) during the non-residential floodplain pre-design investigation (PDI) (Anchor QEA 2022); therefore, this vernal pool was subsequently added to the list. These 60 vernal pools identified in Reach 5A are shown on Figure 1-1.

Total PCB concentrations in the top one foot of vernal pool soils were determined using data collected as part of the 2022 PDI of non-residential floodplain Exposure Areas (EAs) in Reach 5A, supplemented by historical floodplain soil data and other PDI data collected from floodplain residential properties in Reach 5A. As part of the non-residential floodplain PDI, GE collected 371 soil cores in vernal pools in Reach 5A between May and August 2022, yielding a total of 646 samples in either 0- to 0.5-foot and/or 0.5- to 1-foot depth intervals. These samples were generally positioned at an approximate 50-foot spacing for pools greater than approximately 0.1 acre in size, except in one large pool (5A-VP-77), where samples were positioned at an approximate 100-foot spacing. For pools less than 0.1 acre, a minimum of three cores were collected and analyzed.

The historical vernal pool data include samples collected by EPA under its Supplemental Investigation conducted between 1998 and 2002 and other historical floodplain soil samples collected by GE in 1992 as part of the Massachusetts Contingency Plan Phase II Investigation. These two historical field efforts yielded 159 samples in the top one foot of vernal pool soils, with the majority of the samples collected from the surficial 0.5-foot interval (Table 1-1). In addition, GE collected PDI samples on Actual/Potential Lawn properties between 2013 and 2015 and for other Reach 5A floodplain residential properties in 2020 and 2021, yielding a total of 11 samples in vernal pools; these samples were analyzed for PCBs within the 0- to 1-foot interval.

The PCB sample counts in the Reach 5A vernal pools from these programs are shown in Table 1-1, and the PCB data are presented in Appendix A.

Table 1-1
Summary of Total PCB Sample Counts in Reach 5A Vernal Pools

Program	Lead Entity	0–0.5 foot	0.5–1 foot	0–1 foot	Total
1990–1992 Massachusetts Contingency Plan Phase II Investigation	GE	2	2	--	4
1998–2002 EPA Supplemental Investigation	EPA	148	7	--	155
2013–2015 PDI (Actual/Potential Lawn Properties)	GE	--	--	5	5
2020–2021 PDI (Reach 5A Residential Floodplain Properties)	GE	--	--	6	6
2022 PDI (Reach 5A Non-Residential Floodplain EAs)	GE	275	371	--	646
	Total	**425**	**380**	**11**	**816**

Notes:
--: no data

Using the dataset summarized in Table 1-1 and presented in Appendix A, spatially weighted average concentrations (SWAC) for total PCBs within the 0- to 1-foot depth interval were calculated for each of the 60 vernal pools (Table 1-2).[2] Maps depicting the PCB concentrations in the 0- to 0.5-foot and 0.5- to 1-foot depth intervals, and the measured and calculated 0- to 1-foot depth interval are also provided in Appendix A.[3] As shown in Table 1-2, 47 of the vernal pools in Reach 5A have a total PCB SWAC in the top one foot that exceeds the performance standard of 3.3 mg/kg. This is depicted in the cumulative probability distribution shown in Figure 1-2.

GE's 2020 Final Vernal Pool Report summarizes the physical and biological surveys that were conducted on the Reach 5A vernal pools to confirm their status as vernal pools. Physical surveys were conducted in summer 2018 and summer and fall 2019 to document the physical and hydrologic conditions of the pools, including the existence of a permanently flowing outlet. These surveys also established the presence or absence of a reproducing fish population within the pools. Biological surveys were conducted in spring 2018 and 2019 to identify the presence and abundance of obligate and facultative amphibian species for determining whether a pool meets the Massachusetts NHESP criteria for certification as a vernal pool. The results of these surveys are summarized in Table 1-2 (attached).

The investigations and surveys conducted to date provide a comprehensive dataset to characterize the chemical, physical, and ecological conditions of the Reach 5A vernal pools. Additional survey

[2] The details of the data processing conducted prior to calculation of the SWACs are described in Appendix A of the *Second Revised Pre-Design Investigation Work Plan for Non-Residential Floodplain Exposure Areas* (Anchor QEA 2021).

[3] As shown in Table 1-2, the PCB SWAC in the one additional, non-floodplain vernal pool that EPA directed GE to add to the PDI (5A-VP-24B), as discussed in this section, is less than 1 mg/kg. As a result, no further evaluation of this pool is warranted.

data on the vernal pools included in this pilot study will be collected as part of this study, as described in Section 4.1, to further characterize the vernal pools selected for the study.

1.4 Summary of Vernal Pool Pilot Study Selection

As noted in Section 1.1, GE's Selection Proposal (approved by EPA) described the 10 vernal pools to be included in the pilot study. Several criteria were used to select those 10 pools, including: (1) the PCB SWACs in the pools; (2) pool size; (3) pool accessibility; (4) surrounding habitat; (5) known species within the pool; (6) vegetative cover within the pool; and (7) pool hydrology. These 10 pools will receive either removal-based or amendment-based remediation (collectively referred to hereafter as "test pools") during the pilot study. Those 10 pools are listed in Table 1-3 and are shown on Figure 1-1.[4] After EPA's approval of the Selection Proposal, GE selected seven additional vernal pools to be used as field controls (referred to hereafter as "control pools") during the course of the pilot study. The control pools will be used to differentiate any changes that may occur in vernal pool ecology as a result of remediation from changes that may occur naturally. The control pools are likewise listed in Table 1-3 and shown on Figure 1-1. The basis for selecting both the test and control pools for the pilot study is summarized in the following sections.

1.4.1 Test Pools

The criteria used to select the test pools for the pilot study were described previously in the Selection Proposal and are summarized as follows:

- PCB SWAC: Pools covering the approximate range of PCB concentrations observed in the Reach 5A vernal pools were selected as test pools for the pilot study to assess remedy effectiveness in pools with varying PCB concentrations. The calculated PCB SWACs of all Reach 5A vernal pools range from 0.08 to 77 mg/kg, and the PCB SWACs in the 10 selected test pools range from 6.3 to 45 mg/kg (Table 1-3).

- Size: Vernal pools of varying sizes were selected for the pilot study. The mean size of all confirmed vernal pools in Reach 5A is approximately 0.36 acre. Vernal pools were designated as "average" in size if their size was within 50% of the mean value (i.e., between 0.18 and 0.54 acre). Pools larger or smaller than this range were designated as "large" or "small,"

[4] EPA's February 8, 2023, conditional approval letter stated that GE had proposed a reasonable mix of vernal pools, but that, in preparing GE's Vernal Pool Pilot Study Work Plan, "it may become apparent that certain Vernal Pools should be added to or removed from the program to achieve the study objectives," and that in that plan. GE should "propose changes to the list of selected vernal pools as needed to achieve study objectives." No changes have been made at this time to the list of selected test vernal pools. However, in response to EPA's directive, changes may be made after, and based on the results of, the baseline monitoring and survey described in Section 4.1 and will be presented in the Final Revised Vernal Pool Pilot Study Work Plan described in Section 1.6. In particular, changes to the pool selection (for both test and control pools) would be made if significant deviations from the previously documented conditions are observed during baseline monitoring.

respectively. Of all Reach 5A vernal pools, 20 are "average," 10 are "large," and 30 are "small." Of the test pools selected for the pilot study, five are "average," two are "large," and three are "small" (Table 1-3).

- Accessibility: Many of the vernal pools in the Reach 5A floodplain are difficult to access for several reasons (e.g., located far from any existing road or upland access point, located far from the river channel, or containing extensive vegetation in the vicinity of the pool). Pools with reasonable accessibility from an upland access point or from the river channel were given preference as test pools for the pilot study (Table 1-3).

Table 1-3
Summary of Vernal Pools Selected for the Pilot Study and Control Pools

Vernal Pool ID	Area (acres)[1]	Total PCB SWAC (0–1 foot; mg/kg)	Parcel Owner[2]	Accessibility	Pool Type
5A-VP-9	0.60 (Large)	45	MassDFW	Accessible via easement to the north (EA 4)	Amendment
5A-VP-12	0.27 (Average)	25	Private (Miss Hall's School)	Access from river	Amendment
5A-VP-15	0.37 (Average)	28	Private (Parcel I6-3-1)	Accessible via easement to the north (EA 4)	Amendment
5A-VP-22	0.82 (Large)	6.3	MassDFW	Accessible via easement to the east (EA 12)	Amendment
5A-VP-27	0.08 (Small)	7.7	Private (Parcel J5-2-11)	Accessible via easement to the west (EA 12)	Amendment
5A-VP-4	0.23 (Average)	15	MassDFW	Accessible via private residential property to the north (Parcel I6-1-60)	Excavation/ Restoration
5A-VP-7	0.41 (Average)	34	MassDFW	Accessible via easements to the north (EA 4) and west (EA 61)	Excavation/ Restoration
5A-VP-16	0.04 (Small)	6.8	Private (Parcel I6-3-1)	Accessible via easement to the north (EA 4)	Excavation/ Restoration
5A-VP-52	0.06 (Small)	40	MassDFW	Accessible via easement to the west (EA 12)	Excavation/ Restoration
5A-VP-57	0.49 (Average)	30	MassDFW	Accessible via easement to the west (EA 12)	Excavation/ Restoration
5A-VP-3	0.39 (Average)	18	MassDFW	Accessible via private residential property to the north (Parcel I6-1-60)	Control
5A-VP-5	0.33 (Average)	2.7	MassDFW	Accessible via private residential property to the north (Parcel I6-1-60)	Control
5A-VP-10	0.17 (Small)	6.5	MassDFW	Accessible via easement to the south (EA 4)	Control

Vernal Pool ID	Area (acres)[1]	Total PCB SWAC (0–1 foot; mg/kg)	Parcel Owner[2]	Accessibility	Pool Type
5A-VP-21	1.65 (Large)	3.1	Private (Parcel J5-2-5)	Accessible from Holmes Road	Control
5A-VP-26	0.08 (Small)	3.4	Private (Parcel J5-2-11)	Accessible via easement to the east (EA 12)	Control
5A-VP-55	0.25 (Average)	25	MassDFW	Accessible via easement to the west (EA 12)	Control
5A-VP-61	0.26 (Average)	2.1	MassDFW	Accessible from the river or via property to the west or south	Control

Notes:

1. The average size of the confirmed vernal pools in Reach 5A is approximately 0.36 acre; a pool was defined as "average" in size if its size was within 50% of this average value. Pools that are larger or smaller are identified as "large" or "small."
2. Inclusion of these pools is contingent on the ability to obtain access agreements from the property owners.

- Surrounding habitat: In selecting the test pools for the pilot study, an effort was made, where possible, to avoid pools where surrounding sensitive habitat might be particularly adversely affected by construction activities, such as proximity to other vernal pools, areas with a potential direct hydrologic connection to the river, proximity to local residences, or proximity to Core Area 1 habitats.

- Core Area 1: Section 4.2.4 of the EPA-approved Final Revised SOW stated that no vernal pools located within Core Area 1 habitat would be selected for the pilot study. Fifteen of the vernal pools in Reach 5A are located in Core Area 1 habitat and, therefore, were eliminated from consideration for the pilot study.

- Known species within pool: The pilot study selection process included the selection of vernal pools that supported both obligate and facultative vernal pool species. Priority was placed on selecting test pools where more numerous obligate species (e.g., wood frogs) have been documented, although one test pool was confirmed as a vernal pool based only on the presence of fairy shrimp (which is not uncommon in the Reach 5A floodplain).

- Vegetative cover within pool: While not a significant factor in the selection process, the test pools selected for the pilot study contain a range of habitat cover types, including open-water, deep marsh, shallow marsh, shrub swamp, and forested swamp. An effort was made to select test pools that encompass a range of cover types, rather than focusing on only one habitat type.

- Pool hydrology: Given that most vernal pools are normally dry for a portion of the year, preference was given to pools that exhibited a typical vernal pool hydrology rather than being wetter or drier than a "normal" pool.

1.4.2 Control Pools

Seven control pools (Table 1-3 and Figure 1-1) have been selected to monitor vernal pool conditions before, during, and after remediation to differentiate changes that may occur in vernal pool ecology because of remediation from changes that may occur naturally. The selection of these pools was based on proximity to the test pools and existing background data to consider pools with similar characteristics as those described in Section 1.4.1 for the test pools.[5]

The seven pools selected as control pools are classified as certifiable vernal pools based on containing obligate vernal pool species. As shown on Figure 1-1, all but one control pool was selected based upon its proximity to test pools. For example, six of the selected test pools are upstream of the Pomeroy Avenue Bridge (three subject to excavation/restoration and three subject to placement of an amendment). Three of the seven control pools were selected within this same reach (5A-VP-3, 5A-VP-5, and 5A-VP-10), all within the contiguous transitional floodplain forest that encompasses this area. These pools were selected as control pools to provide information on undisturbed breeding activity within this contiguous floodplain area (which may comprise a network of vernal pools) to compare with observations of such activity within the six test pools in this same area.

Similarly, three additional control pools were selected downstream of Holmes Road (5A-VP-21, 5A-VP-26, and 5A-VP-55) based on their proximity to the test pools in that area (Figure 1-1). One additional control pool (5A-VP-61), located relatively far from any of the test pools, was selected to provide information on vernal pool breeding activity in a location that is unlikely to be impacted by activities associated with treatment during the pilot study (Figure 1-1).

1.5 Pilot Study Objectives

The principal objective of the vernal pool pilot study is to evaluate the effectiveness and potential adverse impacts of amendment-based and removal-based remediation of the pools so as to facilitate selection of an appropriate remedial approach for the remaining vernal pools in Reach 5A, as well as those in downstream reaches. To achieve this objective the following activities will be conducted prior to implementation of the pilot study itself:

- Establish a porewater-based performance criterion that can be used to evaluate the effectiveness of the amendment-based alternative to reduce the bioavailability of PCBs to a

[5] As noted, these seven pools will serve as controls for the purposes of the pilot study. However, as shown in Table 1-3, four of these seven control pools have a total PCB SWAC greater than 3.3 mg/kg and will therefore be subject to future remediation after the pilot study results are evaluated and approved by EPA. The scope of remediation in those pools will be presented in an addendum to the Final RD/RA Work Plan for Reach 5A, as described in Section 4.4.

level less than or equivalent to the bioavailability of PCBs associated with 3.3 mg/kg total PCBs in vernal pool soils.

- Identify ranges of amendment types, doses, and application methods that could be used to achieve the porewater-based performance criteria by conducting bench-scale treatability tests.

- Establish the physical, chemical, and/or ecological metrics and criteria that will be used during and after the pilot study to evaluate the effectiveness of the amendment-based and removal-based alternatives.

- Develop a monitoring program to assess the performance of the amendment-based and removal-based alternatives.

- Finalize the experimental design of the pilot study to facilitate implementation of both the amendment-based and removal-based alternatives in the field, including final plans, specifications, sequencing, and schedule.

1.6 Pilot Study Design Process

The pilot study design will be developed using the following approach, which is graphically depicted on Figure 1-3.

- This initial Vernal Pool Pilot Study Work Plan outlines the performance criteria, describes the process for selecting the amendment(s) and application requirements, identifies the anticipated footprint for removal and amendment application, and describes the metrics and monitoring (before, during, and after remediation) to evaluate the effectiveness of the remediation approach used. This initial work plan also provides the experimental design of bench-scale testing to be conducted to evaluate various amendment types, doses, and application methods.

- A Revised Vernal Pool Pilot Study Work Plan will be submitted concurrently with the Conceptual Remedial Design/Remedial Action Plan (RD/RA) Work Plan for Reach 5A (anticipated to be submitted in fall 2023) or within 60 days of receipt of EPA's approval or conditional approval of this initial work plan, whichever is later. That revised work plan will: (1) address any EPA comments on this initial work plan; (2) propose any changes to the baseline monitoring and ecological survey program (described below) based on EPA comments or otherwise; (3) present the final experimental design for bench-scale testing of amendments (as needed); and (4) describe the conceptual design of the pilot study implementation, including conceptual plans, specifications, and sequencing (e.g., vernal pool access, amendment applications, soil removal, transportation, and disposal, and vernal pool restoration). GE will request EPA approval of this revised work plan before proceeding with the baseline monitoring program and the bench-scale testing program to support amendment selection and final design of the amendment-based alternative.

- A Final Revised Vernal Pool Pilot Study Work Plan (Final Revised VP Pilot Work Plan) will be submitted within 60 days following completion of the bench-scale testing or receipt and validation of the final data from the baseline monitoring program, whichever is later. The final revised work plan will: (1) present the results of the baseline monitoring/survey; (2) document the results of the amendment-based bench-scale testing; (3) provide a final list of the vernal pools to be included in the pilot study; (4) finalize the experimental design of the pilot study by formally establishing the types, doses, and delivery methods for the amendment treatments; and (5) present the final design of the pilot study implementation for both the amendment-based and removal-based alternatives, including final plans, specifications, sequencing, and schedule.

The anticipated schedule for the vernal pool pilot study is provided in Section 4.4.[6]

1.7 Work Plan Organization

The remainder of this initial Vernal Pool Pilot Study Work Plan is organized into the following three sections:

- Section 2 establishes the removal-based, porewater, and ecological performance criteria that will be used to assess effectiveness during the pilot study.
- Section 3 presents a review of potential amendment types, amendment doses, and application methods that will be considered for use and evaluation in the pilot study. This section also describes a bench-scale study that will be used to further understand amendment performance in a simulated vernal pool environment.
- Section 4 presents the vernal pool pilot study implementation plan describing the baseline monitoring program, the pilot study design, the pilot study monitoring and data evaluation, and the overall pilot study schedule and reporting schedule.

[6] As discussed further in Section 4.4, GE has considered the relative timing of the amendment- and removal-based remediation activities and has determined that those activities would best be conducted concurrently to minimize potential environmental variables that could impact the restoration or ecological effectiveness.

2 Pilot Study Performance Criteria

This section presents the performance criteria that will be used to evaluate the removal-based and amendment-based treatments during the pilot study.

2.1 Removal-Based Performance Criterion

As discussed in Section 1.2, the performance standard for vernal pools is to achieve a SWAC of 3.3 mg/kg for total PCBs in the upper one foot of soil of each pool. This standard was used to establish the pilot study design for the five pools currently selected for the removal-based alternative: 5A-VP-4, 5A-VP-7, 5A-VP-16, 5A-VP-52, and 5A-VP-57. PCB-containing soils will be excavated to the depth of one foot and then backfill material will be placed to grade to achieve a post-remediation PCB SWAC equal to or less than 3.3 mg/kg.

Among the five pools selected for removal, 5A-VP-7 is within Core Area 2 habitat and 5A-VP-52 and 5A-VP-57 are within both Core Areas 2 and 3 habitats (see Figure 1-1). Best construction practices will be developed and implemented during the pilot study to minimize potential adverse impacts from access and excavation activities in these vernal pools on species associated with these Core Area habitats.[7]

2.2 Porewater Performance Criterion

As described in Section II.B.3.b.(1).(b).i of the Revised Final Permit, the treatment of vernal pools with an amendment is required reduce the bioavailability of PCBs in the vernal pool soil "to a level less than or equivalent to the bioavailability of PCBs associated with 3.3 mg/kg total PCBs in sediment." This section presents the framework for establishing a porewater-based performance criterion that will be used to assess whether an appropriate reduction of PCB bioavailability has been achieved within these pools.

The use of carbon-based amendments (e.g., AC) has been demonstrated to reduce PCB bioavailability in sediment and soils by sorbing PCBs so that they are not present, or present in substantially reduced concentrations, in the porewater, which is considered the phase in which aquatic organisms uptake PCBs. Adding amendment to soil or sediment containing PCBs does not significantly alter the total sorbed-phase concentration measured by traditional solid-phase sample analytical techniques. Therefore, the development of a porewater-based performance criteria is needed to assess the effectiveness of the amendment as a viable remedial technology within the vernal pools.

[7] As discussed above, in accordance with the Final Revised SOW, vernal pools located within Core Area 1 habitat were not selected for the pilot study.

A porewater-based performance standard for the vernal pools is best derived from the data produced during the site-specific wood frog toxicological study that established the 3.3 mg/kg total PCB performance standard, which is described in Appendix E of the *Ecological Risk Assessment for General Electric (GE)/Housatonic River Site, Rest of River* (ERA; Weston 2003). That performance standard was established based on the observed 20% effects concentration (EC_{20}) for malformations in wood frog Phase III metamorphs (ERA Table E.4-1). The EC_{20} represents the total PCB concentration at which 20% of the Phase III metamorphs exhibited malformations attributed to PCB exposure as established using a probit analysis.[8] According to equilibrium partitioning principles (e.g., Karickhoff 1984), porewater PCB concentrations are expected to be in equilibrium with the organic carbon (OC) fraction of the soil phase PCBs; thus, an assessment of the equivalent EC_{20} on an OC-normalized PCB basis provides a means of deriving the porewater PCB performance standard. The data used to establish a dose-response relationship between spatially weighted mean total PCB concentrations in sediment and Phase III metamorph malformations in the vernal pools tested in the wood frog study were presented on a dry weight basis in Table E.3-11 and on an OC-normalized basis in Table E.2-10 of the ERA. These data are reproduced in Table 2-1 (below) for convenience. Applying the same probit analysis to the OC- normalized data from the wood frog study yields an EC_{20} for total PCBs on an OC-normalized basis of approximately 110 mg/kg OC (see Figure 2-1).

Table 2-1
Summary of Malformed Metamorphs of Wood Frogs and Sediment PCBs in Vernal Pools

Vernal Pool ID[1]	Sediment PCBs Mean (mg/kg)[2]	Sediment PCBs SWAC (mg/kg)[2]	OC-Normalized Sediment PCBs (mg/kg OC)[3]	Malformed Metamorphs (%)[2]
8-VP-1	14.5	24.6	275	66.7
18-VP-2	6.05	4.9	127	26.9
23b-VP-1	0.19	0.21	2.49	4.9
23b-VP-2	0.11	0.3	1.24	5.9
38-VP-1	28	28.5	430	41
38-VP-2	62	32.3	675	51.5
46-VP-1	0.5	0.8	4.18	8.6
46-VP-5	2.18	0.7	72.6	9.2

Notes:
1. These are vernal pool IDs used in the ERA (Weston 2003), which are different from the current vernal pool IDs.
2. Values from Table E.3-11 of Appendix E to the ERA.
3. Values from Table E.2-10 of Appendix E to the ERA.

Using Equation 1, a total PCB porewater performance standard can then be calculated from the OC-normalized removal-based performance criterion of 110 mg/kg OC and a site-specific partitioning

[8] A probit model was fit to the study data based on transforming the percent malformation values by the probit transformation and the concentration variable by log10 transformation before fitting a linear relationship to the data (Weston 2003).

coefficient (i.e., organic carbon-porewater partitioning coefficient [K_{oc}]) for total PCBs. For example, using the site-specific log K_{oc} value of 6.4 established from studies documented in GE's 2003 RCRA Facility Investigation Report,[9] the associated total PCB porewater performance standard would be approximately $4x10^{-5}$ milligrams per liter (or 40 nanograms per liter). It is recognized that PDI data to support the in-river sediment cap design should include paired porewater and sediment PCB samples that are being used to verify and refine the understanding of porewater partitioning in Reach 5A, as will be described in the forthcoming Conceptual RD/RA Work Plan for Reach 5A. Similarly, paired porewater and soil data will be collected from vernal pools as part of the baseline monitoring to be conducted for this pilot study, as discussed in Section 4.1.1. Together these datasets will be used to develop a refined K_{oc} value that will be used to support the calculation of a final porewater PCB equivalent performance standard. Hence, the final porewater performance standard to be applied to each of the vernal pools receiving amendment-based treatment will be computed as described previously and will be presented in the Final Revised VP Pilot Work Plan.

Equation 1

$$PC_{PW} = \mathrm{PC}_{S-OC}/K_{OC}$$

where:

PC_{PW}	=	The porewater performance criterion (milligrams per liter)
PC_{S-OC}	=	The OC normalized removal-based performance criterion (100 mg/kg OC total PCBs in soil)
K_{OC}	=	The site-specific OC partition coefficient (liters per kilogram)

2.3 Ecological Performance Criteria

Both the removal-based and amendment-based remediation will also be evaluated based on their potential adverse ecological impacts. As indicated in Section II.B.3.b.(2)(e) of the Revised Final Permit, the criteria for success and the means of assessing the ecological effects of these alternatives will be based upon comparisons of pre-remediation and post-remediation conditions. To accomplish this, the selection of parameters to be evaluated needs to consider the availability of background data, as well as the natural variability in vernal pool dynamics that occurs within and between years. These considerations indicate that the ecological performance criteria should be based on a relatively basic set of parameters that can be readily documented and compared with pre-remediation conditions while considering the contemporaneous dynamics as represented through monitoring of the control

[9] Specifically, the log K_{oc} of 6.4 was derived from site-specific data from the Housatonic River obtained as a cooperative effort by GE and EPA in 2001 (see Weston 2002; BBL and QEA 2003).

pools. Accordingly, the following field parameters will be measured in both the test and the control vernal pools:

- Pool hydrology: Pool hydroperiod will be monitored relative to amphibian larval development and maximum flooding depths will be determined.
- Egg mass/fairy shrimp surveys: Springtime egg mass count/fairy shrimp surveys of obligate vernal pool species will be conducted to document presence and obtain estimates of local population size.
- Plant community surveys: Vegetation surveys will be conducted to quantify percent cover of the different vegetation layers within each pool (i.e., herbs, woody shrubs, trees, and vines) and to develop a list of observed plant species. These surveys may involve sampling in pre-established vegetation monitoring plots, line-intercept transects, or other accepted standard methods. Vegetation surveys will assess plant health or vigor, community composition, canopy cover, and presence of invasive species.
- Water quality: Basic water quality data will be collected (i.e., turbidity, temperature, dissolved oxygen, specific conductance, and pH).
- Other physical features: Pool bathymetry will be measured before and after treatment. Also, the physical effects (e.g., soil texture, field capacity, covering of surface organic soils) of adding amendments to surface soils and organic material will be assessed.

The timing and duration of these measurements are discussed in Sections 4.3.1 and 4.3.2.

The ecological performance criterion for evaluating the impacts of amendment application or removal and restoration activities on vernal pool environments is that the remediation should not adversely affect the physical characteristics of the vernal pools so as to prevent their continued viability as vernal pools. Comparison of post-remediation results from the test pools to those from the control pools will be used to assess whether any observed deviations from pre-remediation conditions are a result of the remedial activities or natural year-to-year variation. More specifically, this performance criterion will be evaluated by assessing the physical conditions of the restored pools relative to each pool's pre-remediation condition and by conducting within-year comparisons to control pools that have similar pre-remediation physical and biological conditions. Comparisons will consider the key physical parameters that are recognized as determining vernal pool viability, including the following:

- Spring/early summer temporary flooding for a duration sufficient to allow obligate vernal pool species (obligate amphibians or fairy shrimp) to carry through their breeding cycle (i.e., through metamorphosis and emigration from pools into the adjacent landscape), typically 60 to 90 days during years of relatively normal precipitation (e.g., flooded conditions from April through June for wood frogs and spotted salamanders);

- Lack of surface inlets or outlets that would provide surface water conduits for predatory fish to access the pool; and
- Availability of habitat features that indicate development of primary productivity/food sources and provide refuge for developing larvae and egg attachment sites for adult amphibians (e.g., vegetative growth, well developed leaf-litter/duff layer, and presence of coarse and fine woody debris).

3 Amendment Selection Process

This section first summarizes a review of existing information from the technical literature on amendment types, doses, and application methods. It then discusses the amendment types, doses, and application method that will be evaluated through bench-scale testing to select the appropriate form, dose, and delivery method needed to achieve the porewater-based performance criterion described in Section 2.2. Finally, this section will describe the experimental design for the bench-scale testing.

3.1 Literature Review

This section provides a focused review of the technical peer-reviewed literature on amendment types, doses, and application methods used to control the bioavailability of hydrophobic organic compounds such as PCBs within soils and aquatic sediments and identifies data gaps that need to be further evaluated through bench-scale testing.

3.1.1 Amendment Types

Selection of appropriate amendment types to treat PCB contamination in vernal pools is centered on optimizing the efficacy of reducing porewater PCB concentrations, ecosystem response, cost, commercial availability, and long-term sustainability of the targeted porewater PCB concentration reductions.

3.1.1.1 PCB Sequestration

In-situ remediation of PCB-containing soil and sediment is typically performed with a carbonaceous amendment such as AC or biochar. These amendments have been shown through many bench, pilot, and field-scale applications to effectively reduce bioavailable concentrations of PCBs (e.g., Bridges et al. 2020; Patmont et al. 2014; Ghosh et al. 2011; Fagervold et al. 2010). Carbonaceous amendments are particularly effective at reducing bioavailability of PCBs due to the large surface area that is a result of the amendments' extensive pore network. Addition of these carbonaceous amendments can produce reductions in porewater PCB concentrations of up to 99% in sediments and soils (Bridges et al. 2020; Patmont et al. 2014; Ghosh et al. 2011). Uptake of PCBs by carbonaceous amendments is generally controlled by the internal pore structure of the amendment, with ACs typically providing reductions of PCB bioavailability by one or more orders of magnitude greater than natural organic matter (Gomez-Eyles et al. 2013). The highly porous structure of an AC is produced by randomly oriented graphite stacks that are produced from thermal and chemical activation of coal-based (bituminous or lignite) or coconut shell-based feedstock. Coal- and coconut shell-based ACs have become the predominant source for ACs used for in-situ sediment and soil remediation because of their highly porous structure and even distribution of pore sizes (small and large pore sizes) (Abel et al. 2017).

Typically, one of three types of carbonaceous amendments is used for the in-situ remediation of PCB-containing sediments and soils: (1) powdered activated carbon (PAC); (2) granular activated carbon (GAC); or (3) biochar. ACs can be manufactured in a wide range of particle sizes but are typically divided into two categories: (1) GAC, defined as AC particle sizes greater than 180 micrometers (µm) (commercially available GAC products are typically between 420 and 840 µm); and (2) PAC, defined as AC particle sizes smaller than 180 µm (commercially available PAC products are typically between 44 and 74 µm). Typically, PAC provides faster uptake and greater overall reductions in bioavailability than GAC, due to the higher surface area to volume ratio and shorter particle pore scale diffusion distances (Shen et al. 2023; Choi et al. 2013; Zimmerman et al. 2005). Impacts from pore space blocking and competitive sorption have a larger effect on GAC, because a greater proportion of the surface area is located within the internal pore spaces in GAC than PAC.

Activated biochars are produced from thermal and chemical activation of biomass, such as wood chips, nut shells, or poultry litter, and are considered a less expensive and more environmentally beneficial alternative for AC when selected for appropriate sites (Gomez-Eyles et al. 2013). Activated biochars, while commercially available, are not commercially produced for PCB sequestration, and the performance of biochar can vary widely based on the type of biomass used (Gomez-Eyles et al. 2013). In addition to variability in performance, activated biochars have lower density and settling rates than AC, which presents engineering challenges to be considered for effective application in sediment environments and stability in soil and sediment environments. Because of these limitations, biochars are rarely used for in-situ PCB remediation. However, biochars have been retained for further consideration because of their use in improving soil productivity (Lehmann and Joseph 2009), as discussed further in Section 3.1.1.2.

3.1.1.2 Ecological Impacts

Literature investigating the ecological impacts associated with AC applications to sediment environments has focused on quantifying the impact on benthic invertebrates. There is general consensus that the application of AC is not acutely toxic to benthic invertebrates (Ramo et al. 2021; Lillicrap et al. 2015; Jansen and Beckingham 2013). AC has been classified as a potential physical or mechanical stressor leading to a reduction in growth and changes in behavior (Lillicrap et al. 2015), but the magnitude of these ecological impacts is highly dependent on the following factors: species present, sediment characteristics, AC particulate size, and in-situ AC dose.

Ecological impacts on benthic and terrestrial organisms vary by species; typically, the lower trophic-level sediment-dwelling organisms, such as *Lumbriculus varigatus, Chironomus riparius,* and *Arenicola marina* species, experience the most extensive impacts. Adverse effects, such as reduced growth, biomass, and emergence rate or lower feeding rates, are typically observed during laboratory exposures. However, field-scale studies have produced contradictory results, with some measuring reduced species richness, abundance, and biomass following AC placement

(Beckingham et al. 2013; Jansen and Beckingham 2013; Kupryianchyk et al. 2012a,b; Cornelissen et al. 2011) and others showing little to no observable impact following AC placement (Janssen et al. 2013; Cho et al. 2009)

Community-level effects in field-scale studies typically show less pronounced effects than observed in the laboratory due to recolonization by organisms from areas outside the AC application and dilution of the AC amendment (Rakowska et al. 2012). Dilution can occur in field applications where loading of organic matter and nutrients from nearby habitats provides supplemental food sources for the impacted organisms and the impact of adverse effects can be ameliorated.

Not all ecological impacts can be attenuated by scaling up from bench to field scale. AC particle size can directly impact benthic invertebrates such as worms that feed directly on sediment or soil (i.e., *Neathes arenaceodentata*, a marine polychaete worm). Janssen et al. (2011) investigated the effect of various particle sizes of AC – non-ingestible coarse (600 to 1,000 µm), ingestible (180 to 350 µm), and fine (45 µm) – on *Neathes arenaceodentata* growth and survival. In general, sediment type, AC dose, and AC particle size did not significantly impact survival rates in PCB-contaminated sediment. In this study, exposure to untreated PCB-contaminated sediments resulted in significant organism weight loss of between 12% and 26%. Sediment amended with 20% non-ingestible coarse AC particles resulted in even greater organism weight loss. Ingestible medium-sized AC and non-ingestible coarse AC amendments did not result in statistically significant differences in organism weight loss. Additional food sources increased overall organism weight, but organisms exposed to AC amendment with food gained less weight than organisms in untreated sediment with food. This may be attributed to sorption of food borne nutrients to AC rather than to natural sediment particles. The study concluded that organism health decline in sediment may be attributed to general starvation more than to AC exposure. Overall, in this study, sediment type, AC dose, and AC particle size did not significantly impact survival rates in PCB-contaminated sediment.

While activated biochars, have not been studied as extensively as ACs, the available literature suggests they do not produce the same type or level of adverse ecological impacts when amended at the same or greater dose as AC (Gomez-Eyles and Ghosh 2013; Erikson 2016). Therefore, biochars are typically viewed as useful soil amendments because of their use for improving soil productivity (Lehmann and Joseph 2009).

3.1.2 Amendment Dose

The ability for AC or biochar to reduce porewater PCB concentrations in sediment or soil is dependent on the rate of mass transfer from porewater to the AC or biochar particles and on the amount of amendment per unit mass of sediment (i.e., dose). Desorption of a contaminant from sediment is limited by diffusive mass transfer along the porous AC structure. Over periods of months or years, adsorption of hydrophobic organic compounds, such as PCBs to AC, may be kinetically limited by slow diffusion toward the AC particle center. To combat this rate-limiting factor, increasing the dosage (or number of particles) directly increases the mass transfer rate by providing a greater amount of potential binding sites. When applied at the optimized dose (often similar to the native total organic carbon [TOC] content), porewater concentrations and bioavailability of PCBs can be reduced by 70% to 99% (Bridges et al. 2020; Patmont et al. 2014; Ghosh et al. 2011). Additionally, the sequestration of PCBs by AC or biochar often becomes more effective over time due to progressive mass transfer (i.e., mass transfer within the AC particle) (Millward et al. 2005; Zimmerman et al. 2005; Werner et al. 2006; Sun et al. 2009; Ghosh et al. 2011; Cho et al. 2012).

Both field and laboratory studies show that AC doses ranging from 1.7% to 4% of sediment or soil dry weight reduce release of PCBs from sediment or soil into the aqueous phase by 74% to 99% over approximately 18 months (Piuly and Ghosh 2011; Abel et al. 2017). AC doses calculated through modeled porewater reductions generally overpredict actual reductions in porewater concentrations. This bias can be attributed to organic matter blocking sorption sites not accounted for in the sorption models (Gomez-Eyles et al. 2013). This competitive sorption of AC binding sites has a much larger effect on GAC than on PAC, since GAC relies on intraparticle diffusion because of its higher internal pore space as compared to PAC. Because of this, the relative composition of organic matter (including natural organic matter and dissolved OC) within the vernal pools and the type of amendment being used must be considered when designing the amendment dose.

Higher amendment doses can have an adverse impact on benthic organisms, but depending on site-specific factors, may result in minimal additional reduction in PCB bioaccumulation. For example, one controlled laboratory study did not show statistically significant additional reductions in PCB bioaccumulation in a case where the AC dose was doubled (Abel et al. 2017); this was attributed to the lower dose providing sufficient binding sites for the level of PCB contamination. To avoid unnecessary ecological impacts, AC or biochar dosages should be tested in a bench-scale setting to determine the minimum dose required to reduce porewater PCB concentrations to an appropriate level to achieve the porewater performance criterion (Section 2.2). As noted previously, activated biochars do not produce the same type or level of adverse ecological impacts when amended to soils or sediments, so activated biochars are typically applied at higher doses than AC.

3.1.3 Application Methods

Studies have examined the cost and benefits of several methods of amendment application to reduce contaminant concentration in porewater and bioaccumulation. These methods generally fall under two categories: placement and mixing.

3.1.3.1 Placement

Placement of an amendment can be made in a thin layer or in a thicker layer combined with sand, clay, or topsoil. Thin-layer placement is a less laborious AC or biochar application method than direct mixing but typically requires a higher dose of amendment and a longer duration to achieve performance criteria. The latter is because this method relies on organisms to mix the amendment deeper into the vernal pool soils to provide enough PCB sorption to achieve the required degree of porewater concentration reduction. Thin-layer placement replaces the surface with the amended material. Hence, the risk of amendment loss due to wind drift and other uncontrolled variables in the environment is higher than in methods involving the mixing of the amendment with surface soils or a delivery matrix prior to placement. Thin-layer placement creates a longer diffusion pathway for contaminants in deeper sediment layers and allows for additional factors, such as AC weathering or sorption of natural organic matter, to reduce the effectiveness of the AC or biochar over time. Although natural processes such as bioturbation can aid thin-layer placement in mixing with deeper layers, these processes are much slower than physical mixing.

The placement of a thicker layer of AC or biochar mixed with sand, clay, or topsoil is an alternative to thin-layer placement. The thicker placement layer (analogous to a cap) provides a new clean surface, and the homogenously mixed amendment allows for contaminant sequestration as the PCBs diffuse up through the placement layer. Because AC retains remediation efficiency for many years after placement, the effectiveness of the AC or biochar amendment often increases over time due to progressive mass transfer (Millward et al. 2005; Zimmerman et al. 2005; Werner et al. 2006; Sun et al. 2009; Ghosh et al. 2011; Cho et al. 2012). However, the placement of amendments in a thicker layer of material can undesirably alter the topography of the treated area and smother existing flora and fauna, requiring recolonization.

3.1.3.2 Mixing

Mixing directly incorporates the AC or biochar amendment into the surficial soil or sediment layers, typically the top 0.5 to 1.0 feet. This enhanced contact between the amendment and the PCB-containing soils accelerates the reduction of porewater PCB concentrations relative to that which may occur naturally through bioturbation alone (Rakowska et al. 2012). AC amendments that mixed into the surface sediments provide greater contaminant-binding efficiency due to the homogeneity of AC particle distribution than the same amount of AC placed in a thin layer above the sediment (Abel et al. 2017).

In one study, rototillers, tine sleds, and trim pipes used to facilitate mixing in a tidal mudflat environment improved the efficacy of in-situ AC amendment, such that AC levels retained in sediment after five years were comparable to the original target dose (Cho et al. 2009). Measurements of bioavailable PCB during this study showed that using a one-time, 30-minute mixing event reduced porewater PCB concentrations by more than 50% compared to a static application. However, such high-energy mixing events can disturb flora or fauna habitat within the mixing zone. In such instances, recovery of the ecological system relies on recolonization or replanting to establish habitat after construction. However, in many cases, recolonization can be rapid. Indeed, in two field studies where AC was directly mixed into the surface sediment, most species recovered via recolonization within months following remedial treatment (Cho et al. 2012; Abel et al. 2017).

3.2 Selected Amendment Types, Doses, and Application Method

Carbon-based amendments are the primary means of reducing bioavailability of PCB in both sediment and soil environments. ACs are the most widely used in-situ sediment and soil sequestration amendment worldwide and have successfully reduced bioavailable concentrations of PCB in wetland environments considered similar to the vernal pools (Patmont et al. 2014). Consequently, both PAC and GAC will be retained for further study during bench-scale testing. Additionally, biochar has been shown to reduce PCB bioavailability at the laboratory and pilot scale but has not been implemented as a full-scale remedy (Denyes et al. 2012; Gomez-Eyles et al. 2013). Considering its beneficial impact on soil quality, biochar will also be retained for bench-scale testing.

Typical AC applications target an in-situ dose between 1% and 10% by dry weight in field settings, although field trials and experimental studies suggest that potential negative ecological effects can be minimized by maintaining finer-grained AC doses below approximately 5% (Patmont et al. 2014). As a result, AC will be tested at doses of 1%, 2%, and 5% by dry weight. Activated biochars do not produce the same type or level of adverse ecological impacts when amended to soils or sediments, and therefore can be applied at higher doses. Because of this, activated biochars will be tested at the bench-scale at 5% and 10% by dry weight.

Finally, application methods using both placement and mixing will be retained for bench-scale testing.

3.3 Bench-Scale Testing Design

The specific data quality objectives (DQOs) for the bench-scale testing to be performed in support of the vernal pool pilot study are as follows:

DQO 1. Provide data to evaluate the effectiveness of biochar, as compared to AC, to sequester porewater PCBs in vernal pool soils.

DQO 2. Provide data to determine the minimum effective AC (GAC and PAC) or biochar dose needed to achieve the porewater performance criteria.

DQO 3. Compare the effectiveness of different placement methods, including thin-layer placement, amended cover placement (AC and sand mixture), and mixing.

DQO 4. Provide data to evaluate the time to achieve the porewater performance criteria.

Comparison of the effectiveness of amendments and the identification of a minimum effective dose (DQO 1 and DQO 2) can be readily evaluated through bench-scale jar testing in which site soils are amended with AC or biochar at specific doses. Soil porewater PCB concentrations measured using passive samplers provide the data to assess achievement of the porewater performance standard. The comparison of different placement methods (DQO 3) and the time required to achieve the porewater performance criteria (DQO 4) are best evaluated using bench-scale column tests (instead of jar tests) because these tests provide a means to simulate anticipated in situ conditions within the vernal pools, including the impact of drying and wetting on mass transfer kinetics. The bench-scale jar and column tests are discussed in detail in Sections 3.3.1 and 3.3.2.

The vernal pools soils required for the bench-scale jar and column tests will be collected from the five vernal pools selected for amendment-based treatment. As discussed in Section 4.1.1, the soil sampling locations in those pools that were sampled during the PDI of non-residential EAs will be resampled for TOC and PCBs as part of the pilot study baseline monitoring and survey program. In addition, a 10-kilogram bulk soil sample from each of the five pools selected for amendment-based treatment will be collected at one of the sampling stations in each pool (using the same methods described in Section 4.1) for potential use in the bench-scale testing. Following review of the PCB concentration data at each location, two of the five bulk soil samples representing the highest and lowest PCB concentrations will be selected for inclusion in the bench-scale jar testing and bench-scale column testing. This will allow the assessment of amendment performance over a range of PCB concentrations.

3.3.1 Bench-Scale Jar Testing Design

The objective of the bench-scale jar testing is to evaluate the effectiveness of AC (both PAC and GAC) and biochar in reducing porewater PCB concentrations in vernal pool soils. Eight unique test batches will be prepared for each selected vernal pool. Water will be added to improve transfer kinetics and allow for a comparison of near-equilibrium conditions for all amendments in a timely manner. The experimental design of the bench-scale jar testing is presented in Table 3-1.

Table 3-1
Experimental Design for Vernal Pool Bench-Scale Jar Tests

Vernal Pool ID	Test Batch (Amendment to Vernal Pool Soil)	Soil Mass (grams dry weight)	Amendment Mass (grams dry weight)	Number of Replicates
Vernal Pool Soil 1	Unamended	300	--	2
	1% (dry weight) PAC	300	3	2
	2% (dry weight) PAC	300	6	2
	5% (dry weight) PAC	300	15	2
	2% (dry weight) GAC	300	6	2

Vernal Pool ID	Test Batch (Amendment to Vernal Pool Soil)	Soil Mass (grams dry weight)	Amendment Mass (grams dry weight)	Number of Replicates
	5% (dry weight) GAC	300	15	2
	5% activated biochar	300	15	2
	10% activated biochar	300	30	2
Vernal Pool Soil 2	Unamended	300	--	2
	1% (dry weight) PAC	300	3	2
	2% (dry weight) PAC	300	6	2
	5% (dry weight) PAC	300	15	2
	2% (dry weight) GAC	300	6	2
	5% (dry weight) GAC	300	15	2
	5% activated biochar	300	15	2
	10% activated biochar	300	30	2

Note:
1. High-performance liquid chromatography-grade water was added to target 70% moisture to make a slurry for efficient mixing.
--: not applicable

During the bench-scale treatability testing, each test jar will be continuously mixed for 30 days to allow the soil and amendment to equilibrate. Following that initial 30-day period, solid-phase microextraction (SPME) passive samplers will be deployed in each jar for another 30 days (while continuing to mix) to measure the remaining bioavailable PCB concentrations following contact with amendment. The continuous mixing accelerates the mass-transfer kinetics and achieves near-equilibrium conditions over much shorter timescales than would be achievable in the field. The reduction in bioavailable PCBs will be determined by comparison of measured porewater PCB concentrations in each amended jar test with that of the unamended control. This information will be used to determine which amendments should be carried forward into the field pilot study. Detailed methods for implementing the bench-scale jar tests are provided in Appendix B.

3.3.2 Bench-Scale Column Testing Design

The objective of the bench-scale column testing is to evaluate the effectiveness of a number of amendment application methodologies (thin-layer placement, amended cover placement [AC and sand mixture], and mixing) and amendment performance under site-specific conditions. Also, because the amendments will be placed in vernal pools, the column tests will be used to evaluate the impact of drying and wetting on mass transfer kinetics within the near-surface soil. For the bench-scale column testing, soils from the same vernal pools selected for bench-scale jar testing (as described in Section 3.3.1) will be added into acrylic columns (10-centimeter [cm] diameter by 50-cm tall), using the following application methods:

- Unamended control column: No amendment will be added.

- Thin-layer placement: A thin layer of amendment will be added on top of the vernal pool soil such that the top six inches of the column contains 5% (by weight) of amendment.
- Amended cover placement (AC and sand mixture): A six-inch cover layer that is 5% (by weight) of amendment and 95% (by weight) of sand will be placed on top of the column.
- Mixing: A thin layer of amendment will be added such that the top six inches of the column contains 5% (by weight) of amendment, and then the top six inches of the column will be mixed until a uniform texture and color are achieved.

Two columns will be prepared for each application type and soil sample combination. After preparation of the columns, water will be added, simulating the "wet season," and the columns will be allowed to equilibrate for 30 days. After 30 days, SPME passive samplers will be inserted into the soil columns to measure bioavailable PCB concentrations. Once the SPME passive sampler is removed, the water will be drained through the column from the bottom, simulating water draining from the vernal pool during the dry season, the columns will be allowed to equilibrate for another 30 days, then additional SPME passive samplers will be inserted into the soil columns to measure bioavailable PCB concentrations.

Detailed methods for implementing the bench-scale column tests are provided in Appendix C, and the standard operating procedure (SOP) for in-situ SPME sampling is provided in Appendix D.

A comparison of the bioavailable PCB concentrations in each column after the initial "wet season" will allow for additional evaluation of the effectiveness of each application method (i.e., beyond that which will be provided by the jar tests). A comparison of the bioavailable PCB concentrations from the "wet season" and the "dry season" will allow for an understanding of the potential impact of vernal pool drying on mass transfer into the AC. Together, these testing applications will assist in selecting application methods carried forward into the field-scale pilot study.

4 Vernal Pool Pilot Study Implementation

4.1 Baseline Monitoring and Survey

This section describes the baseline monitoring and ecological survey that will be conducted prior to implementation of the pilot study. Specific DQOs for this baseline data collection are as follows:

DQO 1. Provide data on baseline (i.e., pre-treatment) soil porewater PCB concentrations in each of the five vernal pools that will be subject to treatment with an amendment.

DQO 2. Provide additional data needed to calculate vernal pool-specific OC partitioning coefficients (i.e., K_{oc}) in the five vernal pools that will be subject to treatment with an amendment.

DQO 3. Provided updated information related to ecological status of all test and control vernal pools.

Baseline monitoring and ecological survey data will be collected in all vernal pools identified in Table 1-3 – i.e., the 10 test and seven control pools. In the vernal pools receiving amendment-based treatment, these activities will consist of soil sampling, porewater sampling, ecological monitoring, and a bathymetric survey. In the vernal pools receiving removal-based treatment, the baseline activities will consist of soil sampling, ecological monitoring, and a bathymetric survey. In the control vernal pools, only ecological monitoring will be performed.

It is anticipated that the baseline sampling and survey program will be conducted in advance of the bench-scale testing described in Section 3.3 given that the soil to be used during the bench-scale tests will be obtained during the baseline sampling and survey program. The results of the baseline monitoring and survey activities will be presented in the Final Revised VP Pilot Work Plan described in Section 1.6.

4.1.1 Baseline Sampling for PCBs

Baseline sampling in the five amendment-based test pools will establish the initial soil concentrations of total PCBs and TOC and porewater concentrations of PCBs in the pools prior to treatment. The data will also provide information to evaluate porewater partitioning within these pools.

Bulk soil and porewater samples will be collected from the five vernal pools selected for amendment-based treatment (5A-VP-9, 5A-VP-12, 5A-VP-15, 5A-VP-22, and 5A-VP-27). The soil sampling locations sampled previously in these pools during the floodplain non-residential PDI, which was summarized in GE's *Addendum to Second Revised Pre-Design Investigation Work Plan for Reach 5A Non-Residential Floodplain Exposure Areas* (Anchor QEA and Arcadis 2023), will be reoccupied to provide the desired spatial coverage in each pool.

At each of those locations. porewater sampling will be conducted by advancing in-situ SPME passive samplers into the top six inches of the vernal pool soils in accordance with the SOP for in-situ SPME sampling in Appendix D. SPME passive samplers will be deployed when vernal pool soils are saturated, so as to provide the fastest mass transfer kinetics. Based on a conservative estimate of vernal pool porewater concentrations, the SPME passive samplers will remain in place for up to two months, at which point they will be retrieved and analyzed for PCB congeners using EPA Method 1668A.

Bulk soil samples will also be collected alongside each SPME passive sampler location from the 0- to 0.5-foot depth interval in accordance with the SOP for soil sample collection and handling provided in Appendix D of GE's *Second Revised Pre-Design Investigation Work Plan for Reach 5A Non-Residential Floodplain Exposure Areas* (Second Revised Non-Residential Floodplain PDI Work Plan; Anchor QEA 2021). Sampling locations will be located and recorded using a differential global positioning system. Each vernal pool soil sample collected by GE will be analyzed for PCBs as Aroclors using EPA Method 8082, PCBs as congeners using EPA Method 1668A, and TOC using the Lloyd Kahn Method.

4.1.2 Baseline Ecological Survey

A baseline ecological survey will be conducted in all vernal pools to be included in the pilot study (i.e., the 10 test pools and the seven control pools) to obtain information on the field parameters specified in Section 2.3. This survey will take into account field measurements obtained during the Reach 5A field surveys conducted in 2022, which included line intercept transects to quantify percent cover of the different vegetation layers within each pool (i.e., herbs, woody shrubs, trees, and vines) and development of a list of observed plant species. The vernal pool baseline ecological survey will consist of more detailed surveys in each of these 17 pools, including the following:

- Survey of the plant community using randomly placed monitoring plots, line-intercept sampling, or other standard accepted methods that will provide detailed species-specific information and allow an assessment of plant community composition, canopy cover, plant vigor/health, and presence of invasive plant species;
- Collection of baseline data on hydroperiod and maximum flooding depths, including an assessment of surface water flooding conveyance into and out of each pool;
- Collection of detailed bathymetry, including traditional bathymetric surveys;
- Performance of additional egg mass counts and a survey for fairy shrimp presence prior to treatment;

- Collection of data on baseline water quality, including temperature, dissolved oxygen, specific conductance, pH, and turbidity;
- Development of soil profile descriptions, including an assessment of the underlying substrate to between three and four feet in depth (including the surface leaf-layer and organic duff layer) to understand the soil or substrate stratigraphy and the relative influence of groundwater versus surface water on the hydrology in the pools; and
- An assessment of the habitat surrounding each vernal pool and any potential vernal pool networking.

Appendix E contains an SOP describing the collection of the baseline ecological survey information listed above.

4.2 Pilot Study Design

4.2.1 Final Selection of Vernal Pools

The 10 test and seven control pools selected to date for inclusion in the pilot study are shown in Figures 4-1 through 4-7, along with PCB concentration and habitat information regarding them and the areas of the test pools currently identified for amendment placement or removal. Based on the information collected during the baseline monitoring and ecological survey described in Section 4.1, GE will identify any changes to the selected test and/or control pools. Any changes to the selected test pools will be made using the same criteria presented in the Selection Proposal and summarized in Section 1.4, along with any other criteria indicated by the data from the baseline monitoring and ecological survey. However, it is anticipated that changes to the pool selection (for both test and control pools) would be made only if significant deviations from the previously documented conditions are observed during baseline monitoring or ecological survey. Any changes to the selection of test or control vernal pools for the pilot study will be made in consultation with EPA; if additional vernal pools not listed in Table 1-3 and shown on Figures 4-1 through 4-7 are identified for inclusion in the pilot study, baseline monitoring and ecological surveying will be conducted in them, on a schedule to be determined in consultation with EPA, to establish baseline conditions in those added pools. The final selection of test and control vernal pools, along with the results of the baseline monitoring and ecological surveying, will be presented in the Final Revised VP Pilot Work Plan described in Section 1.6.

4.2.2 Amendment-Based Pilot Study Design

Amendment placement will be conducted in the five vernal pools chosen to receive such treatment (currently 5A-VP-9, 5A-VP-12, 5A-VP-15, 5A-VP-22, and 5A-VP-27, as shown on Figures 4-2, 4-3, 4-4, and 4-5). Details related to the specific amendment types, doses, and application methods to be evaluated in each pool will be determined based on the results of the bench-scale testing described in Section 3.2. Final assignment of amendment type(s), dose(s), and application method(s) in each pool will be presented in the Final Revised VP Pilot Work Plan.

In addition to the details related to the specific treatment, the pilot study design will address various habitat considerations. Application of the amendment(s) will likely require some degree of vegetation controls (e.g., cutting/clearing) to facilitate distribution of the amendment. Also, the need for various site preparation measures will be evaluated. Such measures could include siltation barriers to define and control the application area; removal and preservation of coarse woody debris for future restoration; and raking (or blowing) and storage of the leaf or humus layer prior to treatment (if applicable) to promote more effective amendment application (and for reuse in future restoration if necessary). If an application method is selected that has the capacity to substantially disturb existing vernal pool habitat (e.g., use of soil mixing), habitat restoration in the form of supplemental planting or seeding may be conducted. The timing and schedule of treatment will also be evaluated further to minimize potential ecological impacts.

Further details on the amendment-based design, including any habitat restoration efforts, will be provided in the Final Revised VP Pilot Work Plan.

4.2.3 Removal-Based Pilot Study Design

To achieve the performance standard of 3.3 mg/kg for the 0- to 1-foot PCB SWAC (see Section 2.1), areas for removal and backfill have been delineated in the five vernal pools currently selected for removal-based treatment during the pilot study (5A-VP-4, 5A-VP-7, 5A-VP-16, 5A-VP-52, and 5A-VP-57), as shown on Figures 4-1, 4-2, 4-3, and 4-6. The pre-remedy PCB SWACs for these pools ranged from 6.8 to 40 mg/kg as shown in Table 4-1. The remediation areas were derived using a hill-topping approach, consistent with the method described in Appendix A to GE's Second Revised Non-Residential Floodplain PDI Work Plan (Anchor QEA 2021). This involved processing the pre-remedy spatial distribution of 0- to 1-foot PCB concentrations (based on Thiessen polygons) into three-foot by three-foot raster grids and then sequentially "removing" raster grid cells with the highest PCB concentration and replacing them with a PCB concentration of 0.021 mg/kg (representing backfill).[10] Pool-wide SWACs were calculated after each remediation step and compared against the performance criterion until SWACs were reduced to a value less than 3.3 mg/kg. The removal areas delineated from the hill-topping analysis in two of the five pools (5A-VP-4 and 5A-VP-57) were further "optimized" to provide a more contiguous remedial footprint (i.e., grid cells with somewhat lower PCB concentrations were targeted for removal in the interest of

[10] In conducting remediation evaluations for areas outside the river under the CD, GE has generally used an assumed PCB concentration of 0.021 mg/kg for the backfill, which represents one-half of the average detection limit from actual prior sampling of backfill sources. This value was identified in the Second Revised Non-Residential Floodplain PDI Work Plan for use to represent backfill in the Reach 5A floodplain evaluations.

generating a more contiguous remedial footprint). The estimated removal volumes and areas for the five vernal pools currently selected for the removal-based remediation are shown in Table 4-1.[11]

Table 4-1
Removal Area and Volume for Vernal Pools Selected for Removal-Based Pilot Study

Vernal Pool ID	Pre-Remedy SWACs (mg/kg)	Total Area (acres)	Removal Area (acres)	Removal Volume (cubic yards)
5A-VP-4	15	0.23	0.16	250
5A-VP-7	34	0.41	0.29	466
5A-VP-16	6.8	0.04	0.018	30
5A-VP-52	40	0.06	0.050	81
5A-VP-57	30	0.49	0.33	530
		Total	**0.85**	**1,357**

Similar to the design described in Section 4.2.2 for the amendment-based pools, the pilot study design for pools subject to removal will also address various habitat considerations. Prior to excavation, the need for various site preparation measures will be evaluated. Again, such measures could include siltation barriers to define and control the application area, removal and preservation of coarse woody debris and grubbed root systems for future restoration, and raking (or blowing) and storage of the leaf or humus layer prior to excavation for reuse in future restoration. Following excavation and subsequent backfill or grading, the pools will be restored by applying a wetland seed mix (or other acceptable mix) to the disturbed areas and by planting trees, shrubs, and herbaceous species.

It is anticipated that the removal will be performed by mechanical excavation, followed by backfill and habitat restoration. Further details on the removal-based design, including backfill soil specifications and details on the habitat restoration, will be provided in the Final Revised VP Pilot Study Work Plan.

4.3 Pilot Study Monitoring and Evaluation

4.3.1 Monitoring During and After Amendment-Based Treatment

The five vernal pools selected for amendment-based treatment during the pilot study will be monitored during application of the amendment (construction monitoring) to assess achievement of the target amendment doses, as well as potential adverse ecological impacts. These pools will also

[11] In the event that any of the five test vernal pools selected for removal-based remediation are changed in the Final Revised VP Pilot Work Plan (as discussed in Section 4.2.1), the removal areas and volumes for the newly selected test pools will be determined using the same methods described above and will be presented in the Final Revised VP Pilot Work Plan.

be monitored one to two months following amendment application, and then annually for three years following amendment application (post-construction monitoring) to assess progression towards achieving and maintaining the porewater PCB performance standard and to assess any longer-term ecological impacts. These monitoring programs are described further in the following paragraphs.

Construction monitoring during amendment application will focus on amendment placement verification and ecological monitoring to evaluate the effects of amendment-based construction activities. Verification monitoring will be completed immediately following the amendment placement in each pool to verify achievement of the target amendment dose. This monitoring will consist of collecting soil samples from the upper six inches at a sampling density of one sample per 0.1 acre and analysis for AC or black carbon content depending on the type of amendment placed. Specific details of the type(s) of analyses to be performed will be provided in the Final Revised VP Pilot Work Plan.

In addition, ecological monitoring will be conducted during site preparation prior to treatment and during amendment application. During the site preparation phase, screening for the presence of state-listed species, such as wood turtle (*Glyptemys insculpta*) and/or Jefferson salamander (*Ambystoma jeffersonianum*), will be performed. During placement of the amendment, the application process will be monitored to document effects on vegetation in the applied area, as well as any adverse impacts associated with trafficking and equipment operations.

As noted above, post-remediation monitoring of the vernal pools subject to amendment-based remediation will be initially conducted one to two months following treatment and then annually (starting one year following completion of construction) for a period of three years to allow for equilibration of porewater PCBs with the amendment and the identification of yearly variance in chemical and ecological parameters. The annual post-remediation monitoring events will be conducted during the same time of year as the baseline monitoring and ecological survey (see Section 4.1) to control for potential seasonal variations. This post-remediation monitoring program will involve the collection and analysis of soil porewater PCB samples and ecological monitoring, using the same or similar methods and locations as those described in Sections 4.1.1 and 4.1.2, respectively. The ecological monitoring will involve amphibian egg mass and fairy shrimp surveys and hydrology, soils, and vegetation surveys, as well as an assessment of invasive plant species colonization. The post-remediation monitoring data will be reviewed on a yearly basis to evaluate performance criteria achievement and maintenance.

4.3.2 Monitoring During and After Excavation and Restoration

For the vernal pools subject to removal, monitoring will likewise be conducted during site preparation, during excavation/construction/restoration work, and after construction, as described in the following paragraphs.

During the site preparation phase, screening for the presence of state-listed species (e.g., wood turtle or Jefferson salamander) will be performed. Also, any specific habitat features that are to be avoided and preserved (e.g., wolf trees, downed woody debris, or standing dead trees) will be identified, and procedures to afford their protection will be reviewed and implemented prior to initiating clearing or grubbing and excavation activities.

During excavation, monitoring will include material tracking to verify the appropriate volume of soil removal and backfill placement. Specifically, monitoring will be performed (using grade stakes and on-site survey means) to ensure removal to plan specifications. Soil profile conditions will also be documented during excavation to establish similar conditions for backfill. Imported soil materials to be used as backfill will be monitored to ensure compliance with specifications and consistency with pre-remediation conditions. Monitoring will also be conducted during placement of the backfill (using grade stakes and pre-remediation topographic mapping and data) to re-establish the pre-remediation topography. This will ensure preservation of the original configuration of depressional areas and swales within and near the vernal pool that contribute to surface water conveyance to the pool, soil moisture, and overall habitat conditions. Also, efforts to promote microtopographic variability, consistent with pre-remediation conditions in the pool, will be conducted by embedding some organic debris within the replacement soils. During restoration, monitoring will be conducted of seeding and planting activities, as well as the replacement of leaf litter material (if applicable) or the placement of mulch composed of leaf litter from trees characteristic of the nearby floodplain forest, and distribution of dead woody debris over and into the ground surface (as appropriate depending on pre-remediation coverage by such debris).

Post-construction monitoring will focus on evaluating the success of planting and seeding, and assessment of any colonization of invasive plant species. In addition, the baseline monitoring survey protocol (i.e., amphibian egg mass and fairy shrimp surveys and hydrology, soils, and vegetation surveys) will be repeated. Post-remediation monitoring for the vernal pools receiving removal-based treatment will be conducted annually (starting one year following completion of construction) for three years to assess yearly variance in ecological parameters. This monitoring will be conducted during the same season as the baseline monitoring and ecological survey (see Section 4.1) to control for seasonal variations. No additional soil PCB sample collection and analysis will be performed in the pilot study pools subject to removal.

4.3.3 Application of the Performance Criteria

Post-remediation monitoring data collected from the test pools will be evaluated against the applicable performance criteria described in Section 2.

For the amendment-based alternatives, in-situ passive samplers will be used to evaluate the reduction of soil porewater PCB concentrations and achievement of the porewater performance criterion. These in-situ passive samplers will be deployed and used in accordance with the SOP in Appendix D for in-situ SPME sampling. It is expected that any pools receiving amendment placed directly on the vernal pool soil, either as a discrete thin layer or mixed into the surficial pool soils, will require greater than one year for the amendment to equilibrate with the vernal pool soils and produce the desired reductions in porewater PCB concentrations. In contrast, pools receiving amendments applied as part of a clean sand layer cover are expected to achieve the performance criterion in that new layer immediately following construction; in these cases, the performance monitoring will focus on evaluating whether contaminated soil below the clean amendment layer has the potential to re-contaminate surface soils.

Removal-based alternatives will remove existing contaminated soil and replace it with clean backfill, as described in Section 4.2.3. As a result, the removal-based alternatives will achieve the removal--based performance criterion immediately following construction.

For all alternatives, the results of the ecological monitoring performed during the post-remediation period will be compared to pre-remediation conditions to evaluate impacts of amendment application or removal and restoration activities on the vernal pool environments and thereby to assess achievement of the ecological performance criterion specified in Section 2.3. Ecological monitoring results within the test pools will be compared to those from one or more of the control pools to assess whether any observed deviations from pre-remediation conditions are a result of the remedial activities or natural year-to-year variation.

This information will be used to facilitate selection of remediation approaches for the remainder of the vernal pools in Reach 5A (and eventually for vernal pools identified in downstream reaches). If both treatment approaches are shown to be able to meet the established performance criteria, other factors (such as sensitive habitat or ease of access) will be used to determine which remedial approach (amendment-based or removal-based) is best applied to the remaining vernal pools.

4.4 Pilot Study Schedule and Reporting

As described in Section 1.6, a revised Pilot Study Work Plan will be submitted by GE concurrently with the Conceptual RD/RA Work Plan for Reach 5A (anticipated to be submitted in fall 2023) or within 60 days of receipt of EPA's approval or conditional approval of this initial work plan, whichever is later. Following EPA approval of that revised work plan, GE will implement the baseline monitoring and ecological survey and the bench-scale testing activities.[12] After the baseline monitoring/ecological survey and bench-scale testing are complete, a Final Revised VP Pilot Work Plan will be submitted to present the final design of the pilot study, as described in Section 1.6. Upon EPA approval of that final work plan, the pilot study removal and amendment placement activities will commence. Based on consideration of the relative timing for implementation of the pilot studies of the two treatment alternatives, GE has determined that, due to potential year-to-year variations in physical and ecological conditions, the removal-based and amendment-based treatment activities in the pilot study will be performed concurrently.

Depending on the timing of EPA approval of the Final Revised VP Pilot Work Plan, GE anticipates that implementation of the vernal pool pilot study (i.e., excavation activities and placement of amendments) will be conducted prior to initiation of other construction activities in Reach 5A (and regardless of whether construction of the Upland Disposal Facility has been completed). Also, as noted in Sections 4.3.1 and 4.3.2, GE will conduct post-remediation monitoring of the pilot study vernal pools for a period of three years, which is anticipated to be ongoing while remediation is occurring in other areas of Reach 5A. This three-year period will allow for equilibration of porewater PCBs in the pools where an amendment has been placed and provide sufficient time to assess restoration effectiveness and potential ecological impacts in pools where soil removal and restoration has been performed.

GE will submit a Vernal Pool Pilot Study Summary Report for EPA review and approval within 60 days after receipt and validation of the final data collected as part of the post-remediation monitoring program. Within 90 days following EPA approval of the Vernal Pool Pilot Study Summary Report, GE will submit an addendum to the Final RD/RA Work Plan for Reach 5A that provides remedial design details for the remaining vernal pools in Reach 5A.

[12] As discussed in Section 4.2.1, in the event that changes to the vernal pools selected for the pilot study are made based on the initial baseline monitoring and/or ecological survey, baseline monitoring and ecological surveying in those added pools will be conducted, if necessary, to establish baseline conditions in those pools. Any changes to the selection of vernal pools for the pilot study, as well as the schedule for baseline monitoring and ecological surveying in any added pools (if necessary), will be made in consultation with EPA.

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Table

Table 1-2
Summary of Chemistry, Physical, and Biological Conditions in Reach 5A Vernal Pools

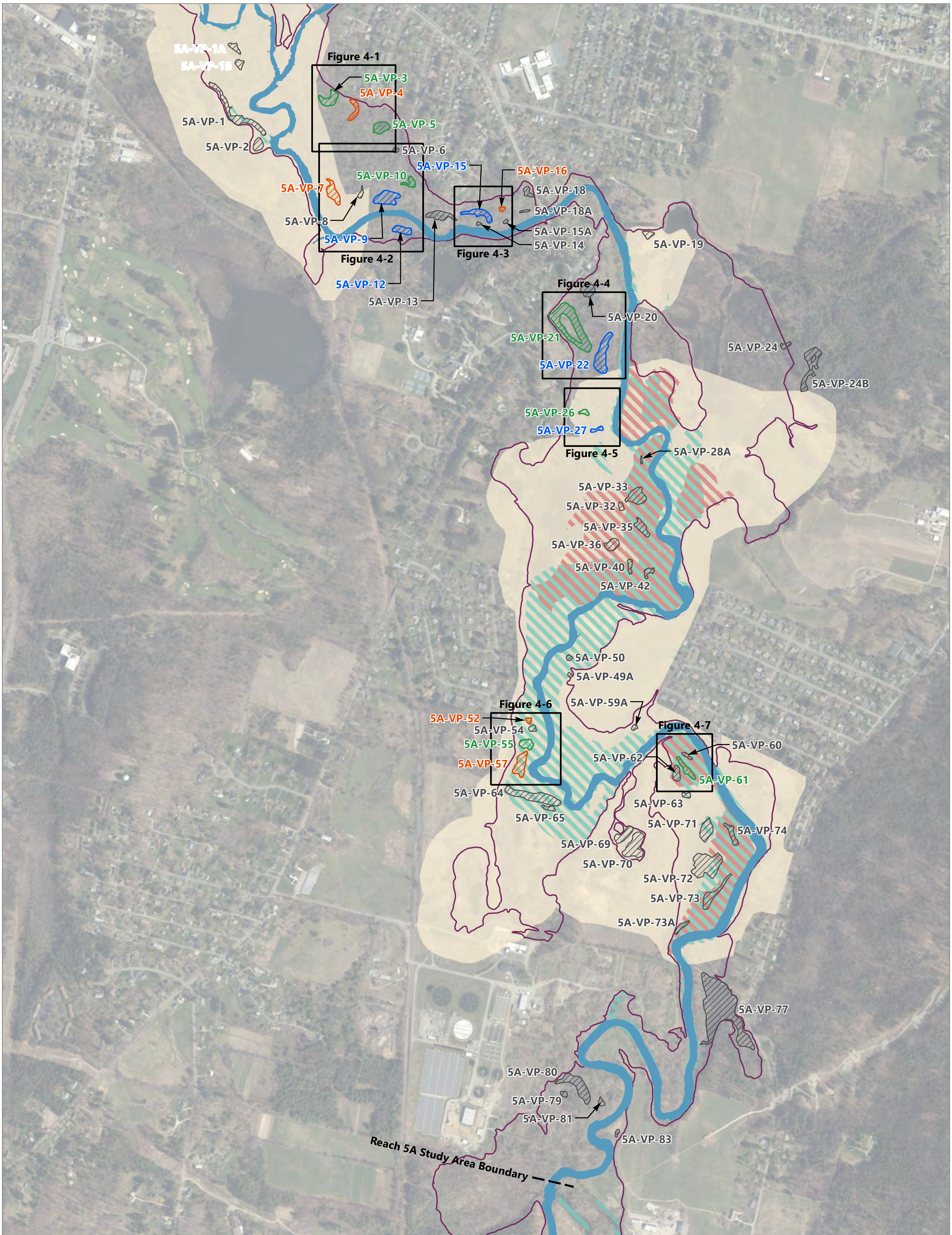
Vernal Pool ID	Area (acres)	Chemstry Conditions		Physical Conditions			Ecological Conditions		Pool Type in the Pilot Study
		Number of Samples	PCB SWAC (0–1 foot; mg/kg)	Permanent Flowing Outlet?	Established Fish Population?	Hydrology[1]	Known Species	Vegetative Cover	
5A-VP-1	0.82	27	6.4	No	NA	Intermittently exposed	13 SpS, 1 WF, FS few	SS/SEM	
5A-VP-1A	0.15	8	0.6	No	NA	Seasonally flooded	1 WF, FS, 1 SpS	SS/SEM	
5A-VP-1B	0.13	8	2.9	No	No	Seasonally flooded	4 SpS, 3 WF	SS/SEM	
5A-VP-2	0.23	10	3.5	No	NA	Continuously saturated	25 SpS, 13 WF	SEM/SS/WS	
5A-VP-3	0.39	14	18	No	No	Seasonally flooded	WF, few larvae	WS	Field control
5A-VP-4	0.23	12	14	No	NA	Seasonally flooded	10 WF, FS	WS/SS	Excavation/restoration
5A-VP-5	0.33	13	2.6	No	NA	Seasonally flooded	SpS, 300 WF, FS	WS/SS	Field control
5A-VP-6	0.05	6	4.6	No	NA	Seasonally flooded	6 WF, FS few	WS	
5A-VP-7	0.41	15	33	No	NA	Seasonally flooded	50 WF, 2 SpS, FS	WS/SS	Excavation/restoration
5A-VP-8	0.07	6	12	No	NA	Seasonally flooded	15 WF, FS few	WS/SS	
5A-VP-9	0.6	25	44	No	NA	Seasonally flooded	30 WF, FS	SS/SEM/WS	Amendment
5A-VP-10	0.17	10	6.2	No	NA	Seasonally flooded	100 WF, FS	SS/WS	Field control
5A-VP-12	0.27	11	25	No	NA	Seasonally flooded	23 WF, 1 SpS	WS	Amendment
5A-VP-13	0.4	14	24	No	NA	Semipermanently flooded	9 WF	DEM/WS	
5A-VP-14	0.03	6	8.6	No	NA	Seasonally flooded	WF larvae	SS/WS	
5A-VP-15	0.37	16	28	No	NA	Seasonally flooded	25 WF, FS	DEM/SEM/WS	Amendment
5A-VP-15A	0.04	6	20	No	NA	Seasonally flooded	FS, 3 WF	WS	
5A-VP-16	0.04	6	7.1	No	NA	Seasonally flooded	FS, 25 WF	WS	Excavation/restoration
5A-VP-18	0.15	10	0.5	No	NA	Seasonally flooded	9 WF	WS/SS/SEM	
5A-VP-18A	0.04	6	29	No	No	Seasonally flooded	WF larvae	SEM/WS	
5A-VP-19	0.14	6	5.3	No	NA	Seasonally flooded	5 WF	SEM	
5A-VP-20	0.33	16	4.5	No	NA	Seasonally flooded	7 WF, FS	SEM/SS/WS	
5A-VP-21	1.65	64	3.1	No	NA	Seasonally flooded-saturated	300 WF, SpS, FS	SEM/SS/WS	Field control
5A-VP-22	0.82	26	6.1	No	NA	Seasonally flooded-saturated	170 WF, FS	SEM/SS/WS	Amendment
5A-VP-24	0.1	6	0.13	No	NA	Seasonally flooded	10 WF, 14 SpS	WS	
5A-VP-24B	0.76	22	0.08	No	No	Seasonally flooded-saturated	5 SpS, WF (larvae)[2]	SS/WS	
5A-VP-26	0.08	6	3.4	No	NA	Seasonally flooded	FS	SS/WS	Field control
5A-VP-27	0.08	6	7.6	No	No	Seasonally flooded	FS	WS	Amendment
5A-VP-28A	0.03	6	31	No	NA	Seasonally flooded	2 WF	SS/WS	
5A-VP-32	0.08	8	34	No	NA	Seasonally flooded	4 WF, FS	SS/WS	
5A-VP-33	0.53	17	45	No	NA	Seasonally flooded-saturated	10 WF, FS	SEM/SS/WS	
5A-VP-35	0.3	10	67	No	NA	Seasonally flooded-saturated	6 WF, few FS	SS/WS	
5A-VP-36	0.3	14	12	No	NA	Seasonally flooded	6 WF	SEM/SS/WS	
5A-VP-40	0.12	10	74	No	NA	Seasonally flooded	1 WF, FS	WS	
5A-VP-42	0.13	10	32	No	NA	Seasonally flooded	5 WF	SEM/WS	
5A-VP-49A	0.03	6	10	No	NA	Seasonally flooded	1 WF	WS	
5A-VP-50	0.06	6	4.9	No	NA	Seasonally flooded	1 WF	SEM/WS	
5A-VP-52	0.06	6	40	No	NA	Seasonally flooded	1 WF	SEM/WS	Excavation/restoration
5A-VP-54	0.09	13	42	No	NA	Seasonally flooded	1 WF	SEM/SS/WS	
5A-VP-55	0.25	15	25	No	NA	Seasonally flooded	2 WF	SEM/WS	Field control
5A-VP-57	0.49	6	30	No	NA	Seasonally flooded	20 WF	WS	Excavation/restoration

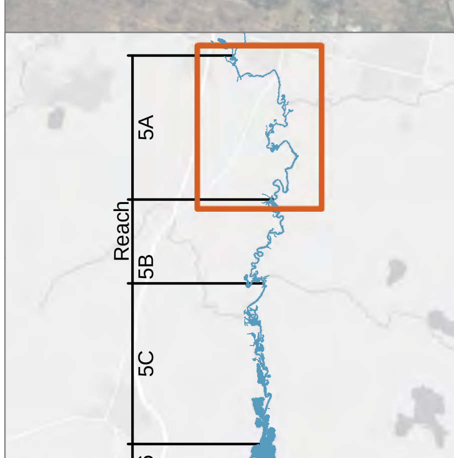
Table 1-2
Summary of Chemistry, Physical, and Biological Conditions in Reach 5A Vernal Pools

		Chemstry Conditions		Physical Conditions			Ecological Conditions		
Vernal Pool ID	Area (acres)	Number of Samples	PCB SWAC (0–1 foot; mg/kg)	Permanent Flowing Outlet?	Established Fish Population?	Hydrology[1]	Known Species	Vegetative Cover	Pool Type in the Pilot Study
5A-VP-59A	0.06	6	13	No	NA	Seasonally flooded	3 WF	WS	
5A-VP-60	0.08	8	4.6	No	NA	Seasonally flooded	9 WF, FS	WS	
5A-VP-61	0.26	12	2.2	No	NA	Seasonally flooded	70 WF, FS	WS	Field control
5A-VP-62	0.22	10	1.3	No	NA	Seasonally flooded	7 WF, FS	WS	
5A-VP-63	0.09	6	2.6	No	NA	Seasonally flooded	1 WF, FS	WS	
5A-VP-64	1	34	28	No	No	Seasonally flooded	4WF/FAC only	SEM/SS	
5A-VP-65	0.11	8	27	No	NA	Seasonally flooded	6 WF	SEM	
5A-VP-69	0.34	16	0.11	No	NA	Seasonally flooded	6 WF	SEM/SS	
5A-VP-70	0.78	18	0.12	No	NA	Seasonally flooded	65 WF, FS	SEM/SS	
5A-VP-71	0.47	13	6.6	No	NA	Intermittently exposed/semipermanently flooded	8 WF, 2 SpS	SEM/SS	
5A-VP-72	1.26	36	5.9	No	NA	Intermittently exposed/semipermanently flooded	6 SpS, 1 WF	DEM/SEM/SS	
5A-VP-73	0.48	16	19	No	NA	Seasonally flooded	200 WF, 13 SpS	SS/WS	
5A-VP-73A	0.15	10	8.5	No	NA	Seasonally flooded	5 WF, FS	SS/WS	
5A-VP-74	0.26	11	10	No	NA	Seasonally flooded	23 WF. FS, SpS	WS	
5A-VP-77	3.93	60	6	No	NA	Seasonally flooded-saturated	6 WF, 18 SpS	SEM/SS/WS	
5A-VP-79	0.08	6	5.2	No	NA	Seasonally flooded	FS	SS/WS	
5A-VP-80	0.83	26	36	No	NA	Seasonally flooded	FS	SS/WS	
5A-VP-81	0.09	6	77	No	No	Seasonally flooded	FS	WS	
5A-VP-83	0.05	6	24	No	NA	Seasonally flooded	WF larvae	SEM	

Notes:
Higlighted pools were selected for the pilot study. Inclusion of these pools is contingent on the ability to obtain access agreements from the property owners.
1. Based on Nontidal Water Regime Modifers described in Cowardin Classification system
2. Observation performed in May 2022
DEM: deep emergent marsh
FAC: facultative
FS: fairy shrimp
kg: kilogram
mg: milligram
NA: not available
PCB: polychlorinated biphenyl
SEM: shallow emergent marsh
SpS: spotted salamander
SS: shrub swamp
SWAC: spatially weighted average concentration
WF: wood frog
WS: wooded swamp

Figures





LEGEND:

1 mg/kg PCB Isopleth
Channel (AECOM and Anchor QEA 2020)
Core Area 1 Habitat
Core Area 2 Habitat
Core Area 3 Habitat (2022 NHESP Data)

Vernal Pools (AECOM 2020, GE 2021)
Other Non-Pilot Study Pools

Vernal Pools Selected for Pilot Study
Excavation/Restoration
Amendment
Control

NOTES:
1. Aerial imagery from MassGIS 2021.
2. Core Area 3 habitat was developed using 2022 Natural Heritage & Endangered Species Program data.

0 1,000
Feet

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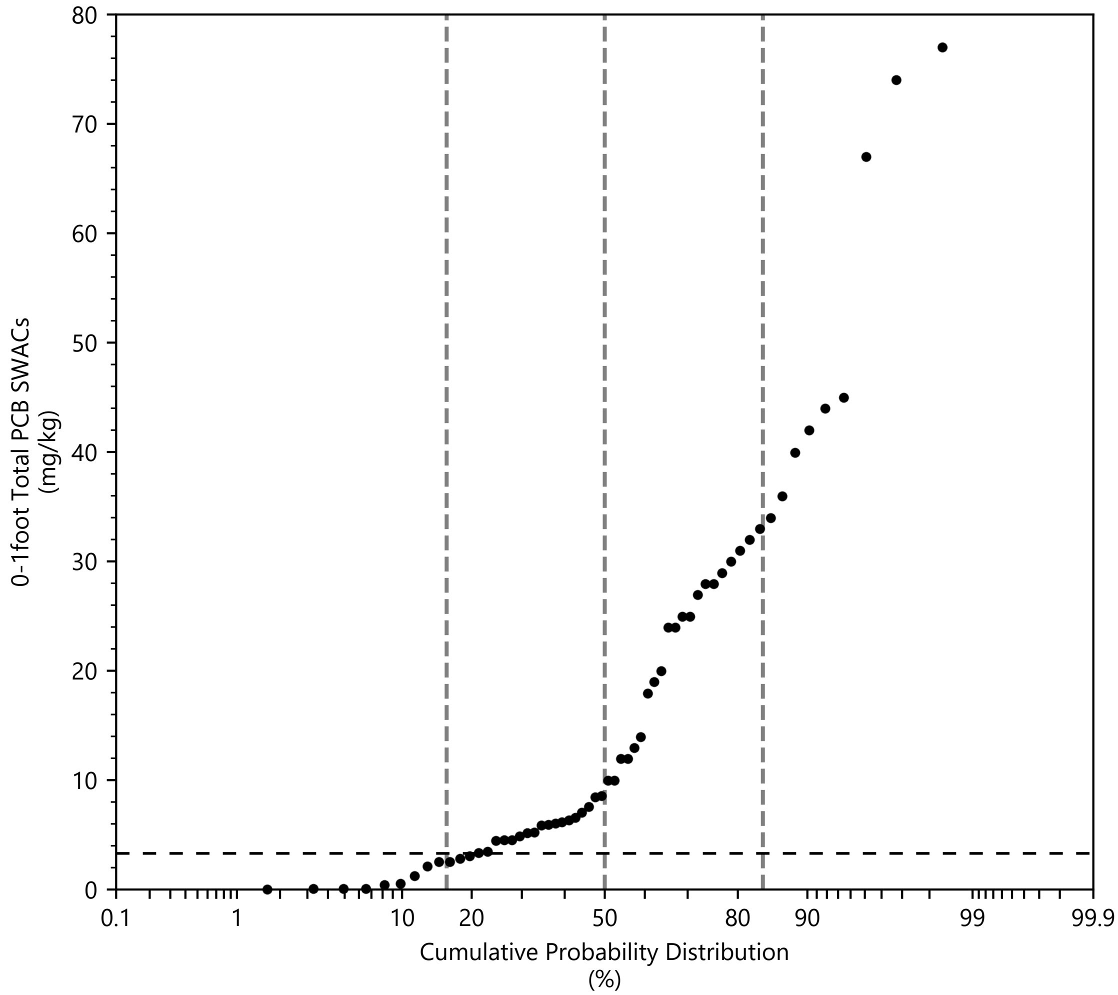
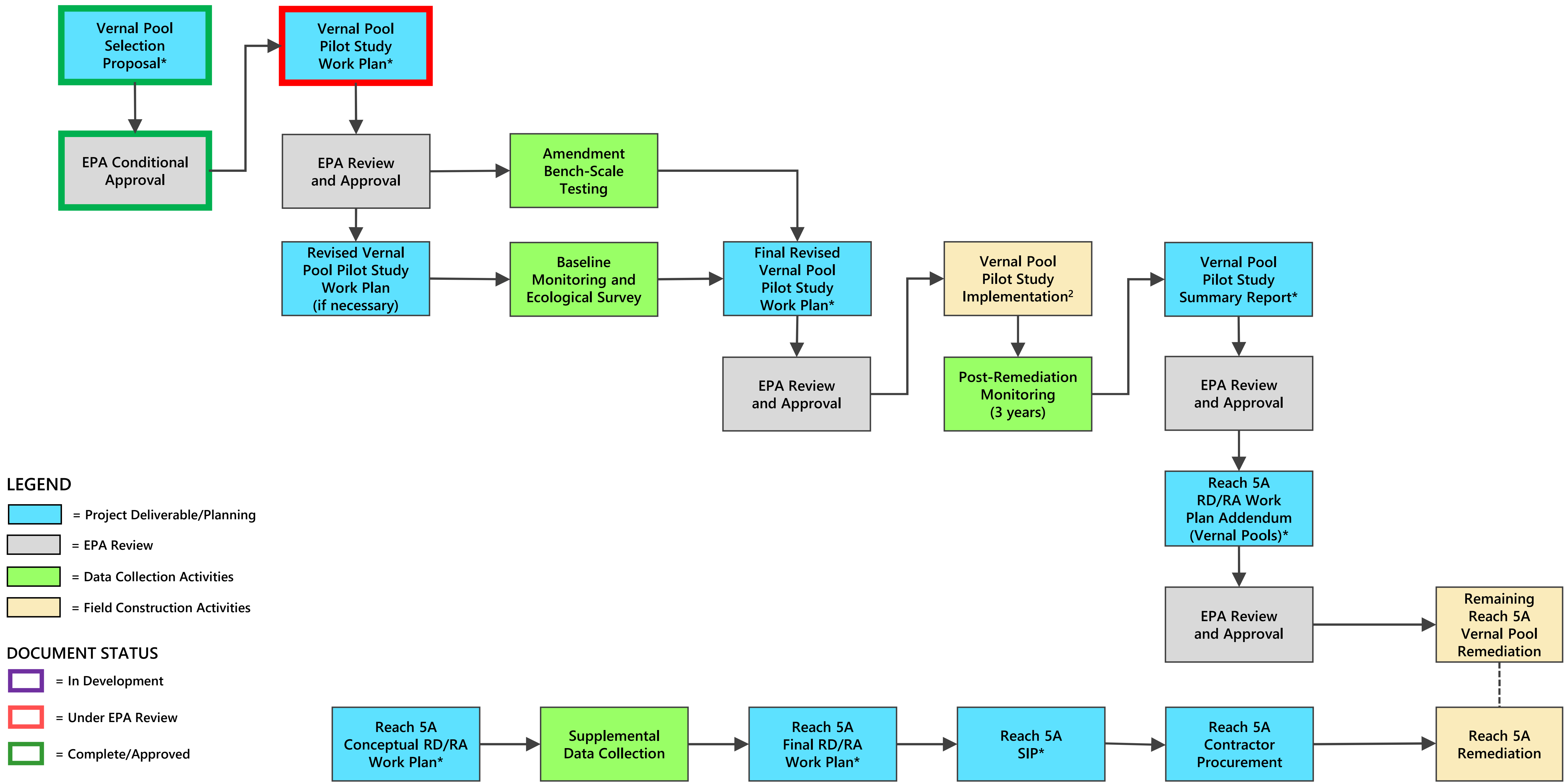
ANCHOR QEA

Figure 1-1
Summary of Vernal Pools Selected for Pilot Study
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Horizontal black line at 3.3 mg/kg represent the performance standard.

Figure 1-2
Cumulative Probability Distribution of 0- to 1-foot PCB SWACs in Vernal Pools



ABBREVIATIONS

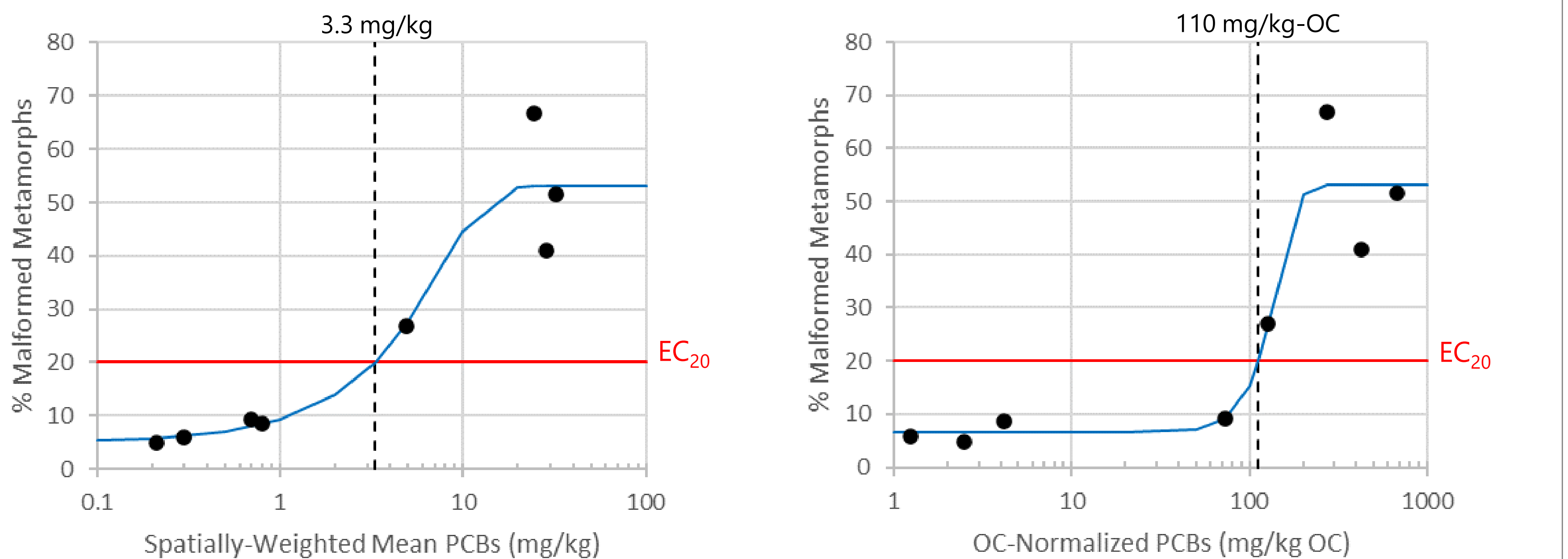
EPA: U.S. Environmental Protection Agency
RD/RA: Remedial Design/Remedial Action
SIP: Supplemental Information Package
UDF: Upland Disposal Facility

Notes:
1. Asterisk (*) indicates deliverable requiring EPA approval.
2. Vernal pool pilot study will likely start prior to initiation of construction in Reach 5A and will continue during initial year(s) of Reach 5A construction.

Last updated: June 7, 2023

ANCHOR QEA

Figure 1-3
Vernal Pool Pilot Study Precedence Flowchart
Vernal Pool Pilot Study Work Plan
GE-Pittsfield/Housatonic River Site



Notes:

1. Malformation data collected from 8 vernal pools during the Phase III wood frog metamorph study conducted by EPA in 2000.
2. Spatially-weighted mean soil PCB concentrations (SWACs) were calculated using interpolated concentration using the inverse distance weighting method.
3. Soil PCB concentrations were measured in 0- to 6-inch interval.
4. The blue line represents the probit analysis results using the transformed percent malformation by the probit transformation and non-transformed soil concentration values. The calculation was performed using the JMP statistical software.
5. The vertical dashed line represents the PCB soil concentration associated with $EC_{20.}$

EC = effects concentration

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Figure 2-1

Correlation of Percent Malformations in Phase III Wood Frog Metamorphs and Soil PCB Concentrations in Vernal Pools

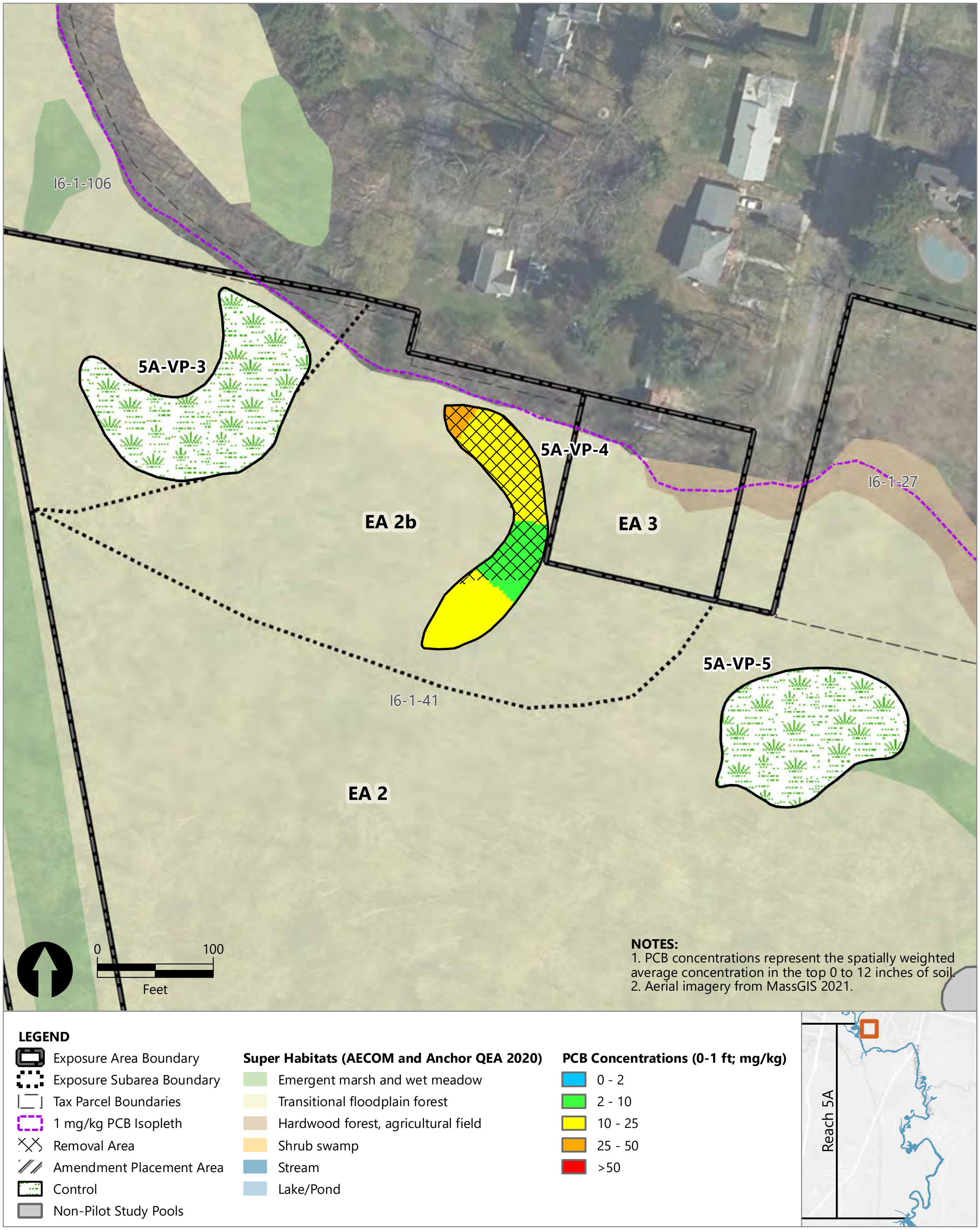

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Figure 4-1
Pilot Study Vernal Pools: Test Pool (5A-VP-4); Control Pools (5A-VP-3; 5A-VP-5)

Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River

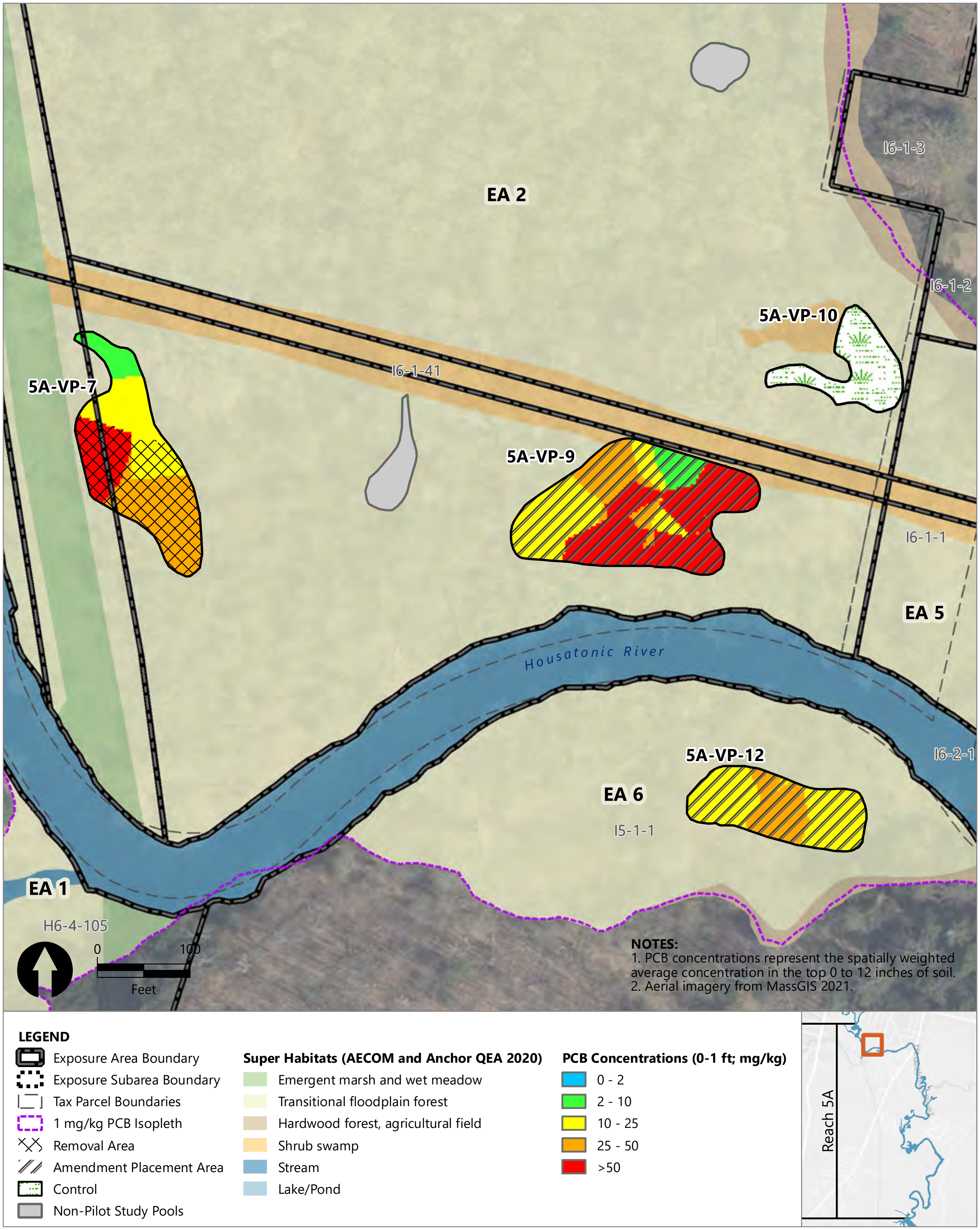

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Figure 4-2
Pilot Study Vernal Pools: Test Pools (5A-VP-7; 5A-VP-9; 5A-VP-12); Control Pool (5A-VP-10)

Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River

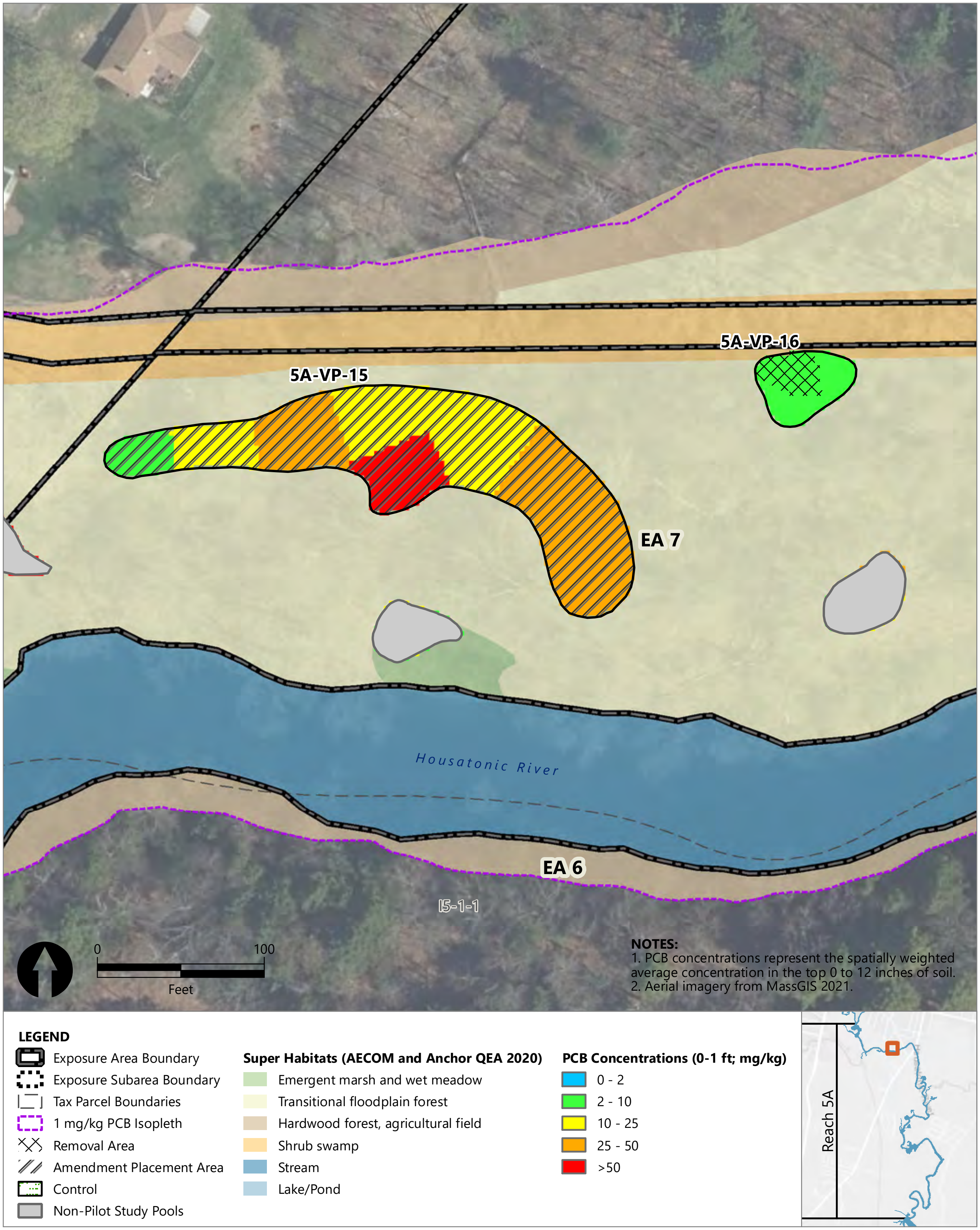

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Figure 4-3

Pilot Study Vernal Pools: Test Pools (5A-VP-15; 5A-VP-16)

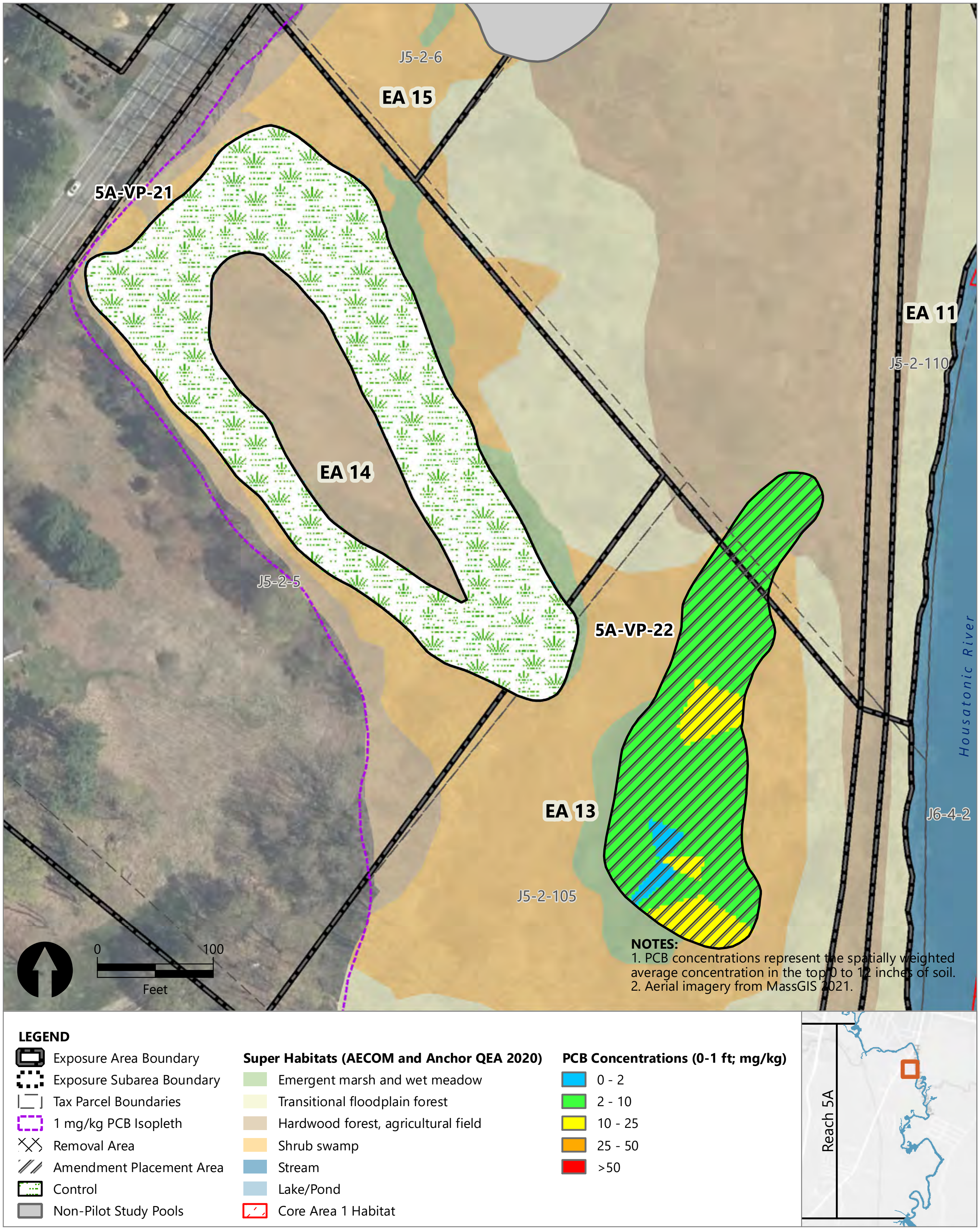

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Figure 4-4
Pilot Study Vernal Pools: Test Pool (5A-VP-22); Control Pool (5A-VP-21)

Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River

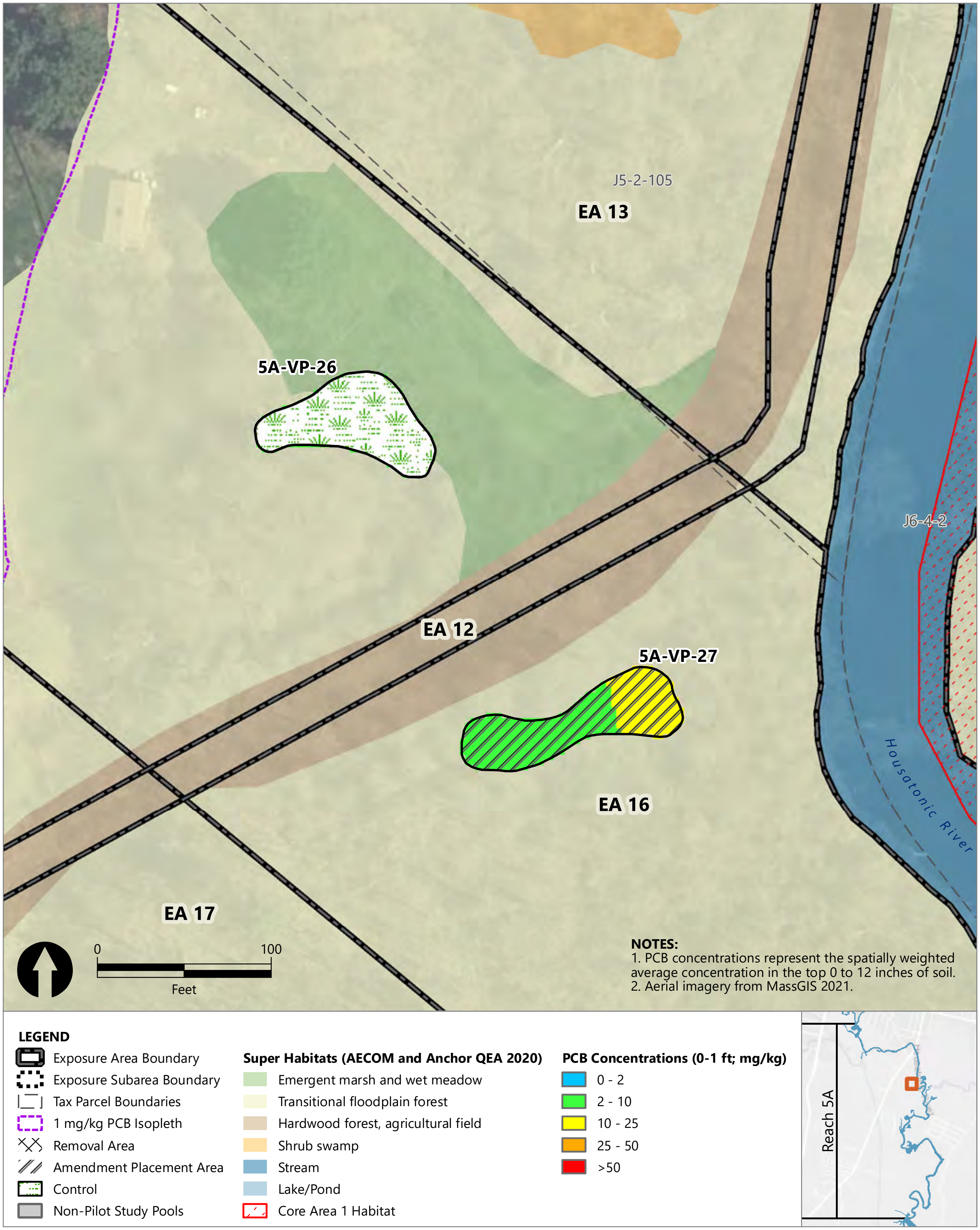

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Figure 4-5
Pilot Study Vernal Pools: Test Pool (5A-VP-27); Control Pool (5A-VP-26)

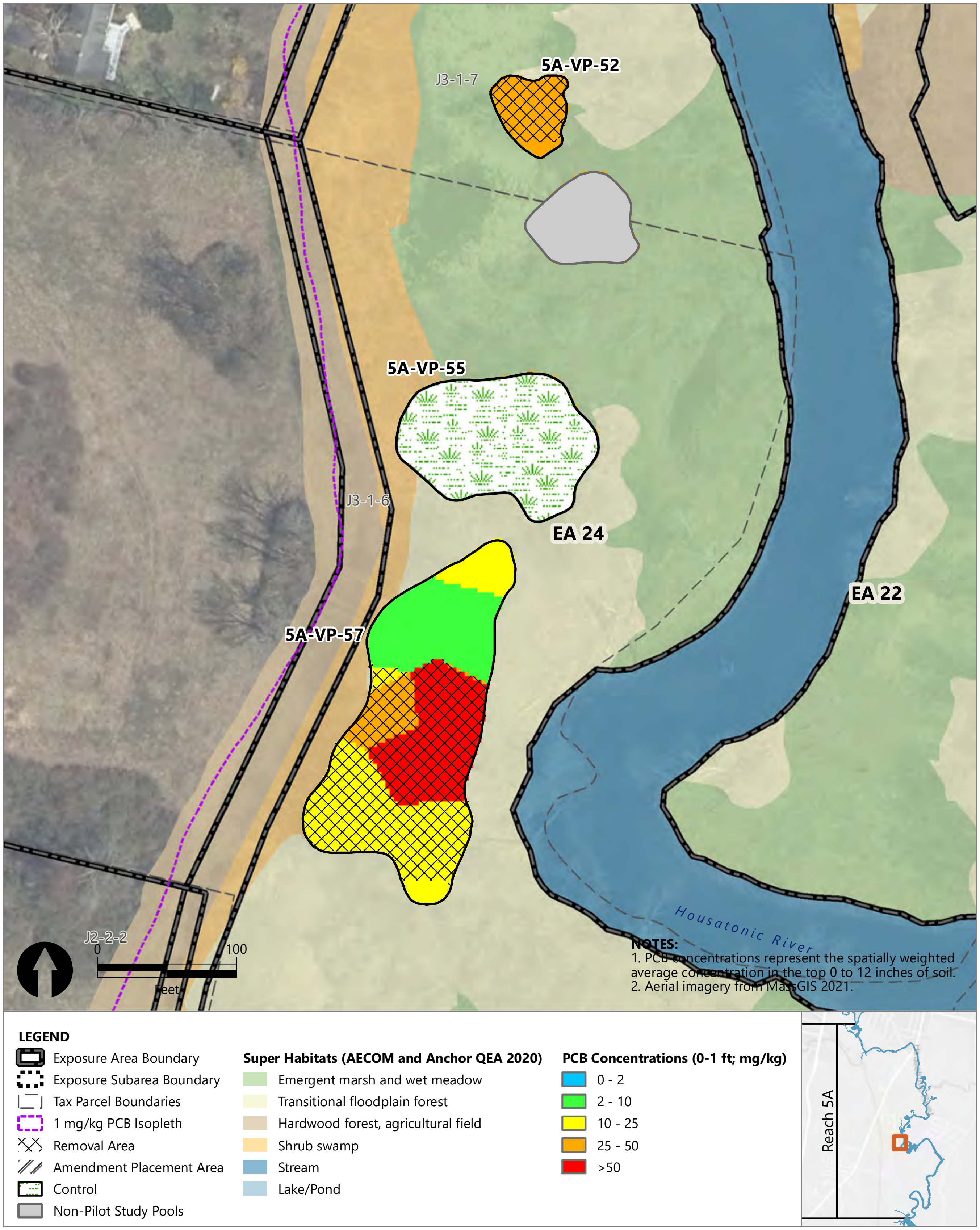

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Figure 4-6
Pilot Study Vernal Pools: Test Pools (5A-VP-52; 5A-VP-57); Control Pool (5A-VP-55)

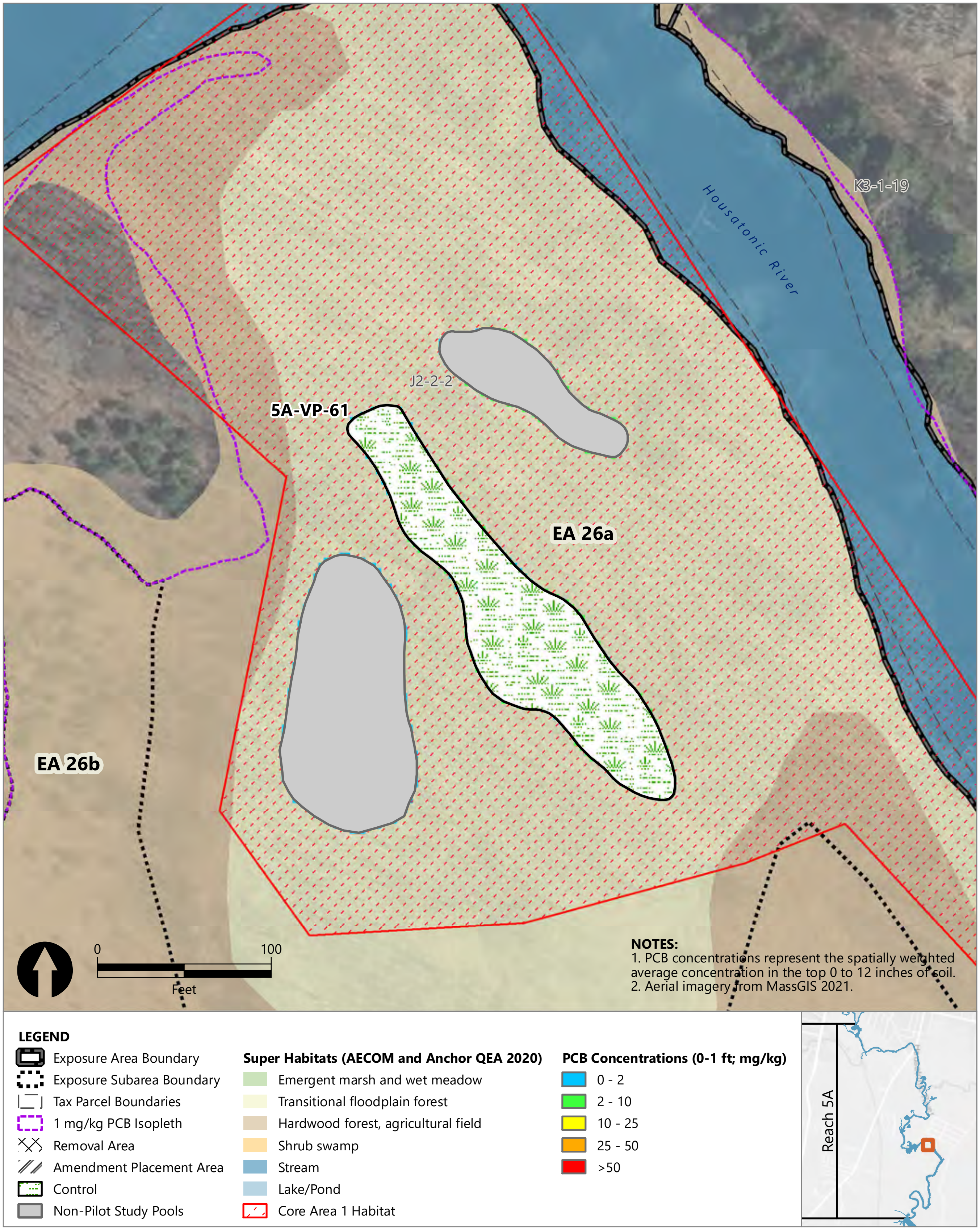

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Figure 4-7
Pilot Study Vernal Pools: Control Pool (5A-VP-61)

Appendix A
Polychlorinated Biphenyl Concentrations in Vernal Pools

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
I6-3-13_AD-6-01-200925-00-0.7	I6-3-13_AD-6	185145.0879	2986534.373	44099	0	0.7	--	42	J	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_AE-6-01-200925-00-0.6	I6-3-13_AE-6	185145.0879	2986509.373	44099	0	0.6	--	43	J	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_AE-7-01-200928-00-0.4	I6-3-13_AE-7	185170.0879	2986509.373	44102	0	0.4	--	27	J	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_AF-6-01-200925-00-0.4	I6-3-13_AF-6	185145.0879	2986484.373	44099	0	0.4	--	10	--	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_AF-9-01-200925-00-0.5	I6-3-13_AF-9	185220.0877	2986484.373	44099	0	0.5	--	61	--	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_AF/AG-4-01-200925-00-0.7	I6-3-13_AF/AG-4	185095.0881	2986472.099	44099	0	0.5	--	9.8	--	2020–2021 PDI (Reach 5A Residential Floodplain Properties)
I6-3-13_N-8-000001	I6-3-13_N-8	185191.8	2986519.2	41484.6701	0	1	--	50	J	2013–2015 PDI (Actual/Potential Lawn Properties)
I6-3-13_N-9-000001	I6-3-13_N-9	185216.5	2986519.5	41484.5833	0	1	--	61	J	2013–2015 PDI (Actual/Potential Lawn Properties)
J5-2-10_M-4-000001	J5-2-10_M-4	186641.9	2985748.4	41494.5132	0	1	--	2.9	J	2013–2015 PDI (Actual/Potential Lawn Properties)
J5-2-10_N-3-000001	J5-2-10_N-3	186591.9	2985697.9	41494.4951	0	1	--	0.91	--	2013–2015 PDI (Actual/Potential Lawn Properties)
J5-2-10_V-7-000001	J5-2-10_V-7	186791.8	2985298.3	41493.4583	0	1	--	2.4	--	2013–2015 PDI (Actual/Potential Lawn Properties)
VP10-T/U-18 (0-0.5')	VP10-T/U-18	184742.4553	2986827.465	44720.5903	0	0.5	--	22	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP10-T/U-20 (0-0.5')	VP10-T/U-20	184836.9879	2986825.502	44720.6035	0	0.5	--	2.21	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP10-U-19 (0-0.5')	VP10-U-19	184794.1858	2986813.54	44720.5972	0	0.5	--	2.42	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B/C-1/2 (0-0.5')	VP12-B/C-1/2	184657.3622	2986368.054	44726.6361	0	0.5	--	16.3	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220614-1	VP12-B/C-1/2	184657.3622	2986368.054	44726	0	0.5	FD	9.92	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B/C-4 (0-0.5')	VP12-B/C-4	184783.1392	2986367.784	44726.6201	0	0.5	--	8.75	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B-2/3 (0-0.5')	VP12-B-2/3	184694.9012	2986391.617	44726.6292	0	0.5	--	13.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-C/D-4 (0-0.5')	VP12-C/D-4	184787.8361	2986331.325	44726.6083	0	0.5	--	8.01	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP13-G/H-3 (0-0.5')	VP13-G/H-3	185031.2414	2986519.79	44721.5264	0	0.5	--	5.88	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP13-H-2 (0-0.5')	VP13-H-2	184985.8698	2986509.613	44721.5201	0	0.5	--	14.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-I/J-12/13 (0-0.5')	VP14-I/J-12/13	185495.3596	2986430.838	44722.4632	0	0.5	--	3.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-I/J-13 (0-0.5')	VP14-I/J-13	185516.1109	2986426.229	44722.4604	0	0.5	--	3.95	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-J-12 (0-0.5')	VP14-J-12	185479.4374	2986418.48	44722.4688	0	0.5	--	2.79	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I/J-17/18 (0-0.5')	VP15A-I/J-17/18	185749.7715	2986433.676	44725.6243	0	0.5	--	13.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I-17/18 (0-0.5')	VP15A-I-17/18	185768.1389	2986444.747	44725.6306	0	0.5	--	26.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I-18 (0-0.5')	VP15A-I-18	185779.1769	2986464.156	44722.5076	0	0.5	--	32.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G/H-9 (0-0.5')	VP15-G/H-9	185327.9977	2986530.572	44721.6313	0	0.5	--	8.49	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220609-3	VP15-G/H-9	185327.9977	2986530.572	44721	0	0.5	FD	11.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-10 (0-0.5')	VP15-G-10	185375.0718	2986535.321	44727.3646	0	0.5	--	15.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-11 (0-0.5')	VP15-G-11	185427.4788	2986541.512	44722.409	0	0.5	--	25.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-12 (0-0.5')	VP15-G-12	185476.0525	2986555.987	44722.4361	0	0.5	--	31.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-13 (0-0.5')	VP15-G-13	185531.4822	2986539.285	44722.4521	0	0.5	--	16	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-H-12 (0-0.5')	VP15-H-12	185490.8475	2986519.918	44722.4542	0	0.5	--	42.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-H-14 (0-0.5')	VP15-H-14	185577.5684	2986510.166	44722.4736	0	0.5	--	14.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-I-15 (0-0.5')	VP15-I-15	185602.2478	2986468.471	44722.4778	0	0.5	--	33.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-F/G-17 (0-0.5')	VP16-F/G-17	185726.8424	2986576.626	44725.6604	0	0.5	--	16.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-F-17/18 (0-0.5')	VP16-F-17/18	185750.4404	2986581.149	44725.6438	0	0.5	--	9.44	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220613-2	VP16-F-17/18	185750.4404	2986581.149	44725	0	0.5	FD	4.38	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-G-17 (0-0.5')	VP16-G-17	185718.303	2986558.995	44725.6688	0	0.5	--	10.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP18A-G-21 (0-0.5')	VP18A-G-21	185913.6813	2986543.02	44725.5868	0	0.5	--	36.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18A-G-21/22 (0-0.5')	VP18A-G-21/22	185957.1113	2986552.601	44722.5285	0	0.5	--	20.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220610-2	VP18A-G-21/22	185957.1113	2986552.601	44722	0	0.5	FD	11.3	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18A-G-22/23 (0-0.5')	VP18A-G-22/23	186000.0456	2986559.842	44725.6007	0	0.5	--	20.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-B-22 (0-0.5')	VP18-B-22	185985.457	2986786.062	44725.5194	0	0.5	--	0.065	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-C-21/22 (0-0.5')	VP18-C-21/22	185953.4443	2986761.053	44725.5285	0	0.5	--	0.106	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-C-22 (0-0.5')	VP18-C-22	185992.1135	2986745.906	44725.5153	0	0.5	--	0.364	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-D-22 (0-0.5')	VP18-D-22	185972.7218	2986716.409	44725.5556	0	0.5	--	0.412	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-D-23 (0-0.5')	VP18-D-23	186024.7132	2986710.509	44725.541	0	0.5	--	0.735	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-B/C-4 (0-0.5')	VP19-B/C-4	187232.0372	2986328.124	44728.3875	0	0.5	--	6.19	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-B-2/3 (0-0.5')	VP19-B-2/3	187157.2234	2986335.82	44728.4069	0	0.5	--	7.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-C-3 (0-0.5')	VP19-C-3	187191.6141	2986304.255	44728.3965	0	0.5	--	11.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-B-5/6 (0-0.5')	VP1A-B-5/6	183005.0644	2988219.51	44706.4201	0	0.5	--	0.156	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220525-1	VP1A-B-5/6	183005.0644	2988219.51	44706	0	0.5	FD	0.262	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-B-6/7 (0-0.5')	VP1A-B-6/7	183053.8208	2988217.03	44706.4188	0	0.5	--	0.24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-C-7 (0-0.5')	VP1A-C-7	183079.9369	2988156.516	44706.4236	0	0.5	--	0.132	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-E-7 (0-0.5')	VP1B-E-7	183072.2952	2988057.938	44706.3854	0	0.5	--	2.09	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-F-7 (0-0.5')	VP1B-F-7	183076.2854	2988019.833	44706.4111	0	0.5	--	6.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-F-7/8 (0-0.5')	VP1B-F-7/8	183102.8798	2987989.658	44706.3931	0	0.5	--	8.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-I/J-2 (0-0.5')	VP1-I/J-2	182813.508	2987821.521	44706.3993	0	0.5	--	0.352	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-J/K-3 (0-0.5')	VP1-J/K-3	182860.4233	2987786.096	44706.4868	0	0.5	--	0.826	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-K/L-4 (0-0.5')	VP1-K/L-4	182914.2768	2987726.872	44707.3632	0	0.5	--	2.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-L/M-4/5 (0-0.5')	VP1-L/M-4/5	182948.6741	2987674.015	44707.3542	0	0.5	--	6.14	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-N-5 (0-0.5')	VP1-N-5	182974.423	2987608.418	44707.3688	0	0.5	--	5.63	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-O-5 (0-0.5')	VP1-O-5	182979.567	2987543.193	44707.3813	0	0.5	--	1.15	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-Q-7 (0-0.5')	VP1-Q-7	183089.6305	2987462.73	44707.3951	0	0.5	--	4.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-Q-9 (0-0.5')	VP1-Q-9	183163.005	2987457.574	44707.4222	0	0.5	--	45.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-R/S-11/12 (0-0.5')	VP1-R/S-11/12	183298.6599	2987378.147	44707.4167	0	0.5	--	3.26	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-B-2 (0-0.5')	VP20-B-2	186543.012	2985789.129	44741.6229	0	0.5	--	8.92	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-B-3/4 (0-0.5')	VP20-B-3/4	186601.3403	2985813.355	44741.6194	0	0.5	--	13.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-2/3 (0-0.5')	VP20-C-2/3	186554.7558	2985733.008	44741.6069	0	0.5	--	5.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-3/4 (0-0.5')	VP20-C-3/4	186601.717	2985748.469	44741.6146	0	0.5	--	2.81	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-4 (0-0.5')	VP20-C-4	186646.4295	2985766.457	44768.3715	0	0.5	--	13.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-D-4 (0-0.5')	VP20-D-4	186618.8901	2985709.649	44768.3771	0	0.5	--	7.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-A/B-4/5(0-0.5')	VP21-A/B-4/5	186354.8605	2985623.472	44748.366	0	0.5	--	6.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-B/C-3/4(0-0.5')	VP21-B/C-3/4	186309.2769	2985571.702	44748.3778	0	0.5	--	1.79	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220706-2	VP21-B/C-3/4	186309.2769	2985571.702	44748	0	0.5	FD	2.49	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-B/C-4/5(0-0.5')	VP21-B/C-4/5	186354.2483	2985576.923	44748.3708	0	0.5	--	7.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C/D-2/3(0-0.5')	VP21-C/D-2/3	186265.5749	2985522.5	44748.4111	0	0.5	--	0.913	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C/D-3(0-0.5')	VP21-C/D-3	186297.0237	2985530.894	44748.3924	0	0.5	--	1.68	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP21-C-4/5(0-0.5')	VP21-C-4/5	186348.5938	2985537.36	44747.7104	0	0.5	--	7.47	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D/E-2(0-0.5')	VP21-D/E-2	186236.1455	2985478.675	44747.5208	0	0.5	--	0.77	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D/E-3(0-0.5')	VP21-D/E-3	186283.0047	2985479.182	44747.5278	0	0.5	--	8.63	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D-1/2(0-0.5')	VP21-D-1/2	186212.5091	2985513.942	44747.4931	0	0.5	--	0.774	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E/F-6(0-0.5')	VP21-E/F-6	186437.7534	2985427.88	44748.4764	0	0.5	--	7.24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E/F-7(0-0.5')	VP21-E/F-7	186490.5252	2985425.301	44748.4486	0	0.5	--	13.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E-2/3(0-0.5')	VP21-E-2/3	186262.1533	2985441.664	44747.5417	0	0.5	--	2.65	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-F/G-3/4(0-0.5')	VP21-F/G-3/4	186310.2582	2985381.736	44747.5618	0	0.5	--	3.22	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G/H-8(0-0.5')	VP21-G/H-8	186543.2925	2985321.848	44748.5063	0	0.5	--	4.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G-7/8(0-0.5')	VP21-G-7/8	186501.5157	2985335.053	44748.5	0	0.5	--	9.83	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-H/I-5/6(0-0.5')	VP21-H/I-5/6	186402.5917	2985277.176	44747.6118	0	0.5	--	7.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-H/I-8(0-0.5')	VP21-H/I-8	186547.7167	2985275.833	44748.5083	0	0.5	--	5.83	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I/J-7/8(0-0.5')	VP21-I/J-7/8	186502.4238	2985218.672	44748.5771	0	0.5	--	4.88	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I-6(0-0.5')	VP21-I-6	186448.6375	2985245.4	44747.6271	0	0.5	--	10.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-J/K-8(0-0.5')	VP21-J/K-8	186513.7394	2985181.241	44748.5694	0	0.5	--	9.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-J/K-9(0-0.5')	VP21-J/K-9	186597.6763	2985179.198	44748.5507	0	0.5	--	2.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-B-4/5 (0-0.5')	VP22-B-4/5	186809.0486	2985313.217	44768.3938	0	0.5	--	8.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-C-4(0-0.5')	VP22-C-4	186769.3344	2985250.941	44749.4931	0	0.5	--	6.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-D-3(0-0.5')	VP22-D-3	186746.3951	2985183.033	44749.4896	0	0.5	--	12.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-F/G-3/4 (0-0.5')	VP22-F/G-3/4	186740.4732	2985086.32	44749.5035	0	0.5	--	9.46	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-H-3/4(0-0.5')	VP22-H-3/4	186749.672	2984991.712	44749.5139	0	0.5	--	6.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AA-36 (0-0.5')	VP24B-AA-36	188814.7703	2985109.813	44739.6431	0	0.5	--	0.246	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AA-37 (0-0.5')	VP24B-AA-37	188889.8413	2985095.065	44739.6729	0	0.5	--	0.14	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AB-35/36 (0-0.5')	VP24B-AB-35/36	188808.9793	2985062.518	44739.6479	0	0.5	--	0.1	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AB-37 (0-0.5')	VP24B-AB-37	188871.155	2985035.561	44739.6611	0	0.5	--	0.195	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AC-36 (0-0.5')	VP24B-AC-36	188821.85	2985012.206	44739.6542	0	0.5	--	0.0814	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AD-36 (0-0.5')	VP24B-AD-36	188820.4094	2984942.038	44739.6889	0	0.5	--	0.15	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AE-35 (0-0.5')	VP24B-AE-35	188776.5607	2984893.834	44739.6944	0	0.5	--	0.0889	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AF-34/35 (0-0.5')	VP24B-AF-34/35	188757.5437	2984842.479	44739.5326	0	0.5	--	0.0697	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AG-34/35 (0-0.5')	VP24B-AG-34/35	188762.541	2984788.212	44739.5243	0	0.5	--	0.048	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-Z-36/37 (0-0.5')	VP24B-Z-36/37	188854.2321	2985144.362	44739.6361	0	0.5	--	0.173	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-Z-37/38 (0-0.5')	VP24B-Z-37/38	188901.2274	2985135.756	44739.6806	0	0.5	--	0.18	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-X/Y-32 (0-0.5')	VP24-X/Y-32	188611.582	2985224.189	44735.5688	0	0.5	--	0.526	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-Y-30 (0-0.5')	VP24-Y-30	188539.6196	2985194.218	44735.5771	0	0.5	--	0.082	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-Y-31 (0-0.5')	VP24-Y-31	188578.3911	2985206.61	44735.5826	0	0.5	--	0.11	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B/C-1/2 (0-0.5')	VP26-B/C-1/2	186510.7398	2984531.154	44742.3681	0	0.5	--	10.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B/C-3 (0-0.5')	VP26-B/C-3	186586.7767	2984517.282	44742.3819	0	0.5	--	3.81	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B-2/3 (0-0.5')	VP26-B-2/3	186555.6764	2984542.957	44742.375	0	0.5	--	3.89	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP27-E/F-6 (0-0.5')	VP27-E/F-6	186728.0553	2984375.086	44742.4028	0	0.5	--	22.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP27-F-4 (0-0.5')	VP27-F-4	186629.4492	2984350.181	44742.3889	0	0.5	--	9.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP27-F-5 (0-0.5')	VP27-F-5	186680.3221	2984362.928	44742.4097	0	0.5	--	6.86	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-B-2(0-0.5')	VP28A-B-2	187126.0886	2984086.907	44743.3924	0	0.5	--	18.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-C/D-2(0-0.5')	VP28A-C/D-2	187128.7487	2984024.972	44743.4097	0	0.5	--	11.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220701-1	VP28A-C/D-2	187128.7487	2984024.972	44743	0	0.5	FD	14	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-C-2 (0-0.5')	VP28A-C-2	187125.127	2984055.514	44743.3611	0	0.5	--	68.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-T/U-11 (0-0.5')	VP2-T/U-11	183291.1648	2987269.923	44708.3653	0	0.5	--	1.36	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-U/V-10/11 (0-0.5')	VP2-U/V-10/11	183256.1059	2987221.413	44708.3722	0	0.5	--	4.81	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-U/V-11/12 (0-0.5')	VP2-U/V-11/12	183302.5329	2987227.207	44708.3667	0	0.5	--	2.49	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-V/W-10/11 (0-0.5')	VP2-V/W-10/11	183255.3421	2987180.551	44708.3764	0	0.5	--	1.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-V/W-11/12 (0-0.5')	VP2-V/W-11/12	183299.7849	2987185.915	44707.4799	0	0.5	--	10.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-D/E-4/5(0-0.5')	VP32-D/E-4/5	186914.1487	2983619.902	44755.4333	0	0.5	--	10.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-F-5(0-0.5')	VP32-F-5	186938.4322	2983562.785	44754.6	0	0.5	--	36.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-A/B-8/9 (0-0.5')	VP33-A/B-8/9	187101.1608	2983766.913	44754.5292	0	0.5	--	17.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-B/C-7/8(0-0.5')	VP33-B/C-7/8	187049.0199	2983724.905	44754.5514	0	0.5	--	25.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-D/E-8/9(0-0.5')	VP33-D/E-8/9	187102.5463	2983622.034	44754.5681	0	0.5	--	35.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP35-H-8/9(0-0.5')	VP35-H-8/9	187106.5211	2983446.437	44755.4806	0	0.5	--	31.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-L-3(0-0.5')	VP36-L-3	186828.3441	2983241.349	44755.6111	0	0.5	--	12.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-L-4(0-0.5')	VP36-L-4	186880.6754	2983245.363	44755.5917	0	0.5	--	15.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220713-3	VP36-L-4	186880.6754	2983245.363	44755	0	0.5	FD	10.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-M-4(0-0.5')	VP36-M-4	186879.1511	2983200.861	44755.5979	0	0.5	--	4.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-N-2/3(0-0.5')	VP36-N-2/3	186812.0305	2983154.273	44755.6181	0	0.5	--	6.04	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-B-4 (0-0.5')	VP3-B-4	184036.9813	2987734.643	44719.5715	0	0.5	--	4.97	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-C/D-3/4 (0-0.5')	VP3-C/D-3/4	184004.192	2987676.877	44715.334	0	0.5	--	6.61	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-C-4/5 (0-0.5')	VP3-C-4/5	184054.0222	2987685.636	44719.5792	0	0.5	--	6.62	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-D/E-2/3 (0-0.5')	VP3-D/E-2/3	183951.1898	2987629.494	44719.5882	0	0.5	--	39	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-D/E-3/4 (0-0.5')	VP3-D/E-3/4	184001.9567	2987629.411	44719.5847	0	0.5	--	20	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-R/S-7(0-0.5')	VP40-R/S-7	187016.0714	2982926.777	44756.384	0	0.5	--	29.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-R-6/7(0-0.5')	VP40-R-6/7	187008.1902	2982963.018	44756.3861	0	0.5	--	64.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R/S-10(0-0.5')	VP42-R/S-10	187170.7129	2982919.078	44756.4868	0	0.5	--	14.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R/S-10/11(0-0.5')	VP42-R/S-10/11	187208.4543	2982933.302	44756.4924	0	0.5	--	13.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R-10(0-0.5')	VP42-R-10	187180.6787	2982954.386	44756.4771	0	0.5	--	29.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R-11(0-0.5')	VP42-R-11	187236.9247	2982955.465	44756.4743	0	0.5	--	10.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-S/T-10(0-0.5')	VP42-S/T-10	187173.8815	2982882.405	44756.491	0	0.5	--	11.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-E/F-2 (0-0.5')	VP49A-E/F-2	186394.8712	2981913.158	44701.3972	0	0.5	--	32	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-F-2/3 (0-0.5')	VP49A-F-2/3	186409.4204	2981901.792	44701.3993	0	0.5	--	7.18	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-F-3 (0-0.5')	VP49A-F-3	186420.5779	2981892.837	44700.541	0	0.5	--	2.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-E-9 (0-0.5')	VP4-E-9	184275.8151	2987600.76	44715.3514	0	0.5	--	28.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-F-9 (0-0.5')	VP4-F-9	184268.4674	2987543.059	44719.6042	0	0.5	--	13.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-G-8 (0-0.5')	VP4-G-8	184221.1187	2987493.785	44715.3556	0	0.5	--	24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP50-B/C-3 (0-0.5')	VP50-B/C-3	186426.9558	2982075.773	44701.4049	0	0.5	--	2.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP50-B-2/3 (0-0.5')	VP50-B-2/3	186400.2945	2982082.476	44701.4111	0	0.5	--	2.98	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP50-C-2 (0-0.5')	VP50-C-2	186386.2515	2982060.072	44704.6035	0	0.5	--	5.84	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220523-1	VP50-C-2	186386.2515	2982060.072	44704	0	0.5	FD	5.87	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-B-5/6 (0-0.5')	VP52-B-5/6	185983.3091	2981461.303	44762.5153	0	0.5	--	15.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220720-1	VP52-B-5/6	185983.3091	2981461.303	44762	0	0.5	FD	15.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-B-6 (0-0.5')	VP52-B-6	186000.3294	2981446.522	44762.5118	0	0.5	--	11.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-C-6 (0-0.5')	VP52-C-6	186002.998	2981422.242	44762.5063	0	0.5	--	29.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP54-C/D-7 (0-0.5')	VP54-C/D-7	186044.1856	2981385.661	44762.6056	0	0.5	--	45.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP54-D-6 (0-0.5')	VP54-D-6	186010.1194	2981361.244	44762.6	0	0.5	--	17.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP54-D-7 (0-0.5')	VP54-D-7	186047.9284	2981351.27	44762.6104	0	0.5	--	40.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-F/G-5 (0-0.5')	VP55-F/G-5	185954.5444	2981239.835	44763.5292	0	0.5	--	50.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-F/G-6 (0-0.5')	VP55-F/G-6	186004.9298	2981229.69	44763.5313	0	0.5	--	36.2	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-G-6/7 (0-0.5')	VP55-G-6/7	186030.5376	2981200.181	44763.5368	0	0.5	--	25.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-J-4 (0-0.5')	VP57-J-4	185905.3132	2981068.198	44763.5688	0	0.5	--	5.42	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-M-4/5 (0-0.5')	VP57-M-4/5	185920.1625	2980916.108	44763.5618	0	0.5	--	6.33	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-P/Q-16 (0-05')	VP59A-P/Q-16	187065.2564	2981364.14	44698.5903	0	0.5	--	18	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-P-15/16 (0-0.5')	VP59A-P-15/16	187051.555	2981387.246	44698.6319	0	0.5	--	17	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220517-1	VP59A-P-15/16	187051.555	2981387.246	44698	0	0.5	FD	7.53	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-Q-15 (0-0.5')	VP59A-Q-15	187040.3273	2981356.793	44698.6014	0	0.5	--	3.36	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I/J-13 (0-0.5')	VP5-I/J-13	184473.5585	2987377.522	44714.5708	0	0.5	--	7.54	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I/J-14/15 (0-0.5')	VP5-I/J-14/15	184552.0216	2987373.399	44714.5653	0	0.5	--	2.26	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-J-13/14 (0-0.5')	VP5-J-13/14	184511.0335	2987351.412	44714.5729	0	0.5	--	5.85	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP60-B-16 (0-0.5')	VP60-B-16	187541.5802	2981115.242	44775.6368	0	0.5	--	1.91	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-C-15 (0-0.5')	VP61-C-15	187493.1909	2981063.402	44777.3569	0	0.5	--	1.22	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220804-2	VP61-C-15	187493.1909	2981063.402	44777	0	0.5	FD	1.36	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-E-16/17 (0-0.5')	VP61-E-16/17	187578.1838	2980947.893	44777.3681	0	0.5	--	3.51	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-E-14/15 (0-0.5')	VP62-E-14/15	187479.6739	2980971.86	44777.3597	0	0.5	--	2.26	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220804-1	VP62-E-14/15	187479.6739	2980971.86	44777	0	0.5	FD	2.15	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-F-14 (0-0.5')	VP62-F-14	187462.9921	2980921.573	44777.3611	0	0.5	--	2.48	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-F-15 (0-0.5')	VP62-F-15	187498.1981	2980919.675	44777.3625	0	0.5	--	1.43	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-G-14 (0-0.5')	VP62-G-14	187455.3229	2980865.577	44777.3764	0	0.5	--	2.06	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-G-15 (0-0.5')	VP62-G-15	187502.9924	2980865.882	44777.3736	0	0.5	--	3.94	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP63-J/K-17 (0-0.5')	VP63-J/K-17	187604.1247	2980680.26	44777.3861	0	0.5	--	1.71	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-P-2 (0-0.5')	VP64-P-2	185787.315	2980752.206	44763.6125	0	0.5	--	17.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-10 (0-0.5')	VP64-Q/R-10	186203.8273	2980678.462	44763.6264	0	0.5	--	8.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-5 (0-0.5')	VP64-Q/R-5	185955.4036	2980683.456	44769.55	0	0.5	--	27.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-9 (0-0.5')	VP64-Q/R-9	186153.3077	2980688.858	44763.6264	0	0.5	--	8.91	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-2/3 (0-0.5')	VP64-Q-2/3	185831.6046	2980712.849	44763.6146	0	0.5	--	16.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-4 (0-0.5')	VP64-Q-4	185904.2731	2980696.098	44769.5479	0	0.5	--	68	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-5 (0-0.5')	VP64-Q-5	185954.066	2980720.329	44763.6215	0	0.5	--	12.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP64-Q-6 (0-0.5')	VP64-Q-6	186006.3727	2980704.206	44763.6215	0	0.5	--	6.94	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-7 (0-0.5')	VP64-Q-7	186055.784	2980693.768	44763.6229	0	0.5	--	12.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-8 (0-0.5')	VP64-Q-8	186104.9141	2980695.312	44763.6243	0	0.5	--	5.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R/S-11 (0-0.5')	VP64-R/S-11	186265.382	2980630.464	44769.5743	0	0.5	--	9.95	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-6 (0-0.5')	VP64-R-6	186006.4343	2980658.279	44769.5535	0	0.5	--	17.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-7 (0-0.5')	VP64-R-7	186056.2768	2980648.991	44769.5625	0	0.5	--	20.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-8 (0-0.5')	VP64-R-8	186105.6067	2980647.449	44769.5653	0	0.5	--	12.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-9 (0-0.5')	VP64-R-9	186153.1726	2980644.269	44769.5681	0	0.5	--	11.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-S/T-9 (0-0.5')	VP65-S/T-9	186138.1966	2980589.009	44770.3507	0	0.5	--	25.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T/U-11 (0-0.5')	VP65-T/U-11	186250.5287	2980542.207	44770.375	0	0.5	--	38.4	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T-10 (0-0.5')	VP65-T-10	186215.6121	2980559.786	44770.3646	0	0.5	--	21.2	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T-9 (0-0.5')	VP65-T-9	186170.6479	2980567.43	44770.3535	0	0.5	--	25.7	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-Q-5 (0-0.5')	VP69-Q-5	187010.7647	2980361.453	44768.6132	0	0.5	--	0.0833	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220726-5	VP69-Q-5	187010.7647	2980361.453	44768	0	0.5	FD	0.046	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-R-4/5 (0-0.5')	VP69-R-4/5	186986.6755	2980321.932	44768.609	0	0.5	--	0.0381	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-S/T-2/3 (0-0.5')	VP69-S/T-2/3	186885.6629	2980236.807	44768.6042	0	0.5	--	0.161	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-S-4 (0-0.5')	VP69-S-4	186942.2196	2980248.656	44768.5889	0	0.5	--	0.185	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-M/N-17 (0-0.5')	VP6-M/N-17	184685.0964	2987172.685	44720.5431	0	0.5	--	4.91	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-N-16 (0-0.5')	VP6-N-16	184643.1549	2987154.702	44714.6208	0	0.5	--	4.23	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-N-16/17 (0-0.5')	VP6-N-16/17	184663.5082	2987162.168	44714.6292	0	0.5	--	4.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-T/U-7 (0-0.5')	VP70-T/U-7	187086.779	2980186.824	44768.6569	0	0.5	--	0.0412	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-4 (0-0.5')	VP70-V-4	186962.7759	2980101.249	44768.5486	0	0.5	--	0.473	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-5/6 (0-0.5')	VP70-V-5/6	187028.4467	2980126.387	44768.5646	0	0.5	--	0.169	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-7 (0-0.5')	VP70-V-7	187104.7894	2980106.969	44768.5694	0	0.5	--	0.037	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-P-21 (0-0.5')	VP71-P-21	187814.5426	2980394.707	44777.5604	0	0.5	--	11.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-S-20 (0-0.5')	VP71-S-20	187756.169	2980246.262	44777.5715	0	0.5	--	10.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-V/W-23 (0-0.5')	VP72-V/W-23	187898.7298	2980076.068	44782.4028	0	0.5	--	8.05	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-V-19 (0-0.5')	VP72-V-19	187688.9526	2980097.198	44777.5833	0	0.5	--	2.47	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-18/19 (0-0.5')	VP72-W-18/19	187676.3542	2980058.496	44777.5861	0	0.5	--	4.91	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-20 (0-0.5')	VP72-W-20	187749.5591	2980054.267	44777.5889	0	0.5	--	2.74	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-21 (0-0.5')	VP72-W-21	187803.0564	2980058.621	44782.3972	0	0.5	--	4.96	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-19 (0-0.5')	VP72-X-19	187701.0546	2980008.064	44777.5944	0	0.5	--	8.55	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-20 (0-0.5')	VP72-X-20	187752.3728	2980005.585	44777.5972	0	0.5	--	10.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-21 (0-0.5')	VP72-X-21	187801.9065	2980009.131	44782.3903	0	0.5	--	12.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-22 (0-0.5')	VP72-X-22	187845.1515	2980014.75	44782.3924	0	0.5	--	7.95	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-23 (0-0.5')	VP72-X-23	187895.9512	2980014.419	44782.4063	0	0.5	--	9.44	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-19 (0-0.5')	VP72-Y-19	187702.056	2979955.746	44777.6118	0	0.5	--	12.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220804-5	VP72-Y-19	187702.056	2979955.746	44777	0	0.5	FD	13.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-20 (0-0.5')	VP72-Y-20	187750.9889	2979956.396	44777.6042	0	0.5	--	8.62	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-21 (0-0.5')	VP72-Y-21	187802.2254	2979957.716	44777.6076	0	0.5	--	9.73	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP72-Y-22 (0-0.5')	VP72-Y-22	187857.5222	2979959.017	44782.3861	0	0.5	--	7.12	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Z-21/22 (0-0.5')	VP72-Z-21/22	187829.5042	2979908.013	44782.3819	0	0.5	--	14.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AA-24/25 (0-0.5')	VP73-AA-24/25	187986.4589	2979862.313	44782.4319	0	0.5	--	4.33	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AJ/AK-15/16 (0-0.5')	VP73A-AJ/AK-15/16	187520.5176	2979376.473	44781.5868	0	0.5	--	12.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AJ-17 (0-0.5')	VP73A-AJ-17	187585.7914	2979419.645	44781.5972	0	0.5	--	9.18	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220808-1	VP73A-AJ-17	187585.7914	2979419.645	44781	0	0.5	FD	9.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AK-15 (0-0.5')	VP73A-AK-15	187495.4488	2979349.654	44781.5764	0	0.5	--	11.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AL-14/15 (0-0.5')	VP73A-AL-14/15	187474.1037	2979316.614	44781.5694	0	0.5	--	28.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AC-23 (0-0.5')	VP73-AC-23	187901.5805	2979751.478	44782.4396	0	0.5	--	9.79	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP74-Q/R-25/26 (0-0.5')	VP74-Q/R-25/26	188026.9444	2980329.935	44782.3813	0	0.5	--	8.52	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-B/C-2 (0-0.5')	VP77-B/C-2	187757.2173	2978884.871	44795.5799	0	0.5	--	2.41	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-C-4 (0-0.5')	VP77-C-4	187851.9398	2978841.543	44795.5729	0	0.5	--	3.04	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-D/E-6 (0-0.5')	VP77-D/E-6	187949.4085	2978790.734	44795.5625	0	0.5	--	1.53	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-D-2 (0-0.5')	VP77-D-2	187762.5975	2978801.854	44797.3917	0	0.5	--	2.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-3 (0-0.5')	VP77-F-3	187791.9075	2978699.708	44797.5097	0	0.5	--	40.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-4 (0-0.5')	VP77-F-4	187852.5019	2978706.954	44797.375	0	0.5	--	11.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220824-3	VP77-F-4	187852.5019	2978706.954	44797	0	0.5	FD	15.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-6 (0-0.5')	VP77-F-6	187941.7802	2978701.965	44792.3924	0	0.5	--	12.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-7 (0-0.5')	VP77-F-7	188001.7893	2978715.9	44792.3833	0	0.5	--	0.878	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H/I-7/8 (0-0.5')	VP77-H/I-7/8	188026.74	2978586.487	44792.4042	0	0.5	--	6.01	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-2/3 (0-0.5')	VP77-H-2/3	187775.1401	2978609.539	44797.5035	0	0.5	--	11.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-4 (0-0.5')	VP77-H-4	187854.5744	2978609.332	44797.3681	0	0.5	--	12.1	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220824-1	VP77-H-4	187854.5744	2978609.332	44797	0	0.5	FD	21.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-6 (0-0.5')	VP77-H-6	187951.7074	2978614.429	44792.4007	0	0.5	--	2.49	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77 I/J-2/3 (0-0.5')	VP77-I/J-2/3	187781.1572	2978539.539	44797.5	0	0.5	--	11.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-I/J-4 (0-0.5')	VP77-I/J-4	187852.452	2978534.062	44797.3583	0	0.5	--	18.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-I/J-6 (0-0.5')	VP77-I/J-6	187953.5847	2978538.232	44792.4139	0	0.5	--	2.77	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-K/L-3 (0-0.5')	VP77-K/L-3	187786.5056	2978435.408	44792.4264	0	0.5	--	10.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-K-6 (0-0.5')	VP77-K-6	187951.9629	2978476.489	44792.4097	0	0.5	--	8.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-L-4 (0-0.5')	VP77-L-4	187862.1737	2978401.045	44797.3521	0	0.5	--	24.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-M/N-3 (0-0.5')	VP77-M/N-3	187799.2552	2978330.699	44792.4354	0	0.5	--	13.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-M-9 (0-0.5')	VP77-M-9	188114.5833	2978346.488	44792.3938	0	0.5	--	2.18	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-N/O-9 (0-0.5')	VP77-N/O-9	188117.4226	2978284.759	44792.3965	0	0.5	--	0.49	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-N-4 (0-0.5')	VP77-N-4	187836.3191	2978294.296	44797.3479	0	0.5	--	18	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220824-8	VP77-N-4	187836.3191	2978294.296	44797	0	0.5	FD	24.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-P-2/3 (0-0.5')	VP77-P-2/3	187780.5115	2978209.396	44796.5007	0	0.5	--	16.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-P-9/10 (0-0.5')	VP77-P-9/10	188123.0912	2978195.555	44792.4097	0	0.5	--	0.0475	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-Q-12 (0-0.5')	VP77-Q-12	188237.134	2978170.825	44792.4479	0	0.5	--	0.237	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP79-E-2/3 (0-0.5')	VP79-E-2/3	186327.6145	2977713.387	44789.5694	0	0.5	--	10.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-T-3/4 (0-0.5')	VP7-T-3/4	184011.9764	2986850.712	44733.3743	0	0.5	--	10.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP7-U-4 (0-0.5')	VP7-U-4	184021.0049	2986800.734	44719.3993	0	0.5	--	18.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-V-3/4 (0-0.5')	VP7-V-3/4	184002.2405	2986744.568	44718.5167	0	0.5	--	43	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-X-5 (0-0.5')	VP7-X-5	184084.2233	2986643.689	44718.5361	0	0.5	--	21	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-2(0-0.5')	VP80-B/C-2	186296.252	2977823.87	44789.3764	0	0.5	--	37.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-3(0-0.5')	VP80-B/C-3	186351.9602	2977837.434	44789.384	0	0.5	--	14.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-4(0-0.5')	VP80-B/C-4	186401.5074	2977830.237	44789.4007	0	0.5	--	39.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B-4(0-0.5')	VP80-B-4	186418.4047	2977864.876	44789.4319	0	0.5	--	9.24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B-5/6(0-0.5')	VP80-B-5/6	186471.2041	2977858.176	44789.5743	0	0.5	--	13.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-C-6(0-0.5')	VP80-C-6	186516.8096	2977821.146	44789.5688	0	0.5	--	26.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220816-1	VP80-C-6	186516.8096	2977821.146	44789	0	0.5	FD	24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-D-7(0-0.5')	VP80-D-7	186554.5799	2977757.974	44789.5958	0	0.5	--	12.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-E-7/8(0-0.5')	VP80-E-7/8	186574.2708	2977707.472	44789.5979	0	0.5	--	32.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-F/G-7/8 (0-0.5')	VP80-F/G-7/8	186579.8846	2977639.958	44789.6076	0	0.5	--	28.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-F-10(0-0.5')	VP81-F-10	186716.2131	2977647.635	44789.5438	0	0.5	--	26.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-G-10/11(0-0.5')	VP81-G-10/11	186720.6744	2977616.496	44789.5403	0	0.5	--	47.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-G-11(0-0.5')	VP81-G-11	186741.9768	2977596.079	44789.5375	0	0.5	--	75	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-A/B-2 (0-0.5')	VP83-A/B-2	186891.0431	2977337.041	44785.3646	0	0.5	--	9.97	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-B/C-1/2 (0-0.5')	VP83-B/C-1/2	186873.7013	2977280.501	44791.3451	0	0.5	--	14.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-B-1/2(0-0.5')	VP83-B-1/2	186880.6747	2977308.833	44790.3507	0	0.5	--	12.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-U/V-10 (0-0.5')	VP8-U/V-10	184325.3006	2986780.251	44720.4875	0	0.5	--	12.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220608-2	VP8-U/V-10	184325.3006	2986780.251	44720	0	0.5	FD	11.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-V-10 (0-0.5')	VP8-V-10	184318.7812	2986732.829	44720.4743	0	0.5	--	26.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-W-9/10 (0-0.5')	VP8-W-9/10	184301.6071	2986693.319	44718.6076	0	0.5	--	20.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-V/W-14 (0-0.5')	VP9-V/W-14	184543.4383	2986721.751	44720.4042	0	0.5	--	34.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-W/X-13/14 (0-0.5')	VP9-W/X-13/14	184505.6821	2986681.659	44720.4	0	0.5	--	15.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-X-13 (0-0.5')	VP9-X-13	184465.6776	2986645.707	44720.4417	0	0.5	--	36.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-X-14 (0-0.5')	VP9-X-14	184526.3953	2986640.175	44720.4347	0	0.5	--	26.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
H3-F0330006-0-0000-RE	F0330006	183929.9513	2987687.009	36378	0	0.5	--	75.5	--	1998–2002 EPA Supplemental Investigation
H2-F0389408-0-0000	F0389408	183043.0517	2988185.502	36108	0	0.5	--	2.45	--	1998–2002 EPA Supplemental Investigation
H3-F0489810-0-0000	F0489810	187664.0522	2979909.215	36123	0	0.5	--	5.06	J	1998–2002 EPA Supplemental Investigation
H3-F0489811-0-0000	F0489811	187709.1598	2979891.987	36123	0	0.5	--	20.2	J	1998–2002 EPA Supplemental Investigation
H3-F0489816-0-0000	F0489816	187941.8654	2979808.378	36123	0	0.5	--	36.6	J	1998–2002 EPA Supplemental Investigation
H3-F0643005-0-0000	F0643005	187837.7417	2978778.491	36193	0	0.5	--	6.02	J	1998–2002 EPA Supplemental Investigation
H3-FL000029-0-0000	FL000029	184470.2359	2987415.968	36087	0	0.5	--	0.4825	U	1998–2002 EPA Supplemental Investigation
H3-FL000030-0-0000	FL000030	184523.0848	2987404.952	36087	0	0.5	--	0.446	U	1998–2002 EPA Supplemental Investigation
H3-FL000031-0-0000	FL000031	184566.467	2987405.685	36087	0	0.5	--	0.4815	U	1998–2002 EPA Supplemental Investigation
H3-FL000032-0-0000	FL000032	186719.8828	2984946.942	36087	0	0.5	--	15.9	--	1998–2002 EPA Supplemental Investigation
H3-FL001832-0-0000	FL000032	186719.8828	2984946.942	37237	0	0.5	--	--	J	1998–2002 EPA Supplemental Investigation
H3-FL000033-0-0000	FL000033	186709.3599	2984984.868	36087	0	0.5	--	1.85	--	1998–2002 EPA Supplemental Investigation
H3-FL000034-0-0000	FL000034	186707.3209	2985018.975	36087	0	0.5	--	1.18	--	1998–2002 EPA Supplemental Investigation

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Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
H3-FL000035-1-0000	FL000035	186698.4634	2985065.312	36087	0	0.5	FD	1.457	0	1998–2002 EPA Supplemental Investigation
H3-FL000035-0-0000	FL000035	186698.4634	2985065.312	36087	0	0.5	--	--	--	1998–2002 EPA Supplemental Investigation
H3-FL000036-0-0000	FL000036	186695.9672	2985114.151	36087	0	0.5	--	0.512	J	1998–2002 EPA Supplemental Investigation
H3-FL000037-0-0000	FL000037	186401.347	2985559.776	36088	0	0.5	--	0.835	J	1998–2002 EPA Supplemental Investigation
H3-FL000037-1-0000	FL000037	186401.347	2985559.776	36088	0	0.5	FD	--	J	1998–2002 EPA Supplemental Investigation
H3-FL000038-0-0000	FL000038	186489.3784	2985382.289	36088	0	0.5	--	2.37	J	1998–2002 EPA Supplemental Investigation
H3-FL000039-0-0000	FL000039	186545.5405	2985191.515	36088	0	0.5	--	1.23	J	1998–2002 EPA Supplemental Investigation
H3-FL000040-0-0000	FL000040	186357.3809	2985350.179	36088	0	0.5	--	0.75	U	1998–2002 EPA Supplemental Investigation
H3-FL000041-0-0000	FL000041	186305.7245	2985432.925	36088	0	0.5	--	0.745	U	1998–2002 EPA Supplemental Investigation
H3-FL000042-0-0000	FL000042	187120.476	2980312.613	36089	0	0.5	--	0.34	U	1998–2002 EPA Supplemental Investigation
H3-FL000043-0-0000	FL000043	187091.7831	2980262.056	36089	0	0.5	--	0.3005	U	1998–2002 EPA Supplemental Investigation
H3-FL000044-0-0000	FL000044	187016.3652	2980170.832	36089	0	0.5	--	0.286	U	1998–2002 EPA Supplemental Investigation
H3-FL000045-0-0000	FL000045	187056.2494	2980219.82	36089	0	0.5	--	0.302	U	1998–2002 EPA Supplemental Investigation
H3-FL000046-0-0000	FL000046	186968.7122	2980290.19	36089	0	0.5	--	0.3205	U	1998–2002 EPA Supplemental Investigation
H3-FL000047-0-0000	FL000047	186938.4634	2980268.62	36089	0	0.5	--	0.305	U	1998–2002 EPA Supplemental Investigation
H3-FL000048-0-0000	FL000048	186908.0984	2980270.743	36089	0	0.5	--	0.342	U	1998–2002 EPA Supplemental Investigation
H3-FL000049-0-0000	FL000049	186881.3361	2980285.661	36089	0	0.5	--	0.3445	U	1998–2002 EPA Supplemental Investigation
H3-FL000075-0-0000	FL000075	184212.4066	2987653.482	36166	0	0.5	--	44.8	J	1998–2002 EPA Supplemental Investigation
H3-FL000076-0-0000	FL000076	184225.2385	2987644.881	36166	0	0.5	--	39	J	1998–2002 EPA Supplemental Investigation
H3-FL000077-0-0000	FL000077	184252.9328	2987639.936	36166	0	0.5	--	28	J	1998–2002 EPA Supplemental Investigation
H3-FL000078-0-0000	FL000078	184252.8543	2987624.741	36166	0	0.5	--	27.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000079-0-0000	FL000079	184258.9697	2987624.06	36166	0	0.5	--	14.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000080-0-0000	FL000080	184055.1896	2986743.711	36166	0	0.5	--	13.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000081-0-0000	FL000081	184047.0054	2986729.176	36166	0	0.5	--	15.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000082-0-0000	FL000082	184061.6008	2986717.171	36166	0	0.5	--	22.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000083-0-0000	FL000083	184049.7972	2986707.41	36166	0	0.5	--	25.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000084-0-0000	FL000084	184056.1881	2986694.282	36166	0	0.5	--	16	J	1998–2002 EPA Supplemental Investigation
H3-FL000085-0-0000	FL000085	184604.366	2986734.78	36167	0	0.5	--	15	J	1998–2002 EPA Supplemental Investigation
H3-FL000086-0-0000	FL000086	184589.0745	2986728.007	36167	0	0.5	--	20.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000087-0-0000	FL000087	184575.0385	2986691.793	36167	0	0.5	--	59.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000088-0-0000	FL000088	184616.4339	2986676.084	36167	0	0.5	--	154	J	1998–2002 EPA Supplemental Investigation
H3-FL000089-0-0000	FL000089	184628.4101	2986632.485	36167	0	0.5	--	54.3	J	1998–2002 EPA Supplemental Investigation
H3-FL000093-0-0000	FL000093	184806.8684	2986901.308	36167	0	0.5	--	6.79	J	1998–2002 EPA Supplemental Investigation
H3-FL000094-0-0000	FL000094	184828.0523	2986866.875	36167	0	0.5	--	9.16	J	1998–2002 EPA Supplemental Investigation
H3-FL000103-0-0000	FL000103	187004.0484	2982997.978	36168	0	0.5	--	144	J	1998–2002 EPA Supplemental Investigation
H3-FL000104-0-0000	FL000104	187010.6547	2983017.426	36168	0	0.5	--	90.5	J	1998–2002 EPA Supplemental Investigation
H3-FL000105-0-0000	FL000105	187020.6098	2983037.848	36168	0	0.5	--	79.9	J	1998–2002 EPA Supplemental Investigation
H3-FL000106-0-0000	FL000106	186831.9516	2983190.642	36168	0	0.5	--	7.07	J	1998–2002 EPA Supplemental Investigation
H3-FL000107-0-0000	FL000107	186808.7372	2983182.855	36168	0	0.5	--	6.42	J	1998–2002 EPA Supplemental Investigation
H3-FL000108-0-0000	FL000108	186786.3753	2983188.29	36168	0	0.5	--	11.5	J	1998–2002 EPA Supplemental Investigation

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Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
H3-FL000109-0-0000	FL000109	186763.9706	2983195.555	36168	0	0.5	--	5.87	J	1998–2002 EPA Supplemental Investigation
H3-FL000122-0-0000	FL000122	187119.4275	2983662.117	36171	0	0.5	--	14.3	J	1998–2002 EPA Supplemental Investigation
H3-FL000123-0-0000	FL000123	187056.2586	2983683.73	36171	0	0.5	--	46.6	J	1998–2002 EPA Supplemental Investigation
H3-FL000124-0-0000	FL000124	187010.1601	2983673.637	36171	0	0.5	--	64.1	J	1998–2002 EPA Supplemental Investigation
H3-FL000125-0-0000	FL000125	187059.97	2983644.891	36171	0	0.5	--	55.6	J	1998–2002 EPA Supplemental Investigation
H3-FL000127-0-0000	FL000127	186914.6832	2983577.496	36171	0	0.5	--	19.8	J	1998–2002 EPA Supplemental Investigation
H3-FL000128-0-0000	FL000128	186903.6812	2983591.048	36171	0	0.5	--	6.25	J	1998–2002 EPA Supplemental Investigation
H3-FL000129-0-0000	FL000129	187199.7832	2983303.246	36172	0	0.5	--	47.6	J	1998–2002 EPA Supplemental Investigation
H3-FL000130-0-0000	FL000130	187157.1394	2983345.143	36172	0	0.5	--	9.13	J	1998–2002 EPA Supplemental Investigation
H3-FL000131-0-0000	FL000131	187140.6572	2983399.877	36172	0	0.5	--	74.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000132-0-0000	FL000132	187079.341	2983403.775	36172	0	0.5	--	76.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000135-0-0000	FL000135	187554.9901	2980691.564	36172	0	0.5	--	6.01	J	1998–2002 EPA Supplemental Investigation
H3-FL000136-0-0000	FL000136	187577.7849	2980694.952	36172	0	0.5	--	5.83	J	1998–2002 EPA Supplemental Investigation
H3-FL000137-0-0000	FL000137	187623.7455	2980896.832	36173	0	0.5	--	3.49	J	1998–2002 EPA Supplemental Investigation
H3-FL000138-0-0000	FL000138	187612.9355	2980916.134	36173	0	0.5	--	0.4775	UJ	1998–2002 EPA Supplemental Investigation
H3-FL000139-0-0000	FL000139	187600.9087	2980925.587	36173	0	0.5	--	8.84	J	1998–2002 EPA Supplemental Investigation
H3-FL000140-0-0000	FL000140	187564.3571	2980985.906	36173	0	0.5	--	3.1	J	1998–2002 EPA Supplemental Investigation
H3-FL000141-0-0000	FL000141	187536.4982	2981013.498	36173	0	0.5	--	4.64	J	1998–2002 EPA Supplemental Investigation
H3-FL000142-0-0000	FL000142	187613.2822	2981065.467	36173	0	0.5	--	10.1	J	1998–2002 EPA Supplemental Investigation
H3-FL000143-0-0000	FL000143	187582.6646	2981091.065	36173	0	0.5	--	13.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000144-0-0000	FL000144	187563.1497	2981099.788	36173	0	0.5	--	7.12	J	1998–2002 EPA Supplemental Investigation
H3-FL000145-0-0000	FL000145	187772.631	2980418.237	36173	0	0.5	--	2.99	J	1998–2002 EPA Supplemental Investigation
H3-FL000146-0-0000	FL000146	187744.4524	2980369.377	36173	0	0.5	--	37.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000147-0-0000	FL000147	187789.0112	2980346.54	36173	0	0.5	--	4.83	J	1998–2002 EPA Supplemental Investigation
H3-FL000148-0-0000	FL000148	187743.3815	2980323.689	36173	0	0.5	--	5.76	J	1998–2002 EPA Supplemental Investigation
H3-FL000149-0-0000	FL000149	187773.5187	2980303.423	36173	0	0.5	--	18.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000150-0-0000	FL000150	187964.106	2980401.519	36173	0	0.5	--	57.5	J	1998–2002 EPA Supplemental Investigation
H3-FL000151-0-0000	FL000151	187995.6551	2980375.15	36173	0	0.5	--	19.1	J	1998–2002 EPA Supplemental Investigation
H3-FL000152-0-0000	FL000152	188029.1824	2980303.112	36173	0	0.5	--	18.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000153-0-0000	FL000153	188030.0983	2980272.279	36173	0	0.5	--	14.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000154-0-0000	FL000154	188081.375	2980222.938	36173	0	0.5	--	15.5	J	1998–2002 EPA Supplemental Investigation
H3-FL000156-0-0000	FL000156	186365.7646	2977684.732	36178	0	0.5	--	11.6	J	1998–2002 EPA Supplemental Investigation
H3-FL000157-0-0000	FL000157	186350.2424	2977702.765	36178	0	0.5	--	8.8	J	1998–2002 EPA Supplemental Investigation
H3-FL000158-0-0000	FL000158	186462.5263	2977824.13	36178	0	0.5	--	33.8	J	1998–2002 EPA Supplemental Investigation
H3-FL000159-0-0000	FL000159	186488.6482	2977789.557	36178	0	0.5	--	26.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000160-0-0000	FL000160	186507.8555	2977738.85	36178	0	0.5	--	37.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000161-0-0000	FL000161	186536.2822	2977665.862	36178	0	0.5	--	132	J	1998–2002 EPA Supplemental Investigation
H3-FL000171-0-0000	FL000171	185864.9996	2980950.817	36199	0	0.5	--	6.58	J	1998–2002 EPA Supplemental Investigation
H3-FL000172-0-0000	FL000172	185914.6811	2980978.281	36199	0	0.5	--	117	J	1998–2002 EPA Supplemental Investigation
H3-FL000173-0-0000	FL000173	185930.5288	2981022.159	36199	0	0.5	--	78	J	1998–2002 EPA Supplemental Investigation

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
H3-FL000174-0-0000	FL000174	185953.0822	2981067.554	36199	0	0.5	--	13.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000175-0-0000	FL000175	185969.6835	2981130.067	36199	0	0.5	--	8.41	J	1998–2002 EPA Supplemental Investigation
H3-FL000176-0-0000	FL000176	185918.1923	2981200.697	36199	0	0.5	--	5.89	J	1998–2002 EPA Supplemental Investigation
H3-FL000177-0-0000	FL000177	185944.7355	2981201.771	36199	0	0.5	--	10.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000178-0-0000	FL000178	185969.0481	2981203.291	36199	0	0.5	--	11.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000179-0-0000	FL000179	185989.9073	2981174.392	36199	0	0.5	--	4.33	J	1998–2002 EPA Supplemental Investigation
H3-FL000180-0-0000	FL000180	186001.8763	2981155.827	36199	0	0.5	--	64.6	J	1998–2002 EPA Supplemental Investigation
H3-FL000181-0-0000	FL000181	187835.0807	2980064.076	36199	0	0.5	--	0.72	UJ	1998–2002 EPA Supplemental Investigation
H3-FL000183-0-0000	FL000183	187758.167	2979570.911	36199	0	0.5	--	12.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000184-0-0000	FL000184	187760.0275	2979593.519	36199	0	0.5	--	26.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000185-0-0000	FL000185	187763.542	2979621.862	36199	0	0.5	--	78.1	J	1998–2002 EPA Supplemental Investigation
H3-FL000186-0-0000	FL000186	187857.0626	2979700.271	36199	0	0.5	--	19.3	J	1998–2002 EPA Supplemental Investigation
H3-FL000187-0-0000	FL000187	187829.5559	2979681.316	36199	0	0.5	--	15	J	1998–2002 EPA Supplemental Investigation
H3-FL000188-0-0000	FL000188	187812.9377	2979670.637	36199	0	0.5	--	14	J	1998–2002 EPA Supplemental Investigation
H3-FL000377-0-0000	FL000377	186726.1574	2985124.9	36227	0	0.5	--	23	J	1998–2002 EPA Supplemental Investigation
H3-FL000378-0-0000	FL000378	186706.2201	2985133.095	36227	0	0.5	--	15.7	J	1998–2002 EPA Supplemental Investigation
H3-FL000379-0-0000	FL000379	186675.2027	2985009.851	36227	0	0.5	--	6.5	J	1998–2002 EPA Supplemental Investigation
H3-FL000380-0-0000	FL000380	186716.5504	2985010.134	36227	0	0.5	--	6.04	J	1998–2002 EPA Supplemental Investigation
H3-FL000445-0-0000	FL000445	186412.4083	2985500.323	36229	0	0.5	--	10.8	J	1998–2002 EPA Supplemental Investigation
H3-FL000446-0-0000	FL000446	186454.8401	2985519.498	36229	0	0.5	--	5	--	1998–2002 EPA Supplemental Investigation
H3-FL000447-0-0000	FL000447	186549.2813	2985218.351	36229	0	0.5	--	3.67	J	1998–2002 EPA Supplemental Investigation
H3-FL000448-0-0000	FL000448	186599.3029	2985218.126	36229	0	0.5	--	2.68	J	1998–2002 EPA Supplemental Investigation
H3-FL000449-0-0000	FL000449	186366.0142	2985321.543	36229	0	0.5	--	2.79	J	1998–2002 EPA Supplemental Investigation
H3-FL000450-0-0000	FL000450	183348.6813	2987320.735	36230	0	0.5	--	0.56	UJ	1998–2002 EPA Supplemental Investigation
H3-FL000457-0-0000	FL000457	183278.8388	2987414.849	36230	0	0.5	--	1.66	J	1998–2002 EPA Supplemental Investigation
H3-FL000458-0-0000	FL000458	183243.9053	2987444.369	36230	0	0.5	--	0.251	UJ	1998–2002 EPA Supplemental Investigation
H3-FL000459-0-0000	FL000459	183222.5513	2987426.168	36230	0	0.5	--	1.58	J	1998–2002 EPA Supplemental Investigation
H3-FL000460-0-0000	FL000460	183122.0159	2987489.607	36230	0	0.5	--	0.4	J	1998–2002 EPA Supplemental Investigation
H3-FL000461-0-0000	FL000461	183026.7156	2987474.53	36230	0	0.5	--	0.619	J	1998–2002 EPA Supplemental Investigation
H3-FL000600-0-0000	FL000600	184606.0498	2986646.443	36270	0	0.5	--	95.2	J	1998–2002 EPA Supplemental Investigation
H3-FL000601-0-0000	FL000601	184580.73	2986646.443	36270	0	0.5	--	72.5	--	1998–2002 EPA Supplemental Investigation
H3-FL000602-0-0000	FL000602	184559.6301	2986663.323	36270	0	0.5	--	78.5	--	1998–2002 EPA Supplemental Investigation
H3-FL000953-0-0000	FL000953	184673.1677	2986697.102	36467	0	0.5	--	49.2	--	1998–2002 EPA Supplemental Investigation
H3-FL000954-0-0000	FL000954	184586.2662	2986730.541	36467	0	0.5	--	22.4	--	1998–2002 EPA Supplemental Investigation
H3-FL000962-0-0000	FL000962	186716.8109	2984998.654	36468	0	0.5	--	40.6	--	1998–2002 EPA Supplemental Investigation
H3-FL001021-0-0000	FL001021	185896.1905	2981017.635	36472	0	0.5	--	30.2	--	1998–2002 EPA Supplemental Investigation
H3-FL001045-0-0000	FL001045	187542.1982	2979396.984	36474	0	0.5	--	9.38	--	1998–2002 EPA Supplemental Investigation
H3-FL001285-0-0000	FL001285	186594.603	2985775.576	36556	0	0.5	--	9.39	--	1998–2002 EPA Supplemental Investigation
H3-FL001304-0-0000	FL001304	185895.2031	2980736.424	36557	0	0.5	--	18.9	--	1998–2002 EPA Supplemental Investigation
H3-FL001320-0-0000	FL001320	188051.9696	2978656.359	36558	0	0.5	--	0.51	U	1998–2002 EPA Supplemental Investigation

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Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
H3-FL001321-0-0000	FL001321	188036.891	2978482.388	36558	0	0.5	--	2.36	J	1998–2002 EPA Supplemental Investigation
H3-FL001322-0-0000	FL001322	187838.1133	2978477.286	36558	0	0.5	--	20.3	--	1998–2002 EPA Supplemental Investigation
H3-FL001571-0-0000	FL001571	188161.9596	2978233.709	36739	0	0.5	--	0.428	J	1998–2002 EPA Supplemental Investigation
H3-FL001998-0-0000	FL001998	184611.5218	2986671.298	37272	0	0.5	--	5.3235	--	1998–2002 EPA Supplemental Investigation
H3-FL002014-0-0000	FL002014	184704.5295	2986395.244	37322	0	0.5	--	28	--	1998–2002 EPA Supplemental Investigation
H3-FL002017-0-0000	FL002017	186948.9569	2980267.008	37343	0	0.5	--	0.03551	--	1998–2002 EPA Supplemental Investigation
H3-FL002018-0-0000	FL002018	187036.9487	2980163.241	37343	0	0.5	--	0.01583	--	1998–2002 EPA Supplemental Investigation
H3-SE000921-0-0000	SE000921	184730.7816	2986357.621	36446	0	0.5	--	51.8	--	1998–2002 EPA Supplemental Investigation
H3-SE000923-0-0000	SE000923	185081.042	2986511.267	36446	0	0.5	--	14.1	--	1998–2002 EPA Supplemental Investigation
H3-SE001246-0-0000	SE001246	184581.619	2986679.164	36615	0	0.17	--	37	--	1998–2002 EPA Supplemental Investigation
H3-SE001246-0-0000	SE001246	184581.619	2986679.164	36615	0	0.17	--	9.4598	--	1998–2002 EPA Supplemental Investigation
H3-SE001249-0-0000	SE001249	186665.2763	2985046.72	36615	0	0.17	--	4.3	J	1998–2002 EPA Supplemental Investigation
H3-SE001249-0-0000	SE001249	186665.2763	2985046.72	36615	0	0.17	--	2.4513	--	1998–2002 EPA Supplemental Investigation
H3-SE001254-0-0000	SE001254	186453.5641	2985475.788	36620	0	0.17	--	5.2	--	1998–2002 EPA Supplemental Investigation
H3-SE001254-0-0000	SE001254	186453.5641	2985475.788	36620	0	0.17	--	5.4774	--	1998–2002 EPA Supplemental Investigation
H3-SE001276-0-0000	SE001276	186453.5641	2985475.788	36665	0	0.17	--	6.9	J	1998–2002 EPA Supplemental Investigation
H3-SE001256-0-0000	SE001256	187035.4855	2980199.519	36621	0	0.17	--	0.12	J	1998–2002 EPA Supplemental Investigation
H3-SE001256-0-0000	SE001256	187035.4855	2980199.519	36621	0	0.17	--	0.3904	--	1998–2002 EPA Supplemental Investigation
H3-SE001275-0-0000	SE001275	187035.4855	2980199.519	36664	0	0.17	--	0.098	J	1998–2002 EPA Supplemental Investigation
H3-SE001258-0-0000	SE001258	186945.0986	2980289.906	36621	0	0.17	--	0.12	J	1998–2002 EPA Supplemental Investigation
H3-SE001258-0-0000	SE001258	186945.0986	2980289.906	36621	0	0.17	--	0.564	--	1998–2002 EPA Supplemental Investigation
H3-SE001274-0-0000	SE001274	186945.0986	2980289.906	36664	0	0.17	--	0.25	J	1998–2002 EPA Supplemental Investigation
H3-SE001274-1-0000	SE001274	186945.0986	2980289.906	36664	0	0.17	FD	0.38	J	1998–2002 EPA Supplemental Investigation
082598BT10	SL0271	183105.8027	2988038.764	36032	0	0.5	--	2.84	--	1998–2002 EPA Supplemental Investigation
082698BT02	SL0274	187122.2231	2983727.277	36033	0	0.5	--	4.01	--	1998–2002 EPA Supplemental Investigation
082698BT04	SL0276	187004.6963	2983682.633	36033	0	0.5	--	4.74	--	1998–2002 EPA Supplemental Investigation
082798BT10	SL0299	186210.2527	2980639.241	36034	0	0.5	--	2	--	1998–2002 EPA Supplemental Investigation
FP2R-11	FP2R-11	184482.5399	2987418.976	33800	0	0.5	--	4.6	--	1990–1992 Massachusetts Contingency Plan Phase II Investigation
FP2R-7	FP2R-7	183965.578	2987665.654	33220	0	0.5	--	58	--	1990–1992 Massachusetts Contingency Plan Phase II Investigation
H2-F0389408-0-0005	F0389408	183043.0517	2988185.502	36108	0.5	1	--	0.858	J	1998–2002 EPA Supplemental Investigation
H3-F0489811-0-0005	F0489811	187709.1598	2979891.987	36123	0.5	1	--	4.09	J	1998–2002 EPA Supplemental Investigation
H3-F0489816-0-0005	F0489816	187941.8654	2979808.378	36123	0.5	1	--	21.4	J	1998–2002 EPA Supplemental Investigation
H3-FL001285-0-0005	FL001285	186594.603	2985775.576	36556	0.5	1	--	0.74	J	1998–2002 EPA Supplemental Investigation
H3-FL001320-0-0005	FL001320	188051.9696	2978656.359	36558	0.5	1	--	0.504	U	1998–2002 EPA Supplemental Investigation
H3-FL001321-0-0005	FL001321	188036.891	2978482.388	36558	0.5	1	--	2.28	--	1998–2002 EPA Supplemental Investigation
H3-FL001571-0-0005	FL001571	188161.9596	2978233.709	36739	0.5	1	--	0.501	U	1998–2002 EPA Supplemental Investigation
FP2R-11	FP2R-11	184482.5399	2987418.976	33800	0.5	1	--	0.63	--	1990–1992 Massachusetts Contingency Plan Phase II Investigation
FP2R-7	FP2R-7	183965.578	2987665.654	33220	0.5	1	--	14	--	1990–1992 Massachusetts Contingency Plan Phase II Investigation
VP10-S-19/20 (0.5'-1.0')	VP10-S-19/20	184806.9509	2986901.483	44720.5868	0.5	1	--	1.62	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP10-T/U-18 (0.5'-1.0')	VP10-T/U-18	184742.4553	2986827.465	44720.5903	0.5	1	--	4.52	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP10-T/U-20 (0.5'-1.0')	VP10-T/U-20	184836.9879	2986825.502	44720.6035	0.5	1	--	0.035	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP10-T-20 (0.5'-1.0')	VP10-T-20	184827.9397	2986866.375	44720.6306	0.5	1	--	5.98	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP10-U-19 (0.5'-1.0')	VP10-U-19	184794.1858	2986813.54	44720.5972	0.5	1	--	17.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B/C-1/2 (0.5'-1.0')	VP12-B/C-1/2	184657.3622	2986368.054	44726.6361	0.5	1	--	26.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B/C-4 (0.5'-0.8')	VP12-B/C-4	184783.1392	2986367.784	44726.6201	0.5	0.8	--	39.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-B-2/3 (0.5'-1.0')	VP12-B-2/3	184694.9012	2986391.617	44726.6292	0.5	1	--	35.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-C/D-4 (0.5'-1.0')	VP12-C/D-4	184787.8361	2986331.325	44726.6083	0.5	1	--	34.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP12-C-3 (0.5'-1.0')	VP12-C-3	184730.8201	2986357.569	44726.625	0.5	1	--	12.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP13-G/H-3 (0.5'-1.0')	VP13-G/H-3	185031.2414	2986519.79	44721.5264	0.5	1	--	4.62	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP13-H-2 (0.5'-1.0')	VP13-H-2	184985.8698	2986509.613	44721.5201	0.5	1	--	19.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP13-H-4 (0.5'-1.0')	VP13-H-4	185079.9933	2986511.186	44721.5417	0.5	1	--	9.95	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-I/J-12/13 (0.5'-1.0')	VP14-I/J-12/13	185495.3596	2986430.838	44722.4632	0.5	1	--	20.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-I/J-13 (0.5'-1.0')	VP14-I/J-13	185516.1109	2986426.229	44722.4604	0.5	1	--	10.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP14-J-12 (0.5'-1.0')	VP14-J-12	185479.4374	2986418.48	44722.4688	0.5	1	--	6.99	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I/J-17/18 (0.5'-0.9')	VP15A-I/J-17/18	185749.7715	2986433.676	44725.6243	0.5	0.89	--	3.99	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I-17/18 (0.5'-1.0')	VP15A-I-17/18	185768.1389	2986444.747	44725.6306	0.5	1	--	11.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15A-I-18 (0.5'-1.0')	VP15A-I-18	185779.1769	2986464.156	44722.5076	0.5	1	--	39.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G/H-9 (0.5'-0.9')	VP15-G/H-9	185327.9977	2986530.572	44721.6313	0.5	0.89	--	8.35	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-10 (0.5'-1.0')	VP15-G-10	185375.0718	2986535.321	44727.3646	0.5	1	--	27.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-11 (0.5'-0.9')	VP15-G-11	185427.4788	2986541.512	44722.409	0.5	0.89	--	33	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-12 (0.5'-1.0')	VP15-G-12	185476.0525	2986555.987	44722.4361	0.5	1	--	9.37	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220610-1	VP15-G-12	185476.0525	2986555.987	44722	0.5	1	FD	9.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-G-13 (0.5'-1.0')	VP15-G-13	185531.4822	2986539.285	44722.4521	0.5	1	--	24.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-H-12 (0.5'-1.0')	VP15-H-12	185490.8475	2986519.918	44722.4542	0.5	1	--	66.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-H-14 (0.5'-1.0')	VP15-H-14	185577.5684	2986510.166	44722.4736	0.5	1	--	36.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP15-I-15 (0.5'-1.0')	VP15-I-15	185602.2478	2986468.471	44722.4778	0.5	1	--	32.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-F/G-17 (0.5'-1.0')	VP16-F/G-17	185726.8424	2986576.626	44725.6604	0.5	1	--	1.73	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-F-17/18 (0.5'-1.0')	VP16-F-17/18	185750.4404	2986581.149	44725.6438	0.5	1	--	0.932	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP16-G-17 (0.5'-1.0')	VP16-G-17	185718.303	2986558.995	44725.6688	0.5	1	--	0.533	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18A-G-21 (0.5'-1.0')	VP18A-G-21	185913.6813	2986543.02	44725.5868	0.5	1	--	31.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18A-G-21/22 (0.5'-1.0')	VP18A-G-21/22	185957.1113	2986552.601	44722.5285	0.5	1	--	46.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18A-G-22/23 (0.5'-1.0')	VP18A-G-22/23	186000.0456	2986559.842	44725.6007	0.5	1	--	17.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-B-22 (0.5'-0.9')	VP18-B-22	185985.457	2986786.062	44725.5194	0.5	0.89	--	0.047	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-C-21/22 (0.5'-0.8')	VP18-C-21/22	185953.4443	2986761.053	44725.5285	0.5	0.8	--	0.56		2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-C-22 (0.5'-1.0')	VP18-C-22	185992.1135	2986745.906	44725.5153	0.5	1	--	1.32	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220613-1	VP18-C-22	185992.1135	2986745.906	44725	0.5	1	FD	0.4	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-D-22 (0.5'-0.8')	VP18-D-22	185972.7218	2986716.409	44725.5556	0.5	0.8	--	0.038	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP18-D-23 (0.5'-1.0')	VP18-D-23	186024.7132	2986710.509	44725.541	0.5	1	--	1.75	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-B/C-4 (0.5'-1.0')	VP19-B/C-4	187232.0372	2986328.124	44728.3875	0.5	1	--	0.117	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-B-2/3 (0.5'-1.0')	VP19-B-2/3	187157.2234	2986335.82	44728.4069	0.5	1	--	1.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
DUP-FP-20220616-1	VP19-B-2/3	187157.2234	2986335.82	44728	0.5	1	FD	2.12	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP19-C-3 (0.5'-1.0')	VP19-C-3	187191.6141	2986304.255	44728.3965	0.5	1	--	3.96	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-B-5/6 (0.5'-1.0')	VP1A-B-5/6	183005.0644	2988219.51	44706.4201	0.5	1	--	0.239	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-B-6/7 (0.5'-1.0')	VP1A-B-6/7	183053.8208	2988217.03	44706.4188	0.5	1	--	0.523	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1A-C-7 (0.5'-1.0')	VP1A-C-7	183079.9369	2988156.516	44706.4236	0.5	1	--	0.0644	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-E-7 (0.5'-1.0')	VP1B-E-7	183072.2952	2988057.938	44706.3854	0.5	1	--	0.182	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-E-7/8 (0.5'-1.0')	VP1B-E-7/8	183105.7151	2988038.823	44706.3903	0.5	1	--	0.568	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-F-7 (0.5'-1.0')	VP1B-F-7	183076.2854	2988019.833	44706.4111	0.5	1	--	0.193	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1B-F-7/8 (0.5'-1.0')	VP1B-F-7/8	183102.8798	2987989.658	44706.3931	0.5	1	--	0.954	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-I/J-2 (0.5'-1.0')	VP1-I/J-2	182813.508	2987821.521	44706.3993	0.5	1	--	0.0566	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220525-2	VP1-I/J-2	182813.508	2987821.521	44706	0.5	1	FD	0.053	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-J/K-3 (0.5'-1.0')	VP1-J/K-3	182860.4233	2987786.096	44706.4868	0.5	1	--	0.0538	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-K/L-4 (0.5'-1.0')	VP1-K/L-4	182914.2768	2987726.872	44707.3632	0.5	1	--	0.106	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-L/M-4/5 (0.5'-1.0')	VP1-L/M-4/5	182948.6741	2987674.015	44707.3542	0.5	1	--	0.828	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-N-5 (0.5'-1.0')	VP1-N-5	182974.423	2987608.418	44707.3688	0.5	1	--	1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-O-5 (0.5'-1.0')	VP1-O-5	182979.567	2987543.193	44707.3813	0.5	1	--	0.145	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-P/Q-6 (0.5'-1.0')	VP1-P/Q-6	183026.7874	2987474.514	44707.3882	0.5	1	--	0.31	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-Q/R-10 (0.5'-1.0')	VP1-Q/R-10	183222.5889	2987426.207	44708.3507	0.5	1	--	0.019	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-Q-7 (0.5'-1.0')	VP1-Q-7	183089.6305	2987462.73	44707.3951	0.5	1	--	10.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-Q-9 (0.5'-1.0')	VP1-Q-9	183163.005	2987457.574	44707.4222	0.5	1	--	49.1	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220526-1	VP1-Q-9	183163.005	2987457.574	44707	0.5	1	FD	25.9	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-R/S-11/12 (0.5'-1.0')	VP1-R/S-11/12	183298.6599	2987378.147	44707.4167	0.5	1	--	1.93	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP1-S/T-12/13 (0.5'-1.0')	VP1-S/T-12/13	183348.7002	2987320.735	44707.4694	0.5	1	--	26.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-B-2 (0.5'-1.0')	VP20-B-2	186543.012	2985789.129	44741.6229	0.5	1	--	0.381	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-B-3/4 (0.5'-1.0')	VP20-B-3/4	186601.3403	2985813.355	44741.6194	0.5	1	--	1.13	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220629-3	VP20-B-3/4	186601.3403	2985813.355	44741	0.5	1	FD	1.08	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-2/3 (0.5'-1.0')	VP20-C-2/3	186554.7558	2985733.008	44741.6069	0.5	1	--	0.0516	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-3/4 (0.5'-1.0')	VP20-C-3/4	186601.717	2985748.469	44741.6146	0.5	1	--	0.608	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-C-4 (0.5'-1.0')	VP20-C-4	186646.4295	2985766.457	44768.3715	0.5	1	--	5.82	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP20-D-4 (0.5'-1.0')	VP20-D-4	186618.8901	2985709.649	44768.3771	0.5	1	--	1.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-A/B-4/5(0.5'-1.0')	VP21-A/B-4/5	186354.8605	2985623.472	44748.366	0.5	1	--	2.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-B/C-3/4(0.5'-1.0')	VP21-B/C-3/4	186309.2769	2985571.702	44748.3778	0.5	1	--	0.435	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-B/C-4/5(0.5'-1.0')	VP21-B/C-4/5	186354.2483	2985576.923	44748.3708	0.5	1	--	0.275	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C/D-2/3(0.5'-1.0')	VP21-C/D-2/3	186265.5749	2985522.5	44748.4111	0.5	1	--	0.055	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C/D-3(0.5'-1.0')	VP21-C/D-3	186297.0237	2985530.894	44748.3924	0.5	1	--	0.078	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C/D-6/7(0.5'-1.0')	VP21-C/D-6/7	186454.6972	2985519.546	44748.4243	0.5	1	--	0.245	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C-4/5(0.5'-1.0')	VP21-C-4/5	186348.5938	2985537.36	44747.7104	0.5	1	--	2.23	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-C-5/6(0.5'-1.0')	VP21-C-5/6	186401.407	2985559.679	44748.4174	0.5	1	--	0.499	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D/E-2(0.5'-1.0')	VP21-D/E-2	186236.1455	2985478.675	44747.5208	0.5	1	--	0.524	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D/E-3(0.5'-1.0')	VP21-D/E-3	186283.0047	2985479.182	44747.5278	0.5	1	--	0.14	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP21-D/E-6/7(0.5'-1.0')	VP21-D/E-6/7	186453.505	2985475.909	44748.4319	0.5	1	--	0.058	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D-1/2(0.5'-1.0')	VP21-D-1/2	186212.5091	2985513.942	44747.4931	0.5	1	--	0.0745	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-D-5/6(0.5'-1.0')	VP21-D-5/6	186412.3345	2985500.324	44748.4278	0.5	1	--	0.189	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E/F-6(0.5'-1.0')	VP21-E/F-6	186437.7534	2985427.88	44748.4764	0.5	1	--	2.66	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E/F-7(0.5'-1.0')	VP21-E/F-7	186490.5252	2985425.301	44748.4486	0.5	1	--	1.98	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E-2/3(0.5'-1.0')	VP21-E-2/3	186262.1533	2985441.664	44747.5417	0.5	1	--	0.0808	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-E-3/4(0.5'-1.0')	VP21-E-3/4	186305.8402	2985432.981	44747.5604	0.5	1	--	0.423	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-F/G-3/4(0.5'-1.0')	VP21-F/G-3/4	186310.2582	2985381.736	44747.5618	0.5	1	--	1.42	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-F/G-7(0.5'-1.0')	VP21-F/G-7	186489.3901	2985382.225	44748.484	0.5	1	--	0.0577	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G/H-5(0.5'-1.0')	VP21-G/H-5	186366.1879	2985321.773	44747.6042	0.5	1	--	0.948	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220705-1	VP21-G/H-5	186366.1879	2985321.773	44747	0.5	1	FD	1.08	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G/H-8(0.5'-1.0')	VP21-G/H-8	186543.2925	2985321.848	44748.5063	0.5	1	--	1.57	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G-4/5(0.5'-1.0')	VP21-G-4/5	186357.5327	2985350.069	44747.5951	0.5	1	--	7.79	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-G-7/8(0.5'-1.0')	VP21-G-7/8	186501.5157	2985335.053	44748.5	0.5	1	--	5.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-H/I-5/6(0.5'-1.0')	VP21-H/I-5/6	186402.5917	2985277.176	44747.6118	0.5	1	--	5.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220705-2	VP21-H/I-5/6	186402.5917	2985277.176	44747	0.5	1	FD	6.38	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-H/I-8(0.5'-1.0')	VP21-H/I-8	186547.7167	2985275.833	44748.5083	0.5	1	--	0.324	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220706-3	VP21-H/I-8	186547.7167	2985275.833	44748	0.5	1	FD	0.277	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I/J-7/8(0.5'-1.0')	VP21-I/J-7/8	186502.4238	2985218.672	44748.5771	0.5	1	--	0.594	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I/J-8(0.5'-1.0')	VP21-I/J-8	186549.1692	2985218.258	44748.559	0.5	1	--	1.48	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I/J-9(0.5'-1.0')	VP21-I/J-9	186599.2852	2985218.184	44748.5549	0.5	1	--	0.227	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-I-6(0.5'-1.0')	VP21-I-6	186448.6375	2985245.4	44747.6271	0.5	1	--	1.53	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-J/K-8(0.5'-1.0')	VP21-J/K-8	186513.7394	2985181.241	44748.5694	0.5	1	--	0.455	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-J/K-9(0.5'-1.0')	VP21-J/K-9	186597.6763	2985179.198	44748.5507	0.5	1	--	2.61	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP21-J-8 (0.5'-1.0')	VP21-J-8	186545.6426	2985191.41	44748.5618	0.5	1	--	0.97	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-B-4/5 (0.5'-1.0')	VP22-B-4/5	186809.0486	2985313.217	44768.3938	0.5	1	--	0.646	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-C-4(0.5'-1.0')	VP22-C-4	186769.3344	2985250.941	44749.4931	0.5	1	--	0.543	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-D-3(0.5'-1.0')	VP22-D-3	186746.3951	2985183.033	44749.4896	0.5	1	--	3.61	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-E-2(0.5'-1.0')	VP22-E-2	186696.0006	2985114.261	44749.4861	0.5	1	--	3.88	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-F/G-2/3(0.5'-1.0')	VP22-F/G-2/3	186698.4796	2985065.224	44749.4826	0.5	1	--	4.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-F/G-3/4 (0.5'-1.0')	VP22-F/G-3/4	186740.4732	2985086.32	44749.5035	0.5	1	--	7.35	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-H-2(0.5'-1.0')	VP22-H-2	186675.265	2985009.891	44749.4792	0.5	1	--	2.13	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-H-3/4(0.5'-1.0')	VP22-H-3/4	186749.672	2984991.712	44749.5139	0.5	1	--	5.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP22-I-3(0.5'-1.0')	VP22-I-3	186719.8686	2984947.006	44749.4736	0.5	1	--	4.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220707-1	VP22-I-3	186719.8686	2984947.006	44749	0.5	1	FD	4.71	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AA-36 (0.5'-0.8')	VP24B-AA-36	188814.7703	2985109.813	44739.6431	0.5	0.8	--	0.14	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AA-37 (0.5'-1.0')	VP24B-AA-37	188889.8413	2985095.065	44739.6729	0.5	1	--	0.046	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AB-35/36 (0.5'-0.8')	VP24B-AB-35/36	188808.9793	2985062.518	44739.6479	0.5	0.8	--	0.07	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AB-37 (0.5'-1.0')	VP24B-AB-37	188871.155	2985035.561	44739.6611	0.5	1	--	0.0859	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220627-1	VP24B-AB-37	188871.155	2985035.561	44739	0.5	1	FD	0.14	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP24B-AC-36 (0.5'-0.8')	VP24B-AC-36	188821.85	2985012.206	44739.6542	0.5	0.8	--	0.046	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AD-36 (0.5'-1.0')	VP24B-AD-36	188820.4094	2984942.038	44739.6889	0.5	1	--	0.072	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AE-35 (0.5'-1.0')	VP24B-AE-35	188776.5607	2984893.834	44739.6944	0.5	1	--	0.044	UJ	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AF-34/35 (0.5'-1.0')	VP24B-AF-34/35	188757.5437	2984842.479	44739.5326	0.5	1	--	0.046	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-AG-34/35 (0.5'-1.0')	VP24B-AG-34/35	188762.541	2984788.212	44739.5243	0.5	1	--	0.045	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-Z-36/37 (0.5'-1.0')	VP24B-Z-36/37	188854.2321	2985144.362	44739.6361	0.5	1	--	0.18	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24B-Z-37/38 (0.5'-1.0')	VP24B-Z-37/38	188901.2274	2985135.756	44739.6806	0.5	1	--	0.071	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-X/Y-32 (0.5'-1.0')	VP24-X/Y-32	188611.582	2985224.189	44735.5688	0.5	1	--	0.057	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-Y-30 (0.5'-1.0')	VP24-Y-30	188539.6196	2985194.218	44735.5771	0.5	1	--	0.0594	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP24-Y-31 (0.5'-1.0')	VP24-Y-31	188578.3911	2985206.61	44735.5826	0.5	1	--	0.0483	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B/C-1/2 (0.5'-1.0')	VP26-B/C-1/2	186510.7398	2984531.154	44742.3681	0.5	1	--	0.51	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B/C-3 (0.5'-1.0')	VP26-B/C-3	186586.7767	2984517.282	44742.3819	0.5	1	--	4.34	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP26-B-2/3 (0.5'-1.0')	VP26-B-2/3	186555.6764	2984542.957	44742.375	0.5	1	--	0.511	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP27-E/F-6 (0.5'-1.0')	VP27-E/F-6	186728.0553	2984375.086	44742.4028	0.5	1	--	2.28	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP27-F-4 (0.5'-1.0')	VP27-F-4	186629.4492	2984350.181	44742.3889	0.5	1	--	2.29	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP27-F-5 (0.5'-1.0')	VP27-F-5	186680.3221	2984362.928	44742.4097	0.5	1	--	1.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-B-2(0.5'-1.0')	VP28A-B-2	187126.0886	2984086.907	44743.3924	0.5	1	--	87.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-C/D-2(0.5'-1.0')	VP28A-C/D-2	187128.7487	2984024.972	44743.4097	0.5	1	--	20.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP28A-C-2 (0.5'-1.0')	VP28A-C-2	187125.127	2984055.514	44743.3611	0.5	1	--	6.74	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-T/U-11 (0.5'-1.0')	VP2-T/U-11	183291.1648	2987269.923	44708.3653	0.5	1	--	2.73	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-U/V-10/11 (0.5'-0.9')	VP2-U/V-10/11	183256.1059	2987221.413	44708.3722	0.5	0.89	--	0.356	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-U/V-11/12 (0.5'-1.0')	VP2-U/V-11/12	183302.5329	2987227.207	44708.3667	0.5	1	--	7.42	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220527-1	VP2-U/V-11/12	183302.5329	2987227.207	44708	0.5	1	FD	7.52	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-V/W-10/11 (0.5'-1.0')	VP2-V/W-10/11	183255.3421	2987180.551	44708.3764	0.5	1	--	0.082	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP2-V/W-11/12 (0.5'-1.0')	VP2-V/W-11/12	183299.7849	2987185.915	44707.4799	0.5	1	--	0.718	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-D/E-4/5(0.5'-1.0')	VP32-D/E-4/5	186914.1487	2983619.902	44755.4333	0.5	1	--	46	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-E/F-4/5 (0.5'-1.0')	VP32-E/F-4/5	186915.9151	2983577.809	44754.6097	0.5	1	--	21.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-E-4/5(0.5'-1.0')	VP32-E-4/5	186903.676	2983591.604	44755.4729	0.5	1	--	58	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP32-F-5(0.5'-1.0')	VP32-F-5	186938.4322	2983562.785	44754.6	0.5	1	--	84.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-A/B-8/9 (0.5'-1.0')	VP33-A/B-8/9	187101.1608	2983766.913	44754.5292	0.5	1	--	41.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-B/C-7/8(0.5'-0.9')	VP33-B/C-7/8	187049.0199	2983724.905	44754.5514	0.5	0.89	--	36.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-B/C-9(0.5'-1.0')	VP33-B/C-9	187122.1142	2983727.017	44754.5264	0.5	1	--	56.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-C/D-6/7(0.5'-1.0')	VP33-C/D-6/7	187004.517	2983682.532	44754.559	0.5	1	--	41.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-C/D-7/8(0.5'-1.0')	VP33-C/D-7/8	187056.4513	2983683.727	44754.5556	0.5	1	--	43.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-D/E-8/9(0.5'-1.0')	VP33-D/E-8/9	187102.5463	2983622.034	44754.5681	0.5	1	--	45.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-D-7/8(0.5'-1.0')	VP33-D-7/8	187059.908	2983644.935	44754.5653	0.5	1	--	70.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP33-D-9(0.5'-0.9')	VP33-D-9	187119.5246	2983662.147	44754.5215	0.5	0.89	--	120	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP35-H-8/9(0.5'-1.0')	VP35-H-8/9	187106.5211	2983446.437	44755.4806	0.5	1	--	71.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220713-2	VP35-H-8/9	187106.5211	2983446.437	44755	0.5	1	FD	69.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP35-I-8(0.5'-1.5')	VP35-I-8	187079.4306	2983403.98	44755.4833	0.5	1.5	--	77.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP35-I-9(0.5'-1.0')	VP35-I-9	187140.7552	2983399.947	44755.4868	0.5	1	--	92.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP35-J-9/10(0.5'-1.0')	VP35-J-9/10	187157.249	2983344.831	44755.5146	0.5	1	--	133	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP35-K-10/11(0.5'-1.0')	VP35-K-10/11	187199.8549	2983303.212	44755.5208	0.5	1	--	50.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-L-3(0.5'-1.0')	VP36-L-3	186828.3441	2983241.349	44755.6111	0.5	1	--	19	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-L-4(0.5'-1.0')	VP36-L-4	186880.6754	2983245.363	44755.5917	0.5	1	--	42.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-M-2(0.5'-1.0')	VP36-M-2	186786.3547	2983188.287	44755.6153	0.5	1	--	7.61	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-M-3(0.5'-1.0')	VP36-M-3	186831.8933	2983190.53	44755.6035	0.5	1	--	4.15	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-M-4(0.5'-1.0')	VP36-M-4	186879.1511	2983200.861	44755.5979	0.5	1	--	6.62	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP36-N-2/3(0.5'-1.0')	VP36-N-2/3	186812.0305	2983154.273	44755.6181	0.5	1	--	15.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-B-4 (0.5'-0.9')	VP3-B-4	184036.9813	2987734.643	44719.5715	0.5	0.89	--	0.022	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-C/D-3/4 (0.5'-1.0')	VP3-C/D-3/4	184004.192	2987676.877	44715.334	0.5	1	--	2.22	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-C-2 (0.5'-1.0')	VP3-C-2	183930.1285	2987687.319	44715.3375	0.5	1	--	48.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220603-1	VP3-C-2	183930.1285	2987687.319	44715	0.5	1	FD	34	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-C-4/5 (0.5'-1.0')	VP3-C-4/5	184054.0222	2987685.636	44719.5792	0.5	1	--	0.174	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-D/E-2/3 (0.5'-1.0')	VP3-D/E-2/3	183951.1898	2987629.494	44719.5882	0.5	1	--	15.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP3-D/E-3/4 (0.5'-1.0')	VP3-D/E-3/4	184001.9567	2987629.411	44719.5847	0.5	1	--	0.122	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-P/Q-6/7(0.5'-1.0')	VP40-P/Q-6/7	187010.5478	2983017.486	44756.5069	0.5	1	--	65.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-P-7(0.5'-1.0')	VP40-P-7	187020.5334	2983037.907	44756.4028	0.5	1	--	85.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-Q-6/7(0.5'-1.0')	VP40-Q-6/7	187003.6853	2982997.966	44756.3896	0.5	1	--	51.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-R/S-7(0.5'-1.0')	VP40-R/S-7	187016.0714	2982926.777	44756.384	0.5	1	--	50.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP40-R-6/7(0.5'-1.0')	VP40-R-6/7	187008.1902	2982963.018	44756.3861	0.5	1	--	80.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R/S-10(0.5'-1.0')	VP42-R/S-10	187170.7129	2982919.078	44756.4868	0.5	1	--	52.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R/S-10/11(0.5'-1.0')	VP42-R/S-10/11	187208.4543	2982933.302	44756.4924	0.5	1	--	70.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R-10(0.5'-1.0')	VP42-R-10	187180.6787	2982954.386	44756.4771	0.5	1	--	49.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-R-11(0.5'-1.0')	VP42-R-11	187236.9247	2982955.465	44756.4743	0.5	1	--	46.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP42-S/T-10(0.5'-1.0')	VP42-S/T-10	187173.8815	2982882.405	44756.491	0.5	1	--	12.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-E/F-2 (0.5'-1.0')	VP49A-E/F-2	186394.8712	2981913.158	44701.3972	0.5	1	--	22.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-F-2/3 (0-5'-1.0')	VP49A-F-2/3	186409.4204	2981901.792	44701.3993	0.5	1	--	3.95	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP49A-F-3 (0.5'-1.0')	VP49A-F-3	186420.5779	2981892.837	44700.541	0.5	1	--	2.51	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-D-8 (0.5'-1.0')	VP4-D-8	184225.2558	2987644.836	44715.3493	0.5	1	--	9.88	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-E-9 (0.5'-1.0')	VP4-E-9	184275.8151	2987600.76	44715.3514	0.5	1	--	14.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-F-9 (0.5'-1.0')	VP4-F-9	184268.4674	2987543.059	44719.6042	0.5	1	--	2.39	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP4-G-8 (0.5'-1.0')	VP4-G-8	184221.1187	2987493.785	44715.3556	0.5	1	--	0.677	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP50-B/C-3 (0.5'-1.0')	VP50-B/C-3	186426.9558	2982075.773	44701.4049	0.5	1	--	7.15	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP50-B-2/3 (0.5'-1.0')	VP50-B-2/3	186400.2945	2982082.476	44701.4111	0.5	1	--	5.05	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP50-C-2 (0.5'-1.0')	VP50-C-2	186386.2515	2982060.072	44704.6035	0.5	1	--	5.14	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-B-5/6 (0.5'-1.0')	VP52-B-5/6	185983.3091	2981461.303	44762.5153	0.5	1	--	70.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-B-6 (0.5'-1.0')	VP52-B-6	186000.3294	2981446.522	44762.5118	0.5	1	--	72.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP52-C-6 (0.5'-1.0')	VP52-C-6	186002.998	2981422.242	44762.5063	0.5	1	--	40.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP54-C/D-7 (0.5'-0.9')	VP54-C/D-7	186044.1856	2981385.661	44762.6056	0.5	0.89	--	45.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP54-D-6 (0.5'-1.0')	VP54-D-6	186010.1194	2981361.244	44762.6	0.5	1	--	52.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP54-D-7 (0.5'-1.0')	VP54-D-7	186047.9284	2981351.27	44762.6104	0.5	1	--	53.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-F/G-5 (0.5'-1.0')	VP55-F/G-5	185954.5444	2981239.835	44763.5292	0.5	1	--	38.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220721-3	VP55-F/G-5	185954.5444	2981239.835	44763	0.5	1	FD	39.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-F/G-6 (0.5'-1.0')	VP55-F/G-6	186004.9298	2981229.69	44763.5313	0.5	1	--	28.8	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-G-5 (0.5'-0.85')	VP55-G-5	185944.8315	2981201.545	44763.5278	0.5	0.85	--	20.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-G-6/7 (0.5'-0.9')	VP55-G-6/7	186030.5376	2981200.181	44763.5368	0.5	0.89	--	23.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220721-2	VP55-G-6/7	186030.5376	2981200.181	44763	0.5	0.89	FD	25.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP55-H-6 (0.5'-1.0')	VP55-H-6	185989.9167	2981174.408	44763.5333	0.5	1	--	21.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-H/I-5/6 (0.5'-0.85')	VP57-H/I-5/6	185969.7363	2981129.996	44763.55	0.5	0.85	--	36.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-J-4 (0.5'-1.0')	VP57-J-4	185905.3132	2981068.198	44763.5688	0.5	1	--	0.638	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-J-5 (0.5'-1.0')	VP57-J-5	185953.2461	2981067.576	44763.5528	0.5	1	--	5.74	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-K/L-4 (0.5'-0.85')	VP57-K/L-4	185915.3076	2980978.146	44763.5604	0.5	0.85	--	31.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-K-4/5 (0.5'-1.0')	VP57-K-4/5	185928.1081	2981021.442	44763.5556	0.5	1	--	72.5	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-L-3 (0.5'-0.85')	VP57-L-3	185865.873	2980950.387	44763.5632	0.5	0.85	--	22.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP57-M-4/5 (0.5'-0.9')	VP57-M-4/5	185920.1625	2980916.108	44763.5618	0.5	0.89	--	15.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-P/Q-16 (0.5'-0.9')	VP59A-P/Q-16	187065.2564	2981364.14	44698.5903	0.5	0.88	--	20.9	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-P-15/16 (0.5'-1.0')	VP59A-P-15/16	187051.555	2981387.246	44698.6319	0.5	1	--	2.33	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP59A-Q-15 (0.5'-1.0')	VP59A-Q-15	187040.3273	2981356.793	44698.6014	0.5	1	--	23	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I/J-13 (0.5'-1.0')	VP5-I/J-13	184473.5585	2987377.522	44714.5708	0.5	1	--	1.71	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I/J-14/15 (0.5'-1.0')	VP5-I/J-14/15	184552.0216	2987373.399	44714.5653	0.5	1	--	6.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I-14 (0.5'-1.0')	VP5-I-14	184523.0977	2987404.968	44714.5556	0.5	1	--	1.83	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-I-15 (0.5'-1.0')	VP5-I-15	184566.4835	2987405.7	44714.5611	0.5	1	--	1.96	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP5-J-13/14 (0.5'-1.0')	VP5-J-13/14	184511.0335	2987351.412	44714.5729	0.5	1	--	1.15	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP60-B/C-16/17 (0.5'-1.0')	VP60-B/C-16/17	187582.7235	2981090.888	44777.4285	0.5	1	--	0.375	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP60-B-16 (0.5'-1.0')	VP60-B-16	187541.5802	2981115.242	44775.6368	0.5	1	--	0.432	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP60-B-16/17(0.5'-1.0')	VP60-B-16/17	187562.9408	2981100.369	44775.6347	0.5	1	--	0.716	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP60-C-17 (0.5'-1.0')	VP60-C-17	187612.9587	2981064.404	44777.4271	0.5	1	--	0.277	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-C-15 (0.5'-1.0')	VP61-C-15	187493.1909	2981063.402	44777.3569	0.5	1	--	0.0495	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-D/E-16 (0.5'-1.0')	VP61-D/E-16	187564.3958	2980985.969	44777.366	0.5	1	--	0.275	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-D-16 (0.5'-0.9')	VP61-D-16	187536.5359	2981013.508	44777.3583	0.5	0.89	--	0.142	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-E-16/17 (0.5'-1.0')	VP61-E-16/17	187578.1838	2980947.893	44777.3681	0.5	1	--	0.943	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP61-F-17/18 (0.5'-1.0')	VP61-F-17/18	187623.9518	2980896.853	44777.3715	0.5	1	--	0.662	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-E-14/15 (0.5'-1.0')	VP62-E-14/15	187479.6739	2980971.86	44777.3597	0.5	1	--	0.113	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-F-14 (0.5'-1.0')	VP62-F-14	187462.9921	2980921.573	44777.3611	0.5	1	--	0.581	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-F-15 (0.5'-1.0')	VP62-F-15	187498.1981	2980919.675	44777.3625	0.5	1	--	0.289	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-G-14 (0.5'-1.0')	VP62-G-14	187455.3229	2980865.577	44777.3764	0.5	1	--	0.0424	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP62-G-15 (0.5'-1.0')	VP62-G-15	187502.9924	2980865.882	44777.3736	0.5	1	--	0.382	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP63-J/K-17 (0.5'-1.0')	VP63-J/K-17	187604.1247	2980680.26	44777.3861	0.5	1	--	0.519	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP63-J-16 (0.5'-1.0')	VP63-J-16	187554.8774	2980691.335	44777.3799	0.5	1	--	0.295	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP63-J-16/17 (0.5'-1.0')	VP63-J-16/17	187577.6674	2980694.971	44777.3819	0.5	1	--	1.02	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-P/Q-4 (0.5'-0.9')	VP64-P/Q-4	185895.1918	2980736.416	44763.616	0.5	0.89	--	48.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-P-2 (0.5'-0.9')	VP64-P-2	185787.315	2980752.206	44763.6125	0.5	0.89	--	18.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-10 (0.5'-1.0')	VP64-Q/R-10	186203.8273	2980678.462	44763.6264	0.5	1	--	33.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-5 (0.5'-1.0')	VP64-Q/R-5	185955.4036	2980683.456	44769.55	0.5	1	--	18.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q/R-9 (0.5'-1.0')	VP64-Q/R-9	186153.3077	2980688.858	44763.6264	0.5	1	--	59.5	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-2/3 (0.5'-1.0')	VP64-Q-2/3	185831.6046	2980712.849	44763.6146	0.5	1	--	76.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-4 (0.5'-1.0')	VP64-Q-4	185904.2731	2980696.098	44769.5479	0.5	1	--	62.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-5 (0.5'-0.9')	VP64-Q-5	185954.066	2980720.329	44763.6215	0.5	0.89	--	45	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-6 (0.5'-1.0')	VP64-Q-6	186006.3727	2980704.206	44763.6215	0.5	1	--	24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-7 (0.5'-0.95')	VP64-Q-7	186055.784	2980693.768	44763.6229	0.5	0.94	--	21.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-Q-8 (0.5'-0.90')	VP64-Q-8	186104.9141	2980695.312	44763.6243	0.5	0.89	--	42.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R/S-10 (0.5'-1.0')	VP64-R/S-10	186210.2453	2980639.178	44769.5708	0.5	1	--	58.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R/S-11 (0.5'-1.0')	VP64-R/S-11	186265.382	2980630.464	44769.5743	0.5	1	--	17.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-6 (0.5'-1.0')	VP64-R-6	186006.4343	2980658.279	44769.5535	0.5	1	--	29.8	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-7 (0.5'-1.0')	VP64-R-7	186056.2768	2980648.991	44769.5625	0.5	1	--	58.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-8 (0.5'-1.0')	VP64-R-8	186105.6067	2980647.449	44769.5653	0.5	1	--	34.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP64-R-9 (0.5'-1.0')	VP64-R-9	186153.1726	2980644.269	44769.5681	0.5	1	--	47.2	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-S/T-9 (0.5'-0.9')	VP65-S/T-9	186138.1966	2980589.009	44770.3507	0.5	0.89	--	25.2	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T/U-11 (0.5'-1.0')	VP65-T/U-11	186250.5287	2980542.207	44770.375	0.5	1	--	26.3	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T-10 (0.5'-1.0')	VP65-T-10	186215.6121	2980559.786	44770.3646	0.5	1	--	21.8	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP65-T-9 (0.5'-1.0')	VP65-T-9	186170.6479	2980567.43	44770.3535	0.5	1	--	36.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-Q-5 (0.5'-1.0')	VP69-Q-5	187010.7647	2980361.453	44768.6132	0.5	1	--	0.0405	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-R/S-2/3 (0.5'-1.0')	VP69-R/S-2/3	186881.1944	2980285.787	44768.5833	0.5	1	--	0.0256	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-R/S-4 (0.5'-1.0')	VP69-R/S-4	186945.0545	2980289.915	44768.5979	0.5	1	--	0.039	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-R-4/5 (0.5'-1.0')	VP69-R-4/5	186986.6755	2980321.932	44768.609	0.5	1	--	0.036	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-S/T-2/3 (0.5'-1.0')	VP69-S/T-2/3	186885.6629	2980236.807	44768.6042	0.5	1	--	0.0279	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP69-S-4 (0.5'-1.0')	VP69-S-4	186942.2196	2980248.656	44768.5889	0.5	1	--	0.0711	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-M/N-17 (0.5'-1.0')	VP6-M/N-17	184685.0964	2987172.685	44720.5431	0.5	1	--	0.687	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-N-16 (0.5'-1.0')	VP6-N-16	184643.1549	2987154.702	44714.6208	0.5	1	--	4.26	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP6-N-16/17 (0.5'-1.0')	VP6-N-16/17	184663.5082	2987162.168	44714.6292	0.5	1	--	7.26	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-R-7/8 (0.5'-1.0')	VP70-R-7/8	187120.315	2980312.575	44768.6431	0.5	1	--	0.041	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-S-7 (0.5'-1.0')	VP70-S-7	187091.8193	2980262.044	44768.6465	0.5	1	--	0.037	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-T/U-7 (0.5'-1.0')	VP70-T/U-7	187086.779	2980186.824	44768.6569	0.5	1	--	0.0684	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-T-6 (0.5'-1.0')	VP70-T-6	187056.365	2980219.824	44768.65	0.5	1	--	0.095	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-U-5 (0.5'-1.0')	VP70-U-5	187016.4756	2980170.792	44768.6597	0.5	1	--	0.036	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-4 (0.5'-1.0')	VP70-V-4	186962.7759	2980101.249	44768.5486	0.5	1	--	0.035	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-5/6 (0.5'-1.0')	VP70-V-5/6	187028.4467	2980126.387	44768.5646	0.5	1	--	0.038	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP70-V-7 (0.5'-1.0')	VP70-V-7	187104.7894	2980106.969	44768.5694	0.5	1	--	0.038	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220726-4	VP70-V-7	187104.7894	2980106.969	44768	0.5	1	FD	0.036	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP71-P-20/21 (0.5'-1.0')	VP71-P-20/21	187772.6854	2980418.088	44777.5625	0.5	1	--	2.47	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-P-21 (0.5'-1.0')	VP71-P-21	187814.5426	2980394.707	44777.5604	0.5	1	--	1.13	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-Q-20 (0.5'-1.0')	VP71-Q-20	187744.7081	2980369.208	44777.5646	0.5	1	--	1.86	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-Q-21 (0.5'-0.9')	VP71-Q-21	187788.9757	2980346.566	44777.5667	0.5	0.89	--	0.954	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-R-20/21 (0.5'-1.0')	VP71-R-20/21	187773.3383	2980303.466	44777.5694	0.5	1	--	0.235	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP71-S-20 (0.5'-1.0')	VP71-S-20	187756.169	2980246.262	44777.5715	0.5	1	--	1.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-V/W-23 (0.5'-1.0')	VP72-V/W-23	187898.7298	2980076.068	44782.4028	0.5	1	--	0.043	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-V-19 (0.5'-0.9')	VP72-V-19	187688.9526	2980097.198	44777.5833	0.5	0.89	--	0.11	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-18/19 (0.5'-1.0')	VP72-W-18/19	187676.3542	2980058.496	44777.5861	0.5	1	--	2.48	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-20 (0.5'-0.9')	VP72-W-20	187749.5591	2980054.267	44777.5889	0.5	0.89	--	1.16	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-21 (0.5'-1.0')	VP72-W-21	187803.0564	2980058.621	44782.3972	0.5	1	--	1.12	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-W-21/22 (0.5'-1.0')	VP72-W-21/22	187835.1039	2980064.112	44782.4	0.5	1	--	0.99	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-19 (0.5'-1.0')	VP72-X-19	187701.0546	2980008.064	44777.5944	0.5	1	--	8.12	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220804-3	VP72-X-19	187701.0546	2980008.064	44777	0.5	1	FD	9.03	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-20 (0.5'-1.0')	VP72-X-20	187752.3728	2980005.585	44777.5972	0.5	1	--	0.075	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-21 (0.5'-0.9')	VP72-X-21	187801.9065	2980009.131	44782.3903	0.5	0.89	--	0.727	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-22 (0.5'-1.0')	VP72-X-22	187845.1515	2980014.75	44782.3924	0.5	1	--	1.55	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-X-23 (0.5'-1.0')	VP72-X-23	187895.9512	2980014.419	44782.4063	0.5	1	--	0.0658	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-19 (0.5'-1.0')	VP72-Y-19	187702.056	2979955.746	44777.6118	0.5	1	--	4.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-20 (0.5'-1.0')	VP72-Y-20	187750.9889	2979956.396	44777.6042	0.5	1	--	0.113	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-21 (0.5'-1.0')	VP72-Y-21	187802.2254	2979957.716	44777.6076	0.5	1	--	3.32	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220804-4	VP72-Y-21	187802.2254	2979957.716	44777	0.5	1	FD	0.271	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Y-22 (0.5'-1.0')	VP72-Y-22	187857.5222	2979959.017	44782.3861	0.5	1	--	0.194	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Z-18 (0.5'-1.0')	VP72-Z-18	187664.0501	2979909.111	44777.6146	0.5	1	--	21.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP72-Z-21/22 (0.5'-1.0')	VP72-Z-21/22	187829.5042	2979908.013	44782.3819	0.5	1	--	4.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AA-24/25 (0.5'-1.0')	VP73-AA-24/25	187986.4589	2979862.313	44782.4319	0.5	1	--	1.62	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AJ/AK-15/16 (0.5'-0.8')	VP73A-AJ/AK-15/16	187520.5176	2979376.473	44781.5868	0.5	0.8	--	4.87	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AJ-15/16 (0.5'-1.0')	VP73A-AJ-15/16	187542.1481	2979396.947	44781.5903	0.5	1	--	2.08	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AJ-17 (0.5'-1.0')	VP73A-AJ-17	187585.7914	2979419.645	44781.5972	0.5	1	--	1.21	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AK-15 (0.5'-1.0')	VP73A-AK-15	187495.4488	2979349.654	44781.5764	0.5	1	--	1.14	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73A-AL-14/15 (0.5'-1.0')	VP73A-AL-14/15	187474.1037	2979316.614	44781.5694	0.5	1	--	11.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AC-23 (0.5'-1.0')	VP73-AC-23	187901.5805	2979751.478	44782.4396	0.5	1	--	0.519	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AD-22 (0.5'-1.0')	VP73-AD-22	187857.0593	2979700.357	44782.4417	0.5	1	--	25.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AE-21 (0.5'-0.9')	VP73-AE-21	187812.9944	2979670.673	44782.4438	0.5	0.89	--	7.51	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220809-2	VP73-AE-21	187812.9944	2979670.673	44782	0.5	0.89	FD	6.15	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AF-20 (0.5'-1.0')	VP73-AF-20	187763.5594	2979621.865	44782.4701	0.5	1	--	21.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP73-AG-20 (0.5'-0.9')	VP73-AG-20	187758.1293	2979570.862	44782.4722	0.5	0.89	--	0.478	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP74-P/Q-25 (0.5'-1.0')	VP74-P/Q-25	187995.6335	2980375.217	44782.3757	0.5	1	--	0.533	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP74-P-24 (0.5'-1.0')	VP74-P-24	187964.1489	2980401.589	44782.375	0.5	1	--	2.75	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP74-Q/R-25/26 (0.5'-1.0')	VP74-Q/R-25/26	188026.9444	2980329.935	44782.3813	0.5	1	--	0.223	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP74-S-25/26 (0.5'-1.0')	VP74-S-25/26	188030.1029	2980272.543	44782.3826	0.5	1	--	1.78	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP74-T-26/27 (0.5'-1.0')	VP74-T-26/27	188081.3547	2980223.029	44782.3875	0.5	1	--	0.677	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-B/C-2 (0.5'-1.0')	VP77-B/C-2	187757.2173	2978884.871	44795.5799	0.5	1	--	0.241	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-C-4 (0.5'-1.0')	VP77-C-4	187851.9398	2978841.543	44795.5729	0.5	1	--	1.42	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-D/E-4 (0.5'-1.0')	VP77-D/E-4	187837.7876	2978778.427	44795.5694	0.5	1	--	2.06	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-D/E-6 (0.5'-1.0')	VP77-D/E-6	187949.4085	2978790.734	44795.5625	0.5	1	--	0.845	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-D-2 (0.5'-1.0')	VP77-D-2	187762.5975	2978801.854	44797.3917	0.5	1	--	0.246	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-3 (0.5'-1.0')	VP77-F-3	187791.9075	2978699.708	44797.5097	0.5	1	--	2.31	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-4 (0.5'-1.0')	VP77-F-4	187852.5019	2978706.954	44797.375	0.5	1	--	7.83	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-6 (0.5'-1.0')	VP77-F-6	187941.7802	2978701.965	44792.3924	0.5	1	--	2.01	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-F-7 (0.5'-1.0')	VP77-F-7	188001.7893	2978715.9	44792.3833	0.5	1	--	1.16	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H/I-7/8 (0.5'-1.0')	VP77-H/I-7/8	188026.74	2978586.487	44792.4042	0.5	1	--	1.12	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-2/3 (0.5'-1.0')	VP77-H-2/3	187775.1401	2978609.539	44797.5035	0.5	1	--	0.363	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-4 (0.5'-1.0')	VP77-H-4	187854.5744	2978609.332	44797.3681	0.5	1	--	13.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-H-6 (0.5'-1.0')	VP77-H-6	187951.7074	2978614.429	44792.4007	0.5	1	--	0.537	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77 I/J-2/3 (0.5'-1.0')	VP77-I/J-2/3	187781.1572	2978539.539	44797.5	0.5	1	--	0.826	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-I/J-4 (0.5'-1.0')	VP77-I/J-4	187852.452	2978534.062	44797.3583	0.5	1	--	1.11	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-I/J-6 (0.5'-1.0')	VP77-I/J-6	187953.5847	2978538.232	44792.4139	0.5	1	--	3.04	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-J/K-4(0.5'-1.0')	VP77-J/K-4	187837.658	2978477.578	44791.6306	0.5	1	--	15.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

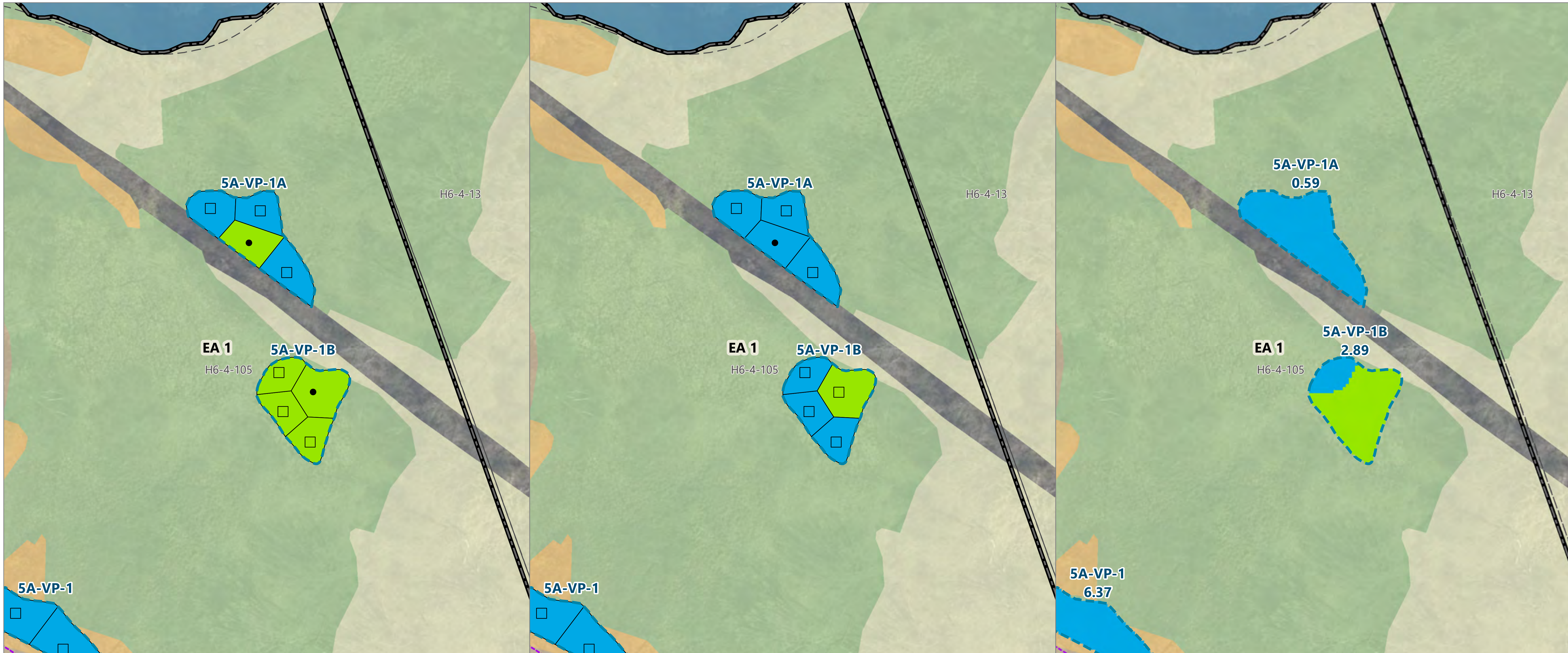
Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP77-K/L-3 (0.5'-1.0')	VP77-K/L-3	187786.5056	2978435.408	44792.4264	0.5	1	--	0.435	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-K-6 (0.5'-1.0')	VP77-K-6	187951.9629	2978476.489	44792.4097	0.5	1	--	5.56	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-L-4 (0.5'-1.0')	VP77-L-4	187862.1737	2978401.045	44797.3521	0.5	1	--	4.11	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220824-2	VP77-L-4	187862.1737	2978401.045	44797	0.5	1	FD	1.98	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-M/N-3 (0.5'-1.0')	VP77-M/N-3	187799.2552	2978330.699	44792.4354	0.5	1	--	1.51	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-M-9 (0.5'-1.0')	VP77-M-9	188114.5833	2978346.488	44792.3938	0.5	1	--	0.531	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220819-1	VP77-M-9	188114.5833	2978346.488	44792	0.5	1	FD	0.492	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-N/O-9 (0.5'-1.0')	VP77-N/O-9	188117.4226	2978284.759	44792.3965	0.5	1	--	0.0539	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-N-4 (0.5'-1.0')	VP77-N-4	187836.3191	2978294.296	44797.3479	0.5	1	--	2.24	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-P-2/3 (0.5'-1.0')	VP77-P-2/3	187780.5115	2978209.396	44796.5007	0.5	1	--	32.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-P-9/10 (0.5'-1.0')	VP77-P-9/10	188123.0912	2978195.555	44792.4097	0.5	1	--	0.0328	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP77-Q-12 (0.5'-1.0')	VP77-Q-12	188237.134	2978170.825	44792.4479	0.5	1	--	0.058	U	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP79-E/F-3(0.5'-1.0')	VP79-E/F-3	186365.6649	2977685.452	44789.5799	0.5	1	--	0.059	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP79-E-2/3 (0.5'-1.0')	VP79-E-2/3	186327.6145	2977713.387	44789.5694	0.5	1	--	0.187	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP79-E-3(0.5'-1.0')	VP79-E-3	186350.4766	2977702.763	44789.5764	0.5	1	--	0.0612	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-T-3/4 (0.5'-1.0')	VP7-T-3/4	184011.9764	2986850.712	44733.3743	0.5	1	--	0.214	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-U-4 (0.5'-1.0')	VP7-U-4	184021.0049	2986800.734	44719.3993	0.5	1	--	7.18	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-V-3/4 (0.5'-1.0')	VP7-V-3/4	184002.2405	2986744.568	44718.5167	0.5	1	--	65.6	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-V-4/5 (0.5'-1.0')	VP7-V-4/5	184055.0259	2986743.781	44718.5264	0.5	1	--	23.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-W-4/5 (0.5'-1.0')	VP7-W-4/5	184056.0308	2986694.139	44718.5319	0.5	1	--	73.8	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP7-X-5 (0.5'-0.9')	VP7-X-5	184084.2233	2986643.689	44718.5361	0.5	0.89	--	62.9	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-2(0.5'-1.0')	VP80-B/C-2	186296.252	2977823.87	44789.3764	0.5	1	--	1.22	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-3(0.5'-1.0')	VP80-B/C-3	186351.9602	2977837.434	44789.384	0.5	1	--	59.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-4(0.5'-1.0')	VP80-B/C-4	186401.5074	2977830.237	44789.4007	0.5	1	--	59.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B/C-5(0.5'-1.0')	VP80-B/C-5	186462.524	2977824.044	44789.5799	0.5	1	--	53.8	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B-4(0.5'-1.0')	VP80-B-4	186418.4047	2977864.876	44789.4319	0.5	1	--	30.4	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-B-5/6(0.5'-1.0')	VP80-B-5/6	186471.2041	2977858.176	44789.5743	0.5	1	--	5.72	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-C/D-6(0.5'-1.0')	VP80-C/D-6	186488.8543	2977789.865	44789.5826	0.5	1	--	75.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-C-6(0.5'-1.0')	VP80-C-6	186516.8096	2977821.146	44789.5688	0.5	1	--	34.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-D/E-6(0.5'-1.0')	VP80-D/E-6	186507.5082	2977738.773	44789.625	0.5	1	--	37.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-D-7(0.5'-1.0')	VP80-D-7	186554.5799	2977757.974	44789.5958	0.5	1	--	32.7	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220816-2	VP80-D-7	186554.5799	2977757.974	44789	0.5	1	FD	49.2	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-E-7/8(0.5'-1.0')	VP80-E-7/8	186574.2708	2977707.472	44789.5979	0.5	1	--	27.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Table A-1
Polychlorinated Biphenyl Concentrations in Vernal Pools

Sample ID	Location ID	X Coordinate	Y Coordinate	Collection Date	Start Depth (feet)	End Depth (feet)	Sample Type	Total PCBs (mg/kg)	Qualifier	Sampling Program
VP80-F/G-7/8 (0.5'-1.0')	VP80-F/G-7/8	186579.8846	2977639.958	44789.6076	0.5	1	--	52.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP80-F-6/7(0.5'-1.0')	VP80-F-6/7	186535.9937	2977665.883	44789.6222	0.5	1	--	41.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-F-10(0.5'-1.0')	VP81-F-10	186716.2131	2977647.635	44789.5438	0.5	1	--	43.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-G-10/11(0.5'-1.0')	VP81-G-10/11	186720.6744	2977616.496	44789.5403	0.5	1	--	122	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP81-G-11(0.5'-1.0')	VP81-G-11	186741.9768	2977596.079	44789.5375	0.5	1	--	118	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-A/B-2 (0.5'-1.0')	VP83-A/B-2	186891.0431	2977337.041	44791.3646	0.5	1	--	48	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220818-4	VP83-A/B-2	186891.0431	2977337.041	44791	0.5	1	FD	55.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-B/C-1/2 (0.5'-1.0')	VP83-B/C-1/2	186873.7013	2977280.501	44791.3451	0.5	1	--	36.1	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP83-B-1/2(0.5'-1.0')	VP83-B-1/2	186880.6747	2977308.833	44790.3507	0.5	1	--	18.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-U/V-10 (0.5'-1.0')	VP8-U/V-10	184325.3006	2986780.251	44720.4875	0.5	1	--	5.88	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-V-10 (0.5'-1.0')	VP8-V-10	184318.7812	2986732.829	44720.4743	0.5	1	--	2.99	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP8-W-9/10 (0.5'-1.0')	VP8-W-9/10	184301.6071	2986693.319	44718.6076	0.5	1	--	6.87	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-V/W-14 (0.5'-1.0')	VP9-V/W-14	184543.4383	2986721.751	44720.4042	0.5	1	--	28.5	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-V-15/16 (0.5'-1.0')	VP9-V-15/16	184604.5257	2986735.17	44721.4319	0.5	1	--	1.48	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-W/X-13/14 (0.5'-1.0')	VP9-W/X-13/14	184505.6821	2986681.659	44720.4	0.5	1	--	5.64	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-W/X-16 (0.5'-1.0')	VP9-W/X-16	184616.4798	2986676.109	44720.4271	0.5	1	--	28.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220608-3	VP9-W/X-16	184616.4798	2986676.109	44720	0.5	1	FD	23.7	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-W-15 (0.5'-0.9')	VP9-W-15	184575.0842	2986691.758	44720.4111	0.5	0.89	--	66.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-W-17 (0.5'-0.9')	VP9-W-17	184673.1847	2986697.056	44721.4354	0.5	0.89	--	68.7	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
DUP-FP-20220609-2	VP9-W-17	184673.1847	2986697.056	44721	0.5	0.89	FD	80.9	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-X/Y-16 (0.5'-1.0')	VP9-X/Y-16	184627.8393	2986631.884	44721.4208	0.5	1	--	77.5	J	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-X-13 (0.5'-1.0')	VP9-X-13	184465.6776	2986645.707	44720.4417	0.5	1	--	11.6	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)
VP9-X-14 (0.5'-1.0')	VP9-X-14	184526.3953	2986640.175	44720.4347	0.5	1	--	81.3	--	2022 PDI (Reach 5A Non-Residential Floodplain Exposure Areas)

Notes:
Projections in NAD 1983 State Plane Massachusetts Mainland FIPS 2001 (US Feet)
--: no data
EPA: U.S. Environmental Protection Agency
FD: field duplicate
J: estimated detected value
mg/kg: milligram per kilogram
PDI: Pre-Design Investigation
U: not detected at reported value
UJ: estimated non-detect value



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

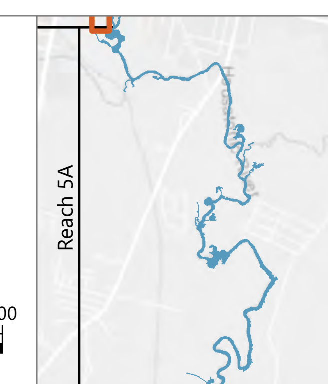
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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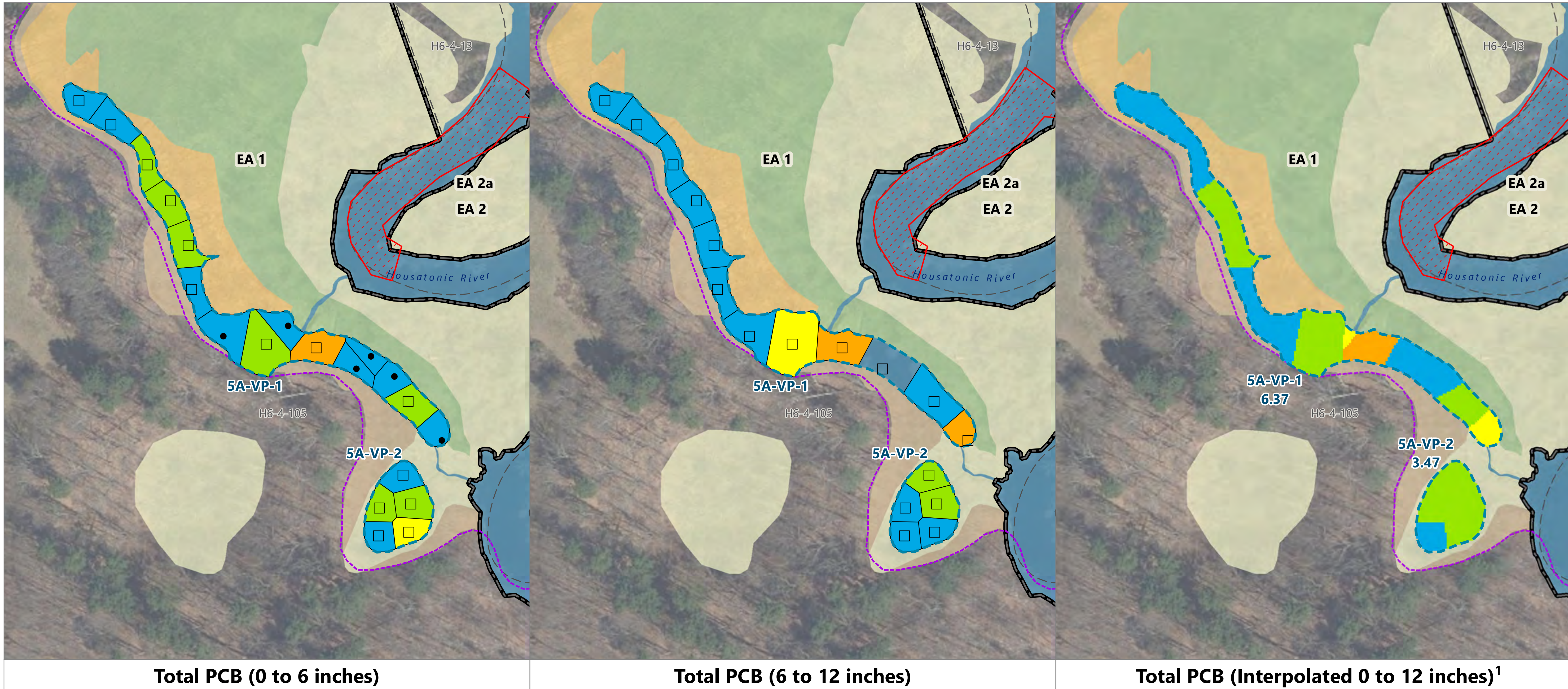
ANCHOR QEA

Figure A-1a
Vernal Pools in Exposure Area 1
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

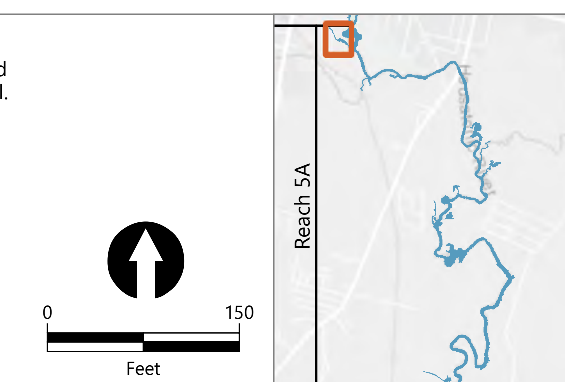
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.



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ANCHOR QEA

Figure A-1b
Vernal Pools in Exposure Area 1
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River

Total PCB (0 to 6 inches)	Total PCB (6 to 12 inches)	Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

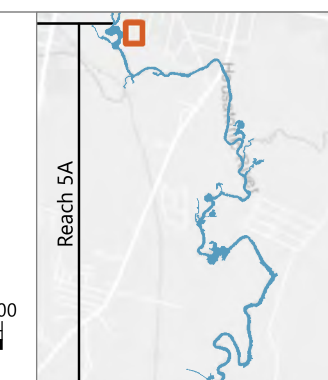
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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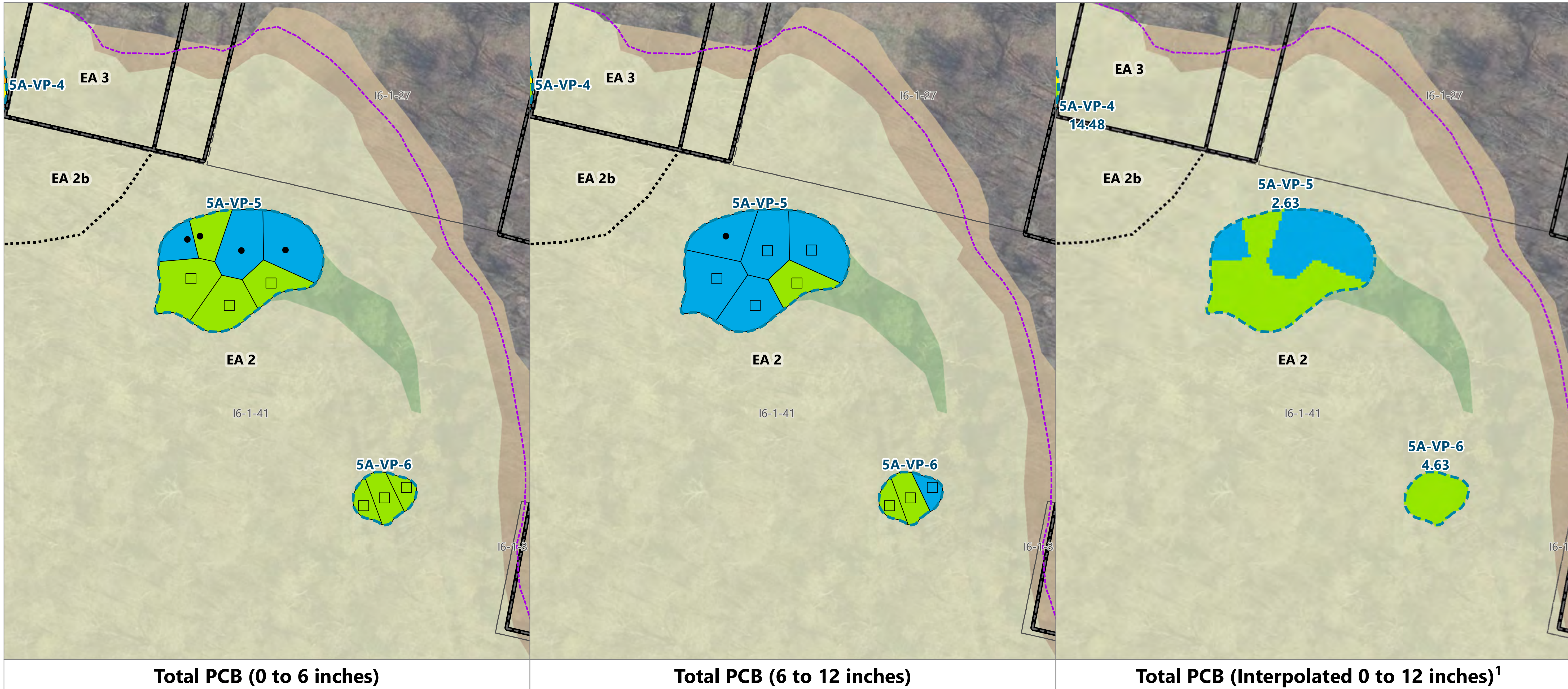
ANCHOR QEA

Figure A-1c
Vernal Pools in Exposure Area 2
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

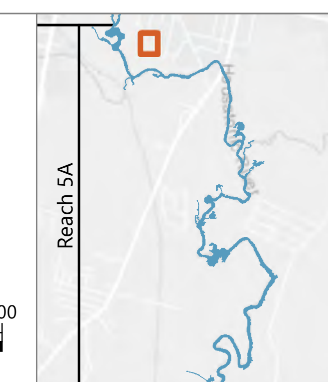
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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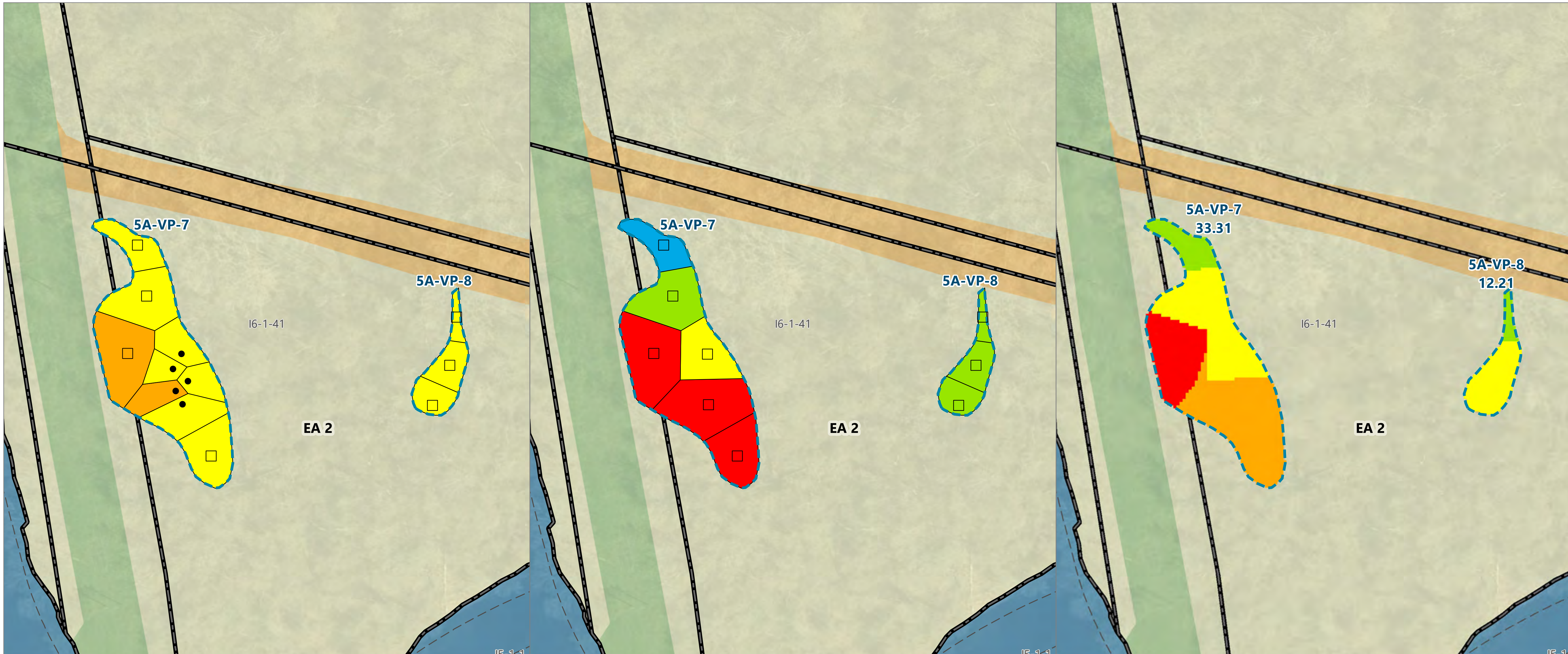
ANCHOR QEA

Figure A-1d
Vernal Pools in Exposure Area 2
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)	Total PCB (6 to 12 inches)	Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

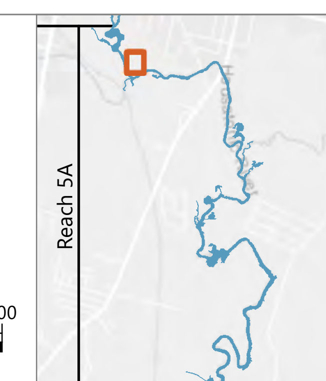
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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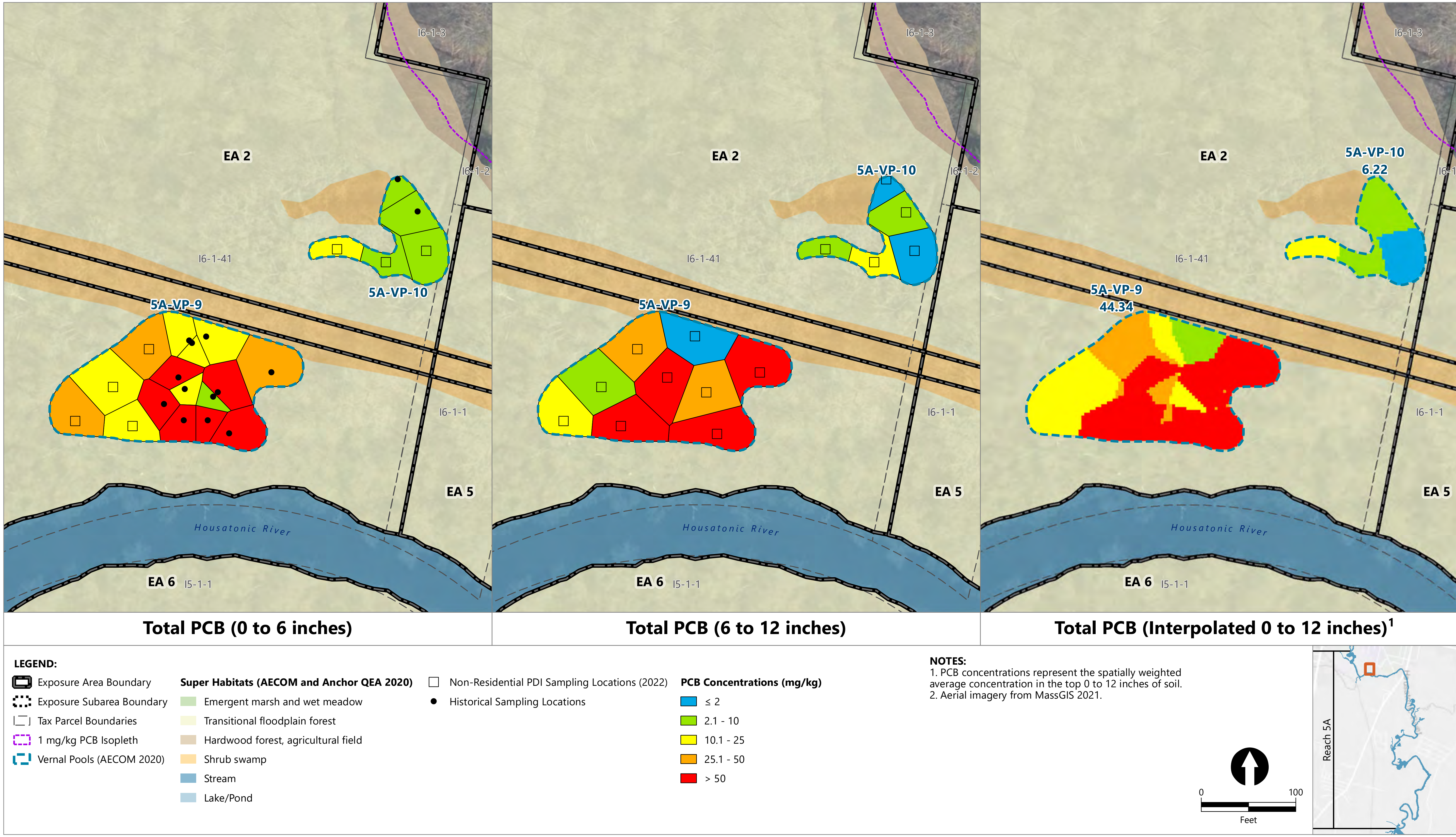
ANCHOR QEA

Figure A-1e
Vernal Pools in Exposure Area 2
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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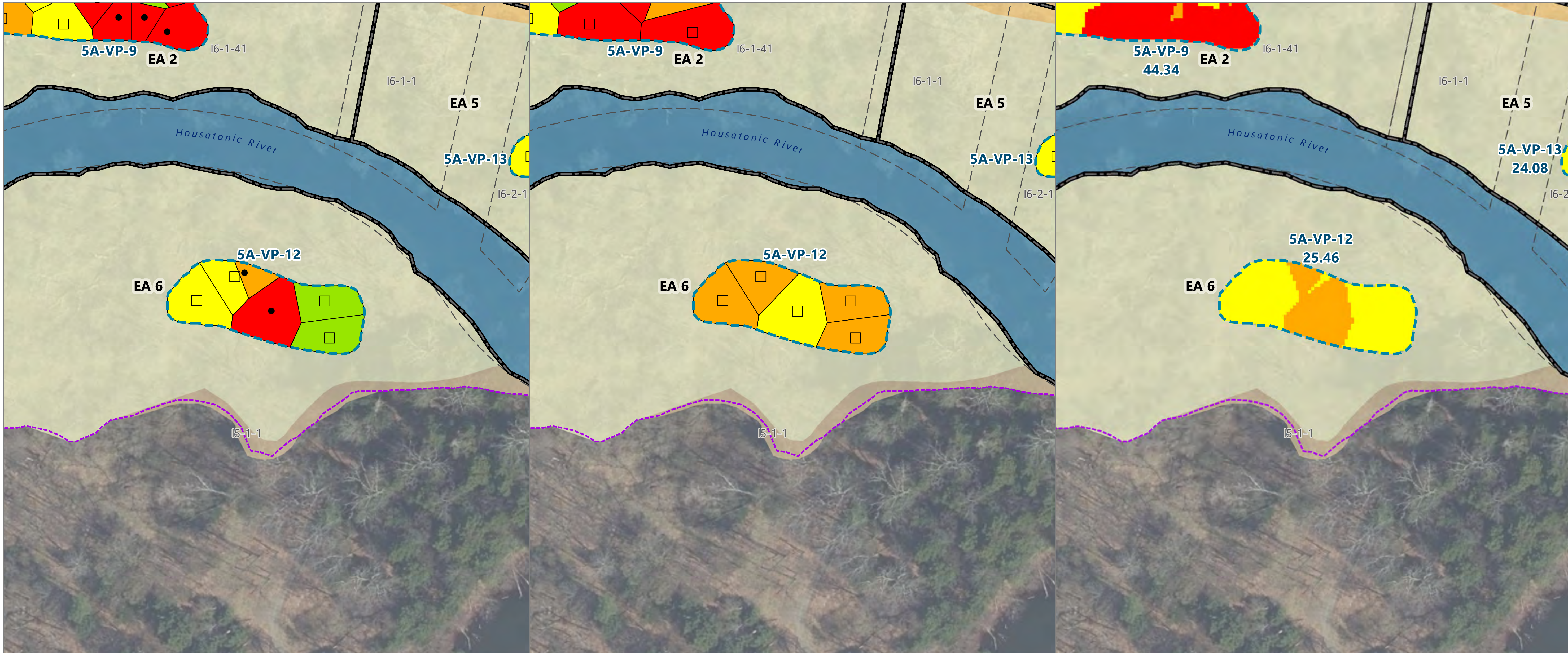
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1f
Vernal Pools in Exposure Area 2
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

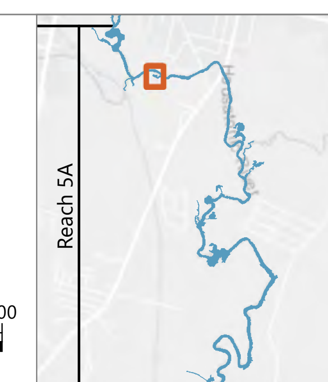
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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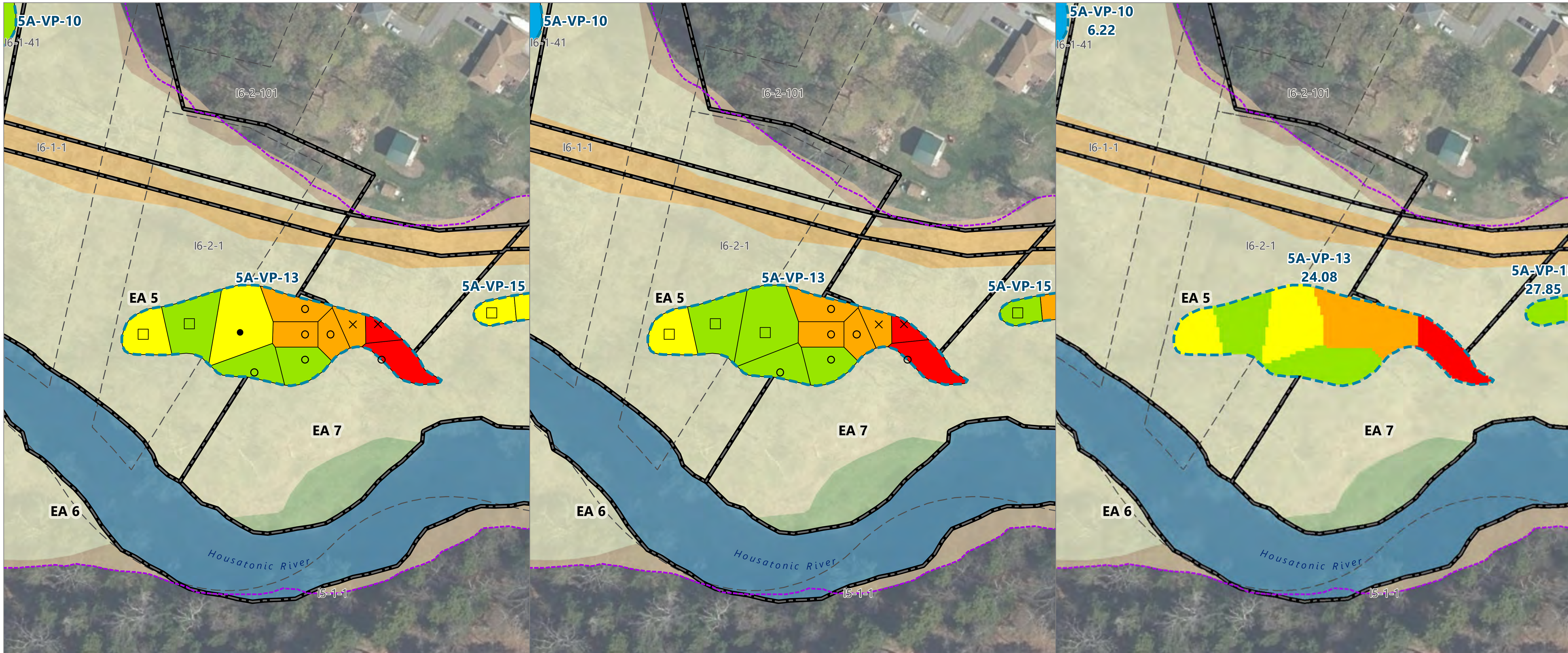
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1g
Vernal Pool in Exposure Area 6
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Residential PDI Sampling Locations (2020-2021)
- Actual/Potential Lawn Sampling Locations
- Historical Sampling Locations

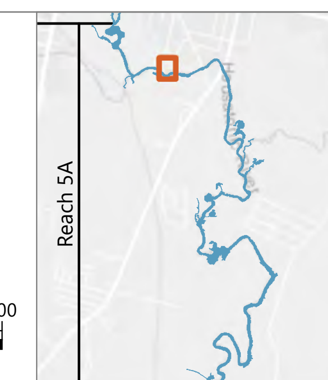
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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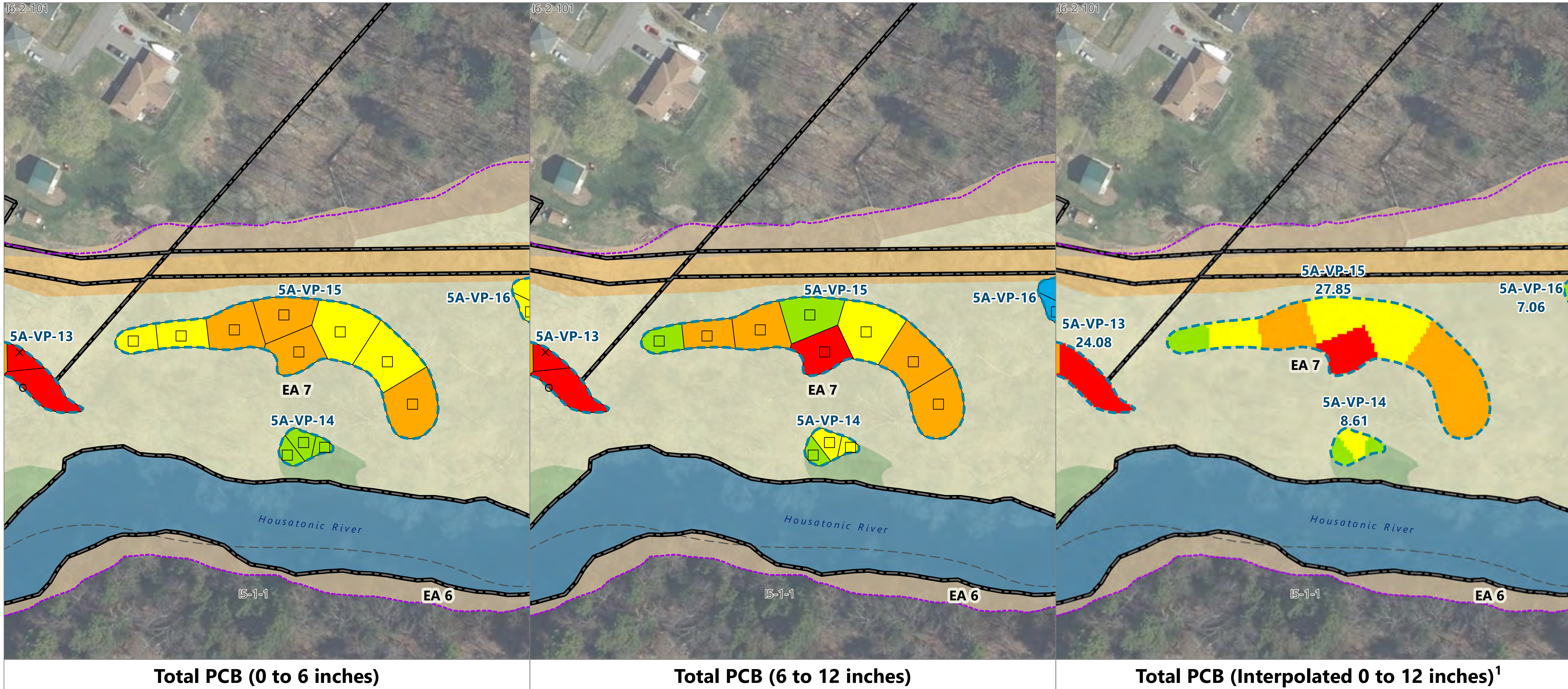
ANCHOR QEA

Figure A-1h
Vernal Pool in Exposure Areas 5 and 7
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

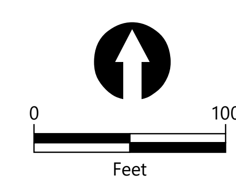
- Non-Residential PDI Sampling Locations (2022)
- Residential PDI Sampling Locations (2020-2021)
- Actual/Potential Lawn Sampling Locations

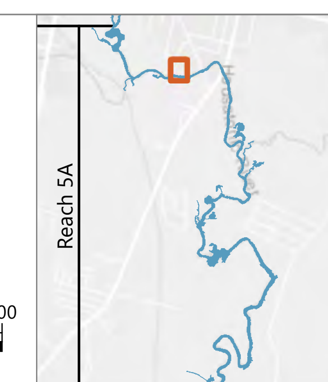
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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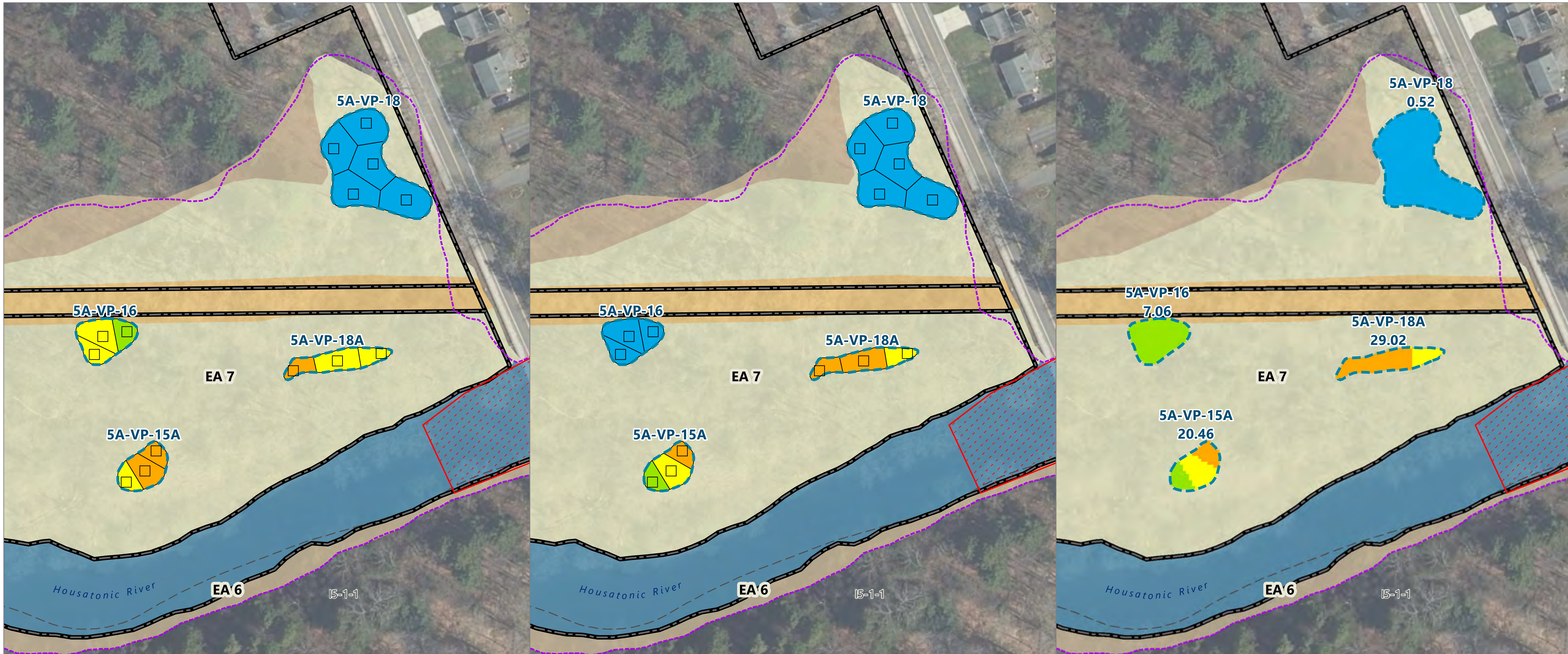
ANCHOR QEA

Figure A-1i
Vernal Pools in Exposure Area 7
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

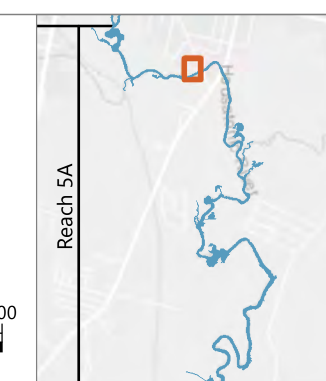
- Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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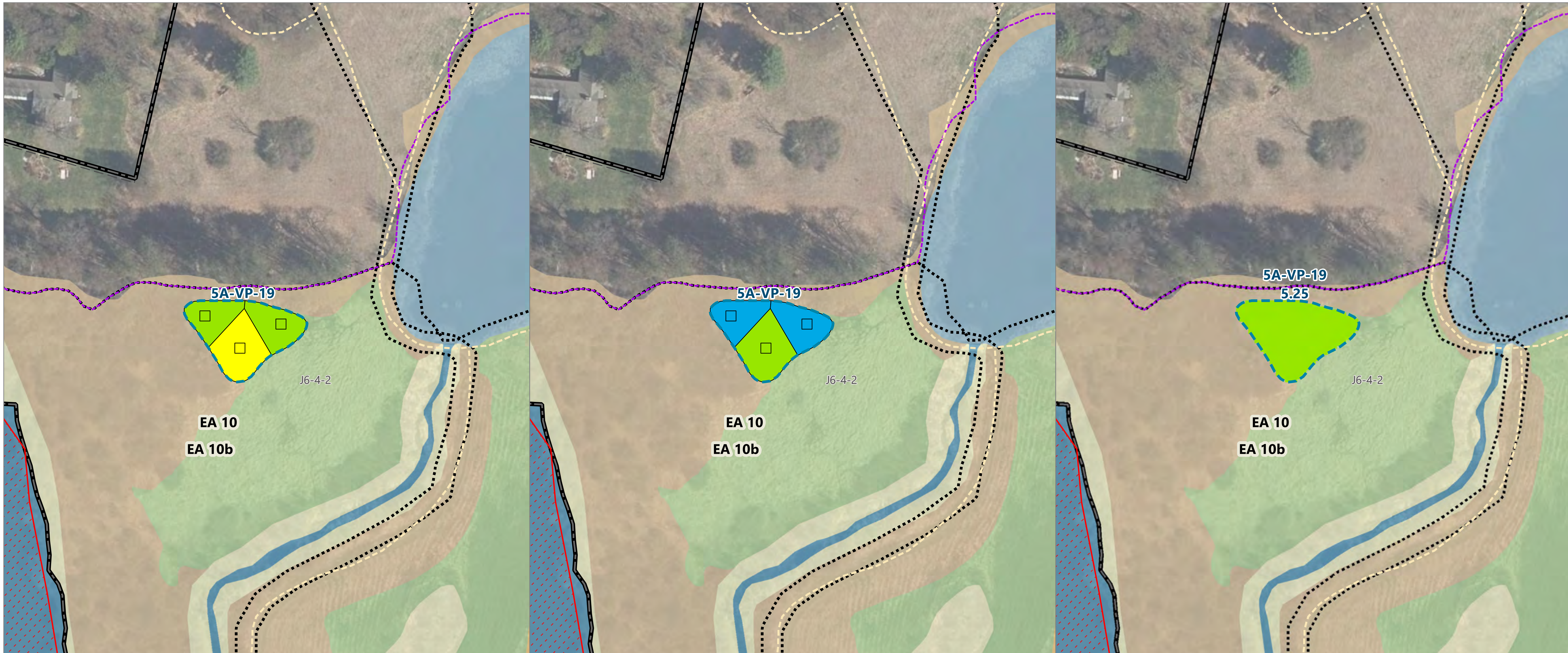
ANCHOR QEA

Figure A-1j
Vernal Pools in Exposure Area 7
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)

Total PCB (6 to 12 inches)

Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat
- Walking Trails

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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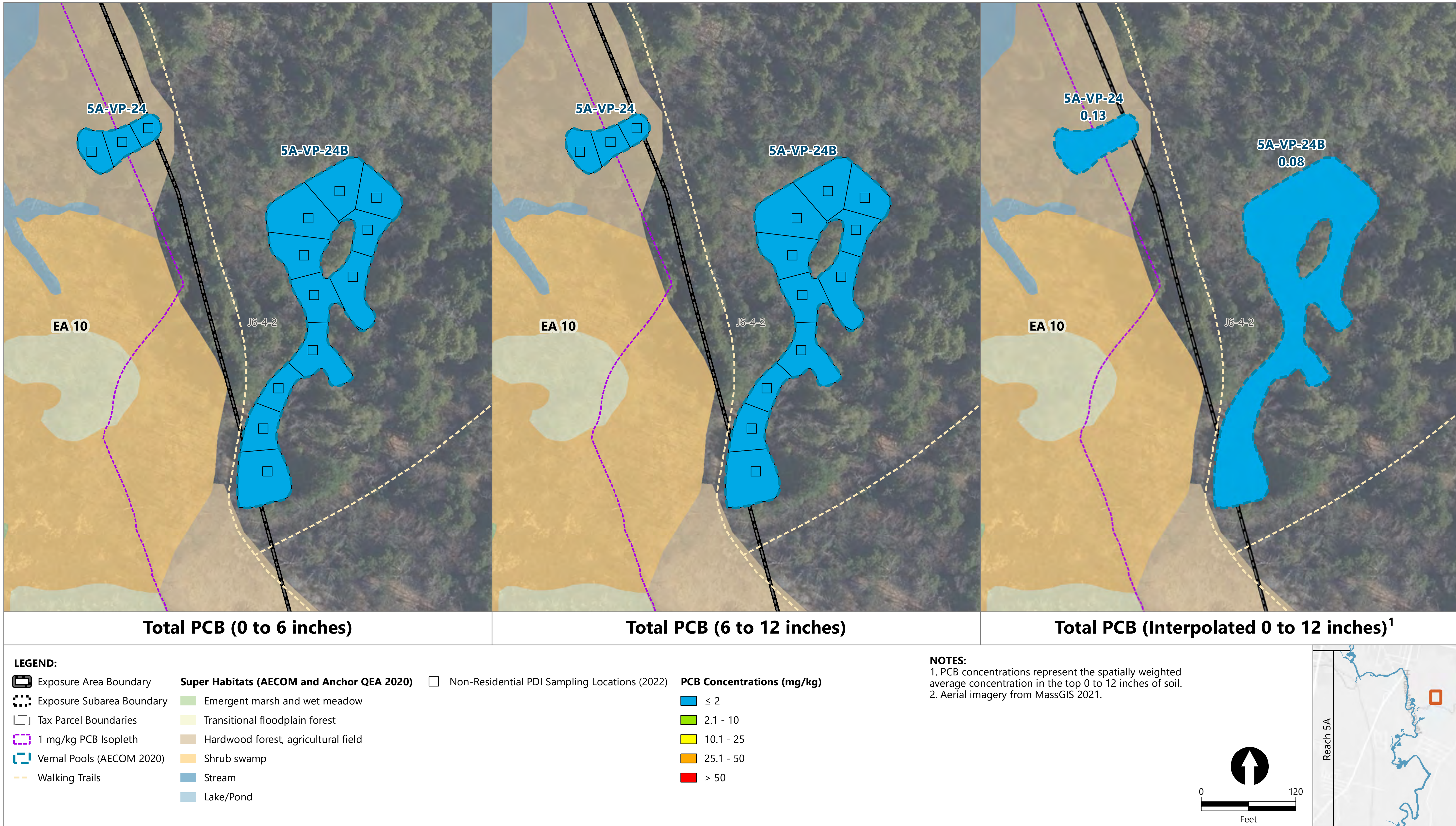
ANCHOR QEA

Figure A-1k
Vernal Pools in Exposure Area 10
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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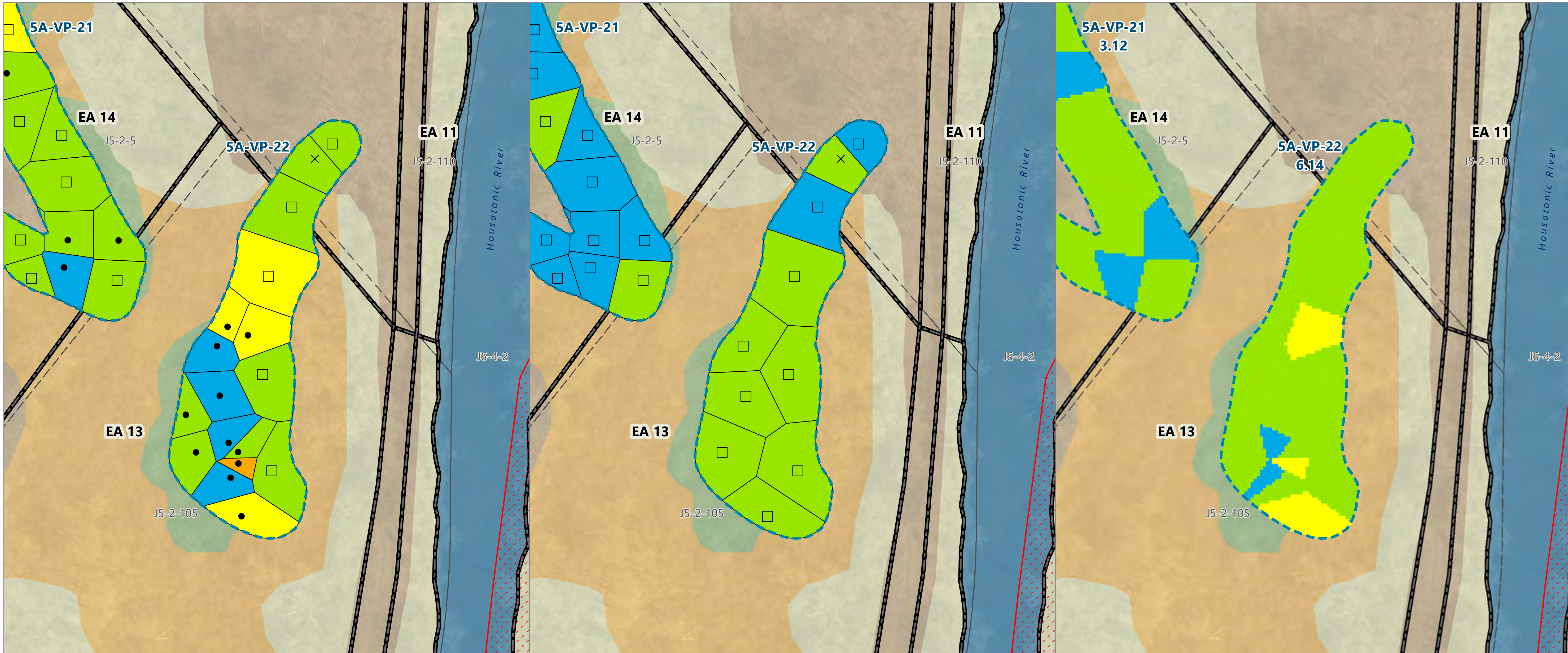
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1l
Vernal Pools in Exposure Area 10
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | Total PCB (6 to 12 inches) | Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

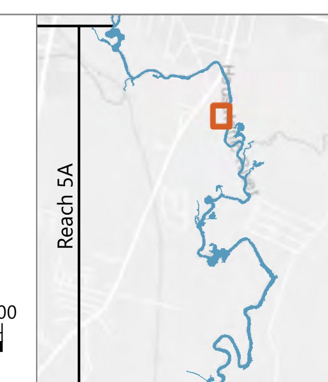
- Non-Residential PDI Sampling Locations (2022)
- Actual/Potential Lawn Sampling Locations
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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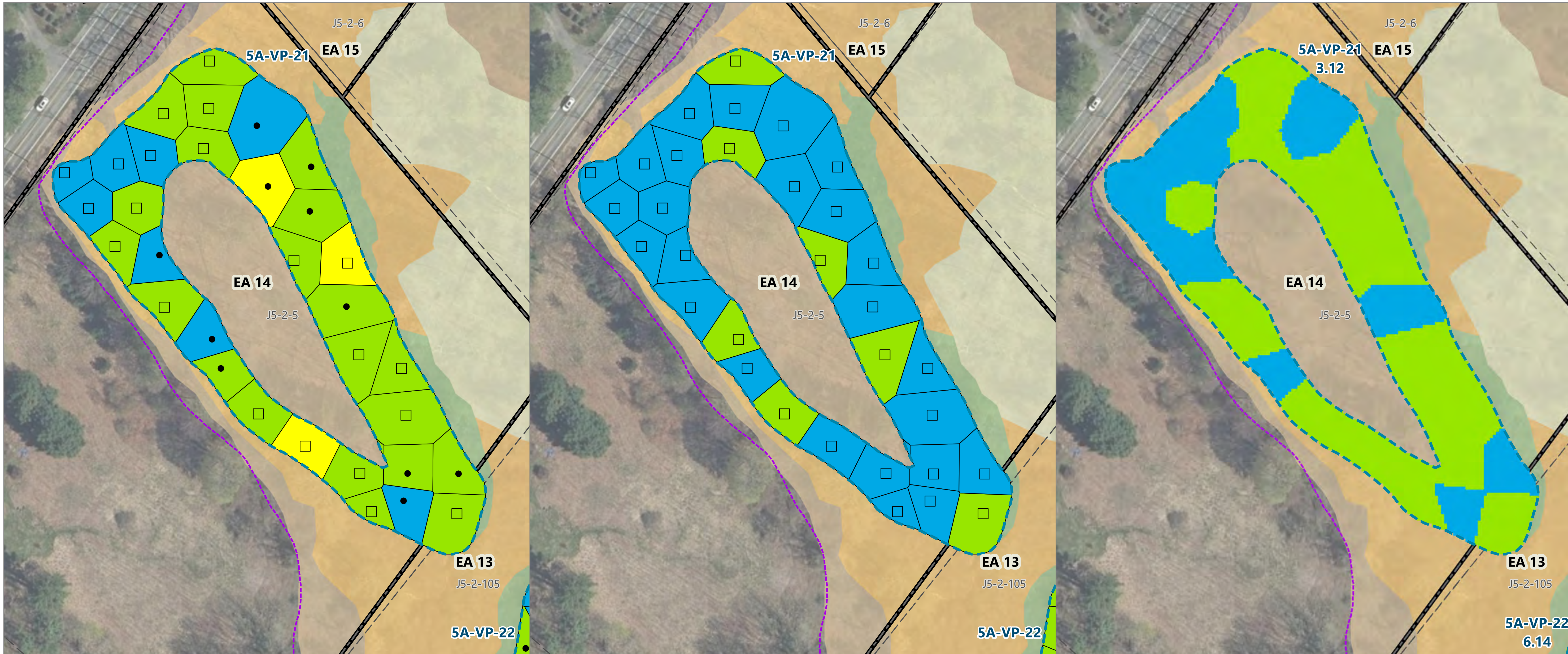
ANCHOR QEA

Figure A-1m
Vernal Pool in Exposure Area 13
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)**[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

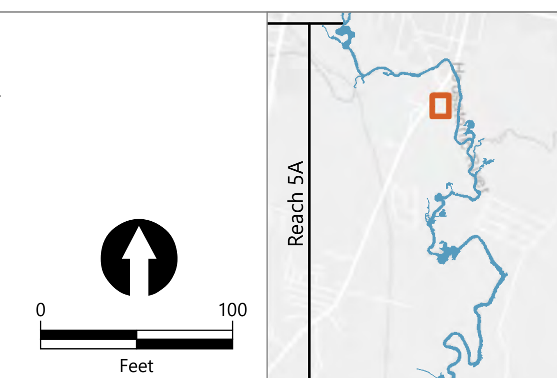
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.



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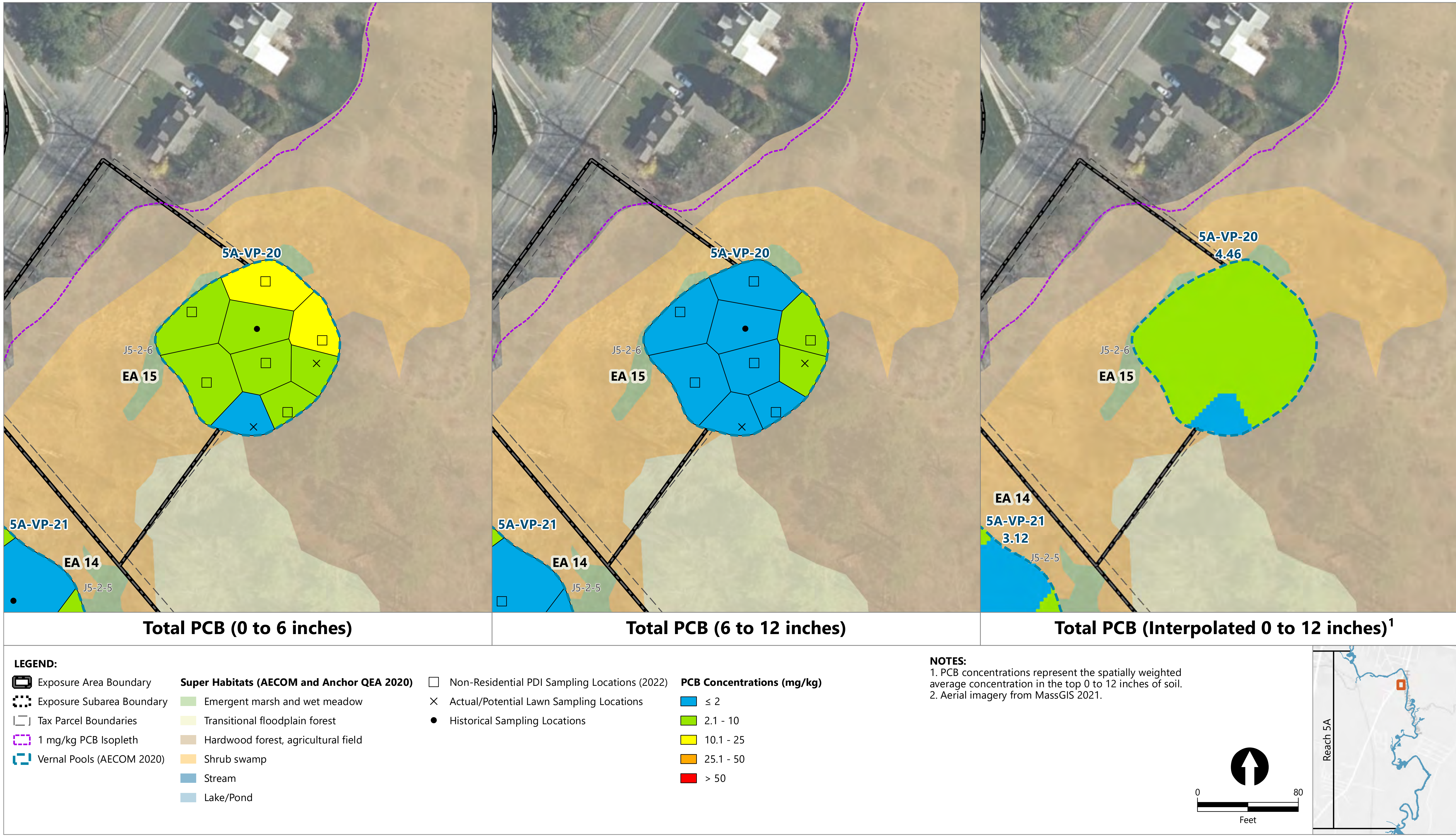
ANCHOR QEA

Figure A-1n
Vernal Pool in Exposure Area 14
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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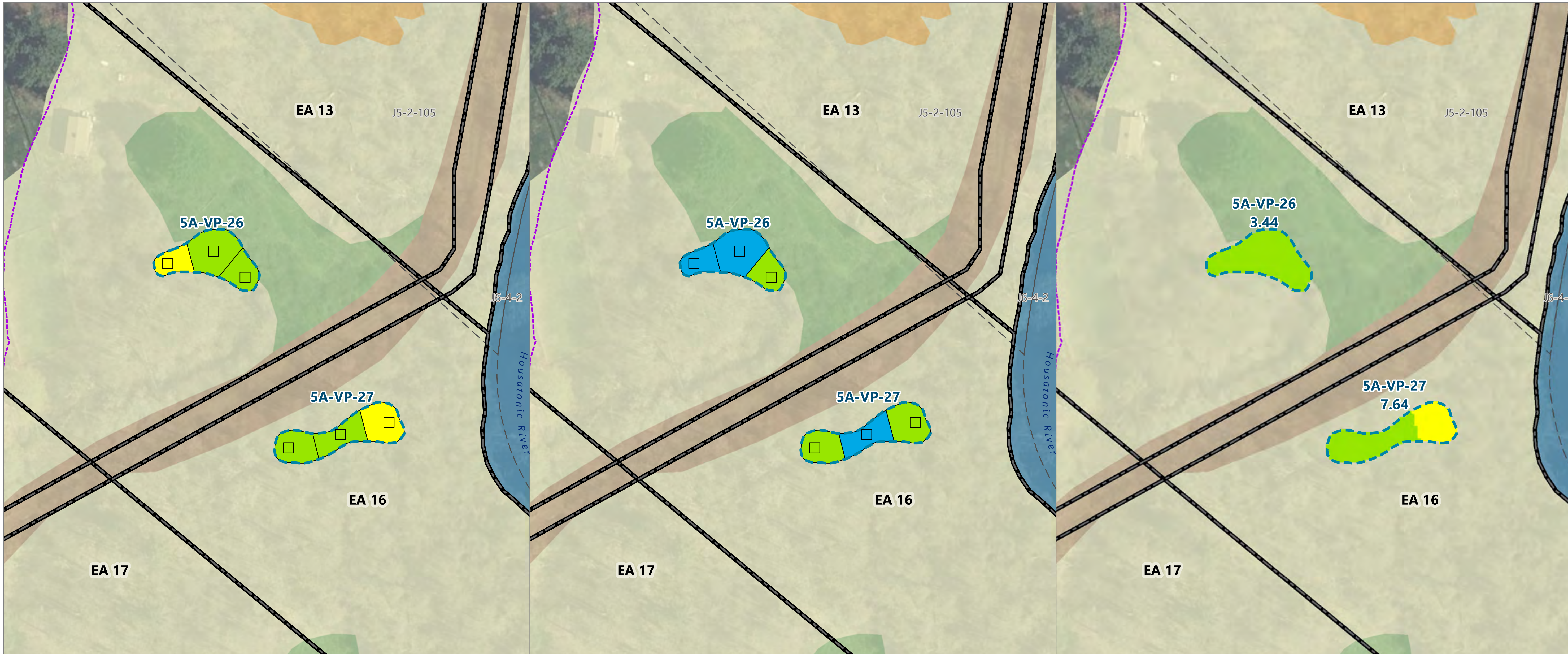
ANCHOR QEA

Figure A-1o
Vernal Pool in Exposure Area 15
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | Total PCB (6 to 12 inches) | Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

Non-Residential PDI Sampling Locations (2022)

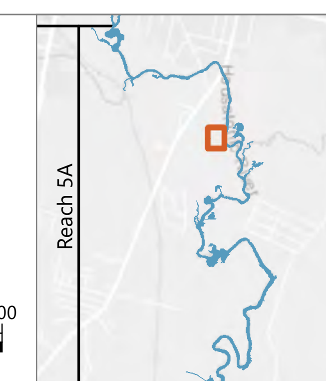
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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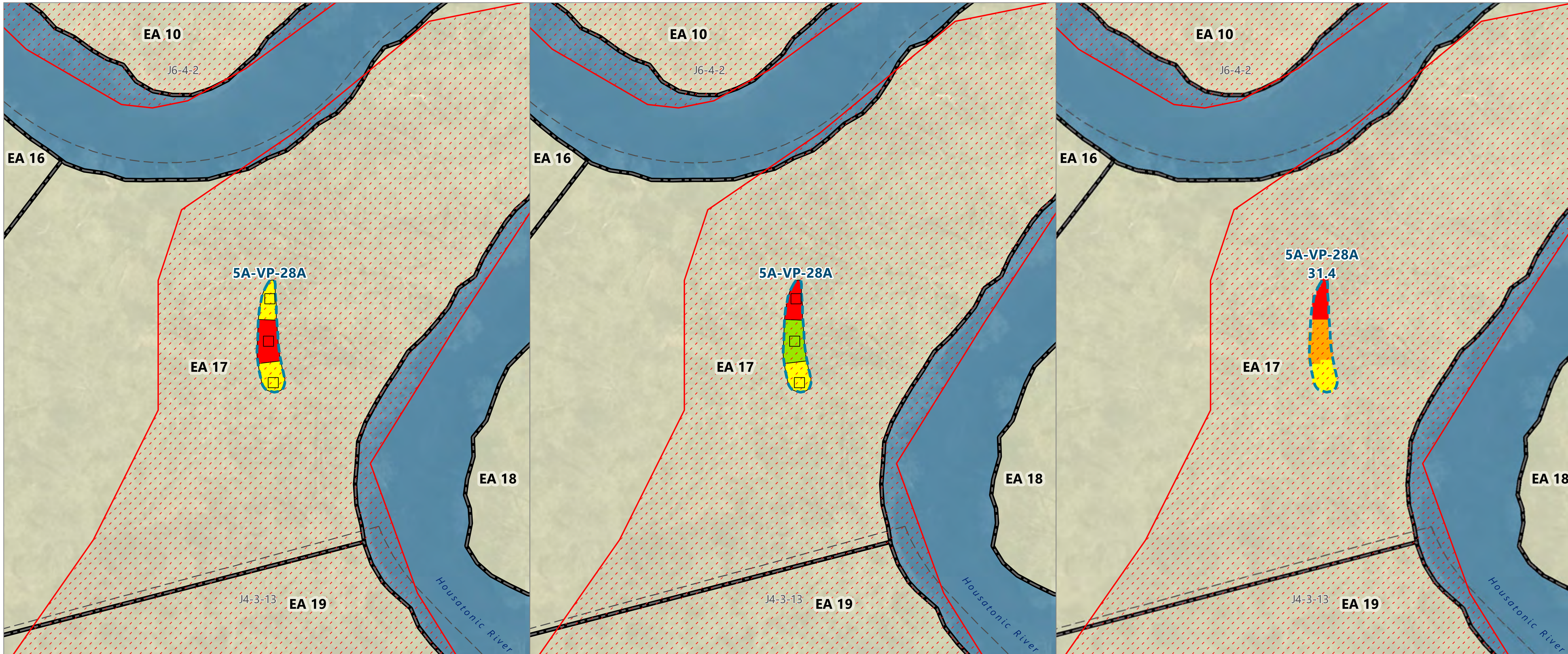
ANCHOR QEA

Figure A-1p
Vernal Pools in Exposure Area 16
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)

Total PCB (6 to 12 inches)

Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

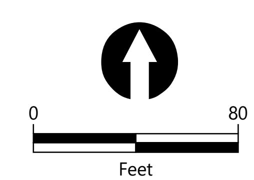
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

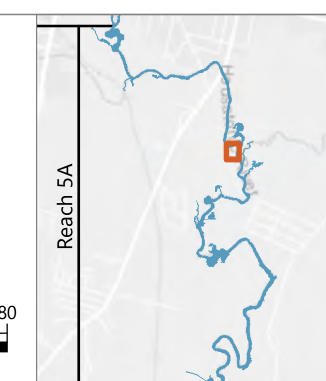
Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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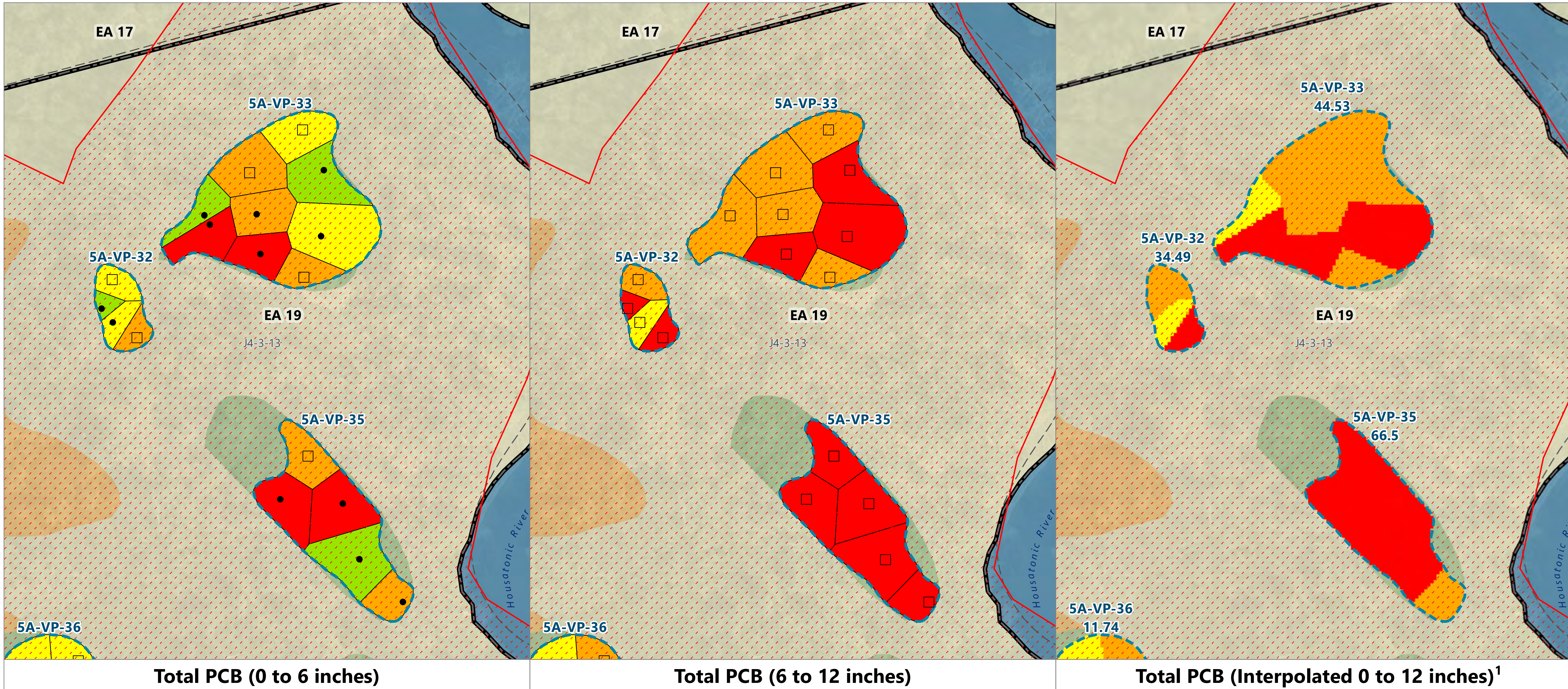
ANCHOR QEA

Figure A-1q
Vernal Pool in Exposure Area 17
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

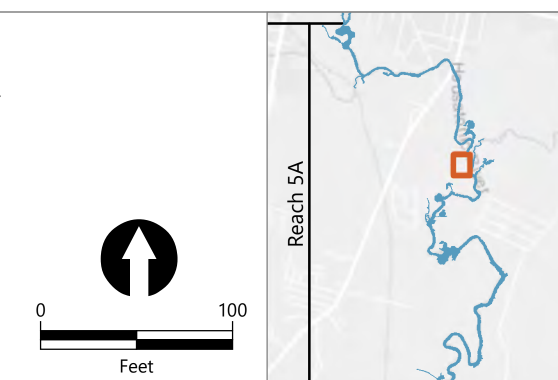
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.



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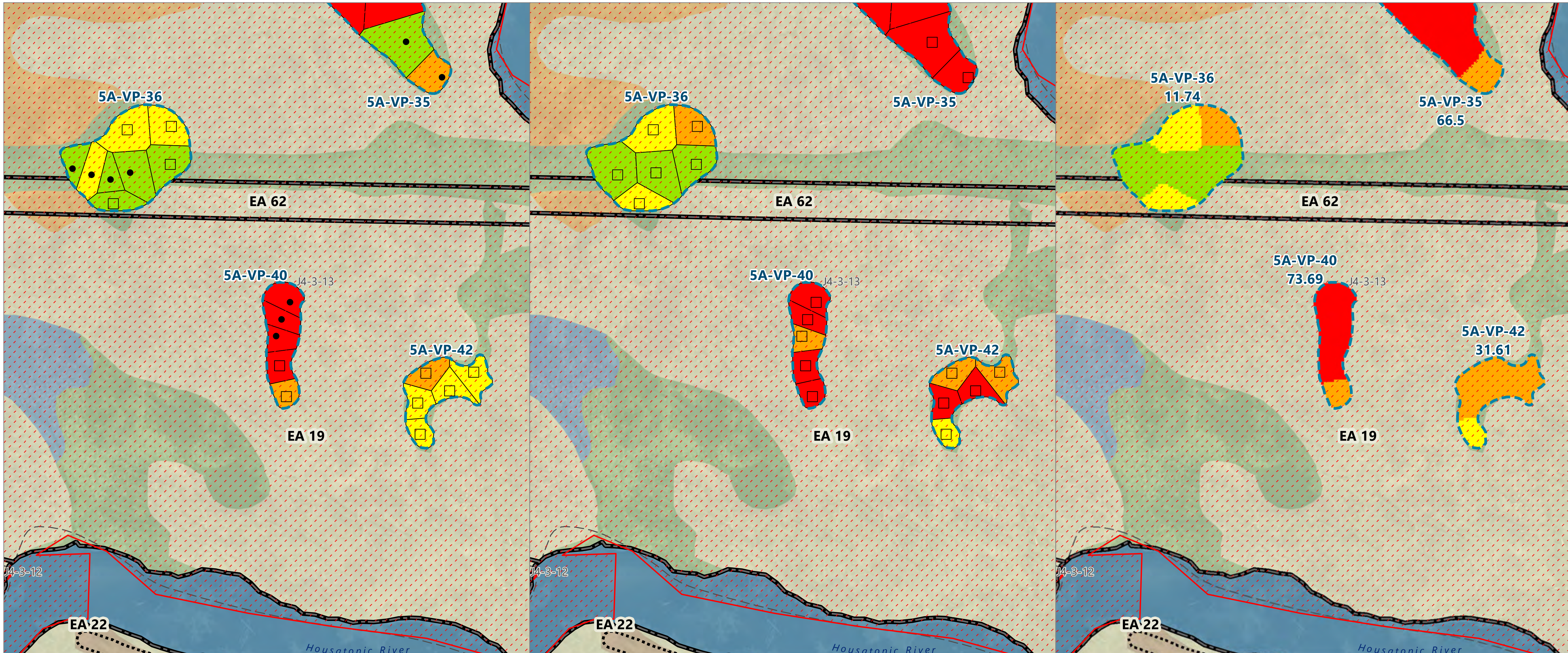
ANCHOR QEA

Figure A-1r
Vernal Pools in Exposure Area 19
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)	Total PCB (6 to 12 inches)	Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

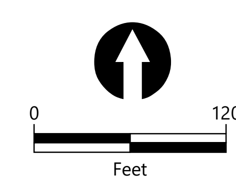
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

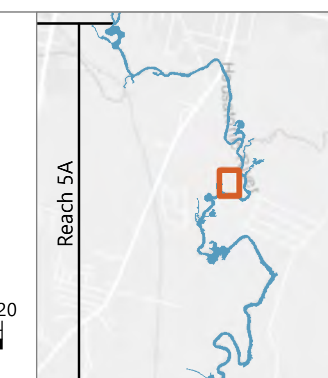
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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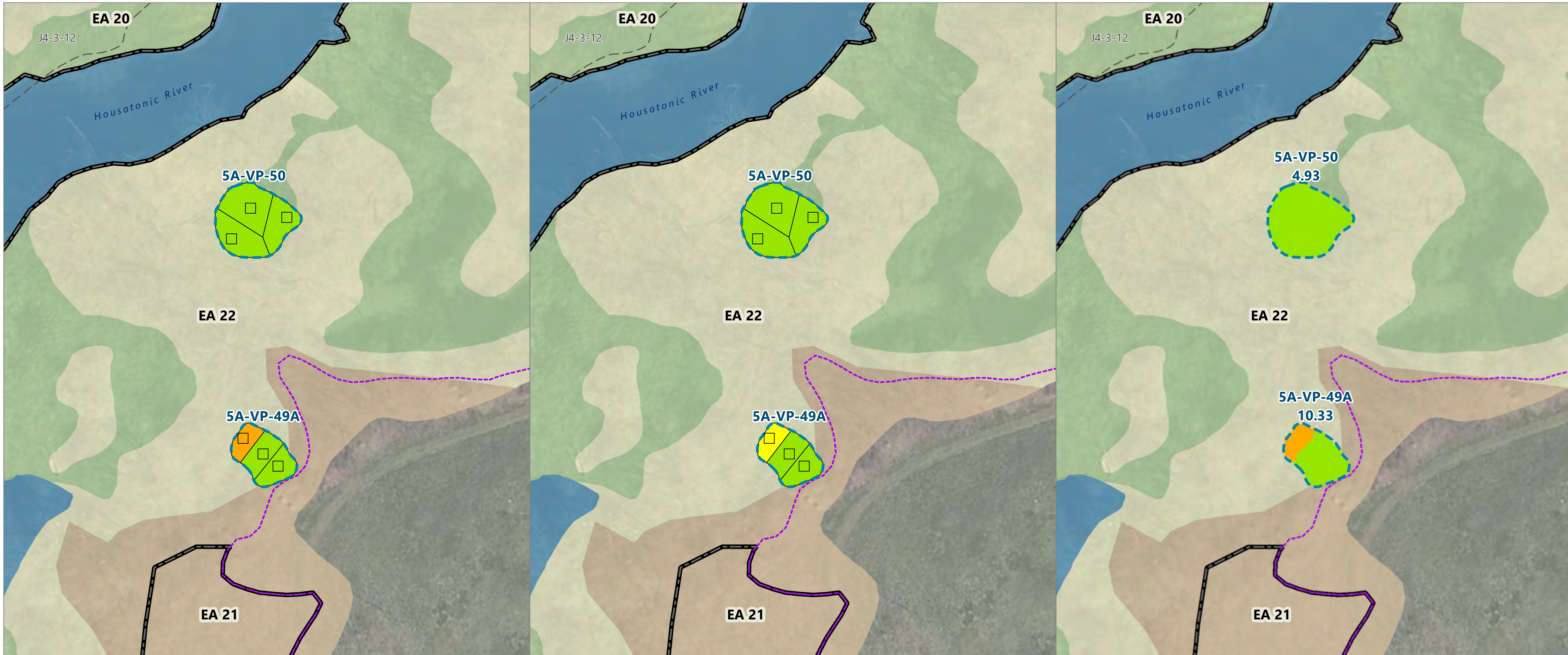
ANCHOR QEA

Figure A-1s
Vernal Pools in Exposure Area 19
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | Total PCB (6 to 12 inches) | Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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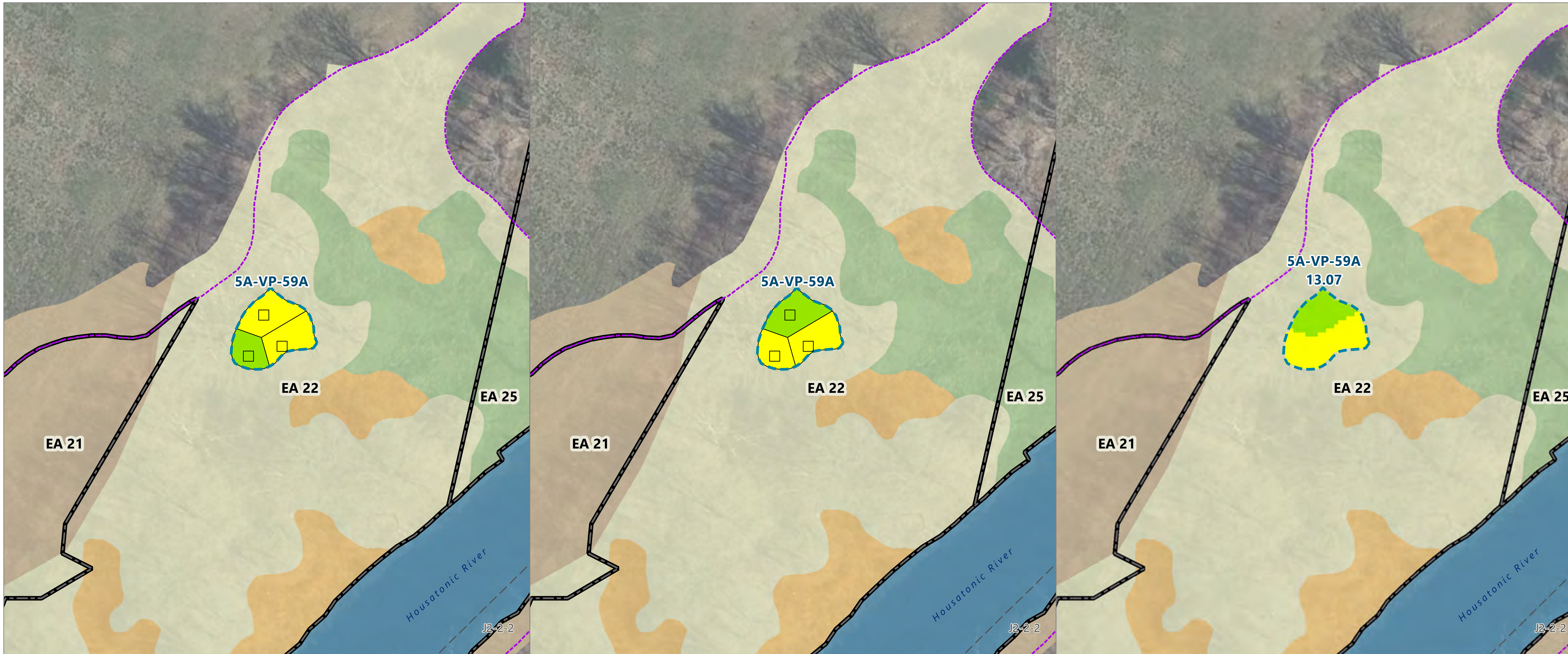
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1t
Vernal Pools in Exposure Area 22
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

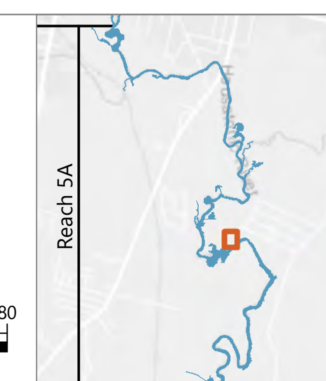
- Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 80
Feet



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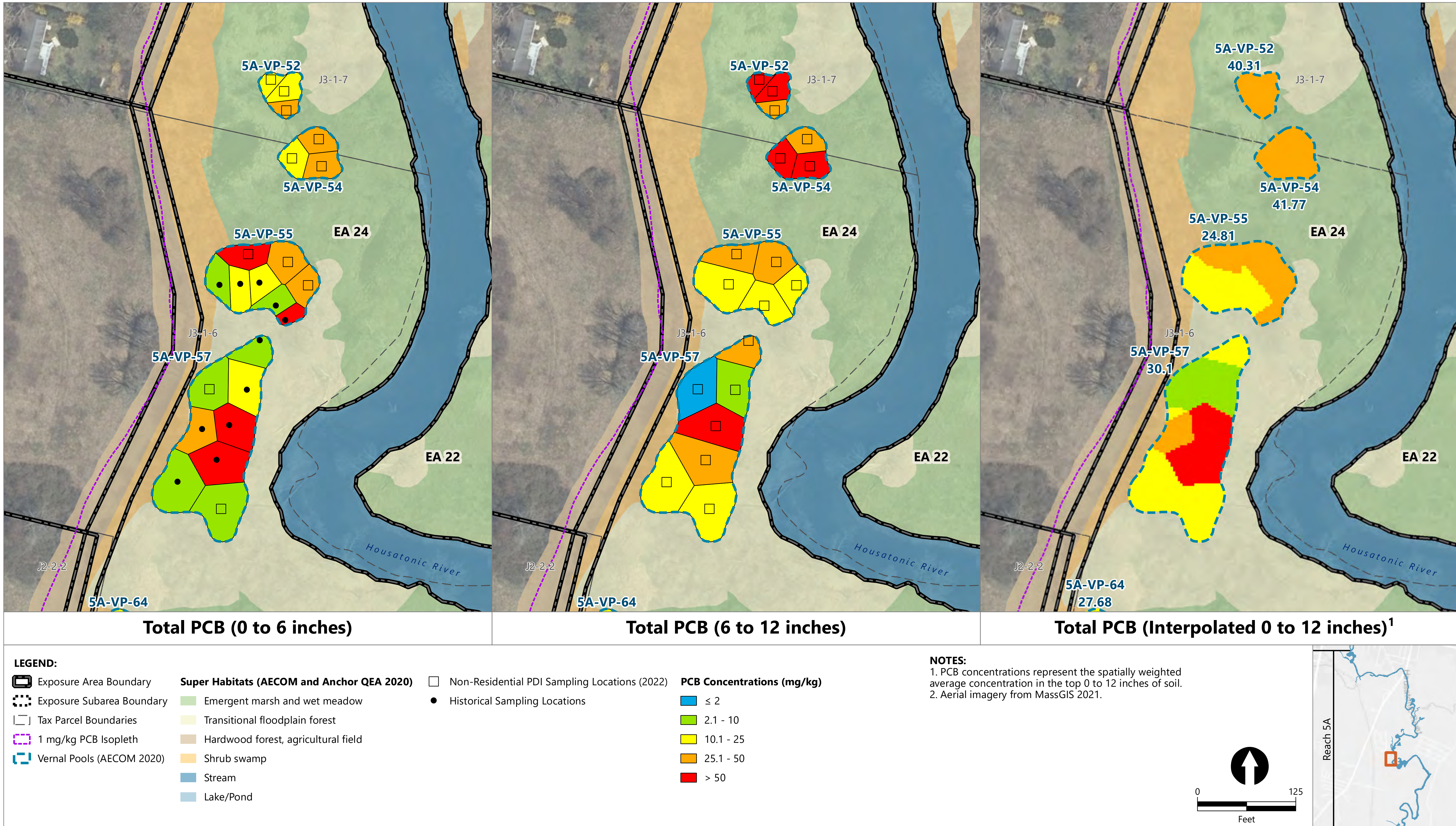
ANCHOR QEA

Figure A-1u
Vernal Pools in Exposure Area 22
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)**[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

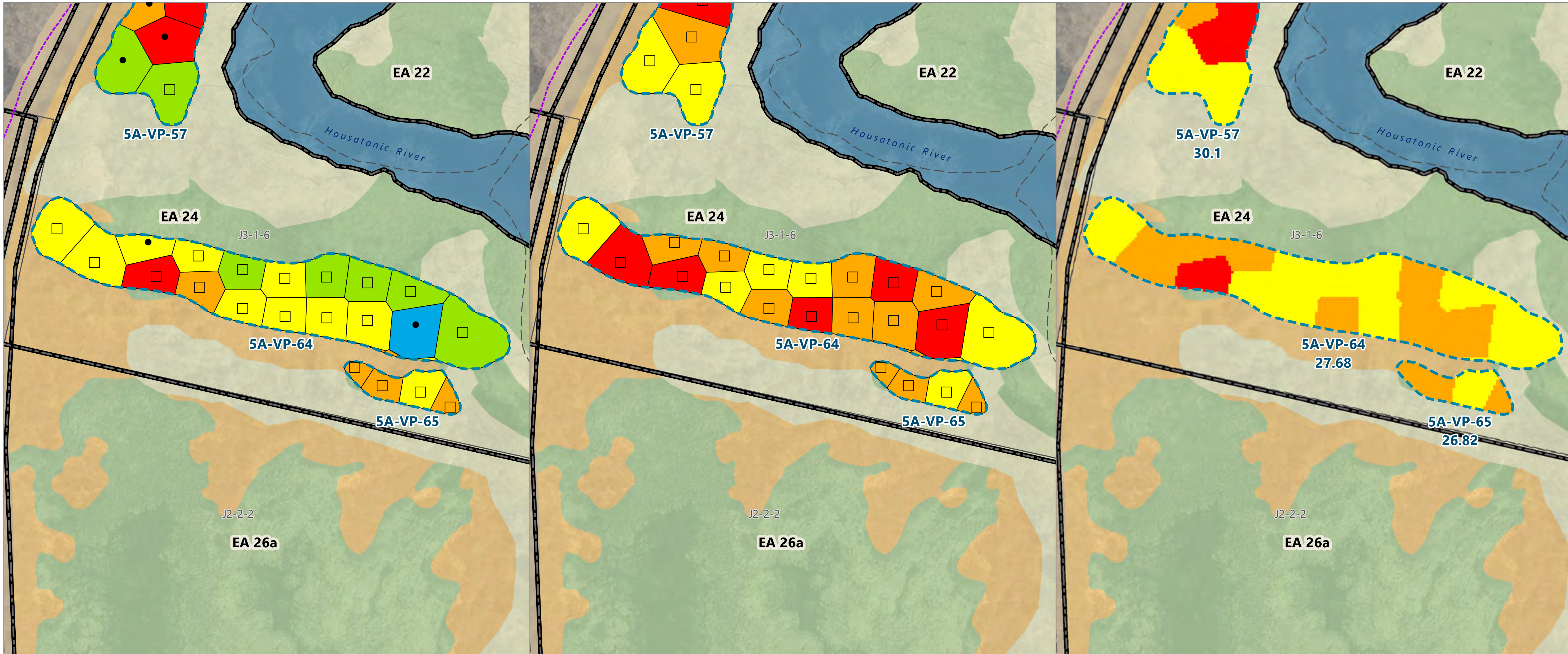
- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

Publish Date: 2023/05/10, 4:55 PM | User: eiverson
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1v
Vernal Pools in Exposure Area 24
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

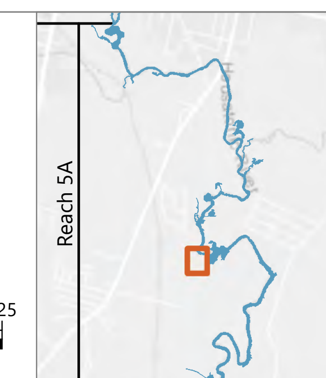
PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 125
Feet



Publish Date: 2023/05/10, 4:55 PM | User: eiverson
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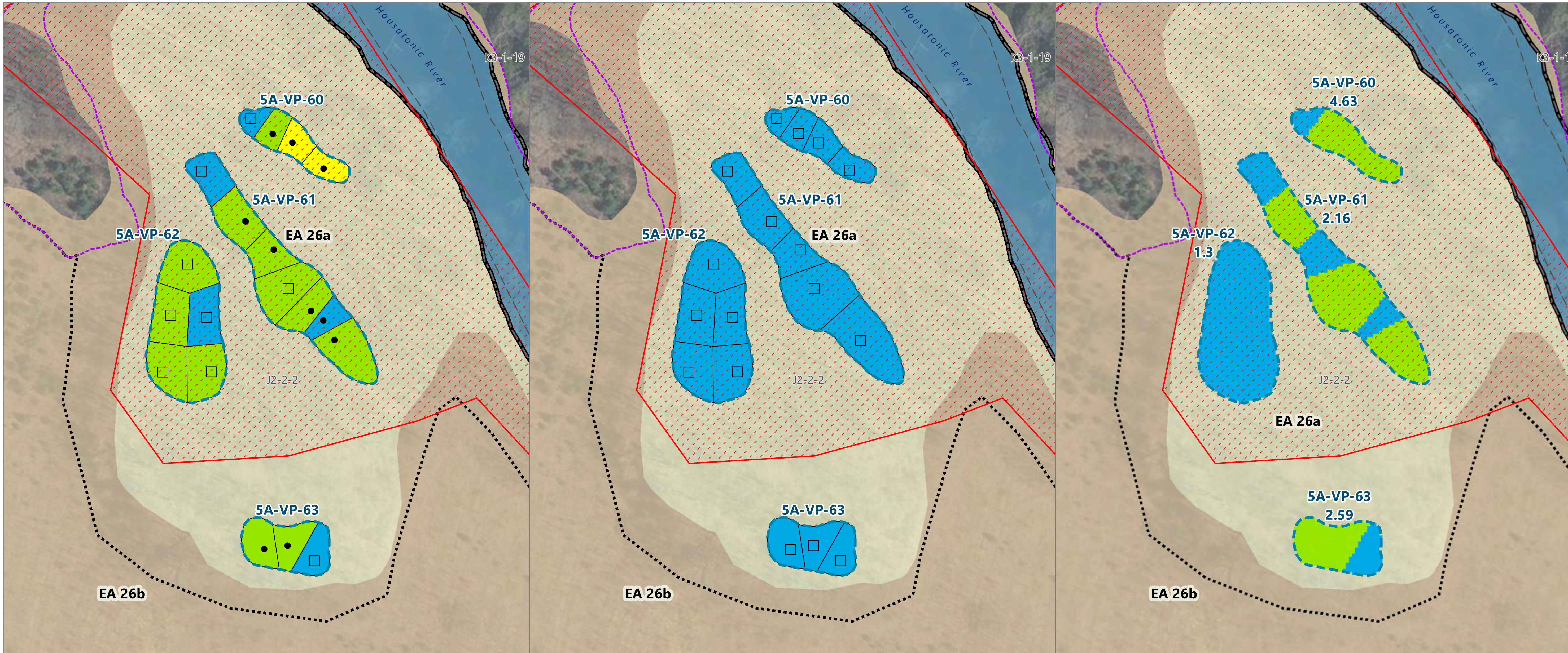
ANCHOR QEA

Figure A-1w
Vernal Pools in Exposure Area 24
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | Total PCB (6 to 12 inches) | Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)
- Core Area 1 Habitat

Super Habitats (AECOM and Anchor QEA 2020)

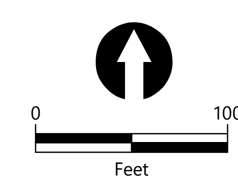
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

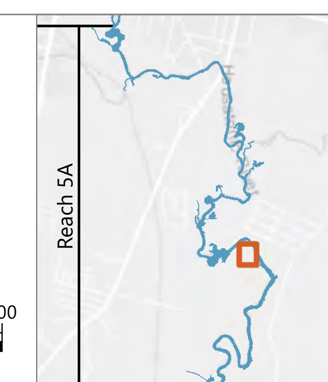
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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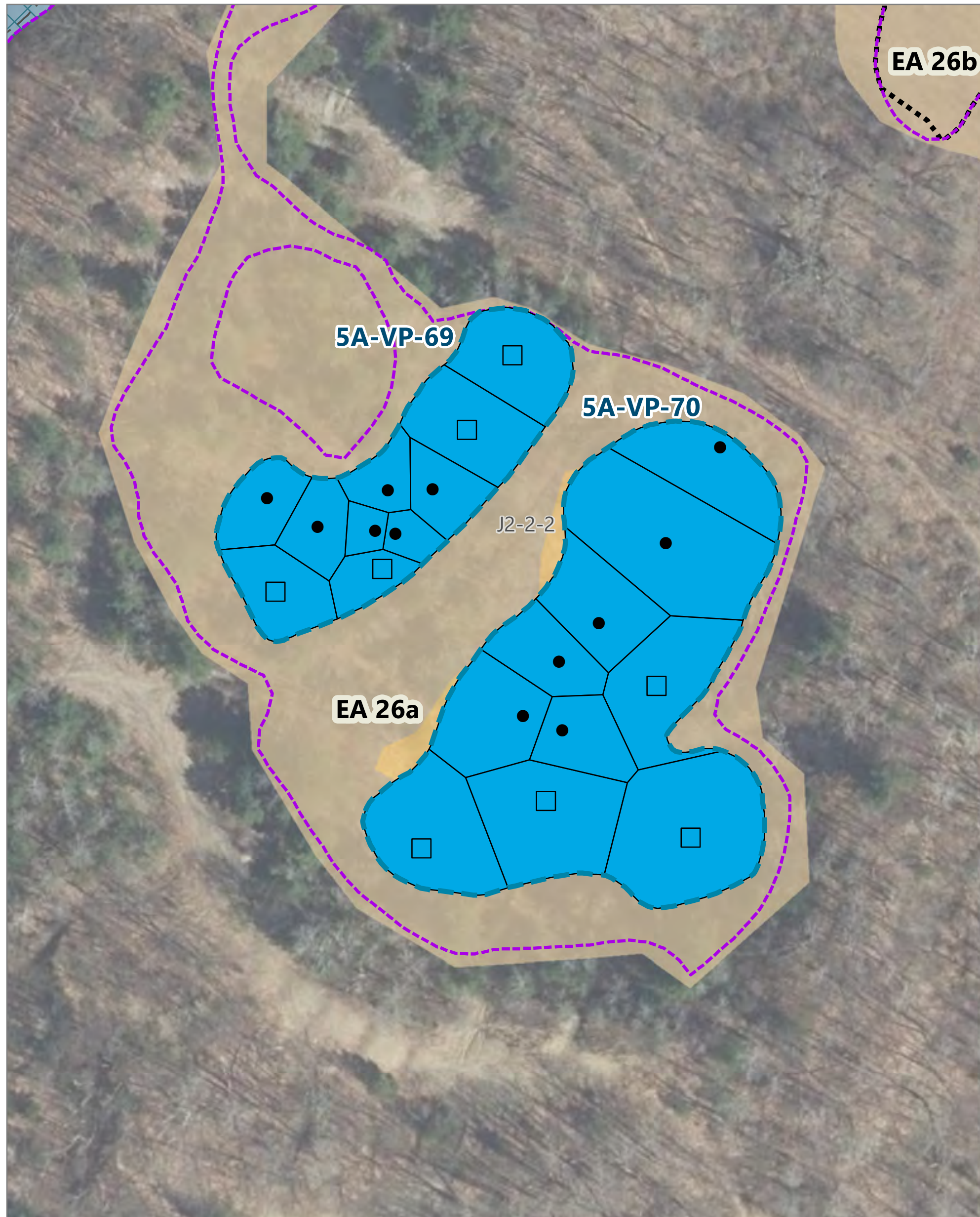
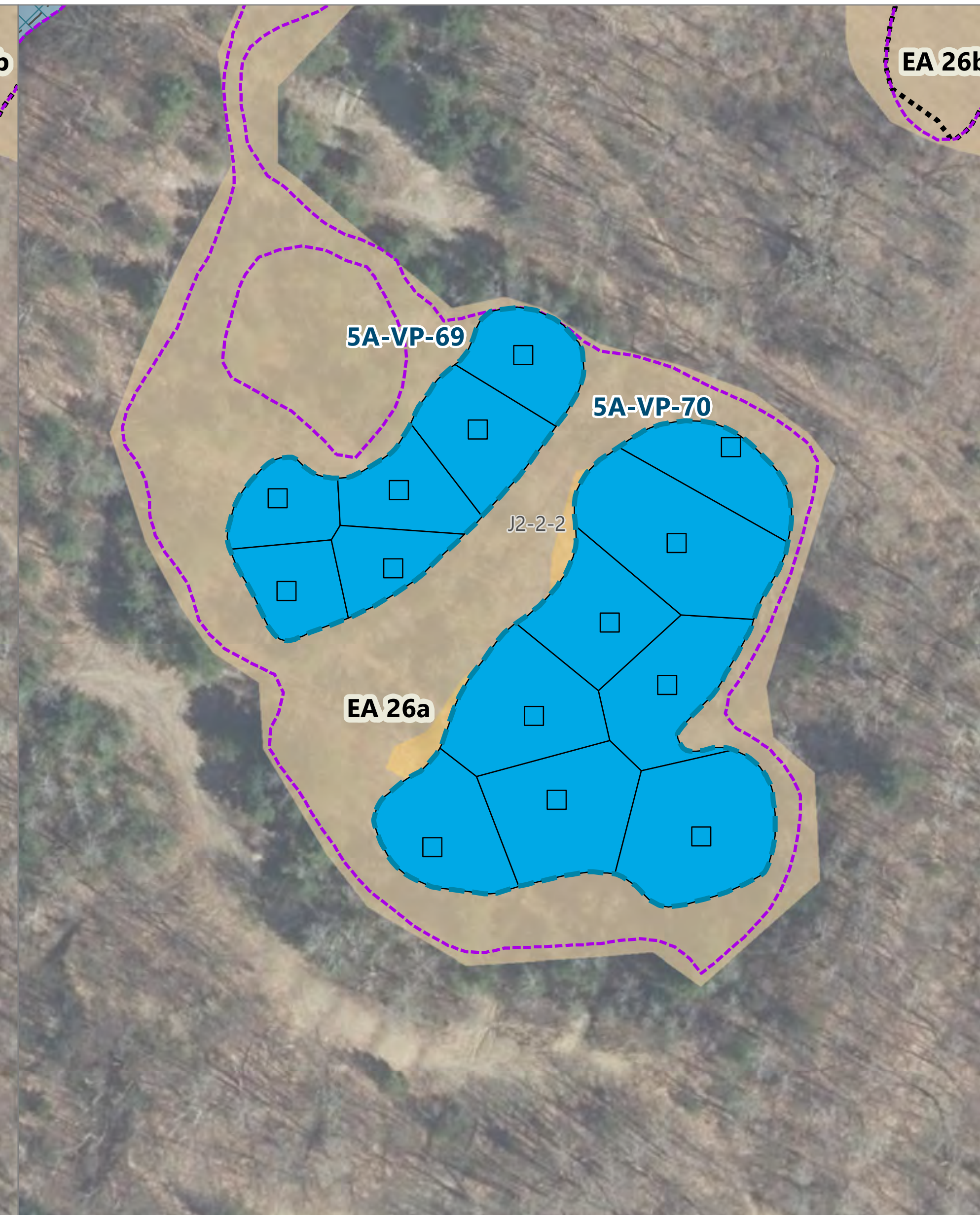
ANCHOR QEA

Figure A-1x
Vernal Pools in Exposure Area 26
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)



Total PCB (6 to 12 inches)

Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

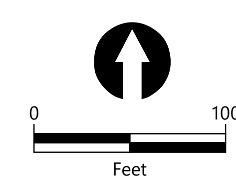
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

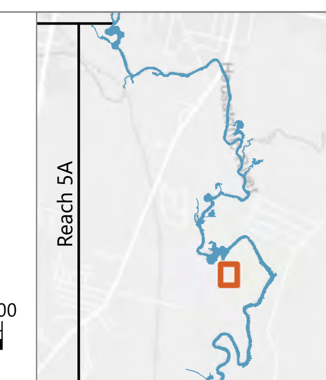
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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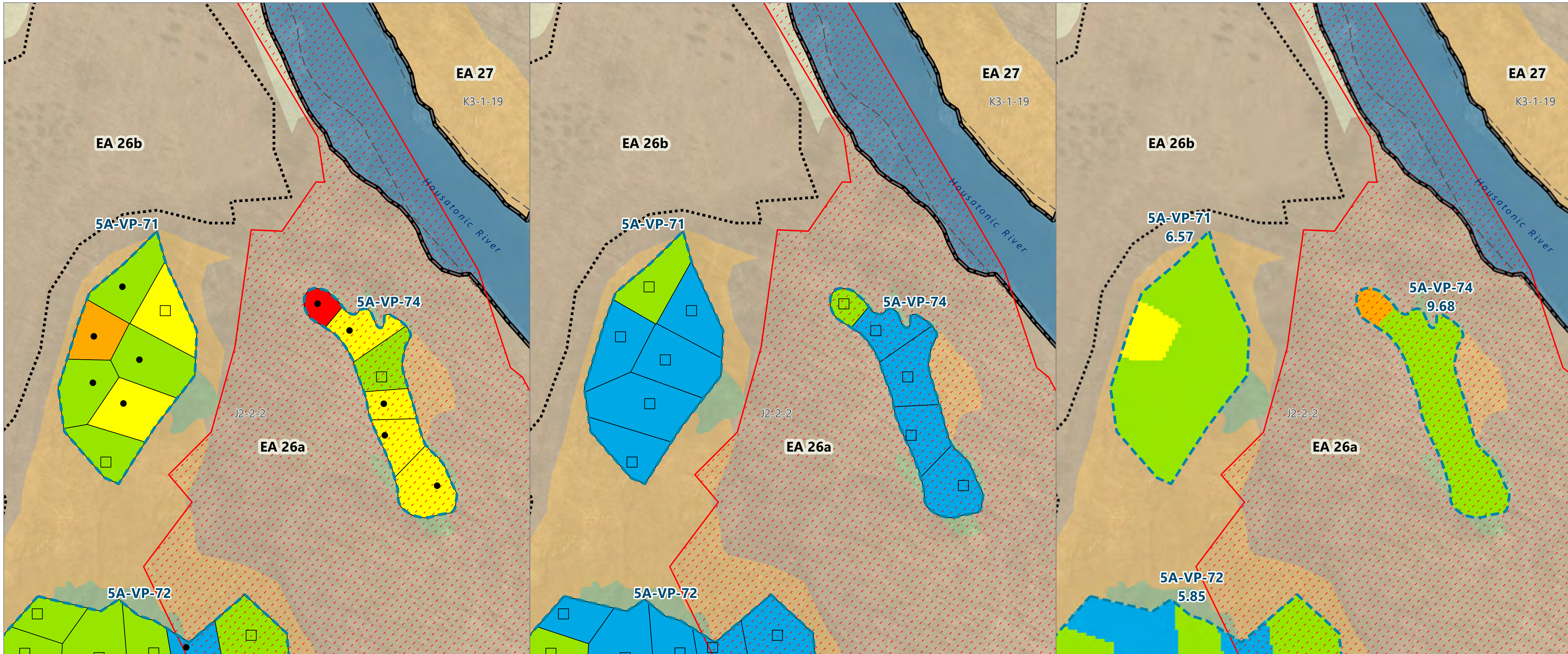
ANCHOR QEA

Figure A-1y
Vernal Pools in Exposure Area 26
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)	Total PCB (6 to 12 inches)	Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

Exposure Area Boundary
Exposure Subarea Boundary
Tax Parcel Boundaries
1 mg/kg PCB Isopleth
Vernal Pools (AECOM 2020)
Core Area 1 Habitat

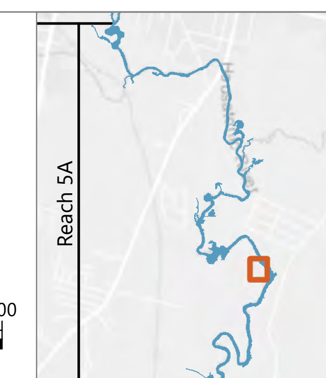
Super Habitats (AECOM and Anchor QEA 2020)
Emergent marsh and wet meadow
Transitional floodplain forest
Hardwood forest, agricultural field
Shrub swamp
Stream
Lake/Pond

Non-Residential PDI Sampling Locations (2022)
Historical Sampling Locations

PCB Concentrations (mg/kg)
≤ 2
2.1 - 10
10.1 - 25
25.1 - 50
> 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 100
Feet



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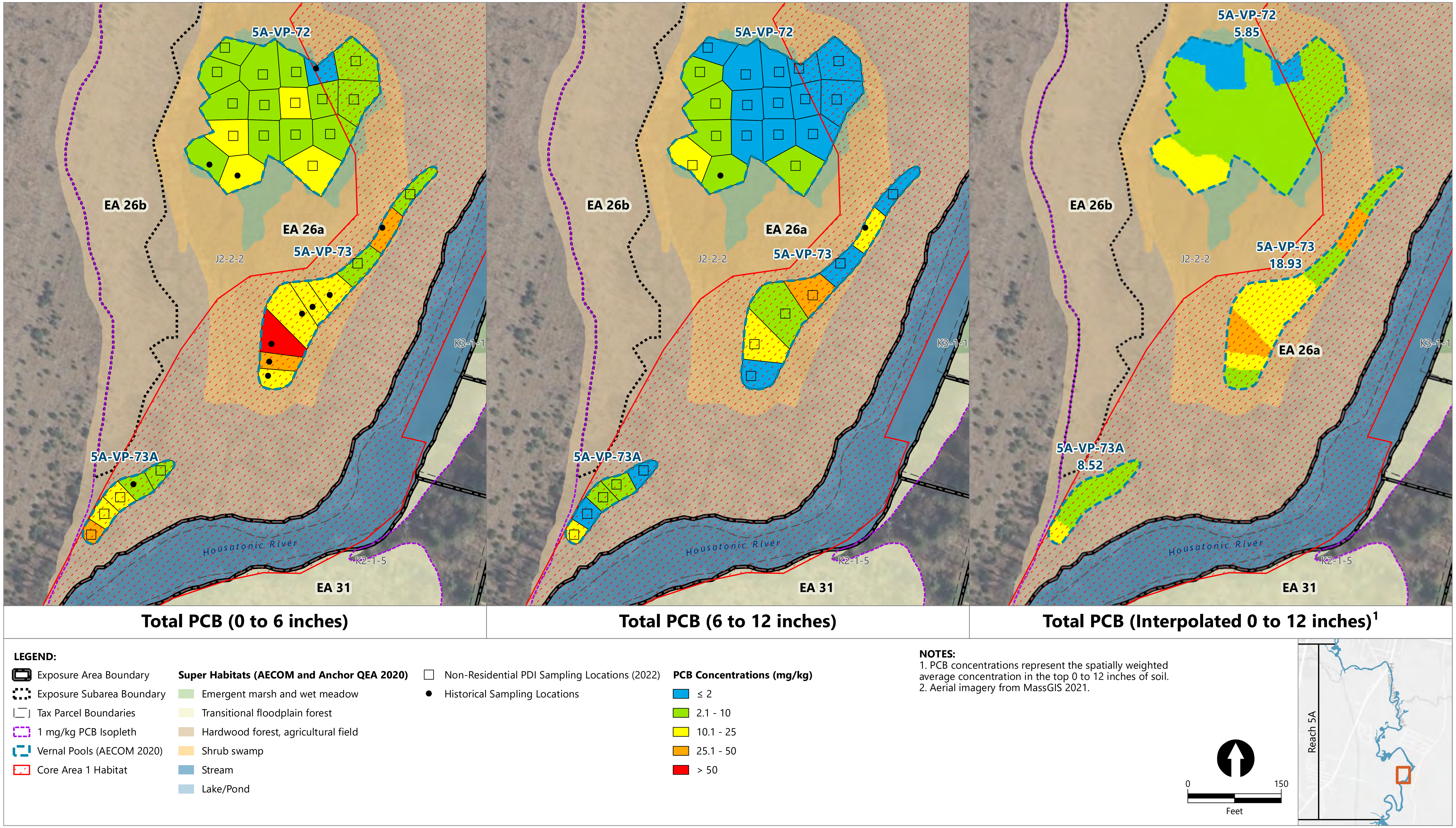
ANCHOR QEA

Figure A-1z
Vernal Pools in Exposure Area 26
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



NOTES:

1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

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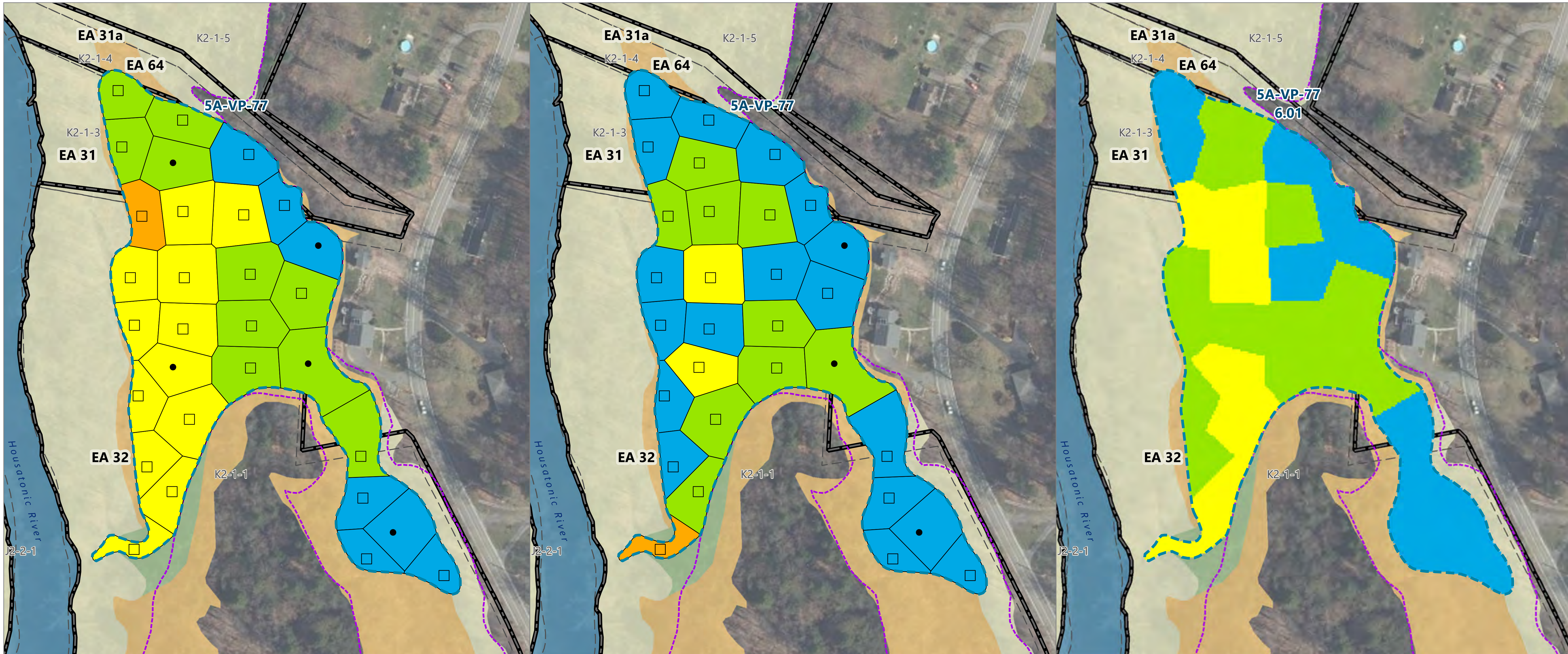
Filepath: \\orcas\GIS\Jobs\GE_0469\HousatonicRiver\Maps\Reports\VernalPools\PilotStudy\WorkPlan\AQ_VPWP_FigA-1_VernalPoolThiessens.mxd

ANCHOR QEA

Figure A-1aa
Vernal Pools in Exposure Area 26
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches) | **Total PCB (6 to 12 inches)** | **Total PCB (Interpolated 0 to 12 inches)[1]**

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

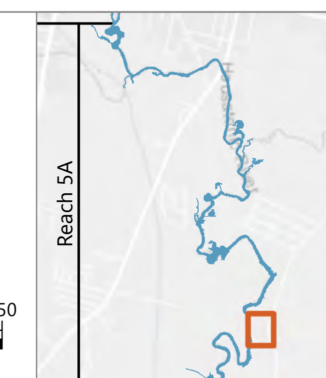
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 150
Feet



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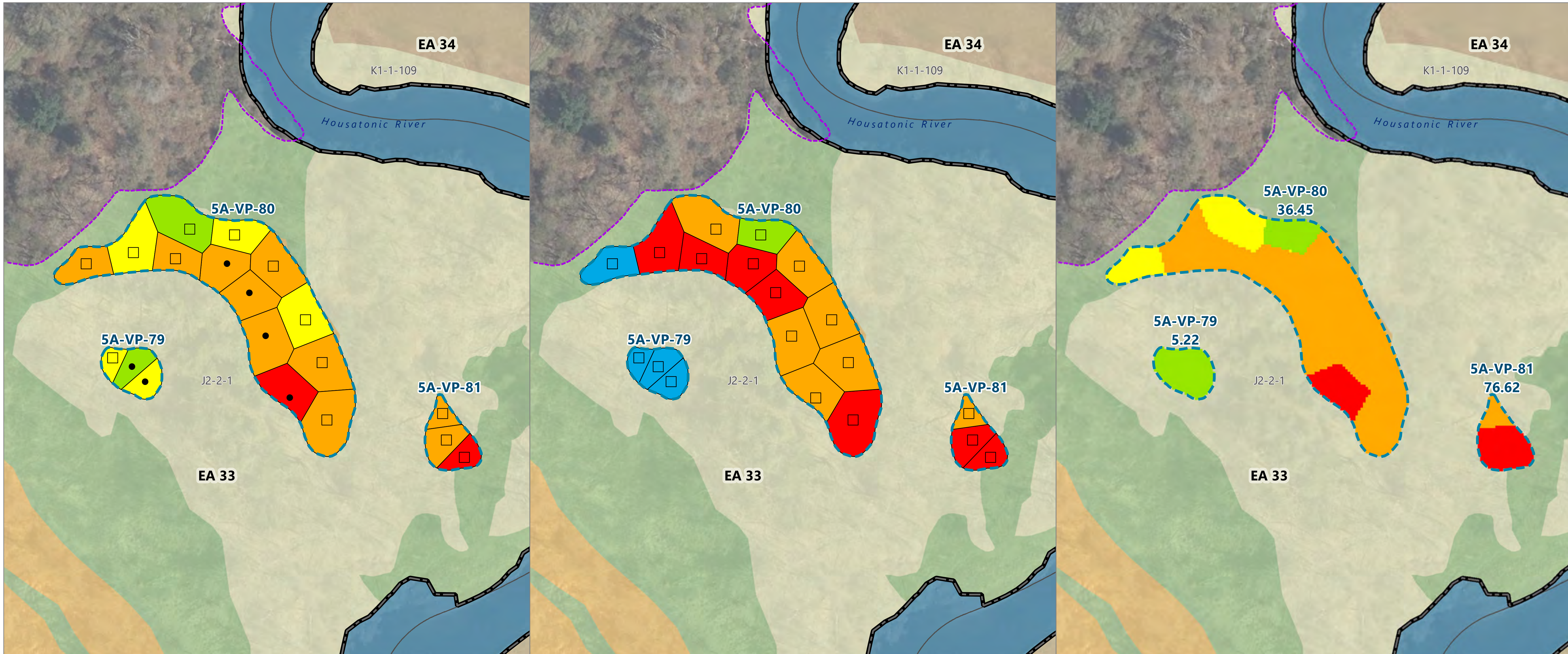
ANCHOR QEA

Figure A-1bb
Vernal Pool in Exposure Areas 31 and 32
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



Total PCB (0 to 6 inches)	Total PCB (6 to 12 inches)	Total PCB (Interpolated 0 to 12 inches)[1]

LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

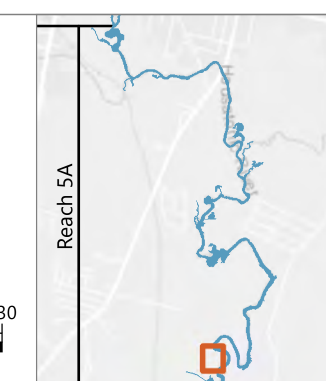
- Non-Residential PDI Sampling Locations (2022)
- Historical Sampling Locations

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.

0 130
Feet



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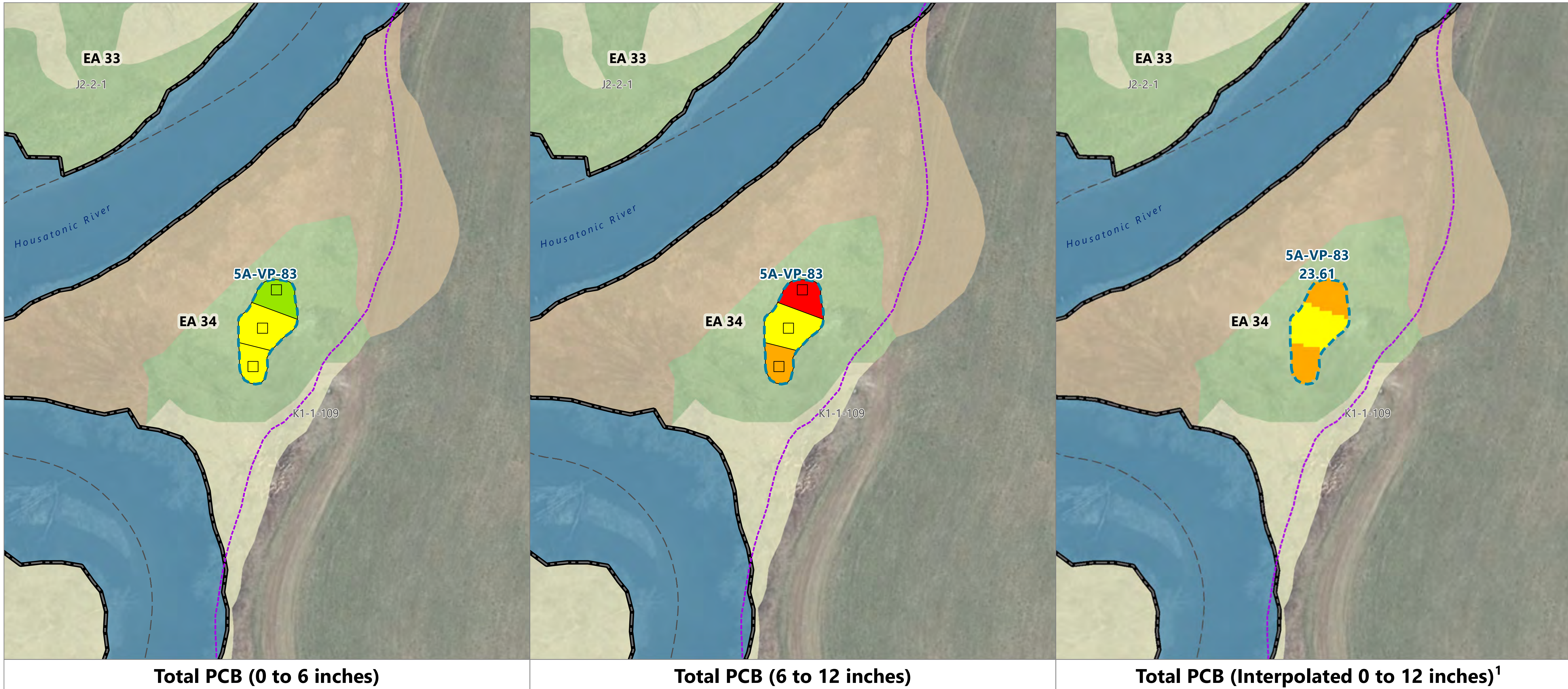
ANCHOR QEA

Figure A-1cc
Vernal Pools in Exposure Area 33
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River



LEGEND:

- Exposure Area Boundary
- Exposure Subarea Boundary
- Tax Parcel Boundaries
- 1 mg/kg PCB Isopleth
- Vernal Pools (AECOM 2020)

Super Habitats (AECOM and Anchor QEA 2020)

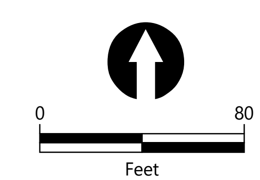
- Emergent marsh and wet meadow
- Transitional floodplain forest
- Hardwood forest, agricultural field
- Shrub swamp
- Stream
- Lake/Pond

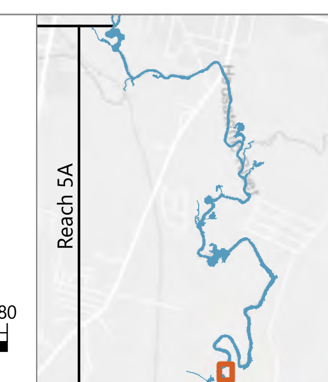
Non-Residential PDI Sampling Locations (2022)

PCB Concentrations (mg/kg)

- ≤ 2
- 2.1 - 10
- 10.1 - 25
- 25.1 - 50
- > 50

NOTES:
1. PCB concentrations represent the spatially weighted average concentration in the top 0 to 12 inches of soil.
2. Aerial imagery from MassGIS 2021.





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ANCHOR QEA

Figure A-1dd
Vernal Pool in Exposure Area 34
Vernal Pool Pilot Study Work Plan
Housatonic River – Rest of River

Appendix B
Standard Operating Procedure for Bench-Scale Jar Testing of Vernal Pool Amendments

Standard Operating Procedure for Bench-Scale Jar Testing of Vernal Pool Amendments

Standard Operating Procedure

Bench-Scale Jar Testing of Vernal Pool Amendments

Scope and Application

This standard operating procedure (SOP) applies to the testing of vernal pool soils for the purpose of evaluating potential soil amendments. In this method, field-collected vernal pool soils will be contacted with activated carbon and biochar amendments to evaluate their effectiveness at reducing freely dissolved porewater polychlorinated biphenyls (PCBs). A polydimethylsiloxane (PDMS)-coated glass fiber (solid phase microextraction [SPME] fiber) will be used to measure freely dissolved porewater PCB concentrations. A PDMS-coated glass fiber is inserted into the soils and remains there for sufficient time to allow uptake and equilibration of target analytes in freely dissolved phase with the PDMS coating, as described by Mayer et al. (2000). Porewater concentrations (C_w) can be estimated from the measured concentration sorbed to the PDMS polymer (C_{PDMS}) and the PDMS-water partition coefficient ($K_{PDMS\text{-}w}$), as shown in Equation 1. Performance reference compounds (PRCs) are used to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009).

Equation 1

$$C_w = \frac{C_{PDMS}}{K_{PDMS-w} \times f_e}$$

where:

C_W	=	concentration in porewater (nanograms per liter [ng/L])
C_{PDMS}	=	concentration in PDMS coating (ng/L)
$K_{PDMS\text{-}w}$	=	PDMS-water partitioning coefficient (liter per liter [L/L])
f_e	=	fraction of equilibrium (-)

Procedures outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be documented and reported to the project manager.

Health and Safety Warnings

All laboratory work will be performed in accordance with the Anchor QEA Environmental Geochemistry Laboratory (EGL) Chemical Hygiene Plan (CHP) by approved staff. Approval to work in the EGL requires orientation to laboratory safety procedures and potential hazards under the guidance of the Laboratory Manager, as specified in the CHP.

Personnel Qualifications

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP and the *Vernal Pool Pilot Study Work Plan* (Anchor QEA and AECOM 2023), as well as any conditions specified by the U.S. Environmental Protection Agency in review of such plan(s). Field personnel will work under the direct supervision of qualified professionals who are experienced in performing the tasks described herein.

Equipment and Supplies

The following equipment may be necessary to carry out the procedures contained in this SOP (additional equipment may be required depending on conditions):

- Appropriate personal protective equipment and clothing, as defined in the CHP;
- PDMS-coated SPME fiber;[1]
- 32-ounce, wide-mouth glass jar with Teflon-lined cap;
- Razor blade;
- Water (high-performance liquid chromatography [HPLC] grade);
- Methanol (HPLC grade);
- Hexane (HPLC grade);
- PRC stock solutions (^{13}C-PCB-008, ^{13}C-PCB-031, ^{13}C-PCB-060, ^{13}C PCB-085, ^{13}C-PCB-128, and ^{13}C-PCB-182);
- Sodium azide (NaN_3);
- Pre-cleaned, 40-milliliter amber glass volatile organic analysis (VOA) vials;
- Wash bottles;
- Laboratory shaker table;
- Analytical balance;
- Tweezer;

[1] Standard is Polymicro Technologies, Inc. (Phoenix, Arizona) FSS10001070 (Glass rod OD: 1,000 µm, Fiber OD: 1,070 µm).

- Waterproof markers;
- Alconox, Liquinox, or equivalent;
- Micropipette and tips (10 to 1,000 microliters [μL]);
- Heavy-duty aluminum foil;
- Kimwipes; and
- Mylar bags.

Soil Test Batch Preparation

The following procedure should be used to prepare the vernal pool soil batches for testing:

1. Soil samples collected in the field should be filled into appropriate containers and shipped to the EGL.
2. Upon arrival, the soil samples should be thoroughly homogenized and subsampled. The remaining soils should be stored in the dark to reduce the chance of photodegradation and stored cold (less than 4°C) to avoid volatilization of target contaminants.
3. Following receipt of the soil PCB concentrations, two soils should be selected to carry out the testing. Remaining soils will be archived and stored in the dark to reduce the chance of photodegradation and stored cold (less than 4°C) to avoid volatilization of target contaminants.
4. Determine moisture content of the soil by weighing the soil, then placing it into an oven to dry at 105ºC for 24 hours. Weigh the soil again after drying. Determine the moisture content (percent by weight) from weights before and after drying.
5. Using moisture content, determine mass needed to achieve dry weight values listed in Table 3-1 of the *Vernal Pool Pilot Study Work Plan*. Measure appropriate mass of soil and remove coarse particles and debris from soil. The latter should be limited to removing non-sorbing constituents like stones because removal of any sorbing constituents may cause changes in the soil composition, leading to a matrix that does not fully reflect the in situ conditions.
6. Mix the soil and amendment in a 1-L glass jar. Add excess water to achieve ratio listed in Table 3-1 of the *Vernal Pool Pilot Study Work Plan*.
7. Place glass jar into a tumbler and allow batches to mix for 30 days.

Solid-Phase Microextraction Passive Sampling

SPME fibers will be used to measure the porewater PCB concentrations in each test batch. The SPME fibers will be selected, prepared, deployed, and retrieved as stated in the following procedures.

Solid-Phase Microextraction Fiber Selection

The SPME fiber will be obtained from Polymicro Technologies, Inc., in Phoenix, Arizona (part number: 1068020127, FSS500570). It consists of a 1,000-micrometer (µm)-diameter inert glass core coated with 35-µm thick PDMS.

Solid-Phase Microextraction Fiber Preparation

The following procedure should be used to clean and cut SPME fibers:

1. Determine the length of SPME fiber needed in each sample to achieve target detection limits using Equation 2 (see Detection Limit Calculation section).
2. Handle fibers with clean nitrile gloves. All work surfaces should be covered with clean, heavy-duty aluminum foil. Fiber processing should be performed in a manner that minimizes background contamination.
3. Cut the total length of fiber needed into 40-centimeter (cm) sections to fit into a glass cylinder:
    a. Wash the ceramic fiber cutter with water, methanol, acetone, and n-hexane.
    b. Cut the fiber by gently scratching a line on the fiber and then bending along the line.
4. Wash the glass cylinder with high-performance liquid chromatography (HPLC) grade hexane, methanol, and water to remove background contaminants.
5. Transfer the cut fibers to the clean glass cylinder.
6. Wash the fibers with HPLC-grade hexane, acetone, methanol, and water in the following order:
    a. Fill the cylinder approximately one-third with hexane.
    b. Agitate for 24 hours in hexane.
    c. Discard hexane in a waste container.
    d. Completely remove residual hexane by evaporation.
    e. Fill the cylinder approximately one-third with methanol.
    f. Agitate for 24 hours in methanol.

g. Discard methanol and add small volume of water to remove residual methanol (repeat a few times).

h. Fill the cylinder one-third with water and agitate for 24 hours to remove acetone swelled in PDMS polymer.

i. Discard water.

7. Take out a method blank SPME and wrap with foil and store in a heat-sealed Mylar bag.

8. After deployment period of SPME, transfer the method blank SPME in a pre-weighed amber glass VOA vial. Fibers may be cut if needed to fit into the vial. The vial of the method blank SPME will be shipped to an analytical laboratory together with the PRC-spiked reproducibility standards.

Following preparation of the SPME fibers, each PME fiber will need to be spiked with PRCs to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009). The following procedure should be used to spike PRCs onto PME fibers:

1. Place clean SPME fibers in the glass cylinder.

2. Prepare a mixture of methanol and water (approximately 300 mL) in a glass beaker and spike PRCs in the methanol and water mixture. The mixing ratio of methanol and water needs to be adjusted for PCBs to optimize PRC spiking.

3. Add the PRC-spiked methanol and water mixture to the glass cylinder and mix well by gently shaking the glass cylinder. Rinse the beaker with a small volume of methanol and add the rinsate to the glass cylinder. Seal the cylinder.

4. Agitate to equilibrate for 14 days on a shaker table.

5. After 14 days of agitation, transfer the PRC spiking solution to a different container and store container temporarily in a hood.

6. Fill the glass cylinder with HPLC-grade water and leave on a shaker table overnight to remove swelled methanol from PDMS polymer.

7. Remove the fibers from the glass cylinder and blot dry with Kimwipes.

8. Cut to the desired length for deployment.

9. Collect the PRC-loaded passive sampler reproducibility standards in 60-mL amber glass VOA vials (n = 5) and send to an analytical laboratory immediately. Fibers may be cut if needed to fit into the vial.

Solid-Phase Microextraction Fiber Deployment

The following procedure should be used to deploy SPME fibers into the jars:

1. Remove the top cap.
2. Using pre-cleaned metal tweezers and a gloved hand, advance the PRC-spiked SPME fibers into the soil or amended soil.
3. Replace the top cap.
4. Allow the SPME fiber to equilibrate with the vernal pool soil for approximately 1 month.

Solid-Phase Microextraction Fiber Retrieval

The following procedure should be used to retrieve SPME fibers from the test batches:

1. Withdraw the SPME fiber from the jar using pre-cleaned metal tweezers and gloved hand.
2. Wash the SPME fiber with HPLC-grade water and wipe with a damp Kimwipe several times to remove any attached particles, biofilms, and mineral deposits.
3. Wearing a new set of clean gloves, wipe the SPME fiber again with a dry Kimwipe and transfer to a pre-labeled, pre-weighed amber glass VOA vial.
4. Document any color changes on the surface of the SPME fiber. Changes in color may be due to biogeochemical processes in the soil or the presence of nonaqueous-phase liquid (NAPL), which may also be detected by odor. In particular, surface coatings of NAPL can bias results leading to overestimation of freely dissolved concentrations. Note any scratches or other damage to the SPME fiber.
5. Measure the total mass of the glass vial containing the fibers using an analytical balance and convert to the length. The VOA glass vials are wrapped with bubble wrap, placed in a cooler on ice, and shipped to the analytical laboratory as soon as possible. Samples should be stored at 4°C until chemical analyses are initiated.

Data Analysis

Water concentrations (C_W) will be calculated as fiber concentrations (C_{PDMS}) divided by the PDMS-water partition coefficients ($K_{PDMS\text{-}W}$), as shown in Equation 1. Fiber concentrations are defined as the mass of contaminants absorbed by the fiber (nanograms [ng]) to the volume of PDMS (L). PDMS water partition coefficients of target analytes are estimated from correlation with K_{ow} based on literature $K_{PDMS\text{-}W}$ and K_{ow} values of PCBs (Equation 2).

Equation 2

$$\log K_{PDMS-W} = 0.903 \times \log K_{OW} - 0.159$$

where:

$K_{PDMS\text{-}W}$ = PDMS-water partitioning coefficient (L/L)
K_{OW} = octanol-water partitioning coefficient (L/kg)

Log K_{ow} of polycyclic aromatic hydrocarbons (PAHs) will be taken from the U.S. Environmental Protection Agency document on sediment benchmarks for PAHs (EPA 2003). Log coefficient (K) of PCBs are values of Hawker and Connell (1988) adjusted based on a regression with De Bruijn (1989). Log K of polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans are cited from Govers and Krop (1998).

If equilibrium is not achieved as indicated by the PRC dissipation rate, the porewater concentrations will be corrected with the fraction to equilibrium (f_e) with PRC results in conjunction with the external resistance model (Lampert et al. 2015).

Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples should be collected during the ex situ SPME sampling so that contamination is not introduced during the sampling process, including SPME fiber preparation (pre-deployment), deployment, and retrieval. The general QA/QC samples are described below. The number of QA/QC samples per deployment may vary depending on the data quality objectives of the project. In addition, a variety of internal QA/QC checks should be followed in the analytical laboratory.

Solid-Phase Microextraction Fiber Method Blank

An SPME fiber method blank sample should be prepared to assess any residual, analytical background contaminants introduced during cleaning and cutting of SPME fibers. For the method blank, an SPME fiber should be cut and cleaned along with other SPME fibers, wrapped with heavy-duty aluminum foil, and stored in an air-tight bag at 4°C until analysis.

Performance Reference Compound-Loaded Passive Sampler Reproducibility Standard

Low variability of PRC concentrations in the PRC-loaded passive sampler reproducibility standards is key for accurately characterizing the fraction of equilibrium of target analytes. PRC-spiked SPME fibers should exhibit reproducible PRC concentrations. Ghosh et al. (2014) suggests a coefficient of variation (CV) less than 20% is acceptable. After spiking PRCs, three to five of the PRC-loaded passive sampler reproducibility standards should be immediately sent to the analytical laboratory to measure the initial PRC concentrations. The CV should be less than 20% (n = 5) at the EGL and reported otherwise.

Laboratory Replicate Samples

Laboratory replicate samples are defined as independent samples that are prepared as close as possible to one of the treatability testing samples. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. They are required as an indication of the reproducibility of the treatability test to be analyzed in the same fashion as the treatability testing samples.

Temperature Blank

Samples should be maintained at the proper temperature during shipping.

Reproducibility of Solid-Phase Microextraction Analysis

Laboratory replicate samples will be analyzed at a rate of 1 per 20 samples or at least one duplicate per analytical batch. The reproducibility will be determined by calculating relative percent difference, as shown in Equation 3.

Equation 3

$$\boldsymbol{RPD = \frac{(X_1 - X_2) \times 100}{\frac{X_1 + X_2}{2}}}$$

where:

RPD = relative percent difference (%)
X_1 = larger result value (ng/L)
X_2 = smaller result value (ng/L)

Fouling of Solid-Phase Microextraction Sampler

Upon retrieval, any color changes in the sampler should be documented. Color changes may be due to changes in soil biogeochemistry or may indicate the potential that the SPME fibers may have been in contact with NAPL or have biofouling on the surface of the SPME fibers. The use of PRCs may aid in addressing potential artifacts of fouling. If NAPL appears to be present in a soil sample or on an SPME fiber, it should be recorded so that the resulting C_w will be recognized as potentially affected by artifacts.

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Appendix C
Standard Operating Procedure for Bench-Scale Column Testing of Vernal Pool Amendments

Standard Operating Procedure for Bench-Scale Column Testing of Vernal Pool Amendments

Standard Operating Procedure

Bench-Scale Column Testing of Vernal Pool Amendments

Scope and Application

This standard operating procedure (SOP) applies to the testing of vernal pool soils for the purpose of evaluating potential soil amendments. In this method, field-collected vernal pool soils will be added to a column, and then an activated carbon amendment will be added to the soils, simulating the proposed amendment application methods selected. In this method, polydimethylsiloxane (PDMS)-coated glass fiber (solid phase microextraction [SPME] fiber) is inserted into the soil and remains there for sufficient time to allow uptake and equilibration of target analytes in freely dissolved phase with the PDMS coating, as described by Mayer et al. (2000). At equilibrium, porewater concentrations (C_w) can be estimated from the measured concentration absorbed to the PDMS polymer (C_{PDMS}) and the PDMS-water partition coefficient (K_{PDMS-w}), as shown in Equation 1. Performance reference compounds (PRCs) are used to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009).

Equation 1

$$C_w = \frac{C_{PDMS}}{K_{PDMS-w} \times f_e}$$

where:

C_W	=	concentration in porewater (nanograms per liter [ng/L])
C_{PDMS}	=	concentration in PDMS coating (ng/L)
K_{PDMS-w}	=	PDMS-water partitioning coefficient (liter per liter [L/L])
f_e	=	fraction of equilibrium (-)

Procedures outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be documented and reported to the project manager.

Health and Safety Warnings

All laboratory work will be performed in accordance with the Anchor QEA Environmental Geochemistry Laboratory (EGL) Chemical Hygiene Plan (CHP) by approved staff. Approval to work in the EGL requires orientation to laboratory safety procedures and potential hazards under the guidance of the Laboratory Manager, as specified in the CHP.

Personnel Qualifications

Personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP and the *Vernal Pool Pilot Study Work Plan* (Anchor QEA and AECOM 2023), as well as any conditions specified by the U.S. Environmental Protection Agency in review of such plan(s). Field personnel will work under the direct supervision of qualified professionals who are experienced in performing the tasks described herein.

Equipment and Supplies

The following equipment may be necessary to carry out the procedures contained in this SOP (additional equipment may be required depending on conditions):

- Appropriate personal protective equipment and clothing, as defined in the CHP;
- PDMS-coated SPME fiber;[1]
- Acrylic columns (10 centimeters [cm] wide by 50 cm tall);
- Razor blade;
- Water (high-performance liquid chromatography [HPLC] grade);
- Methanol (HPLC grade);
- Hexane (HPLC grade);
- PRC stock solutions (^{13}C-PCB-008, ^{13}C-PCB-031, ^{13}C-PCB-060, ^{13}C PCB-085, ^{13}C-PCB-128, and ^{13}C-PCB-182);
- Sodium azide (NaN_3);
- Pre-cleaned, 40-milliliter amber glass volatile organic analysis (VOA) vials;
- Wash bottles;
- Laboratory shaker table;
- Analytical balance;
- Tweezer;

[1] Standard is Polymicro Technologies, Inc. (Phoenix, Arizona) FSS10001070 (Glass rod OD: 1,000 µm, Fiber OD: 1,070 µm).

- Waterproof markers;
- Alconox, Liquinox, or equivalent;
- Micropipette and tips (10 to 1,000 microliters [µL]);
- Heavy-duty aluminum foil;
- Kimwipes; and
- Mylar bags.

Vernal Pool Soil Collection

1. Vernal pool soil samples will be collected in the field and filled in 1- or 2-liter glass jars with polytetrafluoroethylene (PTFE)-lined caps. Vernal pool soil samples should be thoroughly homogenized. It is recommended to use sufficiently large sample jars to limit variation caused by small-scale heterogeneity. Field duplicate samples will be collected at a rate of 1 per 20 samples to assess field precision and SPME analysis precision. The reproducibility will be determined by calculating relative percent difference. Vernal pool soil jars will be shipped on ice in coolers to the EGL.

2. Upon arrival, the vernal pool soil jars will be stored in a refrigerator until further analysis. The soil jars should be stored in the dark to reduce the chance of photodegradation of target contaminants.

3. A quantity of the biocide sodium azide (NaN_3) should be added to soils to produce a concentration of 100 milligrams per liter water to inhibit biological activity during the experiments.

Bench-Scale Column Setup

The two selected vernal pool soil samples will be thawed and transferred from sample jars into the glass columns. Woody debris, rocks, and large shell fragments will be removed by hand. Eight columns will be prepared per soil sample (16 columns total).

Vernal pool soils will be placed in each column to achieve a soil thickness of 15 cm. For each soil sample, the activated carbon amendment will be added to two columns described as follows:

- Unamended control column: No amendment will be added.
- Thin layer placement: A thin layer of amendment will be added on top of the vernal pool soil such that the top 6 inches of the column contains 5% (by weight) of amendment.

- Amended cover placement (activated carbon and sand mixture): A 6-inch cover layer that is 5% by weight amendment and 95% by weight sand will be placed on top of the column.

- Mixed placement: A thin layer of amendment will be added such that the top 6 inches of the column contains 5% (by weight) of amendment, and then the top 6 inches of the column will be mixed until a uniform texture and color is achieved.

Following construction of the amended soil columns, water will be slowly added to the columns from the top to provide an overlying water column depth of 20 cm. After adding water to the columns, they will be sealed with a PTFE cap. The columns will be kept in the dark except during sampling. After approximately two months, the surface water will be drained out of the lowest sampling port to simulate drying of the vernal pools. After approximately four months, water will be slowly added back into the columns from the top to provide an overlying water column depth of 20 cm.

Bench-Scale Column Solid-Phase Microextraction Passive Sampling

SPME fibers will be used to measure the porewater PCB concentrations in each column on the following schedule:

- First sampling: SPME fibers will be deployed in the column soils approximately one month following construction of the columns. SPME fibers will be allowed to equilibrate with the vernal pool soils for one month prior to being retrieved.

- Second sampling: SPME fibers will be deployed in the column soils approximately three months following construction of the columns (approximately one month following drying of vernal pool soils). SPME fibers will be allowed to equilibrate with the vernal pool soils for one month prior to being retrieved.

- Third sampling: SPME fibers will be deployed in the column soils approximately five months following construction of the columns (approximately one month following rewetting of vernal pool soils). SPME fibers will be allowed to equilibrate with the vernal pool soils for one month prior to being retrieved.

The bench-scale column testing is expected to last a total of approximately six months. SPME fibers will be selected, prepared, deployed, and retrieved as stated in the following procedures.

Solid-Phase Microextraction Fiber Selection

The SPME fiber will be obtained from Polymicro Technologies, Inc., in Phoenix, Arizona (part number: 1068020127, FSS500570). It will consist of an inert glass core 1,000 micrometers (µm) in diameter coated with PDMS 35 µm thick.

Solid-Phase Microextraction Fiber Preparation

The following procedure should be used to clean and cut SPME fibers:

1. Determine the length of SPME fiber needed in each sample to achieve target detection limits using Equation 2 (see Detection Limit Calculation section).
2. Handle fibers with clean nitrile gloves. All work surfaces should be covered with clean, heavy-duty aluminum foil. Fiber processing should be performed in a manner that minimizes background contamination.
3. Cut the total length of fiber needed into 40-centimeter sections to fit into a glass cylinder:
    a. Wash the ceramic fiber cutter with water, methanol, acetone, and n-hexane.
    b. Cut the fiber by gently scratching a line on the fiber and then bending along the line.
4. Wash the glass cylinder with high-performance liquid chromatography (HPLC)-grade hexane, methanol, and water to remove background contaminants.
5. Transfer the cut fibers to the clean glass cylinder.
6. Wash the fibers with HPLC-grade hexane, acetone, methanol, and water in the following order:
    a. Fill the cylinder approximately one-third with hexane.
    b. Agitate for 24 hours in hexane.
    c. Discard hexane in a waste container.
    d. Remove all the residual hexane by evaporation.
    e. Fill the cylinder approximately one-third with methanol.
    f. Agitate for 24 hours in methanol.
    g. Discard methanol and add small volume of water to remove residual methanol (repeat a few times).
    h. Fill the cylinder one-third with water and agitate for 24 hours to remove acetone swelled in PDMS polymer.
    i. Discard water.
7. Take out a method blank SPME, wrap with foil, and store in a heat-sealed Mylar bag.

8. After deployment period of SPME, transfer the method blank SPME in a pre-weighed amber glass VOA vial. Fibers may be cut if needed to fit into the vial. The vial of the method blank SPME will be shipped to an analytical lab together with the PRC-spiked reproducibility standards.

Following preparation of the SPME fibers, each PME fiber will need to be spiked with PRCs to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009). The following procedure should be used to spike PRCs onto PME fibers:

1. Place clean SPME fibers in the glass cylinder.
2. Prepare a mixture of methanol and water (approximately 300 mL) in a glass beaker and spike PRCs in the methanol and water mixture. The mixing ratio of methanol and water needs to be adjusted for PCBs to optimize PRC spiking.
3. Add the PRC-spiked methanol and water mixture to the glass cylinder and mix well by gently shaking the glass cylinder. Rinse the beaker with a small volume of methanol and add the rinsate to the glass cylinder. Seal the cylinder.
4. Agitate to equilibrate for 14 days on a shaker table.
5. After 14 days of agitation, transfer the PRC spiking solution to a different container and store container temporarily in a hood.
6. Fill the glass cylinder with HPLC-grade water and leave on a shaker table overnight to remove swelled methanol from PDMS polymer.
7. Remove the fibers from the glass cylinder and blot dry with Kimwipes.
8. Cut to the desired length for deployment.
9. Collect the PRC-loaded passive sampler reproducibility standards in 60 mL amber glass VOA vials (n = 5) and send to an analytical laboratory immediately. Fibers may be cut if needed to fit into the vial.

Solid-Phase Microextraction Fiber Deployment

The following procedure should be used to deploy SPME fibers samplers into the columns:

1. Remove the top cap.
2. Using pre-cleaned metal tweezers and a gloved hand, advance the PRC-spiked SPME fibers into the soil or amended soil.

3. Replace the top cap.

4. Allow the SPME fiber to equilibrate with the vernal pool soil for approximately one month.

Solid-Phase Microextraction Fiber Retrieval

The following procedure should be used to retrieve SPME fibers from the test batches:

1. Withdraw the SPME fiber from the column using pre-cleaned metal tweezers and a gloved hand.

2. Wash the SPME fiber with HPLC-grade water and wipe with a damp Kimwipe several times to remove any attached particles, biofilms, and mineral deposits.

3. Wearing a new set of clean gloves, wipe the SPME fiber again with a dry Kimwipe and transfer to a pre-labeled, pre-weighed amber glass VOA vial.

4. Document any color changes on the surface of the SPME fiber. Changes in color may be due to biogeochemical processes in the soil or the presence of non-aqueous-phase liquid (NAPL), which may also be detected by odor. In particular, surface coatings of NAPL can bias results leading to overestimation of freely dissolved concentrations. Note any scratches or other damage to the SPME fiber.

5. Measure the total mass of the glass vial containing the fibers using an analytical balance and convert to the length. Wrap the VOA glass vials with bubble wrap, place in a cooler on ice, and ship to the analytical laboratory as soon as possible. Samples should be stored at 4ºC until chemical analyses are initiated.

Data Analysis

Water concentrations (C_w) will be calculated as fiber concentrations (C_{PDMS}) divided by the PDMS-water partition coefficients ($K_{PDMS\text{-}W}$) as shown in Equation 1. Fiber concentrations are defined as the mass of contaminants absorbed by the fiber (nanograms [ng]) into the volume of PDMS (L). PDMS water partition coefficients of target analytes are estimated from correlation with K_{ow} based on literature $K_{PDMS\text{-}W}$ and K_{ow} values of PCBs (Equation 2).

Equation 2

$$\boldsymbol{logK_{PDMS-W} = 0.903 \times logK_{OW} - 0.159}$$

where:

$K_{PDMS\text{-}W}$ = PDMS-water partitioning coefficient (L/L)
K_{OW} = octanol-water partitioning coefficient (L/kg)

Log K_{ow} of polycyclic aromatic hydrocarbons (PAHs) will be taken from the U.S. Environmental Protection Agency document on sediment benchmarks for PAHs (EPA 2003). Log coefficient (K) of PCBs are values of Hawker and Connell (1988) adjusted based on a regression with De Bruijn (1989). Log K of polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans are cited from Govers and Krop (1998).

If equilibrium is not achieved as indicated by the PRC dissipation rate, the porewater concentrations will be corrected with the fraction to equilibrium (f_e) with PRC results in conjunction with the external resistance model (Lampert et al. 2015).

Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples should be collected during the ex situ SPME sampling so that contamination is not introduced during the sampling process, including SPME fiber preparation (pre-deployment), deployment, and retrieval. The general QA/QC samples are described below. The number of QA/QC samples per deployment may vary depending on the data quality objectives of the project. In addition, a variety of internal QA/QC checks should be followed in the analytical laboratory.

Solid-Phase Microextraction Fiber Method Blank

A SPME fiber method blank sample should be prepared to assess any residual, analytical background contaminants introduced during cleaning and cutting of SPME fibers. For the method blank, an SPME fiber should be cut and cleaned along with other SPME fibers, wrapped with heavy-duty aluminum foil, and stored in an air-tight bag at 4°C until analysis.

Performance Reference Compound-Loaded Passive Sampler Reproducibility Standard

Low variability of PRC concentrations in the PRC-loaded passive sampler reproducibility standards is key for accurately characterizing the fraction of equilibrium of target analytes. PRC-spiked SPME fibers should exhibit reproducible PRC concentrations. Ghosh et al. (2014) suggest a coefficient of variation (CV) less than 20% is acceptable. After spiking PRCs, three to five of the PRC-loaded passive sampler reproducibility standards should be immediately sent to the analytical laboratory to measure the initial PRC concentrations. The CV should be less than 20% (n = 5) at the EGL and reported otherwise.

Laboratory Replicate Samples

Laboratory replicate samples are defined as independent samples that are prepared as close as possible to one of the treatability testing samples. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. They are required as an indication of the reproducibility of the treatability test to be analyzed in the same fashion as the treatability testing samples.

Temperature Blank

Samples should be maintained at the proper temperature during shipping.

Reproducibility of Solid-Phase Microextraction Analysis

Laboratory replicate samples will be analyzed at a rate of 1 per 20 samples, or at least one duplicate per analytical batch. The reproducibility will be determined by calculating relative percent difference, as shown in Equation 3.

Equation 3

$$RPD = \frac{(X_1 - X_2) \times 100}{\frac{X_1 + X_2}{2}}$$

where:

RPD	=	relative percent difference (%)
X_1	=	larger result value (ng/L)
X_2	=	smaller result value (ng/L)

Fouling of Solid-Phase Microextraction Fiber

Upon retrieval, any color changes in the sampler should be documented. Color changes may be due to changes in soil biogeochemistry or may indicate the potential that the SPME fibers may have been in contact with NAPL or have biofouling on the surface of the SPME fibers. The use of PRCs may aid in addressing potential artifacts of fouling. If NAPL appears to be present in a soil sample or on a SPME fiber, it should be recorded so that the resulting C_w will be recognized as potentially affected by artifacts.

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Appendix D
Standard Operating Procedure for Measurement of Hydrophobic Organic Contaminants in Sediment Porewater by In Situ Solid-Phase Microextraction

Standard Operating Procedure for Measurement of Hydrophobic Organic Contaminants in Sediment Porewater by In-Situ Solid-Phase Microextraction

Standard Operating Procedure

Measurement of Hydrophobic Organic Contaminants in Sediment Porewater by In-Situ Solid-Phase Microextraction

Scope and Application

This standard operating procedure (SOP) is applicable to the in-situ measurement of porewater concentrations (C_w) of hydrophobic organic contaminants, such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs)/dibenzofurans (PCDFs), and pesticides, using solid-phase microextraction (SPME). In this method, a polydimethylsiloxane (PDMS)-coated glass fiber (solid phase microextraction [SPME] fiber) is inserted into the soil and remains there for sufficient time to allow uptake and equilibration of target analytes in freely dissolved phase with the PDMS coating, as described by Mayer et al. (2000). At equilibrium, porewater concentrations (C_w) can be estimated from the measured concentration absorbed to the PDMS polymer (C_{PDMS}) and the PDMS-water partition coefficient ($K_{PDMS\text{-}w}$), as shown in Equation 1. Performance reference compounds (PRCs) are used to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009).

Equation 1

$$C_w = \frac{C_{PDMS}}{K_{PDMS-w} \times f_e}$$

where:

C_W	=	concentration in porewater (nanograms per liter [ng/L])
C_{PDMS}	=	concentration in PDMS coating (ng/L)
$K_{PDMS\text{-}w}$	=	PDMS-water partitioning coefficient (liter per liter [L/L])
f_e	=	fraction of equilibrium (-)

Procedures outlined in this SOP are expected to be followed. Substantive deviations from the procedures detailed in this SOP will be recorded in the Daily Activity Log or field log book, on a Field Deviation Form, and reported to the field lead or project manager.

Health and Safety Warnings

Field health and safety protocols are addressed in the most current Site Health and Safety Plan (HASP) for the GE-Pittsfield/Housatonic River Site. All laboratory work will be performed in accordance with the Anchor QEA Environmental Geochemistry Laboratory (EGL) Chemical Hygiene Plan (CHP) by approved staff. Approval to work in the EGL requires orientation to laboratory safety procedures and potential hazards under the guidance of the Laboratory Manager, as specified in the CHP.

Personnel Qualifications

Field personnel executing these procedures will have read, be familiar with, and comply with the requirements of this SOP and the *Vernal Pool Pilot Study Work Plan* (Anchor QEA and AECOM 2023), as well as any conditions specified by the U.S. Environmental Protection Agency (EPA) in review of such plan(s). Field personnel will work under the direct supervision of qualified professionals who are experienced in performing the tasks described herein.

Equipment and Supplies

The following equipment may be necessary to carry out the procedures contained in this SOP (additional equipment may be required depending on conditions):

- Appropriate personal protective equipment and clothing, as defined in the HASP and CHP;
- PDMS-coated SPME fiber;[1]
- Razor blade;
- Water (high-performance liquid chromatography [HPLC] grade);
- Methanol (HPLC grade);
- Hexane (HPLC grade);
- PRC stock solutions (^{13}C-PCB-008, ^{13}C-PCB-031, ^{13}C-PCB-060, ^{13}C PCB-085, ^{13}C-PCB-128, and ^{13}C-PCB-182);
- Pre-cleaned, 40-milliliter amber glass volatile organic analysis (VOA) vials;
- Wash bottles;
- Laboratory shaker table;
- Analytical balance;
- Tweezer;
- Waterproof markers;

[1] Standard is Polymicro Technologies, Inc. (Phoenix, Arizona) FSS10001070 (Glass rod OD: 1,000 µm, Fiber OD: 1,070 µm).

- Alconox, Liquinox, or equivalent;
- Micropipette and tips (10 to 1,000 microliters [µL]);
- Heavy-duty aluminum foil;
- Kimwipes; and
- Mylar bags.

Solid-Phase Microextraction Passive Sampling

SPME fibers will be used to measure in-situ porewater PCB concentrations. All SPME fibers will be selected and prepared as stated in the following procedures.

Solid-Phase Microextraction Fiber Selection

The SPME fiber is obtained from Polymicro Technologies, Inc., in Phoenix, Arizona (part number: 1068020127, FSS500570). It consists of an inert glass core 1,000 micrometer (µm) in diameter coated with PDMS 35 µm thick.

Solid-Phase Microextraction Fiber Preparation

The following procedure should be used to clean and cut SPME fibers:

1. Determine the length of SPME fiber needed in each sample to achieve target detection limits using Equation 2 (see Detection Limit Calculation section).
2. Handle fibers with clean nitrile gloves. All work surfaces should be covered with clean, heavy-duty aluminum foil. Fiber processing should be performed in a manner that minimizes background contamination.
3. Cut the total length of fiber needed into 40-centimeter sections to fit into a glass cylinder:
    a. Wash the ceramic fiber cutter with water, methanol, acetone, and n-hexane.
    b. Cut the fiber by gently scratching a line on the fiber and then bending along the line.
4. Wash the glass cylinder with HPLC-grade hexane, methanol, and water to remove background contaminants.
5. Transfer the cut fibers to the clean glass cylinder.
6. Wash the fibers with HPLC-grade hexane, acetone, methanol, and water in the following order:
    a. Fill the cylinder approximately one-third with hexane.

b. Agitate for 24 hours in hexane.

c. Discard hexane in a waste container.

d. Completely remove residual hexane by evaporation.

e. Fill the cylinder approximately one-third with methanol.

f. Agitate for 24 hours in methanol.

g. Discard methanol and add a small volume of water to remove residual methanol (repeat a few times).

h. Fill the cylinder one-third with water and agitate for 24 hours to remove acetone swelled in PDMS polymer.

i. Discard water.

7. Take out a method blank SPME, wrap with foil, and store in a heat-sealed Mylar bag.

8. After deployment period of SPME, transfer the method blank SPME in a pre-weighed amber glass VOA vial. Fibers may be cut if needed to fit into the vial. The vial of the method blank SPME will be shipped to an analytical laboratory together with the PRC-spiked reproducibility standards.

Following preparation of the SPME fibers, each SPME fiber will need to be spiked with PRCs to determine the extent to which equilibrium is achieved and, if necessary, to apply a correction for nonequilibrium (Fernandez et al. 2009). The following procedure should be used to spike PRCs onto SPME fibers:

1. Place clean SPME fibers in the glass cylinder.

2. Prepare a mixture of methanol and water (approximately 300 mL) in a glass beaker and spike PRCs in the methanol and water mixture. The mixing ratio of methanol and water needs to be adjusted for PCBs to optimize PRC spiking.

3. Add the PRC spiked methanol and water mixture to the glass cylinder and mix well by gently shaking the glass cylinder. Rinse the beaker with a small volume of methanol and add the rinsate to the glass cylinder. Seal the cylinder.

4. Agitate to equilibrate for 14 days on a shaker table.

5. After 14 days of agitation, transfer the PRC spiking solution to a different container and store container temporarily in a hood.

6. Fill the glass cylinder with HPLC-grade water and leave on a shaker table overnight to remove swelled methanol from PDMS polymer.

7. Remove the fibers from the glass cylinder and blot dry with Kimwipes.

8. Cut to the desired length for deployment.

9. Collect the PRC-loaded passive sampler reproducibility standards in 60 mL amber glass VOA vials (n = 5) and send to an analytical laboratory. Fibers may be cut if needed to fit into the vial.

Solid-Phase Microextraction Fiber Deployment and Retrieval

In-situ porewater sampling will be conducted by deploying an SPME fiber into the top six inches of soil. The SPME fiber will be allowed to contact the soil for approximately 30 days prior to retrieval. Passive sampler preparation, deployment, and retrieval will be conducted consistent with the methods identified in EPA's *Laboratory, Field, and Analytical Procedures for Using Passive Sampling in the Evaluation of Contaminated Sediments: User's Manual* (EPA 2017).

Each in-situ SPME fiber will be deployed within the top six inches of soil using the following procedures:

- Don personal protective equipment, as required by the HASP.
- Using a GPS system, locate the pre-programmed target coordinates for the sample location.
- If the sample location is a grassed area or an area with overlying material, such as gravel, leaves, roots, or sod (grass and dense root matter below the grass), remove any overlying material that contains no soil or only a negligible amount of soil.
- Place the SPME fiber into a rigid housing (such as a Push Point sampler from MHE Products) that will allow the SPME fiber to be advanced into the soil without breaking but will not impede the porewater from contacting the SPME fiber.
- Advance the SPME fiber by hand into the soil maintaining a vertical orientation. Drive the SPME fiber into the soil to a depth of six inches below the soil interface. If the sampler cannot be advanced to the target depth at the desired location due to subsurface refusal, the total depth achieved will be recorded.
- Attach a label to each SPME fiber with the following information:
  - Site name;
  - Location number;

  - As-deployed depth of SPME fiber; and
  - Date and time of deployment.

- Attach brightly colored flagging tape (or other highly visible material)to the SPME fiber housing to assist in finding the sampler for retrieval.

Following the approximately 30-day deployment period, the SPME fiber will be extracted from the soil, cut (if necessary), placed into the appropriate pre-cleaned jars, and stored at 4ºC (±2ºC) until it can be extracted by the analytical laboratory.

Data Analysis

Water concentrations (C_w) will be calculated as fiber concentrations (C_{PDMS}) divided by the PDMS-water partition coefficients ($K_{PDMS\text{-}W}$) as shown in Equation 1. Fiber concentrations are defined as the mass of contaminants absorbed by the fiber (nanograms [ng]) into the volume of PDMS (L). PDMS water partition coefficients of target analytes are estimated from correlation with K_{ow} based on literature $K_{PDMS\text{-}W}$ and K_{ow} values of PCBs (Equation 2).

Equation 2

$$\boldsymbol{logK_{PDMS-W} = 0.903 \times logK_{OW} - 0.159}$$

where:

$K_{PDMS\text{-}W}$ = PDMS-water partitioning coefficient (L/L)
K_{OW} = octanol-water partitioning coefficient (L/kg)

Log K_{ow} of PAHs will be taken from the EPA document on sediment benchmarks for PAHs (EPA 2003). Log coefficient (K) of PCBs are values of Hawker and Connell (1988) adjusted based on a regression with De Bruijn (1989). Log K of PCDD/PCDF are cited from Govers and Krop (1998). If equilibrium is not achieved as indicated by the PRC dissipation rate, the porewater concentrations will be corrected with the fraction to equilibrium (fe) with PRC results in conjunction with the external resistance model (Lampert et al. 2015).

Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples should be collected during the in-situ SPME sampling so that contamination is not introduced during the sampling process, including SPME fiber preparation (pre-deployment), deployment, and retrieval. The general QA/QC samples are described below. The number of QA/QC samples per deployment may vary depending on the data quality objectives of the project. In addition, a variety of internal QA/QC checks should be followed in the analytical laboratory.

Solid-Phase Microextraction Fiber Method Blank

An SPME fiber method blank sample should be prepared to assess any residual, analytical background contaminants introduced during cleaning and cutting of SPME fibers. For the method blank, an SPME fiber should be cut and cleaned along with other SPME fibers, wrapped with heavy-duty aluminum foil, and stored in an air-tight bag at 4°C until analysis.

Performance Reference Compound-Loaded Passive Sampler Reproducibility Standard

Low variability of PRC concentrations in the PRC-loaded passive sampler reproducibility standards is key for accurately characterizing the fraction of equilibrium of target analytes. PRC-spiked SPME fibers should exhibit reproducible PRC concentrations. Ghosh et al. (2014) suggests a coefficient of variation (CV) less than 20% is acceptable. After spiking PRCs, three to five of the PRC-loaded passive sampler reproducibility standards should be immediately sent to the analytical laboratory to measure the initial PRC concentrations. The CV should be less than 20% (n = 5) at the EGL and reported otherwise.

Field Duplicate Samples

Field duplicate samples are defined as two independent samples that are collected close as possible to each other. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. They are required as an indication of the reproducibility of field measurements.

Temperature Blank

Samples should be maintained at the proper temperature during shipping.

Reproducibility of Solid-Phase Microextraction Analysis

Field duplicate samples will be analyzed at a rate of 1 per 20 samples or at least one duplicate per analytical batch. The reproducibility will be determined by calculating relative percent difference, as shown in Equation 3.

Equation 3

$$\boldsymbol{RPD} = \frac{(\boldsymbol{X_1} - \boldsymbol{X_2}) \times \mathbf{100}}{\frac{\boldsymbol{X_1} + \boldsymbol{X_2}}{\mathbf{2}}}$$

where:

RPD	=	relative percent difference (%)
X_1	=	larger result value (ng/L)
X_2	=	smaller result value (ng/L)

Fouling of Solid-Phase Microextraction Sampler

Upon retrieval, any color changes in the sampler should be documented. Color changes may be due to changes in soil biogeochemistry or may indicate the potential that the SPME fibers may have been in contact with non-aqueous-phase liquid (NAPL) or have biofouling on the surface of the SPME fibers. The use of PRCs may aid in addressing potential artifacts of fouling. If NAPL appears to be present in a soil sample or on an SPME fiber, it should be recorded so that the resulting C_w will be recognized as potentially affected by artifacts.

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Appendix E
Vernal Pool Habitat Inventory Standard Operating Procedure

Vernal Pool Habitat Inventory Standard Operating Procedure

Vernal Pool Habitat Inventory Procedure

The initial steps in the baseline survey assessment of vernal pools will consist of: (1) compiling the existing information collected during previous surveys on relevant attributes of the selected vernal pools, namely, flora, topography, bottom sediment/soil composition, in-pool physical structure, surrounding land use, and relationship/proximity to other vernal pools; and (2) collecting additional information on those relevant attributes, as well as data on the general water and soil chemistry of the vernal pools, as described in the following paragraphs. The additional field survey data are described herein and will be recorded on Form VP-1 (Attachment 1).

To estimate percent cover of tree canopy, woody shrubs, and herbaceous plants (including sedges, rushes, and grasses) within each vernal pool, an acceptable vegetative survey procedure will be conducted (e.g., see Barbour et al. 1999 for acceptable methods). This may consist of randomly placed monitoring plots, line-intercept sampling, or other standard accepted method. One acceptable method is line-intercept sampling. This involves stretching a 100-foot tape across the pool from shoreline to shoreline and tallying the total length of each cover type that projects through that plane over the line (Barbour et al. 1999). Percent cover is then calculated as a function of total length of a particular cover type divided by the total length of the transect. Two to three transects will be measured across each pool and the dominant plant species within each of the various plant strata will be recorded, including observations of any invasive plant. Pools less than 0.2 acre in size will have two transects, and pools between 0.2 and 1.0 acre will have three transects. Plant species will be identified using the U.S. Department of Agriculture Natural Resources Conservation Service Plants Database (USDA Plants Database) for the region (i.e., Massachusetts) (USDA NRCS 2022) or other acceptable source (e.g., Native Plant Trust).

During the vegetation sampling, water depth (or evidence of water depths depending upon the seasonal conditions) will be measured or determined at 2- to 5-foot intervals (depending on how flat or steep the topography is) along a transect from shoreline to shoreline to map the relative topography within each pool. The start and stop location of each transect will be surveyed by GPS and points with corresponding water depths will be plotted along that line in GIS. For pools that are too deep to allow running the transects from shoreline to shoreline, data will be collected up to approximately 3-foot depths. Significant topographic or physical features within the pool (e.g., large hummocks or windthrown trees) that are not intercepted by the transect will be characterized and located by GPS.

Vernal pool soil composition will be categorized in the field using a hand auger and/or tile spade shovel and will generally be inspected to a depth of 18 to 24 inches. One profile description per pool will be documented between the outer edge and deepest part of the pool. The information collected for each soil profile will include soil horizons, depth, texture, color, and the presence or absence of redoximorphic features (mottles and other features). Colors of the soil matrix and mottles will be identified using Munsell Soil Color Charts. All hydric soil determinations will be based on criteria established in *Field Indicators for Identifying Hydric Soils in New England* (NEIWPCC 2018) and guidance in the 2012 U.S. Army Corps of Engineers Regional Wetland Manual.

In-pool physical structure other than woody shrubs (which will be measured during the line-intercept sampling) will be quantified within each pool. Observations of coarse woody debris, large boulders, or exposed root wads will be located via GPS during the pool inspection with the approximate length, width, and/or diameter recorded in inches. Fine woody debris will be estimated as a total percent cover of the entire pool area.

The habitat and land use conditions surrounding each vernal pool will be characterized as shown on Form VP-1 (Attachment 1). This will include characterizing the approximate percentage of different habitat cover types within both the 100-foot buffer around the vernal pool (the vernal pool envelope) and 100- to 750-foot zone (the critical terrestrial habitat) (using designations from Calhoun and Klemens 2002). The landscape setting of the pool will also be characterized, noting whether it is a discrete depression in the floodplain or part of a larger wetland and also the juxtaposition with other vernal pools to assess the potential for vernal pool network factors.

In addition, data will be collected on the general water and soil chemistry of each vernal pool (excluding polychlorinated biphenyl [PCB] concentrations, which will be determined separately). The collection of the general water and soil chemistry data will involve the measurement of pH, temperature, conductivity, and dissolved oxygen in the water using a YSI field meter (or similar), and the collection and analysis of soil samples for pH and organic carbon (or organic matter) content.[1] A composite sample of the top 8 inches of soil from three locations within the pool will be mixed in a stainless-steel bowl and placed into jars for laboratory analysis of pH and organic carbon (or organic matter) content.

References

Arcadis, 2013. *Field Sampling Plan/Quality Assurance Project Plan*. Revision 5. Prepared for General Electric Company. Revised July 2013.

Barbour, M.G., J.H. Burk, W.D. Pitts, F.S. Gilliam and M.W. Schwartz. 1999. Terrestrial Plant Ecology, Third Edition. Benjamin Cummings Publishing Company. USA.

[1] For this purpose, soil samples will be collected using the procedures in General Electric Company's current *Field Sampling Plan/Quality Assurance Project Plan* (Arcadis 2013).

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Attachment 1: Form VP-1: Vernal Pool Characterization Form[2]

Pool ID ____________________________
Observers: __________________________
Location of vernal pool: ____
Survey date(s): ____
Coordinates (decimal degrees)

Latitude(X): _____________________________ Longitude (Y): _________________________

A. General Vernal Pool Characteristics

1. Landscape setting (check all that apply)
    [ ] Discrete depression in floodplain
    [ ] Pool part of a larger wetland
    [ ] Pool part of a pool network (____ pools within 1,000 feet)
2. Vernal pool condition (describe any recent modification to the pool, including natural changes such as beaver impoundments): ____
___________ ____
3. Describe the aquatic resource type(s) in pool (e.g., forested, scrub-shrub, etc.)
____
4. Pool canopy cover (%): _____________
5. Predominant substrate (e.g., mineral soil, organic matter): _____________________
6. Pool measurements:
    a. Approximate pool dimensions at maximum inundation condition (include units):
    Length ______________ Width: __________________ Area: _________________
    b. Maximum water depth at deepest point (include units): _______________________
7. Hydrology
    a. Estimated month pool dries, or if never: ______________
    b. Inlet/outlet (none, temporary, permanent): _____________
8. Water quality (clear, high turbidity, high algal content, tannic): ________________

B. Plant Community: Inventory tree and vine data obtained in a 30' radius plot; shrubs in a 15' radius plot; and herbaceous plant data in a 5' radius plot.

% Cover: ________ Trees (> 20') ________ Shrubs (< 20') ________ Woody vines ________ Mosses ________ Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each stratum or any amount of an invasive plant species; "*" designates a dominant plant species for the stratum):

Strata	Plant Species	Strata	Plant Species
_______	________________________________	_______	________________________________
_______	________________________________	_______	________________________________
_______	________________________________	_______	________________________________

[2] Adapted from USACE New England Division Vernal Pool Characterization Form

_______ ______________________________ _______ ______________________________

_______ ______________________________ _______ ______________________________

_______ ______________________________ _______ ______________________________

Strata: T=Tree, S=Shrub, L=Liana (vine), H=Herb (Includes grasses, herbs, pterophytes [ferns], lichens, woody seedlings, and mosses)

Identify any federal or state-listed threatened, endangered, or other rare species in or adjacent to the vernal pool: ____

C. Soil/Substrate Composition

______________________________ Soil Survey Unit

______________________________ Drainage Class

______________________________ Texture (upper part)

______________________________ Depth

Representative Soil Pit Log

Soil Horizon	Depth (inches)	Color	Soil Texture	Mottling

D. In-Pool Physical Habitat Structure

Describe physical structure in the vernal pool which may contribute to vernal pool habitat functions:

[ ] Coarse woody debris _____% cover: Describe ______________________________

[ ] Fine woody debris _______% cover: Describe ______________________________

[ ] Shrub and herbaceous stems _____%: Describe ______________________________

[ ] Windthrown trees and/or root wads _____%: Describe __________________________

[ ] Hummocks _____%: Describe ______________________________________

[ ] Other _____%: Describe ____

E. Surrounding Land Use

1. Vernal Pool Envelope (0-100 feet from pool edge)[3]

[ ] Forested _____%

[ ] Shrub _____%

[ ] Open (e.g., meadow, agriculture, golf course) _____%

[ ] Developed (includes area beyond barriers) _____%

[3] As defined by Calhoun and Klemens (2002)

2. Critical Terrestrial Habitat (100-750 ft from pool edge)[4]

[ ] Forested _____%

[ ] Shrub _____%

[ ] Open (e.g., meadow, agriculture, golf course _____ %

[ ] Developed (includes area beyond barriers) ___% _

F. General Water and Soil Chemistry Water Quality

Water:

[ ] pH _____

[ ] Temperature _______

[ ] Conductivity _______

[ ] Dissolved Oxygen______

Soil:

[ ] pH _____

[ ] Organic Carbon Content _______

[4] As defined by Calhoun and Klemens (2002)