FINAL PROPOSED REMEDIAL ACTION PLAN
OPERABLE UNIT 5 (OU-5)
FORT MEADE, MARYLAND
FORMER DEFENSE REUTILIZATION AND MARKETING OFFICE SITE
January 2026

INTRODUCTION AND PURPOSE

This ***Proposed Remedial Action Plan (PRAP)*** provides information to facilitate public involvement in the environmental remedy selection process at the Operable Unit 5 (OU-5 or Site) Study Area at Fort Meade, Maryland (FMMD) (FGGM identifier: FGGM-07). This PRAP presents a summary of the ***Remedial Investigation (RI)*** findings and the remedial alternatives evaluated in the ***Focused Feasibility Study (FFS)***, as well as other reports, including addenda to the RI (Arcadis U.S., Inc. [Arcadis] 2023a) and FFS (Arcadis 2023b). The RI and FFS, associated addenda, and this PRAP were prepared in accordance with the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)*** as amended, 42 United States Code § 9601 et seq. and the ***National Oil and Hazardous Substances Pollution Contingency Plan (NCP)***, 40 Code of Federal Regulations (C.F.R.) § 300.430, and were reviewed by the United States (U.S.) Environmental Protection Agency (USEPA; "lead regulator") and the Maryland Department of the Environment (MDE; "support regulator"). Figure and table references are bolded throughout this document. In addition, bolded and italicized terms are defined in the "Glossary of Terms" section.

The public is encouraged to comment on the preferred remedial alternative presented in this PRAP as well as the other remedial alternatives considered in the FFS (Arcadis 2023b). Information about how to submit comments may be found in the "Community Participation" section of this PRAP. The U.S. Army (the lead agency) will finalize and present the remedial alternative selected by the U.S. Army and USEPA for the OU-5 Study Area in a ***Record of Decision (ROD)***. The final selection, however, will not take place until after the public comment period for this PRAP has ended. All significant comments will be considered and responded to in the ***Responsiveness Summary*** section of the ROD. Pertinent information regarding the public meeting and comment period, and the remedial alternatives considered, and the availability to the public of other documents that are referenced in the PRAP, are provided in the adjacent text boxes.

Based on investigation activities conducted including the quantitative ***Human Health Risk Assessment (HHRA)*** presented in the RI (Arcadis 2023a), tetrachloroethylene (PCE) and carbon tetrachloride (CCl_4) were detected in groundwater at concentrations greater than their respective maximum contaminant levels (MCLs). Remedial alternatives selected to address groundwater contamination and potential exposure to future hypothetical residents were screened as part of the FFS (Arcadis 2023b). The proposed remedial alternatives to address ***constituents of concern (COCs)*** in groundwater, PCE and CCl_4, as presented in the FFS (Arcadis 2023b) are presented in this PRAP.

Relevant documents used in the preparation of this PRAP are listed in the "References" section found at the end of this document.

IMPORTANT DATES AND LOCATIONS

Public Meeting: January 29, 2026, 7:00 p.m. via Teams

The U.S. Army will hold a public meeting to explain the PRAP and all Response Actions presented in the FFS. Oral and written comments will also be accepted at the meeting. The meeting will be held virtually. Invitation to the virtual meeting can be requested by contracting Katrina Harris at kharris@bridgeconsultingcorp.com.

Public Comment Period: January 29 – March 2, 2026

The U.S. Army will accept written comments on the PRAP during the public comment period.

The Administrative Record, containing information used in selecting the preferred Remedial/Response Action, is available for public review at the following location:

Anne Arundel County Public Library
Odenton Regional Library
1325 Annapolis Rd.
Odenton, Maryland 21113

Additional information is maintained at the following location:

Fort Meade Environmental Division Office
4216 Roberts Avenue, Second Floor
Fort Meade, Maryland 20755

Remedial Alternatives

- Alternative 1: No Action.
- Alternative 2: Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)
- Alternative 3: In-situ Enhanced Bioremediation (ISEB), MNA, and LUCs
- Alternative 4: Dynamic Groundwater Recirculation (DGR), LUCs, and Long-Term Monitoring (LTM) of Groundwater

SITE BACKGROUND

FMMD is located between Washington, D.C. and Baltimore, Maryland, in Anne Arundel County (County), Maryland (**Figure 1**). USEPA placed FMMD on the ***National Priorities List*** on July 22, 1998, after an evaluation of contamination due to past storage and disposal of hazardous substances. A Federal Facility Agreement was signed by the U.S. Army, USEPA, Department of the Interior (DOI), and Architect of the Capitol (AOC) in June 2009 defining the mechanisms and roles of each organization in the restoration of the installation.

OU-5 is located in the southwestern portion of the installation (**Figure 2**) and historically consisted of the Former Defense Reutilization and Marketing Office (DRMO) Salvage Yard (also referred to as the Former Defense Property Disposal Office Salvage Yard), and the Covered Storage Facility (CSF). The Former DRMO Salvage Yard was an open storage and disposal area for automobiles, drums, water heaters, heating units, dry cleaning machines, spent batteries, transformers, pipe, and scrap metal. DRMO Salvage Yard operations ceased in 1994 in preparation for the construction of the CSF. In 1995, several buried drums were discovered during excavation of the paved area south of the planned CSF location. A removal effort followed when the drums and underlying soil were sampled and analyzed for waste oils and solvents. A total of 263 drums, two transformers, one high voltage box, and 3,500 tons of contaminated soil were removed. Soils were excavated until it was demonstrated that the residual concentration of polychlorinated biphenyls (PCBs) in soil was less than 50 mg/kg, exceeding the current industrial and residential cleanup levels. CSF construction resumed after the drum removal, but a portion of the pavement remained uncovered to facilitate investigation of the contaminated soils and groundwater in the drum disposal area. After completion of an investigation, OU-5 was completely paved with a concrete cap and the operation of the DRMO resumed, including the newly constructed CSF (USACE 1997).

SITE CHARACTERISTICS

The OU-5 Study Area currently consists of the following components: The CSF to the north (currently the Defense Logistics Agency [DLA] facility), which is used for administrative and warehouse purposes, a concrete paved area to the south that is used for the handling of materials being sold for scrap, three Stormwater Management (SWM) ponds located directly east of the CSF, and the contaminated groundwater plume that extends under the AOC and the Patuxent Research Refuge (PRR).

The current and future land uses of FMMD have been categorized into community, industrial, troop (e.g., Basic Combat Training complexes), professional/institutional, ranges/training, and residential (ATKINS 2013). According to the Fort Meade Real Property Master Plan, the OU-5 Study Area is categorized into current and future troop and professional/institutional use. The OU-5 Study Area is not anticipated to be transferred out of FMMD control. Residential land use is not likely; however, all potential current and future access and activities were considered in evaluating the source-receptor interactions at the OU-5 Study Area. The groundwater contamination associated with the Former DRMO extends to the southeast, across State Highway 32 to the northeastern portion of the Base Realignment and Closure (BRAC) parcel that was transferred from FMMD to the DOI in the early 1990s. The BRAC parcel is administered as the North Tract of the PRR and is not expected to be transferred out of DOI control.

OU-5 is situated within an outcropped portion of the Lower Patapsco Aquifer (LPA). The LPA is a drinking water aquifer dipping to the southeast and is approximately 100 to 140 feet thick. LPA groundwater flows southeast from the Former DRMO facility located on FMMD property, across the AOC parcel bordering Route 32, into the DOI PRR and continues towards the Little Patuxent River, located approximately 1-mile southeast of the Former DRMO. There are no wells used for private or public drinking water supply within OU-5, the AOC property, or the PRR. Residential communities are located to the southeast of the PRR. Based on well location data received from Anne Arundel County in 2019, the nearest potential receptors for drinking water in the LPA are located at least 2,500 feet southeast of the volatile organic compound (VOC) plume associated with OU-5. LPA groundwater in the Former DRMO at FMMD operates under unconfined (water-table) conditions but becomes confined under the Middle Patapsco Clay and Upper Patapsco Aquifer in the down-gradient area on the PRR land parcel. The groundwater-surface water interaction at the Little Patuxent River is not well defined. It is likely that shallow groundwater in the LPA discharges into the Little Patuxent River, but deeper groundwater in the same aquifer may underflow the Little Patuxent River.

Volatile Organic Compounds in Groundwater

The COCs requiring the actions presented in this PRAP (CCl_4 and PCE) are discussed below. **Table 1** lists Site-related COCs as defined in the RI (Arcadis 2023a) and the FFS (Arcadis 2023b)

The comprehensive data evaluated in the RI (Arcadis 2023a) includes numerous rounds of groundwater samples collected between 1990 and 2018. The most recent groundwater samples were collected from a subset of monitoring wells in November 2024 to characterize current conditions and aid with remedial design. The groundwater samples collected in November 2024 were analyzed for volatile organic compounds (VOCs).

As presented in the RI (Arcadis 2023a) and FFS (Arcadis 2023b), groundwater sampling confirmed the presence of a PCE plume that emanates from the Former DRMO facility and extends onto DOI property on the PRR (**Figure 3**). The current upgradient extent of the PCE plume is defined by monitoring wells DRMO-MW200 and DRMO-

MW42. The PCE plume extends towards the southeast with monitoring wells DRMO-MP-302, DRMO-MP-311, DRMO-MP-315, and DRMO-MP-318 residing along the plume axis (**Figure 3**). DRMO-MP320 serves as the furthest downgradient sentinel monitoring well.

The PCE plume extends southward from the Former DRMO Salvage Yard (on-post) into the PRR, with PCE observed in groundwater at concentrations exceeding its MCL of 5 micrograms per liter (µg/L), as shown on **Figure 3**.

CCl_4 was identified above its MCL at one monitoring well (DRMO-MW7) during the December 2016/March 2017 monitoring event. This monitoring well is located approximately 300 feet east of the PCE plume. During the November 2024 sampling event, CCl_4 was not-detected above its laboratory limit of detection at this location and the only detection observed was at DRMO-MP315 at an estimated concentration of 0.42 µg/L which is below its MCL.

A groundwater elevation isocontour map for the OU-5 Study Area that incorporates groundwater data collected during the November 2024 sampling event is presented on **Figure 4**. Groundwater flow direction within the OU-5 Study Area is to the southeast, which is consistent with regional groundwater flow direction, generally following the structural dip of the formation.

Historical activities at the Former DRMO facility were identified as source areas for the PCE and CCl_4 detected in OU-5 groundwater.

Inorganics in Groundwater

Chromium was identified as a constituent of potential concern (COPC) in the HHRA conducted as part of the RI (Arcadis 2023a). Comparison of total chromium concentrations from the OU-5 Study Area to total concentrations in background wells demonstrated that chromium concentrations are consistent with background concentrations. Therefore, chromium was not retained as a COC in groundwater at the OU-5 Study Area. Further discussion of chromium in groundwater can be found in the Summary of Site Risks section of this PRAP.

Vapor Intrusion

VOCs in shallow groundwater can volatilize to cause vapor intrusion (VI) into indoor air; thus, the nature and extent of indoor air exposures was evaluated via VI sampling. VI sampling was conducted in buildings located within 100 feet of the monitoring well where a MCL exceedance (5.0 µg/L) of CCl_4 was observed during the RI, in accordance with USEPA guidance (USEPA 2015).

Building 68 was selected for sampling based on its proximity (less than 100 feet) to well DRMO-MW7, where a groundwater concentration of 5.63 µg/L of CCl_4,) which exceeds the MCL of 5 µg/L, was identified. An inspection of Building 68 was conducted in April 2019 to evaluate preferential soil gas migration pathways (e.g., pipe penetrations, foundation types) and determine potential indoor sources of VOCs. Two rounds of VI samples including sub-slab air (i.e., vapor present under building foundation), indoor air, and ambient outdoor air, were collected in July (cooling season) and November (heating season) 2019 to evaluate for seasonal variation. The OU-5 Study Area VI sample locations are displayed on **Figure 5**.

The VI dataset evaluated as part of the RI (Arcadis 2023a) comprises 20 samples collected from eight locations (two ambient air, two outdoor air, and four indoor sub-slab) across heating and cooling seasons (winter and summer). The VOCs chloromethane, chloroform, and trichloroethene (TCE) were detected in samples collected during the heating season, while PCE was detected in both heating and cooling seasons.

Sediment

Historical investigations conducted at the OU-5 SWM ponds did not sufficiently evaluate the potential presence of PCBs and Target Analyte List (TAL) metals in sediment. Based on regulatory comments and data gap sampling for VOCs, as presented in the RI (Arcadis 2023a), sediment samples were collected in 2018 from the OU-5 SWM ponds to assess potential contamination and environmental risk. Sample locations are shown on **Figure 5**. To determine COPCs, the maximum detection concentrations for compounds detected in sediment were compared with the lower of (1) the residential soil ***Regional Screening Level (RSL)*** from USEPA for a target cancer risk of 1E-06 and (2) the residential soil RSL from USEPA for a target noncancer hazard of 0.1, both adjusted upward by a factor of 10 (i.e., multiplied by the RSL) to account for the expected lower exposure by human receptors to sediment compared with soil (USEPA 2019b). Soil RSLs were used as a surrogate for sediment, as no sediment RSLs are available.

The three sediment samples collected in 2018 as part of the RI (Arcadis 2023a) were analyzed for TCL VOCs, semi-volatile organic compounds, PCBs, and TAL metals. Based on review of the analytical data against the adjusted USEPA RSL values for residential soil (USEPA 2019b), only chromium was retained as a COPC. Chromium in sediment ranged from a maximum concentration of 7.43 milligrams per kilogram in sample OU5-SED1 to a minimum concentration of 4.35 milligrams per kilogram in sample OU5-SED3. All samples exceeded the screening toxicity value for chromium.

SCOPE AND ROLE OF THE RESPONSE ACTION

Based on the results of the RI (Arcadis 2023a), response actions are required at the OU-5 Study Area to address COCs identified in groundwater at concentrations above their respective MCLs. The Site is one of many OUs at FMMD in the CERCLA and Installation Restoration Program process. FMMD has been pursuing installation cleanup for all contaminant release sites that result in unacceptable risks by adhering to the CERCLA process with the engagement of federal and state regulators as well as the public.

SUMMARY OF THE SITE RISKS

As presented in the RI (Arcadis 2023a), baseline risk assessments were conducted to determine the current and future effects of contaminants on human health and the environment in accordance with 40 C.F.R.C.F.R. § 300.430(d)(4) and USEPA guidance.

The baseline risk assessments provided an estimated level of risk that the OU-5 Study Area would pose to human health and the environment if no action were taken to address on-Site contamination.

Two separate risk assessments were performed as part of the baseline risk assessment - an HHRA and a ***Screening Level Ecological Risk Assessment (SLERA)***. Both risk assessments were conducted in accordance with guidance developed by USEPA, supplemented as necessary with related guidance developed by MDE. The HHRA was performed to estimate the current and future potential risks to human receptors from potential exposure to constituents in environmental media at the OU-5 Study Area using standard USEPA risk assessment methods. The SLERA evaluated the potential for unacceptable risk to ecological receptors that may be exposed to sediment in the OU-5 SWM ponds.

A summary of the groundwater COCs and the basis for this determination is presented in **Table 1**.

Table 1
Summary of Groundwater Constituents of Concern

Groundwater COC	Basis of Groundwater COC Determination	Reference Document
Carbon Tetrachloride (CCl_4)	MCL	RI (Arcadis 2023a)
Tetrachloroethene (PCE)	MCL	RI (Arcadis 2023a)

Notes:
COC = Constituent of Concern
MCL = Maximum Contaminant Level; analytes defined as COC if concentration exceeds the MCL.
RI = Remedial Investigation

The HHRA and SLERA (Arcadis 2023a, Appendix I) concluded that there are no unacceptable risks to human health or the environment associated with potential exposures to contaminants in soil, surface water, sediment, or volatile vapors at the OU-5 Study Area. Chromium was identified as a potential risk driver in groundwater. However, following a background concentration analysis, chromium concentrations in groundwater were found to be naturally occurring. Further discussion of numerical risk estimates can be found in the HHRA section of this PRAP.

Based on exceedances of the MCLs for CCl_4 and PCE in groundwater during the comprehensive sampling event performed during the RI, it is the lead agency's current judgment that the Preferred Alternative identified in this PRAP, or one of the other active measures considered in the PRAP, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

To account for uncertainties associated with the VI modeling performed as part of the HHRA as well as exposures to COPCs in media which were not accounted for in current and future land uses evaluated in the HHRA (i.e., exposure to chromium in SWM pond sediment and PCBs in soils underlying the concrete pavement at the Former DRMO facility), LUCs mitigating these potential exposures will be included in the proposed remedial alternatives for OU-5. These LUCs will address potential VI concerns for new or repurposed buildings and prevent exposures to chromium in sediment and PCBs in soil; further information can be found in the Summary of Remedial Alternatives Section of this PRAP. Refer to the HHRA Section below for information regarding the exposure scenarios considered under current and future land uses.

Human Health Risk Assessment

The HHRA evaluated current and future potential exposures to compounds identified as part of RI activities in groundwater, indoor air, sub-slab gas, and sediment at the OU-5 Study Area. As presented in the text box (on page 5), the HHRA follows the four-step process presented in USEPA guidance: (1) hazard identification (conservative risk-based screening to identify COPCs in different media), (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization.

Based on current and possible future use of the various areas that comprise the OU-5 Study Area, conservative exposure assumptions were used in the exposure assessment to construct a reasonable maximum exposure (RME) scenario for each defined receptor. While USEPA considers the RME scenario protective because most individuals will not be subject to all the conditions that comprise the RME scenario, RME scenarios overestimate potential exposures to the majority of individuals who have more typical (or average) intake of environmental media. Accordingly, if potential health risks are found to be acceptable for a hypothetical reasonably maximum exposed receptor, then potential risks would be acceptable for any actual exposures that may occur with less frequency and/or intensity of contact.

Current and future uses in the OU-5 Study Area are limited to troop and professional/institutional use. According to the Fort Meade Real Property Master Plan, residential land use is not planned at the OU-5 Study Area; however, a hypothetical future residential scenario was evaluated in the HHRA. The northeastern portion of the BRAC parcel where the deep PCE groundwater plume has migrated onto is owned by DOI and is currently used as a wildlife refuge. The land use of the PRR as a wildlife refuge is not anticipated to change.

The source of water supply for FMMD consists of six groundwater wells drawing water from the Patuxent Aquifer, which is not impacted by the LPA groundwater at OU-5. The groundwater pumped to provide water to FMMD is subjected to water treatment consisting of multi-media filtration for turbidity, iron and manganese prior to

public distribution (Fort Meade Environmental Division 2007).

As part of the HHRA, potentially relevant exposure pathways associated with sediment were evaluated and conservatively included incidental ingestion and direct dermal contact for current/future trespassers. The HHRA did not evaluate future residential and worker exposure scenarios for sediment. Since the OU-5 SWM Ponds are enclosed within a fenced area with a locked gate and signage stating "No Trespassing Allowed" exists, routine workers and construction workers are not expected to be exposed to chromium in sediment. Hypothetical future residents are also not expected to be exposed to chromium in sediment because the SWM Ponds are assumed to be removed during any future Site development for residential use. If future Site development occurs prior to the removal of the OU-5 SWM Ponds, the existing fencing and signage would remain to limit future residential receptor access to chromium in sediment.

Exposure to VOCs in indoor air from VI was quantified using both modeled concentrations from groundwater and sub-slab soil gas concentrations and also using measured indoor air concentrations. Indoor air concentrations were modeled from groundwater and sub-slab soil gas using two different types of models (the more conservative vapor intrusion screening level [VISL] models and alternative screening level Johnson and Ettinger VI models). The risk-based screening levels (soil-gas VISLs and indoor air VISLs) were derived by USEPA to be protective of industrial exposures (the defined current use of the OU-5 Study Area) at a target excess lifetime cancer risk of 1E-06 and a target hazard quotient of one (USEPA 2019a). The risk-based screening levels were compared to concentrations of the VOCs detected in sub-slab soil gas, indoor air, and ambient air samples to calculate the cancer risk and non-cancer hazard quotient from groundwater and sub-slab soil gas concentrations.

The list of the current exposure scenarios for the OU-5 Study Area evaluated in the HHRA included:

- Current routine workers exposed to volatile COPCs via VI from groundwater/sub-slab gas in indoor air via inhalation.
- Current trespassers potentially exposed to COPCs in sediment via incidental ingestion, dermal absorption, and inhalation of particulates and/or volatile COPCs in sediment.

WHAT IS HUMAN HEALTH RISK AND HOW IS IT CALCULATED?

A CERCLA baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a Site in the absence of any actions to control or mitigate these releases under current- and future-land uses. A four-step process is utilized for assessing Site-related human health risks for RME scenarios.

Hazard Identification: In this step, the COCs in various media at the OU-5 Study Area (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, an RME scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of Site risks. Exposures are evaluated based on two types of adverse health effects: the potential risk of developing cancer and the potential for non-cancer health hazards.

The likelihood of an individual developing cancer is expressed as a probability. For example, a 1E-04 cancer risk means a one-in-ten-thousand excess (i.e., additional) cancer risk for an individual; or stated another way, one additional cancer may be seen in a population of 10,000 people as a result of exposure to Site contaminants under the conditions explained in the Exposure Assessment. The NCP defines the acceptable exposure for an individual as a lifetime excess cancer risk in the range of 1E-04 to 1E-06 (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk).

For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the hazard quotients (HQs) that impact the same target organs. An HQ is calculated by taking the ratio of the individual exposure level for a Site-related contaminant as compared to its corresponding reference dose. The reference dose is the dose at which no adverse health effects are anticipated to occur. Therefore, an HQ of one or less indicates that no adverse non-cancer effects are anticipated and, when the HQs for COCs impacting the same target organ are summed, an HI of one or less also indicates that no adverse non-cancer effects are anticipated to occur.

The list of the future exposure scenarios for the OU-5 Study Area evaluated in the HHRA included:

- Future routine workers exposed to COPCs in groundwater via ingestion as well as volatile COPCs via VI from groundwater/sub-slab soil gas to indoor air via inhalation.
- Future construction workers exposed to volatile COPCs via inhalation of outdoor air and trench air.
- Hypothetical future residents potentially exposed to COPCs via ingestion of drinking water as well as volatile COPCs via VI from groundwater/sub-slab gas in indoor air via inhalation.

The HHRA (Arcadis 2023a, Appendix I) concluded that there are no unacceptable risks to human health or the environment associated with potential exposures to contaminants in soil, surface water, sediment, or volatile vapors at the OU-5 Study Area based on excess lifetime cancer risks within or below the USEPA's acceptable risk range of 1E-06 to 1E-04 and non-cancer hazard estimates below the target hazard index (HI) of 1. The estimated total cancer risk for the future lifetime resident was 2E-04, (above the acceptable risk range) with chromium in groundwater as a risk driver; however, chromium concentrations in groundwater were determined to be related to background conditions. Therefore, chromium was not retained as a Site-related COC. Excluding chromium, the estimated excess lifetime cancer risk for the future resident was 4E-05, within the USEPA's acceptable risk range (Arcadis 2023a, Appendix I). Further information regarding the background statistical analysis for chromium in groundwater can be found in Appendix H of the RI (Arcadis 2023a), as well as in the Site-to-Background Comparison for Chromium in Groundwater section below.

Site-to-Background Comparison for Chromium in Groundwater

A statistical evaluation of selected inorganic constituents, including chromium, was conducted to evaluate whether inorganic constituents present in the OU-5 Study Area groundwater were related to naturally occurring processes or anthropogenic activity. Chromium was identified as a potential risk driver in groundwater for the future resident in the HHRA.

As no facility-wide background data is available at FMMD, historical analytical data collected from upgradient monitoring wells were used for background analysis. The OU-5 Study Area dataset included 24 groundwater samples collected between 2016 and 2017 and analyzed for the full suite of TAL metals. The statistical methodology used to compare the OU-5 Study Area and background data sets for selected elements, including chromium, in unfiltered groundwater consisted of the nonparametric two-sample Wilcoxon Rank Sum (WRS) test and box plots. A WRS test is a statistical analysis used to compare two independent datasets and can be generated using USEPA software (USEPA 2022). Analytes that failed the WRS test were subjected to geochemical evaluation to determine if the elevated concentrations could be explained by natural processes.

As presented in Appendix H to the RI Report (Arcadis 2023a) chromium was estimated to be a risk driver for potential future ingestion of groundwater used as a water supply (for a future resident). The evaluation of OU-5 Study Area and background upgradient total chromium concentrations in groundwater demonstrated that concentrations of total chromium were found to be naturally occurring. Total chromium concentrations were evaluated in the Site-to-background-comparison due to the limited availability of dissolved chromium data in the designated background wells.

Chromium in the OU-5 Study Area groundwater data set passed the WRS test, indicating agreement between the OU-5 Study Area and background distributions for this inorganic constituent.

Screening Level Ecological Risk Assessment

The three SWM Ponds are located immediately to the east and southeast of the DRMO CSF and west and northwest of Building 68. Ecological receptors, including aquatic biota and mammalian and avian wildlife, are expected to be present in the three SWM Ponds.

As there are no promulgated sediment screening criteria for organisms potentially exposed to ***constituents of potential ecological concern (COPECs)*** in sediment, a weight-of-evidence approach was used. The more sediment benchmarks exceeded by a COPEC concentration, the greater the potential for adverse effects. For this SLERA, an exceedance threshold of more than 50 percent was used to assess the biological significance of direct-contact sediment toxicity.

Based on this screening-level assessment, concentrations of mercury, Aroclor 1254, and butyl benzyl phthalate in sediment have the potential to adversely affect aquatic invertebrates living in these sediments. However, given the small size of the SWM Ponds (0.9 acres in total), application of realistic area use factors for wildlife would result in no adverse effects predicted for wildlife species. Additionally, the SWM Ponds function as settling basins for runoff from nearby impervious surfaces (i.e., parking lots), and it is unknown if the COPECs identified are directly related to historical activities at the Site or from nearby runoff. Regardless of actions taken at the Site, runoff will continue to accumulate chemicals into SWM Pond sediments. The SLERA recommended no further action to address potential ecological concerns of COPECs in SWM Pond sediment.

Deep groundwater is the only impacted media on PRR property resulting from historical Army activities at the Former DRMO facility. Impacted groundwater in the LPA on PRR property is under confined conditions, as the Middle Patapsco Clay outcrops over the LPA in the down-gradient portion of the PRR. The extent of the PCE plume has not reached the Little Patuxent River, confirmed by down-gradient sentinel well (DRMO-MP320) (see **Figure 3**). There is no complete exposure pathway for

groundwater to ecological receptors at the down-gradient portion of the PRR.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are a general description of what the cleanup will accomplish to ensure that conditions are protective of human health and the environment. RAOs are based on human health and environmental factors, which are considered in the formulation and development of remedial alternatives. Such objectives are developed based on the criteria outlined in 40 C.F.R. § 300.430(e)(2)(i) of the NCP and Section 121(d)(2) of CERCLA, which require the establishment of RAOs specifying contaminants and media of concern, potential exposure pathways, and remediation goals.

RAOs were developed in such a way that attainment of these goals will result in the protection of human health and achievement of identified ***Applicable or Relevant and Appropriate Requirements (ARARs)***, as required by 40 C.F.R. § 300.400(g).

The RAOs for the OU-5 Study Area are:

- Prevent human exposure to groundwater and associated vapors until contaminant mass in groundwater is reduced below Site Cleanup Levels (SCLs) for PCE and CCl_4 which allow unlimited use and unrestricted exposure to groundwater.
- Eliminate or minimize the potential for future human exposure with sediment in the retention ponds that are located adjacent to the DLA facility.

The preferred remedial alternative presented in this PRAP will achieve the RAOs and will serve as the final remedial action for the OU-5 Study Area in accordance with requirements under CERCLA. However, selection of the final action will not occur until consideration of all public comments generated during the public comment period associated with this PRAP. The remedial alternative set forth in this PRAP will complete the remedial action at the OU-5 Study Area.

Basis for the Establishment of Remedial Action Objectives

A statutory goal of the ***Defense Environmental Restoration Program*** is for the U.S. Army to take appropriate actions to investigate and, where necessary, address releases of hazardous substances or pollutants to the environment. The U.S. Army is required to select remedies that attain a degree of cleanup that assures protection of human health and the environment.

It is the U.S. Army's current judgment that the preferred remedial alternative identified in this PRAP will address potential health risks and continue to provide protection to human health and the environment from actual or threatened releases of hazardous substances into the environment.

Identification of Constituents of Concern and Site Cleanup Levels

As presented in the RI (Arcadis 2023a), the HHRA determined that there are no current risks to human health associated with groundwater, soil, surface water, and sediment media at the OU-5 Study Area. Therefore, this PRAP focuses solely on the COCs identified in groundwater based on exceedances of the drinking water standards (MCLs) during the comprehensive sampling event completed during the RI. Soil, surface water, and sediment will not be included in further discussion.

Under CERCLA, a COC is defined as a Site-related contaminant that has been determined, following the completion of the RI and baseline risk assessment, to pose an unacceptable risk to human health and/or the environment.

As detailed in the FFS (Arcadis 2023b), the list of Site-related COCs detected in groundwater at concentrations exceeding drinking water standards (MCLs) during the comprehensive sampling event performed during the RI are presented below:

- CCl_4
- PCE

The list of COCs above will be addressed under the OU-5 Study Area CERCLA remedial action proposed in this PRAP. Groundwater samples collected as part of the LTM program detailed in the subsequent sections for remedial alternatives for groundwater will include analysis of the COCs.

Summary of Site Cleanup Levels

SCLs for groundwater will be based on MCLs in accordance with the requirements of CERCLA and identified ARARs. The groundwater SCLs are shown in **Table 2**.

Table 2
SCLs for Groundwater COCs

COC	SCL (µg/L)
Carbon Tetrachloride (CCl_4)	5 (MCL)
Tetrachloroethylene (PCE)	5 (MCL)

Notes:
µg/L = microgram per liter
MCL = Maximum Contaminant Level
SCL = Site Cleanup Level

SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives to address groundwater contamination at the OU-5 Study Area were developed and evaluated in the FFS (Arcadis 2023b) based upon the results of a preliminary technology evaluation and screening. The following remedial technologies were evaluated during the FFS:

- No Action
- MNA

- LUCs (Institutional and Engineering Controls [EC])
- In-Situ Treatment (Enhanced Bioremediation)
- Ex-Situ Treatment (Groundwater Extraction and Granular Activated Carbon Treatment and Reinjection)

All of these technologies identified during the screening phase detailed in FFS (Arcadis 2023b) were retained and further refined into the remedial alternatives listed below. The remedial alternatives are described below with their respective estimated ***Capital Costs***, estimated cost for ***operation and maintenance (O&M)*** activities, and an estimate of the ***Present Worth Costs*** for the remedial alternatives.

Development of alternatives is completed with consideration of CERCLA Section 121(b), which states a clear preference for remedies that are permanent, cost-effective, and involve the treatment of hazardous substances to reduce their volume, toxicity, or mobility. Section 121(b) also states a preference against off-Site transport and disposal of hazardous substances without such treatment. When a remedy is selected that results in hazardous substances left on-site at levels which will not allow unlimited use and unrestricted exposure, Section 121(c) requires that the lead agency review the protectiveness of the remedy every five years.

Remedial Alternatives

Alternative 1: No Action

Estimated Capital Cost: $0
Estimated O&M Cost Over 30 Years: $0
Estimated Present Worth Cost: $0

Under Alternative 1, no remedial action of any kind would be implemented. This alternative would not adequately control the hazards posed by exposure to groundwater; nor would it reduce groundwater COC concentrations below SCLs at the OU-5 Study Area in a reasonable timeframe. However, according to the NCP, the no action alternative must be evaluated to establish a baseline for comparison of the remaining alternatives, even though this alternative would not be a viable option at the OU-5 Study Area. See 40 C.F.R. § 300.430(e)(6).

Alternative 2: Monitored Natural Attenuation and Land Use Controls

Estimated Capital Cost: $96,800
Estimated O&M Cost Over 30 Years: $2,856,200
Estimated Present Worth Cost: $2,953,000

Alternative 2 would control potential risk to human health via MNA and LUCs.

The four general categories of LUCs evaluated or already in use at FMMD and applicable to the OU-5 Study Area which provide layers of protection, are as follows: governmental controls, proprietary controls, permitting, and informational devices, which assist with the management and implementation of LUCs. Most of these measures are already in place as elements of required institutional procedures at FMMD. These elements include requirements to obtain dig permits from the Directorate of Public Works for any intrusive activity at FMMD; Master Plan Regulations; FMMD Geographic Information System Database; FMMD Access Restrictions; and U.S. Army Military Construction Program. These controls have been developed with consideration of all reasonably anticipated land uses at the FMMD; these include parcels in the OU-5 Study Area classified for troop and professional/institutional land use. LUCs already in place at FMMD as part of required installation procedures (e.g. dig permitting, Master Plan regulations, access restrictions) would be maintained and enhanced as part of Alternative 2. LUCs would be implemented to eliminate exposure to contaminants in groundwater, soil vapor, SWM pond sediment, and soils underlying the concrete pavement at the Former DRMO facility as follows:

- Groundwater: LUCs would be implemented to prevent exposure to COCs at concentrations above the MCL in groundwater. LUCs at the OU-5 Study Area would include prohibition of drilling wells for potable use on the Site, as well as a permitting process that would trigger a review of possible drilling prohibitions. Shallow groundwater use is currently restricted at FMMD, and the restriction on the installation of potable wells is managed through the permitting process for intrusive work overseen by the Fort Meade Directorate of Public Works. This process would be effective in preventing exposure to groundwater contamination as long as the property remains under Army-ownership. If, in the future, this property is transferred to private ownership before RAOs are attained, then deed restrictions and notifications would have to be incorporated as part of the property transfer. This is unlikely, as the property is intended for use by the U.S. Army for the foreseeable future.
- Soil Vapor: LUCs would be implemented to account for uncertainties in VI modeling conducted during the HHRA and address VI concerns for new or repurposed buildings at OU-5. A combination of administrative and institutional LUCs implemented under Alternative 2 such as signage (e.g., no digging) and permitting requirements, would control potential VI exposure by preventing the construction of new or repurposed buildings located within or adjacent to the delineated OU-5 plume without completion of a VI assessment. ECs, such as provisions requiring the installation of vapor barriers in the OU-5 Study Area, would also be considered as part of LUCs for newly constructed buildings.
- Sediment: LUCs would be implemented to prevent unauthorized access and future exposure to concentrations of chromium in sediment exceeding the USEPA RSL values for residential soil (USEPA 2019b), as future residential and worker exposures to sediment were not considered in the HHRA. LUCs administered at the OU-5 Study Area would prevent unauthorized access to the sediments in the retention

ponds located adjacent to the current DLA facility via routine inspection and upkeep of existing fence-lines and the installation of signage to describe Site restrictions.

- Soil: LUCs would be implemented to prevent exposure to residual concentrations of PCBs exceeding the current industrial and residential cleanup levels in soils underlying the concrete cap at the Former DRMO facility (soils exceeding 50 mg/kg PCBs were excavated and disposed off-Site during facility construction). The FMMD dig permitting process would prohibit unauthorized intrusive activities. Routine inspections would be performed to document that the existing concrete pavement remains in place as a component of the OU-5 Study Area LUCs.

Additionally, the LUCs would include a residential land use restriction to mitigate exposures to contaminants in all media. Annual inspections would be performed at the OU-5 Study Area and down-gradient PRR land parcel to establish that all LUCs are in effect, to confirm that the land use of the Site has not changed, and to confirm through visual inspection that groundwater is not in use. The CERCLA 5-year review process and the annual land use certifications/inspections would be used to document that continuing land use is industrial and the remedy remains protective. Additionally, the ROD would specify notification requirements to USEPA should land use changes be planned which may impact the integrity of the remedy. The U.S. Army owns and controls the property and there are no plans to close FMMD or transfer the property comprising OU-5 in the future. The northeastern portion of the BRAC parcel where the deep PCE groundwater plume has migrated onto is owned by DOI and is currently used as a wildlife refuge. The land use of the PRR as a wildlife refuge is not anticipated to change. LUCs would be implemented using Department of Defense guidance and USEPA guidance as agreed programmatically between the U.S. Army and USEPA and detailed in the forthcoming ROD (Department of Defense 2001). **Figure 6** displays the boundary of the OU-5 LUC area. **Figure 6** displays key areas of the OU-5 Study Area where enforceable LUCs described above are applicable.

Alternative 2 includes a sampling component to monitor COCs in groundwater. A groundwater sampling program would be established to monitor the continued decline in COC concentrations in groundwater due to natural attenuation factors. Monitoring would include groundwater sampling for COCs and additional MNA parameters, at existing monitoring wells located within the OU-5 Study Area and downgradient PRR land parcel. The existing groundwater data indicate that aquifer conditions at the OU-5 Study Area are favorable for natural attenuation and the attenuation mechanisms are primarily dilution and dispersion. Natural attenuation is expected to address PCE concentrations in groundwater at OU-5, and routine groundwater monitoring would be performed to confirm plume stability and document anticipated reductions in concentration over time. Based on review of the available OU-5 PCE groundwater data (including the November 2024 sampling event) groundwater cleanup timeframes calculated using linear regression analysis at six monitoring wells (DRMO-MP302p3, DRMO-MP305p2, DRMO-MP311, DRMO-MP311, and DRMO-MW200) located along the PCE plume centerline (**Figure 3**), projected an average timeframe to achieve SCL of 5 µg/L in approximately 24 years. CCl_4 was not detected at concentrations exceeding its SCL during the November 2024 sampling event. The OU-5 MNA sampling program would be detailed in the forthcoming remedial design.

Alternative 3: In-situ Enhanced Bioremediation, Land-Use Controls, and Long-Term Monitoring of Groundwater

Estimated Capital Cost: $18,228,800
Estimated O&M Cost Over 30 Years: $1,690,300
Estimated Present Worth Cost: $19,919,000

In addition to the LUCs and establishment of a groundwater monitoring program discussed in the previous section (Alternative 2), Alternative 3 would also include routine injection of carbon substrates into the aquifer to enhance or optimize the biodegradation of VOCs in groundwater and to degrade chlorinated contaminants into less toxic substances.

ISEB consists of injection of a food source, typically emulsified vegetable oil, which can be metabolized by microorganisms to stimulate the degradation of PCE and to nontoxic end products via removal of chlorine atoms. The food source is a carbon amendment to the groundwater which would need to be maintained until the bioremediation process sufficiently degrades the contaminants.

The organic carbon injectate would be introduced to the target in-situ treatment area via groundwater injection well transects, or “biowalls.” Due to the depth of contaminated groundwater, an estimated 160 permanent injection wells would be drilled to an average depth of 160 feet below ground surface across seven biowall transects. The transects would be installed perpendicular to the direction of groundwater flow across the PCE plume core. The conceptual locations of these biowall transects and mapped plume boundaries are presented on **Figure 7**. Based on estimated flushing rates and groundwater travel time estimates for the OU-5 Study Area, up to 10 injection events would be performed. Injections would be required approximately three years apart to sustain carbon levels between each barrier.

Prior to the first injection event, baseline groundwater monitoring would be performed. Post-injection performance monitoring would then be conducted on a semi-annual basis. LTM would be conducted on an annual basis after the completion of the performance monitoring program to assess the COC concentrations.

ISEB would address VOC concentrations in groundwater at the OU-5 Study Area and down-gradient PRR land parcel, and semi-annual groundwater monitoring would

be performed to confirm groundwater plume stability, monitor PCE, PCE daughter products (e.g., TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride), and chloroform, and document anticipated COC concentration reductions over time.

Key ARARs which may apply to Alternative 3 include regulations relating to intrusive work performed in the vicinity of the floodplain or protected wetlands, as well as regulations pertaining to underground injection control. ARARs would also include consideration of the down-gradient PRR land parcel which is a wildlife refuge requiring adherence to additional regulations.

Alternative 4: Dynamic Groundwater Recirculation, Land Use Controls, and Long-Term Monitoring of Groundwater

Estimated Capital Cost: $1,270,400
Estimated O&M Cost Over 30 Years: $6,745,000
Estimated Present Worth Cost: $8,016,000

Alternative 4 consists of installation and operation of a DGR system combined with the LUCs and groundwater monitoring program summarized as part of Alternatives 2 and 3, The installation and operation of a DGR system would capture impacted groundwater along the OU-5 Study Area PCE plume core, treat the impacted groundwater using granular activated carbon (GAC), and re-inject treated groundwater back into the sub-surface further down-gradient to enhance contaminant flushing (i.e., dilution of PCE concentrations via injection of treated groundwater). Captured groundwater would be treated via liquid phase GAC. Alternative 4 would include the installation of a series of extraction and injection wells along with below-grade conveyance piping, manifolds, and water treatment infrastructure housed in a system enclosure. Conceptual locations of extraction/injection wells along with surface and subsurface infrastructure associated with the DGR system at the OU-5 Study Area are displayed on **Figure 8**.

A total of two extraction wells and five injection wells would be installed along two transects running perpendicular to groundwater flow. The extraction well transect would span a linear length of approximately 280 feet. The two extraction wells would be constructed with 50-foot screens to straddle the zone of the aquifer with the highest COC concentrations. The extraction wells would be installed approximately 1,500 feet southeast of a paved access road present in the OU-5 Study Area.

The five injection wells would be installed along a transect spanning approximately 1,100 feet located hydraulically upgradient of five existing monitoring wells: DRMO-MP-312 through DRMO-MP-316 (**Figure 8**). These five existing monitoring wells would be utilized to monitor performance of the DGR system and expected decrease in COC concentrations over time. The five injection wells would be constructed with 50 feet screens and screened at depths between approximately 115 and 165 feet below ground surface.

Preliminary calculations, based on an OU-5 Study Area groundwater model and on-going operational experience gathered via management of a Hydraulic Containment System at the nearby Operable Unit 4 site (which was designed to remediate a PCE plume in the same hydrogeologic aquifer), have determined an extraction rate of approximately 60 gallons per minute (gpm) would be necessary to establish a hydraulic barrier in the LPA. Therefore, the estimated recovery rate for each extraction well would be approximately 30 gpm. Recovered groundwater would be treated using GAC and re-injected down-gradient into the LPA at an approximate rate of 12 gpm per injection well). LTM would be conducted until SCLs are attained.

To the extent practical, renewable power sources (e.g., solar power) would be evaluated for the equipment compound as part of the remedial design. Final components of the system (e.g., well locations, transect lengths, extraction, and injection rates) would be refined as part of the remedial design.

Performance monitoring for VOCs, PCE, and PCE daughter products (e.g., TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride), and chloroform and water quality parameters would be conducted on a semi-annual basis. Performance monitoring objectives include confirmation that the DGR system is capturing the flux of VOCs and that concentrations within the plume are declining over time.

Key ARARs which may apply to Alternative 4 include regulations relating to intrusive work performed in the vicinity of the floodplain or protected wetlands, as well as regulations pertaining to well construction and underground injection control. ARARs would include consideration of the down-gradient PRR land parcel which is a wildlife refuge requiring adherence to additional regulations.

EVALUATION OF REMEDIAL ALTERNATIVES

The NCP requires the evaluation of remedial alternatives both individually and against one another using the nine evaluation criteria, in order to select a remedy [40 C.F.R. § 300.430(e)(9)]. These criteria are as follows:

Threshold Criteria – Must be met for the remedial alternative to be eligible for selection as a remedial option.

- Overall Protection of Human Health and the Environment – Determines whether an alternative adequately protects human health and the environment by eliminating, reducing, or controlling exposures to protective levels.
- Compliance with ARARs – Evaluates whether the remedial alternative meets the requirements set forth in Federal and State environmental or facility siting statutes and regulations, or whether a waiver is justified. Identification of ARARs is dependent on Site risks and the hazardous substances present at the Site, Site characteristics, the Site location, and the

actions selected to remediate the Site. Thus, requirements may be chemical-, location-, or action-specific. Please refer to Section 2.4 of the FFS (Arcadis 2023b) for a more detailed discussion of ARARs which will be formalized in the forthcoming ROD.

Primary Balancing Criteria – Used to weigh major trade-offs among remedial alternatives.

- Long-term Effectiveness and Permanence – Considers the ability of a remedial alternative to maintain protection of human health and the environment over time.
- Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment – Evaluates a remedial alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
- Short-term Effectiveness – Considers the length of time needed to implement a remedial alternative and the risks the remedial alternative poses to workers, residents, and the environment during implementation.
- Implementability – Considers the technical and administrative feasibility of implementing the remedial alternative, including factors such as the relative availability of goods and services.
- Cost – Includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of a remedial alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of –30 to +50 percent.

Modifying Criteria – May be considered to the extent that information is available prior to the start of the public comment period but can be fully considered only after public comment is received on this PRAP.

- State/Support Agency Acceptance – Considers whether the State agrees with the U.S. Army's analysis and recommendations, as described in the RI, FFS, and PRAP.
- Community Acceptance – Considers whether the local community agrees with the U.S. Army's analysis and preferred remedial alternative. Comments received on the PRAP are an important indicator of community acceptance.

Comparative Analysis of Remedial Alternatives

This section summarizes the comparative analysis of remedial alternatives for the OU-5 Study Area that were presented in the FFS (Arcadis 2023b). The remedial alternative comparative analysis is summarized in **Table 3**.

Overall Protection of Human Health and the Environment

Alternative 1 takes no action and is therefore not protective of human health and the environment. Alternative 2, 3, and 4 would be protective by reducing the risk of encountering COCs by human receptors though implementation, inspection, and management of LUCs.

Compliance with ARARs

Alternatives 2, 3 and 4 would meet the potential location, action, and chemical specific ARARs identified for the OU-5 Study Area. Alternative 1 takes no action and therefore does not meet ARARs.

Long-Term Effectiveness and Permanence

Alternatives 2, 3, and 4 would provide a permanent and effective remedy since LUCs ensure protection for human health by preventing exposure to COCs while degradation occurs. Based on COC trend analysis evaluating analytical data collected to date at the OU-5 Study Area including the November 2024 sampling event, Alternative 2 may take up to 24 years to reduce COC concentrations to levels that allow unlimited use and unrestricted exposure. For both Alternative 3 and Alternative 4, the highest concentrations would be addressed by ISEB or DGR, which could shorten the timeframe to achieve SCLs for groundwater.

The reasonably anticipated land use for the OU-5 Study Area is troop and professional/institutional, and the OU-5 Study Area is not anticipated to be transferred out of FMMD control. The current land use of the PRR as a wildlife refuge is not anticipated to change. Residential land use is not likely at OU-5 or the PRR. Alternatives 2, 3, and 4 would be effective at preventing unacceptable risk of residential exposure, providing better effectiveness than No Action.

Reduction of Toxicity, Mobility, and Volume through Treatment

Alternative 4 provides the greatest reduction of toxicity, mobility, and volume by reducing concentrations of COCs via groundwater extraction, and treatment. Additionally, Alternative 4 would reduce the mobility of COCs by achieving hydraulic capture (i.e., preventing further downgradient migration of COCs). Alternative 3 would provide reduction of toxicity and volume of COCs but may be limited by aerobic aquifer conditions and complications associated with chemical degradation. Alternative 2 has demonstrated effectiveness to reduce toxicity and volume of COCs in groundwater via MNA, confirmed by concentration reductions observed during the most recent sampling event completed in November 2024 compared to historical COC concentrations. The common process included in Alternative 2 (natural attenuation) would still be present for Alternative 1, however; Alternative 1 does not establish a monitoring program to confirm reductions of toxicity, mobility, or volume. Conversely, both Alternative 3 and Alternative 4 include the establishment of LTM program to monitor anticipated concentration

reductions as part of active treatment (i.e. ISEB and DGR).

Short-Term Effectiveness

Alternatives 3 and 4 would both present short-term impacts to the community or workers during intrusive activities; however, any potential exposures would be eliminated by using appropriate health and safety procedures as well as compliance with ARARs (e.g., dust control measures during installation of remediation wells). By implementing active remedial technologies for contaminants in groundwater, Alternatives 3 and 4 could achieve RAOs faster than Alternative 2. However, the area with concentrations of COCs exceeding the respective SCLs will be addressed by LUCs implemented under Alternatives 2, 3, and 4. Therefore, human exposures to COCs will be prevented and there is no difference in short-term effectiveness between Alternatives 2, 3, and 4. Unlike Alternative 1, Alternatives 2, 3, and 4 rely on LUCs to provide the protection for human health in the short-term.

Implementability

All alternatives are technically feasible, though Alternatives 3 and 4 present substantial logistical challenges compared to Alternative 2. Alternative 3 may prove logistically difficult to implement due to the large volume of water required for injection of carbon amendment and the installation of numerous injection well transects in a heavily wooded area with limited access roads and access restrictions due to military range activities. Alternative 4 offers logistical implementability challenges due to similar access restrictions as Alternative 3, as well as the installation of semi-permanent electrical infrastructure and sub-surface utility piping on the PRR land parcel. Alternative 2 is the most implementable, and would not involve active remedial technologies requiring placement of above ground and subsurface infrastructure in an established wildlife refuge.

Cost

Although there is no cost associated with Alternative 1, there is also no potential risk reduction or effectiveness provided by this alternative should groundwater use be considered under future land use scenarios. Alternative 2 ($2,953,000) mitigates current and future risk posed by groundwater and sediment under current and future land-use scenarios via LUCs and MNA. Both Alternative 3 ($19,919,000) and Alternative 4 ($8,016,000) would result in the permanent destruction of VOCs in groundwater and would reduce the toxicity, mobility, and volume of contaminated groundwater. Alternatives 3 and 4 are technically feasible, however they present increased costs and implementability challenges compared to Alternative 2.

State/Support Agency Acceptance

Approval of the preferred remedial alternative presented in this PRAP by MDE is expected. Regulatory approval will be further evaluated in the ROD following the public comment period.

The actions implemented under the preferred remedial alternative will achieve state ARARs including substantive provisions of State of Maryland permitting requirements.

Community Acceptance

The U.S. Army has approved the release of this PRAP to the public. Community acceptance of the preferred remedial alternative will be evaluated at the conclusion of the public comment period. A summary of significant comments, criticisms and new relevant information submitted during the public comment period and the Lead Agency's response to each issue will be presented in the Responsiveness Summary section of the ROD.

Table 3
Comparative Analysis of Remedial Alternatives for the OU-5 Study Area

	Alternative 1 **No Action**	**Alternative 2** **MNA and LUCs**	**Alternative 3** **ISEB, LUCs, and LTM of Groundwater**	**Alternative 4** **DGR, LUCs, and LTM of Groundwater**
Evaluation Criteria	**Description**	**Description**	**Description**	**Description**
Overall Protection of Human Health and the Environment	• The no-action alternative provides no control of exposure to impacted groundwater at the OU-5 Study Area and no reduction in potential future risk to human health or the environment.	• Protective of human health by implementation of LUCs to prevent contact with COCs in groundwater, SWM pond sediments, soils underlying the Former DRMO facility concrete pavement, and associated groundwater vapors. • Protective of human health via natural attenuation processes that would reduce contaminant concentrations over time.	• Active remediation would improve groundwater quality at the OU-5 Study Area. • LUCs would prevent contact with COCs in groundwater, stormwater pond sediments, soils underlying the Former DRMO facility concrete pavement, and associated groundwater vapors.	• Active remediation would improve groundwater quality at the OU-5 Study Area. • LUCs would prevent contact with COCs in groundwater, stormwater pond sediments, soils underlying the Former DRMO facility concrete pavement, and associated groundwater vapors.
Compliance with ARARs	• ARARs are not met by the No Action alternative.	• Complies with Chemical, Location, and Action specific ARARs.	• Complies with Chemical, Location, and Action specific ARARs.	• Complies with Chemical, Location, and Action specific ARARs.
Long-Term Effectiveness and Permanence	• Not effective or permanent now or in the future.	• LUCs would achieve long-term effectiveness because the U.S. Army would control and maintain LUCs at FMMD for the foreseeable future. • Does not involve active remediation of COCs, so the effectiveness may be lower compared to active remedial alternatives, however degradation of parent compounds achieved via MNA processes is permanent. • MNA has demonstrated effectiveness to reduce COC concentrations in groundwater at the OU-5 Study Area and establishes a means to monitor the anticipated reductions in COC concentrations and ensure plume stability. • Aquifer conditions are favorable for the MNA component of the remedy based on COC trend analysis performed using the November 2024 groundwater analytical results.	• LUCs would achieve long-term effectiveness because the U.S. Army would control and maintain LUCs at FMMD for the foreseeable future. • Active treatment performed as part of Alternative 3 would treat groundwater and provide an effective and permanent resolution for COC hazards to human health and the environment. • The LTM component of the remedy establishes a means to monitor COCs trends.	• LUCs would achieve long-term effectiveness because the U.S. Army would control and maintain LUCs at FMMD for the foreseeable future. • Active treatment performed as part of Alternative 4 would treat groundwater and provide an effective and permanent resolution for COC hazards to human health and the environment. • The LTM component of the remedy establishes a means to monitor COC trends.
Reduction of Toxicity, Mobility, and Volume through Treatment	• No change in toxicity, mobility, or volume under the No Action alternative.	• Toxicity and volume are expected to reduce via MNA processes as degradation products are less toxic than parent compounds.	• Toxicity and volume of COCs may be reduced through treatment via biological degradation of COCs to nontoxic end products. However, this alternative does not reduce mobility of COCs.	• Toxicity, mobility, or volume of COCs may be reduced through treatment by reducing the volume of COCs on-Site and using hydraulic capture to reduce mobility of COCs (i.e., preventing further migration of contaminants).
Short-Term Effectiveness	• No short-term impacts because no action would be taken. • Risks to human health or the environment would not increase in the short-term.	• No short-term impacts to community or facility. • No short-term impacts to workers. • Short-term human health potential exposures mitigated through LUCs.	• Limited short-term impacts to community or facility. • Limited short-term impacts to workers, potential exposure can be eliminated by using appropriate health and safety procedures. • Short-term environmental impacts or potential disruptions to ecosystems (i.e. tree clearing) are anticipated.	• Limited short-term impacts to community or facility. • Limited short-term impacts to workers, potential exposure can be eliminated by using appropriate health and safety procedures. • Short-term environmental impacts or potential disruptions to ecosystems (i.e. tree clearing) are anticipated.
Implementability	• The No Action alternative does not implement a remedy at the Site.	• This alternative is technically and administratively feasible.	• This alternative uses proven technologies and is feasible to implement. • Implementability challenges include: o High number of injection wells. o Large volume of water needed for remedy. o Night work required due to range activity and restrictions. o Significant forest clearing in an established wildlife refuge required for drilling rig access.	• This alternative uses proven technologies and is more feasible to implement compared to Alternative 3. • Implementability challenges include: o Night work required due to range activity and restrictions. o Moderate forest clearing required for drilling rig access. o Installation of electrical infrastructure and sub-surface utility piping in an established wildlife refuge.
Cost	• There are no capital or overhead costs to implement the No Action alternative because no action will be taken.	• Capital: $96,800 • O&M: $2,856,200 • Present Worth: $2,953,000	• Capital: $18,228,80 • O&M: $1,690,300 • Present Worth: $19,919,000	• Capital: $1,270,400 • O&M: $6,745,000 • Present Worth: $8,016,000
State/Support Regulatory Acceptance	• TBD	TBD	• TBD	TBD
Community Acceptance	• TBD	TBD	• TBD	TBD

Notes:
ARAR = Applicable or Relevant and Appropriate Requirements
COC = Constituent of Concern
LUC = Land Use Control
MCL = Maximum Contaminant Level
O&M = Operation and Maintenance
RAO = Remedial Action Objective
TBD = To Be Determined

SUMMARY OF THE PREFERRED ALTERNATIVE FOR THE OU-5 STUDY AREA

The results of the HHRA, as presented in the RI (Arcadis 2023a) indicate there are no current and future unacceptable health effects associated with groundwater and indoor air under exposure scenarios for routine workers, construction workers, trespassers, and future residents. Sediment exposure is assumed to be non-significant under current exposures. Additionally, the proposed LUCs would address any possible future exposure scenarios to indoor air, sediment in the SWM ponds, and soil under the concrete cover at the Former DRMO facility.

Due to exceedances of the promulgated MCLs for PCE and CCl_4 in groundwater, action is warranted under CERCLA to restore the aquifer to unlimited use and unrestricted exposure. The Preferred Alternative is recommended based on the best balance among the selection criteria for addressing contamination at the OU-5 Study Area.

The Preferred Alternative for the OU-5 Study Area:

- Alternative 2: MNA and LUCs.

Based on the results of the comparative analysis and detailed evaluation presented in the FFS (Arcadis 2023b), the U.S. Army proposes Alternative 2 as the preferred alternative for remediation of contaminants at the OU-5 Study Area. The proposed Preferred Alternative for the OU-5 Study Area would meet the RAOs and satisfy the evaluation criteria, as described in the "Evaluation of Remedial Alternatives" section of this PRAP.

Implementation of Alternative 2 includes establishing a sampling program to monitor the anticipated COC reductions in groundwater at the OU-5 Study Area and downgradient PRR land parcel. The implementation of LUCs would also prevent exposure to groundwater and associated vapors, sediment in the SWM ponds, soils underlying the Former DRMO pavement, and prevent future residential land use. Groundwater monitoring will be performed until the aquifer has been returned to unlimited use and unrestricted exposure through attainment of SCLs in groundwater.

It is the U.S. Army's judgement that the Preferred Alternative identified in this PRAP, or one of the other active measures considered in the PRAP, is necessary to protect public health or the environment from actual or threatened releases of hazardous substances into the environment. It should be noted that the Preferred Alternative can be changed in light of new information or in response to public comments as described below.

Based on available information, the U.S. Army believes the preferred remedial alternative meets the threshold and primary balancing criteria, and is expected to satisfy applicable modifying criteria. The U.S. Army expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b): (1) to be protective of human health and the environment; (2) to comply with ARARs; (3) to be cost-effective; (4) to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and (5) to satisfy the preference for treatment as a principal element.

COMMUNITY PARTICIPATION

Public participation is an important component of remedy selection. The U.S. Army, USEPA, and MDE are soliciting input from the community on the preferred remedial alternative. The comment period extends from **January 29, 2026 to March 2, 2026** (32 days). This period includes a public meeting at which the U.S. Army will present the PRAP as agreed to by USEPA and MDE. The U.S. Army will accept both oral and written comments at this meeting and written comments following the meeting through **March 2, 2026**.

The ***Restoration Advisory Board (RAB)*** is a critical component of the FMMD Installation Restoration Program to keep the public informed about the environmental cleanup activities and be involved in decision-making. The RAB gives community members, particularly those who may be affected by the cleanup activities, and government representatives a chance to exchange information and participate in meaningful dialogue. The OU-5 Site has previously been discussed with the RAB, with the most recent update taking place on May 16, 2024.

Public Comment Period

In accordance with CERCLA Section 117 and 40 C.F.R. § 300.430(f)(3)(i), the U.S. Army is providing a 30-day comment period from **January 29, 2026 to March 2, 2026** to provide an opportunity for public involvement in the decision-making process for the proposed action. The public is encouraged to review and comment on this PRAP. During the public comment period, the public is encouraged to review the following reports and other documents pertinent to the OU-5 Site and the Superfund process: RI (Arcadis 2023a), and the FFS (Arcadis 2023b). This information is available at the County Library located at 1325 Annapolis Road in Odenton, Maryland and the FMMD Environmental Division Office, located at 4216 Roberts Avenue, Second Floor, at FMMD. To obtain further information, the following representatives may be contacted:

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Written Comments

If the public would like to comment in writing on the PRAP or other relevant issues, comments should be delivered to the U.S. Army at the public meeting or delivered by email or U.S. mail (postmarked no later than **March 2, 2026**) to Mr. Shaun Herron at the address provided.

Public Meeting

The U.S. Army will hold a public meeting to present this PRAP and answer questions about this PRAP on **January 29, 2026 at 7:00 p.m. via a virtual Teams meeting**. **Invitation requests to the virtual meeting can be made to Katrina Harris at kharris@bridgeconsultingcorp.com**. This meeting will provide an opportunity for the public to provide oral and written comments on the proposed action. Oral comments made at the meeting will be transcribed. A copy of the transcript will be included in the ROD Responsiveness Summary and will be added to the FMMD ***Administrative Record*** file and information repositories.

U.S. Army's Review of Public's Comment

The U.S. Army will review the public's comments as part of the process in reaching a final decision on the action to be taken. The U.S. Army's final choice of action will be issued in the ROD. A Responsiveness Summary, documenting and responding to written and oral comments received from the public will be included as a section of the ROD. Once community response and input are received and the U.S. Army and USEPA sign the ROD, it will become part of the Administrative Record.

ACRONYMS AND ABBREVIATIONS

µg/L	Microgram Per Liter
AOC	Architect of the Capitol
ARAR	Applicable or Relevant and Appropriate Requirement
Arcadis	Arcadis U.S., Inc.
BRAC	Base Realignment and Closure
CCl_4	Carbon Tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
C.F.R.	Code of Federal Regulations
COC	Constituent of Concern
COPC	Constituent of Potential Concern
COPEC	Constituent of Potential Ecological Concern
County	Anne Arundel County
CSF	Covered Storage Facility
DGR	Dynamic Groundwater Recirculation
DLA	Defense Logistics Agency
DOI	Department of the Interior
DRMO	Defense Reutilization and Marketing Office
EC	Engineering Control
FFS	Focused Feasibility Study
FMMD	Fort Meade Maryland
GAC	Granular Activated Carbon
gpm	Gallon per Minute
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ISEB	In-situ Enhanced Bioremediation
LPA	Lower Patapsco Aquifer
LTM	Long-Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	Operation and Maintenance
OU-5	Operable Unit 5
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PRAP	Proposed Remedial Action Plan
PRR	Patuxent Research Refuge
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSL	Regional Screening Level
SCL	Site Cleanup Level
SLERA	Screening Level Ecological Risk Assessment
SWM	Stormwater Management
TAL	Target Analyte List
TBD	To Be Determined
U.S.	United States
U.S. Army	United States Department of the Army
USEPA	United States Environmental Protection Agency
VI	Vapor Intrusion
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
WRS	Wilcoxon Rank Sum

GLOSSARY OF TERMS

Administrative Record: This is a collection of documents (including plans, correspondence and reports) generated during site investigation and remedial activities. Information in the Administrative Record is used to select the preferred Response Action and is available for public review. 40 CFR 300.800

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state statutory and regulatory environmental and facility siting requirements that a selected remedy must attain. These requirements may vary among sites and RAs. 40 CFR 300.5

Capital Costs: This includes costs associated with construction, treatment equipment, site preparation, services, transportation, disposal, health and safety, installation and start-up, administration, legal support, engineering, and design associated with Response Actions.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): This federal law was passed in 1980 and is commonly referred to as the Superfund Program. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste disposal sites that endanger public health and safety or the environment.

Constituent of Concern (COCs): The chemical substances found at the site that federal or state environmental agencies have determined pose an unacceptable risk to human health or the environment. COCs are typically identified following thorough analysis against risk screening criteria conducted as part of a risk assessment.

Constituent of Potential Concern (COPC): Constituents detected in a medium that are selected to be addressed in the risk assessment process because contact with humans may result in adverse effects.

Constituent of Potential Ecological Concern (COPEC): Any contaminant that is shown to pose possible ecological risk to a site.

Defense Environmental Restoration Program: Addresses the cleanup of Department of Defense hazardous waste sites consistent with the requirements of CERCLA. The three main objectives of the Defense Environmental Restoration Program are: 1) the identification, research and development, and cleanup of contamination from hazardous substances, pollutants, and contaminants; 2) the correction of other environmental damage that creates an imminent and substantial endangerment to public health or the environment; and 3) the demolition and removal of unsafe buildings and structures at sites formerly used by or under the jurisdiction of the Secretary of Defense.

Exposure Scenarios: These present possible situations where sites users may come in contact with impacted groundwater.

Focused Feasibility Study (FFS): This CERCLA document reviews the chemicals of concern at a site, and evaluates multiple remedial technologies for use at the site. Finally, it identifies the most feasible remedial alternative.

Groundwater Contour: Like topographic map contours, groundwater contours represent lines of equal elevation across a water table. These contours are used to interpret the direction of groundwater flow based on differences in groundwater elevation over distance.

Human Health Risk Assessment (HHRA): This assessment describes the formal step-by-step scientific process for quantifying health risks to human receptors (residents, workers, recreationalists), thereby estimating the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media under current or future scenarios. A risk assessment uses standardized tools, formats, and scientifically accepted assumptions.

National Oil and Hazardous Substances Contingency Plan (NCP): These CERCLA regulations provide the federal government with the authority to respond to the problems of abandoned or uncontrolled hazardous waste disposal sites as well as to certain incidents involving hazardous wastes (e.g., spills).

National Priorities List: A list of contaminated sites that require cleanup under CERCLA and where CERCLA funds may be expended.

Operation and Maintenance (O&M): Annual post-construction cost necessary to ensure the continued effectiveness of a Response Action.

Present Worth Costs: Used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year. This allows the cost of the Response Actions to be compared on the basis of a single figure representing the amount of money that would be sufficient to cover capital and O&M costs associated with each Response Action over its planned life.

Proposed Remedial Action Plan (PRAP): The PRAP is a document used to facilitate public involvement in the remedy selection process. The document presents the lead agency's preliminary recommendation concerning how best to address contamination at the site, presents alternatives that were evaluated, and explains the reasons the lead agency proposes the Preferred Alternative.

Record of Decision (ROD): This legal document is signed by the U.S. Army and USEPA in consultation with the MDE. It describes the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments, responses to comments, and the estimated cost of the remedy.

Regional Screening Level (RSL): Risk-based chemical concentrations derived from standardized equations combing exposure assumptions with USEPA chemical-specific toxicity values and target risk levels that are used for site screening and initial cleanup goals. (https://www.epa.gov/risk/regional-screening-levels-rsls)

Remedial Investigation (RI): An investigation under CERCLA that involves sampling environmental media such as air, soil, and water to determine the nature and extent of contamination and human health and environmental risks that result from the contamination present at a site.

Responsiveness Summary: A part of the ROD in which the U.S. Army documents and responds to written and oral comments received during the public comment period regarding the alternatives presented in the PRAP.

Restoration Advisory Board (RAB): The board provides a forum for exchange of information and partnership among citizens, the military installation, USEPA, and MDE. The RAB offers an opportunity for community members to provide input to the cleanup process.

Screening Level Ecological Risk Assessment (SLERA): SLERAs are performed to evaluate the likelihood of adverse ecological effects occurring as a result of exposure to physical or chemical stressors. These stressors are defined as any biological, physical, or chemical factor that causes adverse responses in the environment. A SLERA evaluates any potential harm that human activities have on living organisms within ecosystems.

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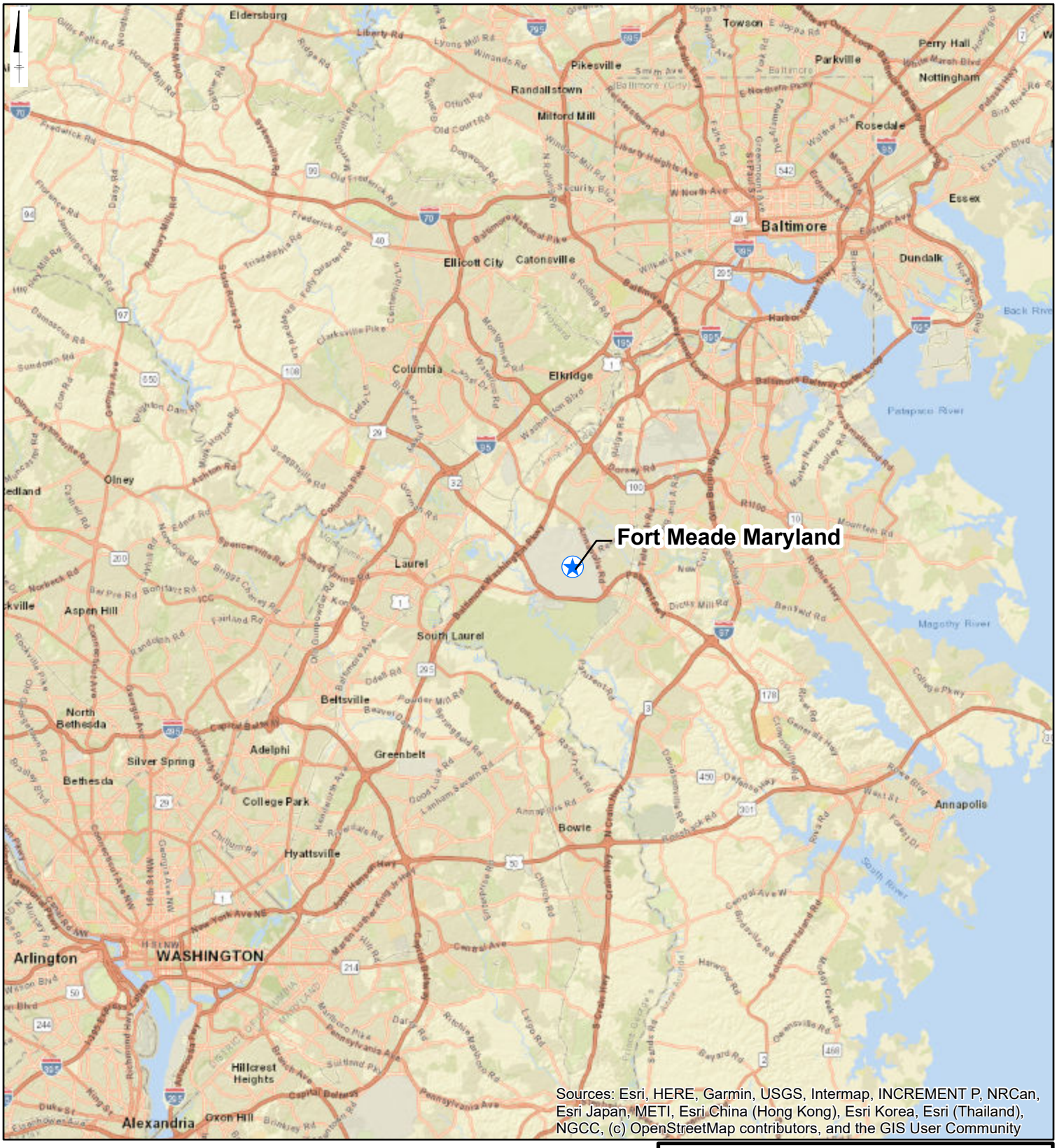
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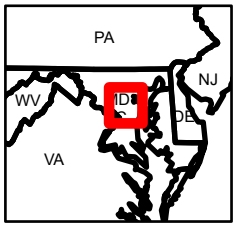
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FIGURES



Fort Meade Maryland Location



0 2.5 5 10 Miles

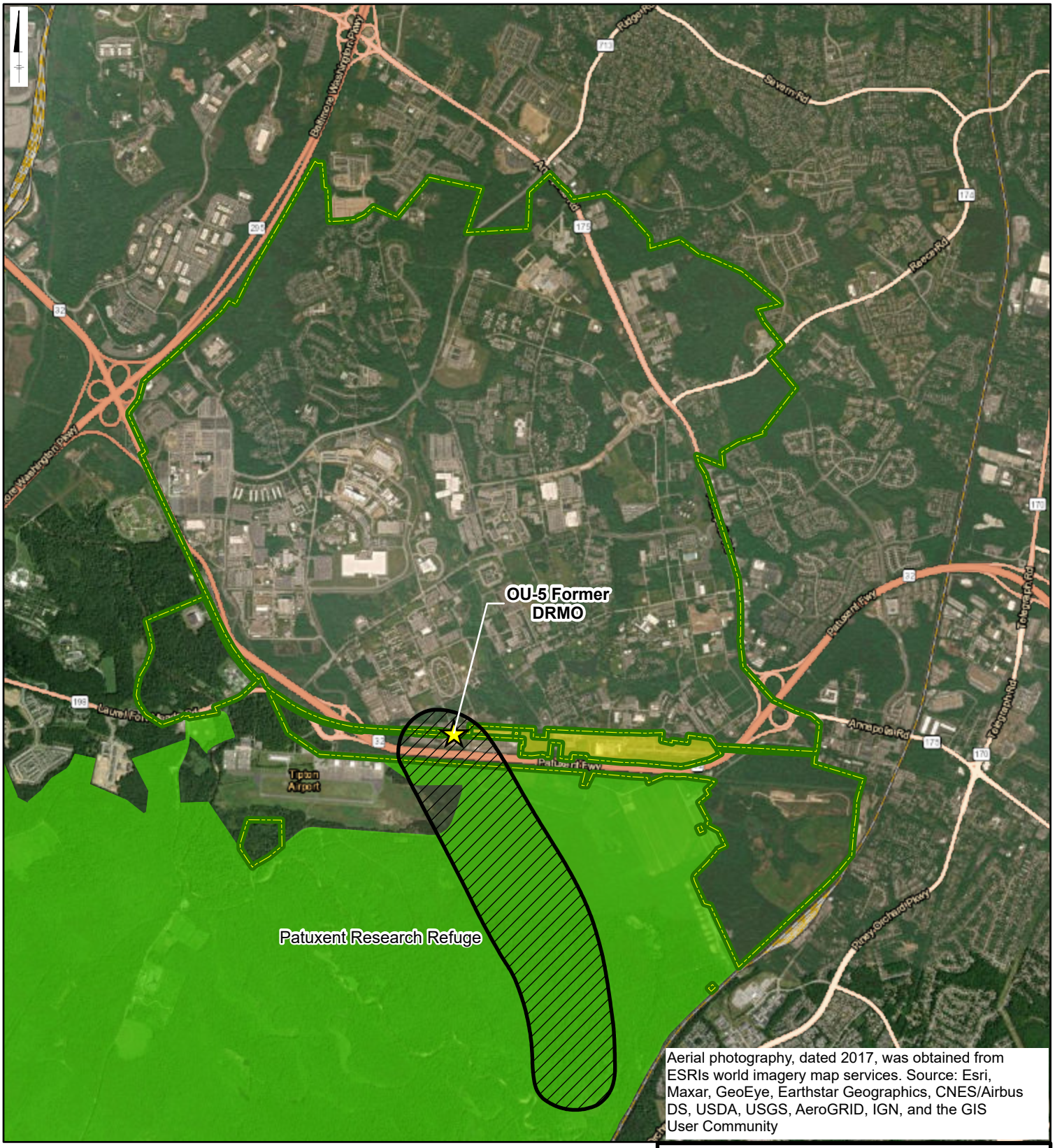
NAD 1983 StatePlane Maryland FIPS 1900 Feet

FORT MEADE MARYLAND
LOCATION MAP
FORT MEADE, MARYLAND

SERES Engineering & Services, LLC
ARCADIS
a joint venture

FIGURE
1

Path: T:_ENV\Fort_Meade\PRO\Fort_Meade_OU5\OU5_PreDesign_Work_Plan_2024.aprx



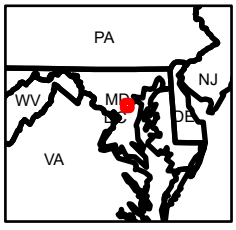
Site Location

OU-5 Site Boundary

Fort Meade Maryland Boundary

Architect of the Capitol

Patuxent Research Refuge



0 1,750 3,500 7,000 Feet

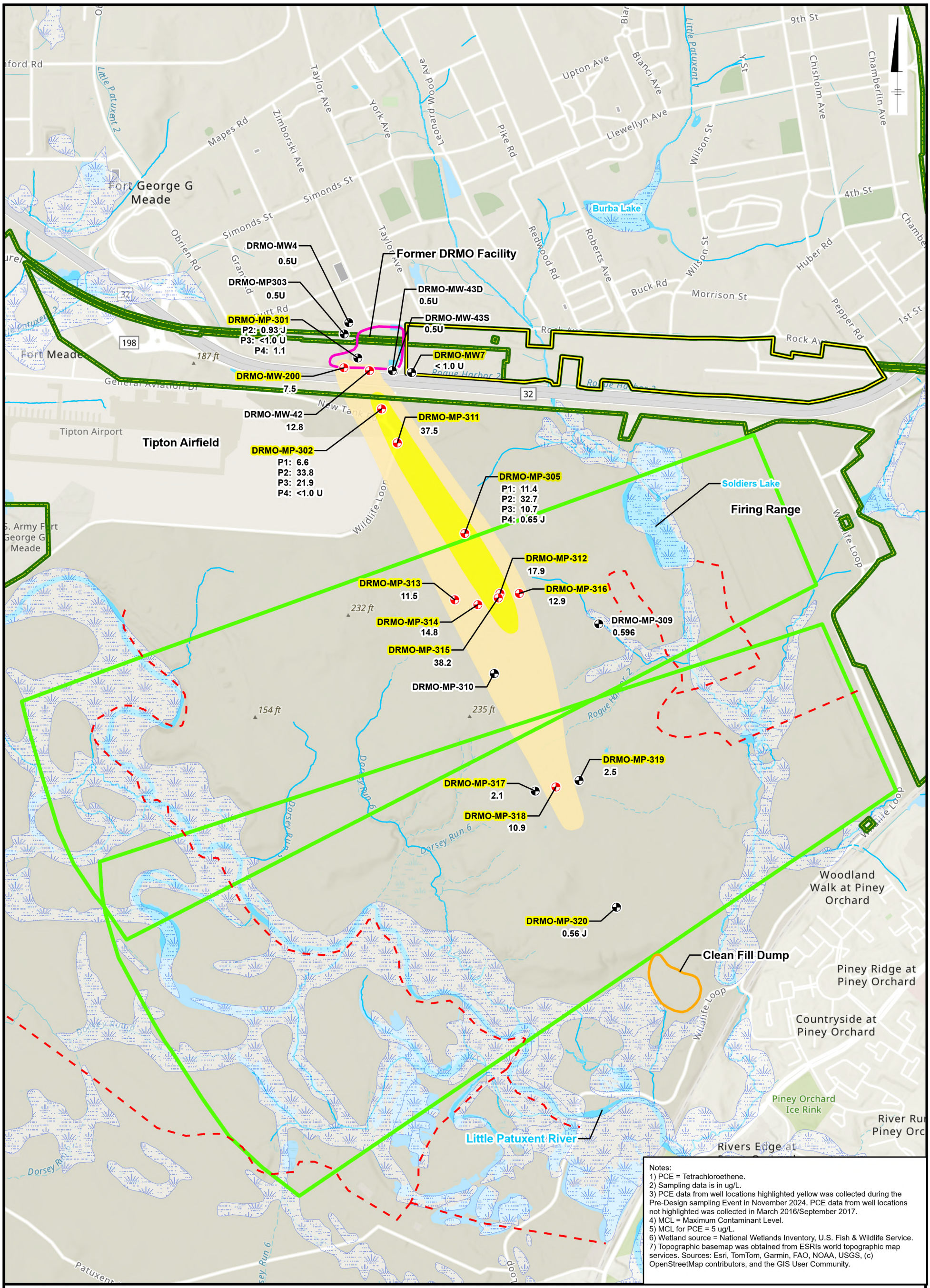
NAD 1983 StatePlane Maryland FIPS 1900 Feet

OPERABLE UNIT 5 LOCATION MAP
FORT MEADE, MARYLAND

SERES Engineering & Services, LLC
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FIGURE
2

Path: T:_ENV\Fort_Meade\PRO\Fort_Meade_OU5\OU5_PreDesign_Work_Plan_2024.aprx



Notes:
1) PCE = Tetrachloroethene.
2) Sampling data is in ug/L.
3) PCE data from well locations highlighted yellow was collected during the Pre-Design sampling Event in November 2024. PCE data from well locations not highlighted was collected in March 2016/September 2017.
4) MCL = Maximum Contaminant Level.
5) MCL for PCE = 5 ug/L.
6) Wetland source = National Wetlands Inventory, U.S. Fish & Wildlife Service.
7) Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.

LEGEND

Groundwater Sampling

- Monitoring Well Exceeding the Groundwater MCL
- Monitoring Well
- Road or Trail
- Water Feature
- Water Body
- Wetland
- Fort Meade Maryland Boundary
- Architecture of the Capitol Boundary
- OU-5 Site Boundary
- Firing Range Safety Fan
- Clean Fill Dump

PCE Concentration (ug/L)

- 5-25
- 25-50

0 1,250 2,500 Feet

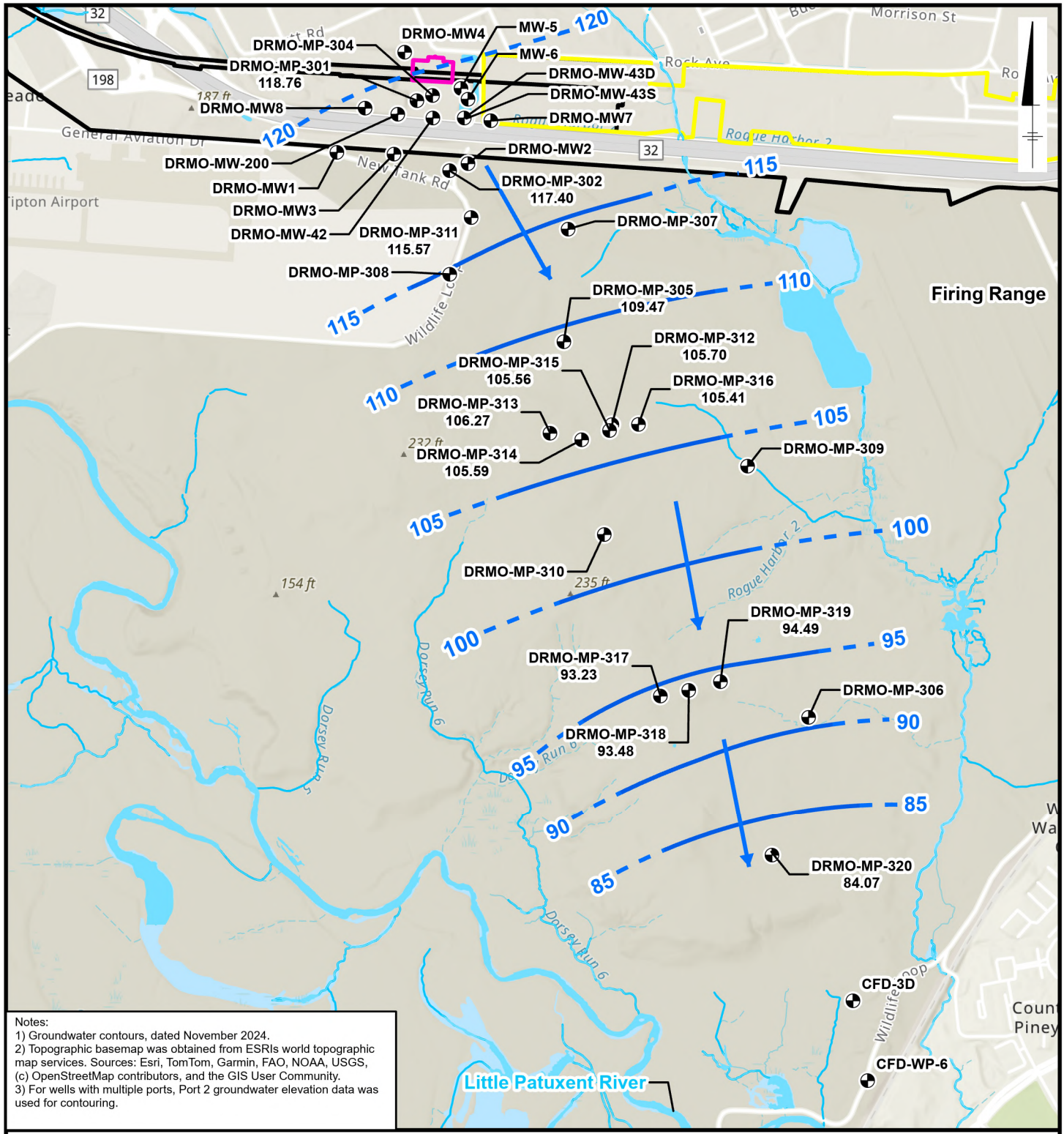
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TETRACHLOROETHENE DETECTIONS - NOVEMBER 2024 OPERABLE UNIT 5 FORT MEADE, MARYLAND

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FIGURE 3

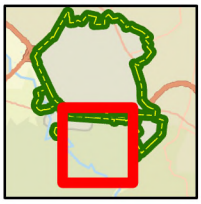
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Notes:
1) Groundwater contours, dated November 2024.
2) Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.
3) For wells with multiple ports, Port 2 groundwater elevation data was used for contouring.

LEGEND

- Monitoring Well
- Groundwater Flow Direction
- Groundwater Contour Line (Feet amsl [above mean sea level])
- Inferred Groundwater Contour Line (Feet amsl)
- Water Feature
- 118.76 Groundwater Elevation (Feet amsl)
- Water Body
- Covered Storage Facility
- Fort Meade Maryland Boundary
- Architect of the Capitol Boundary



0 1,400 2,800 Feet

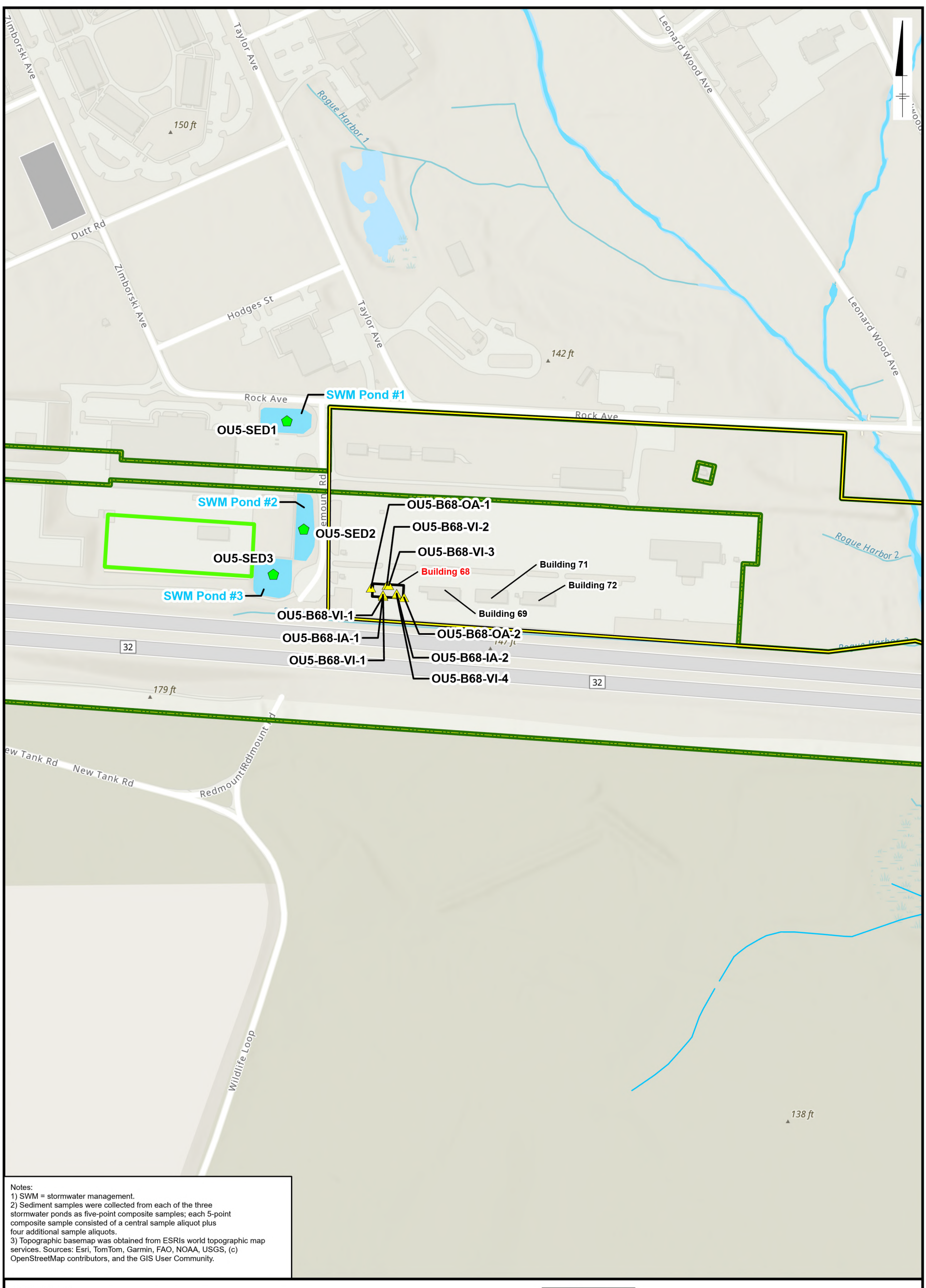
NAD 1983 StatePlane Maryland FIPS 1900 Feet

GROUNDWATER ELEVATION ISOCONTOUR MAP - NOVEMBER 2024 OPERABLE UNIT 5 FORT MEADE, MARYLAND

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FIGURE
4

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Notes:
1) SWM = stormwater management.
2) Sediment samples were collected from each of the three stormwater ponds as five-point composite samples; each 5-point composite sample consisted of a central sample aliquot plus four additional sample aliquots.
3) Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.

LEGEND

- Building 68
- **Sediment Sampling**
  - Aliquot Location (Composite Sample)
- **Vapor Intrusion Sampling**
  - Sub-Slab Sample Location
- Water Feature
- Water Body
- Concrete Cap
- Fort Meade Maryland Boundary
- Architect of the Capitol Boundary

0 500 1,000 Feet

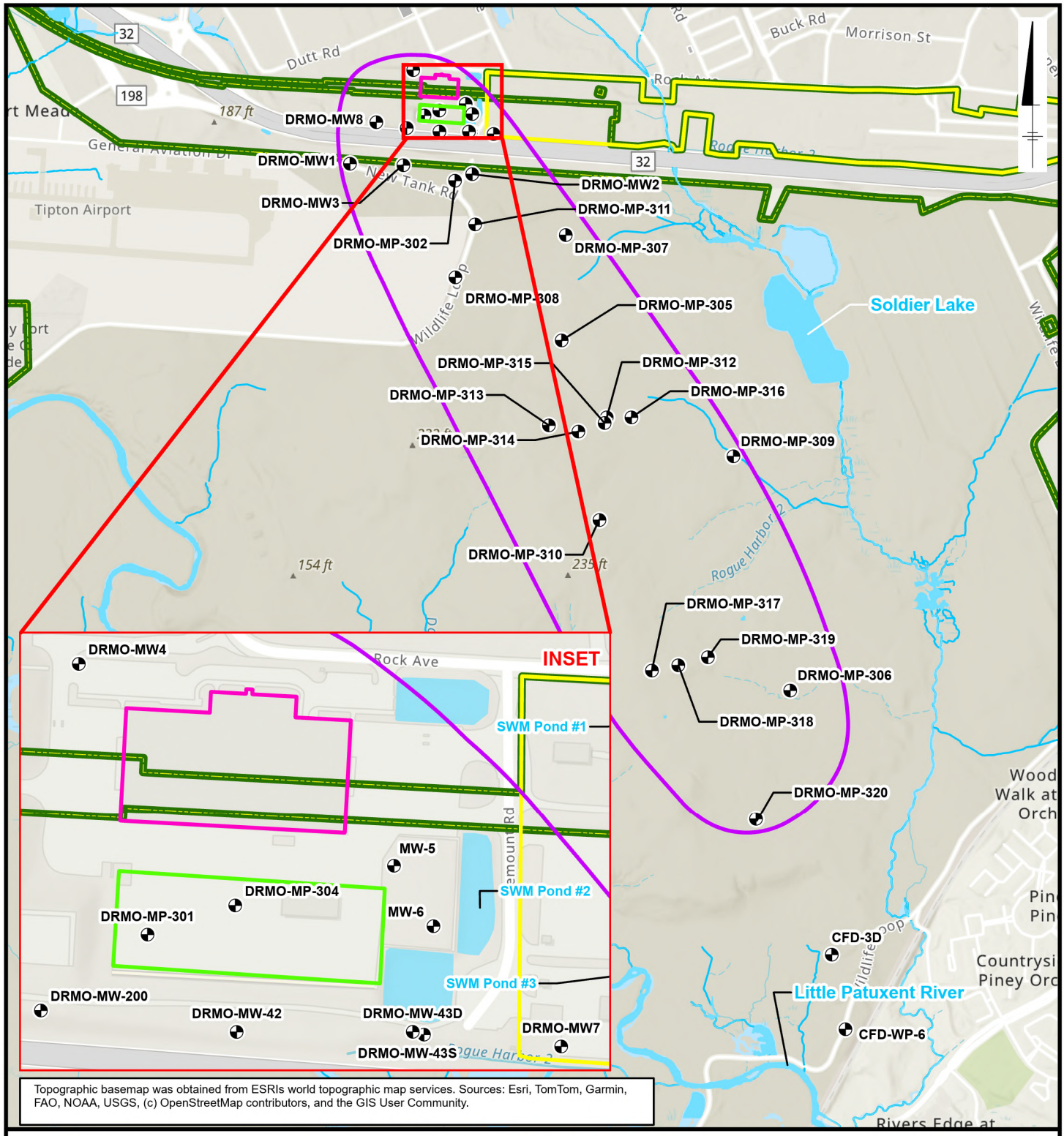
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VAPOR INTRUSION AND SEDIMENT SAMPLING LOCATIONS
OPERABLE UNIT 5
FORT MEADE, MARYLAND

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FIGURE 5

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Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.

LEGEND

- Monitoring Well
- Water Feature
- Water Body
- Fort Meade Maryland Boundary
- Covered Storage Facility
- Architect of the Capitol
- Operable Unit 5 Land Use Control Boundary
- Concrete Cap



0 1,500 3,000 Feet

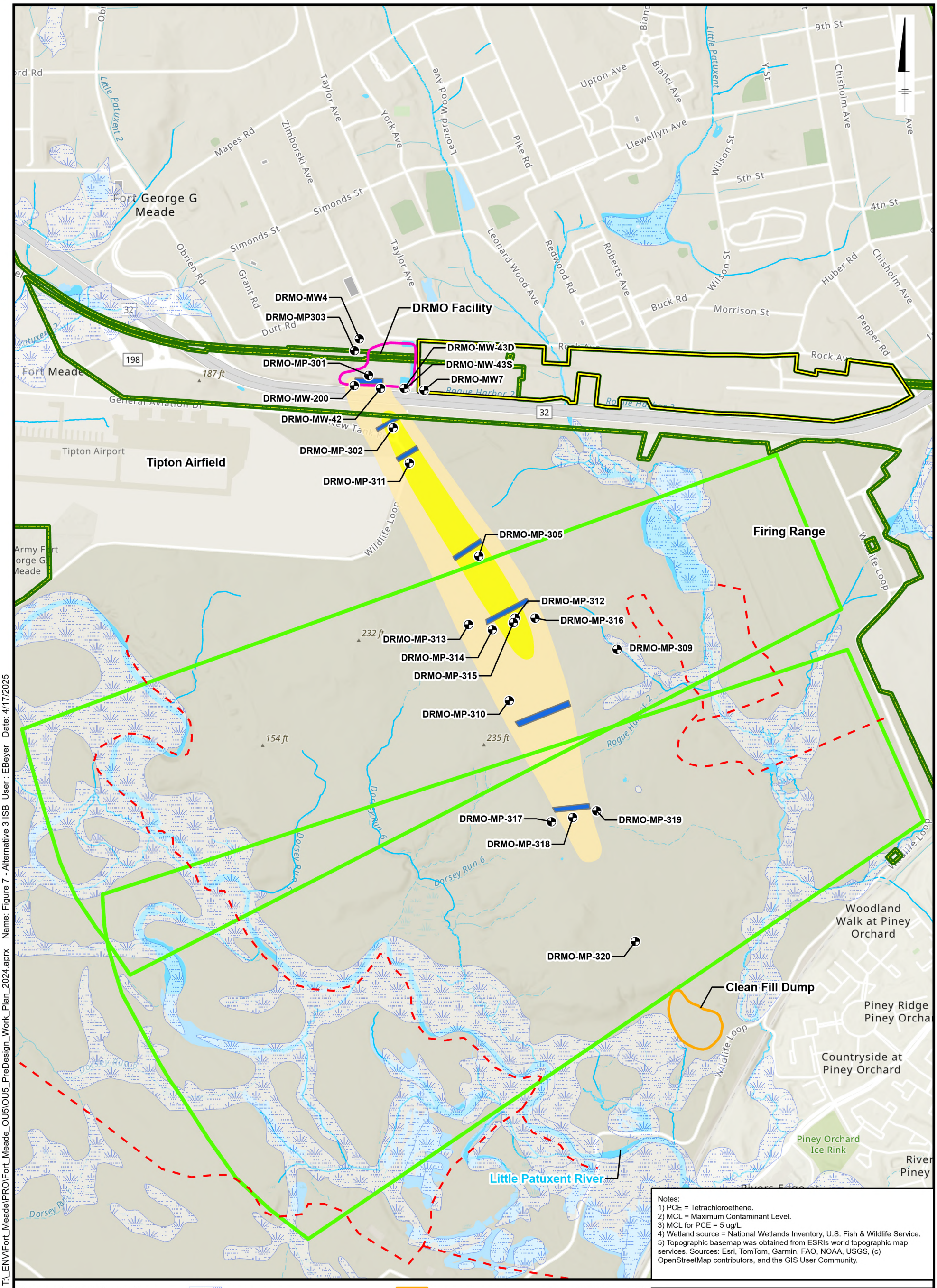
NAD 1983 StatePlane Maryland FIPS 1900 Feet

OPERABLE UNIT 5
LAND USE CONTROL BOUNDARY
FORT MEADE, MARYLAND

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FIGURE
6

Path: T:_ENV\Fort_Meade\PRO\Fort_Meade_OU5\OU5_PreDesign_Work_Plan_2024.aprx saved by EBeyer on 4/11/2025 12:58 PM



Notes:
1) PCE = Tetrachloroethene.
2) MCL = Maximum Contaminant Level.
3) MCL for PCE = 5 ug/L.
4) Wetland source = National Wetlands Inventory, U.S. Fish & Wildlife Service.
5) Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.

Groundwater Sampling
- Monitoring Well
- Road or Trail
- Water Feature
- Water Body
- Bio Wall

- Wetland
- Fort Meade Maryland Boundary
- Architecture of the Capitol Boundary
- OU-5 Site Boundary
- Firing Range Safety Fan

- Clean Fill Dump

PCE Concentration (ug/L)
- 5-25
- 25-50

0 1,200 2,400 Feet

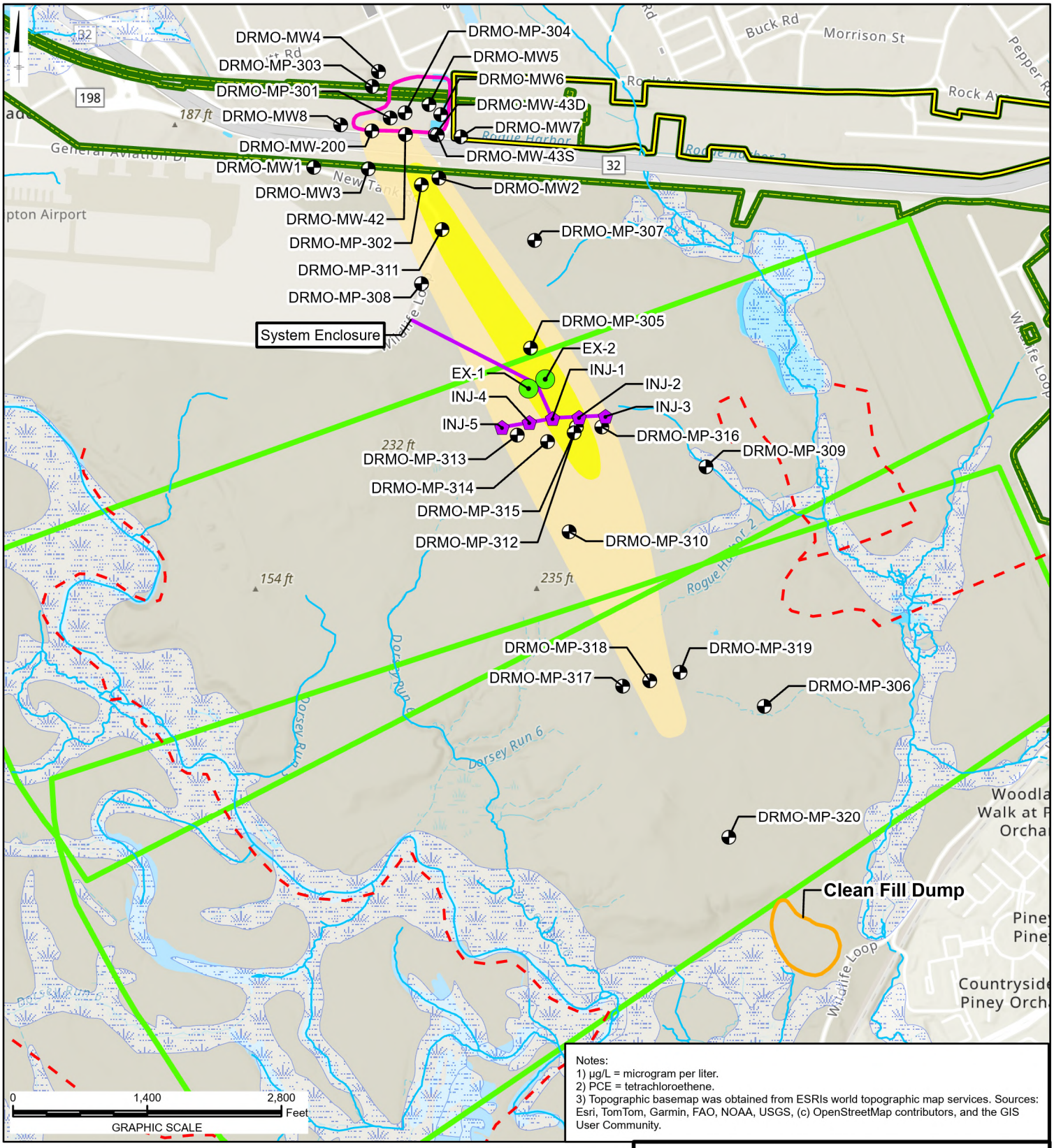
NAD 1983 StatePlane Maryland FIPS 1900 Feet

OPERABLE UNIT 5
ALTERNATIVE 3: ISEB
FORT MEADE, MARYLAND

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FIGURE 7

Document Path: T:_ENV\Fort_Meade\PRO\Fort_Meade_OU5\OU5_PreDesign_Work_Plan_2024.aprx Name: Figure 7 - Alternative 3 ISB User : EBeyer Date: 4/17/2025



Notes:
1) µg/L = microgram per liter.
2) PCE = tetrachloroethene.
3) Topographic basemap was obtained from ESRIs world topographic map services. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community.

Extraction Wells
Injection Wells

Groundwater Sampling
Monitoring Well
Subsurface Conveyance Piping
Road or Trail
Water Feature

Water Body
Wetland
Fort Meade Maryland Boundary
Architect of the Capitol Boundary
OU-5 Site Boundary
Firing Range Safety Fan

Clean Fill Dump

PCE Concentration (µg/L)
5-25
25-50

OPERABLE UNIT 5
ALTERNATIVE 4: DYNAMIC GROUNDWATER RECIRCULATION
FORT MEADE, MARYLAND

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FIGURE 8

Document Path: T:_ENV\Fort_Meade\PROI\Fort_Meade_OU5\OU5_PreDesign_Work_Plan_2024.aprx Name: Figure 8_OU5_Alternative 4 Dynamic Groundwater Recirculation User : EBeyer Date: 4/17/2025