2018 Site Management Plan

Defense Depot Memphis, Tennessee
U.S. EPA I.D. Number TN4210020570

Revision 1
June 2018

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Department of the Army

Prepared for:

U.S. Army Corps of Engineers, Mobile District
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Acronyms and Abbreviations

AOC	Area of Concern
AR	Administrative Record
AS/SVE	air sparging with soil vapor extraction
bgs	below ground surface
BRAC	Base Realignment and Closure
cDCE	cis-1,2-dichloroethene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	chloroform
COC	chemical of concern
COPC	constituent of potential concern
CSM	Conceptual Site Model
CT	carbon tetrachloride
CVOC	chlorinated volatile organic compound
CWM	chemical warfare material
CY	cubic yard
DCE	1,1-dichloroethene
DDMT	Defense Depot Memphis, Tennessee
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
DoD	Department of Defense
e^2M	engineering-environmental Management, Inc.
EBT	enhanced bioremediation treatment
EISR	Early Implementation of Selected Remedy
ESD	Explanation of Significant Differences
ET&D	excavation, transportation and disposal
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
FOST	Findings of Suitability to Transfer
FSVE	Fluvial soil vapor extraction
FU	functional unit
HHRA	human health risk assessment
HI	hazard index
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendment
IAQ	intermediate aquifer
IC	institutional control
IR	Information Repository
IRA	interim remedial action
IRACR	Interim Remedial Action Completion Report
IW	injection well
lb/hr	pound per hour
LTM	long-term monitoring
LUC	land use control
LUCIP	land use control implementation plan

MACTEC	MACTEC Engineering and Consulting, Inc.
MAQ	Memphis aquifer
MCL	maximum contaminant level
MI	Main Installation
MIP	membrane interface probe
MLGW	Memphis Light, Gas & Water
MNA	monitored natural attenuation
MW	monitoring well
NPL	National Priorities List
ODB	Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division
O&M	operations and maintenance
OPS	Operating Properly and Successfully
OU	Operable Unit
PAHs	polyaromatic hydrocarbons
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PCP	pentachlorophenol
PID	photoionization detector
PMW	performance monitoring well
POL	petroleum/oil/lubricants
ppbv	part per billion by volume
PRB	permeable reactive barrier
RA	remedial action
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RG	remediation goal
RI	remedial investigation
RL	reporting limit
ROD	Record of Decision
RW	recovery well
SCHD	Shelby County Health Department
SL	screening level
SLERA	screening level ecological risk assessment
SMP	Site Management Plan
SRI	Supplemental Remedial Investigation
SVE	soil vapor extraction
SWMU	Solid Waste Management Unit
TC	target concentration
TCL	Target Compound list
TCA	1,1,2-trichloroethane
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TeCA	1,1,2,2-tetrachloroethane
Trinity	Trinity Analysis and Development Corp.

TSVE	thermal soil vapor extraction
TTA	target treatment area
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VI	vapor intrusion
VISL	Vapor Intrusion Screening Level
VMP	vapor monitoring point
VOC	volatile organic compound
WNRC	Washington National Records Center
ZVI	zero valent iron
µg/L	micrograms per liter

1 Introduction

HDR has prepared this 2018 Site Management Plan (SMP) for the former Defense Depot Memphis, Tennessee (DDMT) under Contract W90FYQ-09-D-0005, Task Order CK04 to the United States Army Corps of Engineers (USACE), Mobile District. The environmental restoration program at DDMT is directed by the Department of the Army (Army), Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure (BRAC) Division.

This SMP has been prepared in accordance with *Department of Defense (DoD) Manual Number 4715.20, Defense Environmental Restoration Program [DERP] Guidance* (DoD, 2012) and fulfills a requirement of the *Federal Facilities Agreement at the Defense Distribution Depot Memphis* (FFA) (USEPA, 1995), which was signed by United States Defense Logistics Agency (DLA), United States Environmental Protection Agency (USEPA) and Tennessee Department of Environment and Conservation (TDEC) in 1995. DDMT's USEPA Identification Number is TN4210020570.

In accordance with the DERP Guidance, the SMP describes a coordinated approach for environmental restoration activities and includes all required activities by year until the expected completion of environmental restoration at DDMT. The SMP will be updated annually, made available for public review in the information repository (IR) and included in the Administrative Record (AR). The 2018 SMP is updated with information available as of 17 November 2017.

The IR is maintained in the TDEC office at the following address:

TDEC
8383 Wolf Lake Dr.
Bartlett, TN 38133-4119

The public can make an appointment to view documents in the IR by calling TDEC at (901) 371-3900. Additional information, including documents not in the IR, can be requested by calling the DDMT Community Involvement Line at 901-774-3683.

The AR for DDMT is stored by the National Archives and Records Administration, Washington National Records Center (WNRC). The last transmittal of files to the WNRC was made in September 2016. Additional shipments will be made periodically as AR documents are created. Prior to shipment, the AR documents are stored in a locked file cabinet at the DDMT field office. The WNRC address is:

WNRC
4205 Suitland Road
Suitland, MD 20745-8001

Responses to USEPA comments on the 2018 SMP and approval letters from TDEC and USEPA are included in Appendix A.

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2 Summary of Site Conditions

2.1 Site Location and Description

DDMT is located in southeastern Memphis, Shelby County, Tennessee approximately 5 miles east of the Mississippi River and just northeast of Interstate 240 (Figure 1). DDMT originated as a military facility in the early 1940s to provide stock control, material storage, and maintenance services for the U.S. Army. In 1995, DDMT was placed on the list of DoD facilities to be closed under BRAC. Storage and distribution activities continued until DDMT closed in September 1997.

DDMT covers approximately 632 acres and consists of the Main Installation (MI) and Dunn Field (Figure 2). The MI contains approximately 567 acres with open storage areas, warehouses, former military family housing, and outdoor recreational areas. Dunn Field, which is located across Dunn Avenue from the north-northwest portion of the MI, contains approximately 65 acres and includes former mineral storage and waste disposal areas.

2.2 Regulatory Status

DDMT was a Resource Conservation and Recovery Act (RCRA) hazardous waste generator with USEPA identification number TN4210020570. The wastes generated included hazardous substances that reached shelf-life expiration dates and could no longer be used, vehicle maintenance wastes, and waste materials from the cleanup of small hazardous substance spills.

On 28 September 1990, USEPA Region 4 and TDEC issued the Depot a RCRA Part B permit for storage of hazardous waste. The Hazardous and Solid Waste Amendment (HSWA) portion of the permit issued by USEPA included requirements for the identification and, if necessary, corrective action of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). A RCRA Facility Assessment (RFA) completed in 1990 identified 49 SWMUs and 8 AOCs (A.T. Kearney, 1990).

Subsequent to issuing the RCRA permit, USEPA prepared a final Hazard Ranking System (HRS) Scoring Package for the facility. On 14 October 1992, USEPA added the Depot to the National Priorities List (NPL) (57 Federal Register 47180 No. 199). On 6 March 1995, USEPA, TDEC, and the Depot entered into a FFA (USEPA, 1995) under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 120, and RCRA, Sections 3008(h) and 3004(u) and (v). The FFA outlines the process for investigation and cleanup of the Depot sites under CERCLA. The parties agreed that investigation and cleanup of releases from the sites (including formerly identified SWMUs/AOCs) would satisfy any RCRA corrective action obligation.

The RCRA Part B permit for hazardous waste storage was terminated by TDEC in October 1998 upon request from DDMT because the storage unit was not constructed. The HSWA portion of the permit for corrective action remained in effect. DDMT submitted a corrective

action permit renewal application in March 2004. In January 2005, TDEC issued a Denial to Reissue the Hazardous Waste Corrective Action Permit, which terminated the requirement to perform corrective action under RCRA, and noted that all corrective action activities shall continue to be performed under CERCLA.

The NPL site status was revised to Construction Complete in May 2010 after construction of the selected remedies for DDMT was completed.

2.3 Site Designations

Site designations at DDMT were developed for overlapping environmental programs and for facility reuse. Four Operable Units (OUs) were established during preparation of the FFA: Dunn Field, OU 1; Southwest Quadrant MI, OU 2; Southeastern Watershed and Golf Course, OU 3; and North Central Area MI, OU 4.

The property was divided into 36 parcels based on planned reuse after DDMT was selected for closure under BRAC. Areas of environmental concern within each parcel were broken into sub-parcels representing buildings, spill locations, burial locations, former pistol ranges, open land areas, and other sites. This system allowed investigation results to be compared directly to BRAC parcels for reuse purposes and facilitated sampling/analysis and decisions regarding environmental condition of property for leasing and transfer.

During the MI Remedial Investigation (RI), the parcels were combined in functional units (FUs) in order to evaluate risk to human health and the environment. Each FU represented an area where human health exposure was generally uniform based on operational history, expected use and location. The MI was divided into six FUs with groundwater under the MI being FU 7. Dunn Field was divided into three areas for conducting baseline risk assessments based on similar historical use and proposed reuse: Northeast Open Area, Stockpile Area, and Disposal Area. The FUs/Areas are described on Table 1 and the boundaries are shown on Figure 3 for the MI and Figure 4 for Dunn Field.

Environmental restoration sites were first identified during the 1990 RFA, and additional sites were added over time. The 1990 RFA identified 57 SWMUs and AOCs. An appendix to the FFA increased the number of sites to 89 based on additional site investigations; additional information is provided in the *Environmental Baseline Survey Report* (Woodward-Clyde, 1996). Two of the 89 sites consisted of multiple disposal locations that were later separated, bringing the number of sites to 93. The environmental restoration sites within each OU are listed on Table 2 with the current site status; the site locations are shown on Figures 5, 6, 7 and 8. The site designations on the figures (e.g. RI, Screening, and No Further Action) were established when the sites were identified and do not reflect the current status.

2.4 Geology and Hydrogeology

The geologic units of interest at DDMT are (from youngest to oldest): loess, including surface soil; fluvial deposits; Jackson Formation/Upper Claiborne Group (Jackson/Upper Claiborne); and Memphis Sand.

The loess consists of wind blown and deposited brown to reddish-brown, low plasticity clayey silt to silty clay. The loess deposits are about 20 to 30 feet thick and are continuous throughout the DDMT.

The fluvial (terrace) deposits at DDMT consist of two general layers. The upper layer is silty, sandy clay to clayey sand and ranges from about 0 to 30 feet thick. The lower layer is composed of interlayered sand, sandy gravel, and gravelly sand, and ranges from 30 to 100 feet thick. The uppermost aquifer is the unconfined Fluvial Aquifer, consisting of saturated sands and gravelly sands in the lower portion of the deposits. The saturated thickness ranges from 0 feet (dry) to approximately 70 feet, and is controlled by the uppermost clay configuration in the Upper Claiborne. The groundwater in the Fluvial Aquifer is not a drinking water source for area residents; however, the current Tennessee groundwater classification at DDMT is General Use (TDEC Chapter 1200-04-03).

The Jackson/Upper Claiborne forms the upper confining unit for the Memphis Aquifer (MAQ) on a regional basis and separates the Fluvial Aquifer from the MAQ at DDMT. The Upper Claiborne Group includes the Cockfield and Cook Formations; the individual layers of the Jackson/Upper Claiborne consist of clays, silts, and sands deposited in lenses or individual beds that are not areally extensive. The Jackson Formation is reported to be absent in the area of DDMT. The Cockfield Formation consists of inter-fingering fine sand, silt, clay, and local lenses of lignite. The Cook Mountain Formation consists primarily of clay with varying amounts of fine sand and is reported to be the most persistent clay layer in the Jackson/Upper Claiborne confining unit. The Intermediate Aquifer (IAQ) is locally developed in the Upper Claiborne sands. Where clay layers are absent, a hydraulic connection is created between the Fluvial Aquifer and the IAQ, and potentially, the MAQ.

The Memphis Sand consists primarily of thick bedded, white to brown or gray, very fine grained to gravelly, partly argillaceous and micaceous sand. The Memphis Sand ranges from 500 to 890 feet in thickness, and begins at a depth below ground surface (bgs) of approximately 120 to 300 feet. The MAQ is a regional deep, confined aquifer and is the primary source of water for the City of Memphis. Memphis Light, Gas & Water (MLGW) extracts groundwater from several well fields in the Memphis area, which has created a regional cone of depression in the potentiometric surface, with steeper local cones of depression at each well field. The Allen Well Field is the closest to DDMT; individual extraction wells in the well field are 1 to 2 miles west of DDMT.

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3 Environmental Program Status

Construction of the selected remedies for DDMT was completed in December 2009, and the *Preliminary Close Out Report* (USEPA, 2010a) was approved in May 2010. Interim remedial action completion reports (IRACRs) have been approved for all remedial actions (RAs). USEPA has concurred with operating properly and successfully (OPS) determinations for the remedies implemented on Federal property. The remedial action objectives (RAOs) for groundwater have not been met; remedial action and long-term monitoring are continuing.

3.1 Main Installation (OU-2, 3 and 4)

The MI contains approximately 567 acres with open storage areas, warehouses, former military family housing, and outdoor recreational areas. All of the MI property has been transferred for reuse through public benefit and economic development conveyances. (See Section 3.3)

Investigations from 1989 to 2001 identified contamination in surface soil and ground water. Surface soil contamination requiring response consisted primarily of metals, pentachlorophenol (PCP), polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and a pesticide, dieldrin. Groundwater contamination requiring response was limited to chlorinated volatile organic compounds (CVOCs) primarily tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride (CT), and chloroform (CF). The site investigations and evaluation of remedial alternatives are described in the *Main Installation Remedial Investigation Report, Volumes I through* IV (CH2M HILL, 2000a), the *Final Main Installation Groundwater Feasibility Study Report* (CH2M HILL, 2000b), and the *Final Main Installation Soils Feasibility Study Report* (CH2M HILL, 2000c).

3.1.1 Prior Removal Actions

The following actions were taken on the MI prior to the Record of Decision (ROD). The locations are shown on Figure 3.

- Approximately 602 cubic yards (CY) of surface and subsurface soil were removed from the PCP dip vat area (Building 737) because of elevated levels of PCP (completed in 1985).
- Approximately 60,000 gallons of hazardous and petroleum/oil/lubricants materials from damaged drums were reclaimed and repackaged at Building 873 in 1985. Approximately 800 55-gallon drums were recouped in this open storage area and then returned to their original location for storage and distribution.
- Approximately 5,000 tons (3,700 CY) of surface soil in the Housing Area were removed because of the presence of dieldrin (began in June 1998; completed in October 1998). The Housing Area is an exception to the overall industrial land use for MI and remediation levels were based on residential reuse.
- Approximately 530 tons (400 CY) of surface soil surrounding the cafeteria (Building 274) were removed in 1998 because of elevated levels of PCBs.

- Approximately 980 CY of surface and subsurface soil from near Buildings 1084, 1085, 1087, 1088, 1089 and 1090 were removed in 2000 because of elevated levels of metals and PAHs.

3.1.2 Record of Decision

The Memphis Depot *Main Installation Record of Decision* (MI ROD) (CH2M HILL, 2001) received final approval in September 2001. The MI ROD specified the RAOs that the selected remedy was expected to meet in order to protect human health and the environment. The RAOs were developed to allow the lease and later transfer of the MI for its intended land uses (industrial and recreational). The RAOs are:

Surface Soil

- Prevent direct contact/ingestion of surface soils contaminated with lead in excess of industrial worker risk-based criteria.
- Prevent direct contact/ingestion of surface soils contaminated with dieldrin and arsenic in excess of human health risk assessment criteria for residents.
- Prevent direct contact/ingestion of surface soils contaminated with lead in excess of risk-based criteria for protection of residential children.

Groundwater

- Prevent human ingestion of water contaminated with volatile organic compounds (VOCs) in excess of maximum contaminant levels (MCLs) from potential future on-site wells.
- Reduce concentrations of chemicals of concern (COCs) to MCLs or lower.
- Prevent horizontal and vertical off-site migration of groundwater contaminants in excess of MCLs.

The selected remedy presented in the MI ROD contained the following components:

- Excavation, transport and off-site disposal (ET&D) of lead contaminated surface soil near Building 949.
- Deed restrictions and land use controls (LUCs) to prevent residential land use on the MI, except at the existing housing area; to implement daycare restrictions; to prevent production/consumptive use groundwater controls for the Fluvial Aquifer and drilling into deeper aquifers on the MI; and to eliminate casual access through maintenance of a boundary fence around the golf course.
- Enhanced bioremediation treatment (EBT) of CVOCs in the most contaminated part of the groundwater plume.
- Long-term groundwater monitoring to document changes in plume concentrations and to detect potential plume migration to off-site areas or into deeper aquifers.
- Five-Year Reviews of the selected remedy.

ET&D for lead contamination adjacent to Building 949 (approximately 300 CY) was completed prior to final execution of the ROD (see Figure 3). The action was taken to accommodate the economic redevelopment of the site, documented in *Remediation Report, Removal Action at Building 949* (Jacobs Federal Programs, 2002) and noted as a significant change in the ROD.

3.1.3 Remedial Action

The selected remedy included EBT in the most contaminated areas with the assumption that "untreated parts of the groundwater plume would degrade under natural attenuation". The *Main Installation Final Remedial Design, Revision 1* (MI RD) (CH2M HILL, 2004a) was approved by USEPA in August 2004. Groundwater concentrations equal to or greater than 100 micrograms per liter (µg/L) for PCE and TCE were used to delineate the initial treatment areas and this criterion was also used for the additional EBT treatment areas. Sodium lactate was chosen for injection in two target treatment areas (TTA-1 and TTA-2). The MI RD also included a long-term monitoring (LTM) plan and a Land Use Control Implementation Plan (LUCIP).

The initial remedy implementation (EBT-1) included sodium lactate injections into the Fluvial Aquifer within the two treatment areas from September 2006 through February 2009 with performance monitoring conducted quarterly from October 2006 through March 2009. CVOC concentrations for parent compounds (PCE, TCE, CT and CF) were reduced over 90 percent in IWs and over 80 percent in MWs at locations with baseline concentrations above 100 µg/L.

The *Main Installation Interim Remedial Action Completion Report, Revision 1* (MI IRACR) (HDR|e^{2}M, 2010), including an OPS determination, was approved by USEPA in March 2010. Although EBT did not achieve the goal of reducing concentrations below MCLs, additional field investigation, groundwater modeling and trend analysis indicated that additional RA was not necessary.

Following observed rebound in CVOC concentrations in 2010 LTM samples, EBT-2 was conducted for areas where individual CVOC concentrations of parent compounds PCE, TCE and CT exceeded 100 µg/L: TTA-1, TTA-2, the West-Central plume and the Building 835 plume. Quarterly injections were made from November 2012 to August 2014 and performance monitoring was conducted from February 2013 to November 2014. The final report for EBT-2, *Main Installation Year Four Enhanced Bioremediation Treatment Report, Revision 0* (HDR, 2015), was approved by USEPA and TDEC in May 2015. The CVOC concentrations in the final samples (November 2014) decreased from the baseline samples (December 2011) by an average of 80 percent for IWs and 28 percent for performance monitoring wells (PMWs); the total number of EBT wells exceeding MCLs decreased from 55 wells to 17 wells over the same period. While EBT-2 reduced CVOC concentrations, it was not sufficient to meet the groundwater RAOs for the MI.

3.1.4 Supplemental Remedial Investigation

A Supplemental Remedial Investigation (SRI) is currently being performed for the MI to address data gaps identified through EBT performance monitoring and LTM. A Focused Feasibility Study (FFS) will be conducted upon completion of the SRI to update the remedial strategy. An

Explanation of Significant Differences (ESD) or a ROD Amendment will be prepared as necessary to document changes to the selected remedy. Further RA will be conducted after the FFS is completed and the selected remedy has been confirmed or revised.

The MI SRI, initiated in 2015, includes review of documents regarding the basis for the selected remedy and field investigation to improve understanding of site hydrogeology, extent of groundwater contamination and potential off-site sources of contamination. Phase 1 of the SRI was performed from April to August 2015 and Phase 2 was performed from October 2016 to April 2017. The field investigation included installation of twenty Fluvial Aquifer wells and two IAQ wells; the SRI wells were incorporated into LTM following initial collection of groundwater samples.

The *Supplemental Remedial Investigation Phases 1 and 2 Report, Revision 0* (HDR, 2017a) was submitted to USEPA and TDEC for review in November 2017. Conclusions from document review addressed hydraulic connections between the Fluvial Aquifer and the MAQ in the Memphis area and at DDMT; limits to natural attenuation of CVOCs in groundwater at DDMT due to low natural carbon and high dissolved oxygen in groundwater; and findings from the 2009 groundwater model (HDR|e^{2}M, 2010). Conclusions from the field investigation addressed site hydrogeology and plume delineation.

3.1.5 Vapor Intrusion

Potential vapor intrusion (VI) issues at the MI are being evaluated through a study performed in accordance with DoD and USEPA guidance, and with consideration of TDEC guidance. The primary guidance documents are:

- *DoD Vapor Intrusion Handbook* (Tri Service Environmental Risk Assessment Workgroup [TSERAWG], 2009)
- *Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air* (USEPA, 2015) (https://www.epa.gov/vaporintrusion/technical-guide-assessing-and-mitigating-vapor-intrusion-pathway-subsurface-vapor)
- *Vapor Intrusion Process and Flowchart* (TDEC, 2014)

VI monitoring for DDMT was previously conducted in the Dunn Field area (see Section 3.2.5.3) to evaluate the potential risks from groundwater contamination and implementation of the air sparging with soil vapor extraction (AS/SVE) remedy; CVOC concentrations in groundwater were an order of magnitude higher than currently reported on the MI. CVOC concentrations in the loess vapor samples were below then-current residential vapor screening values. The results indicated the loess provides a barrier to vertical migration of soil vapor and prevents vapor intrusion problems above the groundwater plume in that area.

The *Vapor Intrusion Screening Level Assessment Memorandum* (HDR, 2017b) was submitted to USEPA and TDEC for review in August 2017. Constituents of potential concern (COPCs) were identified from the primary CVOCs targeted for groundwater remediation on the MI; the May 2016 Vapor Intrusion Screening Level (VISL) calculator was used to determine the

groundwater screening level (SL) and the October 2016 LTM results were used to show where groundwater concentrations exceeded the SLs (Figure 9). In addition, the VISL Calculator and the Johnson Ettinger model were used to estimate the potential VI human health risk from COPCs at three wells which had the highest groundwater concentrations of COPCs and are located adjacent to occupied buildings. The assessment identified potential cancer risks greater than the target $1x10^{-6}$ and non-cancer risk greater than 1.0. Therefore, COPCs in groundwater on the MI may present an unacceptable human health risk from VI and warrant further investigation.

3.1.6 Long-Term Monitoring

MI LTM is performed to document changes in plume concentrations, to detect potential plume migration to off-site areas or into deeper aquifers, and to track progress toward meeting RAOs in accordance with the LTM Plan in Appendix B of the MI RD (CH2M HILL 2004a). LTM samples are analyzed for USEPA Target Compound List (TCL) VOCs; analytical summary tables include the primary CVOCs and other VOCs detected above the reporting limit (RL) in one or more samples. The primary CVOCs for the MI are CT, CF, PCE, TCE, cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC).

In response to suggestions from USEPA and the BRAC Environmental Coordinator, the well classifications in the LTM plan were reviewed based on additional information on site hydrogeology and contaminant extent from approximately 100 LTM wells installed since 2004. LTM well classifications were revised from the initial purpose-based criteria (background, boundary, sentinel and performance) to classification by aquifer and plume/area as described in the *Annual Long-Term Monitoring Report-2016, Revision 1* (HDR, 2017c); the report was approved by TDEC in June and by USEPA in October 2017.

LTM wells were assigned to the Fluvial, Intermediate or Memphis Aquifers. The upper clay layer in the Upper Claiborne which usually forms the base of the Fluvial Aquifer is absent in the central part of the MI, and the Fluvial sand and the Upper Claiborne sand form a single water table aquifer. Several deeper wells in this area are designated Upper Claiborne and are grouped with the IAQ wells. In addition, the MI LTM wells were grouped in the following area/plumes: TTA-1 North, TTA-1 South, TTA-2, West-Central, Building 835, North-Central, South-Central, Southeast MI, Window and Background. The Background wells were selected based on criteria in the MI LTM Plan (wells upgradient of or at a distance from groundwater plumes and with no, or low, previous detections of site contaminants).

The 2016 LTM report also included review and revision of the sample frequencies for LTM wells, consistent with the MI LTM Plan. The following criteria were recommended:

- New wells will be sampled semiannually over 2 years prior to a frequency being determined.
- Wells with stable concentrations below the MCL in the eight most recent samples will be sampled biennially.

- Wells with stable concentrations approximately two times the MCL or less will be sampled annually.
- All other wells will be sampled semiannually.
- The following exception to the criteria for the MI was recommended:
    - The MI MAQ wells have not exceeded MCLs in 13 samples but will continue to be sampled annually due to increased concentrations in upgradient wells.

In 2017, MI LTM included 148 wells, which are listed on Table 3; the well locations, color-coded by area, are shown on Figure 10. The number of wells and 2017 sample frequencies by aquifer are:

- 115 Fluvial Aquifer - semiannual (74), annual (23) and biennial (18);
- 30 IAQ/UC - semiannual (14), annual (12) and biennial (4); and
- 3 MAQ - semiannual (1) and annual (2).

The April 2017 LTM event consisted of a water level sweep and groundwater sampling at designated semiannual wells; a total of 104 groundwater samples were collected. The most recent analytical results for the primary CVOCs, from the April 2017 event or the biennial event in October 2016, were used to evaluate extent of contamination and prepare CVOC concentration maps.

The number of MI LTM wells with primary CVOCs exceeding an MCL and the maximum concentration for CVOCs exceeding MCLs in the most recent sample are summarized by aquifer and area on Table 4. A total of 87 MI LTM wells had concentrations above the MCL for one or more primary CVOCs. PCE and TCE were the CVOCs most often detected above MCLs and had maximum concentrations of 155 µg/L and 62.1 µg/L, respectively. Concentrations and isopleths for PCE and TCE from the April 2017 semiannual LTM event are shown on Figures 11 and 12, and the concentrations are shown on a cross-section through the window on Figure 13.

3.2 Dunn Field (OU-1)

Dunn Field, which is located across Dunn Avenue from the MI, contains approximately 65 acres and includes former mineral storage and waste disposal areas. Approximately 41 acres have been transferred through a public benefit conveyance and a competitive public sale; approximately 24 acres along the western and northern sides of Dunn Field are still held by the Army. (See Section 3.3)

Site records indicated that chemical warfare material (CWM), chlorinated lime, super tropical bleach, and calcium hypochlorite, food stocks, paints/thinners, petroleum/oil/lubricants (POL), acids, herbicides, mixed chemicals, and medical waste were destroyed or buried in pits and trenches at the Dunn Field disposal sites. Subsurface soils, including those from the disposal sites in the Disposal Area were considered to be principal threat wastes, which have significantly degraded groundwater quality in the shallow Fluvial Aquifer. The following CVOCs were detected at elevated concentrations in subsurface soils in the Disposal Area:

- PCE
- TCE
- cDCE
- VC
- 1,1,2,2-Tetrachloroethane (TeCA)
- 1,1,2-Trichloroethane (TCA)
- CT
- CF

Groundwater samples were analyzed for explosives, herbicides, metals (total), pesticides, PCBs, semi-volatile organic compounds, and VOCs; samples were also analyzed for chemical warfare materiel breakdown products. Only CVOCs were selected as COCs for groundwater; the CVOCs with the highest groundwater concentrations were TeCA and TCE. Three CVOC plumes were identified in the Fluvial Aquifer: a northern plume, a central plume, and a southern plume. The plume along the northern boundary of the site was determined to have on-site sources from previous releases in the northwest section of the Disposal Area on Dunn Field and from undetermined off-site sources, based on CVOCs detected in off-site monitoring wells (MWs) upgradient of Dunn Field. The central and southern plumes had on-site sources from releases in the Disposal Area (Figure 4). The site investigations and evaluation of remedial alternatives are described in the *Dunn Field Remedial Investigation Report* (CH2M HILL, 2002) and *Final Dunn Field Feasibility Study Report* (CH2M HILL, 2003a).

3.2.1 Prior Remedial and Removal Actions

The following actions were taken on Dunn Field prior to the ROD in 2004. The locations are shown on Figure 4.

3.2.1.1 Interim Remedial Action

The *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field (OU-1)* (CH2M HILL, 1996) was signed in April 1996, with the objective of hydraulic containment to prevent further contaminant plume migration and reduce contaminant mass in groundwater. The interim groundwater extraction system began operation in November 1998 with seven recovery wells (RWs); groundwater was discharged without treatment to the city sewer system under Industrial Discharge Agreement S-NN3-097. An expanded system with four additional RWs was brought on-line in 2001.

Based on reduction of CVOC concentrations in groundwater following implementation of the Dunn Field ROD, all RWs were shut down by January 2009. Approximately 918 pounds of total VOCs were discharged by the interim remedial action (IRA) in just over 10 years of operation. The IRA system was removed and the RWs abandoned in July 2010. The final year of IRA groundwater monitoring and the closure activities were described in *2009 Operations and Closure Report, Dunn Field Groundwater Interim Remedial Action* (HDR, 2010).

3.2.1.2 Removal Actions

The following non-time critical removal actions were performed:

- Approximately 914 CY of soil contaminated with mustard degradation by-products, 19 CY of mustard-contaminated soil and 29 bomb casings were removed by ET&D. The action was completed in March 2001 and documented in the *Final Chemical Warfare Materiel Investigation/Removal Action Report* (UXB International, Inc., 2001).

- Approximately 930 CY of lead-contaminated surface soil from the former pistol range were removed by ET&D. The action was completed in March 2003 and documented in *Removal Action at Former Pistol Range, Site* 60 (Jacobs Federal Programs, 2003).

3.2.2 Record of Decision and ROD Amendment

The *Memphis Depot Dunn Field Record of Decision* (Dunn Field ROD) (CH2M HILL, 2004b) was approved in April 2004 and *the Dunn Field Record of Decision Amendment, Revision 3* (ROD Amendment) (e^2M, 2009a) was approved in March 2009. The RAOs are:

Surface Soil

- Limit use of the surface soil in the Disposal Area to activities consistent with light industrial land use and prevent residential use through land controls

Disposal Sites

- Prevent groundwater impacts from a release of buried containerized hazardous liquids and the leaching of contaminants from buried hazardous solids
- Prevent unacceptable risk of direct contact with buried hazardous liquids and/or solids due to intrusive activities during future land use or site development

Subsurface Soil Impacted with VOCs

- Prevent direct inhalation of indoor air vapors from subsurface soils in excess of industrial worker criteria
- Reduce or eliminate further impacts to the shallow Fluvial Aquifer from VOCs in the subsurface soil

Groundwater

- Prevent human exposure to contaminated groundwater (i.e., exceeding protective target concentrations [TCs])
- Prevent further off-site migration of VOCs in excess of protective target levels
- Remediate Fluvial Aquifer groundwater to drinking water quality to be protective of the deeper MAQ

The subsurface soils, primarily within the Disposal Area of Dunn Field, had residual CVOC levels that exceeded the soil-to-groundwater migration-based screening levels and potential for VI to indoor air under possible future land use conditions. Site-specific target concentrations calculated for the loess and fluvial deposits are shown on Table 5.

Since multiple CVOCs were detected in groundwater at the site and in the immediate downgradient area, targeting to meet the MCLs was not considered adequately protective of a potentially exposed receptor due to the possibility of cumulative toxicity exceeding the upper-bound limit of the acceptable risk or hazard index (HI). Upon completion of RA, the residual risks are to be below target levels at points of compliance throughout the plume(s). The

individual concentration of each CVOC will be below MCLs and combined concentration levels will not exceed a cumulative upper-bound target risk of 1 in 10,000 ($1X10^{-4}$) and a HI of 1.0 in any given plume.

The components of the selected remedy from the Dunn Field ROD are:

- ET&D of soil and material contained within disposal sites based upon results from a pre-design investigation
- Soil vapor extraction (SVE) to reduce VOC concentrations in subsurface soils to levels that are protective of the intended land use and groundwater
- Injection of zero valent iron (ZVI) within Dunn Field to treat CVOCs in the most contaminated part of the groundwater plume, and installation of a permeable reactive barrier (PRB) to remediate CVOCs within the off-site areas of the groundwater plume
- Monitored natural attenuation (MNA) and LTM of groundwater to document changes in plume concentrations, detect potential plume migration to off-site areas or into deeper aquifers, and track progress toward remediation goals (RGs)
- Implementation of LUCs, which consist of the following ICs: Deed and/or lease restrictions; Notice of Land Use Restrictions; City of Memphis/Shelby County zoning restrictions and the Shelby County Health Department (SCHD) groundwater well restrictions.

The Dunn Field ROD identified the eastern portion of Dunn Field, including most of the Northeast Open Area and the Stockpile Area, as suitable for unrestricted use and unlimited exposure (Figure 4).

The fundamental change documented in the ROD Amendment was the use of AS/SVE instead of a PRB for the Off Depot groundwater plume. The criteria used to determine the extent of the AS/SVE system and the treatment objective were also included in the ROD Amendment. The AS/SVE system was selected to cross the core of the plume near the downgradient end and to reduce the individual CVOC concentrations in groundwater to 50 µg/L or less. The RGs for the COCs, shown on Table 5, were not changed from the Dunn Field ROD.

Three RAs were performed to implement the selected remedies for OU 1, Dunn Field: Disposal Sites RA (ET&D); Source Areas RA (SVE, ZVI injections and LUCs); and Off-Depot Groundwater RA (AS/SVE, MNA, and LTM). Locations of the Disposal Sites, Source Areas and Off-Depot Groundwater RAs are shown on Figure 14.

3.2.3 Disposal Sites Remedial Action

Soil and debris including potential principal threat wastes (primarily drums and glass bottles) from five disposal sites were excavated and transported for off-site disposal in accordance with the *Dunn Field Disposal Sites Final Remedial Design, Revision 1* (CH2M HILL, 2004c). The *Dunn Field Disposal Sites Remedial Action Completion Report, Revision 1* (MACTEC, 2006), was approved by USEPA in August 2006.

The Disposal Sites RA was performed during two separate mobilizations in 2005 and 2006. Approximately 2,700 CY of non-hazardous materials were transported off-site and disposed at the BFI South Shelby County Landfill. Approximately 234 CY of hazardous materials from Disposal Site 3 was disposed at the Clean Harbors Lambton Secure Landfill in Canada. The confirmation samples met the RGs at each site.

3.2.4 Source Areas Remedial Action

The Source Areas RA included conventional SVE in the coarse-grained fluvial soils; ET&D for two shallow areas containing waste materials (TA-1F) and buried drums with residual petroleum hydrocarbons (TA-3); thermal SVE (TSVE) (in situ thermal desorption) in the fine-grained loess; and ZVI injection in the Fluvial Aquifer. The RA was performed in accordance with the *Memphis Depot Dunn Field Source Areas Final Remedial Design* (Dunn Field RD) (CH2M HILL, 2007).

The *Dunn Field Source Areas Interim Remedial Action Completion Report, Revision 1* (HDR|e^{2}M, 2009) was approved by USEPA and TDEC in November 2009. The *Dunn Field Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (e^{2}M, 2009b), was approved by USEPA in October 2009.

The Fluvial SVE (FSVE) system was installed to remove CVOCs from the fluvial sands at Dunn Field with screened intervals for the SVE wells at approximately 30 to 70 feet bgs. The FSVE system was operated from July 2007 through July 2012, and removed approximately 4,000 pounds of VOCs. The FSVE system was shut down in July 2012 based on confirmation soil sample results demonstrating that RAOs had been met. The final year of operations and monitoring was described in *Dunn Field Source Areas Fluvial Soil Vapor Extraction System Annual Operations Report, Year Five, Revision 0* (HDR, 2012a), which was approved by USEPA and TDEC in December 2012.

The initial excavations at TA-1F and TA-3 were performed October 2007 to January 2008. Further excavation was delayed in order to proceed with construction and operation of the TSVE system. The excavations were completed February to June 2009. Approximately 7,400 CY of waste material were disposed as non-hazardous waste at a CERCLA-approved facility. Soil confirmation samples met RGs in both areas.

TSVE treatment was performed in four areas with a total area of about 1.25 acres and a treatment interval of approximately 5 to 30 feet bgs. The thermal conduction wells operated from May to November 2008, and the vapor extraction system was shut down on 4 December 2008. Approximately 12,500 pounds of VOCs were removed during treatment. Confirmation soil samples demonstrated that clean-up standards were met.

ZVI injections were not required because groundwater objectives for the Source Areas remedy were achieved through the subsurface soil remedies.

3.2.5 Off Depot Groundwater Remedial Action

3.2.5.1 Early Implementation

An Early Implementation of Selected Remedy (EISR) using ZVI was performed to reduce contaminant mass downgradient of the planned PRB in order that the portion of the plume slated for MNA in the ROD was not unduly extensive or high in concentration. ZVI injections were made November 2004 to January 2005. The *EISR Interim Remedial Action Completion Report, Revision 1* (MACTEC, 2005) noted that the injections did not achieve the goal of 90 percent or greater reduction of TCE and TeCA and the report included recommendations for decreased spacing between injection locations to achieve increased reduction in CVOCs. The report was approved by USEPA in September 2005.

3.2.5.2 AS/SVE

The Off Depot Groundwater RA included installation of an AS/SVE system across the core of the plume near the downgradient end; MNA and long-term groundwater monitoring to document remedy performance and/or changes in the lateral or vertical extent of the CVOC plume; and ICs to prevent access to contaminated groundwater. The RA was performed in accordance with the *Memphis Depot Dunn Field Off Depot Groundwater Final Remedial Design, Revision* 1 (Off Depot RD) (CH2M HILL, 2008). Remedial action construction and implementation are described in *Off Depot Groundwater Interim Remedial Action Completion Report, Revision 1* (Off Depot IRACR) (HDR, 2011), which was approved by USEPA in August 2011.

The AS/SVE system consists of 90 AS points, 12 SVE wells, 10 pairs of vapor monitoring points (VMPs) and control buildings for the AS compressor, SVE blowers and system controls. The AS points are individually programmed for daily operation in 2-hour blocks and set to operate in three groups. System operations have been adjusted periodically to reduce potential for plume diversion around the treatment area. The AS/SVE system layout and nearby monitoring wells are shown on Figure 15.

The latest annual report, *Off Depot Air Sparge-Soil Vapor Extraction System Annual Operations Report, Year Six, Revision 0* (HDR, 2017d), was submitted to USEPA and TDEC in August 2017. The AS/SVE system is limited to full operations in alternate months to maintain northerly groundwater flow in the treatment area; the system uptime was approximately 93 percent during periods of full operation. The SVE system extracted over three times the AS injection rate and vacuum measurements indicated vapor capture throughout the treatment area. Total VOC concentrations in effluent vapor samples ranged from 75 to 82 parts per billion by volume (ppbv). The April 2017 total VOC concentration (82 ppbv) is approximately 6 percent of the concentration at startup in December 2009 (1240 ppbv). The estimated VOC emission rate in the effluent during Year Six was 0.001 pound per hour (lb/hr), below the SCHD de minimus standard. Approximately 86 pounds of VOCs have been removed since startup in 2009.

Overall performance of the AS/SVE system is evaluated based on results of LTM analyses. The AS/SVE system was installed to intercept the majority of the Off Depot CVOC plume and to reduce individual CVOC concentrations below 50 µg/L. Operations are to continue until concentrations do not exceed 50 µg/L for individual CVOCs in each upgradient well. Since April

2012, only TCE in one LTM well near the AS/SVE system, MW-159, has exceeded the 50 µg/L objective. The TCE concentration in MW-159 was 171 µg/L in October 2016 and 141 µg/L in April 2017.

In order to address the continued high concentration of TCE at MW-159, additional AS wells will be installed south of MW-159 to increase removal of CVOCs from groundwater. The *Off Depot Air Sparge Well Installation Work Plan, Dunn Field* (Trinity, 2016) was approved by USEPA and TDEC in 2016. The new AS wells will be installed upon completion of an updated access agreement with MLGW and will be incorporated into system operations following installation. No other changes to AS/SVE operations are planned.

The initial project schedule assumed AS/SVE operations would be conducted for 5 years. However, since the active remediation goal of CVOC concentrations at 50 µg/L (or less) has not been met, operations are planned to continue through May 2019.

3.2.5.3 Vapor Intrusion Study

Vapor sampling was performed in 2009 to assess potential VI at residences from CVOCs in the Off Depot plume. The sampling activities and results were described in the Off Depot IRACR (HDR, 2011). Since the past disposal activities which resulted in the groundwater plume were limited to Dunn Field, CVOCs in groundwater were considered the only source for potential VI in the Off Depot area. The target area was determined using the 2009 TCE 5 µg/L isopleth with a 100-foot outer buffer. Based on site conditions and access, vapor probe locations were selected at four properties. A control location was selected on the MLGW substation property adjacent to both an AS/SVE vapor monitoring point (VMP-4) and a monitoring well with high CVOC concentrations (MW-155). CVOC concentrations at MW-155 in June 2009 were 1610 µg/L for TeCA and 643 µg/L for TCE.

Baseline vapor samples were collected in September 2009 prior to the start of AS/SVE operations. The maximum reported concentrations in the samples were compared to Soil Vapor Screening Values-Residential from New Jersey Department of Environmental Protection website, March 2007. The baseline sample results were summarized as follows:

- CVOC concentrations in vapor samples from the loess were below residential screening levels and were orders of magnitude lower than baseline concentrations in the fluvial sands.
- CVOCs at the highest concentrations in the baseline samples from the fluvial sands (TeCA and TCE) were not detected as frequently or at similar relative concentrations in the loess.
- Vapor concentrations in baseline samples collected from the loess directly above the plume were similar to results from the locations above the edge of the plume.

A second round of vapor samples was collected in March 2010 to confirm the findings from the baseline vapor probe samples and to evaluate the impact of AS/SVE operations on vapor concentrations. The same three CVOCs (TCE, PCE and methylene chloride) were detected in samples from the loess; the CVOC concentrations were similar to the initial samples and

remained below screening levels. TCE, PCE and methylene chloride were also detected in vapor samples from the fluvial sand at much lower concentrations than in the baseline samples. TCE was reported at the highest concentration (28 micrograms per cubic meter), which was less than 1 percent of the baseline sample concentration.

The Off Depot VI study found that AS-SVE operations significantly reduced CVOC concentrations in the fluvial sands and that CVOCs in the groundwater plume did not present a VI problem for nearby residences. Following approval from USEPA and TDEC, the vapor probes were abandoned in September 2010.

3.2.6 Long-Term Monitoring

From 1999 to 2010, groundwater monitoring on Dunn Field was conducted to evaluate IRA effectiveness in restricting plume migration. Since 2010, groundwater monitoring has been conducted in accordance with the LTM Plan in Appendix C of the Off Depot RD (CH2M HILL 2008). Dunn Field LTM is conducted to evaluate progress in meeting RAOs to prevent further off-site migration of VOCs in groundwater in excess of protective target levels and restore Fluvial Aquifer groundwater to drinking water quality to be protective of the deeper MAQ. LTM samples are analyzed for USEPA TCL VOCs; analytical summary tables include the primary CVOCs and other VOCs detected above the RL in one or more samples. The primary CVOCs for Dunn Field are CT, CF, 1,1-dichloroethene (DCE), trans-1,2-dichloroethene, cDCE, TeCA, PCE, TCA, TCE, and VC.

As noted in Section 3.1.6, LTM well classifications and sample frequencies were revised in the 2016 LTM report (HDR, 2017c). LTM wells were assigned to the Fluvial, Intermediate or Memphis Aquifers and were grouped in the following area for Dunn Field: DF North, DF West, Off Depot and Background. The criteria for sample frequency for the MI and Dunn Field are the same:

- New wells will be sampled semiannually over 2 years prior to a frequency being determined.
- Wells with stable concentrations below the MCL in the eight most recent samples will be sampled biennially.
- Wells with stable concentrations approximately two times the MCL or less will be sampled annually.
- All other wells will be sampled semiannually.
- The following exception to the criteria for the Dunn Field was recommended:
    - The DF North wells exceeding an MCL will continue to be sampled annually until the need for remedial action is determined.
    - Off Depot wells adjacent to the AS/SVE system will be sampled more frequently than required by the new criteria in order to monitor AS/SVE performance

In 2017, Dunn Field LTM included 85 wells. The LTM wells are listed on Table 6 and the well locations, color-coded by area, are shown on Figure 16. The number of wells and 2017 sample frequencies by aquifer are:

- 80 Fluvial Aquifer - semiannual (13), annual (31) and biennial (36);
- 4 IAQ/UC - annual (2) and biennial (2); and
- 1 MAQ - biennial (1).

The April 2017 LTM event consisted of a water level sweep and biennial groundwater sampling at all wells; a total of 85 groundwater samples were collected. The analytical results for the primary CVOCs were used to evaluate extent of contamination and prepare CVOC concentration maps.

The number of Dunn Field LTM wells with primary CVOCs exceeding an MCL or TC and the maximum concentration for those CVOCs are summarized by aquifer and area on Table 7. A total of 16 Dunn Field LTM wells had concentrations above an MCL or TC for one or more primary CVOCs; all 16 wells are screened in the Fluvial Aquifer. TCE was most often detected above MCLs and had a maximum concentration of 141 µg/L (MW-159). Concentrations and isopleths for total CVOCs and TCE from the April 2017 LTM event are shown on Figures 17 and 18.

3.2.6.1 Off-Site Plume, Northeast Dunn Field

CVOC concentrations above MCLs in Fluvial Aquifer wells on the north end of Dunn Field are considered to result from contaminant migration from a suspected, off-site source(s) upgradient of Dunn Field. Concentrations of DCE, PCE and TCE above MCLs have been detected at the north end of Dunn Field since 1993. Groundwater concentrations have exceeded MCLs for DCE, PCE, and TCE in off-site, upgradient wells (MW-129 and MW-130) since installation in 2003.

TDEC conducted preliminary assessments and site investigations upgradient of Dunn Field to identify an off-site source(s). During investigations at the Wabash Avenue and Cintas/Production Specialties sites from 2005 to 2008, TDEC installed 11 monitoring wells (Figure 19). Elevated concentrations of CVOCs were detected at the Cintas site, but TDEC did not consider it a source for the plume migrating on to Dunn Field.

Army conducted a membrane interface probe (MIP) survey with confirmation soil sampling at the northeast corner of Dunn Field in March and April 2017 (Figure 19). The investigation was performed to determine if previously unidentified contaminant source areas exist in this area of Dunn Field and was limited to the unsaturated loess, as previous investigations have shown the loess would retard migration of CVOCs and act as a long-term source area. *The Membrane Interface Probe Survey Report, Dunn Field* (Trinity, 2017) was submitted to USEPA and TDEC in July 2017. The report concluded there was no indication of source materials in the northeast portion of Dunn Field contributing to elevated CVOC concentrations in groundwater.

Following the MIP survey, Army collected additional data from the TDEC wells installed upgradient of Dunn Field. Ten of the TDEC wells were found to be usable; the wells were

redeveloped, water level measurements were recorded, and groundwater samples were collected for analysis of VOCs. *Data Collection at TDEC Wells, Dunn Field, Defense Depot Memphis, Tennessee* (HDR, 2017e) was submitted to USEPA and TDEC in December 2017. Several CVOCs were detected above the RL in one or more wells (DCE, CT, CF, PCE, TCE and 1,1-dichloroethane). The only CVOC reported above an MCL was DCE in CS-02 at 16.3 µg/L. The upgradient limits of the off-site plumes for TCE and DCE, based on concentrations above the RL, are located on the Cintas site.

3.3 Property Transfer and Land Use Controls

All DDMT property was made available for transfer through six Findings of Suitability to Transfer (FOSTs). The area covered by each FOST is shown on Figure 20. Following approval of FOST 6, USEPA issued the *Superfund Property Reuse Evaluation Checklist for Reporting the Site Wide Ready for Anticipated Use Measure* (USEPA, 2010b) documenting that all cleanup goals affecting current and reasonably anticipated future land uses have been achieved, and all institutional or other controls required in the RODs have been put in place.

Property transfers through deed or letter of assignment have been completed for all FOSTs, except for the western and northern area on Dunn Field included in FOST 5. The acreage, type of conveyance, type of transfer, receiving party and date of transfer are listed on Table 8. Army plans to transfer the remaining 24.5 acres from FOST 5 through a competitive public sale. The transfer has been delayed due to economic conditions, impediments to site development from remediation equipment and monitoring wells on-site, and the presence of groundwater contamination from a suspected off-site source migrating on to the property.

DDMT is currently zoned for light industrial use. The MI is used for commercial warehousing and light manufacturing, except in the southeast quadrant of the MI where the Airways police station, a homeless shelter for veterans and a golf course are located; Dunn Field is undeveloped (Figure 2). The current property owners, acreage and land use are listed on Table 9.

LUCs have been established for the MI and Dunn Field, as described in the following sub-sections. The LUCs will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use. Annual inspections are conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

3.3.1 Main Installation

LUCs for the MI are described in the LUCIP in Appendix C of the MI RD (CH2M HILL, 2004a). The LUCs prevent residential use of the majority of the MI and production or consumptive use of groundwater or drilling of groundwater supply wells throughout the MI; the areas covered by the LUCs are shown on Figure 21.

The MI LUCIP was implemented in 2005. The Notice of Land Use Restrictions for the MI was recorded at the City of Memphis/Shelby County Register of Deeds on January 26, 2005. Deed

restrictions have been included in property transfers. Annual inspections have been performed since 2005 and reports have been distributed in accordance with the LUCIP. The *Main Installation 2017 Annual Site Inspection Report* (HDR, 2017f) was submitted to USEPA and TDEC on 8 August 2017; no deficiencies or violations of the LUCs were identified.

3.3.2 Dunn Field

LUCs for Dunn Field are described in the LUCIP in Appendix A of the Off Depot RD (CH2M HILL, 2008). The LUCs are to limit use of the Disposal Area to light industrial land uses, to prevent residential use of Dunn Field, and to prevent exposure to contaminated groundwater. The majority of the eastern section of Dunn Field was approved for unrestricted use in the Dunn Field ROD (CH2M HILL, 2004b). There is some overlap between the unrestricted use area and the areas subject to LUCs as approved in the Dunn Field LUCIP (Figure 22).

The Dunn Field LUCIP was implemented in 2009. The Notice of Land Use Restrictions for Dunn Field was recorded at the City of Memphis/Shelby County Register of Deeds on 11 June 2009. Annual inspections have been performed since 2009 and reports have been distributed in accordance with the LUCIP. The *Dunn Field 2017 Annual Site Inspection Report* (HDR, 2017f) was submitted to USEPA and TDEC on 8 August 2017; no deficiencies or violations of the LUCs were identified.

4 Activities Required for Site Completion

Selected remedies for DDMT have been implemented in accordance with the MI and Dunn Field RODs, and the IRACRs have been approved by USEPA and TDEC. The Preliminary Closeout Report has also been approved by USEPA, and the NPL site status is Construction Complete.

Soil cleanup standards have been met where applicable. The remaining requirement for completion of remedial action is that groundwater concentrations for CVOCs, which are the contaminants of concern, are below MCLs.

The ongoing activities are summarized below with additional information in the following sections:

- The MI SRI, and associated activities for risk assessment, groundwater modeling and VI, will continue in 2018. An FFS will be conducted upon completion of the SRI to update the remedial strategy. A decision document (ESD or ROD Amendment) will be prepared as necessary to document changes to the selected remedy. Further RA will be conducted after the selected remedy has been confirmed or revised.
- FSVE operations on Dunn Field were shut down in July 2012 after remediation goals were met. The SVE wells, piping and equipment compound remain in place while groundwater is monitored for rebound. Limited rebound has been observed along the western boundary of Dunn Field; CVOC concentrations in three LTM wells increased slightly above the MCL or TC in April 2017. Additional remedial action to address the limited rebound on Dunn Field is not considered necessary at present.
- AS/SVE in the Off Depot area is continuing; only a small area near MW-159 exceeds the active remediation goal. Additional AS wells will be installed in that area following approval of an access agreement with the property owner, MLGW.
- Initial investigations found no indication of a contaminant source in the soil (loess) at the northeast corner of Dunn Field, and groundwater samples in TDEC wells upgradient of Dunn Field contained CVOCs above RLs. The scope for additional investigation is being developed by Army.
- LTM at Dunn Field and the MI is performed to monitor contaminant migration horizontally and vertically and to evaluate progress toward restoring groundwater concentrations to remediation goals. LTM will continue until CVOC concentrations are at or below MCLs, and TCs for Dunn Field.
- LUCs and requirements for Five-Year Reviews will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use.

4.1 Main Installation

4.1.1 Supplemental Remedial Investigation

Additional investigation is planned in 2018. The following data gaps were developed from the SRI Phases 1 and 2 report and the 2016 and April 2017 LTM reports.

1. Determine the groundwater flow direction, hydraulic gradient and off-site extent of CVOCs in the IAQ to the north of MW-256.
2. Investigate potential contaminant migration into the IAQ at the Fluvial Aquifer sink and determine the IAQ groundwater flow direction and hydraulic gradient in the south-central MI.
3. Determine the groundwater flow direction, hydraulic gradient and extent of CVOCs in the Fluvial Aquifer and the IAQ at the southeast area of the window (area bounded by MW-282, MW-63A/B, MW-207A/B, MW-211 and MW-107).
4. Assess a potential contaminant source near MW-107 that could impact the IAQ and MAQ due to its location within the upgradient area or the window.
5. Complete delineation of identified plumes, including potential upgradient impacts on-site and off-site, where needed to effectively plan remedial activities.
6. Investigate upgradient extent of CVOCs at MW-270 on the southern MI boundary.
7. Complete well installation in areas without previous investigation as identified in the SRI Phase 2 work plan.
8. Investigate vertical heterogeneity in hydraulic parameters in the Fluvial Aquifer and IAQ in order to effectively position well screens for vertical delineation in Phase 4.
9. Investigate potential source areas near wells with relatively quick rebound of CVOC concentrations following EBT or consistently high concentrations of parent compounds (PCE, TCE and CT). (PMW21-02, PMW21-03, PMW21-04 in TTA-1 North; MW-101, PMW101-03B and PMW101-04B in TTA-1 South; and DR2-1, MW-92 and PMW85-05 in TTA-2).

The *SRI Phase 3 Quality Assurance Project Plan (QAPP), Revision 0* (HDR, 2017g) was submitted to USEPA and TDEC in November 2017. The Phase 3 investigation will include installation of new monitoring wells in the Fluvial Aquifer and the IAQ to collect hydrogeological and analytical data and address data gaps 1 to 7. Data Gaps 8 (vertical heterogeneity) and 9 (potential source areas) are outside the scope of work for the current task order and will be addressed later. The proposed SRI Phase 3 well locations are shown on Figure 23.

4.1.2 Risk Assessment

The groundwater component of the human health risk assessment (HHRA) in the MI RI (CH2M HILL, 2000a) is being updated to comply with current guidance and address technical and policy changes since its completion. In addition, the soil component of the HHRA and the screening level ecological risk assessment (SLERA) in the MI RI are being reviewed. Soil contaminants

(lead, PCP, dieldrin, PCBs and metals/PAHs) were addressed in removal actions prior to completion of the MI ROD. There has been no change in the site's development for light industrial use nor has there been an increase in suitable ecological habitat since the MI RI was completed in 2000. The review includes evaluation of changes to toxicity factors and risk assessment protocols for the identified soil contaminants and for ecological risk in order to determine if an update to the soil component of the HHRA and/or the SLERA is warranted. The Human Health and Ecological Risk Assessment report is in preparation for submittal to USEPA and TDEC in early 2018.

4.1.3 Groundwater Model

An updated groundwater model is being developed to incorporate site information obtained since the previous groundwater modeling in 2009 and to utilize a more detailed flow and transport model. The modeling update includes data collection and compilation, conceptual site model (CSM) development, and groundwater flow and transport model construction, calibration and predictive scenarios. The updated CSM will consider groundwater flow directions and velocities within the site, off-site and towards the Allen Well Field in the Memphis Sand Aquifer; identification of potential source areas based on current PCE and TCE plume maps and establishment of boundary conditions for the model domain.

The model will focus on flow and transport in the Fluvial Aquifer with simplifying assumptions for the IAQ and MAQ based on available information. A technical memorandum documenting the CSM, modeling objectives and data limitations, and planned model construction is in preparation for submittal to USEPA and TDEC. Data for the Allen Well Field has been requested from MLGW, to include monthly pumping data for supply wells and monthly water level data for supply and monitoring wells at Allen Well Field. Based on review of the existing data from DDMT, the Allen Well Field data are necessary to update the 2009 model results. Submittal of the CSM technical memorandum and modeling will be delayed until availability of the Allen Well Field data is resolved.

A second technical memorandum will document the final model construction, calibration and predictive scenarios. The memoranda will be incorporated in the final SRI report.

4.1.4 Vapor Intrusion

The initial VI screening assessment, summarized in Section 3.1.5, identified potential cancer risks greater than the target $1x10^{-6}$ and non-cancer risk greater than 1.0. Site-specific VI pathway evaluation is planned in accordance with DoD guidance. Soil gas samples will be collected in open areas and beneath building sub-slabs at locations considered most likely to contain VOCs in soil and/or groundwater at concentrations that may present a VI human health risk. The *Main Installation Vapor Intrusion Soil Gas Sampling QAPP* (HDR, 2017h) was submitted to USEPA and TDEC in October 2017. The proposed soil gas sample locations are shown on Figure 24. Soil gas sampling is planned for early 2018.

Depending on soil gas sample results, samples of indoor air may be collected and options for mitigation and/or remediation will be evaluated as needed. A detailed report describing VI study

activities, analytical results with data validation and laboratory reports, conclusions and recommendations will be prepared upon completion.

4.1.5 Feasibility Study

The FFS, to be performed after completion of the SRI, will identify contaminant extent, volumes and area of groundwater contamination, and develop appropriate remedial alternatives for evaluation. The alternatives are expected to include No Action, EBT (including bioaugmentation), AS/SVE, and groundwater pump and treat system. A detailed analysis will be performed for the remedial alternatives that pass the preliminary screening against applicable CERCLA evaluation criteria.

4.1.6 Long-Term Monitoring

MI LTM is performed in accordance with the LTM Plan in the MI RD (CH2M HILL, 2004a). Recommendations for optimization are made in the annual LTM reports. The current status of MI LTM was described in Section 3.1.6.

In April 2017, a semiannual LTM event was performed with samples collected at 102 wells. MCLs for PCE, TCE, cDCE, VC and/or CT were exceeded at 87 wells including 70 Fluvial Aquifer wells, 16 IAQ wells and 1 MAQ well (Table 4). An annual MI LTM event was conducted 6 to 12 October; the results will be presented in the 2017 LTM report.

4.2 Dunn Field

4.2.1 Fluvial SVE Operations

The FSVE system was shut down in July 2012 based on confirmation soil samples meeting remediation goals and VOC concentrations in system influent asymptotically decreasing below 1 part per million. BaroBall™ caps were installed on 11 SVE wells for passive venting. The caps have a control valve which utilizes the natural fluctuation of atmospheric pressure to allow soil gas to flow out of the well while restricting air flow from the surface into the well.

Rebound of CVOC concentrations in groundwater is evaluated through LTM sample results. Vadose zone modeling indicated rebound due to residual CVOC mass in the loess would show the greatest impact 3 to 5 years after shutdown of the FSVE system. The April LTM event marked almost 5 years of post-shutdown monitoring.

The main indication of rebound prior to 2017 was increased CF and TCE concentrations at MW-87 on the central section of Dunn Field's western boundary. In April 2017, four wells (MW-06, MW-57, MW-70 and MW-87) along the western boundary exceeded the MCL or TC for CF and/or TCE (Figures 17 and 18). For the first time since the FSVE shutdown in 2012, CF concentrations exceeded the MCL at MW-87 and the TC at MW-06, and TCE concentrations exceeded the MCL at MW-57 and MW-70. Annual analytical results for April 2013 to April 2017 are shown below. The limited increase in concentrations does not warrant additional remedial action on Dunn Field at present, but concentrations will continue to be monitored.

MW-06	MCL	TC	Apr-2013	Apr-2014	Apr-2015	Apr-2016	Apr-2017
CF (µg/L)	80	12	2.21	4.2	11	7.39	15.3
TCE (µg/L)	5	5	0.707J	0.929J	2.59	1.02	0.876J

MW-87	MCL	TC	Apr-2013	Apr-2014	Apr-2015	Apr-2016	Apr-2017
CF (µg/L)	80	12	0.254J	19.3	63.1	59.8	100
TCE (µg/L)	5	5	<1	2.74	4.16	7.04	7.32

MW-57	MCL	TC	Apr-2013	Apr-2014	Apr-2015	Apr-2016	Apr-2017
CF (µg/L)	80	12	6.97	1.17	0.653	0.396	0.324
TCE (µg/L)	5	5	0.916J	1.03	0.843J	2.1	5.61

MW-70	MCL	TC	Apr-2013	Apr-2014	Apr-2015	Apr-2016	Apr-2017
CF (µg/L)	80	12	0.166J	0.187J	0.148J	0.24J	<0.3
TCE (µg/L)	5	5	0.988J	0.378J	0.27J	0.676J	5.69

4.2.2 AS/SVE Operations

The AS/SVE system consists of 90 AS points, 12 SVE wells, 10 pairs of VMPs and control buildings for the AS compressor, SVE blowers and system controls. The AS/SVE system layout is shown on Figure 15.

The vapor stream passes through the air/water separator tank to remove entrained vapor and debris from the air stream. No other treatment is performed prior to discharge. AS/SVE operations were incorporated in SCHD Permit #01030-01P issued for the FSVE with permit conditions, including the VOC emission limit of 5.71 lb/hr, applicable to the combined operations. In May 2016, SCHD cancelled the permit and exempted the remediation system based on emissions being below the de minimus limit of 0.1 pounds per hour. Effluent vapor monitoring will continue to confirm emissions remain below the de minimus limit.

Overall effectiveness of the AS/SVE system is evaluated based on results of LTM analyses. The Off Depot RD (CH2M HILL, 2008) states shutdown of the AS/SVE system will be considered when groundwater samples upgradient and downgradient of the AS barrier show individual CVOC concentrations at or below 50 µg/L for 12 months. Isolated upgradient outliers may be excluded from consideration if surrounding wells show statistically significant decreasing trends.

The only wells, upgradient or downgradient of the AS/SVE system, with CVOC concentrations exceeding the active remediation goal in April 2017 were TCE at 141 µg/L in MW-159 located immediately upgradient of the system, and CF at 100 µg/L in MW-87 located near the Dunn Field boundary. As noted in Section 4.2.1, limited rebound has been observed along the western boundary of Dunn Field.

Additional AS wells are to be installed near MW-159 to reduce CVOC concentrations in that area below the active remediation goal. The *Off Depot Air Sparge Well Installation Work Plan, Dunn Field* (Trinity, 2016) was approved by USEPA and TDEC. The additional AS wells, shown on Figure 15, will be installed upon completion of an updated access agreement with MLGW. Since the active remediation goal has not been met, AS/SVE operations are planned to continue through at least 2018.

AS/SVE operations include:

- Weekly site visits to adjust AS compressor and SVE blower cycles in accordance with the operating plan and to conduct system inspections to identify and schedule repair or replacement of components, as needed.
- Bi-weekly readings at AS compressor and SVE blowers for flow rate, pressure/vacuum, temperature, and operating hours.
- Monthly flow rate, vacuum and photoionization detector (PID) measurements at SVE wells and system effluent during months when the AS manifold is open.
- Quarterly PID and vacuum measurements at VMPs.
- Quarterly laboratory samples from system effluent analyzed for VOCs.
- Semiannual report to describe operations and maintenance (O&M) activities, system status, performance and monitoring results.
- Annual operations report to summarize system operations and monitoring results with data validation and to provide recommendations for optimization of operations.

Inspections include a visual review of the equipment compound (exterior and interior) and major system components. The inspector records system flow rates and other operating parameters from one of the system interface screens or directly from gauges and meters located within the equipment room. Original field sheets are maintained on-site in the project file. General maintenance of AS/SVE system components is performed based on field observations and manufacturer requirements.

Vapor samples for laboratory analysis are limited to the system effluent and are collected quarterly for VOC analysis. PID readings at SVE wells and system effluent and the effluent sampling results are used to assess VOC capture effectiveness. The effluent sampling results are also used to verify compliance with the SCHD de minimus emission level. PID readings and vacuum measurements at VMPs are used to assess the vacuum radius of influence and vapor extraction effectiveness.

4.2.3 Long-Term Monitoring

Dunn Field LTM is performed in accordance with the LTM Plan in the Off Depot Groundwater RD (CH2M HILL, 2008). Recommendations for optimization are made in the annual LTM reports. The current status of Dunn Field LTM was described in Section 3.2.6.

In April 2017, a biennial sampling event was performed at Dunn Field and the Off Depot area with samples collected at the 85 Dunn Field LTM wells. MCLs or TCs for TeCA, PCE, TCE, cDCE, DCE, VC and/or CF were exceeded at 16 Fluvial Aquifer wells (Table 7): 8 DF North wells, 4 DF West Wells and 4 Off Depot wells. The exceedances in the DF North and Off Depot wells were at the same wells and similar concentrations as in 2016; there were three additional exceedances in the DF West wells, as discussed in Section 4.2.1. A semiannual Dunn Field LTM event was conducted 5 and 6 October; the results will be presented in the 2017 annual report.

4.2.4 Off-Site Plume

As described in Section 3.2.6.1, Army performed limited investigations for the offsite plume in 2017. An on-site MIP survey with confirmation soil sampling was conducted in April 2017, and water level measurements and groundwater samples were collected from TDEC wells upgradient from Dunn Field in October 2017. A plan for additional investigation is being developed by Army.

4.3 Land Use Controls

The LUCs applicable to the MI and Dunn Field are described in the LUCIPs in the MI RD (CH2M HILL, 2004a) and Off Depot Groundwater RD (CH2M HILL, 2008). The areas covered by the LUCs are shown on Figures 21 and 22. LUCs will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use. As described in Section 3.3, annual inspections are conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved. No deficiencies or violations of the LUCs have been identified.

4.4 Five-Year Reviews

The continued effectiveness of the selected remedies at the MI and Dunn Field are evaluated in CERCLA Five-Year Reviews because hazardous substances remain at the site above levels that allow for unrestricted use and unlimited exposure. Because the final remedies for both the MI and Dunn Field include LUCs in perpetuity, the period in which five-year reviews will be required is indefinite.

The initial statutory review, *Memphis Depot, Dunn Field Five Year Review* (CH2M HILL, 2003b), was triggered by initiation of the IRA groundwater recovery system at Dunn Field on DDMT in 1998. The *Second Five-Year Review, Revision 1* (e^2M, 2007) was approved in January 2008, and the *Third Five-Year Review, Revision 1 (*HDR, 2012b) was approved in January 2013.

The latest five-year review was conducted in 2017 in accordance with *Comprehensive Five-Year Review* Guidance (USEPA, 2001). The *Fourth Five-Year Review, Revision 1* (HDR, 2017i) incorporated responses to agency comments and was submitted to USEPA and TDEC on 8 December 2017. On 31 January 2018, USEPA requested a 60-day extension to the schedule for review of Revision 1, which extended the deadline for approval of the Fourth Five-Year Review to 9 April 2018.

The remedy at Dunn Field (OU 1) was found to be protective of human health and the environment. The remedy at the MI (OUs 2, 3 and 4) was found to be currently protective of human health and the environment, because there is no current exposure to COCs in groundwater, and exposure pathways that could result in unacceptable risks are being controlled through LUCs. Two issues were identified, both related to the MI: the selected remedy of EBT and LTM has not shown expected progress toward the RAOs and additional lines of evidence are needed to assess VI risk. The issues, recommended actions, schedule and status are shown on Table 10.

4.5 Timeline for Site Completion

The master schedule for MI, Dunn Field and site-wide activities through planned site completion in 2027 is shown on Figure 25. The planned completion date in the 2017 SMP was 2026; the current date results from additional time to complete the MI SRI. In addition, operation of the Off Depot AS/SVE has been extended for 1 year due to delay in the access agreement for installation of additional AS wells. The estimated timeline for site completion includes the following:

- Main Installation
  - SRI to be completed in October 2019.
  - FFS to be completed in January 2020.
  - ROD Amendment to be final in December 2020.
  - Additional RA from July 2021 through July 2024.
  - MI LTM through 2024, with final quarterly compliance monitoring in 2025.
  - MI Remedial Action Completion Report to be completed in September 2026.
- Dunn Field
  - Off Depot AS/SVE operates through May 2019.
  - Dunn Field LTM through 2019, with final quarterly compliance monitoring in 2020.
  - Dunn Field Remedial Action Completion Report to be completed in October 2021.
- Final Closeout Report to be completed in March 2027.

The timeline described above is considered a reasonable estimate given current information. Significant variables include the time required for additional MI RA to achieve RAOs and whether additional RA is necessary on Dunn Field to address rebound in CVOC concentrations on Dunn Field or the impact of the groundwater plume from a suspected off-site source(s).

- The schedule assumes 3 years of additional RA at the MI, which may not be sufficient; the estimated schedule for RA will be included in the FFS.
- The schedule assumes additional AS wells will be installed in early 2018 and Year 8 (May 2018 to May 2019) will be the final year of AS/SVE operation.

- The schedule does not currently include additional investigation or remedial action on Dunn Field. The schedule currently estimates the Dunn Field RA will be completed in 2021 and additional work could be performed without impacting the current site completion date in 2027.

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5 Schedule and Fiscal Year Requirements

5.1 Response Schedules

The environmental restoration activities currently planned for the next three fiscal years are summarized below. Table 11 lists primary and secondary documents for the DDMT environmental restoration program through FY19; primary and secondary documents are defined in the FFA, Section XV (USEPA, 1995).

5.1.1 FY18

- MI RA – Conduct Phase 3 well installation and sampling and submit the SRI Phase 3 summary report. Complete risk assessment update/review. Pending receipt of Allen Well Field data, complete ground-water modeling. Collect soil gas samples. Prepare work plan for indoor air sampling and collect initial indoor air samples.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field/Off Depot RA – Install additional AS wells near MW-159. Complete Year 7 and begin Year 8 AS/SVE operations and monitoring.
- Dunn Field LTM – Perform groundwater monitoring in accordance with LTM plan.
- Off-Site Plume – Prepare work plan and conduct additional investigation upgradient from Dunn Field.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter; complete Fourth Five-Year Review Report.

5.1.2 FY19

- MI RA – Complete the SRI Phase 4 work plan, conduct Phase 4 field investigation, prepare the final SRI report, evaluate remedial alternatives and begin the FFS report.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- MI VI – Collect second round of indoor air samples. Prepare indoor air sampling memorandum, select mitigation and/or remediation options and prepare the Comprehensive VI Study report.
- Dunn Field/Off Depot RA – Complete Year 8 AS/SVE operations and monitoring. Maintain AS/SVE system until Dunn Field compliance monitoring is completed.
- Dunn Field LTM – Perform groundwater monitoring in accordance with LTM plan.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter.

5.1.3 FY20

- MI RA – Complete the FFS report, prepare Revised Proposed Plan, hold public meeting and comment period and submit the MI ESD or ROD Amendment and the new MI RD.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field LTM – Begin groundwater compliance monitoring.
- Site Management and Community Relations – Conduct annual LUC inspections; prepare SMP Update and annual community newsletter.

5.2 Requirements by Fiscal Year

The financial requirements by fiscal year for the environmental program at DDMT are summarized in Table 12, which lists estimated annual costs on a site-wide basis. These requirements are revised annually in accordance with updates to the cost-to-complete database (Headquarters Army Environmental System) maintained by ODB.

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Tables

TABLE 1
FUNCTIONAL UNIT AND AREA DESCRIPTIONS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Main Installation

Functional Unit	Name	Size[1] (Acres)	Common Past Land Use	Description
1	Twenty Typical Warehouses	89	Transportation to and storage in closed warehouses	Located in the northeastern area of the MI, consisting of about 20 large warehouses, with interspersed roadways and railroad tracks.
2	Southeast Golf Course/ Recreational Area	53	Golf, other recreation	Located in the southeastern corner of the MI, consisting of golf course (Parcel 3). This FU also includes a baseball field and a small playground in the southeastern corner. This FU includes two constructed ponds and two concrete-lined drainage ditches from the ponds leading to the off-site area.
3	Southwest Open Area	92	Transportation to and storage in open-sided warehouses, painting and sandblasting, open storage	Located in the southwestern corner of the MI, consisting of varied type of parcels and sites.
4	Northern and Open Areas	193	Open storage, and transportation to and storage in closed warehouses	Located in the north-central to northwest area of the MI, covering a large area.
5	Newer Warehouses	109	Transportation to and storage in closed warehouses	Located in the south-central area of the MI and includes 10 large warehouse buildings.
6	Administrative and Residential Areas	33	Offices, equipment storage and maintenance, on-base housing	Located along the property boundary of the Depot along the Airways Boulevard. This FU includes the old Residential Unit Area, parking lots, and other asphalt-paved areas.
7	Groundwater at the Main Installatiion	-	No past use of groundwater	Includes all groundwater beneath the Main Installation.

Dunn Field

Area	Size[1] (Acres)	Description
Northeast Open Area	20	Land in the northeast quadrant of Dunn Field, mostly grass covered with some lightly wooded areas.
Disposal Area	14	Open land in the northwest quadrant of Dunn Field, where the majority of disposal sites are located.
Stockpile Area	30	Open land in the southern half of Dunn Field. Area of former bauxite and fluorspar stockpiles (removed in 1999) and burial areas in the eastern and southwestern portions of Dunn Field.

Notes:
1) Acreage is approximate
FU: Functional Unit
MI: Main Installation

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 1: Dunn Field			
1	36.16	Mustard and Lewisite Training Sets (9 sets) Burial Site (1955)	A CERCLA Removal Action took place for this area in 2000-2001. No further action is required for this site.
2	36.1	Ammonia Hydroxide (7 pounds) and Acetic Acid (1 gallon) Burial (1955)	No further action is required for this site.
3	36.2	Mixed Chemical Burial Site (orthotoluidine dihydrochloride) (1955)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006. No further action is required for this site.
4	36.3	POL Burial Site (thirteen 55-gallon drums of oil, grease, and paint)	This site is associated with Dunn Field groundwater remediation for administrative purposes. No further action is required for this site. SVE system in fluvial deposits operated from July 2007 to July 2012. Thermal-enhanced SVE system in loess deposits operated from May until December 2008. USEPA approved the Source Areas OPS determination in October 2009 and the Source Areas IRACR in November 2009. The Off-Depot groundwater air sparging (AS)/SVE system began operating in December 2009. USEPA approved the Off Depot IRACR in August 2011. Additional AS wells will be installed upon completion of access agreement with Memphis Light Gas and Water. AS/SVE system operations will continue through 2018.
5	36.4	Methyl Bromide Burial Site A (3 cubic feet) (1955)	No further action is required for this site.
6	36.2	40,037 units ointment (eye) Burial Site (1955)	No further action is required for this site.
7	36.5	Nitric Acid Burial Site (1,700 quart bottles) (1954)	No further action is required for this site.
8	36.6	Methyl Bromide Burial Site B (3,768 1-gallon cans) (1954)	No further action is required for this site.
9	36.17	Ashes and Metal Burial Site (burning pit refuse) (1955)	No further action is required for this site.
10	36.21	Solid Waste Burial Site (near MW-10) (metal, glass, trash, etc.)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. Excavation of this site began in March 2005 and was completed in 2006. USEPA approved the RACR in August 2006. No further action is required for this site.
11	36.7	Trichloroacetic Acid Burial (1,433 1-ounce bottles) (1965)	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
12	36.8	Sulfuric and Hydrochloric Acid Burial (1965)	No further action is required for this site.
13	36.9	Mixed Chemical Burial (Acid, 900 pounds; unnamed solids, 8,100 pounds)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006. No further action is required for this site.
14	36.22	Municipal Waste Burial Site B (near MW-12) (food, paper products)	No further action is required for this site.
15	36.23	Sodium Burial Sites (1968)	No further action is required for this site.
16	36.1	Unknown Acid Burial Site (1969)	No further action is required for this site.
17	36.11	Mixed Chemical Burial Site C (1969)	No further action is required for this site.
18	36.15	Plane Crash Residue (Dunn Field)	No further action is required for this site.
19	36.24	Former Tear Gas Canister Burn Site (Dunn Field)	No further action is required for this site.
20	36.25	Probable Asphalt Burial Site (Dunn Field)	No further action is required for this site.
21	36.26	XXCC-3 Burial Site (Dunn Field)	No further action is required for this site.
22	36.15	Hardware Burial Site (nuts and bolts) (Dunn Field)	No further action is required for this site.
23	36.29	Construction Debris and Food Burial Site (Dunn Field)	No further action is required for this site.
24	36.29	Former Burial/Burn Site and Neutralization Pit	Beginning in August 2000 all 29 bomb casings were recovered from the burial site and 900 cubic yards of soil contaminated with mustard degradation by-products were excavated and disposed offsite. Beginning in November 2000, 33 cubic yards of soil contaminated with mustard and degradation by-products were excavated from the neutralization pit and disposed offsite. In March 2001, the CERCLA Removal Action was complete. No further action is required for this site.
50	36.27	Dunn Field Northeastern Quadrant Drainage Ditch	No further action is required at this site.
60	36.14	Pistol Range Impact Area/Bullet Stop	A CERCLA Removal Action for lead in surface soil was conducted in 2003. No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
61	36.28	Buried Drain Pipe (Northwestern Quadrant of Dunn Field)	No further action is required for this site.
62	36.12/36.13	Bauxite Storage (Northeastern Quadrant of Dunn Field)	No further action is required for this site.
63	36.29/36.30	Fluorspar Storage (10 mounds in Southeastern Quadrant of Dunn Field, 1 mound in Southwestern Quadrant of Dunn Field) All mounds removed by 1999	No further action is required for this site.
64	36.29	Bauxite Storage (Southwestern Quadrant of Dunn Field Removed in 1972), CC-2 Burial Site, IA Site 31 (smoke pot burn/disposal area)	The selected CERCLA remedy for IA Site 31 includes excavation of contaminated soils/waste materials and off-site disposal. For the remaining portions of the site no further action is required. Excavation of this site was completed in March 2005. USEPA approved the RACR in August 2006. No further action is required for this site.
71	Multiple	Herbicide (All railroad tracks) (used to clear tracks)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
85	36.14	Old Pistol Range Building 1184/Temporary Pesticide Storage	A CERCLA Removal Action for lead in surface soil was conducted in 2003. No further action is required for this site.
86	36.18/36.19	Food Supplies (Dunn Field)	No further action is required for this site.
90	36.3	POL Burial Site (thirty-two 55-gallon drums of oil, grease, and thinner; previously listed as Site No. 4.1) (1955)	The selected CERCLA remedy includes excavation of contaminated soils/waste materials and off-site disposal. Excavation and off-site disposal of this site was completed in March 2005. USEPA approved the RACR in August 2006. No further action is required for this site.
91	36.23	Sodium Phosphate Burial previously listed as Site No. 15.1 (1968)	No further action is required for this site.
92	36.23	14 Burial Pits: Na_2PO_4, sodium, acid, medical supplies, and chlorinated lime previously listed as Site No. 15.2 (1969)	No further action is required for this site.
93	36.1	Acid Burial Site previously listed as Site No. 16.1	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 2: Southwestern Quadrant, MI			
27	24.1	Former Recoupment Area (Building 873)	Contaminated soil removed in 1985 as part of pre-Remedial Investigation activities. No further action is required for this site.
29	35.2	Former Underground Waste Oil Storage Tank	The tank was located and removed during a CERCLA Removal Action in 2000; the contaminated soils were disposed as special waste and the tank contents were disposed as RCRA hazardous waste. This site is associated with MI groundwater remediation for administrative purposes. EBT was selected as the CERCLA groundwater remedy. EBT was initially performed from May 2006 until February 2009. USEPA approved the MI IRACR and the OPS determination in March 2010. Additional EBT was conducted from November 2012 to August 2014. Further MI groundwater remedial action has been halted until completion of the SRI and Focused Feasibility Study are completed, and the selected remedy has been confirmed or revised. SRI Phases 1 and 2 were completed in 2017. Additional investigation (Phases 3 and 4), groundwater modeling, risk assessment and vapor intrusion sampling are planned in 2018.
30	24.3/35.3	Paint Spray Booths (2 of 3 total; Buildings 770 and 1086)	No further action is required for this site.
31	35.4	Former Paint Spray Booth (Building 1087)	Building 1087 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil outside the building was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site.
32	35.5	Sandblasting Waste Accumulation Area	Building 1088 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil outside the building was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site.
33	35.4	Sandblasting Waste Drum Storage Area (metal shed south of Building 1088)	The surface soil in this area was excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site.
34	24.3	Building 770 Underground Oil Storage Tanks	The underground storage tanks were removed in 1989. No further action is required for this site.
40	24.3	Safety Kleen Units - 5 of 9 total (all located in Building 770)	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
41	24.3	Satellite Drum Accumulation Areas - 1 of 4 total (vicinity Building 770)	No further action is required for this site.
71	Multiple	Herbicide (All railroad tracks) (used to clear tracks)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
82	23.7/23.8	Flammables (Buildings 783 and 793)	No further action is required for this site.
84	27.2	Flammables, Solvents, Waste Oil, etc. (Building 972)	No further action is required for this site.
87	35.2	DDT, banned pesticides (Building 1084)	Building 1084 was demolished and the debris was disposed off-site at a solid waste landfill. A concrete sump beneath the building was excavated; the contaminated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site.
88	35.2	POL (Building 1085)	The concrete slab and hydraulic lift were removed during a CERCLA Removal Action in 2000; the contaminated soils were disposed offsite as special waste and the lift and cylinders were cleaned and disposed as scrap metal. The concrete debris was disposed offsite as construction debris. No further action is required for this site.
89	28.2	Acids (Building 1089)	Building 1089 was decontaminated by vacuuming to remove free dust and pressure washing. The surface soil in areas outside the southern end of the building were excavated to a depth of one foot and replaced with clean backfill. The excavated soil was disposed off-site as special waste. This CERCLA Removal Action was completed in 2000. No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 3: Southeastern Watershed And Golf Course, MI			
25	3.8	Golf Course Pond	No further action is required for this site.
26	3.6	Lake Danielson	No further action is required for this site.
30	4.4	Paint Spray Booths (1 of 3 total - Building 260)	No further action is required for this site.
40	4, 19, and 21	Safety Kleen Units - 4 of 9 total units (Buildings 253, 469, 490, and 689)	No further action is required for these sites.
41	4 and 19	Satellite Drum Accumulation Areas - 2 of 4 total areas (Buildings 260 and 469)	No further action is required for this site.
48	5.2	Former PCB Transformer Storage Area	Site remediation by removal of surface soil was completed in 1998. No further action is required for this site.
49	17.3	Medical Waste Storage Area	No further action is required for this site.
51	3.7	Lake Danielson Outlet Ditch	No further action is required for this site.
52	3.9	Golf Course Pond Outlet Ditch	No further action is required for this site.
58	4.9	Pesticides, Herbicides (Pad 267)	No further action is required for this site.
59	4.1	Pesticides, Cleaners (Building 273)	No further action is required for this site.
65	7.2	XXCC-3 (Building 249)	No further action is required for this site.
66	4.11	POL (Building 253)	No further action is required for this site.
67	4.7	MOGAS (Building 257	No further action is required for this site.
68	4.8	POL (Building 263) (20 by 40 feet)	No further action is required for this site.
69	3.11	2,4-D, M2A1, and M4 Flamethrower Liquid Fuels (surface application)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
75	21.5	Unknown Wastes near Building 689	No further action is required for this site.
76	21.5	Unknown Wastes near Building 690	No further action is required for this site.
77	22.2	Unknown Wastes near Buildings 689 and 690	No further action is required for this site.
78	21.3	Alcohol, Acetone, Toluene, Naphtha; Hydrofluoric Acid Spill	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
Operable Unit 4: North-Central Area, MI			
28	32.3	Recoupment Area (Building 865)	No further action is required for this site.
35	15.2	DRMO Building S308 - Hazardous Waste Storage	This site was decontaminated and certified clean November 2001 in accordance with the RCRA Closure Plan (Permit TNHW-053). No further action is required for this site.
36	15.5	DRMO Hazardous Waste Concrete Storage Pad	No further action is required for this site.
37	15.5	DRMO Hazardous Waste Gravel Storage Pad	No further action is required for this site.
38	15.5	DRMO Damaged/Empty Hazardous Materials Drum Storage Area	No further action is required for this site.
39	15.5	DRMO Damaged/Empty Lubricant Container Area	No further action is required for this site.
41	13.4	Satellite Drum Accumulation Area (1 of 4 total - Building 210)	No further action is required for this site.
42	33.9	Former PCP Dip Vat Area	In 1986, the dip vat was removed and the soil was excavated to a depth of 10 feet. Soil with PCP concentrations greater than 200 ppb remained beneath the excavated area. The excavation was backfilled with clean soil and with gravel or concrete placed on top of the fill. No further action is required for this site.
43	33.9	Former Underground PCP Tank Area	The tank was brought above ground in 1986 and drained into drums. The soil around the site was excavated to a depth of 10 to 15 feet, 20 feet wide and 22 feet long. The pumps and lines were also removed. The excavation was backfilled with clean soil and with gravel or concrete placed on top of the clean fill. No further action is required for this site.
44	33.6	Former Wastewater Treatment Unit Area	No further action is required for this site.
45	33.9	Former Contaminated Soil Staging Area	No further action is required for this site.
46	33.9	Former PCP Pallet Drying Area	No further action is required for this site.
47	33.9	Former Contaminated Soil Drum Storage Area (removed 1988)	No further action is required for this site.
53	30.2	X-25 Flammable Solvents Storage Area (near Building 925)	No further action is required for this site.
54	15.6	MI - DRMO East Stormwater Runoff Canal	No further action is required for this site.
55	15.6	MI - DRMO North Stormwater Runoff Canal	No further action is required for this site.
56	29.3	MI - West Stormwater Drainage Canal	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Site No.	Parcel No.	Description	Site Status
57	12.1	Building 629 Spill Area	No further action is required for this site.
70	Multiple	POL, Various Chemical Leaks (railroad tracks 1, 2, 3, 4, 5, and 6)	No further action is required for this site.
71	Multiple	Herbicide (all railroad tracks) (used to clear tracks)	No further action is required for this site.
72	15.5/15.6	Waste Oil (DRMO yard) (surface application for dust control)	No further action is required for this site.
73	Multiple	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	No further action is required for this site.
74	15.3	Flammables, Toxics (West End - Building 319)	No further action is required for this site.
79	15.6	Fuels, Miscellaneous Liquids, Wood, and Paper (Vicinity S702)	No further action is required for this site.
80	33.13	Fuel and Cleaners Dispensing (Building 720)	No further action is required for this site.
81	33.7	Fuel Oil AST (Building 765 – removed in 1994)	No further action is required for this site.
83	30.5	Disposal of Dried Paint Residues - South of Building 949	Lead contaminated soil was removed from an area of approximately 7,200 square feet. The CERCLA Removal Action was completed in 2001. No further action is required for this site.

Notes:
AS: Air Sparging
AST: aboveground storage tank
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
DDT: 4,4′-dichlorodiphenyltrichloroethane
DRMO: Defense and Reutilization Marketing Office
IRACR: Interim Remedial Action Completion Report
MI: Main Installation
MOGAS: motor gasoline
Na: sodium
OPS: Operating Properly and Successfully
PCB: polychlorinated biphenyl
PCP: pentachloroephenol
PO4: phosphate
POL: petroleum, oil, and lubricants
RACR: Remedial Action Completion Report
SRI: Supplemental Remedial Investigation
SVE: soil vapor extraction
USEPA: United States Environmental Protection Agency

a. Source: DLA correspondence dated September 24, 2004, RE: Corrective Action Permit Application and Attachment 1 Summary of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Defense Depot Memphis, Tennessee

TABLE 3
MAIN INSTALLATION LTM WELLS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Area	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, NAVD)	Ground Elevation (ft, NAVD)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
DR1-1	Fluvial	TTA-1S	276300	800856	293.14	293.42	121.7	20	141.7
DR1-1A	Fluvial	TTA-1S	276307	800863	293.00	293.37	89.2	20	109.2
DR1-2	Fluvial	TTA-1N	276537	801153	290.00	291.39	97.7	20	117.7
DR1-3	Fluvial	TTA-1S	276527	801416	290.93	291.11	109.7	20	129.7
DR1-4	Fluvial	TTA-1S	276231	801400	292.78	293.00	106.3	20	126.3
DR1-5	Fluvial	TTA-1S	276080	800828	292.79	294.86	124.7	20	144.7
DR1-5A	Fluvial	TTA-1S	276087	800835	292.79	294.87	90.0	20	110.0
DR1-6	Fluvial	TTA-1S	276044	801103	292.79	293.50	114.4	20	134.4
DR1-6A	Fluvial	TTA-1S	276035	801104	292.79	293.58	90.9	20	110.9
DR1-7	Fluvial	TTA-1N	276791	801441	289.15	289.46	108.3	20	128.3
DR1-8	Fluvial	TTA-1N	276752	800875	290.09	290.47	92.7	20	112.7
DR2-1	Fluvial	TTA-2	276772	806498	304.90	305.08	73.9	20	93.9
DR2-2	Fluvial	TTA-2	276771	806659	292.79	304.67	78.4	15	93.4
DR2-3	Fluvial	TTA-2	276539	806203	303.44	303.66	93.0	20	113.0
DR2-4	Fluvial	TTA-2	276456	806633	303.55	303.96	88.1	20	108.1
DR2-5	Fluvial	TTA-2	276831	806180	292.79	305.72	84.5	15	99.5
DR2-6	Fluvial	TTA-2	276644	805861	304.70	304.92	94.6	20	114.6
MW-16	Fluvial	Background	278838	807100	299.86	300.19	57.6	15	72.6
MW-19	Fluvial	Background	278946	800782	290.57	290.86	83.1	10	93.1
MW-21	Fluvial	TTA-1N	276473	800602	292.79	295.30	92.1	15	107.1
MW-22	Fluvial	TTA-1S	275912	800702	298.04	298.49	95.4	10	105.4
MW-23	Fluvial	Background	275791	801817	298.99	299.24	101.2	10	111.2
MW-24	Fluvial	Background	275616	803539	299.51	299.81	97.3	15	112.3
MW-25A	Fluvial	TTA-2	275975	805521	269.88	270.13	73.0	10	83.0
MW-26	Fluvial	TTA-2	276508	805962	303.69	303.89	97.6	10	107.6
MW-34	Intermediate	Window	279411	801918	299.97	300.80	136.6	20	156.6
MW-38	Intermediate	Window	279141	802450	307.45	308.45	139.9	15	154.9
MW-39	Fluvial	W-C	277281	802598	296.28	296.58	95.5	20	115.5
MW-39A	Upper Claiborne	W-C	277278	802608	298.61	298.70	148.1	20	168.1
MW-50	Fluvial	TTA-2	276456	807065	298.82	299.32	115.0	10	125.0
MW-52	Fluvial	SE	275372	805897	279.26	279.71	94.0	10	104.0
MW-53	Fluvial	Background	279177	805136	306.38	305.58	72.5	10	82.5
MW-55	Fluvial	Background	279301	801205	292.08	292.48	64.0	10	74.0
MW-62	Fluvial	B-835	278290	801858	292.79	293.90	86.1	10	96.1
MW-63A	Fluvial	N-C	278200	803573	305.96	306.33	130.0	10	140.0
MW-63B	Fluvial	N-C	278201	803558	305.78	306.22	115.0	10	125.0
MW-64	Fluvial	TTA-2	276952	805006	304.21	304.46	102.0	10	112.0
MW-66A	Fluvial	TTA-1N	276626	799793	284.22	284.34	74.6	20	94.6
MW-85	Fluvial	TTA-2	276704	806065	292.79	304.50	95.9	15	110.9
MW-88	Fluvial	TTA-2	276879	806513	305.15	305.47	82.0	15	97.0
MW-89	Intermediate	Window	278287	802555	303.98	304.38	147.0	30	177.0
MW-90	Intermediate	Window	278284	802540	304.19	304.64	115.0	30	145.0
MW-92	Fluvial	TTA-2	276614	806490	304.41	304.78	93.0	15	108.0
MW-93	Fluvial	Background	275542	804440	294.08	294.31	92.0	15	107.0
MW-94A	Fluvial	W-C	276806	803086	303.00	303.23	109.6	10	119.6
MW-96	Fluvial	TTA-2	276310	806320	289.02	289.67	75.5	20	95.5
MW-97	Fluvial	S-C	276074	802139	297.44	297.70	97.5	20	117.5
MW-98	Fluvial	W-C	276891	802573	294.43	294.93	137.0	10	147.0
MW-99	Fluvial	Background	277443	801115	285.33	285.69	91.5	20	111.5
MW-100B	Fluvial	TTA-1N	276601	800854	290.92	291.47	107.4	20	127.4
MW-101[1]	Fluvial	TTA-1S	276204	801110	291.74	291.98	89.0	15	104.0
MW-102B	Fluvial	Background	275761	800708	311.40	312.07	120.5	20	140.5
MW-103	Fluvial	N-C	278691	805160	301.37	301.89	70.0	20	90.0

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Defense Depot Memphis, Tennessee

Well	Aquifer	Area	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, NAVD)	Ground Elevation (ft, NAVD)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-104	Fluvial	N-C	278676	805417	291.98	292.18	70.5	20	90.5
MW-107[1]	Upper Claiborne	Window	278419	803010	304.92	305.18	128.0	15	143.0
MW-108	Upper Claiborne	W-C	277658	802986	303.07	303.25	160.0	10	170.0
MW-113	Fluvial	TTA-2	276685	806279	292.79	304.92	96.0	10	106.0
MW-140	Memphis	Window	279061	801716	298.12	298.16	224.6	20	244.6
MW-141	Intermediate	Window	278019	802571	303.71	303.70	148.7	20	168.7
MW-142	Fluvial	B-835	278056	801629	291.18	291.49	85.0	20	105.0
MW-143	Fluvial	B-835	278301	801201	290.66	290.90	78.6	20	98.6
MW-197A	Upper Claiborne	W-C	276975	802042	292.79	291.54	161.7	15	176.7
MW-197B	Fluvial	W-C	276973	802037	292.79	291.43	93.8	15	108.8
MW-198	Fluvial	B-835	277776	802142	291.78	292.20	90.3	15	105.3
MW-199A	Intermediate	B835	277756	802574	301.53	301.84	146.1	15	161.1
MW-199B	Fluvial	B-835	277752	802576	301.73	302.07	104.6	15	119.6
MW-200	Fluvial	W-C	277006	802859	300.18	300.51	102.9	15	117.9
MW-202A	Intermediate	Window	278686	802111	299.23	299.69	176.2	15	191.2
MW-202B	Intermediate	Window	278693	802112	299.51	299.74	118.8	15	133.8
MW-203A	Upper Claiborne	W-C	276842	801740	292.79	290.80	142.9	20	162.9
MW-203B	Fluvial	W-C	276821	801742	292.79	291.10	93.0	20	113.0
MW-204A	Fluvial	W-C	276725	802168	292.21	292.49	133.3	15	148.3
MW-204B	Fluvial	W-C	276708	802167	292.71	293.00	94.9	15	109.9
MW-205A	Upper Claiborne	W-C	277157	802277	292.30	292.40	141.3	15	156.3
MW-205B	Fluvial	W-C	277173	802278	292.16	292.30	97.3	15	112.3
MW-206A	Fluvial	W-C	277219	802792	299.92	300.35	127.3	15	142.4
MW-206B	Fluvial	W-C	277201	802795	299.90	300.12	96.7	15	111.7
MW-207A	Upper Claiborne	W-C	277653	803192	304.05	304.45	149.9	15	164.9
MW-207B	Fluvial	W-C	277665	803193	304.06	304.42	108.5	15	123.5
MW-208A	Upper Claiborne	W-C	277382	802799	302.21	302.40	183.5	15	198.5
MW-208B	Fluvial	W-C	277397	802815	301.79	302.08	106.7	15	121.7
MW-209A	Intermediate	B-835	277574	802507	298.05	298.36	189.0	15	204.0
MW-209B	Fluvial	B-835	277582	802520	298.49	298.72	102.3	15	117.3
MW-210A	Intermediate	W-C	277239	801958	289.61	289.70	177.0	15	192.0
MW-210B	Fluvial	W-C	277228	801952	289.29	289.53	97.0	15	112.0
MW-211	Intermediate	Window	278001	802974	303.74	304.09	166.3	15	181.3
MW-212	Fluvial	B-835	278028	802225	292.79	295.68	85.3	15	100.3
MW-213	Fluvial	B-835	278427	801669	292.79	294.20	77.3	15	92.3
MW-214A	Upper Claiborne	N-C	277878	803907	303.61	303.96	119.1	15	134.1
MW-214B	Upper Claiborne	N-C	277876	803922	303.70	303.96	101.6	15	116.6
MW-215A	Upper Claiborne	N-C	277298	804164	304.50	304.86	128.8	15	143.8
MW-215B	Fluvial	N-C	277298	804177	304.56	304.98	105.4	15	120.4
MW-216	Fluvial	S-C	276025	801996	297.34	297.63	99.9	15	115.0
MW-217	Fluvial	TTA-2	276671	805214	304.18	304.51	101.8	15	116.8
MW-218	Fluvial	TTA-2	276937	805628	305.60	306.00	98.9	15	114.0
MW-219	Fluvial	TTA-1N	276429	800461	295.13	295.00	98.0	15	113.0
MW-229	Intermediate	Window	279294	802837	311.78	312.09	188.4	20	208.4
MW-252	Intermediate	Window	278789	801365	294.16	294.40	126.1	20	146.1
MW-253	Intermediate	Window	278287	801191	290.47	290.80	118.3	20	138.3
MW-254	Memphis	Window	279334	800858	292.84	293.28	285.8	20	305.8
MW-255	Memphis	Window	279305	801227	291.84	292.38	284.7	20	304.7
MW-256	Intermediate	Window	279302	801244	292.68	293.40	127.1	20	147.1
MW-258	Fluvial	N-C	278126	804427	304.37	304.83	79.3	20	99.3
MW-259	Fluvial	TTA-2	276279	804451	290.77	291.44	98.6	20	118.6
MW-260	Fluvial	N-C	278398	804376	304.16	304.45	68.0	20	88.3
MW-261	Fluvial	S-C	276391	802592	293.52	293.79	90.0	20	110.3

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2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Area	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, NAVD)	Ground Elevation (ft, NAVD)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-262	Intermediate	Window	279334	800833	293.22	293.50	154.4	10	164.6
MW-263	Fluvial	N-C	278945	805817	291.40	291.78	69.1	10	79.3
MW-264	Upper Claiborne	N-C	278411	804590	303.72	304.00	104.8	10	115.0
MW-265	Fluvial	N-C	278112	804710	305.15	305.61	85.8	10	96.0
MW-266	Fluvial	TTA-2	277092	806686	304.68	305.10	77.1	10	87.3
MW-267	Fluvial	TTA-2	277161	806001	303.84	304.30	71.9	10	82.1
MW-268	Upper Claiborne	TTA-2	277204	805284	304.59	304.92	109.5	10	119.7
MW-269	Fluvial	TTA-1N	276369	800127	290.05	290.50	92.2	10	102.4
MW-270	Fluvial	SE	275483	805042	281.74	282.20	78.4	10	88.6
MW-271	Fluvial	S-C	276315	803774	294.91	295.50	134.7	10	144.9
MW-272	Fluvial	Background	275880	804037	293.27	293.70	112.8	10	123.0
MW-273	Intermediate	Window	279713	800122	284.73	285.00	128.1	10	138.3
MW-274	Fluvial	Background	275726	806543	294.30	294.60	89.3	10	99.5
MW-275	Fluvial	Background	275232	805306	272.31	272.59	80.5	10	90.7
MW-276	Fluvial	Background	275564	804697	288.68	288.91	87.5	10	97.7
MW-277	Fluvial	Background	275532	803998	301.67	301.96	102.3	10	112.5
MW-278	Fluvial	Background	276294	799814	292.18	292.46	91.0	10	101.2
MW-279	Fluvial	TTA-1S	275982	800579	299.89	300.17	113.0	10	123.2
MW-280	Fluvial	TTA-2	277390	806313	306.36	306.57	76.0	10	86.2
MW-281	Fluvial	N-C	278155	804123	304.56	305.03	81.7	10	91.9
MW-282	Fluvial	Background	278710	804033	307.81	308.14	76.0	10	86.2
MW-283	Fluvial	Background	278176	806074	304.34	304.87	77.0	10	87.2
PMW21-01	Fluvial	TTA-1N	276533	800600	292.79	295.00	88.4	20	108.4
PMW21-02	Fluvial	TTA-1N	276575	800701	292.79	293.19	91.3	20	111.3
PMW21-03	Fluvial	TTA-1N	276573	800743	292.11	292.72	90.3	20	110.3
PMW21-04	Fluvial	TTA-1N	276602	800772	292.79	292.20	89.0	20	109.0
PMW21-05	Fluvial	TTA-1N	276628	801130	288.53	288.92	94.3	20	114.3
PMW-85-01	Fluvial	TTA-2	276802	806146	292.79	305.39	93.2	10	103.2
PMW-85-05	Fluvial	TTA-2	276752	806222	292.79	305.32	93.2	10	103.2
PMW92-02	Fluvial	TTA-2	276667	806476	304.17	304.35	94.8	10	104.8
PMW92-03	Fluvial	TTA-2	276679	806439	292.79	304.17	92.5	10	102.5
PMW101-02A	Fluvial	TTA-1S	276282	801145	292.79	292.29	117.7	20	137.7
PMW101-02B	Fluvial	TTA-1S	276286	801145	292.79	292.24	97.8	20	117.8
PMW101-03A	Fluvial	TTA-1S	276348	801198	291.61	291.99	119.2	20	139.2
PMW101-03B	Fluvial	TTA-1S	276353	801194	291.55	291.82	99.3	20	119.3
PMW101-04A	Fluvial	TTA-1S	276299	801182	292.79	291.43	117.9	20	137.9
PMW101-04B	Fluvial	TTA-1S	276296	801187	292.79	291.75	98.6	20	118.6
PMW101-06A	Fluvial	TTA-1S	276192	801187	292.13	292.72	120.0	20	140.0
PMW101-06B	Fluvial	TTA-1S	276195	801184	292.17	292.40	99.3	20	119.3
PMW101-07A	Fluvial	TTA-1S	276143	801172	292.79	292.52	117.9	20	137.9
PMW101-07B	Fluvial	TTA-1S	276142	801177	292.79	292.70	98.0	20	118.0
PZ-03	Fluvial	S-C	276379	802941	298.51	298.98	108.9	10	118.9

Notes:
1: MW-101 has three screened sections at the following depths (ft, btoc): 89-104, 109-119 and 124-134.
2: MW-107 has two screened sections at the following depths (ft, btoc): 128-143 and 148-158.
btoc: below top of casing
ft: feet
NAVD: North American Vertical Datum of 1988

TABLE 4
MAIN INSTALLATION MCL EXCEEDANCE SUMMARY, APRIL 2017
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

			PCE		TCE		cDCE		VC		CT	
Area	No. of Wells	No. of Wells >MCL	No. of Wells >MCL	Maximum Concentration (µg/L)	No. of Wells >MCL	Maximum Concentration (µg/L)	No. of Wells >MCL	Maximum Concentration (µg/L)	No. of Wells >MCL	Maximum Concentration (µg/L)	No. of Wells >MCL	Maximum Concentration (µg/L)
Fluvial												
TTA-1N	13	9	7	*150*	5	*61*	2	*111*	1	*174*	0	-
TTA-1S	21	13	12	*67.1*	2	*19.2*	0	-	3	*7.08*	0	-
TTA-2	25	19	15	*155*	8	*31.3*	0	-	7	*95.7*	5	*61*
West-Central	14	13	11	*68.6*	9	*24*	0	-	0	-	0	-
Building 835	8	6	0	-	5	*50.3*	0	-	1	*9.47*	0	-
North-Central	10	6	3	*25*	6	*56.3*	0	-	0	-	0	-
South-Central	5	2	0	-	2	*62.1*	0	-	0	-	0	-
Southeastern MI	2	2	1	*6.73*	1	*23.3*	0	-	0	-	0	-
Background	15	0	-	-	-	-	-	-	-	-	-	-
Fluvial Summary	**113**	**70**	**49**	***155***	**38**	***62.1***	**2**	***111***	**12**	***174***	**5**	***61***
IAQ/UC												
TTA-2	1	0	-	-	-	-	-	-	-	-	-	-
West-Central	8	6	5	*18.9*	5	*19.6*	0	-	1	*2.01*	0	-
Building 835	2	2	0	-	2	*7.53*	0	-	0	-	0	-
North-Central	4	2	2	*5.21*	0	-	0	-	0	-	0	-
Window	15	6	6	*50.2*	2	*9.77*	0	-	0	-	0	-
IAQ/UC Summary	**30**	**16**	**13**	***50.2***	**9**	***19.6***	**0**	**-**	**1**	***2.01***	**0**	**-**
MAQ												
Window	3	1	1	*10.89*	0	-	0	-	0	-	0	-
MI Summary	**146**	**87**	**63**	***155***	**47**	***62.1***	**2**	***111***	**13**	***174***	**5**	**61**

Notes:
µg/L: micrograms per liter
MCL: maximum contaminant level

TABLE 5
REMEDIATION GOALS FROM DUNN FIELD RECORD OF DECISION
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

	Remedial Goal Objectives				
	Site-Specific Soil Screening Levels to be Protective		Protective Soil Vapor Concentration		Groundwater Target Concentrations at 10-4 Target Risk Levels and Target HI=1.0
Parameter	Loess Specific Values (mg/kg)	Fluvial Deposit Specific Values (mg/kg)	Loess Specific Values (ppbv)	Fluvial Deposit Specific Values (ppbv)	(µg/L)
Carbon Tetrachloride	0.2150	0.1086	28.14	14.22	3.0
Chloroform	0.9170	0.4860	61.57	32.63	12.0
Dichloroethane, 1,2-	0.0329	0.0189	1.12	0.64	—
Dichloroethene, 1,1-	0.1500	0.0764	57.00	29.03	7/340
Dichloroethene, cis-1,2-	0.7550	0.4040	73.86	39.52	35.0
Dichloroethene, trans-1,2-	1.5200	0.7910	256.53	133.50	50.0
Methylene Chloride	0.0305	0.0169	5.14	2.85	—
Tetrachloroethane, 1,1,2,2-	0.0112	0.0066	0.03	0.55	2.2
Tetrachloroethene	0.1806	0.0920	15.18	0.99	2.5
Trichloroethane, 1,1,2	0.0627	0.0355	0.84	2.03	1.9
Trichloroethene	0.1820	0.0932	10.56	2.06	5.0
Vinyl Chloride	0.0294	0.0150	28.94	14.77	—

Notes:
HI: hazard index
mg/kg: milligrams per kilogram
ppbv: parts per billion per volume
µg/L: micrograms per liter
—: Not available for groundwater cleanup goals because of low number of detections or detected values consistently less than maximum contaminant levels.

TABLE 6
DUNN FIELD LTM WELLS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Area	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, NAVD)	Ground Elevation (ft, NAVD)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-03	Fluvial	DF North	281596	802101	292.35	290.40	65.5	10	75.5
MW-04	Fluvial	Background	281279	802369	301.61	300.00	60.0	20	80.0
MW-06	Fluvial	DF West	280604	802069	289.11	288.10	51.0	20	71.0
MW-07	Fluvial	DF North	281840	802482	295.10	293.10	67.0	10	77.0
MW-08	Fluvial	DF North	282001	802728	292.59	292.74	56.5	10	66.5
MW-13	Fluvial	Background	281034	802369	300.01	300.10	66.0	15	81.0
MW-15	Fluvial	DF West	280349	801985	295.12	295.23	63.4	15	78.4
MW-28	Fluvial	Background	281569	803154	294.79	294.89	54.3	15	69.3
MW-31	Fluvial	DF North	281652	801784	290.37	287.50	64.1	15	79.1
MW-44	Fluvial	Off Depot	281074	800601	269.07	269.40	64.0	10	74.0
MW-54	Fluvial	Off Depot	281159	801184	295.39	295.57	84.5	10	94.5
MW-57	Fluvial	DF West	280184	802006	290.77	291.10	60.0	10	70.0
MW-58	Fluvial	Background	279845	802066	290.51	290.70	57.0	10	67.0
MW-67	Memphis	Background	280473	800934	278.21	275.53	260.0	15	275.0
MW-68	Fluvial	DF North	281501	802040	291.69	291.60	72.5	10	82.5
MW-69	Fluvial	DF West	281203	802011	307.02	304.90	82.1	10	92.1
MW-70	Fluvial	DF West	281030	801988	304.99	302.80	80.8	10	90.8
MW-71	Fluvial	DF West	280585	801805	294.40	291.90	65.5	10	75.5
MW-76	Fluvial	Off Depot	281312	801643	302.71	303.30	73.0	20	93.0
MW-77	Fluvial	Off Depot	281143	801815	304.42	304.70	68.0	20	88.0
MW-78	Fluvial	DF North	282052	802065	275.00	275.40	44.5	20	64.5
MW-79	Fluvial	DF North	281794	800899	285.03	285.40	82.5	20	102.5
MW-80	Fluvial	Background	281418	800199	273.81	274.00	53.0	20	73.0
MW-87	Fluvial	DF West	280696	802039	294.93	292.80	63.0	15	78.0
MW-91	Fluvial	DF West	280475	802014	291.99	289.30	55.0	15	70.0
MW-126	Fluvial	Background	282390	800492	252.22	252.49	16.0	10	26.0
MW-129	Fluvial	DF North	282271	803129	293.01	293.33	65.0	15	80.0
MW-130	Fluvial	DF North	282117	803241	293.17	293.77	59.5	20	79.5
MW-134	Fluvial	DF West	281013	802103	300.81	301.05	75.0	15	90.0
MW-144	Fluvial	Off Depot	281139	801529	291.60	291.89	56.8	20	76.8
MW-145	Fluvial	Off Depot	280968	800823	284.72	284.86	80.1	20	100.1
MW-147	Fluvial	DF North	281502	801674	289.76	289.93	60.3	20	80.3
MW-148	Fluvial	Off Depot	281378	801462	294.71	294.87	70.0	20	90.0
MW-149	Fluvial	Off Depot	281130	800983	287.18	287.44	81.4	20	101.4
MW-150	Fluvial	Off Depot	281240	801284	296.86	297.00	71.2	20	91.2
MW-151	Fluvial	Off Depot	281290	800875	284.27	284.42	77.0	20	97.0
MW-152	Fluvial	Off Depot	281516	800893	289.59	289.82	91.0	20	111.0
MW-153	Fluvial	DF North	282119	800952	279.17	279.26	76.1	20	96.1
MW-154	Fluvial	Background	280502	800919	273.81	274.07	53.3	10	63.3
MW-155	Fluvial	Off Depot	281325	801169	291.54	291.83	76.9	20	96.9
MW-157	Fluvial	Off Depot	281051	801348	286.47	286.55	56.7	20	76.7
MW-158	Fluvial	Off Depot	281434	801005	294.07	294.38	91.0	15	106.0
MW-158A	Fluvial	Off Depot	281444	801006	293.95	294.22	77.9	15	92.9
MW-159	Fluvial	Off Depot	281304	801007	286.36	286.68	80.5	20	100.5
MW-160	Fluvial	Off Depot	281367	801304	293.84	294.13	65.7	20	85.7
MW-163	Fluvial	Off Depot	281153	801487	290.63	290.81	56.2	20	76.2
MW-164	Fluvial	Off Depot	280998	801497	287.48	287.71	55.6	20	75.6
MW-165	Fluvial	Off Depot	281385	800855	287.06	287.35	88.6	15	103.6
MW-165A	Fluvial	Off Depot	281384	800866	287.26	287.53	71.3	15	86.3
MW-166	Fluvial	Off Depot	281225	800928	282.72	283.29	84.6	15	100.0
MW-166A	Fluvial	Off Depot	281213	800927	282.90	283.36	68.1	15	83.4
MW-167	Fluvial	Background	281394	800619	284.82	285.21	70.5	15	85.5
MW-169	Upper Claiborne	Background	282491	800957	261.90	262.17	68.1	20	88.1
MW-170	Fluvial	Background	282443	801260	273.75	273.98	59.8	20	79.8
MW-171	Fluvial	DF North	282315	801058	270.69	271.02	53.3	15	68.3
MW-174	Fluvial	DF West	280352	802092	296.56	296.83	67.0	10	77.0
MW-176	Fluvial	DF West	280824	802032	299.68	299.92	76.0	10	86.0

TABLE 6
DUNN FIELD LTM WELLS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Area	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, NAVD)	Ground Elevation (ft, NAVD)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-180	Fluvial	DF North	281476	802132	296.14	296.39	72.0	10	82.0
MW-182	Fluvial	Background	280524	800623	275.40	272.98	62.0	10	72.0
MW-184	Fluvial	Off Depot	280903	801442	283.12	283.34	58.0	10	68.0
MW-187	Fluvial	Background	280563	802348	302.74	303.21	76.0	10	86.0
MW-190	Fluvial	Off Depot	281139	801596	297.32	297.58	78.0	10	88.0
MW-220	Fluvial	DF North	281617	802167	293.29	290.31	64.9	15	79.9
MW-221	Fluvial	DF West	281400	802100	301.52	298.37	73.1	15	88.1
MW-222	Fluvial	DF West	280986	802146	303.82	301.06	74.2	15	89.2
MW-223	Fluvial	DF West	280914	802104	303.00	300.41	73.9	15	88.9
MW-224	Fluvial	DF West	281018	802182	304.13	301.18	73.7	15	88.7
MW-225	Fluvial	DF West	280947	802071	304.52	301.30	75.0	15	90.0
MW-226	Fluvial	DF West	280932	802147	303.19	300.56	74.2	15	89.2
MW-227	Fluvial	DF West	280258	802081	299.70	296.64	63.6	15	78.6
MW-228	Fluvial	DF West	280252	802157	301.65	298.59	64.1	15	79.1
MW-230	Fluvial	DF North	281843	802800	286.57	286.66	59.2	15	74.2
MW-235	Fluvial	Background	280728	800448	264.00	264.21	50.6	10	60.8
MW-237	Intermediate	Off Depot	281356	800964	289.18	289.53	166.5	10	176.7
MW-241	Fluvial	Off Depot	281390	801397	292.97	293.16	73.4	15	88.4
MW-242	Fluvial	Off Depot	281297	801229	295.40	295.94	73.2	16	88.7
MW-243	Fluvial	Off Depot	281371	801116	292.26	292.53	80.7	20	100.7
MW-244	Fluvial	Off Depot	281333	801101	288.72	289.45	76.3	20	96.3
MW-245	Fluvial	Off Depot	281379	801035	290.48	290.62	85.1	20	105.1
MW-246	Fluvial	Off Depot	281387	800952	288.17	288.49	85.2	20	105.2
MW-247	Fluvial	Off Depot	281319	800900	286.17	286.63	80.5	20	100.5
MW-248	Fluvial	Off Depot	281254	800720	275.45	275.93	67.5	20	87.5
MW-249	Fluvial	Off Depot	281030	800790	285.53	285.89	78.0	20	98.0
MW-250	Intermediate	Off Depot	281046	800900	289.66	290.19	168.7	15	183.7
MW-251	Intermediate	Off Depot	281212	801022	285.83	286.16	160.2	15	175.2

Notes:
ft: feet
btoc: below top of casing
NAVD: North American Vertical Datum of 1988

TABLE 7
DUNN FIELD MCL EXCEEDANCE SUMMARY, APRIL 2017
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

			TeCA		TCA		PCE		TCE	
Area	No. of Wells	No. of Wells >TC or MCL	No. of Wells >TC	Maximum Concentration (µg/L)	No. of Wells >TC or MCL	Maximum Concentration (µg/L)	No. of Wells >TC or MCL	Maximum Concentration (µg/L)	No. of Wells >TC or MCL	Maximum Concentration (µg/L)
Fluvial										
DF North	15	8	0	-	0	-	8	*32.2*	8	*49.1*
DF West	19	4	0	-	0	-	0	-	3	*7.32*
Off Depot	34	4	4	*10.1*	1	*3.27*	0	-	3	*141*
Background	12	0	-	-	-	-	-	-	-	-
Fluvial Summary	**80**	**16**	**4**	***10.1***	**1**	***3.27***	**8**	***32.2***	**14**	***141***
IAQ/UC										
Off Depot	3	0	-	-	-	-	-	-	-	-
Background	1	0	-	-	-	-	-	-	-	-
IAQ/UC Summary	**4**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
MAQ										
Background	1	0	-	-	-	-	-	-	-	-
MI Summary	**85**	**16**	**4**	***10.1***	**1**	***3.27***	**8**	***32.2***	**14**	***141***

Notes:
µg/L: micrograms per liter
MCL: maximum contaminant level

TABLE 7
DUNN FIELD MCL EXCEEDANCE SUMMARY, APRIL 2017
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

			DCE		VC		CF	
Area	No. of Wells	No. of Wells >TC or MCL	No. of Wells >TC or MCL	Maximum Concentration (µg/L)	No. of Wells >MCL	Maximum Concentration (µg/L)	No. of Wells >TC or MCL	Maximum Concentration (µg/L)
Fluvial								
DF North	15	8	6	*16.2*	0	-	0	-
DF West	19	4	0	-	0	-	2	*100*
Off Depot	34	4	0	-	1	*6.32*	0	-
Background	12	0	-	-	-	-	-	-
Fluvial Summary	**80**	**16**	**6**	***16.2***	**1**	***6.32***	**2**	***100***
IAQ/UC								
Off Depot	3	0	-	-	-	-	-	-
Background	1	0	-	-	-	-	-	-
IAQ/UC Summary	**4**	**0**	**-**	**-**	**-**	**-**	**-**	**-**
MAQ								
Background	1	0	-	-	-	-	-	-
MI Summary	**85**	**16**	**6**	***16.2***	**1**	***6.32***	**2**	***100***

Notes:
µg/L: micrograms per liter
MCL: maximum contaminant level

TABLE 8
PROPERTY TRANSFER STATUS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

FOST No.	Area	Date FOST signed	Acres	Type of Conveyance	Type of Transfer (Transferee)	Date of Transfer/Deed
1	MI	23-Feb-01	6.52	PBC	Deed (Alpha Omega Veterans)	18-Sep-01
2	MI	27-Sep-01	4.67	PBC	Deed (Memphis Police Department)	6-Feb-02
			13.36	EDC	Deed (DRC)	6-May-02
3	MI	1-Jul-04	302.48	EDC	Deed (DRC)	4-Apr-06
			46.74	PBC	Letter of Assignment (DOI/NPS)	29-Sep-05
4	DF	4-Mar-05	1.57	PBC	Deed (Memphis)	2-Sep-05
			39.35	CPS	Deed (Dunn Field Business Park, LLC)	24-Oct-07
5	DF	12-Jul-10	24.5			
6	MI	2-Aug-10	193.0	EDC	Deed (DRC)	30-Mar-11

Notes:
CPS: Competitive Public Sale
DF: Dunn Field
DOI/NPS: Department of Interior/National Parks Service
DRC: Depot Redevelopment Corporation
EDC: Economic Development Conveyance
MI: Main Installation
PBC: Public Benefit Conveyance

TABLE 9
PROPERTY OWNERSHIP AND USE
2018 SITE MANAGMENT PLAN
Defense Depot Memphis, Tennessee

Property Owner	Acreage	Use
Main Installation		
Mayfield Properties, LP	250.60	Warehousing/logistics – Memphis Depot Industrial Park managed by Colliers International. Buildings are leased to multiple tenants.
Barnhart Crane & Rigging	143.80	Engineering, construction and maintenance of complex lifting and transportation equipment for heavy industry.
Economic Development Growth Engine of Memphis/Shelby Co.	69.90	Primarily undeveloped property for future warehousing/logistics or light industrial development.
City of Memphis	46.70	Recreation - Golf Course operated by Memphis Athletic Ministries.
Depot Owners Association	35.60	Memphis Depot Parkway and stormwater basins.
Supply Chain Solutions, LLC	8.20	Warehousing/logistics.
Alpha Omega Veterans Services	6.50	Homeless shelter.
		Approved for unrestricted use.
Memphis Police Department	4.70	Airways Police Station.
Dunn Field		
Dunn Field Business Park, LLC	39.35	Undeveloped property for future warehousing/ logistics or light industrial development.
		Approved for unrestricted use.
Army	24.5	Undeveloped.
City of Memphis	1.6	Realignment of Hayes Road.

TABLE 10
STATUS OF FOLLOW-UP ACTIONS FROM FOURTH FIVE-YEAR REVIEW
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Issues	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)		Completion Date	Document
					Current	Future		
Selected MI remedy of EBT and LTM has not shown expected progress toward the RAOs.	Complete SRI and FFS and determine appropriate revision to the selected remedy.	Army	USEPA/ TDEC	12/3/2019	N	Y		FFS Report
Additional lines of evidence are needed to assess VI risk.	Complete VI survey in accordance with DoD guidance.	Army	USEPA/ TDEC	8/6/2019	N	Y		Comprehensive VI Study Report

Notes:
DoD: Department of Defense
EBT: enhanced bioremediation treatment
FFS: Focused Feasiblilty Study
LTM: Long-Term Monitoring
MI : Main Installation
RAOs: Remedial Action Objectives
SRI: Supplemental Remedial Investigation
TDEC: Tennesse Department of Environment and Conservation
USEPA: United States Environemtnal Protection Agency
VI: vapor intrusion

TABLE 11
PRIMARY AND SECONDARY DOCUMENTS, FY18 THROUGH FY20
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Activity	2018 SMP Date	Date Type
Fiscal Year 2018		
MI VI Soil Gas Sampling QAPP Rev. 0	23-Oct-2017	Target
MI Supplemental RI (Phase 1-2) Report, Rev 0	3-Nov-2017	Deadline
MI Supplemental RI Phase 3 QAPP Rev. 0	7-Nov-2017	Deadline
Data Collection at TDEC Wells Tech Memo	30-Nov-2017	Target
Fourth Five-Year Review, Rev 1	9-Dec-2017	Deadline
2018 Site Management Plan, Rev. 0	15-Jan-2018	Deadline
MI Human Health & Ecological Risk Assessment Report, Rev. 0	17-Jan-2018	Target
Fourth Five-Year Review, Final	19-Jan-2018	Deadline
2017 LTM Report, Rev 0	25-Jan-2018	Target
MI VI Soil Gas Sampling QAPP Rev. 1	5-Feb-2018	Target
MI Supplemental RI (Phase 1-2) Report, Rev 1	6-Feb-2018	Deadline
Off Depot AS/SVE Operations Report, Year 6 Rev 1	8-Feb-2018	Target
Dunn Field MIP Survey Report, Rev. 1	16-Feb-2018	Target
MI Supplemental RI Phase 3 QAPP Rev. 1	20-Feb-2018	Deadline
2018 Site Management Plan, Rev. 1	16-Mar-2018	Deadline
MI Conceptual Site Model, Objectives and Model Construction Tech Memo	31-Mar-2018	Target
2017 LTM Report, Rev 1	25-Apr-2018	Target
MI Human Health & Ecological Risk Assessment Report, Rev. 1	2-May-2018	Target
MI VI Soil Gas Sampling Tech Memo	4-May-2018	Target
Dunn Field Off-Site Investigation QAPP, Rev. 0	28-May-2018	Target
MI VI Indoor Air Sampling QAPP Rev. 0	3-Jun-2018	Target
AS Well Installation Summary Report, Rev. 0	12-Jul-2018	Target
Off Depot AS/SVE Operations Report, Year 7 Rev 0	12-Aug-2018	Target
2018 Annual LUCIP Inspection Reports	14-Aug-2018	Target
MI SRI Groundwater Model Summary Tech Memo	18-Aug-2018	Target
MI Supplemental RI Phase 3 Summary Report	22-Aug-2018	Target
MI VI Indoor Air Sampling QAPP Rev. 1	1-Sep-2018	Target
Dunn Field Off-Site Investigation QAPP, Rev. 1	10-Sep-2018	Target
Fiscal Year 2019		
MI Supplemental RI Phase 4 QAPP Rev. 0	6-Oct-2018	Deadline
AS Well Installation Summary Report, Rev. 1	25-Oct-2018	Target
Off Depot AS/SVE Operations Report, Year 7 Rev 1	25-Nov-2018	Target
2019 Site Management Plan, Rev. 0	30-Nov-2018	Deadline
Dunn Field Off-Site Investigation Tech Memo	27-Dec-2018	Target
MI Supplemental RI Phase 4 QAPP Rev. 1	19-Jan-2019	Deadline
2018 LTM Report, Rev 0	25-Jan-2019	Target
2019 Site Management Plan, Rev. 1	29-Jan-2019	Deadline
2018 LTM Report, Rev 1	25-Apr-2019	Target
MI VI Indoor Air Sampling Tech Memo	29-Apr-2019	Target
MI Comprehensive VI Study Report, Rev. 0	8-Jul-2019	Target
MI Supplemental RI (Phase 3-4) Report, Rev 0	21-Jul-2019	Deadline
Off Depot AS/SVE Operations Report, Year 8 Rev 0	12-Aug-2019	Target
2019 Annual LUCIP Inspection Reports	14-Aug-2019	Target

TABLE 11
PRIMARY AND SECONDARY DOCUMENTS, FY18 THROUGH FY20
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Activity	2018 SMP Date	Date Type
Fiscal Year 2020		
MI Focused Feasibility Study Report, Rev 0	4-Oct-2019	Deadline
MI Supplemental RI (Phase 3-4) Report, Rev 1	20-Oct-2019	Deadline
MI Comprehensive VI Study Report, Rev.1	21-Oct-2019	Target
Off Depot AS/SVE Operations Report, Year 8 Rev 1	25-Nov-2019	Target
2020 Site Management Plan, Rev. 0	30-Nov-2019	Deadline
MI Focused Feasibility Study Report, Rev 1	17-Jan-2020	Deadline
2019 LTM Report, Rev 0	25-Jan-2020	Target
2020 Site Management Plan, Rev. 1	29-Jan-2020	Deadline
MI Revised Proposed Plan, Rev 0	2-Mar-2020	Deadline
2019 LTM Report, Rev 1	25-Apr-2020	Target
MI Revised Proposed Plan, Rev 1	22-May-2020	Deadline
New MI RD, Rev 0	15-Jul-2020	Deadline
MI ROD Amendment, Rev 0	5-Aug-2020	Deadline
2020 Annual LUCIP Inspection Reports	14-Aug-2020	Target

Notes:

1. Section XV. of the DDMT Federal Facilities Agreement (FFA) states DoD is responsible for issuing Primary and Secondary Documents to EPA and TDEC in accordance with the schedule provided in the latest approved SMP.

a. Deadlines are the scheduled submittal dates for Primary Documents; DoD may be assessed stipulated penalties for failure to meet a Deadline (FFA, Section XXIV).

b. Targets are the scheduled submittal dates for Secondary Documents; stipulated penalties do not apply to Targets.

c. Primary Documents are those reports, plans and studies that are major, discrete portions of the response action process.

d. Secondary Documents are those reports, plans and studies that are discrete portions of the Primary Documents and are typically input or feeder documents.

TABLE 12
FISCAL YEAR REQUIREMENTS
2018 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Description	2018	2019	2020	2021	2022	2023	2024	Out Years	Total
Remedial Action Sites	$0	$0	$1,367,000	$1,165,000	$1,053,000	$931,000	$213,000	$1,398,000	$6,127,000

Note: Planned funding for 2018 and 2019 has been awarded for ongoing task orders.

Figures

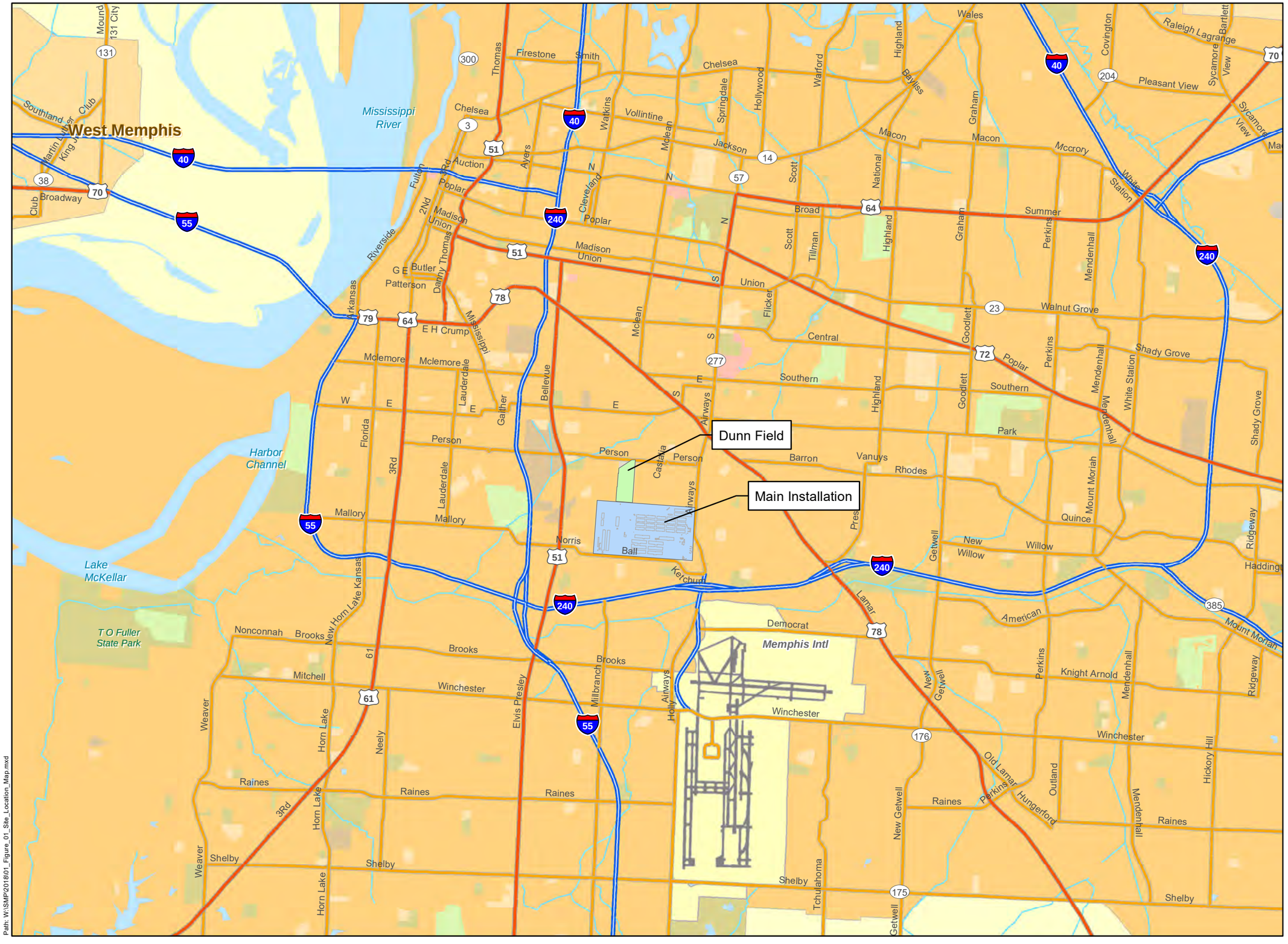


Figure 1

Site Location Map

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N
W E
S

0 1 2
Miles

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0

Path: W:\SMP\2018\02_Site Aerial.mxd

Figure 2

Site Aerial Photograph

2018 Site Management Plan

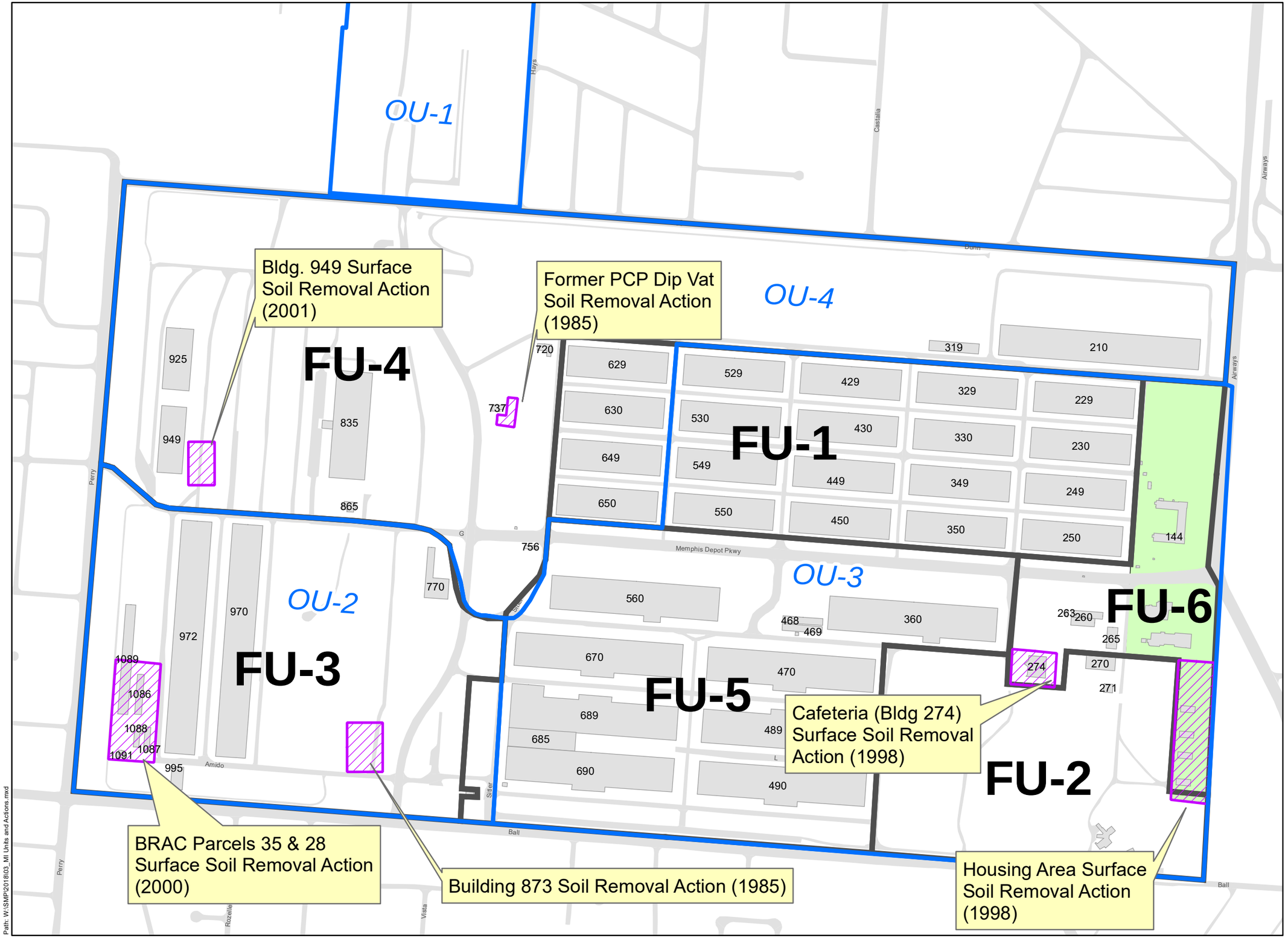
Defense Depot
Memphis, Tennessee

N
W E
S

0 500 1,000
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0



Path: W:\SMP\2018\03_MI Units and Actions.mxd

Figure 3

Main Installation Unit Boundaries and Response Actions

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Operable Units (OU-#)
- Past Response Actions
- Functional Unit Boundary (FU-#)
- Area Available for Unrestricted Use
- Buildings *490 - DDMT Assigned Number*
- Roads

N
W E
S

0 500 1,000
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/12/2017
Edition: Rev 0

HDR

CHEMICAL WARFARE MATERIAL REMOVAL ACTION (2001)

PISTOL RANGE REMOVAL ACTION (2003)

GROUNDWATER INTERIM REMEDIAL ACTION (2009)

CHEMICAL WARFARE MATERIAL REMOVAL ACTION (2001)

NORTHEAST OPEN AREA

DISPOSAL AREA

STOCKPILE AREA

McLean

Person

Carver

Hearst

Hays

State

Ferber

Perry

Dunn

Path: W:\SMP2018\04_DF Areas and Actions.mxd

Figure 4

Dunn Field Area Designations, Removal Actions and Interim Remedial Action

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Original Dunn Field Boundary
- IRA Recovery Well
- IRA Discharge Conveyance Line
- Area Designations
- Removal Actions
- Unrestricted Use Area
- Paved Area
- Roads
- Railroad

N
W E
S

0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/13/2017
Edition: Rev 0

Figure 5

OU-1 Site Locations
Dunn Field

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Operable Units
- Chemical Warfare Manag. Plan Site
- Proposed Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Paved Area
- Roads
- Railroad

N
W E
S

0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 1/5/2018
Edition: Rev 0

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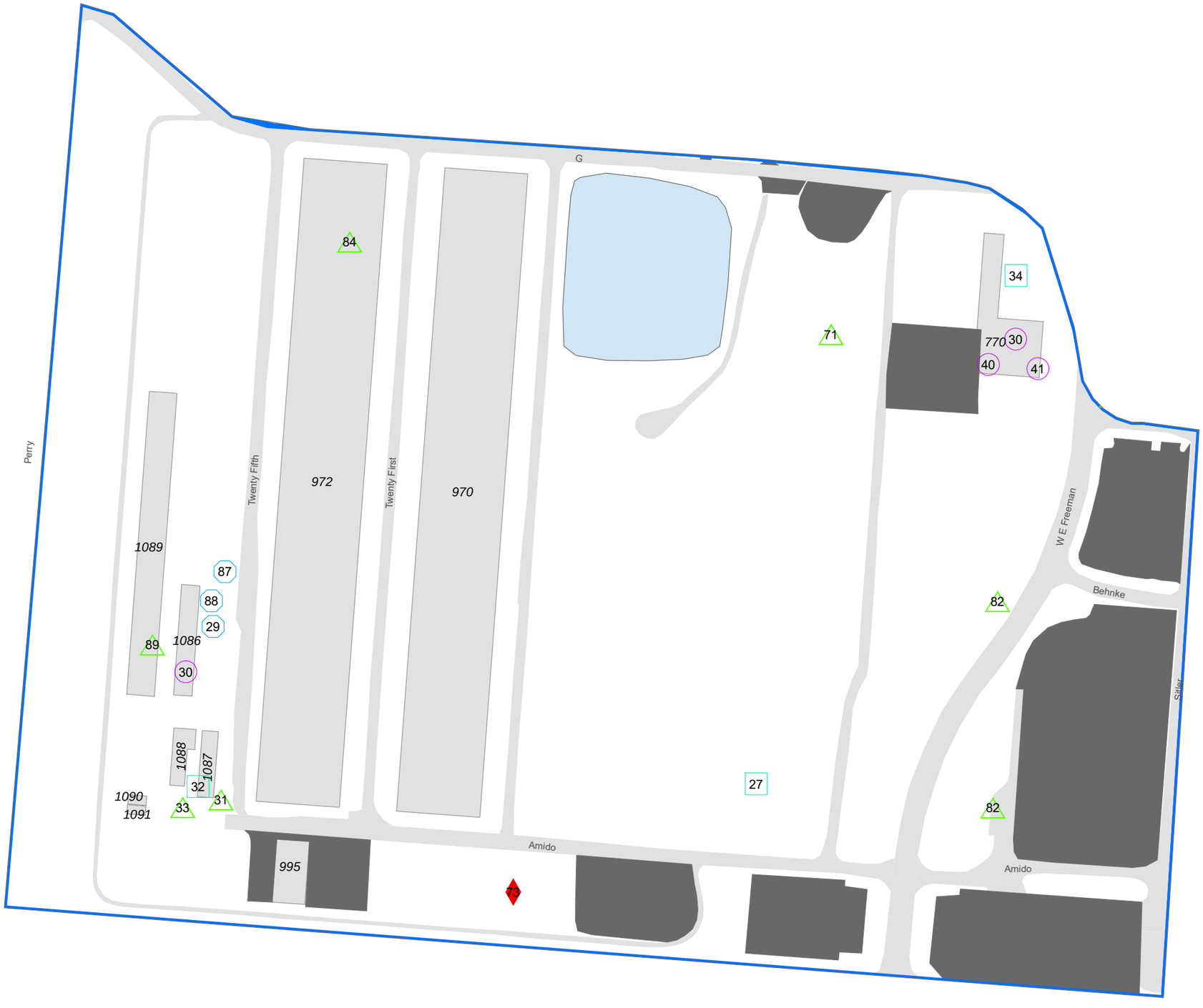


Path: W:\SMP\2018\06_OU2 Sites.mxd

Figure 6

OU-2 Site Locations Main Installation Southwest Quadrant

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Operable Units
- Proposed Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Paved Area
- Holding Pond
- Buildings *490 - DDMT Assigned Number*
- Roads

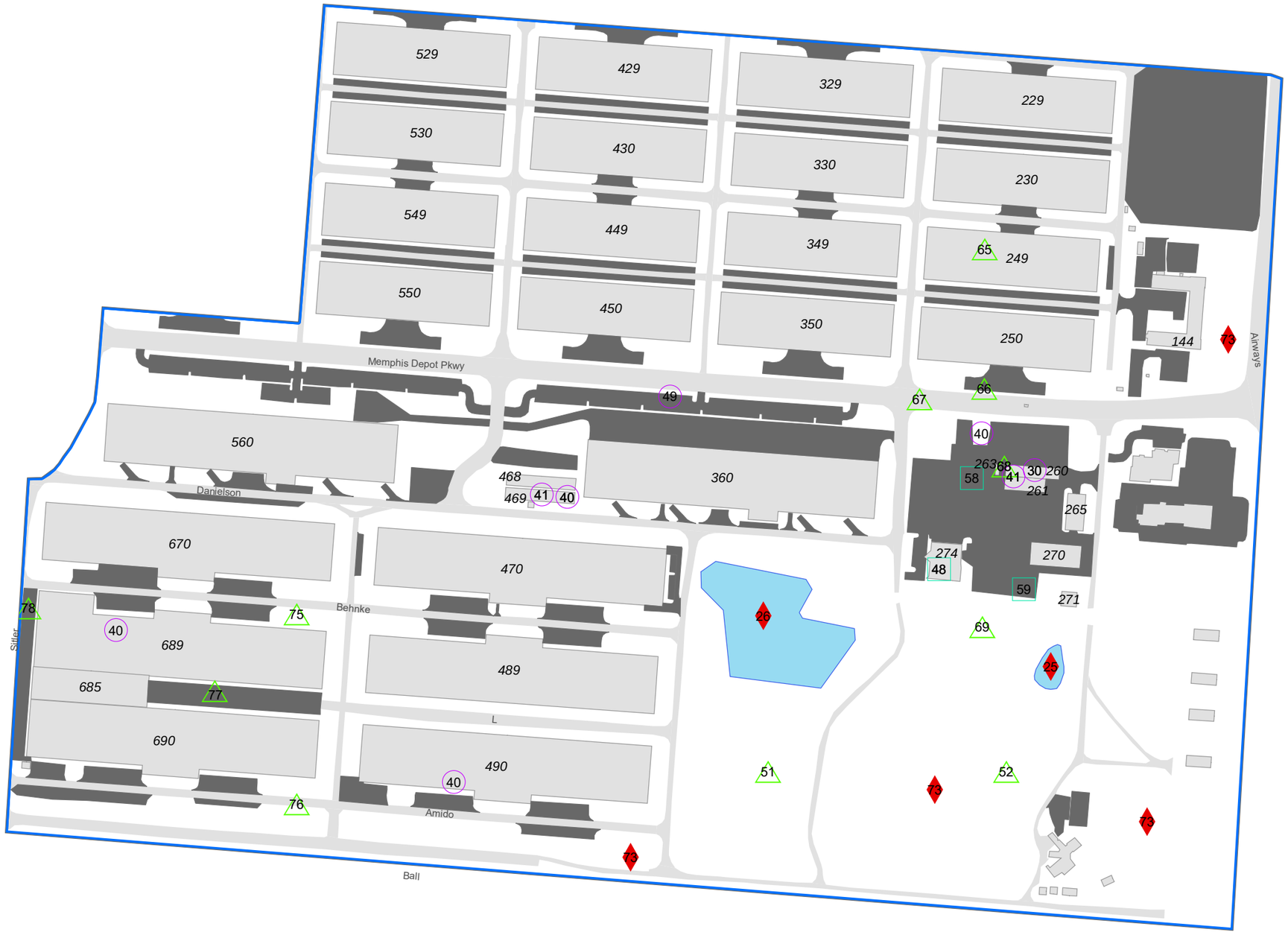
N
W E
S

0 200 400
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 1/5/2018
Edition: Rev 0

HDR



Path: W:\SMP\201807_OU3 Sites.mxd

Figure 7

OU-3 Site Locations Main Installation Southeastern Watershed and Golf Course

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Operable Units
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Surface Water
- Paved Area
- Buildings *490 - DDMT Assigned Number*
- Roads

N
W E
S

0 300 600
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 1/5/2018
Edition: Rev 0

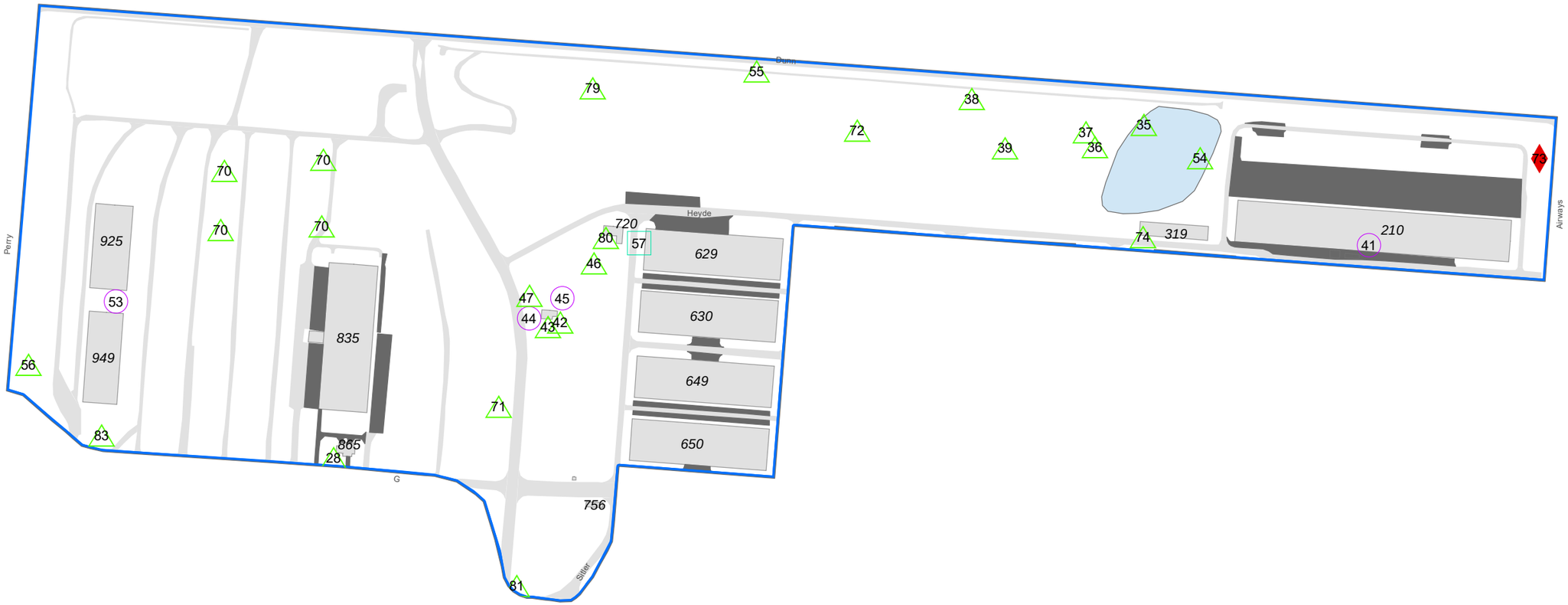


Figure 8

OU-4 Site Locations
Main Installation
North Central Area

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Operable Units
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Paved Area
- Holding Pond
- Buildings *490 - DDMT Assigned Number*
- Roads

N
W E
S

0 500 1,000
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 1/5/2018
Edition: Rev 0

Path: W:\SMP\2018\08_OU4 Sites.mxd

Notes:
1. Groundwater contours from October 2016.
2. CVOC contours from October 2016.

Legend

- PCE Commercial Vapor Intrusion Screening Level (65 ug/L)
- TCE Commercial Vapor Intrusion Screening Level (7.4 ug/L)
- CT Commercial Vapor Intrusion Screening Level (1.8 ug/L)
- CF Commercial Vapor Intrusion Screening Level (3.6 ug/L)
- VC Commercial Vapor Intrusion Screening Level (2.5 ug/L)
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Fluvial Aquifer Well
- Intermediate Aquifer Well
- Property Boundary
- Area Available for Unrestricted Use
- Roads
- Building with Number and Lessee(s)
- Clay Elevation Exceeds Groundwater Elevation

Figure 9

Main Installation Comprehensive Vapor Intrusion Screening Map

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

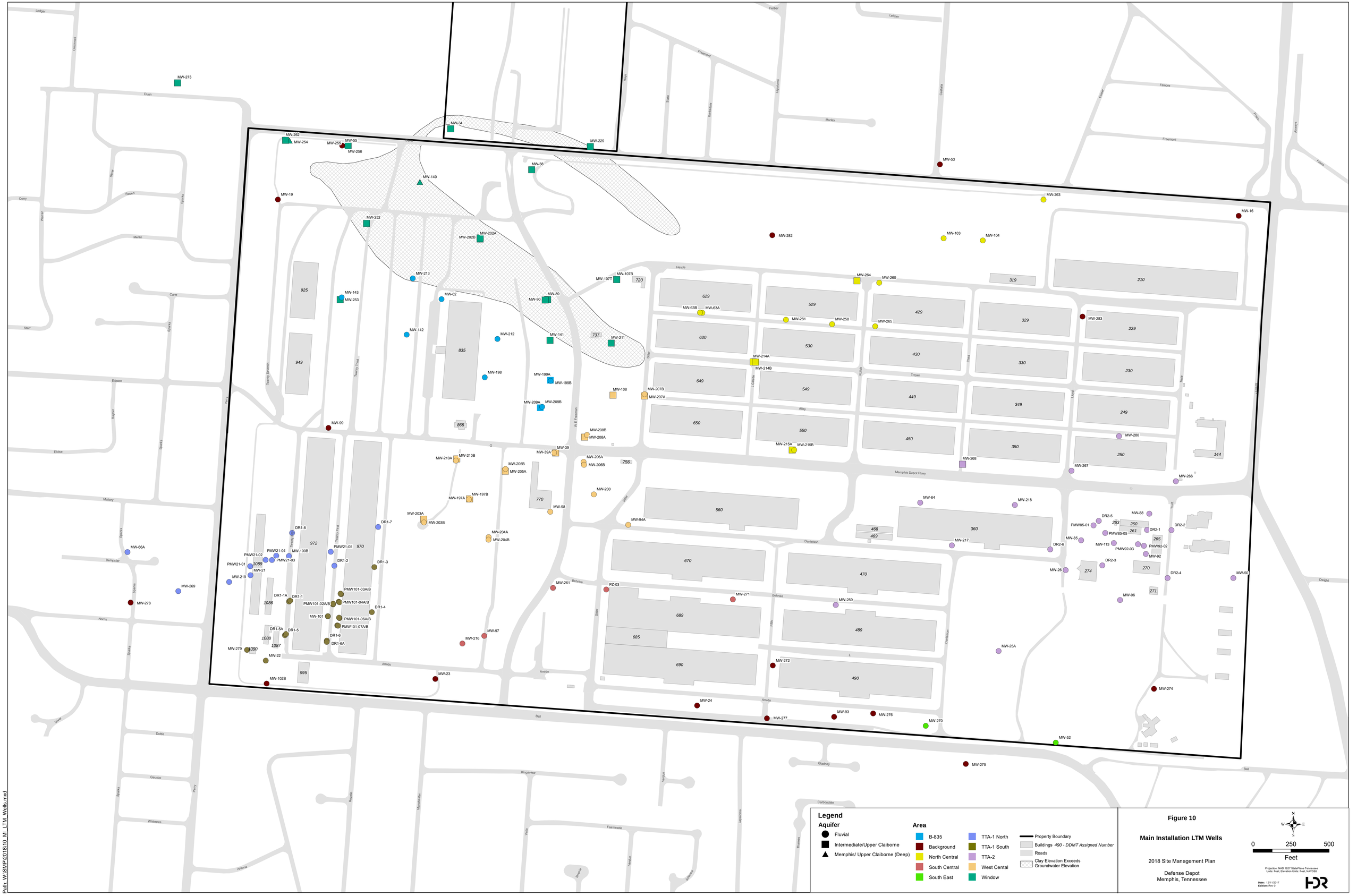
0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0

HDR

Path: W:\SMP\2018\09_MI\Vimap.mxd



Legend

Aquifer

- Fluvial
- Intermediate/Upper Claiborne
- Memphis/ Upper Claiborne (Deep)

Area

- B-835
- Background
- North Central
- South Central
- South East
- TTA-1 North
- TTA-1 South
- TTA-2
- West Cental
- Window

- Property Boundary
- Buildings *490 - DDMT Assigned Number*
- Roads
- Clay Elevation Exceeds Groundwater Elevation

Figure 10

Main Installation LTM Wells

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N
W E
S

0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0

HDR

Path: W:\SMP\2018\10_MI_LTM_Wells.mxd

Note:
1. Color-coded wells symbols are based on the most recent analytical result at each well. Results are from the October 2016 and April 2017 LTM events. Only concentrations from the April 2017 LTM event are shown below the well ID.
2. Groundwater contours are from the April 2017 LTM event.

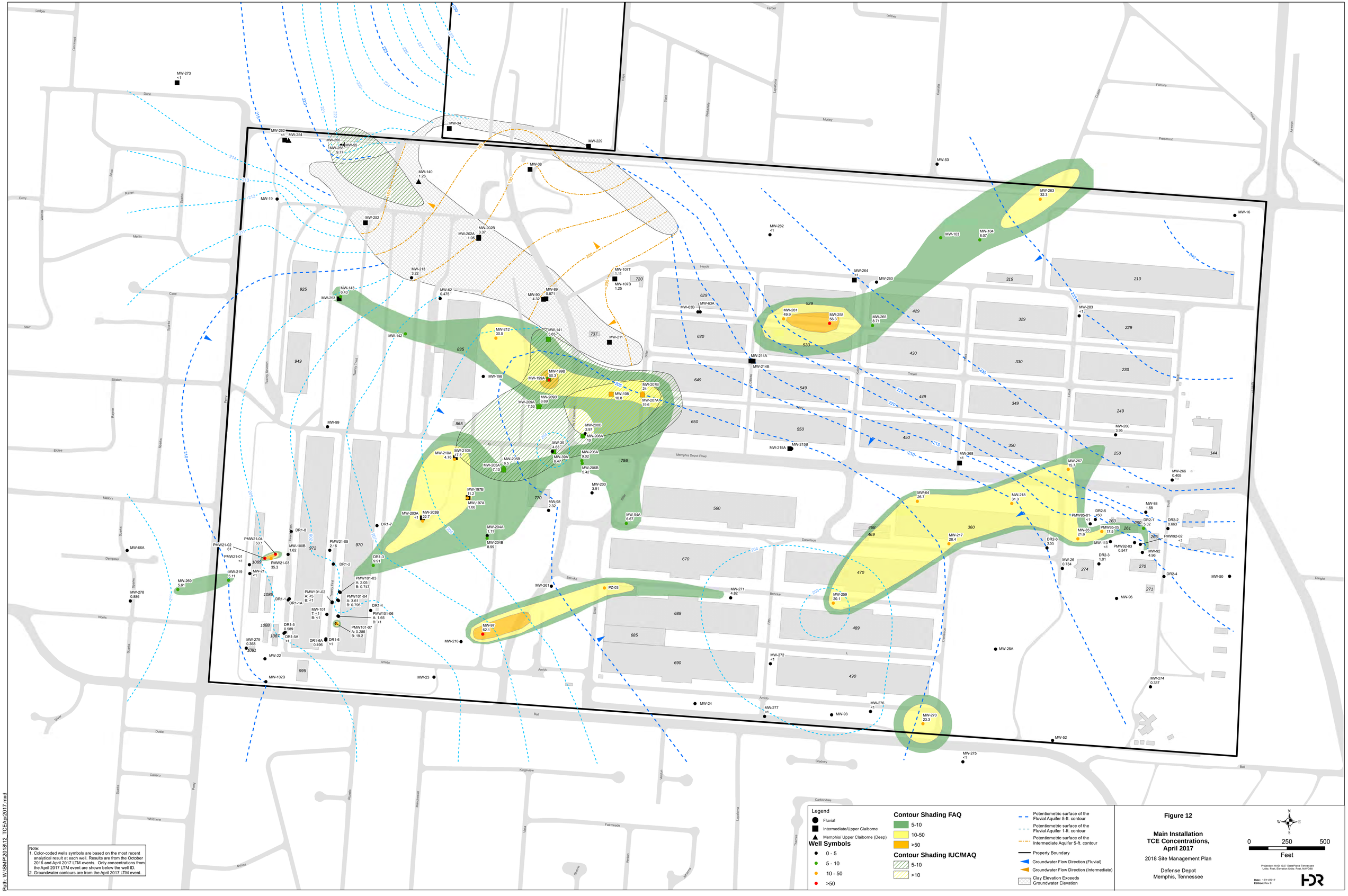
Figure 11

Main Installation PCE Concentrations, April 2017

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Path: W:\SMP\2018\11_PCEApr2017.mxd



Note:
1. Color-coded wells symbols are based on the most recent analytical result at each well. Results are from the October 2016 and April 2017 LTM events. Only concentrations from the April 2017 LTM event are shown below the well ID.
2. Groundwater contours are from the April 2017 LTM event.

Legend

- Fluvial
- Intermediate/Upper Claiborne
- Memphis/ Upper Claiborne (Deep)

Well Symbols

- 0 - 5
- 5 - 10
- 10 - 50
- >50

Contour Shading FAQ

- 5-10
- 10-50
- >50

Contour Shading IUC/MAQ

- 5-10
- >10

- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Intermediate Aquifer 5-ft. contour
- Property Boundary
- Groundwater Flow Direction (Fluvial)
- Groundwater Flow Direction (Intermediate)
- Clay Elevation Exceeds Groundwater Elevation

Figure 12

Main Installation TCE Concentrations, April 2017

2018 Site Management Plan

Defense Depot Memphis, Tennessee

N W E S

0 250 500

Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0

FDR

Path: W:\SMP\2018\12_TCEApr2017.mxd

A North

A' South

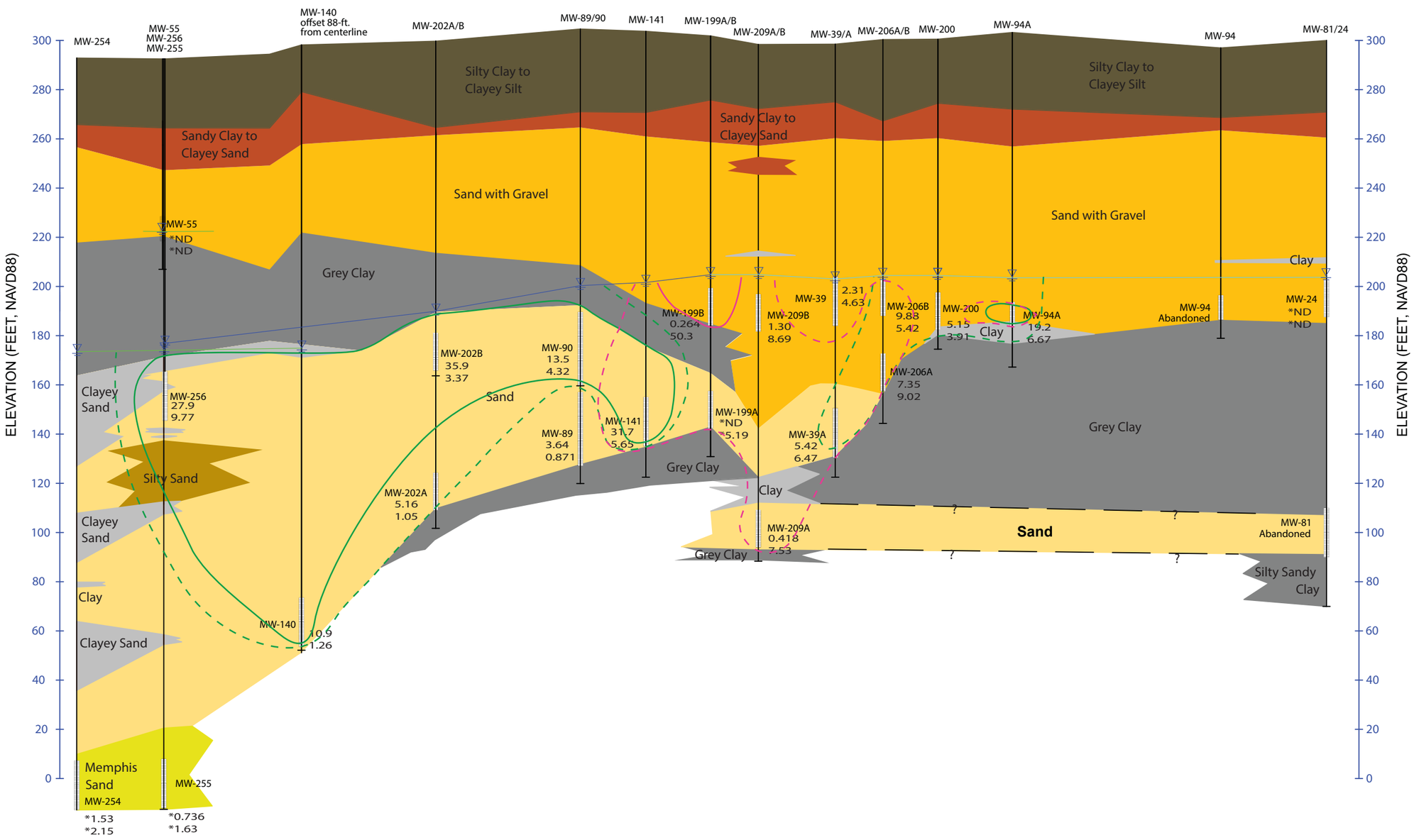


Figure 13
Main Installation
Cross-Section A
with PCE and TCE
Concentration,
April 2017

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

- Silty Clay to Clayey Silt
- Sandy Clay to Clayey Sand
- Fluvial Sand or Sand with Gravel
- Clayey Sand to Silty Clay
- Silty Sand-Sandy Silt
- Intermediate Sand
- Clay
- Memphis Sand
- Groundwater Elevation
- Fluvial Aquifer Groundwater Elevation
- Intermediate Aquifer Groundwater Elevation
- Memphis Aquifer Groundwater Elevation
- Well Screen Interval

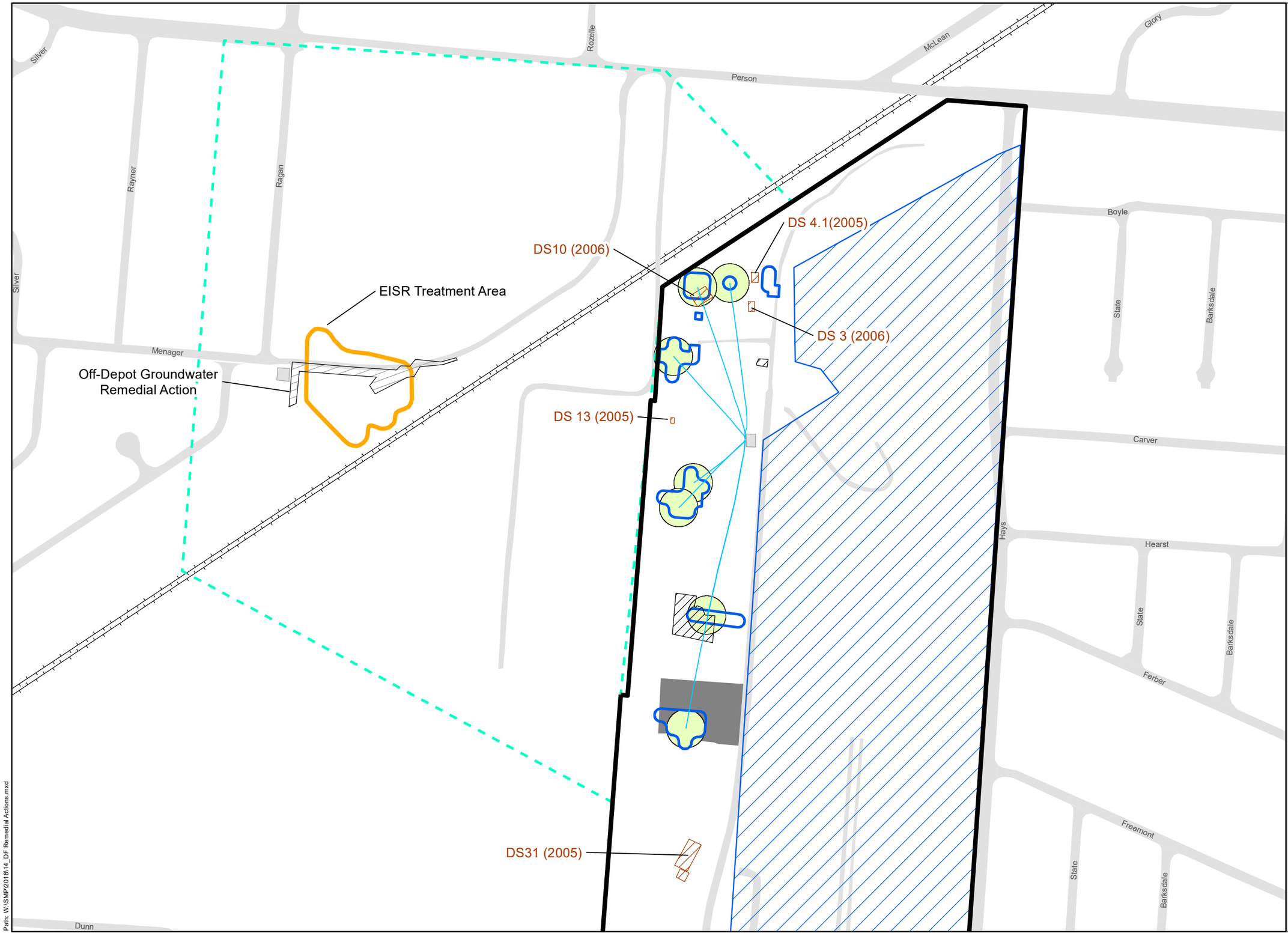
Note: Water levels measured at LTM wells on 4/18/17.

Well ID
PCE Result ug/L
TCE Result ug/L
*: Result from October 2016

- PCE 5 ug/L
- PCE 10 ug/L
- TCE 5 ug/L
- TCE 10 ug/L

20
0
200

Date: December 2017
Edition:Rev 0



Path: W:\SMP\2018\14_DF Remedial Actions.mxd

Figure 14

Dunn Field Disposal Sites, Source Areas and Off-Depot Groundwater Remedial Actions

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

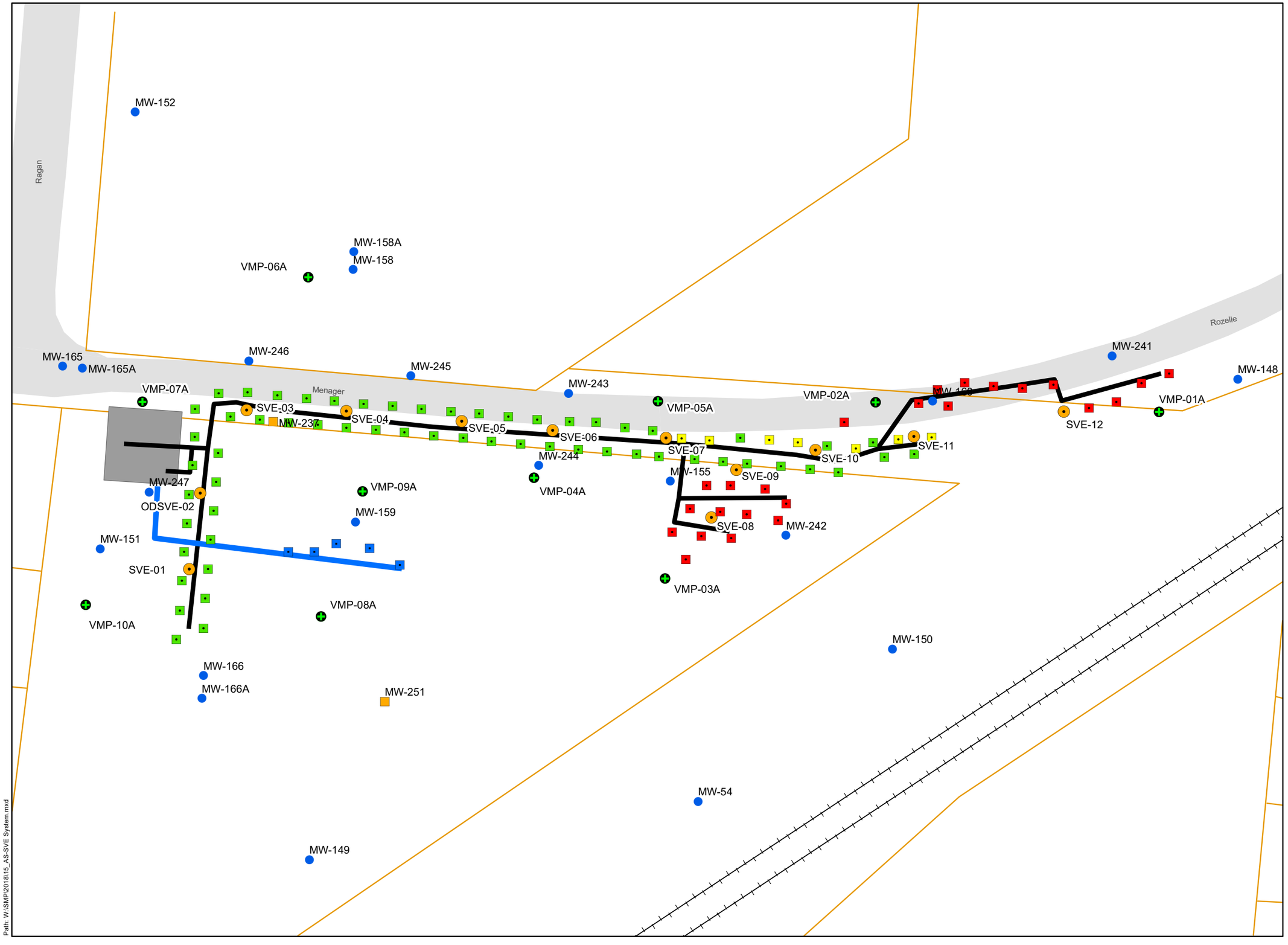
- Original Dunn Field Boundary
- Fluvial SVE Conveyance Line
- Disposal Sites Excavation Area
- Off Site Treatment Areas
- Off Depot Air Sparge Area
- EISR Treatment Area
- *Loess Excavation Areas*
- *Loess Thermal-Enhanced SVE Treatment Areas*
- Fluvial SVE Well 60-foot radius of influence
- Unrestricted Use Area from ROD
- Buildings
- Paved Area
- Roads
- Railroad

N
W E
S

0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0



Path: W:\SMP\201815_AS-SVE System.mxd

Figure 15

AS/SVE System

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

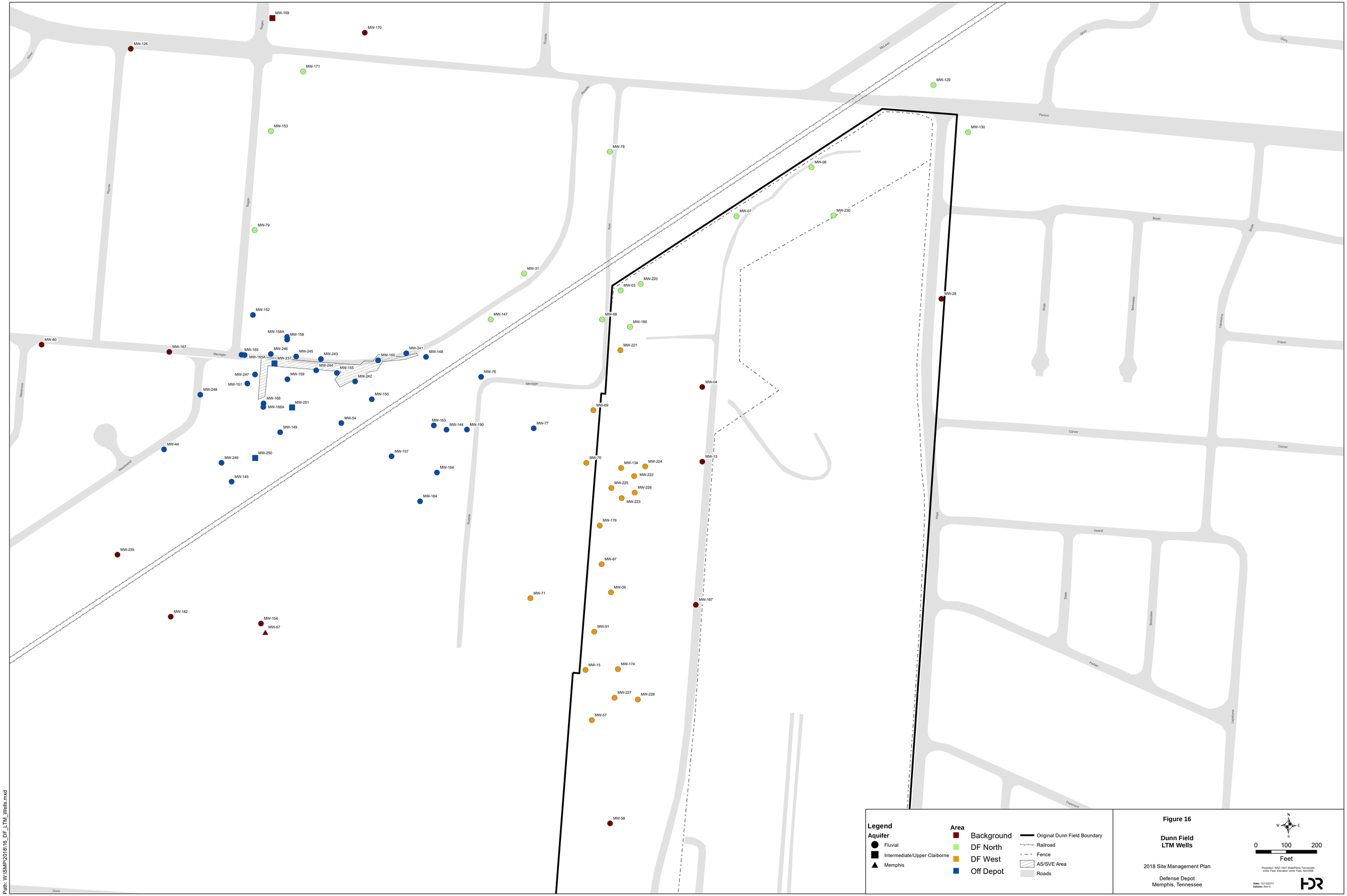
- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- AS Location (1/2 time)
- AS Location (full time)
- AS Location (closed)
- New AS Location
- VMP Location
- SVE Location
- Conveyance Lines
- New Conveyance Line
- SVE Compound
- Roads
- Railroad
- Parcel Boundary

N
W E
S

0 25 50
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/11/2017
Edition: Rev 0



Legend

Aquifer
- Fluvial
- Intermediate/Upper Claiborne
- Memphis

Area
- Background
- DF North
- DF West
- Off Depot

- Original Dunn Field Boundary
- Railroad
- Fence
- AS/SVE Area
- Roads

Figure 16

Dunn Field
LTM Wells

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N W E S

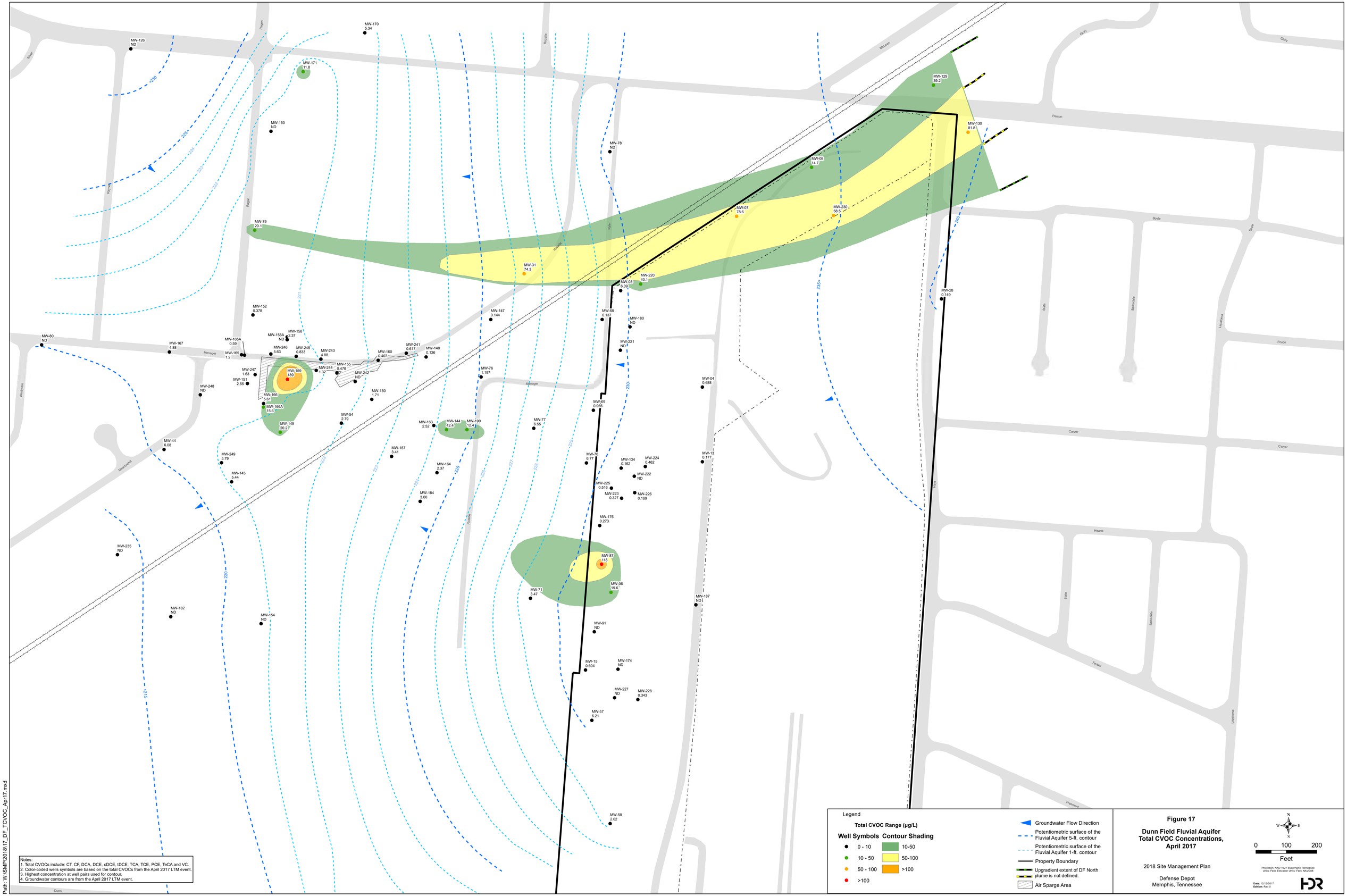
0 100 200
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/13/2017
Edition: Rev 0

HDR

Path: W:\SMP2018\16_DF_LTM_Wells.mxd



Notes:
1. Total CVOCs include: CT, CF, DCA, DCE, cDCE, tDCE, TCA, TCE, PCE, TeCA and VC.
2. Color-coded wells symbols are based on the total CVOCs from the April 2017 LTM event.
3. Highest concentration at well pairs used for contour.
4. Groundwater contours are from the April 2017 LTM event.

Legend

Total CVOC Range (µg/L)

Well Symbols	Contour Shading
0 - 10	10-50
10 - 50	50-100
50 - 100	>100
>100	

- Groundwater Flow Direction
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Property Boundary
- Upgradient extent of DF North plume is not defined.
- Air Sparge Area

Figure 17

Dunn Field Fluvial Aquifer Total CVOC Concentrations, April 2017

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

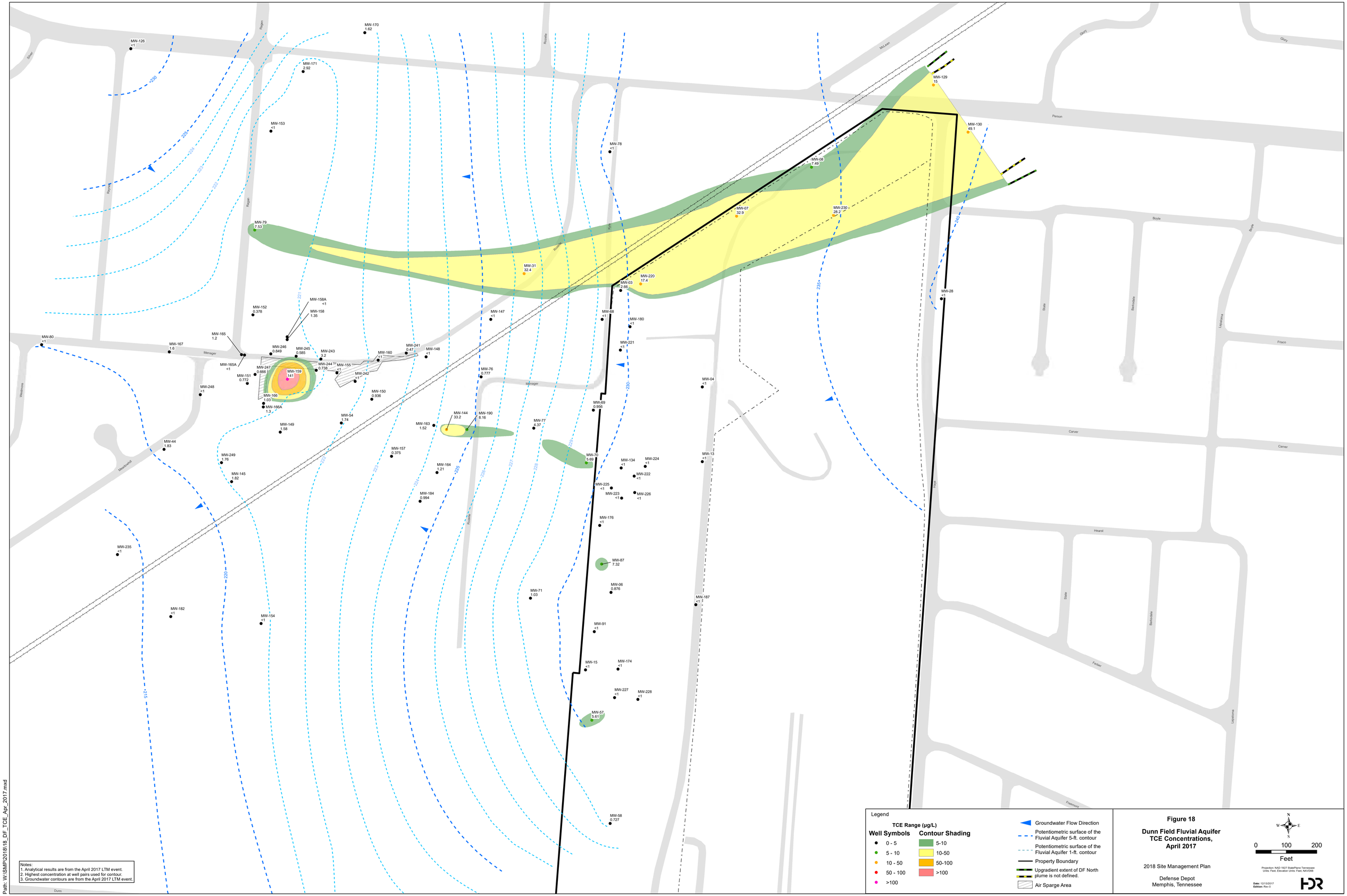
N W E S

0 100 200
Feet

Projection: NAD 1927 StatePlane Tennessee Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/13/2017
Edition: Rev 0

Path: W:\SMP\2018\17_DF_TCVOC_Apr17.mxd



Notes:
1. Analytical results are from the April 2017 LTM event.
2. Highest concentration at well pairs used for contour.
3. Groundwater contours are from the April 2017 LTM event.

Legend

TCE Range (µg/L)

Well Symbols	Contour Shading
0 - 5	5-10
5 - 10	10-50
10 - 50	50-100
50 - 100	>100
>100	

- Groundwater Flow Direction
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Property Boundary
- Upgradient extent of DF North plume is not defined.
- Air Sparge Area

Figure 18

Dunn Field Fluvial Aquifer TCE Concentrations, April 2017

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

0 100 200
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/13/2017
Edition: Rev 0

Cintas Site

Wabash Avenue Site

CS04
CS03
CS01
CS02
CS05
CS06
CS07
WB04
WB03
WB02
WB01
MW-129
MW-130
MW-78
MW-08
MW-07
MW-230
MW-220
MW-03
MW-68
MW-180
MW-221
MW-04
MW-69
MW-28

Legend

Aquifer
- Fluvial
- Intermediate/Upper Claiborne
- Memphis
- Cintas Monitoring Well
- Wabash Monitoring Well
- Original Dunn Field Boundary
- MIP Study Area

LTM Well Classifications
- Background
- DF North
- DF West
- Off Depot

Note:
Well WB-04 is not usable; TDEC has been notified and will take necessary action.

Figure 19

Dunn Field MIP Survey, TDEC and LTM Well Locations

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N
W E
S

0 100 200
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/13/2017
Edition: Rev 0

HDR

Path: W:\SMP\2018\19_MIPSurvey_TCEC Well Locations.mxd

Path: W:\SMP\2018\20_FOST Map.mxd

Figure 20

Finding of Suitability to Transfer Map

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

Legend

- Property Boundary
- FOST 1 — *signed 02/23/01, deeds signed 02/06/02 and 05/06/02.*
- FOST 2 — *signed 9/27/01, deed signed 9/18/01*
- FOST 3 — *signed 07/01/04, deeds signed 04/04/06 and 08/18/06.*
- FOST 4 — *signed 03/04/05, deed signed 10/17/07.*
- FOST 5 — *signed 7/12/10; property not transferred.*
- FOST 6 — *signed 8/3/10; deed signed 3/30/11.*
- Buildings *490 - DDMT Assigned Number*
- Roads

N
W E
S

0 500 1,000
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

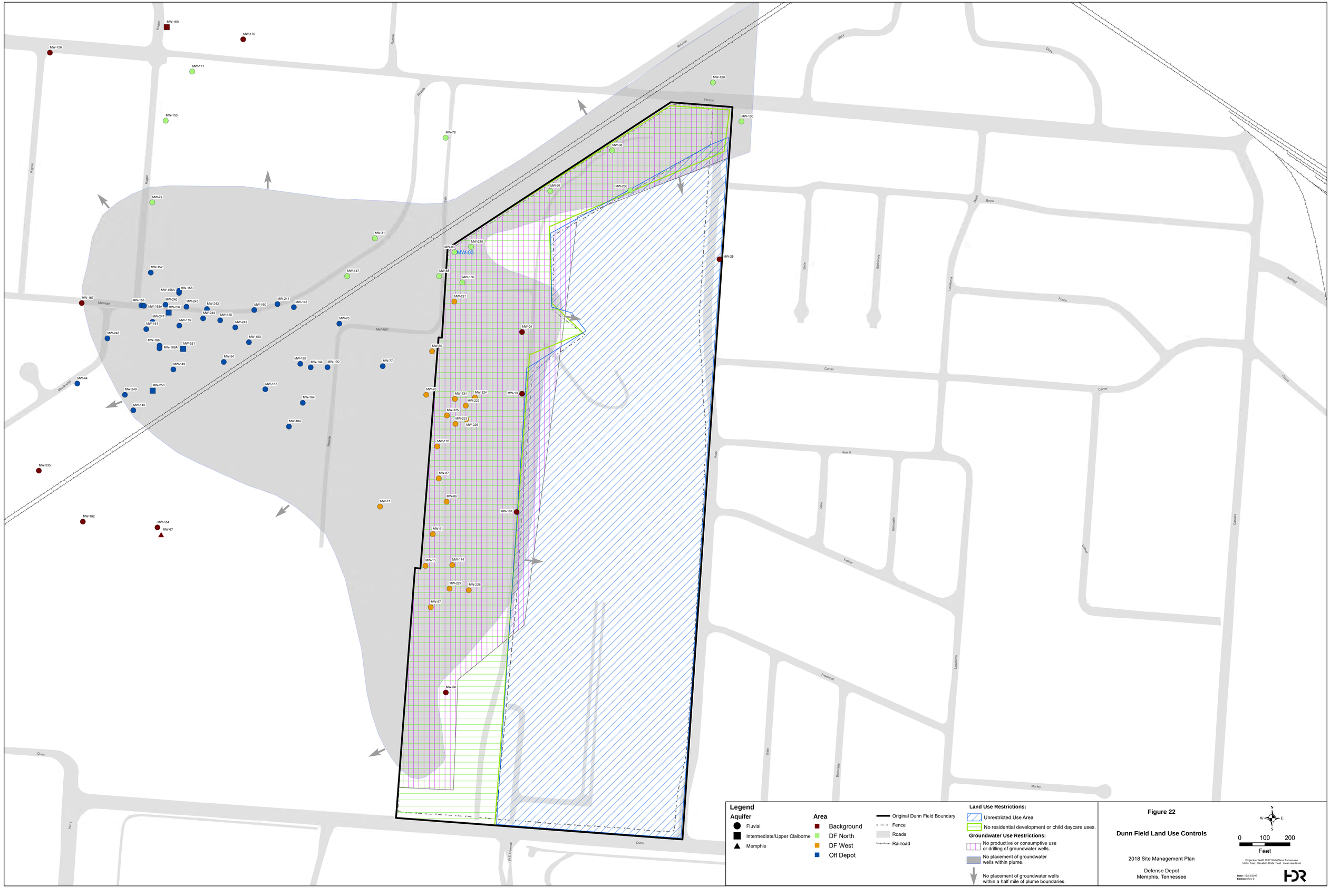
Date: 12/13/2017
Edition: Rev 0

Figure 21

Main Installation Land Use Controls

2018 Site Management Plan

Defense Depot
Memphis, Tennessee



Legend

Aquifer
- Fluvial
- Intermediate/Upper Claiborne
- Memphis

Area
- Background
- DF North
- DF West
- Off Depot

- Original Dunn Field Boundary
- Fence
- Roads
- Railroad

Land Use Restrictions:
- Unrestricted Use Area
- No residential development or child daycare uses.

Groundwater Use Restrictions:
- No productive or consumptive use or drilling of groundwater wells.
- No placement of groundwater wells within plume.
- No placement of groundwater wells within a half mile of plume boundaries.

Figure 22

Dunn Field Land Use Controls

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N W E S

0 100 200
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet , mean sea level

Date: 12/13/2017
Edition: Rev 0

Path: W:\SMP\2018\22_DF LUCs.mxd

Notes:
1. PCE and TCE isopleths and the water level contours are from the April 2017 Long Term Monitoring event.

Legend

Aquifer
- Fluvial
- Intermediate/Upper Claiborne
- Memphis/ Upper Claiborne (Deep)

- PCE (Fluvial, >5 micrograms per liter)
- PCE (IUC, >5 micrograms per liter)
- TCE (Fluvial, >5 micrograms per liter)
- TCE (IUC, >5 micrograms per liter)

Area
- B-835
- Background
- North Central
- South Central
- South East
- TTA-1 North
- TTA-1 South
- TTA-2
- West Central
- Window

- Proposed Fluvial Aquifer Phase 3 Well
- Proposed Intermediate Aquifer Phase 3 Well

- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Intermediate Aquifer 5-ft. contour
- Groundwater Flow Direction (Fluvial)
- Groundwater Flow Direction (Intermediate)
- Property Boundary
- Buildings *490 - DDMT Assigned Number*
- Roads
- Clay Elevation Exceeds Groundwater Elevation

Figure 23

SRI Phase 3 Well Locations

2018 Site Management Plan

Defense Depot
Memphis, Tennessee

N W E S

0 250 500
Feet

Projection: NAD 1927 StatePlane Tennessee
Units: Feet, Elevation Units: Feet, NAVD88

Date: 12/12/2017
Edition: Rev 0

FDR

Path: W:\SMP(2018)\23_Phase3WellLocs.mxd

Path: W:\SMP\2018\24_MI VI Soil Gas Locations.mxd

Figure 25
Master Schedule

ID	Status	Task Name	Duration	Start	Finish
1		**MAIN INSTALLATION**	**3647 d**	**Sun 1/1/17**	**Sat 12/26/26**
2		**Supplemental Remedial Investigation (SRI)**	**155 d**	**Tue 9/5/17**	**Tue 2/6/18**
3	**P**	**SRI Phase 1-2 Report**	**155 d**	**Tue 9/5/17**	**Tue 2/6/18**
4		Prepare and Submit Rev. 0 SRI Phase 1-2 Report	60 d	Tue 9/5/17	Fri 11/3/17
5		Agency Review and Submit Comments on Rev. 0 SRI Phase 1-2 Report	60 d	Sat 11/4/17	Tue 1/2/18
6		Prepare and Submit Rev. 1 SRI Phase 1-2 Report	35 d	Wed 1/3/18	Tue 2/6/18
7		**SRI Phases 3 and 4**	**772 d**	**Sat 9/9/17**	**Sun 10/20/19**
8	**P**	**SRI Phase 3 QAPP**	**165 d**	**Sat 9/9/17**	**Tue 2/20/18**
9		Prepare and Submit Rev. 0 SRI Phase 3 QAPP	60 d	Sat 9/9/17	Tue 11/7/17
10		Agency Review and Submit Comments on Rev. 0 SRI Phase 3 QAPP	60 d	Wed 11/8/17	Sat 1/6/18
11		Prepare and Submit Rev. 1 SRI Phase 3 QAPP	45 d	Sun 1/7/18	Tue 2/20/18
12		SRI Phase 3 Field Activities	70 d	Wed 3/14/18	Tue 5/22/18
13	**S**	**SRI Phase 3 Summary Report**	**90 d**	**Fri 5/25/18**	**Wed 8/22/18**
14		Prepare and Submit SRI Phase 3 Summary Report	90 d	Fri 5/25/18	Wed 8/22/18
15	**P**	**SRI Phase 4 QAPP**	**165 d**	**Wed 8/8/18**	**Sat 1/19/19**
16		Prepare and Submit Rev. 0 SRI Phase 4 QAPP	60 d	Wed 8/8/18	Sat 10/6/18
17		Agency Review and Submit Comments on Rev. 0 SRI Phase 4 QAPP	60 d	Sun 10/7/18	Wed 12/5/18
18		Prepare and Submit Rev. 1 SRI Phase 4 QAPP	45 d	Thu 12/6/18	Sat 1/19/19
19		SRI Phase 4 Field Activities	70 d	Sun 2/10/19	Sat 4/20/19
20	**P**	**Final SRI Report (Phases 3 and 4)**	**181 d**	**Tue 4/23/19**	**Sun 10/20/19**
21		Prepare and Submit Rev. 0 Final SRI Report	90 d	Tue 4/23/19	Sun 7/21/19
22		Agency Review and Submit Comments on Rev. 0 Final SRI Report	63 d	Mon 7/22/19	Sun 9/22/19
23		Prepare and Submit Rev. 1 Final SRI Report	28 d	Mon 9/23/19	Sun 10/20/19
24		**Human Health and Ecological Risk Assessment (HHERA) Update-Review**	**330 d**	**Wed 6/7/17**	**Wed 5/2/18**
25	S	Prepare and Submit HHERA Protocol Technical Memorandum	30 d	Wed 6/7/17	Thu 7/6/17
26		Site Information Review and and Risk Estimation	105 d	Fri 7/7/17	Thu 10/19/17
27	S	Prepare and Submit HHERA Rev.0 Report	90 d	Fri 10/20/17	Wed 1/17/18
28		Agency Review and Submit Comments on HHERA Rev. 0 Report	60 d	Thu 1/18/18	Sun 3/18/18
29		Prepare and Submit HHERA Rev. 1 Report	45 d	Mon 3/19/18	Wed 5/2/18
30		**MI Groundwater Model**	**445 d**	**Wed 5/31/17**	**Sat 8/18/18**
31		Data Collection and Compilation	30 d	Wed 5/31/17	Thu 6/29/17
32		Conceptual Site Model (CSM) Development	60 d	Fri 6/30/17	Mon 8/28/17
33		Request for MLGW Allen Well Field Data	245 d	Fri 6/30/17	Thu 3/1/18
34	S	Prepare and Submit CSM, Objectives and Model Construction Technical Memorandum	30 d	Fri 3/2/18	Sat 3/31/18
35		Final Model Construction, Calibration and Predictive Scenarios	80 d	Sun 4/1/18	Tue 6/19/18
36	S	Prepare and Submit SRI Groundwater Model Summary Technical Memorandum	60 d	Wed 6/20/18	Sat 8/18/18
37		**MI Vapor Intrusion Study**	**904 d**	**Mon 5/1/17**	**Mon 10/21/19**
38		Screening Level VI Assessment	40 d	Mon 5/1/17	Fri 6/9/17
39		Prepare and Submit Screening Level VI Assessment Technical Memorandum	60 d	Sat 6/10/17	Tue 8/8/17
40		**Site Specific VI Pathway Evaluation**	**793 d**	**Sun 8/20/17**	**Mon 10/21/19**
41		**Soil Gas Sampling**	**258 d**	**Sun 8/20/17**	**Fri 5/4/18**
42	**S**	**Soil Gas Sampling QAPP**	**170 d**	**Sun 8/20/17**	**Mon 2/5/18**
43		Prepare and Submit Rev. 0 Soil Gas Sampling QAPP	65 d	Sun 8/20/17	Mon 10/23/17
44		Agency Review and Submit Comments on Rev. 0 Soil Gas Sampling QAPP	60 d	Tue 10/24/17	Fri 12/22/17
45		Prepare and Submit Rev. 1 Soil Gas Sampling QAPP	45 d	Sat 12/23/17	Mon 2/5/18

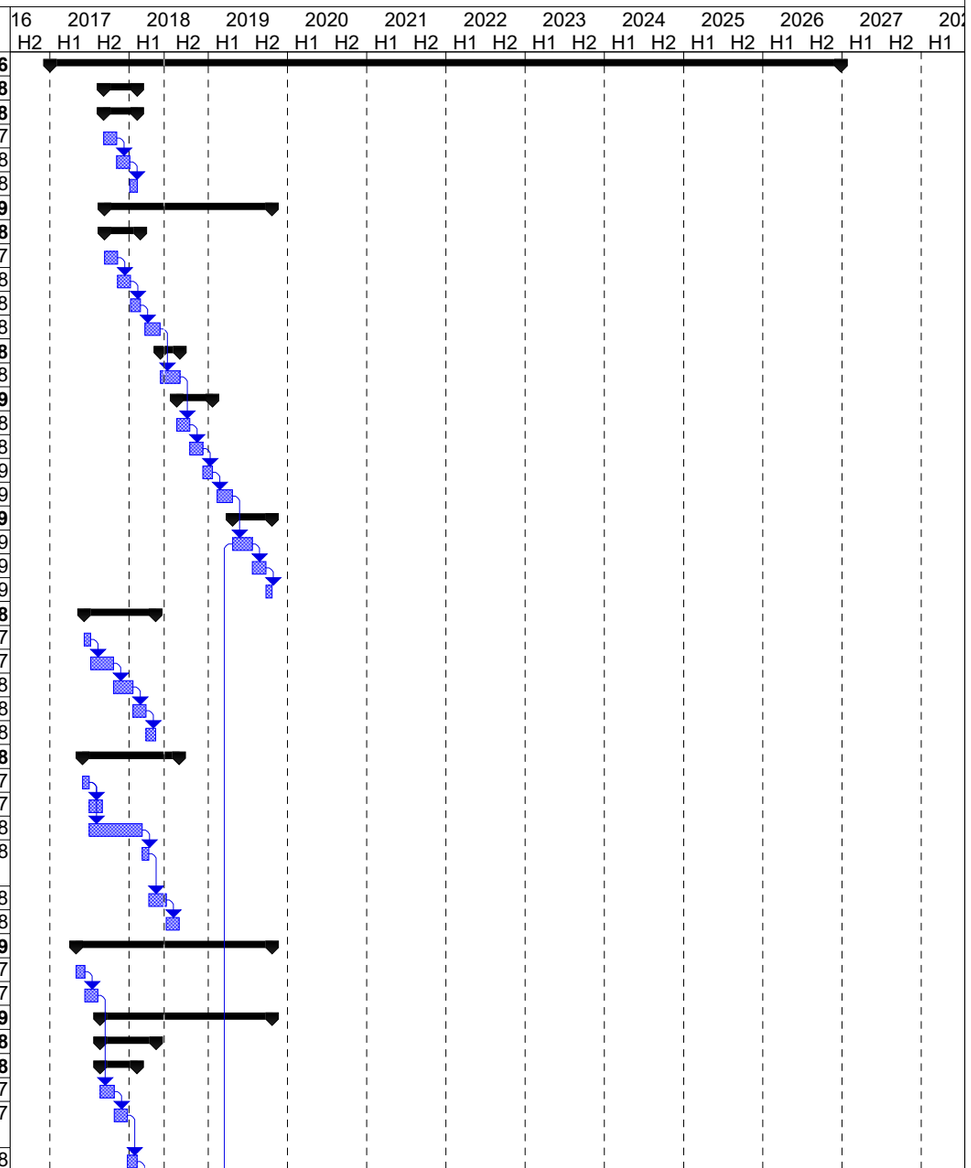


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Figure 25
Master Schedule

ID	Status	Task Name	Duration	Start	Finish
46		Soil Gas Sampling Field Activities	7 d	Tue 2/20/18	Mon 2/26/18
47	S	Prepare and Submit Soil Gas Sampling Technical Memorandum	65 d	Thu 3/1/18	Fri 5/4/18
48		**Indoor Air Sampling**	**390 d**	**Thu 4/5/18**	**Mon 4/29/19**
49	**S**	**Indoor Air Sampling QAPP**	**150 d**	**Thu 4/5/18**	**Sat 9/1/18**
50		Prepare and Submit Rev. 0 Indoor Air Sampling QAPP	60 d	Thu 4/5/18	Sun 6/3/18
51		Agency Review and Submit Comments on Rev. 0 Indoor Air Sampling QAPP	60 d	Mon 6/4/18	Thu 8/2/18
52		Prepare and Submit Rev. 1 Indoor Air Sampling QAPP	30 d	Fri 8/3/18	Sat 9/1/18
53		**Indoor Air Sampling Field Activities**	**187 d**	**Fri 8/24/18**	**Tue 2/26/19**
54		Sample Round 1	7 d	Fri 8/24/18	Thu 8/30/18
55		Sample Round 2	7 d	Wed 2/20/19	Tue 2/26/19
56	S	Prepare and Submit Indoor Air Sampling Technical Memorandum	60 d	Fri 3/1/19	Mon 4/29/19
57		**Mitigation/Remediation Evaluation**	**30 d**	**Wed 4/10/19**	**Thu 5/9/19**
58		Evaluation of Alternatives and Selection of Mitigation and/or Remediation Alternatives	30 d	Wed 4/10/19	Thu 5/9/19
59	**S**	**Comprehensive VI Study Report**	**165 d**	**Fri 5/10/19**	**Mon 10/21/19**
60		Prepare and Submit Rev. 0 Comprehensive VI Study Report	60 d	Fri 5/10/19	Mon 7/8/19
61		Agency Review and Submit Comments on Rev. 0 Comprehensive VI Study Report	60 d	Tue 7/9/19	Fri 9/6/19
62		Prepare and Submit Rev. 1 Comprehensive VI Study Report	45 d	Sat 9/7/19	Mon 10/21/19
63		**Focused Feasibility Study (FFS)**	**240 d**	**Thu 5/23/19**	**Fri 1/17/20**
64		Document Review/Develop Alternatives	35 d	Thu 5/23/19	Wed 6/26/19
65		Screen Alternatives/Selected Preferred Alternatives	35 d	Thu 6/27/19	Wed 7/31/19
66	**P**	**FFS Report**	**170 d**	**Thu 8/1/19**	**Fri 1/17/20**
67		Prepare and Submit Rev. 0 FFS Report	75 d	Thu 8/1/19	Mon 10/14/19
68		Agency Review and Submit Comments on Rev. 0 FFS Report	60 d	Tue 10/15/19	Fri 12/13/19
69		Prepare and Submit Rev. 1 FFS Report	35 d	Sat 12/14/19	Fri 1/17/20
70		**Record of Decision (ROD) Amendment**	**348 d**	**Fri 1/3/20**	**Tue 12/15/20**
71	**P**	**Revised Proposed Plan (RPP)**	**141 d**	**Fri 1/3/20**	**Fri 5/22/20**
72		Prepare and Submit Rev. 0 RPP	60 d	Fri 1/3/20	Mon 3/2/20
73		Agency Review and Submit Comments on Rev. 0 RPP	60 d	Tue 3/3/20	Fri 5/1/20
74		Prepare and Submit Rev. 1 RPP	21 d	Sat 5/2/20	Fri 5/22/20
75		**Public Comment Period**	**53 d**	**Sun 5/31/20**	**Wed 7/22/20**
76		Notice of RPP Comment Period and Public Meeting	7 d	Sun 5/31/20	Sat 6/6/20
77		RPP Public Comment Period	31 d	Mon 6/22/20	Wed 7/22/20
78		Public Meeting	7 d	Thu 7/2/20	Wed 7/8/20
79	**P**	**ROD Amendment**	**207 d**	**Sat 5/23/20**	**Tue 12/15/20**
80		Prepare and Submit Rev. 0 ROD Amendment	75 d	Sat 5/23/20	Wed 8/5/20
81		Agency Review and Submit Comments on Rev. 0 ROD Amendment	60 d	Thu 8/6/20	Sun 10/4/20
82		Prepare and Submit Rev. 1 ROD Amendment	30 d	Mon 10/5/20	Tue 11/3/20
83		Process MI ROD Amendment through Army, TDEC, EPA	30 d	Wed 11/4/20	Thu 12/3/20
84		Final MI ROD Amendment	0 d	Thu 12/3/20	Thu 12/3/20
85		Notice of MI ROD Amendment	7 d	Wed 12/9/20	Tue 12/15/20
86		**New MI Remedial Action**	**1714 d**	**Sat 5/2/20**	**Thu 1/9/25**
87	**P**	**New MI Remedial Design**	**163 d**	**Sat 5/2/20**	**Sun 10/11/20**
88		Prepare and Submit Rev. 0 New MI RD	75 d	Sat 5/2/20	Wed 7/15/20
89		Agency Review and Submit Comments on Rev. 0 New MI RD	60 d	Thu 7/16/20	Sun 9/13/20

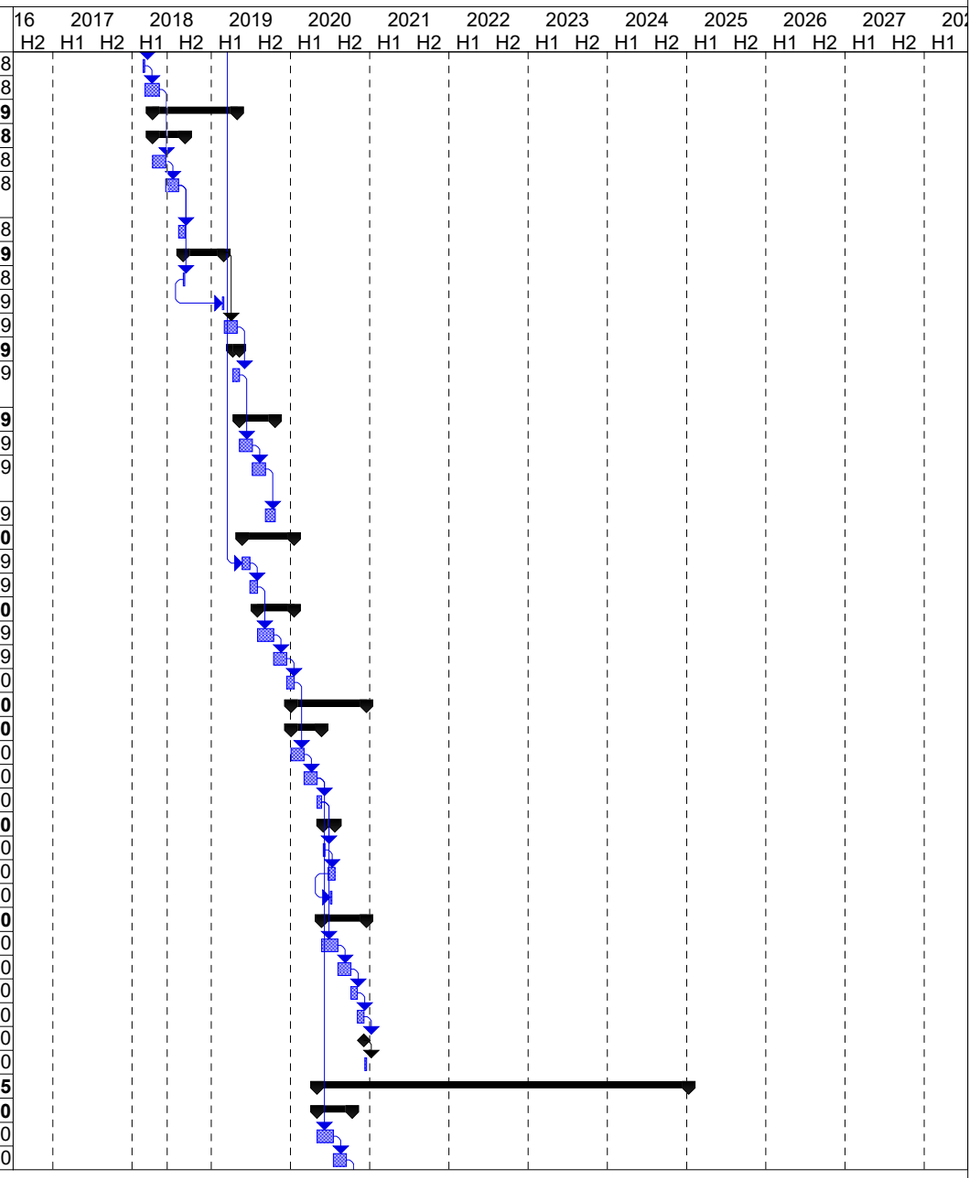

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Figure 25
Master Schedule

ID	Status	Task Name	Duration	Start	Finish
90		Prepare and Submit Rev. 1 New MI RD	28 d	Mon 9/14/20	Sun 10/11/20
91	P	**New MI Remedial Action Work Plan**	**158 d**	**Mon 10/12/20**	**Thu 3/18/21**
92		Prepare and Submit Rev. 0 New MI RAWP	70 d	Mon 10/12/20	Sun 12/20/20
93		Agency Review and Submit Comments on Rev. 0 New MI RAWP	60 d	Mon 12/21/20	Thu 2/18/21
94		Prepare and Submit Rev. 1 New MI RAWP	28 d	Fri 2/19/21	Thu 3/18/21
95		**New MI RA Construction**	90 d	Fri 4/16/21	Wed 7/14/21
96		**New MI Remedial Action Years 1-3**	1095 d	Thu 7/15/21	Sat 7/13/24
97	S	**New MI RA Annual Report Year 1**	**180 d**	**Fri 7/15/22**	**Tue 1/10/23**
98		Prepare & Submit Rev. 0 Y1 MI RA Report	90 d	Fri 7/15/22	Wed 10/12/22
99		Agency Review & Submit Comments on Rev. 0 Y1 MI RA Report	60 d	Thu 10/13/22	Sun 12/11/22
100		Prepare & Submit Rev. 1 Y1 MI RA Report	30 d	Mon 12/12/22	Tue 1/10/23
101	S	**New MI RA Annual Report Year 2**	**180 d**	**Sat 7/15/23**	**Wed 1/10/24**
102		Prepare & Submit Rev. 0 Y3 MI RA Report	90 d	Sat 7/15/23	Thu 10/12/23
103		Agency Review & Submit Comments on Rev. 0 Y2 MI RA Report	60 d	Fri 10/13/23	Mon 12/11/23
104		Prepare & Submit Rev. 1 Y2 MI RA Report	30 d	Tue 12/12/23	Wed 1/10/24
105	S	**New MI RA Annual Report Year 3**	**180 d**	**Sun 7/14/24**	**Thu 1/9/25**
106		Prepare & Submit Rev. 0 Y3 MI RA Report	90 d	Sun 7/14/24	Fri 10/11/24
107		Agency Review & Submit Comments on Rev. 0 Y3 MI RA Report	60 d	Sat 10/12/24	Tue 12/10/24
108		Prepare & Submit Rev. 1 Y3 MI RA Report	30 d	Wed 12/11/24	Thu 1/9/25
109		**MI RA-O Long Term Monitoring (2017 through 2024)**	2922 d	Sun 1/1/17	Tue 12/31/24
110		**Main Installation Compliance Monitoring**	365 d	Wed 1/1/25	Wed 12/31/25
111	P	**Main Installation RA Completion Report**	**270 d**	**Thu 1/1/26**	**Sun 9/27/26**
112		Prepare & Submit Rev. 0 MI RACR	90 d	Thu 1/1/26	Tue 3/31/26
113		Agency Review & Submit Comments on Rev. 0 MI RACR	60 d	Wed 4/1/26	Sat 5/30/26
114		Respond to Agency Comments on Rev. 0 MI RACR	30 d	Sun 5/31/26	Mon 6/29/26
115		Prepare & Submit Rev. 1 MI RACR	60 d	Sun 5/31/26	Wed 7/29/26
116		Agency Review of Rev. 1 MI RACR w/ Concurrence	60 d	Thu 7/30/26	Sun 9/27/26
117		**Main Installation Well Abandonment**	90 d	Mon 9/28/26	Sat 12/26/26
118					
119					
120		**DUNN FIELD**	**2095 d**	**Sun 5/1/16**	**Mon 1/24/22**
121		**Dunn Field Off Depot GW Remedial Action**	**1304 d**	**Sun 5/1/16**	**Mon 11/25/19**
122		**Dunn Field Off Depot RA-O AS/SVE Operations Years 6 to 8**	1095 d	Sun 5/1/16	Tue 4/30/19
123		**AS Well Installation**	**890 d**	**Thu 5/19/16**	**Thu 10/25/18**
124	S	**AS Well Installation QAPP**	**672 d**	**Thu 5/19/16**	**Wed 3/21/18**
125		Prepare and Submit Rev. 0 AS Well Installation QAPP	90 d	Thu 5/19/16	Tue 8/16/16
126		Agency Review and Submit Comments on Rev. 0 AS Well Installation QAPP	66 d	Wed 8/17/16	Fri 10/21/16
127		Prepare and Submit Rev. 1 AS Well Installation QAPP	60 d	Sat 10/22/16	Tue 12/20/16
128		MLGW Access Agreement	456 d	Wed 12/21/16	Wed 3/21/18
129		AS Well Installation Field Activities	10 d	Thu 4/19/18	Sat 4/28/18
130	S	**AS Well Installation Summary Report**	**180 d**	**Sun 4/29/18**	**Thu 10/25/18**
131		Prepare and Submit Rev. 0 AS Well Installation Summary Report	75 d	Sun 4/29/18	Thu 7/12/18
132		Agency Review and Submit Comments on Rev. 0 AS Well Installation Summary Report	60 d	Fri 7/13/18	Mon 9/10/18
133		Prepare and Submit Rev. 1 AS Well Installation Summary Report	45 d	Tue 9/11/18	Thu 10/25/18
134	S	**Year 6 AS/SVE Report**	**255 d**	**Tue 5/30/17**	**Thu 2/8/18**

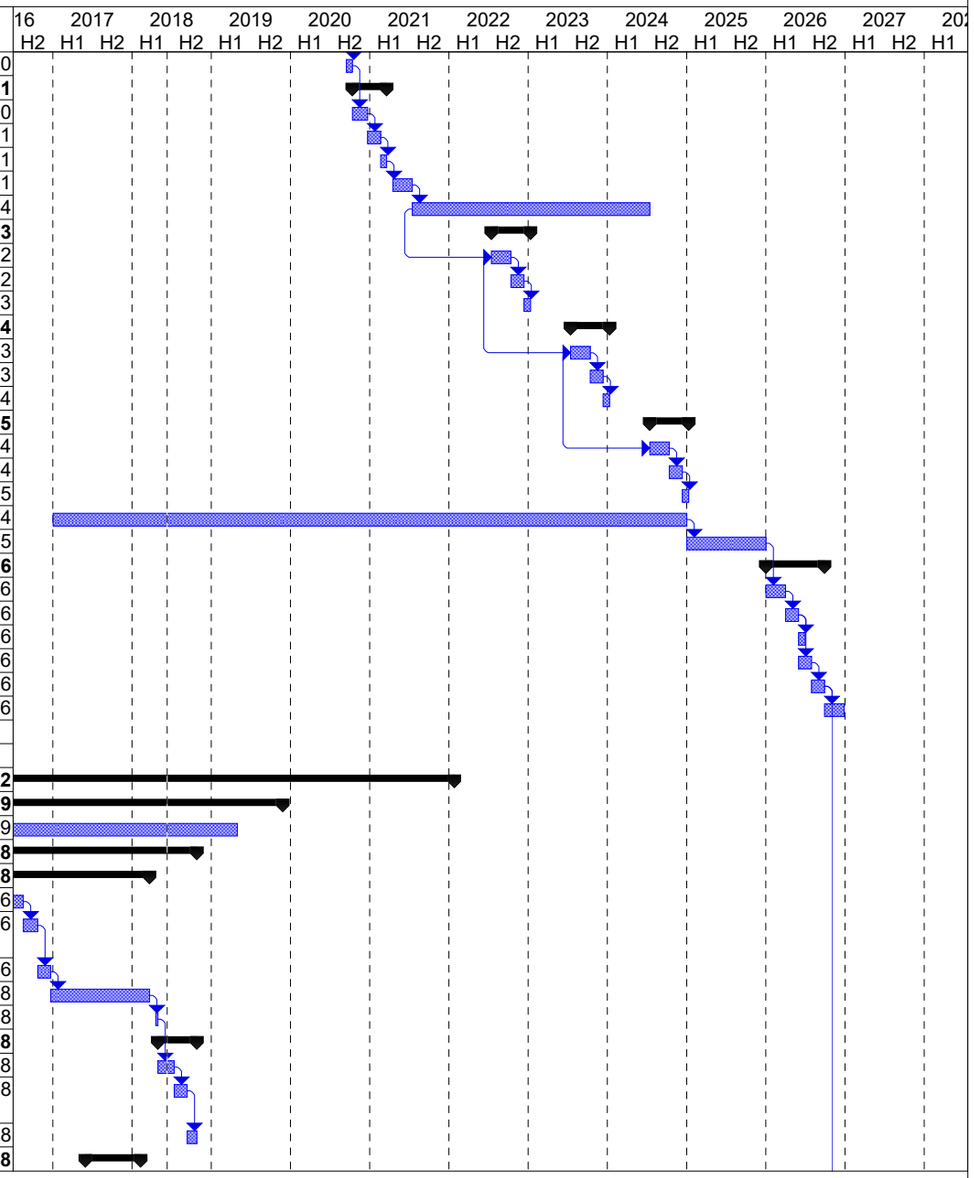

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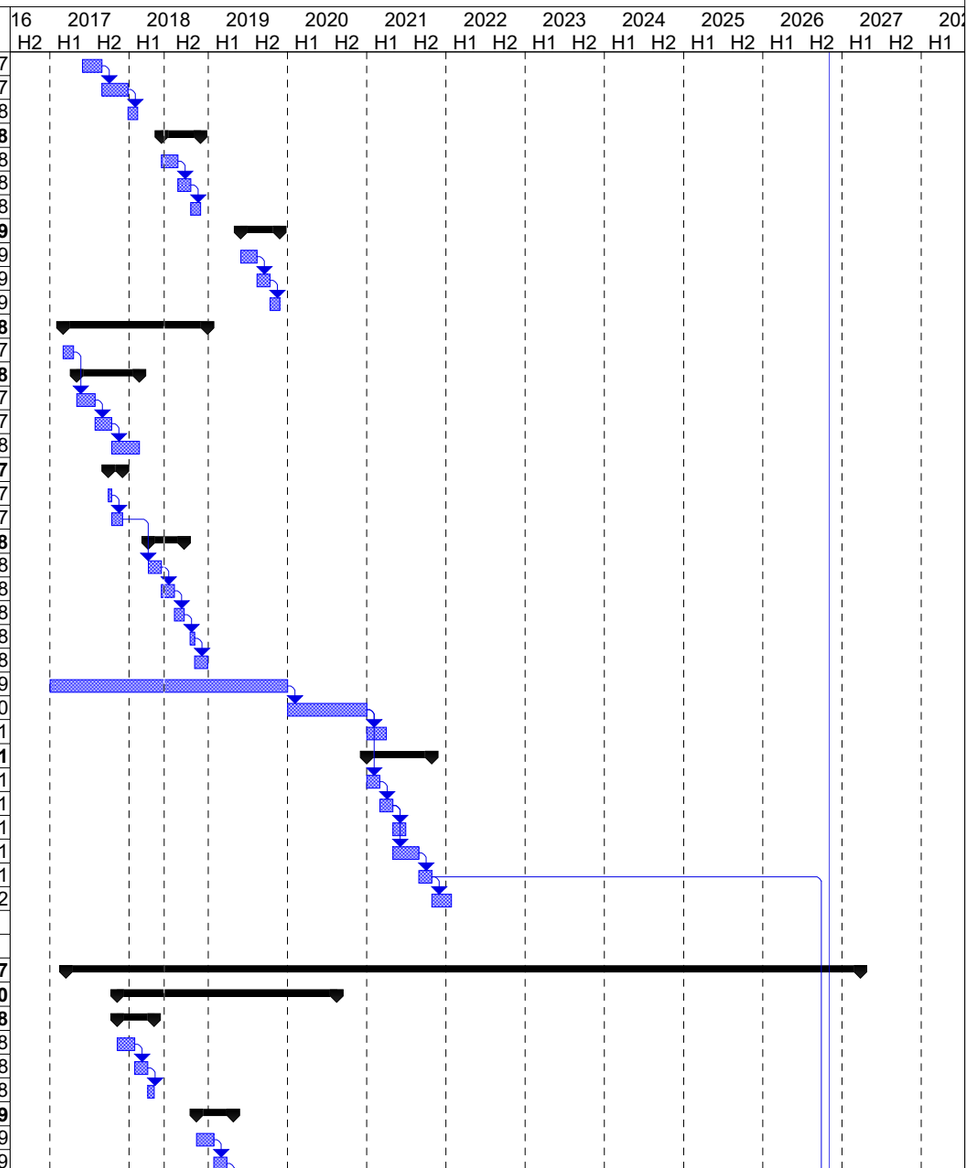
Figure 25
Master Schedule

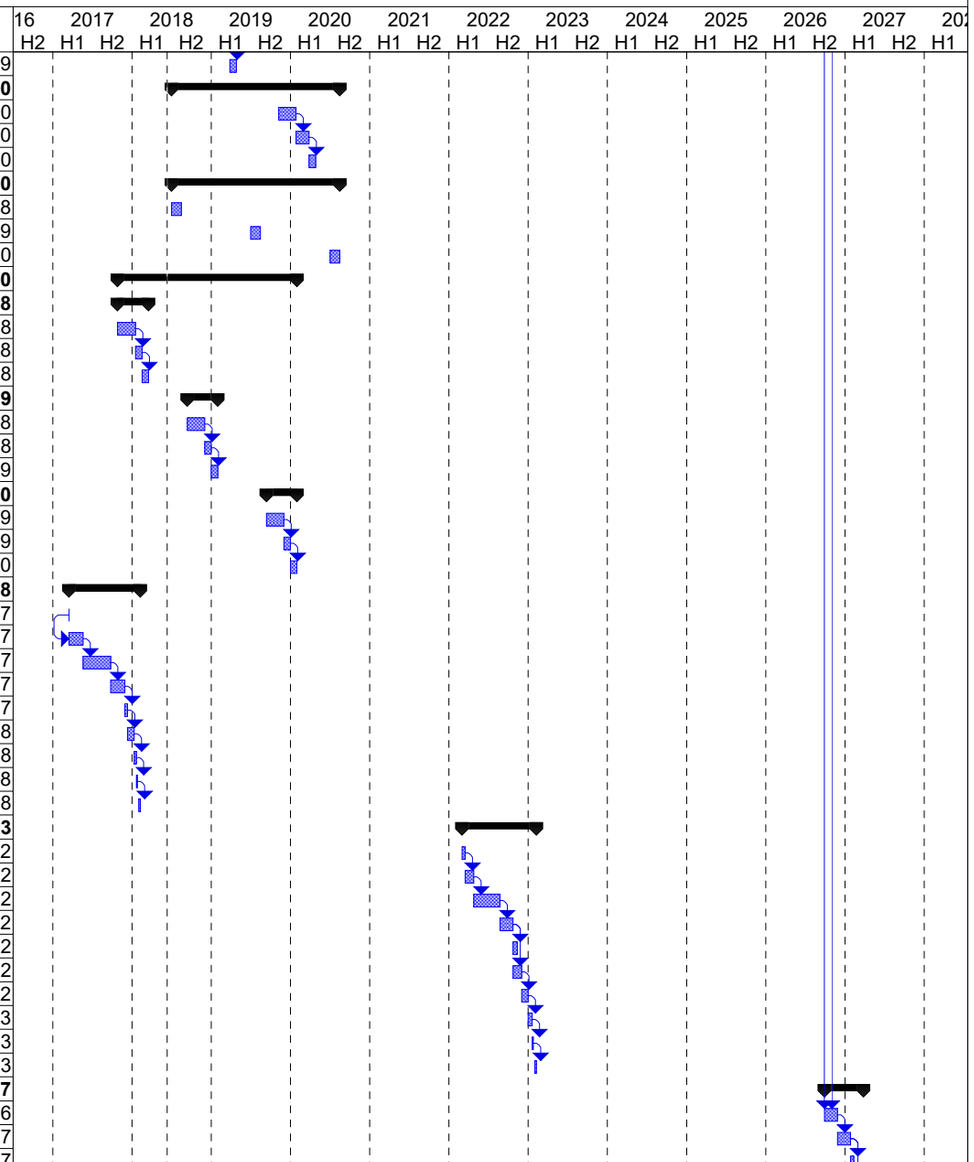
ID	Status	Task Name	Duration	Start	Finish
135		Prepare & Submit Rev. 0 Y6 AS/SVE Report	90 d	Tue 5/30/17	Sun 8/27/17
136		Agency Review & Submit Comments on Rev. 0 Y6 AS/SVE Report	120 d	Mon 8/28/17	Mon 12/25/17
137		Prepare & Submit Rev. 1 Y6 AS/SVE Report	45 d	Tue 12/26/17	Thu 2/8/18
138	**S**	**Year 7 AS/SVE Report**	**180 d**	**Wed 5/30/18**	**Sun 11/25/18**
139		Prepare & Submit Rev. 0 Y7 AS/SVE Report	75 d	Wed 5/30/18	Sun 8/12/18
140		Agency Review & Submit Comments on Rev. 0 Y7 AS/SVE Report	60 d	Mon 8/13/18	Thu 10/11/18
141		Prepare & Submit Rev. 1 Y7 AS/SVE Report	45 d	Fri 10/12/18	Sun 11/25/18
142	**S**	**Year 8 AS/SVE Report**	**180 d**	**Thu 5/30/19**	**Mon 11/25/19**
143		Prepare & Submit Rev. 0 Y8 AS/SVE Report	75 d	Thu 5/30/19	Mon 8/12/19
144		Agency Review & Submit Comments on Rev. 0 Y8 AS/SVE Report	60 d	Tue 8/13/19	Fri 10/11/19
145		Prepare & Submit Rev. 1 Y8 AS/SVE Report	45 d	Sat 10/12/19	Mon 11/25/19
146		**Off-Site Plume Investigation**	**666 d**	**Thu 3/2/17**	**Thu 12/27/18**
147		MIP Survey Field Activities	48 d	Thu 3/2/17	Tue 4/18/17
148	**S**	**MIP Survey Summary Report**	**289 d**	**Thu 5/4/17**	**Fri 2/16/18**
149		Prepare and Submit Rev. 0 MIP Survey Report	84 d	Thu 5/4/17	Wed 7/26/17
150		Agency Review and Submit Comments on Rev. 0 MIP Survey Report	77 d	Thu 7/27/17	Wed 10/11/17
151		Prepare and Submit Rev. 1 MIP Survey Report	128 d	Thu 10/12/17	Fri 2/16/18
152		**Data Collection at TDEC Wells**	**65 d**	**Wed 9/27/17**	**Thu 11/30/17**
153		Data Collection Field Activities	15 d	Wed 9/27/17	Wed 10/11/17
154	S	Prepare and Submit Data Collection Technical Memorandum	50 d	Thu 10/12/17	Thu 11/30/17
155	**S**	**Off-Site Investigation QAPP**	**165 d**	**Fri 3/30/18**	**Mon 9/10/18**
156		Prepare and Submit Rev. 0 Off-Site Investigation QAPP	60 d	Fri 3/30/18	Mon 5/28/18
157		Agency Review and Submit Comments on Rev. 0 Off-Site QAPP	60 d	Tue 5/29/18	Fri 7/27/18
158		Prepare and Submit Rev. 1 Off-Site Investigation QAPP	45 d	Sat 7/28/18	Mon 9/10/18
159		Off-Site Investigation Field Activities	21 d	Mon 10/8/18	Sun 10/28/18
160	S	Prepare and Submit Off-Site Investigation Technical Memorandum	60 d	Mon 10/29/18	Thu 12/27/18
161		**Dunn Field RA-O Long Term Monitoring (2017 through 2019)**	1095 d	Sun 1/1/17	Tue 12/31/19
162		**Dunn Field Compliance Monitoring**	365 d	Wed 1/1/20	Wed 12/30/20
163		**Abandon Fluvial SVE & Off Depot AS/SVE System**	90 d	Thu 12/31/20	Tue 3/30/21
164	**P**	**Dunn Field RA Completion Report**	**300 d**	**Thu 12/31/20**	**Tue 10/26/21**
165		Prepare & Submit Rev. 0 Dunn Field RACR	60 d	Thu 12/31/20	Sun 2/28/21
166		Agency Review & Submit Comments on Rev. 0 Dunn Field RACR	60 d	Mon 3/1/21	Thu 4/29/21
167		Respond to Agency Comments on Rev. 0 Dunn Field RACR	60 d	Fri 4/30/21	Mon 6/28/21
168		Prepare & Submit Rev. 1 Dunn Field RACR	120 d	Fri 4/30/21	Fri 8/27/21
169		Agency Review of Rev. 1 Dunn Field RACR w/ Concurrence	60 d	Sat 8/28/21	Tue 10/26/21
170		**Dunn Field Well Abandonment**	90 d	Wed 10/27/21	Mon 1/24/22
171					
172					
173		**Memphis Depot NPL Site-Wide Activities**	**3664 d**	**Wed 3/15/17**	**Fri 3/26/27**
174		**Site-Wide (MI and Dunn Field) LTM Reports**	**1012 d**	**Tue 11/7/17**	**Fri 8/14/20**
175	**S**	**2017 LTM Report**	**170 d**	**Tue 11/7/17**	**Wed 4/25/18**
176		Prepare & Submit Rev. 0 2017 LTM Report	80 d	Tue 11/7/17	Thu 1/25/18
177		Agency Review & Submit Comments on Rev. 0 2017 LTM Report	60 d	Fri 1/26/18	Mon 3/26/18
178		Prepare & Submit Rev. 1 2017 LTM Report	30 d	Tue 3/27/18	Wed 4/25/18
179	**S**	**2018 LTM Report**	**170 d**	**Wed 11/7/18**	**Thu 4/25/19**
180		Prepare & Submit Rev. 0 2018 LTM Report	80 d	Wed 11/7/18	Fri 1/25/19
181		Agency Review & Submit Comments on Rev. 0 2018 LTM Report	60 d	Sat 1/26/19	Tue 3/26/19



P: Primary Document
S: Secondary Document

Figure 25
Master Schedule

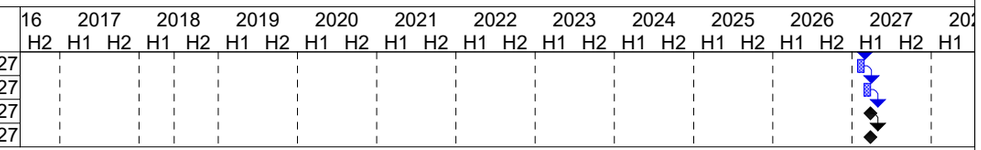
ID	Status	Task Name	Duration	Start	Finish
182		Prepare & Submit Rev. 1 2018 LTM Report	30 d	Wed 3/27/19	Thu 4/25/19
183	S	**2019 LTM Report**	**776 d**	**Sun 7/1/18**	**Fri 8/14/20**
184		Prepare & Submit Rev. 0 2019 LTM Report	80 d	Thu 11/7/19	Sat 1/25/20
185		Agency Review & Submit Comments on Rev. 0 2019 LTM Report	60 d	Sun 1/26/20	Wed 3/25/20
186		Prepare & Submit Rev. 1 2019 LTM Report	30 d	Thu 3/26/20	Fri 4/24/20
187		**Annual LUCIP Inspections**	**776 d**	**Sun 7/1/18**	**Fri 8/14/20**
188	S	Annual LUCIP Inspection and Report - 2018	45 d	Sun 7/1/18	Tue 8/14/18
189	S	Annual LUCIP Inspection and Report - 2019	45 d	Mon 7/1/19	Wed 8/14/19
190	S	Annual LUCIP Inspection and Report - 2020	45 d	Wed 7/1/20	Fri 8/14/20
191		**Site Management Plan (SMP) Updates**	**827 d**	**Wed 10/25/17**	**Wed 1/29/20**
192	P	**2018 Site Management Plan**	**143 d**	**Wed 10/25/17**	**Fri 3/16/18**
193		Prepare & Submit Rev 0 2018 SMP	83 d	Wed 10/25/17	Mon 1/15/18
194		Agency Review & Submit Comments on Rev 0 2018 SMP	30 d	Tue 1/16/18	Wed 2/14/18
195		Prepare & Submit Rev 1 2018 SMP	30 d	Thu 2/15/18	Fri 3/16/18
196	P	**2019 Site Management Plan**	**140 d**	**Wed 9/12/18**	**Tue 1/29/19**
197		Prepare & Submit Rev 0 2019 SMP	80 d	Wed 9/12/18	Fri 11/30/18
198		Agency Review & Submit Comments on Rev 0 2019 SMP	30 d	Sat 12/1/18	Sun 12/30/18
199		Prepare & Submit Rev 1 2019 SMP	30 d	Mon 12/31/18	Tue 1/29/19
200	P	**2020 Site Management Plan**	**140 d**	**Thu 9/12/19**	**Wed 1/29/20**
201		Prepare & Submit Rev 0 2020 SMP	80 d	Thu 9/12/19	Sat 11/30/19
202		Agency Review & Submit Comments on Rev 0 2020 SMP	30 d	Sun 12/1/19	Mon 12/30/19
203		Prepare & Submit Rev 1 2020 SMP	30 d	Tue 12/31/19	Wed 1/29/20
204	P	**CERCLA Fourth 5-Year Review**	**329 d**	**Wed 3/15/17**	**Tue 2/6/18**
205		Notice of Five-Year Review	1 d	Wed 3/15/17	Wed 3/15/17
206		Document Review, Interviews, Inspection, Technical Assessment	65 d	Wed 3/15/17	Thu 5/18/17
207		Prepare & Submit Rev. 0 4th 5-Year Review	127 d	Fri 5/19/17	Fri 9/22/17
208		Agency Review & Submit Comments on Rev. 0 4th 5-Year Review	66 d	Sat 9/23/17	Mon 11/27/17
209		Prepare & Submit Rev. 1 4th 5-Year Review	12 d	Tue 11/28/17	Sat 12/9/17
210		Agency Review of Rev. 1 4th 5-Year Review	31 d	Sun 12/10/17	Tue 1/9/18
211		Prepare & Submit Final 4th 5-Year Review	10 d	Wed 1/10/18	Fri 1/19/18
212		Final 4th 5-Year Review Signed	4 d	Sat 1/20/18	Tue 1/23/18
213		Notification of 4th 5-Year Review Completion	7 d	Wed 1/31/18	Tue 2/6/18
214	P	**CERCLA Fifth 5-Year Review**	**343 d**	**Tue 3/1/22**	**Mon 2/6/23**
215		Notice of Five-Year Review	15 d	Tue 3/1/22	Tue 3/15/22
216		Document Review, Interviews, Inspection, Technical Assessment	40 d	Wed 3/16/22	Sun 4/24/22
217		Prepare & Submit Rev. 0 5th 5-Year Review	120 d	Mon 4/25/22	Mon 8/22/22
218		Agency Review & Submit Comments on Rev. 0 5th 5-Year Review	60 d	Tue 8/23/22	Fri 10/21/22
219		Respond to Agency Comments on Rev. 0 5th 5-Year Review	20 d	Sat 10/22/22	Thu 11/10/22
220		Prepare & Submit Rev. 1 5th 5-Year Review	40 d	Sat 10/22/22	Wed 11/30/22
221		Agency Review of Rev. 1 5th 5-Year Review	30 d	Thu 12/1/22	Fri 12/30/22
222		Prepare & Submit Final 5th 5-Year Review	19 d	Sat 12/31/22	Wed 1/18/23
223		Final 5th 5-Year Review Signed	5 d	Thu 1/19/23	Mon 1/23/23
224		Notification of 5th 5-Year Review Completion	7 d	Tue 1/31/23	Mon 2/6/23
225	P	**Final Closeout Report (FCOR)**	**180 d**	**Mon 9/28/26**	**Fri 3/26/27**
226		Prepare & Submit Rev. 0 FCOR	60 d	Mon 9/28/26	Thu 11/26/26
227		Agency Review & Submit Comments on Rev. 0 FCOR	60 d	Fri 11/27/26	Mon 1/25/27
228		Respond to Agency Comments on Rev. 0 FCOR	15 d	Tue 1/26/27	Tue 2/9/27



P: Primary Document
S: Secondary Document

Figure 25
Master Schedule

ID	Status	Task Name	Duration	Start	Finish
229		Prepare & Submit Rev. 1 FCOR	30 d	Tue 1/26/27	Wed 2/24/27
230		Agency Review of Rev. 1 FCOR w/ Concurrence	30 d	Thu 2/25/27	Fri 3/26/27
231		Final FCOR	0 d	Fri 3/26/27	Fri 3/26/27
232		**Site Completion**	0 d	Fri 3/26/27	Fri 3/26/27



P: Primary Document
S: Secondary Document

A

Appendix A.

Responses to USEPA and TDEC Comments

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
MEMPHIS ENVIRONMENTAL FIELD OFFICE
8383 WOLF LAKE DRIVE
BARTLETT, TN 38133-4119
PHONE (901) 371-3000 STATEWIDE 1-888-891-8332 FAX (901) 371-3170

February 27, 2018

James C. Foster
BRAC Program Manager
Headquarters Department of the Army,
Assistant Chief of Staff for
Installation Management (DAIM-ODB)
Army Pentagon,
2530 Crystal Drive,
Arlington, VA 22202-3934

Subject: **2018 Site Management Plan, Rev. 0**
Defense Depot Memphis, Tennessee
TDoR ID # 79-736

Mr. Foster,

TDEC-DoR has reviewed the contents of the **2018 Site Management Plan (Rev. 0)** for the Memphis Defense Depot, as compiled by T. Holmes (HDR Inc), and approves of the document's contents. If there are questions or concerns, please contact me at (901) 371-3041 or at jamie.woods@tn.gov .

Regards,

Jamie A. Woods, P.G.
Project Manager
Division of Remediation
Memphis Environmental Field Office

cc: Tom Holmes (HDR Inc)
D. Lloyd (EPA-PM)
Joan Hutton (CALIBRE)
TDoR NCO: file 79-736
TDoR MEFO: file 79-736

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

June 04, 2018

UPS NEXT DAY AIR
RETURN RECEIPT REQUESTED

Mr. James Foster
Base Realignment and Closure Division (ACSIM-ODB)
2530 Crystal Drive (Taylor Building), Room 5000
Arlington, VA 22202-3940

Dear Mr. Foster:

The U.S. Environmental Protection Agency (EPA) has received and reviewed the Department of Army, Defense Depot of Memphis Response to EPA Comments on the 2018 Site Management Plan (SMP).

EPA approves the above mentioned report. Should you have any questions or concerns, please feel free to call me at on my cell number 404-229-9500.

Sincerely,

Diedre Lloyd
Remedial Project Manager
Restoration & Sustainability Branch
Superfund Division

cc: Mr. James Foster, (Signed Original), United Parcel Service, Return Receipt
Mr. Jamie A. Woods, PG, Tennessee, Department of Environment and Conservation, Memphis Environmental Field Office, 8383 Wolf Lake Drive, Bartlett, TN 38133-4119
Ms. Joan Hutton, CALIBRE, 3898 Mountain View Road, Kennesaw, GA 30152
Mr. Thomas Holmes, HDR Environmental, P.O. Box 728, Highlands, NC 28741

Responses to Comments from
U.S. Environmental Protection Agency (EPA) Region 4 on:
2018 Site Management Plan, Revision 0, January, 2018
Defense Depot Memphis, Tennessee
Comments Received: 11 April 2018

EPA Comments:

1. Please amend the dates for the 5th Five Year Review Report submittal to April 9 of the appropriate year in all appropriate sections/figures of the SMP.

Response: Army will revise reference to the submittal date in Section 4.4 to "On 31 January 2018, USEPA requested a 60-day extension to the schedule for review of Revision 1, which extended the deadline for approval of the Fourth Five-Year Review to 9 April 2018". No other change required.

2. Please provide a phone for contact purposes if the public wants to view the IR File at TDEC or provide text that explains how the public can view the IR at TDEC, whichever is more appropriate avenue and is acceptable to TDEC.

Response: Army will add the following below the IR address: "The public can make an appointment to view documents in the IR by calling TDEC at (901) 371-3900."

a. Please note if the IR contains the same data that the AR also contains.

Response: The IR and AR do not contain the same documents although there is substantial overlap.

The documents included in the DDMT AR changed over time based on interpretation of available guidance. Newspaper articles and correspondence unrelated to selection of response actions were included in the early stage of the project. Restoration Advisory Board (RAB) meeting minutes and newsletters were not included from 2003 to 2009, although minutes for required public meetings (Proposed Plans and Remedial Designs) were included.

The IR contains the documents required for inclusion in the AR as well as a more complete set of meeting minutes and past materials provided for the local community.

b. If the IR does not contain the same data as the AR – please note how the public can access additional information.

Response: The current AR Index is included in the IR. Army will add the following statement "Additional information, including documents not in the IR, can be requested by calling the DDMT Community Involvement Line at 901-774-3683.".

3. The data in the Figure 25 for the completion date of the FFS is 1/9/25 however, in Section 4.5 Timeline for Site Completion of the FFS is listed as December 2020.

a. Please provide clarification with respect to the anticipated time frame/completion date for the FFS.

Response: The currently scheduled completion date for the FFS is 1/17/20. The setting of tasks and sub-tasks on Figure 25 is incorrect, which resulted in an incorrect date for the FFS being shown; the schedule will be corrected.

Responses to Comments from
U.S. Environmental Protection Agency (EPA) Region 4 on:
2018 Site Management Plan, Revision 0, January, 2018
Defense Depot Memphis, Tennessee
Comments Received: 11 April 2018

4. Section 3.1.5 Vapor Intrusion
    a. Please amend the first sentence to include the specific DOD guidance with appropriate references and websites and should also state that the vapor intrusion investigation/study will be conducted in accordance with EPA guidance (USEPA, 2015) with appropriate reference and websites (https://www.epa.gov/vaporintrusion/technical-guide-assessing-and-mitigating-vapor-intrusion-pathway-subsurface-vapor.

Response: The first two sentences will be revised per the comment. The revised text will match text in the 4th FYR regarding DoD, EPA and TDEC guidance for the VI study, with specific references and the EPA website included.

5. Section 4 Activities Required for Site Completion
    a. Please delete the last sentence in the second bulleted paragraph in this section that states additional RA is not considered necessary. This is somewhat misleading since it is immediately followed by paragraphs outlining the remedial actions (continued AS/SVE monitoring and placement of additional AS/SVE wells) taking place on Dunn Field and there is also additional planned investigation with respect to a potential off site plume.

Response: The bulleted paragraph refers to rebound on Dunn Field following shutdown of the Fluvial SVE system on Dunn Field; the final sentence is not intended to indicate additional remedial action was not planned for Dunn Field in general. The sentence will be revised to "Additional remedial action to address the limited rebound on Dunn Field is not considered necessary at present."

6. Figure 11
    a. Please provide a definition below this table that defines (provides additional detail) for Deadline and Target documents (ie: secondary vs primary).

Response: Army assumes the comment refers to Table 11, not Figure 11. The following notes will be added to Table 11:

1. Section XV. of the DDMT Federal Facilities Agreement (FFA) states DoD is responsible for issuing Primary and Secondary Documents to EPA and TDEC in accordance with the schedule provided in the latest approved SMP.
    a. Deadlines are the scheduled submittal dates for Primary Documents; DoD may be assessed stipulated penalties for failure to meet a Deadline (FFA, Section XXIV).
    b. Targets are the scheduled submittal dates for Secondary Documents; stipulated penalties do not apply to Targets.
    c. Primary Documents are those reports, plans and studies that are major, discrete portions of the response action process.
    d. Secondary Documents are those reports, plans and studies that are discrete portions of the Primary Documents and are typically input or feeder documents.

Responses to Comments from
U.S. Environmental Protection Agency (EPA) Region 4 on:
2018 Site Management Plan, Revision 0, January, 2018
Defense Depot Memphis, Tennessee
Comments Received: 11 April 2018

7. Figure 25
    a. Please provide a definition (key) for the S and P notated in the Status column

Response: The following notes will be added:

P: Primary Document

S: Secondary Document

    b. If possible, could a column be added to *future* SMPs that includes what type of document (target/deadline), when appropriate? (ie: this won't apply to all rows).

Response: The existing Status column provides that information: **P** designates a Primary Document with a scheduled Deadline date for submittal; and **S** designates a Secondary Document with a scheduled Target date for submittal.