2016 SITE MANAGEMENT PLAN

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

Prepared for:

Department of the Army

USACE Contract No. W90FYQ-09-D-0005
Task Order No. CK04

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Revision 1

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LIST OF 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
CT	carbon tetrachloride
CVOC	chlorinated volatile organic compound
CWM	chemical warfare material
CY	cubic yard
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
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendment
IAQ	intermediate aquifer
IC	institutional control
IR	Information Repository
IRA	interim remedial action

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

IRACR	Interim Remedial Action Completion Report
IW	injection well
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
MSCHD	Memphis Shelby County Health Department
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
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PCP	pentachlorophenol
PID	photoionization detector
PMW	performance monitoring well
POL	petroleum/oil/lubricants
ppm	parts per million
PRB	permeable reactive barrier
RA	remedial action
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS AND ABBREVIATIONS
(CONTINUED)

RD	Remedial Design
RFA	RCRA Facility Assessment
RG	remediation goal
RI	remedial investigation
RL	reporting limit
ROD	Record of Decision
RPP	Revised Proposed Plan
RW	recovery well
SMP	Site Management Plan
SRI	Supplemental Remedial Investigation
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TC	target concentration
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TeCA	1,1,2,2-tetrachloroethane
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
VMP	vapor monitoring point
VOC	volatile organic compound
WNRC	Washington National Records Center
ZVI	zero valent iron
µg/L	micrograms per liter

1.0 INTRODUCTION

HDR has prepared this 2016 Site Management Plan (SMP) for 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, Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure (BRAC) Division (ODB).

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 2016 SMP is updated with information available as of 1 October 2015.

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

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

The AR for DDMT is stored by the National Archives and Records Administration, Washington National Records Center (WNRC). The initial transmittal of files to the WNRC was made in December 2013. 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 comments on the 2016 SMP, Revision 0 from USEPA and TDEC and approval letters are included in Appendix A.

2.0 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 includes the Main Installation (MI) and Dunn Field. 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

The Depot was a Resource Conservation and Recovery Act (RCRA) hazardous waste generator with USEPA identification number TN4210020570. The majority of hazardous wastes generated by the Depot consisted of hazardous substances that reached shelf-life expiration dates and could no longer be used by the military services, and vehicle maintenance wastes. The Depot also generated hazardous wastes 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.

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 of 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.

2.3 SITE DESIGNATIONS

Site designations were developed for overlapping environmental programs and for facility reuse. During FFA negotiations after DDMT was placed on the NPL, the Depot was divided into four Operable Units (OUs): Dunn Field, OU 1; Southwest Quadrant MI, OU 2; Southeastern Watershed and Golf Course, OU 3; and North-Central Area MI, OU 4.

During preparation of the environmental baseline survey after DDMT was selected for closure under BRAC, the property was divided into 36 parcels based on planned reuse. Areas of environmental concern within each parcel were broken into subparcels 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 facilitating 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 2 for the MI and Figure 3 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. 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 and the site locations are shown on Figures 4, 5, 6 and 7.

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, and the individual formations 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 primarily consists 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. The Allen Well Field, which is operated by Memphis Light Gas & Water (MLGW), is located approximately two miles west of DDMT.

3.0 ENVIRONMENTAL PROGRAM STATUS

The selected remedies in the decision documents for DDMT have been implemented. The *Preliminary Close Out Report* (USEPA, 2010a) was approved in May 2010, and the DDMT NPL site status was revised to Construction Complete. Interim remedial action completion reports (IRACRs) have been approved for all actions. 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. A Supplemental Remedial Investigation (SRI) for the MI is currently underway as discussed in Section 4.2.2.

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, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), 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 Activities

The following actions were taken on the MI prior to the Record of Decision (ROD). The locations are shown on Figure 2.

- Approximately 602 cubic yards (CY) of surface and subsurface soil was removed from the pentachlorophenol (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 was 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) was 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 was removed in 2000 because of elevated levels of metals and polyaromatic hydrocarbons.

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 use (industrial and recreational).

The RAOs are:

Surface Soil

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

Groundwater

- to prevent human ingestion of water contaminated with volatile organic compounds (VOCs) in excess of maximum contaminant levels (MCLs) from potential future on-site wells.
- to reduce concentrations of chemicals of concern (COCs) to MCLs or lower.

- to 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 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; daycare restriction controls; production/consumptive use groundwater controls for the Fluvial Aquifer and for drilling into deeper aquifers on the MI; and elimination of 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.

The area of lead contamination in soil near Building 949 (approximately 300 CY) was excavated and disposed off-site prior to final execution of the ROD. 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". Groundwater concentrations of 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.

3.1.3.1 EBT

EBT was implemented in accordance with the *Main Installation Final Remedial Design, Revision 1* (MI RD) (CH2M HILL, 2004a) and the *Main Installation Remedial Action Work Plan* (MI RAWP) (MACTEC Engineering and Consulting, Inc. [MACTEC], 2005a). Two treatment areas, in the southwest and southeast areas of the MI, were defined by 100 µg/L isoconcentration contours for CVOCs. The EBT system was constructed from May to August 2006 with installation of 49 4-inch injection wells (IWs) and 30 2-inch performance monitoring wells (PMWs); construction of the lactate-storage and transfer facility and two trailer-mounted injection systems; and baseline groundwater sampling and analysis.

Sodium lactate was injected biweekly during Year One (September 2006 through August 2007) and monthly during Year Two (September 2007 through February 2009). Performance monitoring was conducted quarterly from October 2006 through March 2009. System operations and monitoring results were described in annual reports. CVOC concentrations for parent compounds (PCE, TCE, CT and CF) were reduced over 90 percent in injection wells and over 80 percent in monitoring wells at locations with baseline concentrations above 100 µg/L.

The *Main Installation Interim Remedial Action Completion Report, Revision 1* (MI IRACR) (HDR|engineering environmental Management, Inc. [e^2M], 2010), including an OPS determination, was submitted to USEPA and TDEC in February 2010. Although EBT did not achieve the goal of reducing concentrations below MCLs, additional field investigation, groundwater modeling and trend analysis presented in the MI IRACR indicated that additional remedial action (RA) was not necessary. The OPS determination and the MI IRACR were approved by USEPA in March 2010. Additional monitoring wells installed in the IAQ and the upper portion of the MAQ supported the groundwater model results.

3.1.3.2 Additional EBT

EBT components were planned to be removed following a period of monitoring after the last injection in February 2009. System removal and well abandonment were not performed because of rebound in CVOC concentrations observed in long-term monitoring (LTM) samples. Updated baseline groundwater samples collected in December 2011 confirmed rebound in concentrations of parent compounds in the target treatment areas (TTAs), and additional EBT was recommended utilizing some of the existing IWs and PMWs. Following consultation with USEPA and TDEC, 20 IWs and 11 PMWs not needed for additional EBT were abandoned in June 2012.

EBT was implemented for two years at five treatment areas where individual CVOC concentrations of parent compounds (PCE, TCE and CT) exceeded 100 µg/L: TTA-1N, TTA-1S, TTA-2, the West-Central plume and the Building 835 plume. The *Main Installation Remedial Action Work Plan Addendum, Revision 0* (MI RAWP Addendum) (HDR, 2012b), describing procedures for additional EBT, was approved by USEPA and TDEC in January 2013.

Additional EBT consisted of injections of sodium lactate solution in 45 IWs and groundwater sampling for performance monitoring in the IWs and 13 additional monitoring wells. The EBT wells are listed on Table 3 and the locations are shown on Figure 8. Quarterly injections were made from November 2012 through August 2014 and groundwater samples were collected from February 2013 through November 2014. The final report for additional EBT was *Main Installation Year Four Enhanced Bioremediation Treatment Report* (HDR, 2015a).

The Year 4 EBT report summarized the reduction in CVOC concentrations in EBT wells from the additional EBT:

- CVOC concentrations in the final Year Four samples collected in November 2014 had decreased from the baseline samples in December 2011. The average decrease was -80% for IWs and -28% for PMWs. The decrease for IWs is likely understated due to elevated reporting limits (RLs).
- The total number of EBT wells with MCL exceedances decreased from 55 wells in December 2011 to 17 wells in November 2014; the combined MCL exceedances for PCE, TCE and CT decreased from 91 to 20.

While CVOC concentrations were reduced during the additional EBT, the RA was not sufficient to meet the RAOs for the MI. SRI and Focused Feasibility Study (FFS) are currently being performed to develop a remedial strategy to achieve RAOs throughout the MI. Further remedial action is being delayed until the FFS is completed and the selected remedy has been confirmed or revised.

3.1.3.3 Long Term Monitoring

MI LTM is conducted to evaluate progress in reducing contaminant concentrations to MCLs or lower throughout the MI and to monitor horizontal and vertical contaminant migration off-site at concentrations in excess of MCLs. LTM has been performed since 2004 in accordance with the LTM Plan in Appendix B of the MI RD (CH2M HILL, 2004a). Recommendations for LTM optimization, including new well locations, well abandonment, and changes to well classification, sample frequency, analytical parameters and sampling procedures are made in the annual LTM reports.

MI LTM wells are classified in four categories:

- Background – wells screened in the Fluvial Aquifer located along or outside the MI boundary; wells upgradient of or at a distance from groundwater plumes on the MI and Dunn Field; and wells with no, or low, previous detections of site constituents.
- Boundary – wells screened in the Fluvial Aquifer located along or outside the MI boundary to monitor constituent migration from off-site sources.
- Sentinel – wells screened within either the fluvial or intermediate aquifer adjacent to or within the window to the IAQ.
- Performance – wells screened in the Fluvial Aquifer and within the limits of known groundwater plumes.

In 2014, MI LTM included 99 wells classified as Background (6), Boundary (7), Performance (62) and Sentinel (24). The sample frequency for two wells installed in 2013 (MW-260 and MW-261) will be determined after four semiannual sample events. The remaining 97 wells had the following sample frequency: biennial (15), annual (30) and semiannual (52). Samples were collected from 54 wells in a semiannual event in April and from 99 wells in a biennial event in October 2014.

Of the 62 performance wells, 57 are associated with designated plumes and five are outside the designated plumes (MW-25A, MW-52, MW-215A/B and PZ-03). The designated plumes are shown on Figure 9 with PCE and TCE isopleths from the October 2014 sample event; the plumes are listed below with the primary CVOCs and associated LTM wells.

Plume	CVOC	LTM Wells
TTA-1 North	PCE	DR1-2, DR1-7, DR1-8, MW-100B, PMW21-03, PMW21-05
TTA-1 South	PCE, TCE	DR1-1/1A, DR1-3, DR1-4, MW-101, PMW101-03A/B, PMW101-06A/B
TTA-2	PCE, CT, CF	DR2-1, DR2-3, DR2-4, DR2-6, MW-26, MW-64, MW-88, MW-92, MW-96, MW-217, MW-218, MW-259, PMW92-02
West-Central	PCE	MW-39/39A, MW-94A, MW-98, MW-200, MW-204A/B, MW-205A/B, MW-206A/B, MW-208A/B, MW-210B
Building 835	TCE	MW-142, MW-143, MW-198, MW199B, MW-209B, MW-257
North-Central	TCE	MW-103, MW-104, MW-214A/B, MW-258, MW-260
South-Central	TCE	MW-97, MW-216, MW-261

The latest annual LTM report, *Annual Long-Term Monitoring Report-2014 Revision 1* (HDR, 2015b), was approved by TDEC in April and by USEPA in May 2015. Conclusions for MI LTM were:

- The CVOC plume maps prepared for 2014 are similar to those for 2013 with slightly reduced concentrations for PCE, TCE and CT in and downgradient of the EBT areas.
- CVOCs exceeded the MCLs at 57 of the 99 MI LTM wells, including 1 Boundary well, 45 performance wells and 11 sentinel wells.
- None of the designated CVOC plumes in the Fluvial Aquifer extend off-site; some areas are potentially impacted by contaminant migration from off-site areas.
- CVOCs in the Fluvial Aquifer have migrated vertically into the IAQ through the window in the northwestern area of the MI. The plume in the IAQ extends to the northwest property boundary and likely beyond.

- Changes related to reductive dechlorination, decreases in parent compounds (PCE, TCE and CT) and increases in degradation products (cis-1,2-dichloroethene [cDCE] and vinyl chloride [VC]), were observed at several LTM wells.

Recommended changes for MI LTM in 2015 were to increase sample frequency at MW-209A (annual to semiannual) and to reduce sample frequency at MW-254 and MW-214A/B (semiannual to annual) and at MW-253 (annual to biennial). The changes to sample frequency were implemented.

For the April 2015 LTM event, there were 99 MI LTM wells classified as Background (6), Boundary (7), Performance (62), and Sentinel (24) with the following sample frequency: biennial (16), annual (32) and semiannual (51). The 2015 MI LTM wells are listed on Table 4 and shown on Figure 10.

The primary CVOC results for the semiannual sample event in April 2015 are summarized on Table 5; the CVOCs most often detected above MCLs and the maximum concentrations reported were PCE at 230 µg/L and TCE at 77.1 µg/L. Concentrations and isopleths for PCE, TCE, cDCE and CT for the April 2015 semiannual LTM event are shown on Figures 11, 12, 13 and 14. PCE and TCE concentrations for the April 2015 LTM event in IAQ and MAQ sentinel wells within the window are shown on the cross-section in Figure 15.

3.1.3.4 Land Use Controls

LUCs prevent residential use of the majority of the MI and production or consumptive use of groundwater or drilling of groundwater supply wells on the MI. The LUCs consist of institutional controls (ICs) in the form of lease restrictions, deed restrictions, notice of land use restrictions, zoning restrictions and groundwater well restrictions. The LUCs will remain in place until concentrations of COCs have been reduced to levels that allow for unlimited exposure and unrestricted use. The land use control implementation plan (LUCIP) was included as Appendix C of the MI RD. An annual inspection is conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

The LUCs have been implemented in accordance with the LUCIP. 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. One minor deficiency regarding perimeter fencing was identified and corrected in 2005. No other deficiencies or violations have been identified.

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 boundary 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. Soil samples collected for the RI showed significant levels of CVOCs: 1,1,2,2-tetrachloroethane (TeCA); 1,2-dichloroethane; total 1,2-dichloroethene; CT; CF; methylene chloride; PCE; TCE; and VC. TCE and TeCA were the CVOCs most frequently detected in soil samples at elevated concentrations. Three contaminant plumes in the Fluvial Aquifer were identified at Dunn Field. The CVOCs detected in soil samples were also detected most frequently in groundwater sampling events; the CVOCs with the highest groundwater concentrations were TeCA and TCE. 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 Removal and Remedial Activities

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 remedial action (IRA) groundwater recovery system included 11 recovery wells (RWs) screened in the Fluvial Aquifer and located along the western boundary of Dunn Field. The system began operation in November 1998 with groundwater discharge to the city sewer system without treatment under an industrial discharge agreement. Based on reduction of CVOC concentrations in groundwater following implementation of the Source Areas RA, the final RWs were shutdown in January 2009. Approximately 918 pounds of total VOCs, including 369 pounds of TCE, were discharged by the 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 closure activities were described in the *Dunn Field Groundwater Interim Remedial Action 2009 Operations and Closure Report* (HDR, 2010).

A non-time critical removal action was conducted to reduce or eliminate the potential risk posed by CWM wastes at Sites 1, 24-A, and 24-B. The removal action was completed in March 2001 and documented in

the *Final Chemical Warfare Materiel Investigation/Removal Action Report* (UXB International, Inc., 2001). Approximately 914 CY of soil contaminated with mustard degradation by-products, and 19 CY of mustard-contaminated soil were excavated, transported, and disposed offsite. Twenty-nine bomb casings were recovered from Site 24-A.

A non-time critical removal action to address lead contaminated surface soil at a former pistol range in the Northeast Open Area; the action was completed in March 2003 and documented in *Removal Action at Former Pistol Range, Site 60* (Jacobs Federal Programs, 2003). Approximately 930 CY of lead contaminated surface soil were excavated, transported, and disposed off-site at an approved, permitted landfill.

Locations of the IRA and the pre-ROD response actions are shown on Figure 3.

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

- Excavation, transportation, and disposal (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 Memphis and Shelby County Health Department (MSCHD) groundwater well restrictions.

The fundamental change in the ROD Amendment was the use of air sparging with soil vapor extraction (AS/SVE) instead of a PRB for the Off Depot groundwater plume. The ROD Amendment also revised the criteria for extent of the AS/SVE system and clarified the treatment objective. 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. Groundwater modeling results indicated that the AS/SVE system in combination with natural attenuation processes would reduce groundwater concentrations to MCLs in accordance with the RAOs within a reasonable period of time. The RAOs and the RGs for the contaminants of concern, shown on Table 6, were not changed from the Dunn Field ROD.

3.2.3 Remedial Actions

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). Upon completion of the AS/SVE system for Off Depot groundwater in 2009, construction of the selected remedies for DDMT was complete. Locations of the Disposal Sites, Source Areas and Off-Depot Groundwater RAs are shown on Figure 16.

3.2.3.1 Disposal Sites

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), *Dunn Field Disposal Sites Remedial Action Work Plan, Revision 1* (MACTEC, 2004), and *Dunn Field Disposal Sites Remedial Action Work Plan Addendum 1, Revision 1* (MACTEC, 2006a). The disposal sites are listed on Table 2 as Site No.'s 3, 10, 13, 64 and 90; Site No. 64 was also identified as Installation Assessment Site 31 and Site No. 90 was also listed as Site 4.1. The remedial actions are described in *Dunn Field Disposal Sites Remedial Action Completion Report, Revision 1* (MACTEC, 2006b), which was approved by USEPA in August 2006.

The Disposal Sites RA was performed during two separate mobilizations. During the first mobilization from March 2005 to May 2005, excavations at Sites 13, 64, 90, and the majority of Site 10 were completed. Site 3 and the remaining materials from Site 10 were completed during the second mobilization in February and March 2006. Approximately 2,700 CY of non-hazardous materials were transported off-site and disposed of 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.

3.2.3.2 Early Implementation

An Early Implementation of Selected Remedy (EISR) using ZVI was performed to reduce contaminant mass downgradient of the planned PRB location 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. Injections were made in 14 borings at 2-foot intervals over the Fluvial Aquifer thickness, which averaged 21 feet; the injection locations were spaced approximately 60 to 80 feet apart. The depth of injection ranged from approximately 70 to 100 feet bgs. The total mass of ZVI injected was approximately 192,500 pounds. The *EISR Interim Remedial Action Completion Report, Revision 1*

(MACTEC, 2005b) 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 on 22 September 2005.

3.2.3.3 Source Areas

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 Fluvial Soil Vapor Extraction Remedial Action Work Plan, Revision 1* (FSVE RAWP) (e²M, 2007a); and the *Dunn Field Source Areas Loess/Groundwater Remedial Action Work Plan, Revision 1* (Loess/Groundwater RAWP) (e^2M, 2007b).

The RAs are described in the *Dunn Field Source Areas Interim Remedial Action Completion Report, Revision 1* (HDR|e^2M, 2009); the IRACR was approved by USEPA and TDEC in November 2009. The memorandum, *Dunn Field Operating Properly and Successfully Demonstration, Source Areas Remedial Action* (e^2M, 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. The system consists of two blowers connected to seven SVE wells with screened intervals at approximately 30 to 70 feet bgs, 20 vapor monitoring points (VMPs) located 15 to 80 feet from the SVE wells and an equipment building for the blowers, heat exchangers and controls. Ten additional SVE wells were installed in borings for confirmation soil samples in November 2010. The FSVE system layout is shown on Figure 17. FSVE system operations began in July 2007 and approximately 4,049 pounds of VOCs were removed through July 2012. The VOC concentration in the extracted vapor decreased asymptotically to less than 1 part per million (ppm). The FSVE system was shutdown 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, 2012c), 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 the Waste Management, Inc. landfill in Tunica MS, 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. System components included 367 heater-only wells; 68 vapor extraction wells, 62 multi-level temperature monitoring points, 25 pressure monitoring points and a Shotcrete surface cover to limit water infiltration and improve vapor capture. The system operated continuously from 27 May 2008 until the heaters were shutdown on 20 November 2008. The vapor extraction system was shut down on 4 December 2008. Approximately 12,500 pounds of VOCs were removed during treatment. Confirmation soil samples, collected at various depths from 35 soil borings, demonstrated that clean-up standards were met; the average concentration for CVOCs in each TA was below the RG and none of the final samples exceeded an RG by a factor of 10 or more.

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

3.2.3.4 Off Depot Groundwater

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); and the *Dunn Field Off Depot Groundwater Remedial Action Work Plan, Revision 2* (Off Depot RAWP) (e^2M, 2009c). Remedial action construction and implementation are described in *Off Depot Groundwater Interim Remedial Action Completion Report, Revision 1* (Off Depot IRACR) (HDR, 2011a), which was approved by USEPA in August 2011.

3.2.3.4.1 Vapor Intrusion Study

Vapor sampling was performed in 2009 to assess potential vapor intrusion (VI) at residential structures from CVOCs in the Off Depot plume. The study was described in the Off Depot IRACR. 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 and a 100-foot outer buffer. Parcels within the areas were identified and visually surveyed. 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).

Soil vapor probes with two sample screens (5 feet and 15 feet bgs) were installed at nine locations. Soil samples were collected during installation of the probes and submitted for geotechnical analysis of physical properties. The loess was observed to be relatively uniform silty clay. Baseline vapor sampling from the two vapor screens at each location was performed in September 2009. Three CVOCs were detected above RLs in samples from the probes installed in the loess. The CVOCs and maximum concentrations were: TCE, 4 micrograms per cubic meter (µg/m^3); PCE, 16 µg/m^3; and methylene chloride, 17 µg/m^3. All concentrations were below the vapor screening levels (Soil Vapor Screening Values-Residential from New Jersey Department of Environmental Protection website, March 2007). Nine CVOCs were detected above RLs in the two samples from VMP-4, which is screened in the fluvial sands below the loess. TeCA and TCE were detected at the highest concentrations, as in groundwater samples within the plume; the maximum concentrations were TCE at 6830 µg/m^3 and TeCA at 1420 µg/m^3.

The sampling summary concluded the loess provides a good barrier to vertical migration of soil vapor preventing VI problems above the groundwater plume in the Off Depot area. This conclusion was based on the analytical results showing vapor concentrations in the loess were orders of magnitude lower than in the fluvial sands and the primary contaminants in the fluvial sands (TeCA and TCE) were not detected as frequently or at similar relative concentrations in the loess. In addition, the results for the vapor sample collected in 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 shallow probes installed in the loess. The CVOCs were at similar concentrations as in the initial samples and all were below the residential screening levels. CVOCs in the VMP samples were much lower than in the initial samples; TCE, PCE and methylene chloride were detected with the highest concentration being TCE at 28 µg/m^3. The vapor sampling summary concluded that AS/SVE operations significantly reduced CVOC concentrations in the fluvial sands and the CVOCs in the groundwater plume do not present a VI problem for nearby residences. Following approval from the USEPA and TDEC, the vapor probes were abandoned in September 2010.

3.2.3.4.2 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 was designed to operate with up to one-third of the 90 AS points operating at any time. The AS points are individually programmed for daily operation in 2 hour blocks and are 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 18.

AS/SVE operations began 21 December 2009 and approximately 84 pounds of VOCs were removed through June 2015. The latest annual report, *Off Depot Air Sparge-Soil Vapor Extraction System Annual Operations Report, Year Four, Revision 1* (HDR, 2014), was submitted to USEPA and TDEC in August 2014 following approval of revisions by USEPA and TDEC in July 2014.

Overall performance of the AS/SVE system is evaluated based on results of LTM analyses. The goal for groundwater remediation at Dunn Field is to reduce CVOC concentrations below 50 µg/L for each CVOC constituent, with MNA expected to achieve the RGs for groundwater over time. The AS/SVE system is to continue operations until the upgradient concentrations from the Dunn Field plume do not exceed 50 µg/L for individual CVOCs for 12 months; the estimated period for operations to reach that goal was five years, ending in December 2014. Since April 2012, only one CVOC (TCE) in one LTM well, MW-159, located immediately upgradient of the system, has exceeded the 50 µg/L standard; TCE was reported at 198 µg/L for MW-159 in April 2015.

The Year Four (2013) report recommended the AS/SVE system be operated in alternating months to restore the northerly groundwater flow observed prior to system operation. The change in operation was delayed when the AS/SVE system shut down on 17 February 2014 due to extensive equipment damage from a power surge during a thunderstorm. System repairs and testing were completed and operations resumed on 6 March 2015. The recommended change to operate the system in alternate months was implemented then. Standard operations with the air sparge wells open and two blowers alternating to extract vapors 24 hours per day began in March 2015 and continued in alternate months thereafter. In April 2015 and the following alternate months, the air sparge manifold was closed, except for brief periods during system inspections, and a single blower operated for 12 hours per day; the two blowers were alternated on a weekly basis.

Due to the system shutdown in February 2014, Year 5 was extended to include system operations through 2015. 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 at MW-159, operations are planned to continue through 2017.

Additional sparge wells will be installed in 2016 in an effort to reduce individual CVOC concentrations below 50 µg/L. A work plan describing installation of the new AS wells will be provided to USEPA and TDEC for review prior to implementation.

3.2.3.5 Long Term Monitoring

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. IRA groundwater samples were collected regularly from 1999 to 2010 in order 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. Recommendations for LTM optimization are provided in the annual LTM reports.

Dunn Field LTM wells are classified in three categories:

- Background – wells screened in the Fluvial Aquifer located along or outside of the Dunn Field boundary; located upgradient to or at a distance from contaminant plumes on Dunn Field; no (or only low-level) previous detections of site contaminants in well samples.
- Sentinel – wells screened within either the fluvial or intermediate aquifers adjacent to or within the window to the IAQ.
- Performance – wells screened in the Fluvial Aquifer; located within the limits of known contaminant plumes; or repeatedly have contaminants in samples; located in areas targeted for treatment during the RA.

In 2014, Dunn Field LTM included 86 wells classified as Background (8), Background-NE (5), Performance (50), Performance-FSVE (14) or Sentinel (9). The Background-NE wells are located on or bordering the northeast section of Dunn Field and have CVOC concentrations from a suspected off-site source(s) upgradient of Dunn Field. The Performance-FSVE wells were selected for rebound monitoring after shutdown of the FSVE system in July 2012. The wells had the following sample frequency: biennial (16 wells), annual (32 wells) and semiannual (38). Samples were collected from 69 wells in an annual event in April 2014 and from 38 wells in a semiannual event in October 2014.

The latest annual LTM report, *Annual Long-Term Monitoring Report-2014 Revision 1* (HDR, 2015b), was approved by TDEC in April and by USEPA in May 2015. Conclusions for Dunn Field LTM were:

- CVOC concentrations remain low at most wells due to the Source Areas and Off Depot RAs. CVOC concentrations exceeded the active treatment objective at two performance wells and exceeded an MCL or TC at 13 performance wells.
- CVOC concentrations above MCLs on the north end of Dunn Field are due to contaminant migration from a suspected off-site source.
- Increased CVOC concentrations from plume diversion on the southwest side of the AS/SVE system decreased in 2014.
- Apparent rebound in CVOC concentrations was observed on Dunn Field two years after shutdown of the FSVE system.
- Increased CVOC concentrations were observed immediately downgradient of the AS/SVE system due to shutdown from equipment damage for most of 2014.

Recommended changes for LTM in 2015 were to reduce sample frequency at MW-184 (semiannual to annual) and to abandon MW-33 due to problems with access since 2012. The change to sample frequency was implemented, but abandonment of MW-33 has been postponed until funding is available.

For 2015, there are 85 Dunn Field LTM wells classified as Background (8), Background-NE (5), Performance (49), Performance-FSVE (14) or Sentinel (9) wells. The wells have the following sample frequency: biennial (15), annual (33) and semiannual (37). The 2015 Dunn Field LTM wells are listed on Table 7 and the well locations are shown on Figure 19.

Reduction in CVOC concentrations from the remedial actions on Dunn Field and the Off Depot area began shortly after operations began for the Dunn Field FSVE system in July 2012 and the Off Depot AS/SVE system in December 2009. The reduction is shown in total CVOC plume maps for April 2007 and April 2015 on Figure 20.

The primary CVOC results for the annual sample event in April 2015 are summarized on Table 8; the CVOCs most often detected above the target concentrations in the Dunn Field ROD and the maximum concentrations were: TCE, 198 µg/L; PCE, 43.8 µg/L; TeCA, 11.7 µg/L and DCE 17.2 µg/L. Concentrations and isopleths for TeCA, TCE and PCE for the April 2015 LTM event are shown on Figures 21, 22 and 23.

3.2.3.6 Land Use Controls

LUCs for Dunn Field are described in the LUCIP in Appendix A of the Off Depot RD: deed and/or lease restrictions, Notice of Land Use Restrictions, City of Memphis/Shelby County zoning restrictions, the

MSCHD groundwater well restrictions, fencing and the Dunn Field LUC protocol. The LUCs limit use of the Disposal Area to light industrial land uses, prevent residential use of Dunn Field, and prevent exposure to contaminated groundwater. 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. An annual inspection is conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

The LUCs have been implemented in accordance with the LUCIP. 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. No deficiencies have been identified.

3.3 PROPERTY TRANSFER

Six Findings of Suitability to Transfer (FOSTs) have been completed including all property within DDMT. The area covered by each FOST is shown on Figure 24. 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, so there are no unacceptable risks; 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 FOST 5. The acreage, type of conveyance, type of transfer, receiving party and date of transfer are listed on Table 9. Army plans to transfer the remaining 24.5 acres on 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, or the presence of groundwater contamination from a suspected off-site source migrating on to the property.

4.0 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:

- FSVE operations on Dunn Field were shut down in July 2012 after remediation goals were met. Groundwater is being monitored for rebound.
- AS/SVE in the Off Depot area is continuing; only a small area exceeds the active remediation goal.
- Additional EBT at the MI was completed in November 2014; further MI RA will be conducted upon completion of the SRI/FFS and approval of an Explanation of Significant Differences (ESD) or ROD Amendment, as required.
- 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 MCLs. LTM will continue until CVOC concentrations are at or below MCLs.
- An evaluation of potential VI risks from CVOCs in soil and groundwater at the MI will be conducted prior to the next Five-Year Review.
- 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 DUNN FIELD

4.1.1 Fluvial SVE Operations

The FSVE system was shut down in July 2012 based on confirmation soil samples meeting the RAO and system influent asymptotically decreasing below 1 ppm. The conveyance lines were closed and the wells were opened for passive venting. The air intakes and exhausts for the blowers were sealed; power at the

equipment compound was switched off, but the utility connection remains in place for use during maintenance.

BaroBall™ caps were installed on 11 SVE wells for increased efficiency during 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 at the 14 Performance-FSVE wells on Dunn Field. The system layout and well locations used to monitor rebound are shown on Figure 17.

Vadose zone modeling in 2011 indicated the highest CVOC concentrations in groundwater due to rebound from residual CVOC mass in the fluvial sands would be observed within 90 days after FSVE shutdown. For rebound due to residual CVOC mass in the loess, the modeling indicated the highest CVOC concentrations in groundwater would be observed within 2 to 3 years for TeCA and 4 to 5 years for TCE. The model parameters and results were described in Appendix F of *Dunn Field Source Areas Fluvial Soil Vapor Extraction System Annual Operations Report, Year Four, Revision 0* (HDR, 2011b).

The only indication of rebound to date has been increased CVOC concentrations at MW-06 and MW-87 along the central section of Dunn Field's western boundary. From April 2013 to April 2015, CF concentrations increased from 2.2 to 11 µg/L at MW-06 and from 0.2 to 63 µg/L at MW-87, and TCE concentrations increased from 0.7 to 2.6 µg/L at MW-06 and from <1 to 4.2 µg/L at MW-87. The concentrations are below MCLs, but CF exceeded the TC (12 µg/L) at MW-87. The limited increase in concentrations does not warrant additional FSVE operation but will continue to be monitored in 2016.

4.1.2 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 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 MSCHD Permit #01030-01P issued for the FSVE with permit conditions applicable to the combined operations. The permit will have to be renewed in May 2016. The AS/SVE system layout is shown on Figure 18.

Overall effectiveness of the AS/SVE system is evaluated through groundwater samples during LTM. In accordance with the Off Depot RD (CH2M HILL, 2008), shutdown of the AS/SVE system will be considered when groundwater samples collected 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. Two upgradient wells exceeded the active remediation goal of 50 µg/L in April 2015, MW-159 immediately upgradient of the AS/SVE system (TCE at 198 µg/L) and MW-87 near the Dunn Field boundary (CF at 63 µg/L). Additional sparge wells will be installed in 2016 to reduce CVOC concentrations below the active remediation goal at MW-159; MW-87 will continue to be monitored for increased concentrations.

As stated in Section 3.2.3.4, the AS wells are currently operated in alternate months to increase movement of the plume into the treatment area; an SVE blower is operated 24 hours per day when the AS wells are open and 12 hours per day when the AS wells are closed. Due to the system shutdown in February 2014, Year 5 was extended to include system operations through 2015. Since the active remediation goal has not been met, operations will continue in 2016 (Year 6).

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 required 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 to be 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 on field records provided in the O&M manual. Flow rates and operating parameters are read from one of the system computer display 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 required to allow for longevity of system components and 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 MSCHD air permit. VMPs are monitored to assess the vacuum radius of influence and vapor extraction effectiveness; monitoring includes vacuum measurements and PID measurements.

4.1.3 Long-Term Monitoring

Dunn Field LTM is conducted in accordance with the Off Depot LTM Plan (CH2M HILL, 2008) with recommendations for changes made in annual LTM reports. The current status of Dunn Field LTM was described in Section 3.2.3.5.

In April 2015, all 86 Dunn Field LTM wells were sampled; 11 Performance wells and 5 Background-NE wells had concentrations of TeCA, 1,1,2-trichloroethane, TCE, PCE, DCE, VC and CF above the MCL or TC. The number of performance wells exceeding the MCL or TC decreased from 15 in April 2014; three of the Performance wells (MW-31, MW-79 and MW-220) are impacted by the off-site plume. Recommended changes for 2016 Dunn Field LTM will be provided in the 2015 annual report.

4.1.4 Off-Site Plume

Three monitoring wells (MW-128, MW-129 and MW-130) were installed northeast of Dunn Field in July 2003 to evaluate potential off-site contamination migrating on to Dunn Field. Three CVOCs (DCE, PCE and TCE) were detected in the initial samples from the three wells and exceeded MCLs in the two wells immediately upgradient of Dunn Field (MW-129 and MW-130); concentrations exceeded MCLs in all three wells in later samples. MW-128 was abandoned in March 2013. MW-129 and MW-130 are currently used for LTM, are classified as Background-NE wells and are sampled during annual LTM events. The well locations are shown on Figure 19.

The source of groundwater contamination at MW-129 and MW-130 has been considered to be from an off-site source because waste disposal activities were not reported in the northeast corner of Dunn Field and past analyses of Dunn Field soil samples had identified PCE and TCE, but not DCE. Only wells located on the northern boundary of Dunn Field have contained DCE and the highest concentrations of all three CVOCs are in wells upgradient of Dunn Field. The April 2015 results for PCE and TCE are shown on Figures 22 and 23.

TDEC conducted several rounds of preliminary assessment and site investigation from 2004 through 2008 to evaluate potential sources of groundwater contamination upgradient of Dunn Field. The investigations were reviewed in 2015 by the DDMT BRAC Environmental Coordinator (CALIBRE, 2015) and limitations in the data were identified. TDEC plans additional investigation in 2016 if funding is available.

Army plans to conduct an on-site membrane interface probe (MIP) survey with confirmation soil sampling in 2016 to determine if soil contamination is present and potentially impacting groundwater. The MIP survey will be performed on Army property at the northeast corner of Dunn Field. Previous MIP surveys on Dunn Field and the Main Installation have been successful in identifying the presence or absence on CVOCs in soil. A work plan will be prepared for review by USEPA and TDEC prior to implementation.

4.2 MAIN INSTALLATION

4.2.1 EBT

Previous EBT at the MI was summarized in Section 3.1.3. Although CVOC concentrations were reduced during the latest EBT performed from November 2012 to August 2014, it was not sufficient to meet the RAOs for the MI. Further remedial action on the MI is being delayed until the FFS is completed, and the selected remedy has been confirmed or revised. The 57 EBT wells have not been sampled since November 2014; recommendations for incorporation of selected wells in 2016 LTM will be included in the 2015 annual LTM report.

4.2.2 Supplemental Remedial Investigation and Focused Feasibility Study

A SRI/FFS is being performed to develop a remedial strategy to achieve RAOs throughout the MI. The SRI includes document review to re-examine the basis for the selected remedy and additional field investigation to improve the site hydrogeological model and delineation of contaminant plumes and to identify potential off-site impacts to groundwater. The additional field investigation is being performed in two phases. Phase 1 was performed April to August 2015 and consisted of installing ten Fluvial Aquifer wells and two IAQ wells; the SRI Phase 1 wells will be included in LTM sampling events beginning in October 2015. The SRI Phase 1 wells are listed on Table 10 and the locations are shown on Figure 25.

The SRI Phase 1 Summary Report, currently in preparation, describes the document review and the Phase 1 investigation activities and results, and provides recommendations for Phase 2 of the field investigation. The conclusions from the report are summarized below:

- DDMT is located in the southeast portion of the cone of depression created by groundwater withdrawal from the Allen Well Field. The groundwater flow direction in the MAQ at DDMT is west-northwest towards the Allen Well Field.
- Hydraulic connections (windows) between the Fluvial Aquifer and the MAQ are present throughout the Memphis area, and a window has been identified in the northwestern area of the MI. Sands in the fluvial deposits and in the Upper Claiborne are in contact in the central MI and act as a single water table aquifer in that area. The Upper Claiborne sand continues into the window and provides a connection to the Memphis Sand.
- Naturally occurring biodegradation of CVOCs does not appear to be a significant contributor to natural attenuation in the Fluvial Aquifer at the MI. However, 1st order decay rates calculated for the 2009 groundwater model had good agreement with PCE and TCE concentrations at wells along the flow paths, which indicates attenuation is occurring, and use of attenuation factors in the 2009 model had good correlation with reported concentrations.
- Despite some question about the groundwater gradient used for the 2009 BIOSCREEN and MODFLOW/MT3D model, the model results are in good agreement with PCE and TCE concentrations in the IAQ and MAQ monitoring wells near the window. Comparison of source area PCE and TCE concentrations in the model with current concentrations in those areas indicates the modeled concentrations are still applicable and may be conservative.
- An updated model will require recent water level data for Allen Well Field wells and additional MAQ monitoring wells to improve knowledge of hydraulic parameters and fate and transport characteristics of the MAQ.
- The SRI wells improved delineation of the identified plumes:
  - Upgradient impacts were identified at the North-Central and TTA-1N plumes. The upgradient impacts are off-site for the TTA-1N plume and potentially off-site for the North-Central plume.
  - Delineation at the distal end of West-Central and TTA-2 plumes and at the core of the North-central plume were improved.
  - A new area of groundwater contamination was identified at MW-270 on the southern MI boundary. MW-270 contains high concentrations of TCE and cDCE, which has not been observed in other wells outside EBT areas at DDMT. The high cDCE concentration indicates biodegradation may have occurred and the plume may be relatively old.

  - No CVOCs were detected in the new IAQ wells limiting extent of CVOCs to the west of MW-256.

- The SRI wells also provided additional information on site hydrogeology (Figure 26):
  - Groundwater flow in the Fluvial Aquifer appears to enter the MI from all sides and to migrate vertically through the window in the northwest MI or to a sink in the south-central MI.
  - Groundwater flow in the IAQ at the northwestern MI is apparently to the north rather than northwest as previously shown.
  - Additional monitoring wells are needed to confirm the change in the interpreted flow directions in both areas.

The FFS will be performed to update the remedial strategy for the MI. Based on the results of the SRI, the FFS 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.

4.2.3 Long Term Monitoring

MI LTM is performed in accordance with the MI LTM Plan (CH2M HILL, 2004a) with recommendations for changes made in annual LTM reports. The current status of MI LTM was described in Section 3.1.3.3.

In April 2015, 54 of 99 MI LTM wells were sampled; 48 wells exceeded the MCL for PCE, TCE, cDCE, VC and/or CT, which is the same number as in April 2014. Exceedances were observed in 37 performance wells, 10 sentinel wells and 1 boundary well. The SRI Phase 1 wells will be added to LTM in October 2015. Other recommended changes for 2016 MI LTM, including incorporation of selected EBT wells, will be provided in the 2015 annual report.

4.2.4 Vapor Intrusion

VI has been identified as a potential concern at the MI based on CVOCs in groundwater. Evaluation of VI risk at the MI from CVOCs in soil and groundwater is planned for late 2016. The study will be performed in accordance with the *DoD Vapor Intrusion Handbook* (Tri-Service Environmental Risk Assessment Workgroup, 2009). The overall approach will include the following steps:

- Review site contaminants for volatility and toxicity using Appendix A of the DOD VI Handbook.

- Evaluate whether exposure to the vapors poses an immediate risk to building occupants.
- Conduct a screening level assessment of site contaminants.
- Conduct a site-specific VI pathway evaluation.
- Evaluate mitigation/remediation options, if necessary.

Site conditions relative to the VI risk evaluation are summarized below. A more detailed review will be required for the screening level assessment.

CVOC concentrations in groundwater at the MI are well documented through LTM samples collected at least semiannually since 2004. Groundwater samples were most recently collected from 111 LTM and SRI wells in October 2015 (HDR, 2016). The maximum CVOC concentrations detected were PCE at 225 µg/L in DR2-1; TCE at 206 µg/L and cDCE at 85.1 µg/L in MW-270; and vinyl chloride at 155 µg/L in MW-100B. Depth to groundwater in the Fluvial Aquifer at the MI varied from 55 to 103 feet, bgs in October 2015.

As noted in Section 3.2.3.4.1, vapor sampling in the Off Depot area prior to start of AS/SVE operations did not detect CVOCs in near-surface soils (loess) above residential screening levels. The loess was shown to provide a good barrier to vertical migration of soil vapor and to prevent VI problems above the groundwater plume in that area. When the initial samples were collected in 2009, CVOC concentrations in groundwater were much higher in the Off Depot area than the current concentrations on the MI.

The conceptual model for groundwater contamination at the MI is that small spills and leaks resulted in several moderate-to-low concentration plumes, some of which appear to have multiple sources. Significant CVOC concentrations in soil were not identified in the MI RI (CH2M HILL, 2000). An extensive investigation of CVOCs in near-surface soils (loess) was performed for the *Main Installation Source Area Investigation* (MI SAI) (e2M, 2009). The MI SAI consisted of a membrane interface probe survey over eight survey grids (40-foot spacing) in the upgradient areas of the TTA-1, TTA-2, West-Central and Building 835 plumes. A total of 334 MIP grid points were surveyed to depths of up to 37 feet, bgs and confirmation soil samples were collected for laboratory analysis at 70 locations. Since soil remediation for CVOCs was not required at the MI, the soil remediation goals (RGs) for protection of groundwater in the Dunn Field ROD were used to evaluate MI SAI results. Concentrations exceeded RGs at only three locations above the TTA-2 plume and two locations above the West-Central plume. The CVOCs exceeding RGs and the concentrations were: CT at 22.9 mg/kg, CF at 1.07 mg/kg, and methylene chloride at 0.508 and 0.0389 mg/kg in the TTA-2 area; and PCE at 0.199 and 0.181 mg/kg in the West-Central area. Due to the limited extent of CVOCs above the RGs, soil remediation was not conducted.

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). LUCs will remain in place until concentrations of contaminants of concern have been reduced to levels that allow for unlimited exposure and unrestricted use. An annual inspection is conducted to determine whether the required LUCs remain effective and that land use restrictions are being achieved.

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 needed 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 review was conducted in 2007 and the report, *Second Five-Year Review, Revision 1* (e^2M, 2007c), was approved in January 2008.

The *Third Five-Year Review, Revision 1* (HDR, 2012d) was approved by USEPA on 23 January 2013. The remedies at Dunn Field (OU 1) and the MI (OUs 2, 3 and 4) were found to be protective of human health and the environment, and because the RAs at all OUs for DDMT are protective, the site is protective of human health and the environment. Two issues were identified, both related to the MI: rebound in CVOC concentrations and the time required to achieve groundwater RAOs. The issues, recommended actions, schedule and status are shown on Table 11.

The fourth five-year review will be conducted in 2017 in accordance with *Comprehensive Five-Year Review Guidance* (USEPA, 2001) and the report is required to be completed by 23 January 2018. Per discussions with USEPA and TDEC, potential for VI at DDMT will be reviewed prior to the five-year review. The review will be conducted in accordance with DOD guidance and coordination with USEPA and TDEC to address differences with recent agency guidance documents.

4.5 TIMELINE FOR SITE COMPLETION

The master schedule for MI, Dunn Field and site-wide activities through planned site completion in 2024 is shown on Figure 27. The schedule changes from the 2015 SMP incorporate the extended period for SRI Phase 1 field work and reporting, which extends the SRI and the following FFS, ROD Amendment and

additional MI RA by 2.5 months. Other changes include AS/SVE Year 7 operations (2017) and abandonment of the FSVE and AS/SVE operations in 2018. The estimated schedule for completion of the MI RACR in October 2023 was not changed. The estimated timeline for site completion includes the following:

- Main Installation
  - SRI to be completed in January 2017.
  - FFS to be completed in April 2017.
  - ROD Amendment to be final in May 2018.
  - Additional remedial action from August 2018 through August 2021.
  - MI LTM through 2021, with final quarterly compliance monitoring in 2022.
  - MI Remedial Action Completion Report to be completed in October 2023.
- Dunn Field
  - Off Depot AS/SVE operates through December 2017.
  - Dunn Field LTM through 2018, with final quarterly compliance monitoring in 2019.
  - Dunn Field Remedial Action Completion Report to be completed in October 2020.
- Final Closeout Report to be completed in April 2024.

5.0 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 12 lists primary and secondary documents for the DDMT environmental restoration program through FY18; primary and secondary documents are defined in the FFA, Section XV (USEPA, 1995).

FY16

- MI RA – Perform SRI Phase 2 and begin SRI report.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- MI VI – Perform screening level assessment and prepare work plan for site-specific VI pathway evaluation, if necessary (pending funding and contract award).
- Dunn Field/Off Depot RA – Complete extended Year 5 and begin Year 6 AS/SVE operations and monitoring.
- 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.

FY17

- MI RA – Complete SRI, FFS and Revised Proposed Plan (RPP); begin revised MI RD.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- MI VI – Perform site-specific VI pathway evaluation and evaluate mitigation/remediation options, if necessary
- Dunn Field/Off Depot RA – Complete Year 6 and begin Year 7 AS/SVE operations and monitoring.
- 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; conduct 4th Five-Year Review.

FY18

- MI RA – Conduct RPP public comment period/meeting and complete ROD Amendment; complete revised MI RD and RAWP, and begin additional MI RA.
- MI LTM – Perform groundwater monitoring in accordance with LTM plan.
- Dunn Field/Off Depot RA – Complete Year 7 AS/SVE operations and monitoring; remove/abandon FSVE and AS/SVE systems.
- 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; complete 4th Five-Year Review Report.

5.2 REQUIREMENTS BY FISCAL YEAR

The financial requirements by fiscal year for the environmental program at DDMT are summarized in Table 13, 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 (Army Environmental Database-Restoration) maintained by ODB.

In previous SMPs, the financial requirements were listed by the following categories: Dunn Field LUC Sites, Dunn Field RA Sites, and MI RA Sites. The selection of specific sites for each category was made for administration purposes and did not reflect identified contaminant source areas. The Dunn Field LUC Sites and all but one of the Dunn Field RA Sites were closed because no further action has been approved at each of the sites. Groundwater remediation and other environmental tasks will be administratively tracked under Site 004 for Dunn Field and Site 029 for the Main Installation. The DDMT environmental restoration sites are listed on Table 2.

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TABLES

TABLE 1
FUNCTIONAL UNIT AND AREA DESCRIPTIONS
2016 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
2016 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)	No further action is required for this site. This site is associated with Dunn Field groundwater remediation for administrative purposes. Soil vapor extraction system in fluvial deposits operated from July 2007 to July 2012. Thermal-enhanced soil vapor extraction 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/soil vapor extraction system began operating in December 2009. USEPA approved the Off Depot IRACR in August 2011. AS/SVE operations will continue in 2016.
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.
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.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
19	36.24	Former Tear Gas Canister Burn Site (Dunn Field)	No further action is required at this site.
20	36.25	Probable Asphalt Burial Site (Dunn Field)	No further action is required at this site.
21	36.26	XXCC-3 Burial Site (Dunn Field)	No further action is required at 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 at this site.
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 at 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 at 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.
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 at 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) (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 (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 (1969)	No further action is required for this site.
93	36.1	Acid Burial Site	No further action is required for this site.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2016 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 (SRI/FFS) 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 Supplemental Remedial Investigation and Focused Feasibility Study are completed, and the selected remedy has been confirmed or revised. SRI/FFS completion is scheduled for 2017.
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.
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.
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.

TABLE 2
ENVIRONMENTAL RESTORATION SITES
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
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.
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
2016 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 pentachlorophenol 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
43	33.9	Former Underground pentachlorophenol 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 pentachlorophenol 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.
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.

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2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Site No.	Parcel No.	Description	Site Status
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:
AOC: Area of Concern
AST: Aboveground Storage Tank
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
DDT: 4,4′-Dichlorodiphenyltrichloroethane
DRMO: Defense and Reutilization Marketing Office
EBT: Enhanced Bioremediation Treatment
FFS: Focused Feasiblity Study
IA: Installation Assessment
IRACR: Interim Remedial Action Completion Report
MI: Main Installation
MOGAS: Motor gasoline
Na: Sodium
OPS: Operating Properly and Successfully
PCB: Polychlorinated biphenyl
PCP: Pentachlorophenol
PO_4: Phosphate
POL: Petroleum, oil, and lubricants
SRI: Supplemental Remedial Investigation
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 EBT WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Area	Type	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
IW21-01A	TTA-1N	IW	276504.77	800599.88	294.34	294.99	98.7	10	108.7
IW21-01B	TTA-1N	IW	276500.95	800605.89	294.61	294.85	89.9	10	99.9
IW21-02A	TTA-1N	IW	276464.81	800594.24	294.62	295.25	100.2	10	110.2
IW21-02B	TTA-1N	IW	276462.20	800598.51	294.65	295.12	91.7	10	101.7
IW21-03A	TTA-1N	IW	276551.96	800698.20	292.81	293.23	99.7	10	109.7
IW21-03B	TTA-1N	IW	276549.21	800705.08	292.50	293.12	89.8	10	99.8
IW21-04A	TTA-1N	IW	276518.82	800711.10	292.69	293.20	99.9	10	109.9
IW21-04B	TTA-1N	IW	276515.66	800715.39	292.79	293.30	89.7	10	99.7
MW-21	TTA-1N	IW	276473.36	800602.47	295.00	295.30	92.1	15	107.1
PMW21-01	TTA-1N	IW	276533.14	800600.14	294.76	295.00	88.4	20	108.4
PMW21-02	TTA-1N	PMW	276574.64	800701.00	292.98	293.19	91.3	20	111.3
PMW21-04	TTA-1N	PMW	276601.83	800771.56	291.87	292.20	89.0	20	109.0
IW101-02A	TTA-1S	IW	276198.80	801107.92	291.12	291.60	124.0	15	139.0
IW101-02B	TTA-1S	IW	276200.62	801111.95	291.14	291.72	110.1	15	125.1
IW101-02C	TTA-1S	IW	276203.32	801116.22	291.53	291.74	93.7	15	108.7
IW101-03A	TTA-1S	IW	276164.62	801104.58	291.94	292.36	125.2	15	140.2
IW101-03B	TTA-1S	IW	276161.58	801106.45	291.91	292.51	109.4	15	124.4
IW101-03C	TTA-1S	IW	276158.05	801108.62	292.04	292.54	93.6	15	108.6
IW101-04A	TTA-1S	IW	276249.13	801142.39	291.72	292.18	123.4	15	138.4
IW101-04B	TTA-1S	IW	276252.94	801142.79	291.59	292.08	107.0	15	122.0
IW101-04C	TTA-1S	IW	276257.10	801143.03	291.47	292.05	92.3	15	107.3
IW101-05A	TTA-1S	IW	276214.93	801126.64	291.52	292.12	121.4	15	136.4
IW101-05B	TTA-1S	IW	276218.44	801125.04	291.41	292.06	107.8	15	122.8
IW101-05C	TTA-1S	IW	276221.88	801122.88	291.27	291.89	92.2	15	107.2
IW101-07A	TTA-1S	IW	276125.77	801099.90	292.83	293.13	123.0	15	138.0
IW101-07B	TTA-1S	IW	276123.62	801102.61	292.81	293.15	106.6	15	121.6
IW101-07C	TTA-1S	IW	276121.28	801105.60	292.78	293.08	93.3	15	108.3
DR1-5	TTA-1S	IW	276080.00	800828.43	294.46	294.86	124.7	20	144.7
DR1-5A	TTA-1S	IW	276087.00	800835.01	294.51	294.87	90.0	20	110.0
DR1-6	TTA-1S	IW	276043.88	801103.40	293.17	293.50	114.4	20	134.4
DR1-6A	TTA-1S	IW	276035.02	801103.61	293.28	293.58	90.9	20	110.9
PMW101-02A	TTA-1S	IW	276281.93	801144.78	292.00	292.29	117.7	20	137.7
PMW101-02B	TTA-1S	IW	276286.33	801145.41	291.98	292.24	97.8	20	117.8
PMW101-04A	TTA-1S	PMW	276299.41	801182.12	291.07	291.43	117.9	20	137.9
PMW101-04B	TTA-1S	PMW	276296.40	801186.86	291.47	291.75	98.6	20	118.6
PMW101-07A	TTA-1S	PMW	276143.43	801171.78	292.20	292.52	117.9	20	137.9
PMW101-07B	TTA-1S	PMW	276141.84	801176.74	292.36	292.70	98.0	20	118.0
IW85-05	TTA-2	IW	276815.58	806162.75	304.73	305.30	92.4	10	102.4
IW85-06	TTA-2	IW	276779.47	806183.37	304.81	305.45	95.5	10	105.5
IW92-01	TTA-2	IW	276769.42	806506.97	304.51	304.88	80.4	10	90.4
IW92-02	TTA-2	IW	276719.57	806513.90	304.05	304.87	79.5	10	89.5
IW92-03	TTA-2	IW	276669.17	806511.19	304.20	304.72	83.5	10	93.5
IW92-07	TTA-2	IW	276725.81	806366.98	303.78	304.31	87.8	10	97.8
IW92-08	TTA-2	IW	276784.63	806289.19	304.55	304.93	85.3	10	95.3
DR2-2	TTA-2	IW	276770.85	806658.86	304.30	304.67	78.4	15	93.4
DR2-5	TTA-2	IW	276830.98	806180.40	305.41	305.72	84.5	15	99.5
PMW92-03	TTA-2	IW	276678.91	806438.66	303.91	304.17	92.5	10	102.5
MW-113	TTA-2	PMW	276685.34	806279.10	304.81	304.92	96.0	10	106.0
PMW85-01	TTA-2	PMW	276802.18	806146.13	305.08	305.39	93.2	10	103.2
PMW85-05	TTA-2	PMW	276752.08	806222.46	305.12	305.32	93.2	10	103.2
MW-85	TTA-2	PMW	276704.14	806064.51	304.13	304.50	95.9	15	110.9
MW-62	B-835	IW	278289.65	801857.92	293.71	293.90	86.1	10	96.1
MW-213	B-835	IW	278427.08	801669.11	294.22	294.20	77.3	15	92.3

TABLE 3
MAIN INSTALLATION EBT WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Area	Type	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-212	B-835	PMW	278028.36	802225.40	295.34	295.68	85.3	15	100.3
MW-203A	W-C	IW	276841.76	801740.43	290.70	290.80	142.9	15	162.9
MW-203B	W-C	IW	276821.40	801741.59	290.87	291.10	93.0	15	113.0
MW-197A	W-C	PMW	276975.42	802042.30	291.26	291.54	161.7	15	176.7
MW-197B	W-C	PMW	276973.14	802036.92	291.03	291.43	93.8	15	108.8

Notes:
bgs: below ground surface
btoc: below top of casing
ft: feet
msl: mean sea level

TABLE 4
MAIN INSTALLATION LTM WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-16	Fluvial	Background	Biennial	278837.83	807099.66	299.86	300.19	57.6	15	72.6
MW-19	Fluvial	Background	Biennial	278945.87	800782.26	290.57	290.86	83.1	10	93.1
MW-22	Fluvial	Boundary	Biennial	275912.38	800702.16	298.04	298.49	95.4	10	105.4
MW-23	Fluvial	Boundary	Biennial	275791.02	801817.13	298.99	299.24	101.2	10	111.2
MW-24	Fluvial	Boundary	Biennial	275616.05	803538.81	299.51	299.81	97.3	15	112.3
MW-25A	Fluvial	Performance	Annual	275975.11	805521.27	269.88	270.13	73.0	10	83.0
MW-26	Fluvial	Performance	Semiannual	276508.16	805962.09	303.69	303.89	97.6	10	107.6
MW-34	Intermediate	Sentinel	Biennial	279411.21	801917.96	299.97	300.80	136.6	20	156.6
MW-38	Intermediate	Sentinel	Biennial	279141.38	802450.43	307.45	308.45	139.9	15	154.9
MW-39	Fluvial	Performance	Semiannual	277280.67	802598.11	296.28	296.58	95.5	20	115.5
MW-39A	Fluvial	Performance	Semiannual	277278.11	802607.66	298.61	298.70	148.1	20	168.1
MW-50	Fluvial	Boundary	Biennial	276455.81	807065.28	298.82	299.32	115.0	10	125.0
MW-52	Fluvial	Performance	Annual	275371.97	805897.36	279.26	279.71	94.0	10	104.0
MW-53	Fluvial	Background	Biennial	279176.66	805136.05	306.38	305.58	72.5	10	82.5
MW-55	Fluvial	Background	Biennial	279301.05	801204.62	292.08	292.48	64.0	10	74.0
MW-63A	Fluvial/Intermediate	Sentinel	Annual	278200.31	803572.83	305.96	306.33	140.0	10	150.0
MW-63B	Fluvial/Intermediate	Sentinel	Annual	278201.32	803557.77	305.78	306.22	115.0	10	125.0
MW-64	Fluvial	Performance	Semiannual	276951.52	805005.97	304.21	304.46	102.0	10	112.0
MW-66A	Fluvial	Background	Biennial	276626.02	799792.63	284.22	284.34	74.6	20	94.6
MW-88	Fluvial	Performance	Semiannual	276879.05	806512.88	305.15	305.47	82.0	15	97.0
MW-89	Intermediate	Sentinel	Annual	278286.97	802555.25	303.98	304.38	147.0	30	177.0
MW-90	Intermediate	Sentinel	Semiannual	278283.60	802539.51	304.19	304.64	115.0	30	145.0
MW-92	Fluvial	Performance	Semiannual	276614.20	806489.66	304.41	304.78	93.0	15	108.0
MW-93	Fluvial	Boundary	Biennial	275542.22	804440.10	294.08	294.31	92.0	15	107.0
MW-94A	Fluvial	Performance	Semiannual	276805.80	803085.80	303.00	303.23	109.6	10	119.6
MW-96	Fluvial	Performance	Annual	276310.14	806320.24	289.02	289.67	75.5	20	95.5
MW-97	Fluvial	Performance	Semiannual	276074.23	802139.23	297.44	297.70	97.5	20	117.5
MW-98	Fluvial	Performance	Semiannual	276891.37	802572.77	294.43	294.93	137.0	10	147.0
MW-99	Fluvial	Background	Biennial	277443.37	801114.53	285.33	285.69	91.5	20	111.5
MW-100B	Fluvial	Performance	Semiannual	276600.61	800854.26	290.92	291.47	107.4	20	127.4
MW-101	Fluvial	Performance	Semiannual	276204.09	801110.27	291.74	291.98	89.0	15	104.0
MW-102B	Fluvial	Boundary	Biennial	275760.59	800707.72	311.40	312.07	120.5	20	140.5
MW-103	Fluvial	Performance	Annual	278690.88	805159.83	301.37	301.89	70.0	20	90.0
MW-104	Fluvial	Performance	Annual	278676.47	805417.03	291.98	292.18	70.5	20	90.5
MW-107	Fluvial/Intermediate	Sentinel	Semiannual	278419.07	803009.93	304.92	305.18	128.0	15	143.0
MW-108	Fluvial/Intermediate	Sentinel	Semiannual	277658.02	802985.53	303.07	303.25	160.0	10	170.0
MW-140	Intermediate	Sentinel	Annual	279061.29	801715.68	298.12	298.16	224.6	20	244.6

TABLE 4
MAIN INSTALLATION LTM WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-141	Intermediate	Sentinel	Semiannual	278019.19	802571.25	303.71	303.70	148.7	20	168.7
MW-142	Fluvial	Performance	Annual	278056.03	801629.12	291.18	291.49	85.0	20	105.0
MW-143	Fluvial	Performance	Semiannual	278301.35	801201.48	290.66	290.90	78.6	20	98.6
MW-198	Fluvial	Performance	Annual	277775.91	802142.37	291.78	292.20	90.3	15	105.3
MW-199A	Intermediate	Sentinel	Annual	277756.40	802573.52	301.53	301.84	146.1	15	161.1
MW-199B	Fluvial	Performance	Semiannual	277751.74	802575.66	301.73	302.07	104.6	15	119.6
MW-200	Fluvial	Performance	Semiannual	277006.10	802859.39	300.18	300.51	102.9	15	117.9
MW-202A	Intermediate	Sentinel	Annual	278685.74	802111.27	299.23	299.69	176.2	15	191.2
MW-202B	Intermediate	Sentinel	Semiannual	278692.79	802112.04	299.51	299.74	118.8	15	133.8
MW-204A	Fluvial	Performance	Semiannual	276724.66	802168.25	292.21	292.49	133.3	15	148.3
MW-204B	Fluvial	Performance	Semiannual	276707.81	802167.07	292.71	293.00	94.9	15	109.9
MW-205A	Fluvial	Performance	Semiannual	277157.18	802277.24	292.30	292.40	141.3	15	156.3
MW-205B	Fluvial	Performance	Semiannual	277173.05	802277.84	292.16	292.30	97.3	15	112.3
MW-206A	Fluvial	Performance	Semiannual	277219.28	802792.28	299.92	300.35	127.3	15	142.4
MW-206B	Fluvial	Performance	Semiannual	277200.85	802794.78	299.90	300.12	96.7	15	111.7
MW-207A	Fluvial	Sentinel	Semiannual	277652.76	803192.01	304.05	304.45	149.9	15	164.9
MW-207B	Fluvial	Sentinel	Semiannual	277665.02	803193.27	304.06	304.42	108.5	15	123.5
MW-208A	Fluvial	Performance	Semiannual	277382.22	802799.08	302.21	302.40	184.2	15	199.2
MW-208B	Fluvial	Performance	Semiannual	277396.90	802814.96	301.79	302.08	106.7	15	121.7
MW-209A	Intermediate	Sentinel	Annual	277574.28	802507.10	298.05	298.36	189.0	15	204.0
MW-209B	Fluvial	Performance	Semiannual	277581.50	802520.13	298.49	298.72	102.3	15	117.3
MW-210A	Intermediate	Sentinel	Semiannual	277238.57	801958.11	289.61	289.70	177.0	15	192.0
MW-210B	Fluvial	Performance	Semiannual	277228.18	801951.94	289.29	289.53	97.0	15	112.0
MW-211	Intermediate	Sentinel	Annual	278000.59	802973.69	303.74	304.09	166.3	15	181.3
MW-214A	Fluvial	Performance	Semiannual	277877.62	803906.94	303.61	303.96	119.1	15	134.1
MW-214B	Fluvial	Performance	Semiannual	277875.84	803922.20	303.70	303.96	101.6	15	116.6
MW-215A	Fluvial	Performance	Annual	277298.37	804164.31	304.50	304.86	128.8	15	143.8
MW-215B	Fluvial	Performance	Annual	277298.27	804177.33	304.56	304.98	105.4	15	120.4
MW-216	Fluvial	Performance	Annual	276024.68	801995.93	297.34	297.63	99.9	15	115.0
MW-217	Fluvial	Performance	Semiannual	276670.60	805213.69	304.18	304.51	101.8	15	116.8
MW-218	Fluvial	Performance	Semiannual	276936.70	805628.44	305.60	306.00	98.9	15	114.0
MW-219	Fluvial	Boundary	Semiannual	276429.49	800460.96	295.13	295.00	98.0	15	113.0
MW-229	Intermediate	Sentinel	Biennial	279294.17	802836.96	311.78	312.09	188.4	20	208.4
MW-252	Intermediate	Sentinel	Semiannual	278789.21	801364.70	294.16	294.40	126.1	20	146.1
MW-253	Intermediate	Sentinel	Semiannual	278287.43	801191.42	290.47	290.80	118.3	20	138.3
MW-254	Memphis	Sentinel	Semiannual	279334.36	800857.53	292.84	293.28	285.8	20	305.8
MW-255	Memphis	Sentinel	Semiannual	279304.76	801226.84	291.84	292.38	284.7	20	304.7

TABLE 4
MAIN INSTALLATION LTM WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-256	Intermediate	Sentinel	Semiannual	279301.82	801243.80	292.68	293.40	127.1	20	147.1
MW-257	Fluvial	Performance	Annual	278549.06	801340.58	292.22	292.67	85.5	15	100.5
MW-258	Fluvial	Performance	Semiannual	278125.81	804426.82	304.37	304.83	79.3	20	99.3
MW-259	Fluvial	Performance	Semiannual	276279.04	804450.97	290.77	291.44	98.6	20	118.6
MW-260	Fluvial	Performance	TBD	278398.46	804376.22	304.16	304.45	68.0	20	88.3
MW-261	Fluvial	Performance	TBD	276390.64	802591.62	293.52	293.79	90.0	20	110.3
DR1-1	Fluvial	Performance	Annual	276300.34	800855.57	293.14	293.42	121.7	20	141.7
DR1-1A	Fluvial	Performance	Annual	276307.34	800863.06	293.00	293.37	89.2	20	109.2
DR1-2	Fluvial	Performance	Annual	276536.64	801152.66	290.00	291.39	97.7	20	117.7
DR1-3	Fluvial	Performance	Semiannual	276527.27	801415.91	290.93	291.11	109.7	20	129.7
DR1-4	Fluvial	Performance	Annual	276231.20	801399.53	292.78	293.00	106.3	20	126.3
DR1-7	Fluvial	Performance	Annual	276791.26	801441.36	289.15	289.46	108.3	20	128.3
DR1-8	Fluvial	Performance	Annual	276752.48	800875.32	290.09	290.47	92.7	20	112.7
DR2-1	Fluvial	Performance	Semiannual	276772.10	806497.62	304.90	305.08	73.9	20	93.9
DR2-3	Fluvial	Performance	Semiannual	276539.12	806203.16	303.44	303.66	93.0	20	113.0
DR2-4	Fluvial	Performance	Annual	276455.62	806633.07	303.55	303.96	88.1	20	108.1
DR2-6	Fluvial	Performance	Semiannual	276643.99	805860.91	304.70	304.92	94.6	20	114.6
PMW21-03	Fluvial	Performance	Semiannual	276573.43	800742.52	292.11	292.72	90.3	20	110.3
PMW21-05	Fluvial	Performance	Semiannual	276628.32	801129.72	288.53	288.92	94.3	20	114.3
PMW92-02	Fluvial	Performance	Semiannual	276667.02	806476.47	304.17	304.35	94.8	10	104.8
PMW101-03A	Fluvial	Performance	Semiannual	276348.46	801198.37	291.61	291.99	119.2	20	139.2
PMW101-03B	Fluvial	Performance	Semiannual	276353.09	801194.14	291.55	291.82	99.3	20	119.3
PMW101-06A	Fluvial	Performance	Semiannual	276191.88	801187.45	292.13	292.72	120.0	20	140.0
PMW101-06B	Fluvial	Performance	Semiannual	276194.93	801183.96	292.17	292.40	99.3	20	119.3
PZ-03	Fluvial	Performance	Annual	276379.33	802941.05	298.51	298.98	108.9	10	118.9

Notes:
ft: feet
btoc: below top of casing
msl: mean sea level
TBD: to be determined

TABLE 5
MAIN INSTALLATION PRIMARY CVOC RESULTS, APRIL 2015
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

VOC Analyte	MCL (µg/L)	Number of Samples with Analyte Above RL	Maximum Concentrations (µg/L)	Location of Maximum Concentration	Number of Samples with Analyte Above MCL
Carbon tetrachloride	5	9	47.8	MW-217	5
Chloroform	80	21	9.06	MW-207A	0
cis-1,2-Dichloroethene	70	24	97.1	PMW92-02	1
Tetrachloroethene	5	43	230	DR2-1	38
trans-1,2-Dichloroethene	100	0	0.341	PMW21-03	0
Trichloroethene	5	51	77.1	MW-199B	30
Vinyl chloride	2	8	152	MW-100B	6

Notes:
µg/L: micrograms per liter
--: Not Listed
RL: reporting limit
MCL: Maximum Contaminant Level

TABLE 6
REMEDIATION GOALS FROM DUNN FIELD RECORD OF DECISION
2016 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 (µg/L)
Parameter	Loess Specific Values (mg/kg)	Fluvial Deposit Specific Values (mg/kg)	Loess Specific Values (ppbv)	Fluvial Deposit Specific Values (ppbv)	
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:
mg/kg: milligrams per kilogram
µg/L: micrograms per liter
ppbv: parts per billion per volume
MCL: maximum contaminant level
HI: hazard index
—: Not available for groundwater cleanup goals because of low number of detections or detected values consistently less than MCLs.

TABLE 7
DUNN FIELD LTM WELLS
2016 SITE MANAGEMENT PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-03	Fluvial	Performance-FSVE	Semiannual	281596.25	802100.69	292.35	290.40	65.5	10	75.5
MW-04	Fluvial	Background	Biennial	281278.87	802369.19	301.61	300.00	60.0	20	80.0
MW-06	Fluvial	Performance-FSVE	Semiannual	280604.17	802069.13	289.11	288.10	51.0	20	71.0
MW-07	Fluvial	Background-NE	Annual	281839.88	802481.70	295.10	293.10	67.0	10	77.0
MW-08	Fluvial	Background-NE	Annual	282001.04	802727.91	292.59	292.74	56.5	10	66.5
MW-13	Fluvial	Background	Biennial	281033.56	802369.21	300.01	300.10	66.0	15	81.0
MW-15	Fluvial	Performance	Semiannual	280348.88	801985.36	295.12	295.23	63.4	15	78.4
MW-28	Fluvial	Background	Semiannual	281568.58	803154.48	294.79	294.89	54.3	15	69.3
MW-31	Fluvial	Performance	Semiannual	281651.53	801783.90	290.37	287.50	64.1	15	79.1
MW-44	Fluvial	Performance	Annual	281073.71	800601.09	269.07	269.40	64.0	10	74.0
MW-54	Fluvial	Performance	Semiannual	281159.21	801183.83	295.39	295.57	84.5	10	94.5
MW-57	Fluvial	Performance	Semiannual	280184.05	802006.19	290.77	291.10	60.0	10	70.0
MW-58	Fluvial	Performance	Biennial	279845.07	802066.44	290.51	290.70	57.0	10	67.0
MW-67	Memphis	Sentinel	Biennial	280473.05	800933.94	278.21	275.53	260.0	15	275.0
MW-68	Fluvial	Performance	Annual	281500.76	802040.04	291.69	291.60	72.5	10	82.5
MW-69	Fluvial	Performance	Annual	281202.55	802011.49	307.02	304.90	82.1	10	92.1
MW-70	Fluvial	Performance	Annual	281029.60	801988.49	304.99	302.80	80.8	10	90.8
MW-71	Fluvial	Performance	Annual	280584.68	801804.71	294.40	291.90	65.5	10	75.5
MW-76	Fluvial	Performance	Annual	281311.98	801642.76	302.71	303.30	73.0	20	93.0
MW-77	Fluvial	Performance	Semiannual	281142.96	801815.29	304.42	304.70	68.0	20	88.0
MW-78	Fluvial	Performance	Biennial	282051.71	802065.28	275.00	275.40	44.5	20	64.5
MW-79	Fluvial	Performance	Semiannual	281794.22	800899.03	285.03	285.40	82.5	20	102.5
MW-80	Fluvial	Background	Biennial	281417.56	800199.07	273.81	274.00	53.0	20	73.0
MW-87	Fluvial	Performance-FSVE	Semiannual	280696.36	802038.55	294.93	292.80	63.0	15	78.0
MW-91	Fluvial	Performance	Annual	280474.97	802014.43	291.99	289.30	55.0	15	70.0
MW-126	Fluvial	Background	Biennial	282390.01	800491.67	252.22	252.49	16.0	10	26.0
MW-129	Fluvial	Background-NE	Annual	282271.08	803128.53	293.01	293.33	65.0	15	80.0
MW-130	Fluvial	Background-NE	Annual	282116.80	803241.45	293.17	293.77	59.5	20	79.5
MW-134	Fluvial	Performance-FSVE	Semiannual	281012.74	802102.58	300.81	301.05	75.0	15	90.0
MW-144	Fluvial	Performance	Semiannual	281138.63	801528.84	291.60	291.89	56.8	20	76.8
MW-145	Fluvial	Performance	Annual	280967.63	800823.18	284.72	284.86	80.1	20	100.1
MW-147	Fluvial	Performance	Annual	281501.94	801674.17	289.76	289.93	60.3	20	80.3
MW-148	Fluvial	Performance	Annual	281377.94	801461.63	294.71	294.87	70.0	20	90.0
MW-149	Fluvial	Performance	Semiannual	281130.04	800982.76	287.18	287.44	81.4	20	101.4
MW-150	Fluvial	Performance	Semiannual	281239.57	801283.62	296.86	297.00	71.2	20	91.2
MW-151	Fluvial	Performance	Semiannual	281290.42	800874.85	284.27	284.42	77.0	20	97.0
MW-152	Fluvial	Performance	Annual	281515.56	800892.84	289.59	289.82	91.0	20	111.0
MW-153	Fluvial	Performance	Biennial	282119.38	800952.34	279.17	279.26	76.1	20	96.1

TABLE 7
DUNN FIELD LTM WELLS
2016 SITE MANAGEMENT PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-154	Fluvial	Background	Biennial	280501.53	800919.48	273.81	274.07	53.3	10	63.3
MW-155	Fluvial	Performance	Annual	281325.32	801168.98	291.54	291.83	76.9	20	96.9
MW-157	Fluvial	Performance	Semiannual	281050.86	801348.37	286.47	286.55	56.7	20	76.7
MW-158	Fluvial	Performance	Annual	281434.42	801005.34	294.07	294.38	91.0	15	106.0
MW-158A	Fluvial	Performance	Annual	281443.51	801005.67	293.95	294.22	77.9	15	92.9
MW-159	Fluvial	Performance	Semiannual	281304.17	801006.69	286.36	286.68	80.5	20	100.5
MW-160	Fluvial	Performance	Annual	281366.70	801304.05	293.84	294.13	64.3	20	84.3
MW-163	Fluvial	Performance	Semiannual	281152.59	801487.27	290.63	290.81	56.2	20	76.2
MW-164	Fluvial	Performance	Semiannual	280997.55	801497.47	287.48	287.71	55.6	20	75.6
MW-165	Fluvial	Performance	Semiannual	281384.63	800855.49	287.06	287.35	88.6	15	103.6
MW-165A	Fluvial	Performance	Semiannual	281383.55	800865.69	287.26	287.53	71.3	15	86.3
MW-166	Fluvial	Performance	Semiannual	281225.00	800927.99	282.72	283.29	84.6	15	100.0
MW-166A	Fluvial	Performance	Semiannual	281213.39	800927.27	282.90	283.36	68.1	15	83.4
MW-167	Fluvial	Background	Biennial	281394.03	800618.54	284.82	285.21	70.5	15	85.5
MW-169	Transition	Sentinel	Biennial	282491.23	800956.58	261.90	262.17	68.1	20	88.1
MW-170	Fluvial	Sentinel	Biennial	282443.17	801260.46	273.75	273.98	59.8	20	79.8
MW-171	Fluvial	Sentinel	Biennial	282315.35	801057.83	270.69	271.02	53.3	15	68.3
MW-174	Fluvial	Performance-FSVE	Semiannual	280352.00	802092.07	296.56	296.83	67.0	10	77.0
MW-176	Fluvial	Performance	Annual	280823.77	802032.08	299.68	299.92	76.0	10	86.0
MW-180	Fluvial	Performance	Annual	281476.43	802131.85	296.14	296.39	72.0	10	82.0
MW-182	Fluvial	Sentinel	Annual	280524.22	800623.13	275.40	272.98	62.0	10	72.0
MW-184	Fluvial	Performance	Semiannual	280903.16	801442.29	283.12	283.34	58.0	10	68.0
MW-187	Fluvial	Background	Biennial	280563.18	802348.09	302.74	303.21	76.0	10	86.0
MW-190	Fluvial	Performance	Semiannual	281138.88	801595.73	297.32	297.58	78.0	10	88.0
MW-220	Fluvial	Performance-FSVE	Semiannual	281617.49	802166.87	293.29	290.31	64.9	15	79.9
MW-221	Fluvial	Performance-FSVE	Semiannual	281399.71	802100.05	301.52	298.37	73.1	15	88.1
MW-222	Fluvial	Performance-FSVE	Semiannual	280986.04	802145.54	303.82	301.06	74.2	15	89.2
MW-223	Fluvial	Performance-FSVE	Semiannual	280913.53	802104.29	303.00	300.41	73.9	15	88.9
MW-224	Fluvial	Performance-FSVE	Semiannual	281017.74	802181.62	304.13	301.18	73.7	15	88.7
MW-225	Fluvial	Performance-FSVE	Semiannual	280947.12	802070.50	304.52	301.30	75.0	15	90.0
MW-226	Fluvial	Performance-FSVE	Semiannual	280931.94	802147.21	303.19	300.56	74.2	15	89.2
MW-227	Fluvial	Performance-FSVE	Semiannual	280257.91	802081.00	299.70	296.64	63.6	15	78.6
MW-228	Fluvial	Performance-FSVE	Semiannual	280251.88	802157.40	301.65	298.59	64.1	15	79.1
MW-230	Fluvial	Background-NE	Annual	281842.79	802800.06	286.57	286.66	59.2	15	74.2
MW-235	Fluvial	Sentinel	Annual	280727.57	800447.83	264.00	264.21	50.6	10	60.8
MW-237	Intermediate	Sentinel	Annual	281356.02	800963.99	289.18	289.53	166.5	10	176.7
MW-241	Fluvial	Performance	Annual	281389.82	801396.64	292.97	293.16	73.4	15	88.4
MW-242	Fluvial	Performance	Semiannual	281297.31	801228.65	295.40	295.94	73.2	16	88.7

TABLE 7
DUNN FIELD LTM WELLS
2016 SITE MANAGEMENT PLAN
Dunn Field - Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well Depth (ft, btoc)
MW-243	Fluvial	Performance	Semiannual	281370.62	801116.45	292.26	292.53	80.7	20	100.7
MW-244	Fluvial	Performance	Semiannual	281333.49	801101.07	288.72	289.45	76.3	20	96.3
MW-245	Fluvial	Performance	Semiannual	281379.46	801035.00	290.48	290.62	85.1	20	105.1
MW-246	Fluvial	Performance	Semiannual	281387.26	800951.62	288.17	288.49	85.2	20	105.2
MW-247	Fluvial	Performance	Semiannual	281319.40	800900.12	286.17	286.63	80.5	20	100.5
MW-248	Fluvial	Performance	Annual	281253.66	800720.22	275.45	275.93	67.5	20	87.5
MW-249	Fluvial	Performance	Semiannual	281029.63	800789.83	285.53	285.89	78.0	20	98.0
MW-250	Intermediate	Sentinel	Annual	281045.53	800900.38	289.66	290.19	168.7	15	183.7
MW-251	Intermediate	Sentinel	Annual	281211.70	801021.75	285.83	286.16	160.2	15	175.2

Notes:
ft: feet
btoc: below top of casing
msl: mean sea level

TABLE 8
DUNN FIELD PRIMARY CVOC RESULTS, APRIL 2015
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

VOC Analyte	MCL (µg/L)	TC (µg/L)	Number of Samples with Analyte Above RL	Maximum Concentration (µg/L)	Location of Maximum Concentration	Number of Samples with Analyte above MCL	Number of Samples with Analyte above TC
1,1,2,2-Tetrachloroethane	--	2.2	19	11.7	MW-159	--	5
1,1,2-Trichloroethane	5	1.9	1	3.13	MW-159	0	1
1,1-Dichloroethene	7	7	13	17.2	MW-07	4	4
1,2-Dichloroethane	5	--	0	<0.5	--	0	--
Carbon tetrachloride	5	3	1	1.18	MW-249	0	0
Chloroform	80	12	25	63.1	MW-87	0	1
cis-1,2-Dichloroethene	70	35	5	32	MW-159	0	0
Tetrachloroethene	5	2.5	9	43.8	MW-07	7	8
trans-1,2-Dichloroethene	100	50	1	3.5	MW-159	0	0
Trichloroethene	5	5	33	198	MW-159	12	12
Vinyl chloride	2	--	1	8.84	MW-159	1	--

Notes:
µg/L micrograms per liter
--: Not Listed
RL: reporting limit
MCL: Maximum Contaminant Level
TC: Target Concentration

TABLE 9
PROPERTY TRANSFER STATUS
2016 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)	14-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	CPS		
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 10
SRI PHASE 1 WELLS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis, Tennessee

Well	Aquifer	Well Classification	Sample Frequency	Northing (ft)	Easting (ft)	Top of Casing Elevation (ft, msl)	Ground Elevation (ft, msl)	Riser Length (ft)	Screen Length (ft)	Total Well depth (ft, btoc)
MW-262	Intermediate	TBD	TBD	279334.45	800832.52	293.22	293.50	154.4	10	164.6
MW-263	Fluvial	TBD	TBD	278944.92	805816.52	291.40	291.78	69.1	10	79.3
MW-264	Fluvial	TBD	TBD	278410.68	804589.96	303.72	304.00	104.8	10	115.0
MW-265	Fluvial	TBD	TBD	278111.58	804709.99	305.15	305.61	85.8	10	96.0
MW-266	Fluvial	TBD	TBD	277092.39	806686.45	304.68	305.10	77.1	10	87.3
MW-267	Fluvial	TBD	TBD	277161.13	806001.07	303.84	304.30	71.9	10	82.1
MW-268	Fluvial	TBD	TBD	277203.89	805283.96	304.59	304.92	109.5	10	119.7
MW-269	Fluvial	TBD	TBD	276369.16	800126.79	290.05	290.50	92.2	10	102.4
MW-270	Fluvial	TBD	TBD	275482.67	805042.50	281.74	282.20	78.4	10	88.6
MW-271	Fluvial	TBD	TBD	276314.97	803773.86	294.91	295.50	134.7	10	144.9
MW-272	Fluvial	TBD	TBD	275879.61	804036.59	293.27	293.70	112.8	10	123.0
MW-273	Intermediate	TBD	TBD	279713.20	800122.19	284.73	285.00	128.1	10	138.3

Notes:
ft: feet
btoc: below top of casing
msl: mean sea level
TBD: To Be Determined

TABLE 11
STATUS OF FOLLOW-UP ACTIONS FROM THIRD FIVE-YEAR REVIEW
2016 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		
Rebound in groundwater concentrations of CVOCs on the MI in TAs and concentrations above MCLs in IAQ wells	Restart EBT	ODB	USEPA/TDEC	11/15/2012	N	N	11/6/2012	EBT injections conducted November 2012 through August 2014.
Time required to achieve RAOs on the MI	Re-evaluate in annual report following one year of additional EBT	ODB	USEPA/TDEC	3/11/2014	N	N	4/4/2014	Year Three EBT Report submitted to USEPA/TDEC concluded "it is not likely that contaminant concentrations will be reduced to MCLs throughout the MI by December 2015". A supplemental remedial investigation and focused feasibility study is being performed to develop a remedial strategy to achieve RAOs throughout the MI.

Notes:
CVOCs: chlorinated volatile organic compounds
EBT: enhanced bioremediation treatment
IAQ: intermediate aquifer
MCLs: maximum contaminant levels
MI : Main Installation
ODB: Office of the Assistant Chief of Staff for Installation Management, Base Realignment and Closure Division
RAOs: Remedial Action Objectives
TAs: treatment areas
TDEC: Tennesse Department of Environment and Conservation
USEPA: United States Environemtnal Protection Agency

TABLE 12
PRIMARY AND SECONDARY DOCUMENTS, FY16 THROUGH FY18
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Activity	2015 SMP Date	Date Type
Fiscal Year 2016		
2016 Site Management Plan, Rev. 0	**8 January 2016**	**Deadline**
2015 LTM Report, Rev 0	27 January 2016	Target
MI Supplemental RI Phase 1 Summary Report	29 January 2016	Target
Off Depot AS/SVE Operations Report, Year 5 Rev 0	29 February 2016	Target
2016 Site Management Plan, Rev. 1	**8 March 2016**	**Deadline**
MI Supplemental RI Phase 2 Work Plan, Rev 0	**25 March 2016**	**Deadline**
2015 LTM Report, Rev 1	26 April 2016	Target
MI Supplemental RI Phase 2 Work Plan, Rev 1	**10 June 2016**	**Deadline**
Off Depot AS/SVE Operations Report, Year 5 Rev 1	28 June 2016	Target
2016 Annual LUCIP Inspection Reports	31 July 2016	Target
Fiscal Year 2017		
MI Supplemental RI Report, Rev 0	27 October 2016	Deadline
2017 Site Management Plan, Rev. 0	30 November 2016	Deadline
Focused Feasibility Study Report, Rev 0	5 January 2017	Deadline
2016 LTM Report, Rev 0	5 January 2017	Target
MI Supplemental RI Report, Rev 1	26 January 2017	Deadline
2017 Site Management Plan, Rev. 1	29 January 2017	Deadline
Off Depot AS/SVE Operations Report, Year 6 Rev 0	16 March 2017	Target
2016 LTM Report, Rev 1	5 April 2017	Target
MI Focused Feasibility Study Report, Rev 1	11 April 2017	Deadline
Fourth Five-Year Review, Rev 0	18 June 2017	Deadline
MI Revised Proposed Plan, Rev 0	20 June 2017	Deadline
Off Depot AS/SVE Operations Report, Year 6 Rev 1	14 July 2017	Target
2017 Annual LUCIP Inspection Reports	31 July 2017	Target
MI Revised Proposed Plan, Rev 1	3 September 2017	Deadline
Fiscal Year 2018		
Fourth Five-Year Review, Rev 1	20 October 2017	Deadline
New MI RD, Rev 0	3 November 2017	Deadline
2018 Site Management Plan, Rev. 0	30 November 2017	Deadline

TABLE 12
PRIMARY AND SECONDARY DOCUMENTS, FY16 THROUGH FY18
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Activity	2015 SMP Date	Date Type
MI ROD Amendment, Rev 0	31 December 2017	Deadline
2017 LTM Report, Rev 0	5 January 2018	Target
Fourth Five-Year Review, Final	9 January 2018	Deadline
2018 Site Management Plan, Rev. 1	29 January 2018	Deadline
New MI RD, Rev 1	30 January 2018	Deadline
Off Depot AS/SVE Operations Report, Year 7 Rev 0	16 March 2018	Target
MI ROD Amendment, Rev 1	1 April 2018	Deadline
2017 LTM Report, Rev 1	5 April 2018	Target
New MI RAWP, Rev 0	10 April 2018	Deadline
New MI RAWP, Rev 1	1 July 2018	Deadline
Off Depot AS/SVE Operations Report, Year 7 Rev 1	14 July 2018	Target
2018 Annual LUCIP Inspection Reports	31 July 2018	Target

Notes:

1) Deadlines are dates for primary documents in FY, FY+1 and FY+2. Primary documents are subject to regulatory agency review, comment, and approval. Current FY deadlines are noted in **bold** type. FY+1 and FY+2 deadlines for primary documents will roll forward in subsequent years unless alternate dates are negotiated in the annual SMP updates.

2) Targets are dates for submission of secondary documents. Secondary documents may be reviewed and commented upon, but are not subject to approval except in the context of the next Primary document in the CERCLA process.

TABLE 13
FISCAL YEAR REQUIREMENTS
2016 SITE MANAGEMENT PLAN
Defense Depot Memphis Tennessee

Description	2016	2017	2018	2019	2020	2021	2022	2023	Out Years	Total
Remedial Action Sites	$590,000	$407,000	$163,000	$353,000	$3,257,000	$515,000	$257,000	$207,000	$1,511,000	$7,260,000

FIGURES

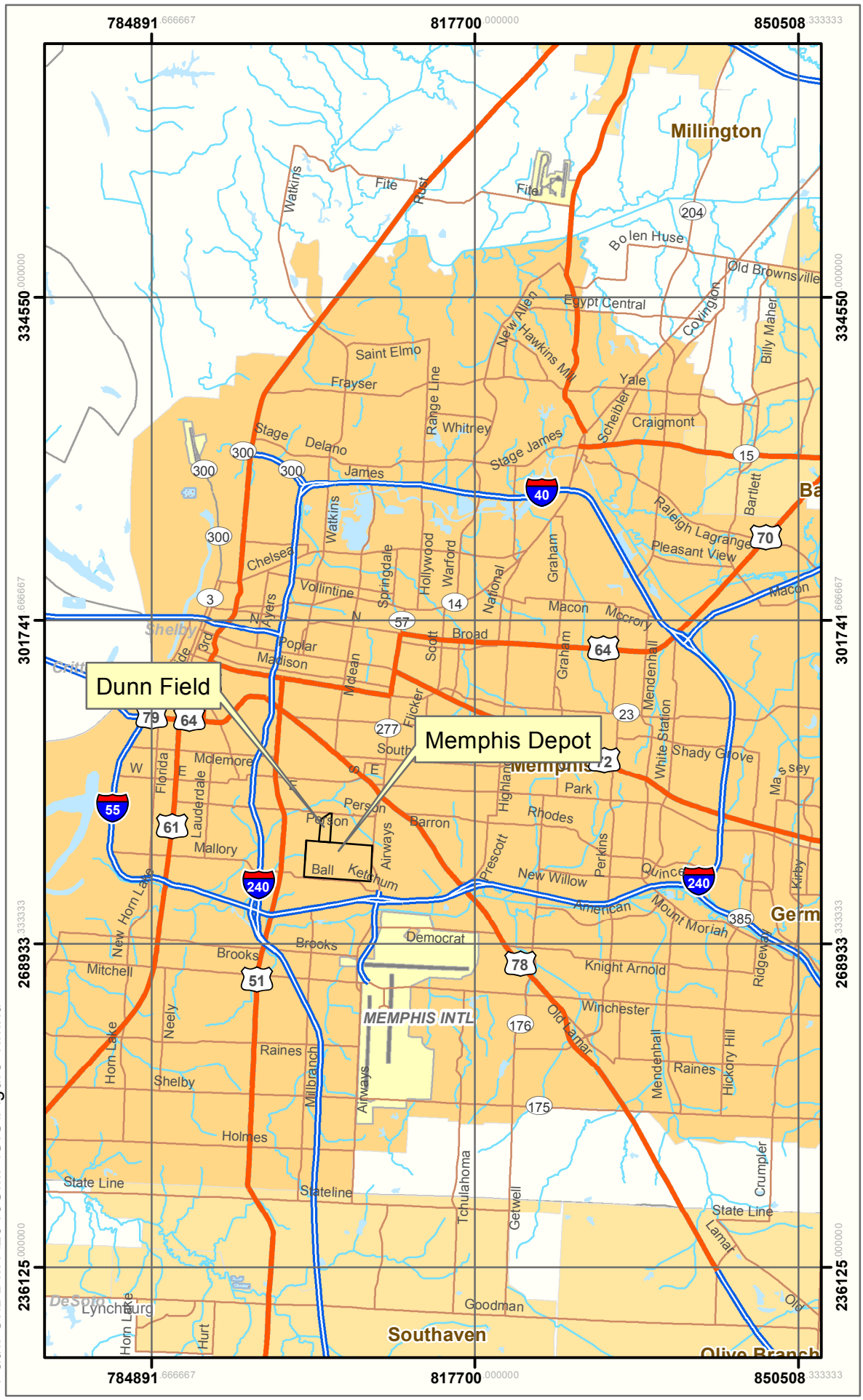

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Figure 1

SITE LOCATION MAP

2016 SITE
MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 0.6 1.2 1.8 2.4 3
Miles

Date: December 2015
Edition: Rev 0

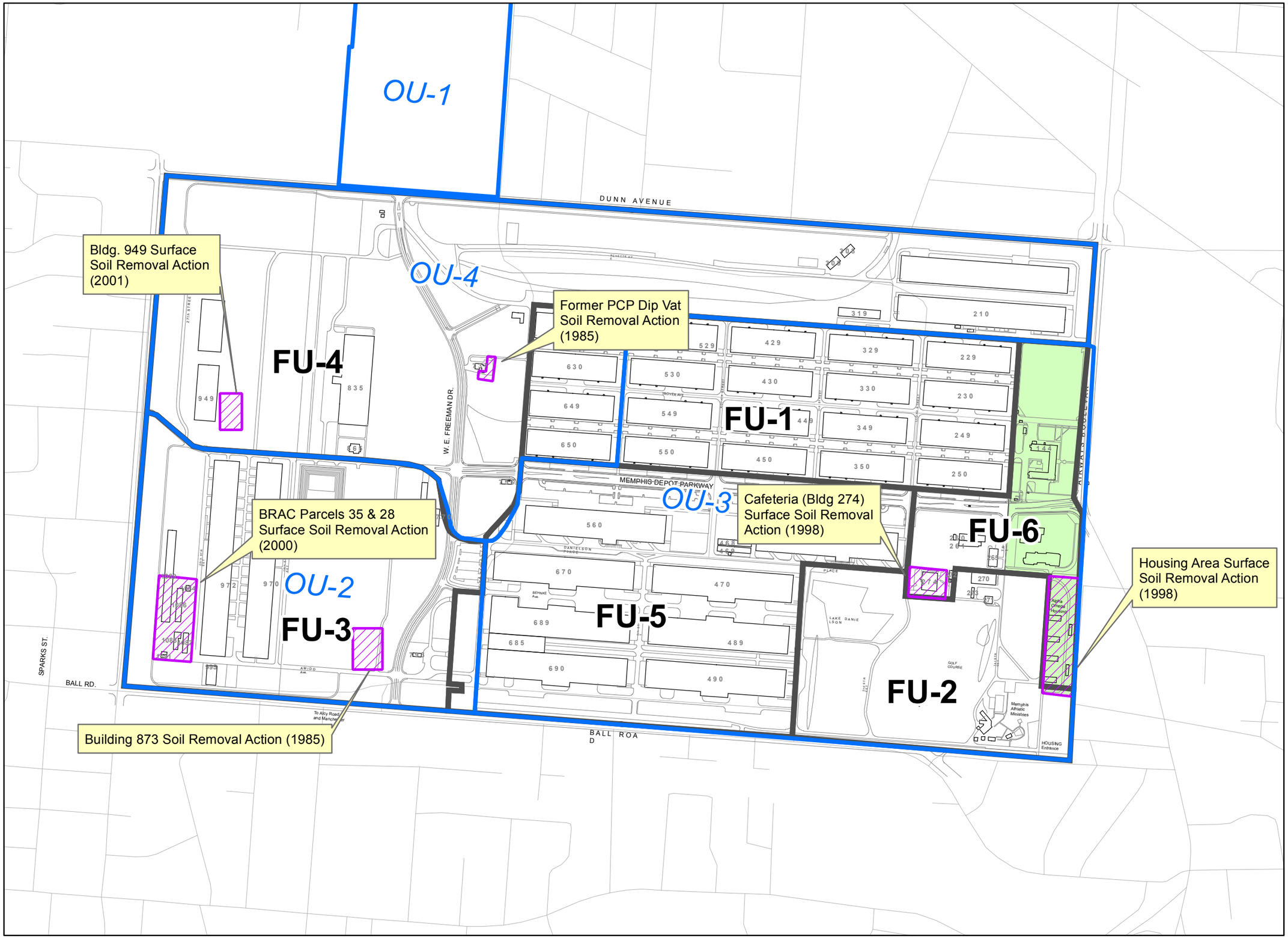

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Figure 2

MAIN INSTALLATION UNIT BOUNDARIES AND RESPONSE ACTIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT MEMPHIS, TENNESSEE

Legend

- Operable Units (OU-#)
- Functional Unit Boundary (FU-#)
- Areas Available for Unrestricted Use
- Past Response Actions

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000

Scale in Feet

Date: December 2015
Edition: Rev 0

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Figure 3

DUNN FIELD AREA DESIGNATIONS, REMOVAL ACTIONS AND INTERIM REMEDIAL ACTION

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Original Dunn Field Perimeter
- Unrestricted Use Area from ROD
- Area Designations
- IRA Recovery Well
- IRA Discharge Conveyance Line
- Removal Actions

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 150 300 600
Feet

Date: December 2015
Edition: Rev 0

HDR

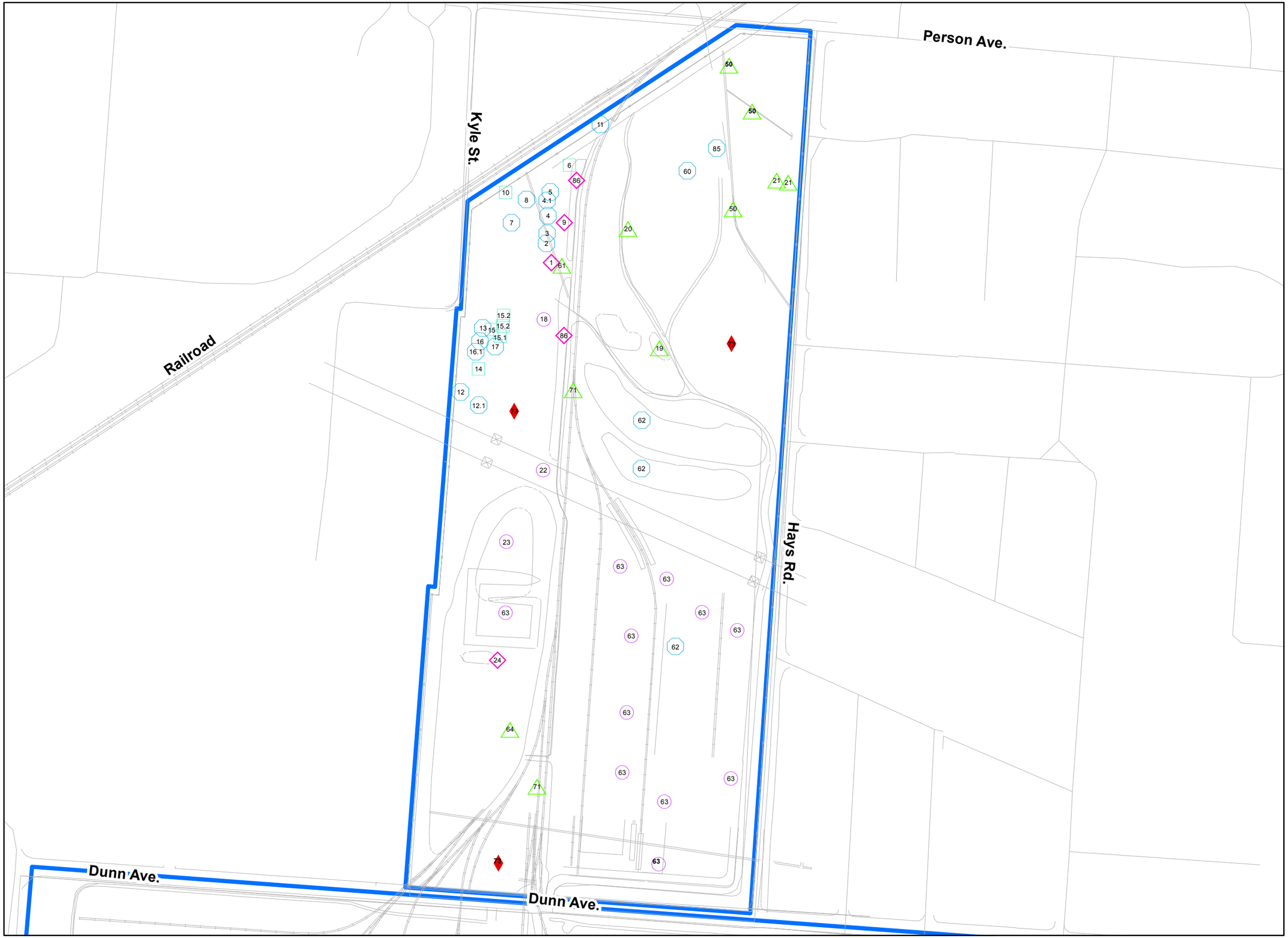

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Figure 4

OU-1 SITE LOCATIONS DUNN FIELD

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Chemical Warfare Management Plan Site
- Proposed Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units
- Streets

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 100 200 400
Feet

Date: December 2015
Edition: Rev 0

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Figure 5

OU-2 SITE LOCATIONS MAIN INSTALLATION

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Early Removal Site
- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Trichloroethene Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Datum : WGS 84
Units: Feet

0 125 250 500

Scale in Feet

Date: December 2015
Edition: Rev 0

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Figure 6

OU-3 SITE LOCATIONS MAIN INSTALLATION

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 150 300 600

Scale in Feet

Date: December 2015
Edition: Rev 0

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Figure 7

OU-4 SITE LOCATIONS MAIN INSTALLATION

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Feasibility Study Site
- No Further Action Site
- Remedial Investigation Site
- Screening Site
- Operable Units

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000

Scale in Feet

Date: December 2015
Edition: Rev 0

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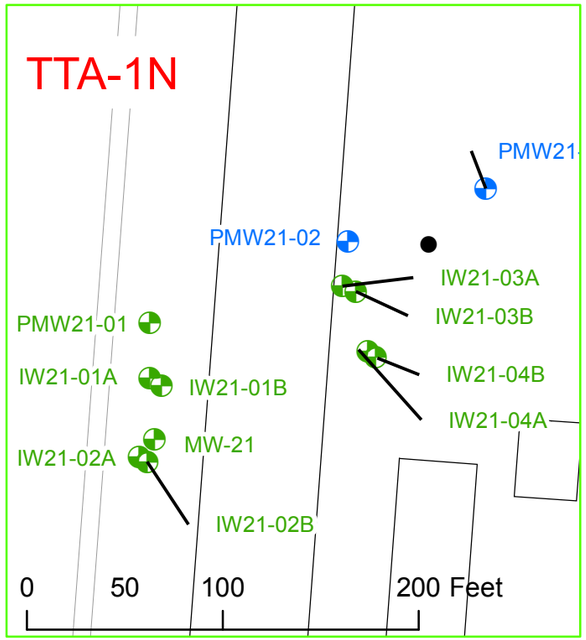

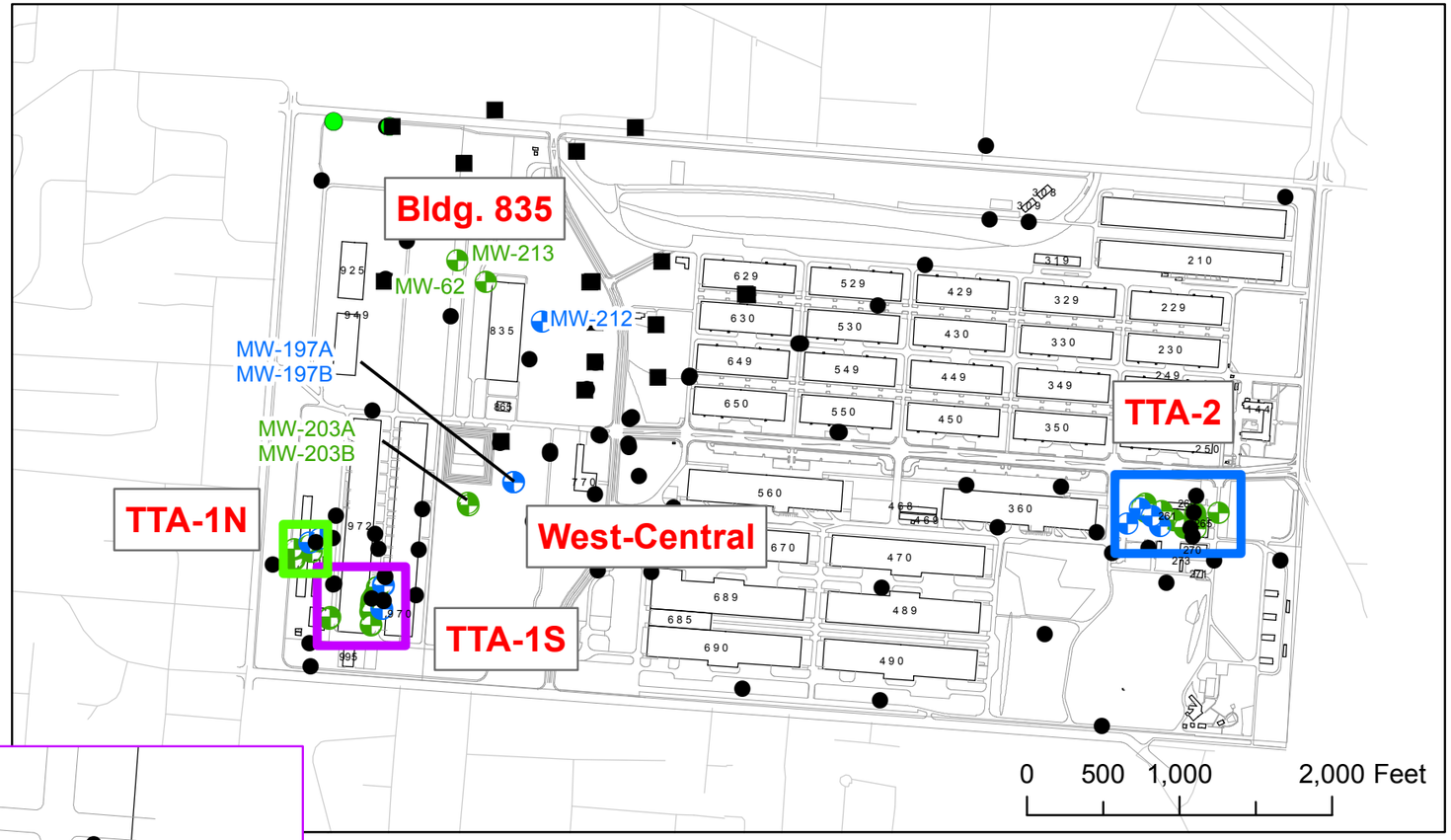

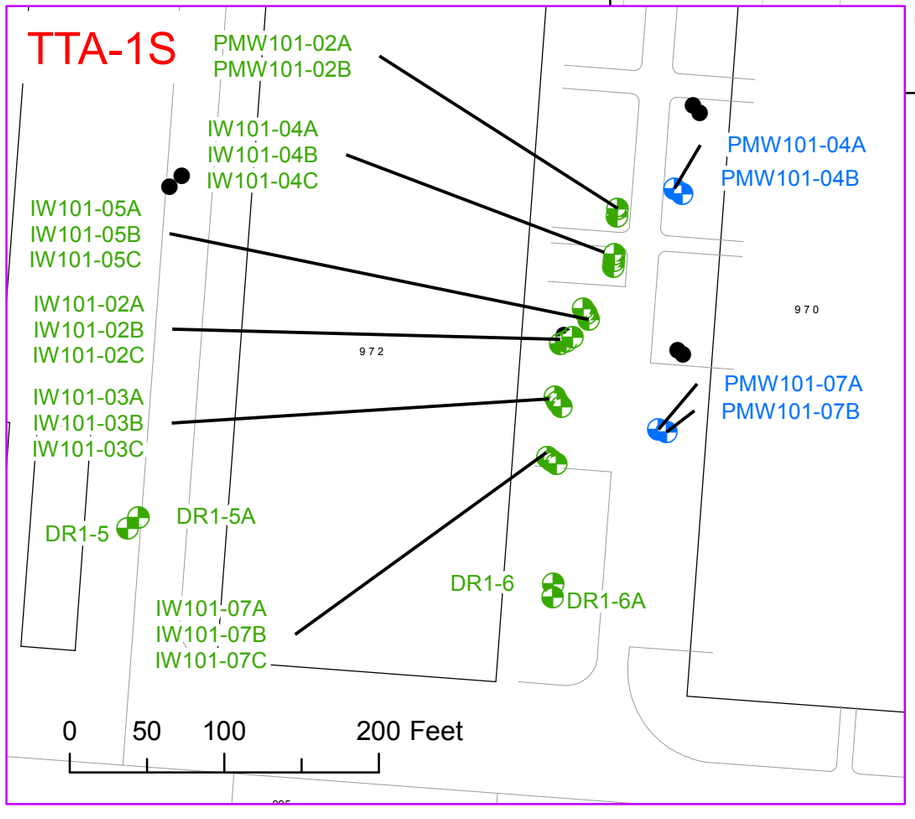

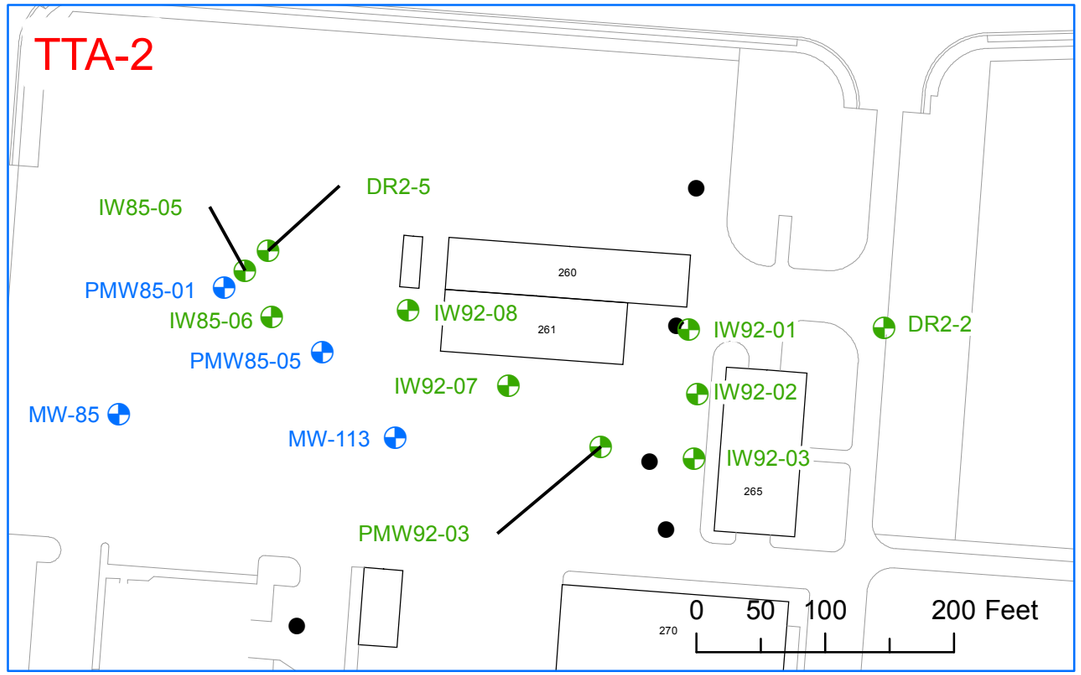

Figure 8

MAIN INSTALLATION EBT WELL LOCATION MAP

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Transition Zone or Intermediate Aquifer
- Monitoring Well Screened in the Memphis Aquifer
- EBT Injection Well
- EBT Performance Monitoring Well

Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Date: December 2015
Edition: Rev 0

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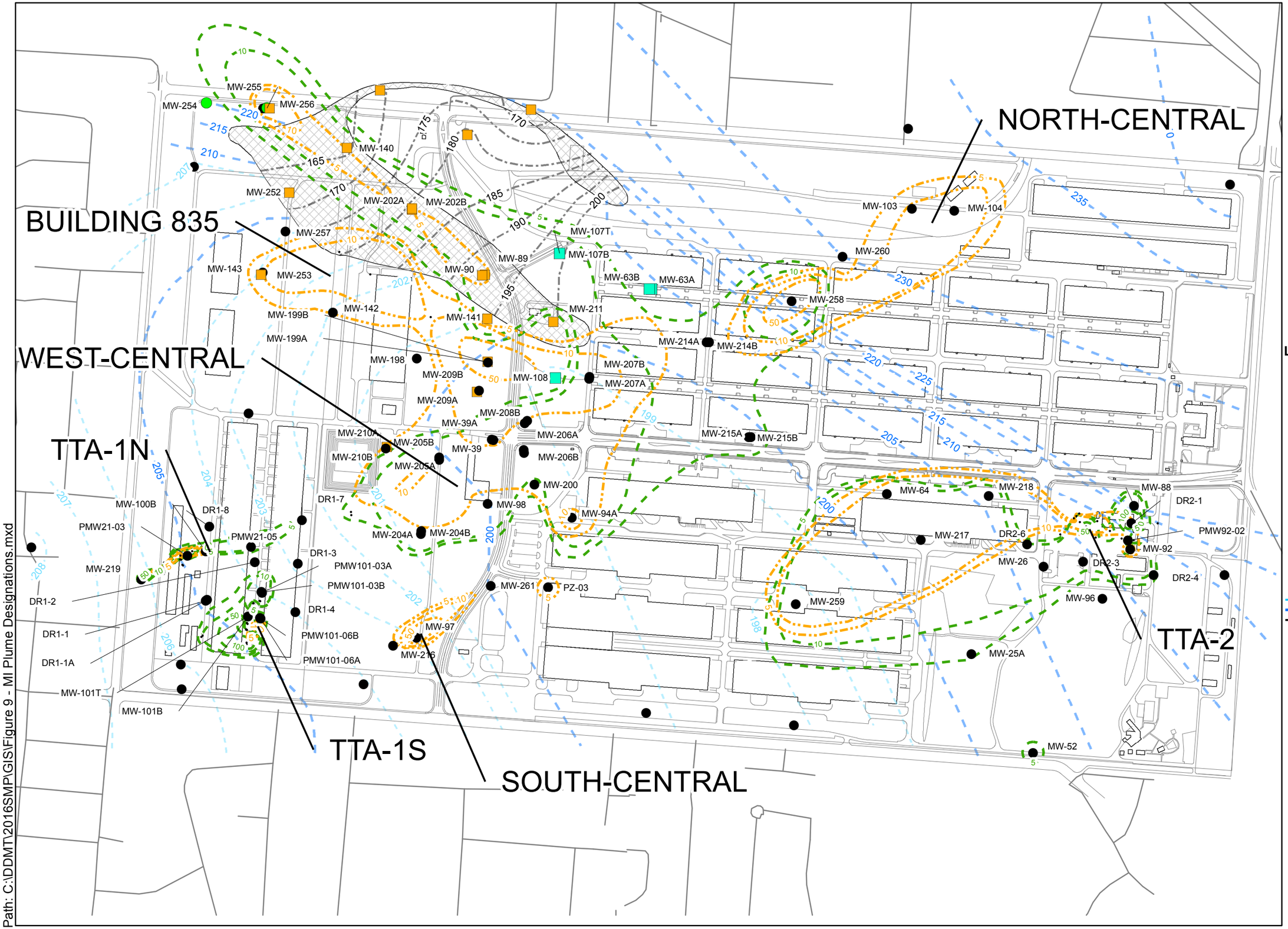

Figure 9

MAIN INSTALLATION PLUME DESIGNATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer
- PCE
- TCE
- Clay Elevation Exceeds Groundwater Elevation
- 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

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 9 - MI Plume Designations.mxd

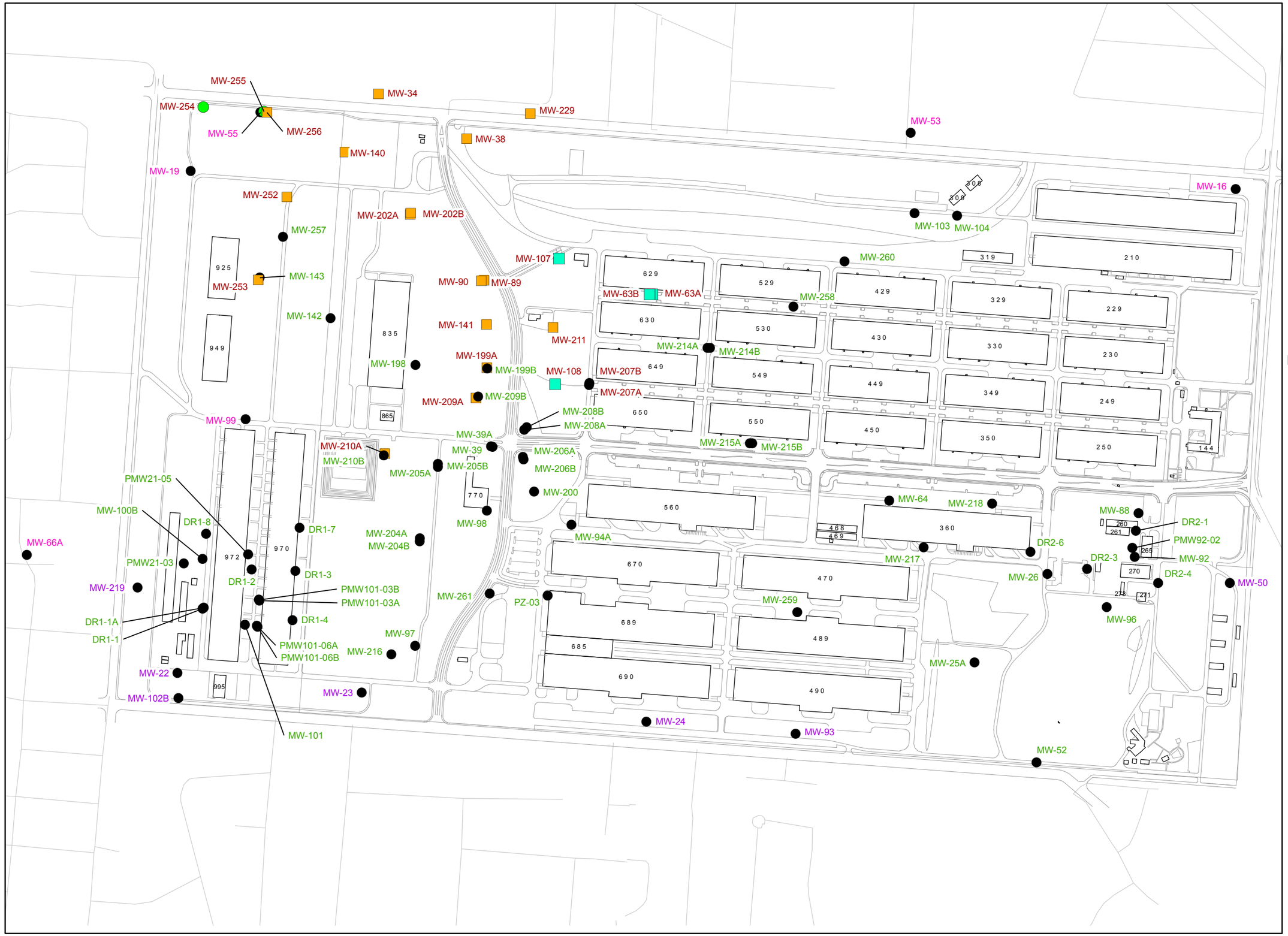

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Figure 10

MAIN INSTALLATION LTM WELL LOCATION MAP

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer

Well Classification

- MW-16 Background
- MW-34 Sentinel
- MW-88 Performance
- MW-219 Boundary

0 250 500 1,000
Feet

Date: December 2015
Edition: Rev 0

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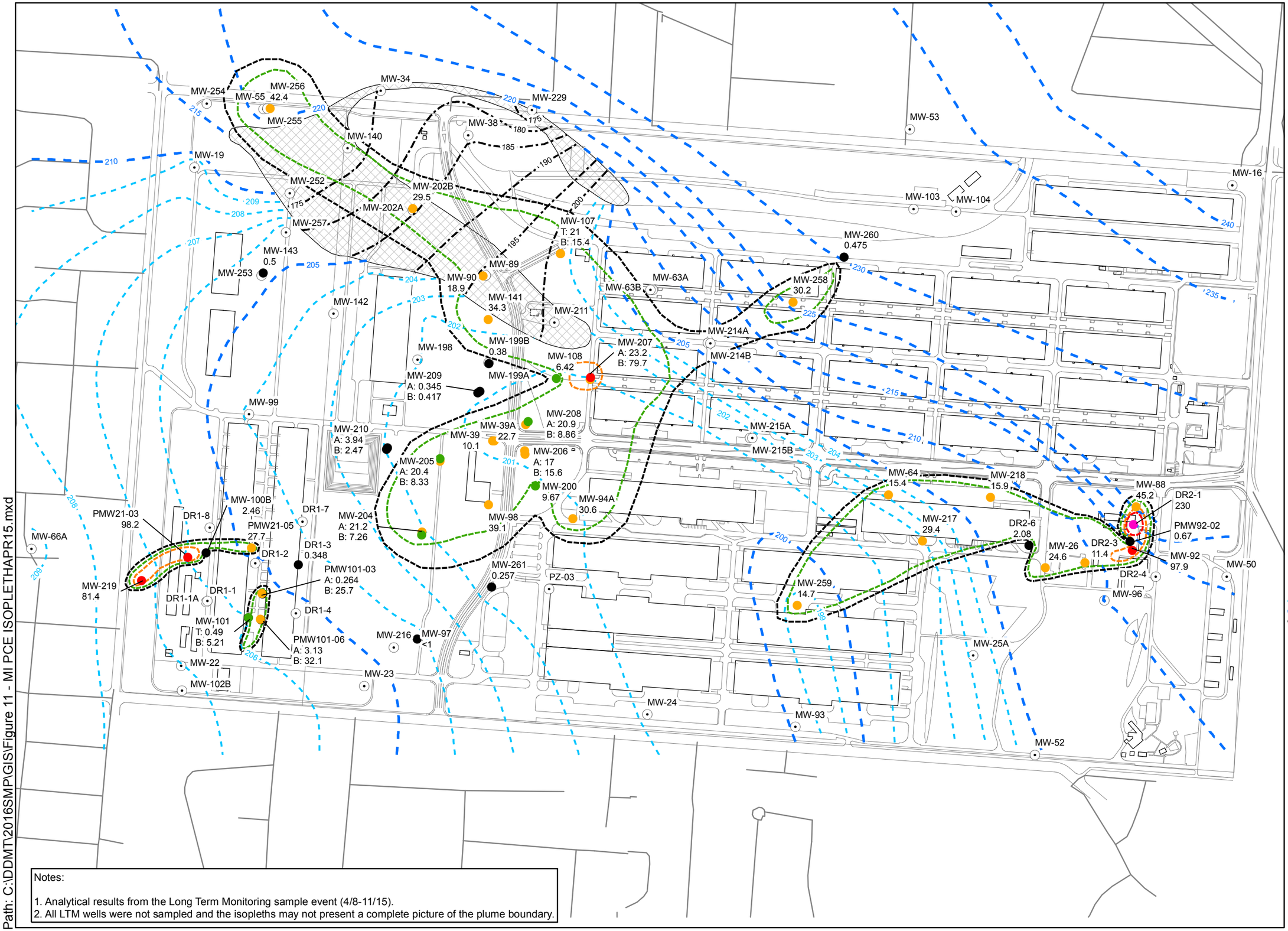

Notes:

1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. All LTM wells were not sampled and the isopleths may not present a complete picture of the plume boundary.

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Figure 11

MAIN INSTALLATION PCE CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

PCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

PCE Isopleth
ug/L

- 5
- 10
- 50
- 100

Clay Elevation Exceeds Groundwater Elevation

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

0 200 400 800
Feet

Date: December 2015
Edition: Rev 0

HDR

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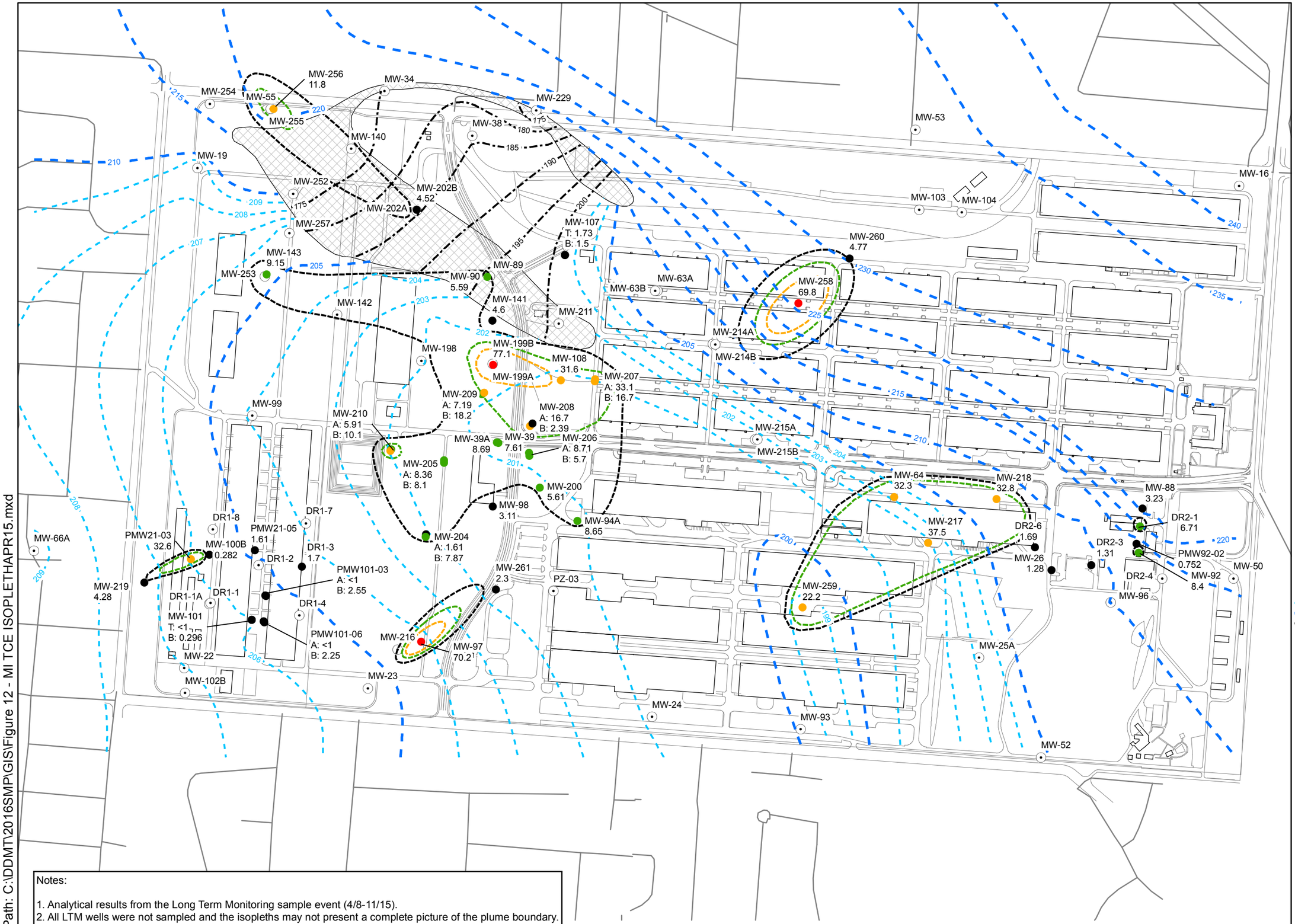


Figure 12

MAIN INSTALLATION TCE CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

TCE Isopleth
ug/L

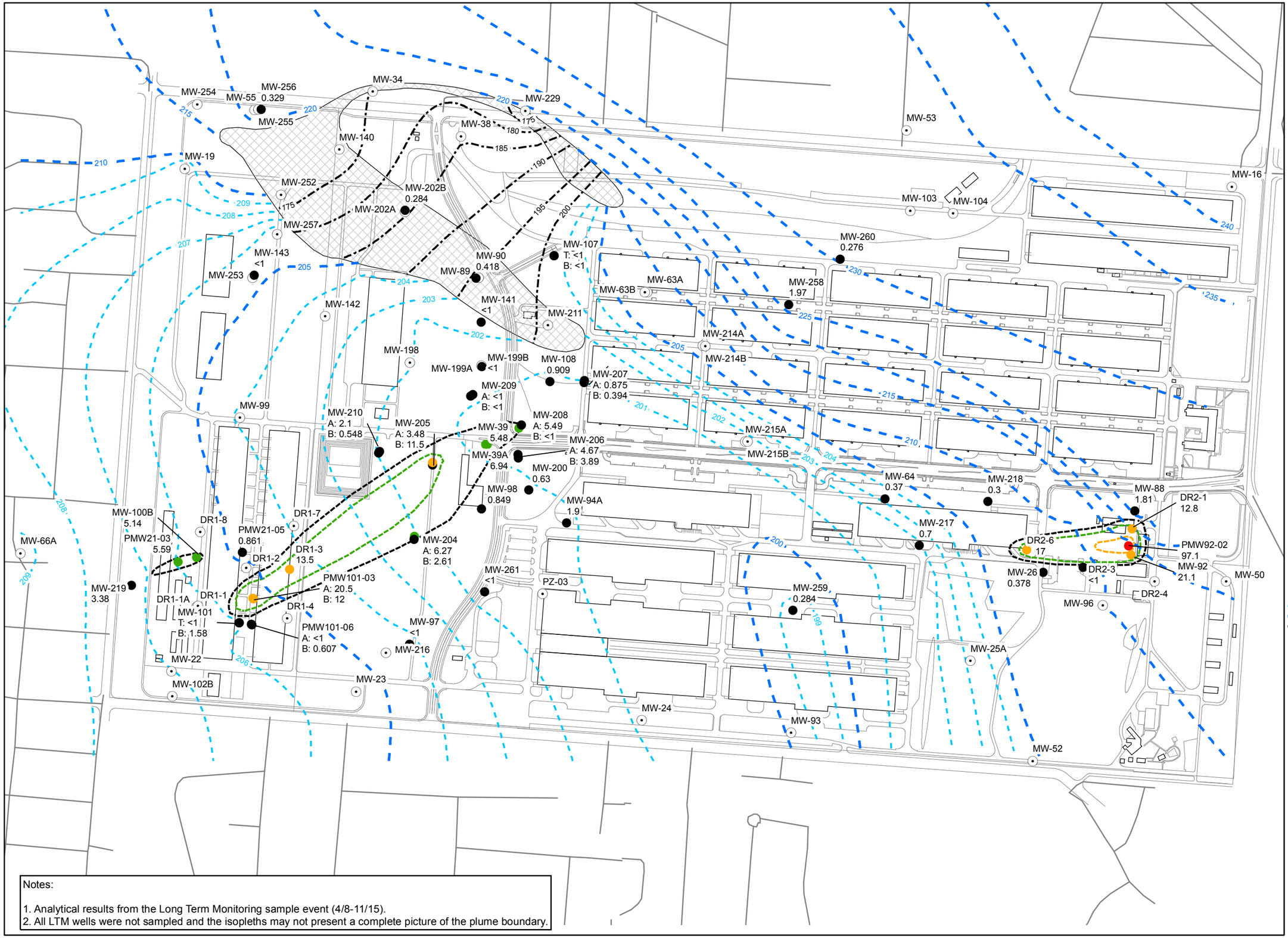
- 5
- 10
- 50
- 100
- Clay Elevation Exceeds Groundwater Elevation
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Potentiometric surface of the Intermediate Aquifer 5-ft. contour

Notes:

1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. All LTM wells were not sampled and the isopleths may not present a complete picture of the plume boundary.

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 12 - MI TCE ISOPLETHAPR15.mxd



Notes:

1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. All LTM wells were not sampled and the isopleths may not present a complete picture of the plume boundary.

Path: C:\DDMT\2016SMP\GIS\Figure 13 - cDCE ISOPLETH APR15.mxd

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Figure 13

MAIN INSTALLATION cDCE CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

cDCE Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- 100 - 300
- Not Sampled

cDCE Isopleth
ug/L

- 5
- 10
- 50
- 100
- Clay Elevation Exceeds Groundwater Elevation
- 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

0 200 400 800
Feet

Date: December 2015
Edition: Rev 0

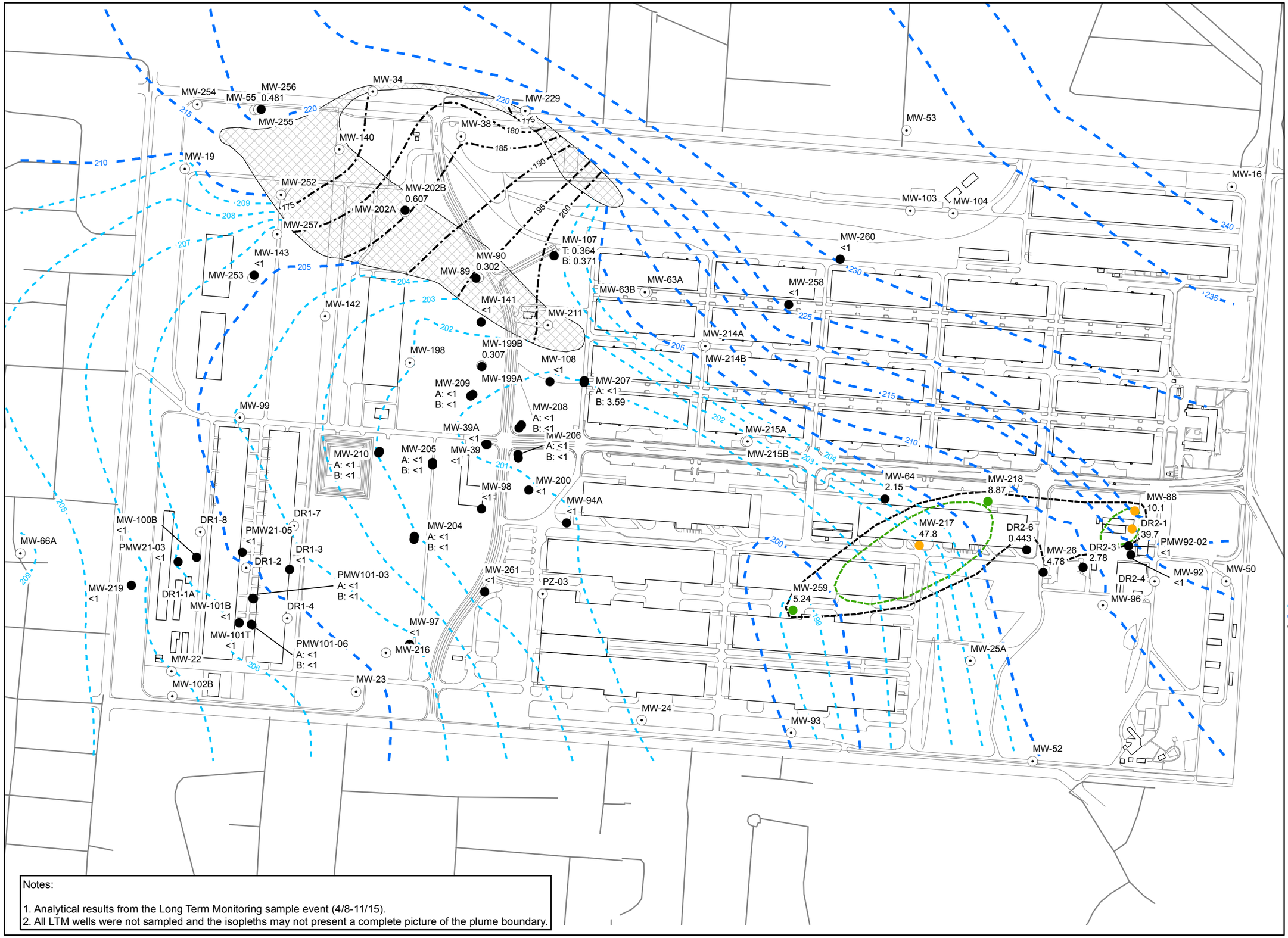
HDR

Figure 14

MAIN INSTALLATION CT CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT MEMPHIS, TENNESSEE



Notes:

1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. All LTM wells were not sampled and the isopleths may not present a complete picture of the plume boundary.

Legend

CT Ranges
ug/L

- 0 - 5
- 5 - 10
- 10 - 50
- 50 - 100
- Not Sampled

CT Isopleth
ug/L

- 5
- 10
- 50
- 100
- Clay Elevation Exceeds Groundwater Elevation
- 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

0 200 400 800
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 14 - CT ISOPLETH APR15.mxd

A NORTH

A' SOUTH

MW-254 | MW-55 MW-256 MW-255 | MW-252 offset 333-ft. from centerline | MW-140 offset 88-ft. from centerline | MW-202A/MW-202B | MW-89/MW-90 | MW-141 | MW-199A MW-199B | MW-209A MW-209B | MW-39 MW-39A | MW-206A MW-206B | MW-200 | MW-94A | MW-94 | MW-81/MW-24

300 280 260 240 220 200 180 160 140 120 100 80 60 40 20 0

Silty Clay to Clayey Silt

Sandy Clay to Clayey Sand

Sand with Gravel

Grey Clay

Clayey Sand

Silty Sand

Clay

Sand

Memphis Sand

MW-254 MW-255 MW-256 MW-252 MW-140 MW-55 MW-202A MW-202B MW-89 MW-90 MW-141 MW-199A MW-199B MW-209A MW-209B MW-39 MW-39A MW-206A MW-206B MW-200 MW-94A MW-94 MW-24 MW-81

PCE 42.4 TCE 11.8

PCE 29.5 TCE 4.52

PCE 18.9 TCE 5.59

PCE 0.38 TCE 77.1

PCE 34.3 TCE 4.6

PCE 0.345 TCE 7.19

MW-209A 195.45

PCE 10.1 TCE 7.61

PCE 0.417 TCE 18.2

PCE 22.7 TCE 8.69

PCE 15.6 TCE 5.7

PCE 17.0 TCE 8.71

PCE 9.67 TCE 5.61

PCE 30.6 TCE 8.65

ABANDONED

ABANDONED

Silty Sandy Clay

B.T.

? ? ? ?

20 0 200

Note:
PCE and TCE concentrations in µg/L for samples collected from LTM wells in April 2015.

Figure 15

MAIN INSTALLATION CROSS-SECTION WITH PCE AND TCE RESULTS

2016 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
- Intermediate Sand
- Clay
- Memphis Sand
- Groundwater Elevation
- Fluvial Aquifer Groundwater Elevation 10/4/2010
- Intermediate Aquifer Groundwater Elevation 10/4/2010
- Memphis Aquifer Groundwater Elevation 10/4/2010
- Well Screen Interval

Date: December 2015
Edition: Rev 0

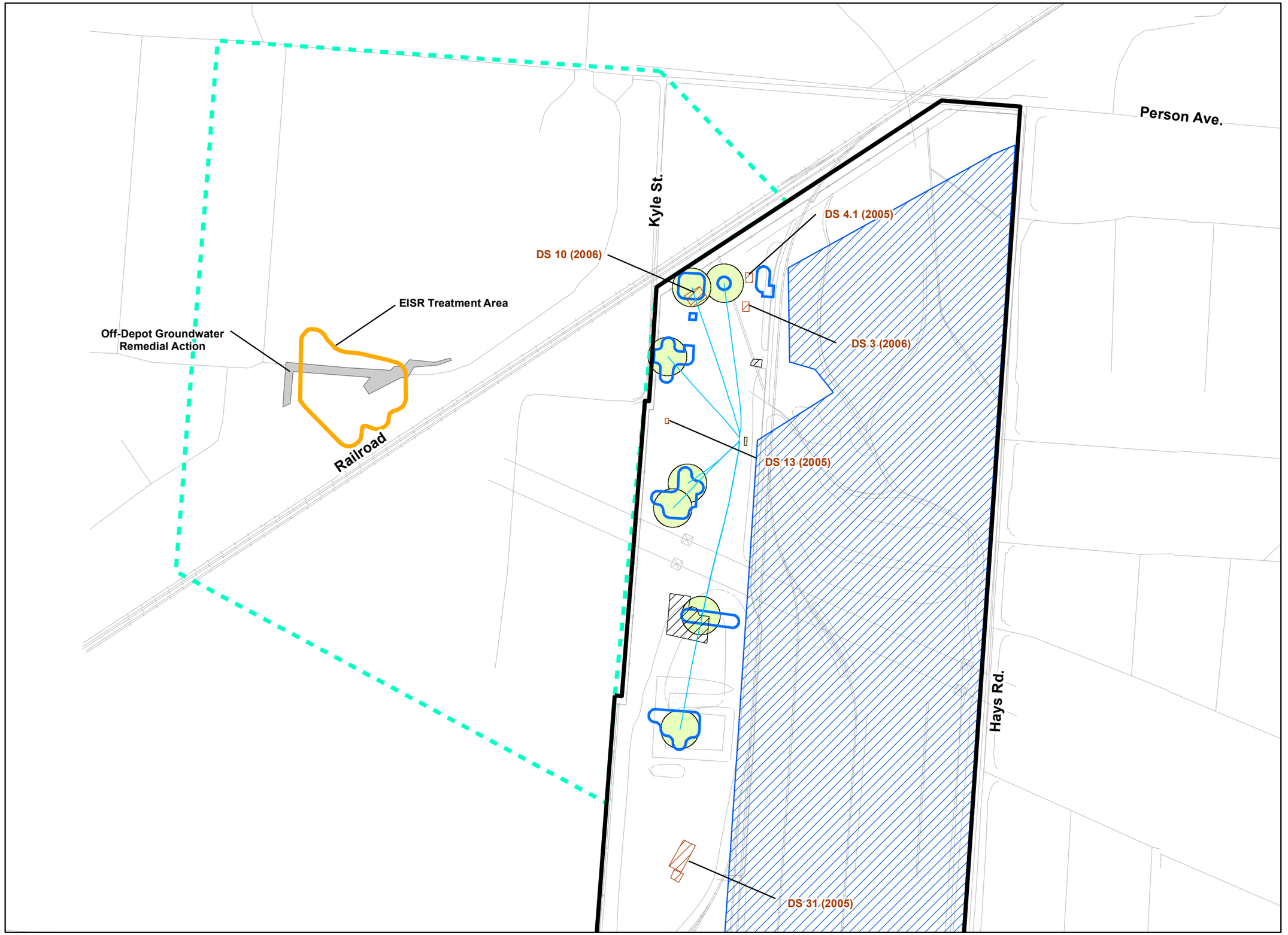


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Figure 16

DUNN FIELD DISPOSAL SITES, SOURCE AREAS AND OFF-DEPOT GROUNDWATER REMEDIAL ACTIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Original Dunn Field Perimeter
- Unrestricted Use Area from ROD
- Off-Site Treatment Area
- EISR Treatment Area
- Disposal Sites Excavation Area
- Fluvial SVE Well - 60-foot radius of influence
- Fluvial SVE Conveyance Line
- SVE Control Building
- Loess Excavation Areas
- Loess Thermal-Enhanced SVE Treatment Areas
- Air Sparge-SVE Area

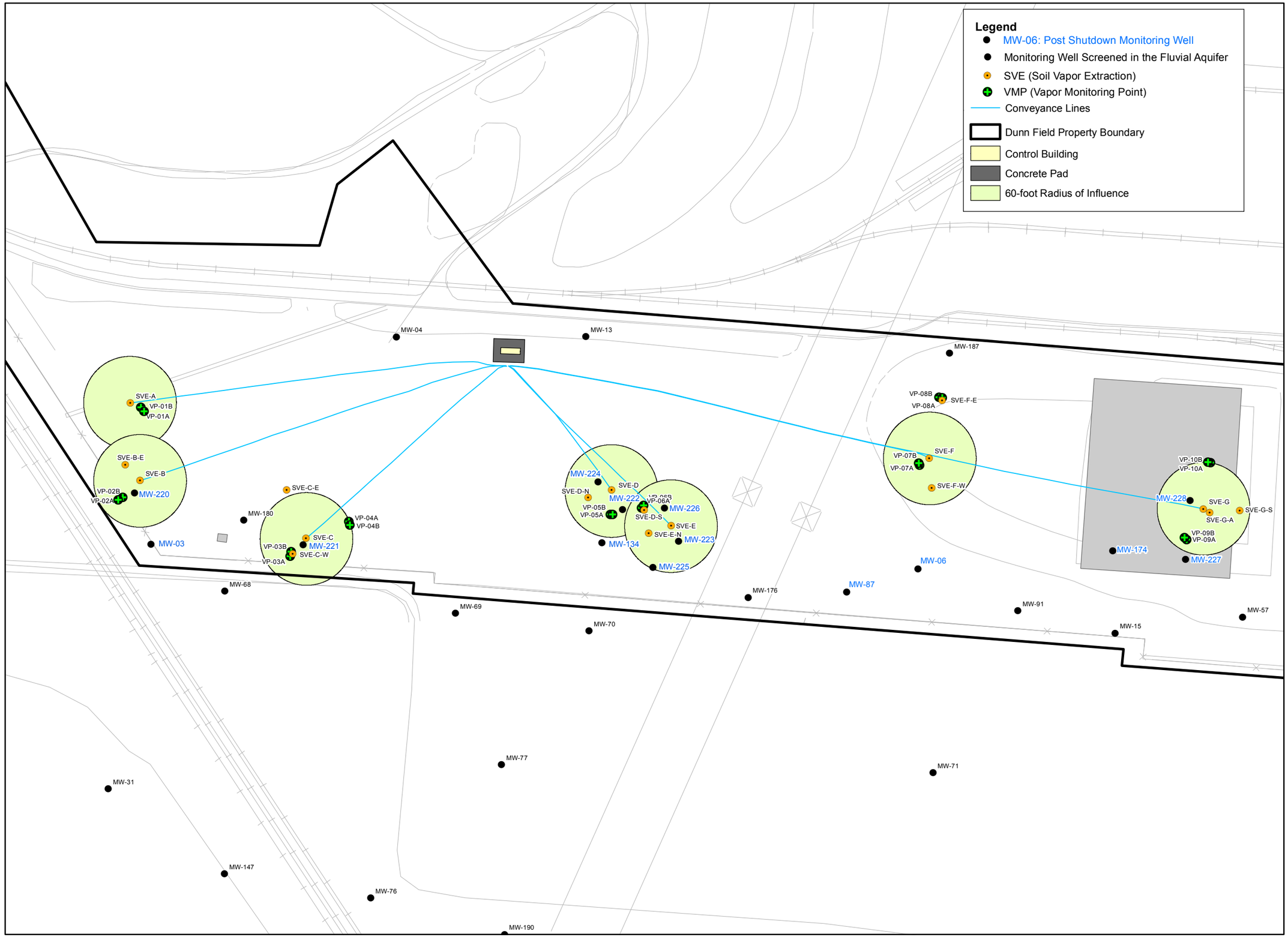
Projection: NAD 1927 StatePlane Tennessee
Units: Feet

Aerial Photo Date: 2006

0 100 200 400
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 16.mxd



Path: C:\DDMT\2016SMP\GIS\Figure 17.mxd

Figure 17

FLUVIAL SVE SYSTEM
DUNN FIELD

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Projection: NAD 1927 StatePlane Tennessee
Datum : WGS 84
Units: Feet

0 50 100 150 200 Feet

Date: December 2015
Edition: Rev 0

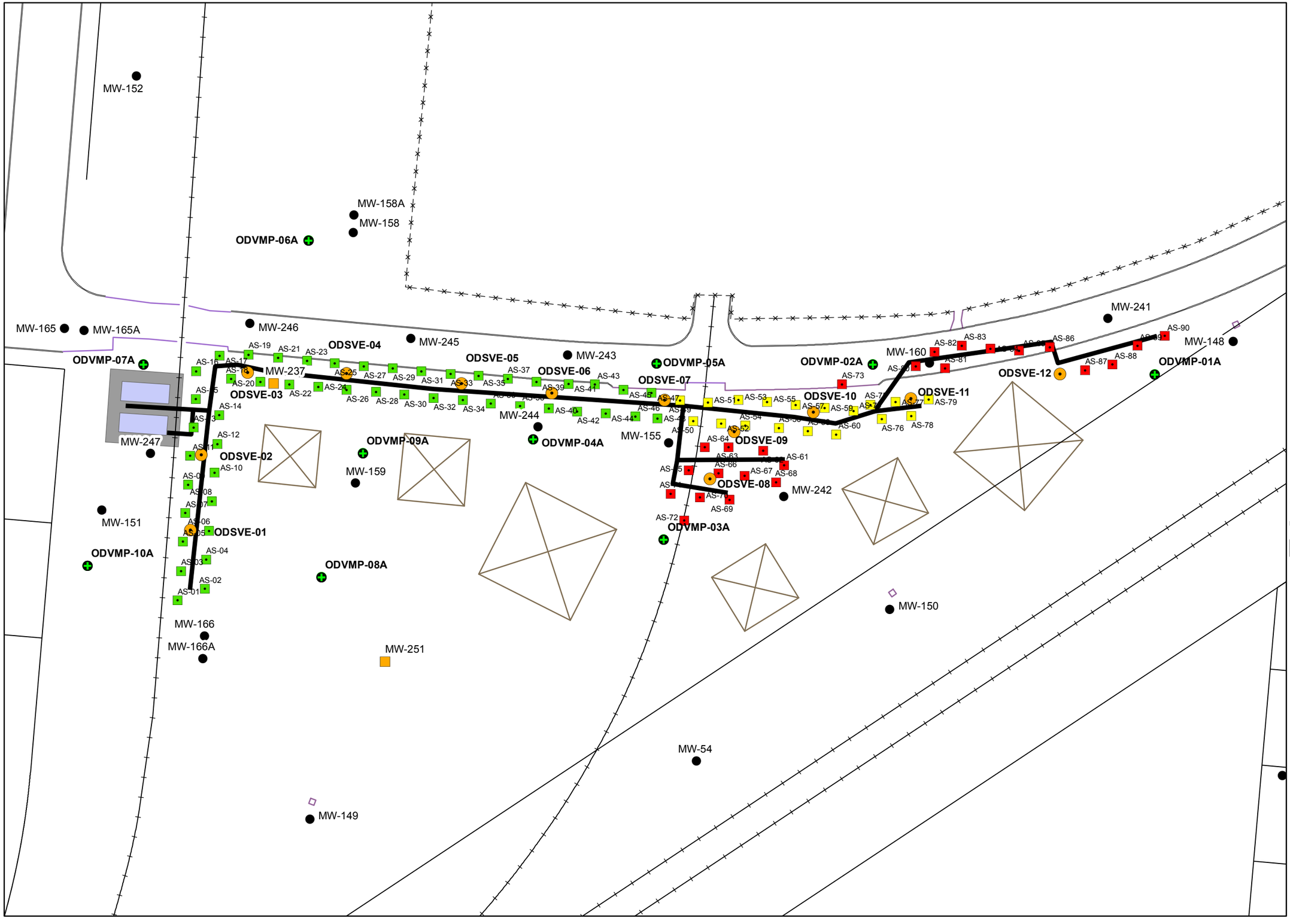


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Figure 18

AS-SVE SYSTEM
DUNN FIELD

2016 SITE MANAGEMENT PLAN

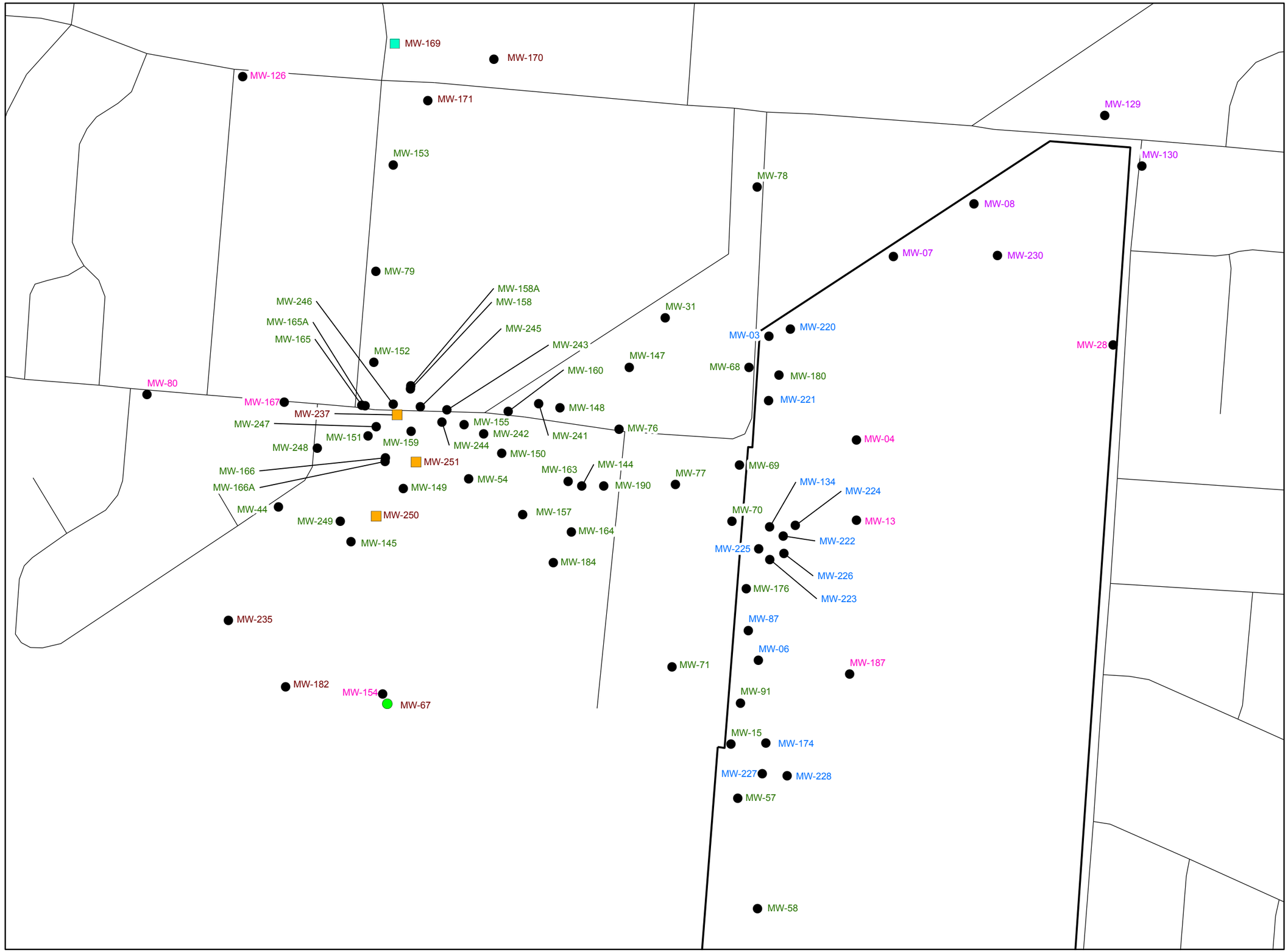
DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

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

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 18.mxd



Path: C:\DDMT\2016SMP\GIS\Figure 19 Dunn Field LTM Well Location Map.mxd

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Figure 19

DUNN FIELD LTM WELL LOCATION MAP

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer

Off Depot Well Classification

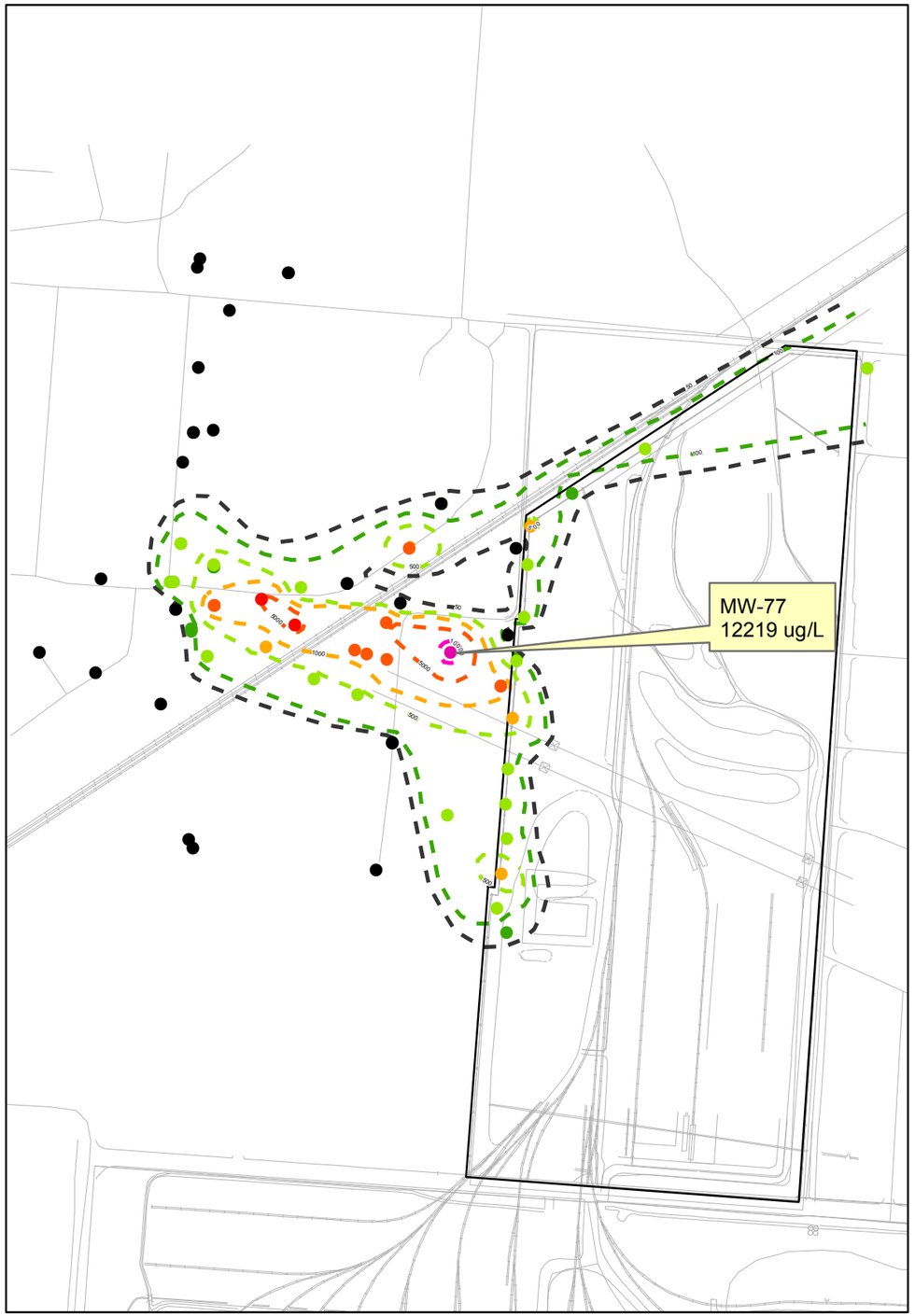
- MW-04 Background
- MW-07 Background-NE
- MW-250 Sentinel
- MW-15 Performance
- MW-03 Performance-FSVE

Dunn Field Boundary

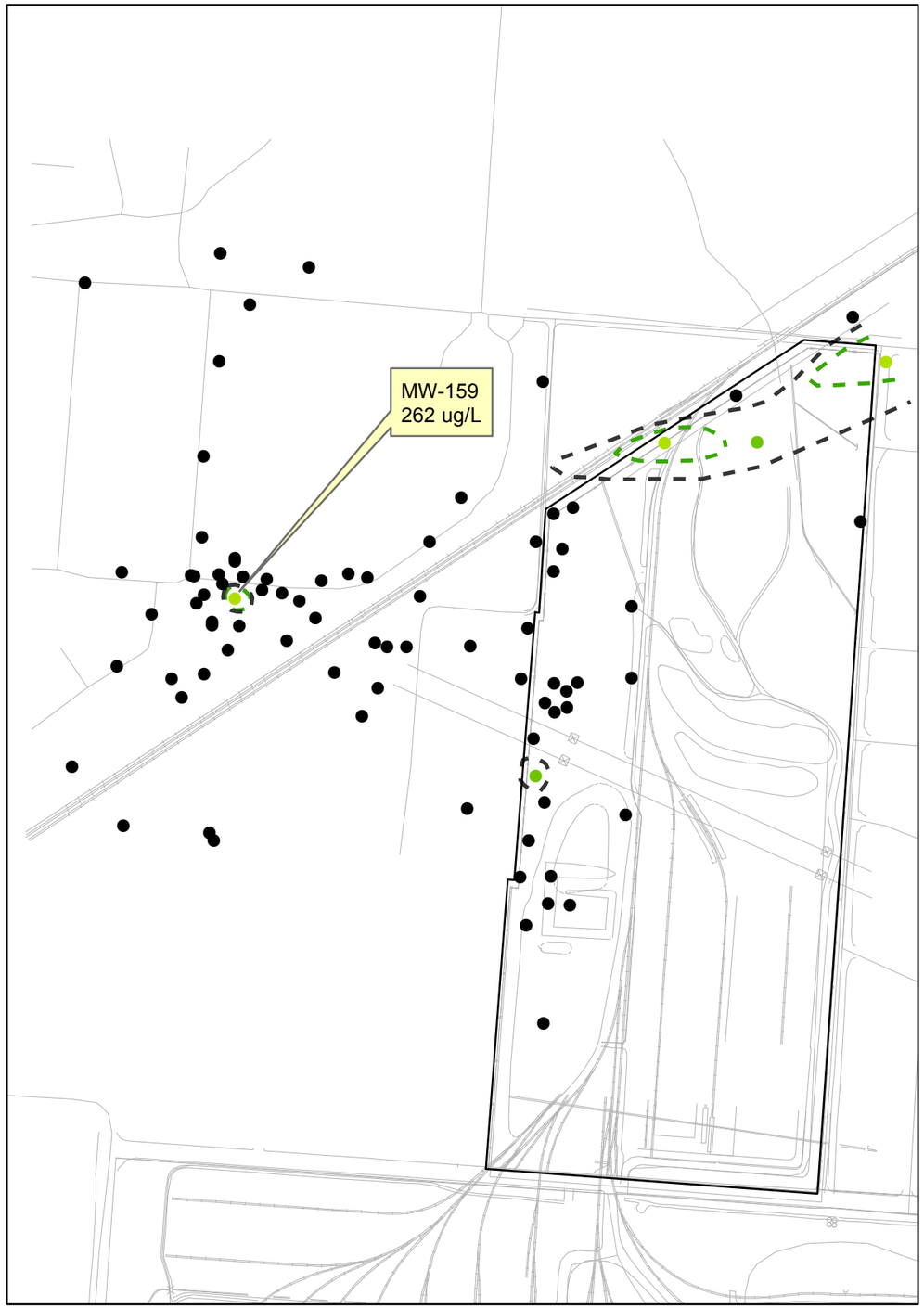
0 150 300 450
Feet

Date: December 2015
Edition: Rev 0

HDR



APRIL 2007



APRIL 2015

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Figure 20

DUNN FIELD TOTAL CVOC CONCENTRATIONS, 2007 - 2015

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

Total CVOC Isopleth (ug/L)

- 50
- 100
- 500
- 1000
- 5000
- 10000

Total CVOC Ranges (ug/L)

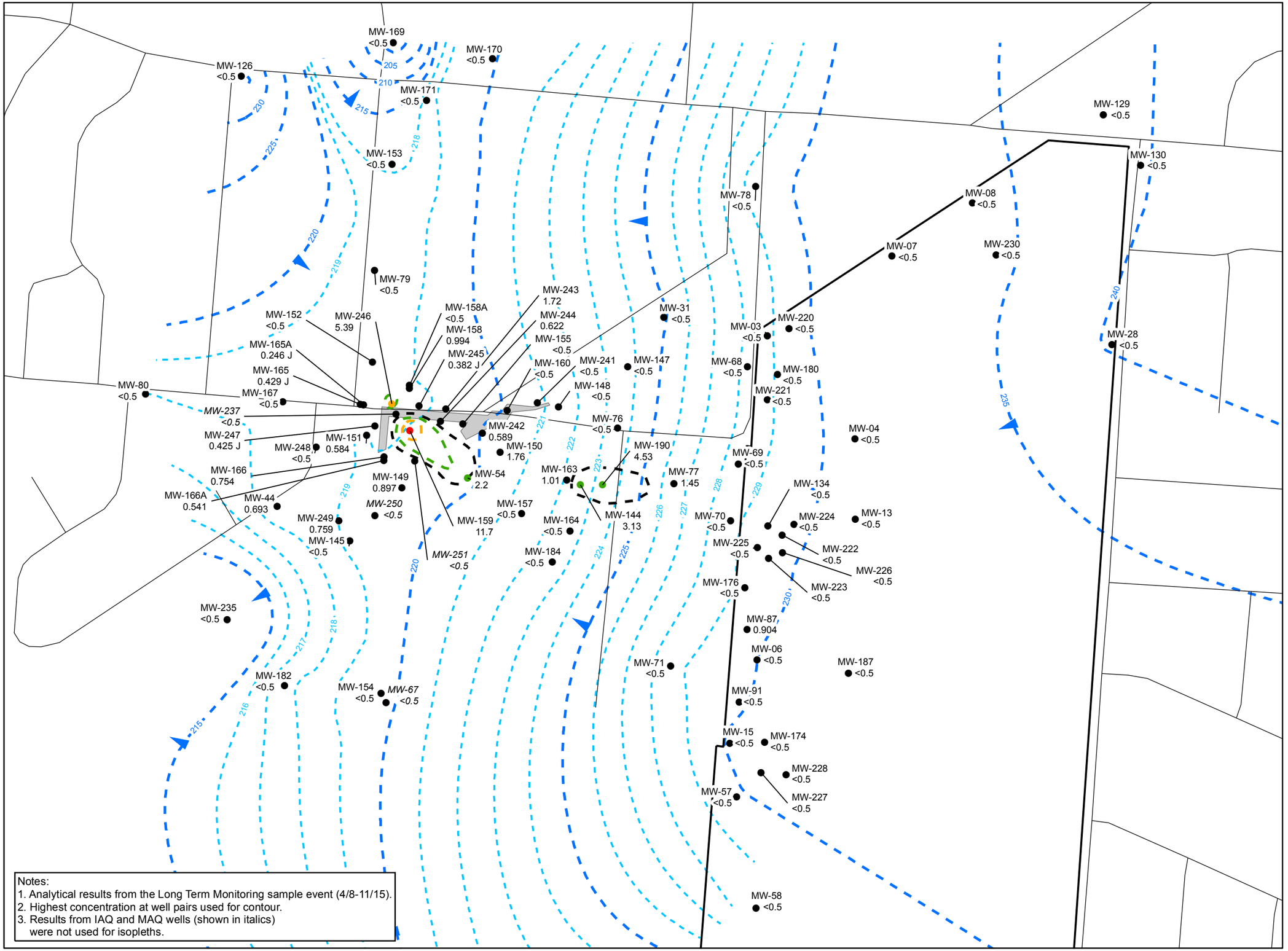
- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10000
- 10000 - 50000

Dunn Field

0 200 400 600 800
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 20.mxd



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

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Figure 21

DUNN FIELD TeCA CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

TeCA Ranges (ug/L)
- 0-2
- 2-5
- 5-10
- 10-50

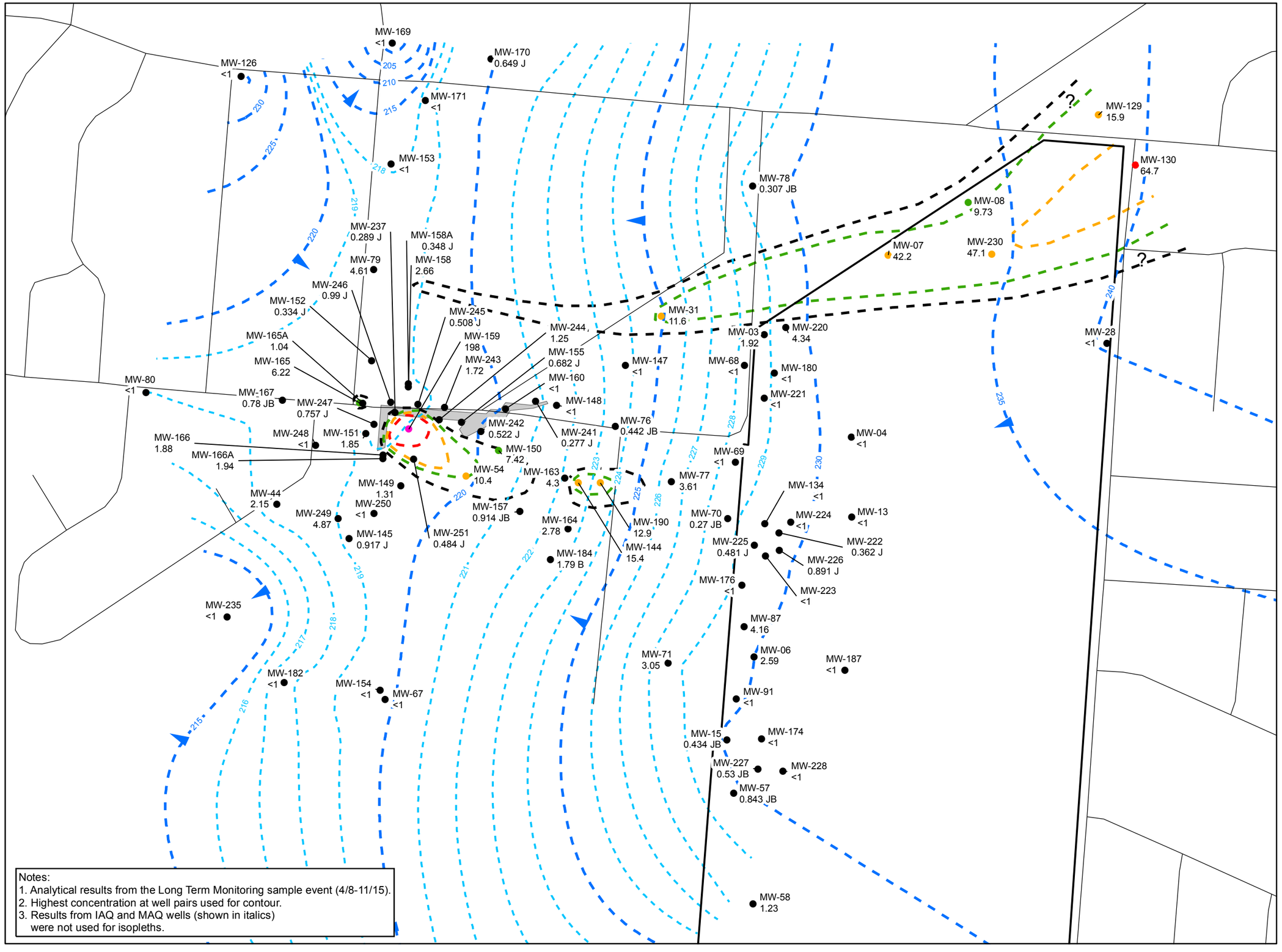
TeCA Isopleth (ug/L)
- 2.2
- 5
- 10

Potentiometric surface of the Fluvial Aquifer 1-ft. contour
Potentiometric surface of the Fluvial Aquifer 5-ft. contour
Groundwater Flow Direction
Air Sparge Well Area
Original Dunn Field Property Boundary

0 100 200 300
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 21 TeCA Apr2015.mxd



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in *italics*) were not used for isopleths.

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Figure 22

DUNN FIELD TCE CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

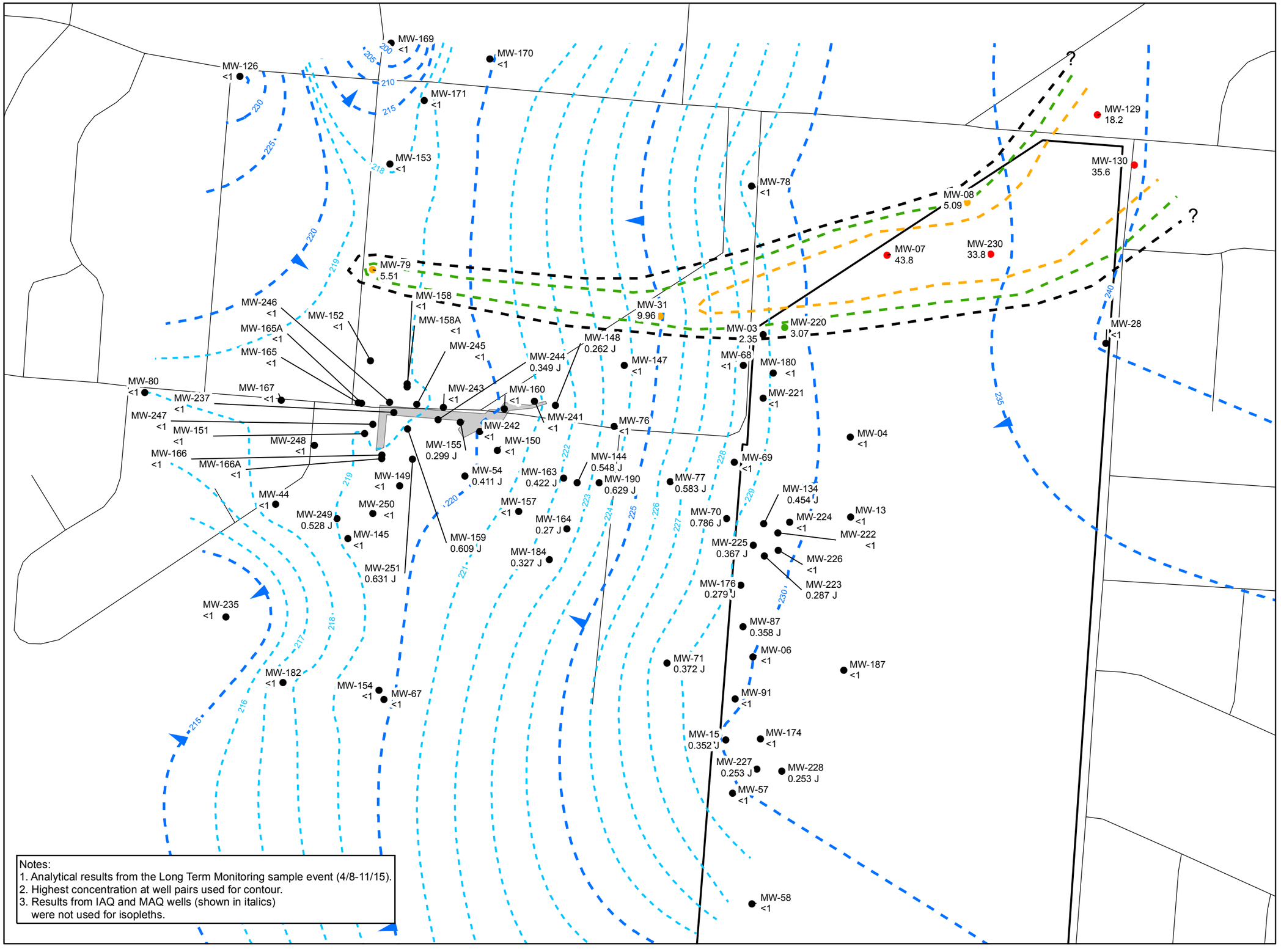
TCE Ranges (ug/L)
- 0-5
- 5-10
- 10-50
- 50-100
- 100-300

TCE Isopleth (ug/L)
- 5
- 10
- 50
- 100
- Potentiometric surface of the Fluvial Aquifer 1-ft. contour
- Potentiometric surface of the Fluvial Aquifer 5-ft. contour
- Groundwater Flow Direction
- Air Sparge Well Area
- Original Dunn Field Property Boundary

0 100 200 300
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 22 DF TCE Apr2015.mxd



Notes:
1. Analytical results from the Long Term Monitoring sample event (4/8-11/15).
2. Highest concentration at well pairs used for contour.
3. Results from IAQ and MAQ wells (shown in italics) were not used for isopleths.

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Figure 23

DUNN FIELD PCE CONCENTRATIONS

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

PCE Ranges (ug/L)
- 0 - 2.5
- 2.5 - 5
- 5 - 10
- 10 - 50

PCE Isopleth (ug/L)
- 2.5
- 5
- 10

Potentiometric surface of the Fluvial Aquifer 1-ft. contour
Potentiometric surface of the Fluvial Aquifer 5-ft. contour
Groundwater Flow Direction
Air Sparge Well Area
Original Dunn Field Property Boundary

0 100 200 300
Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 23 DF PCE Apr2015.mxd

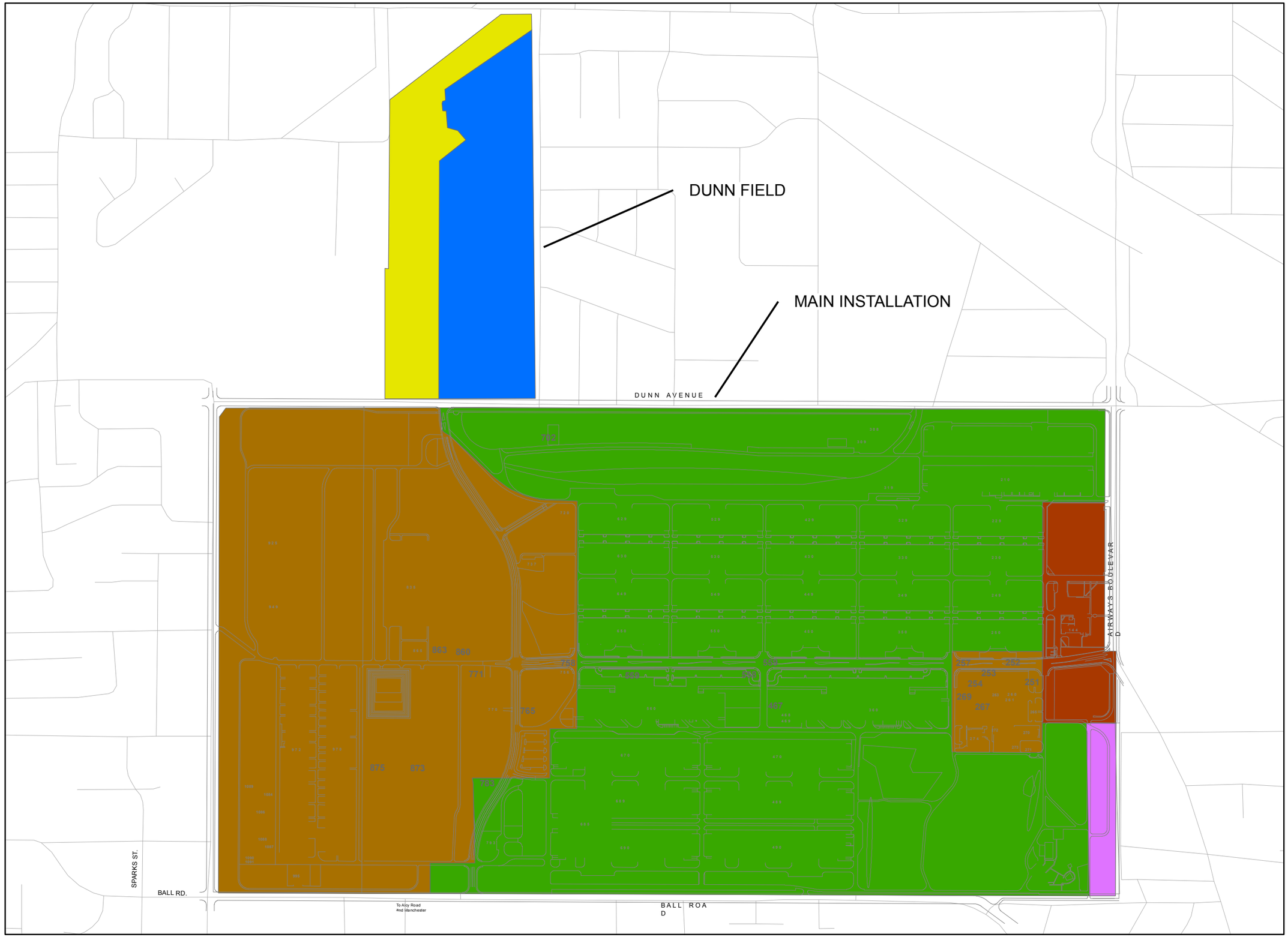

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Figure 24

FINDING OF SUITABILITY TO TRANSFER MAP

2016 SITE MANAGEMENT PLAN

DEFENSE DEPOT
MEMPHIS, TENNESSEE

Legend

FOST
Fost Number

- 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 04/04/05, 08/18/06 and 10/12/06.*
- 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.*

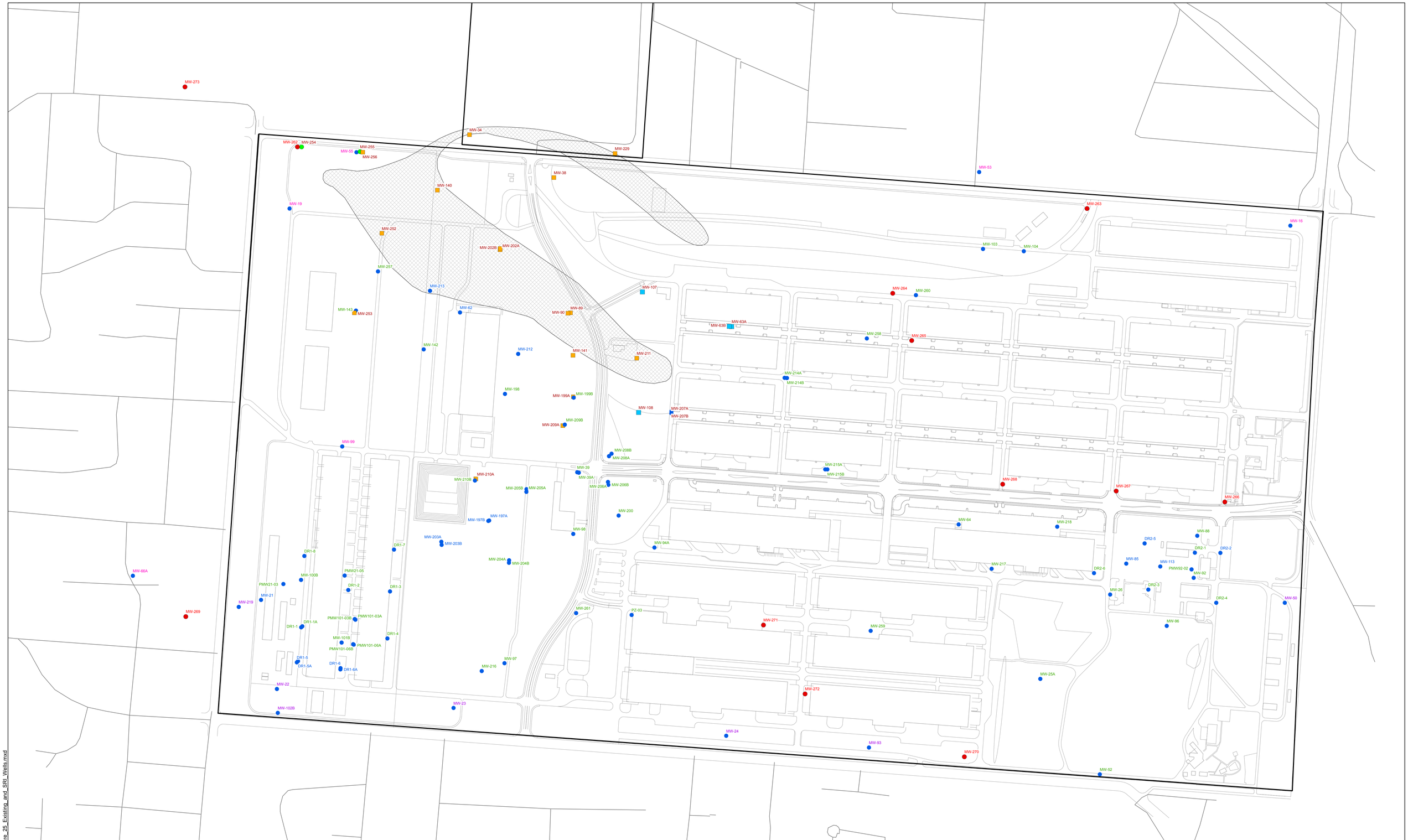
Projection: NAD 1927 StatePlane Tennessee
Units: Feet

0 250 500 1,000

Scale in Feet

Date: December 2015
Edition: Rev 0

Path: C:\DDMT\2016SMP\GIS\Figure 24.mxd



Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Transition Zone
- Monitoring Well Screened in the Memphis Aquifer
- Property Boundary
- Clay Elevation Exceeds Groundwater Elevation

Well Classification

MW-16	Background
MW-219	Boundary
MW-22	EBT-Performance
MW-88	Performance
MW-34	Sentinel
MW-270	SRI Phase 1 Well

Figure 25

MAIN INSTALLATION WELL LOCATION MAP

2016 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 , mean sea level

Date: 12/20/15
Edition: Rev 0

HDR

Path: W:\temp\Requests\20151230\Figure_25_Existing_and_SRI_Wells.mxd

Legend

- Monitoring Well Screened in the Fluvial Aquifer
- Monitoring Well Screene in the Transition Zone
- Monitoring Well Screened in the Intermediate Aquifer
- Monitoring Well Screened in the Memphis Aquifer

SRI Wells

- Fluvial
- IAQ

- 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
- Clay Elevation Exceeds Groundwater Elevation

Note: Groundwater elevations from water level measurements in April 2015 for LTM wells and July 2015 for SRI wells.

MW-03 100.12	Blue: value used for Fluvial Aquifer groundwater contours
MW-107 202.34	Lt Blue: Transition Zone
MW-237 100.15	Orange: value used for Intermediate Aquifer groundwater contours
MW-254 156.83	Green: Memphis Aquifer, not contoured

Figure 26

MAIN INSTALLATION GROUNDWATER ELEVATIONS

2016 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 , mean sea level

Date: 12/30/15
Edition: Rev 0

HDR

Path: W:\tempRequest\20151230\Figure_26_Groundwater_Elev_April_July2015.mxd

Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
1		**MAIN INSTALLATION**	**6346 d**	**Mon 9/11/06**		**Thu 1/25/24**
2		**Main Installation Remedial Action (RA)**	**5635 d**	**Mon 9/11/06**		**Sun 2/13/22**
3		MI RA-O Initial Enhanced Bioremediation Treatment (Y1 and Y2)	900 d	Mon 9/11/06		Thu 2/26/09
4		**MI RA-O Additional Enhanced Bioremediation Treatment**	**977 d**	**Mon 9/17/12**		**Thu 5/21/15**
19		**Supplemental Remedial Investigation (SRI)**	**823 d**	**Mon 10/27/14**		**Thu 1/26/17**
20	**P**	**SRI Phase 1 Work Plan**	**164 d**	**Mon 10/27/14**		**Wed 4/8/15**
24		SRI Phase 1 Field Activities	96 d	Mon 4/27/15	23FS+18 d	Fri 7/31/15
25	**S**	**SRI Review/Phase 1 Summary Report**	**182 d**	**Sat 8/1/15**		**Fri 1/29/16**
26		Prepare and Submit Rev. 0 SRI Review/Phase 1 Summary Report	182 d	Sat 8/1/15	24	Fri 1/29/16
27	**P**	**SRI Phase 2 Work Plan**	**131 d**	**Mon 2/1/16**		**Fri 6/10/16**
28		Prepare and Submit Rev. 0 SRI Phase 2 Work Plan	54 d	Mon 2/1/16	26FS+2 d	Fri 3/25/16
29		Agency Review and Submit Comments on Rev. 0 SRI Phase 2 Work Plan	63 d	Sat 3/26/16	28	Fri 5/27/16
30		Prepare and Submit Rev. 1 SRI Phase 2 Work Plan	14 d	Sat 5/28/16	29	Fri 6/10/16
31		SRI Phase 2 Field Activities	56 d	Sat 7/2/16	30FS+21 d	Fri 8/26/16
32	**P**	**SRI Report**	**151 d**	**Mon 8/29/16**		**Thu 1/26/17**
33		Prepare and Submit Rev. 0 SRI Report	60 d	Mon 8/29/16	31FS+2 d	Thu 10/27/16
34		Agency Review and Submit Comments on Rev. 0 SRI Report	63 d	Fri 10/28/16	33	Thu 12/29/16
35		Prepare and Submit Rev. 1 SRI Report	28 d	Fri 12/30/16	34	Thu 1/26/17
36		**Focused Feasibility Study (FFS)**	**436 d**	**Mon 2/1/16**		**Tue 4/11/17**
37		Document Review/Develop Alternatives	35 d	Mon 2/1/16	26FS+2 d	Sun 3/6/16
38		Screen Alternatives/Selected Preferred Alternatives	35 d	Fri 9/2/16	33FS-56 d	Thu 10/6/16
39	**P**	**FFS Report**	**187 d**	**Fri 10/7/16**		**Tue 4/11/17**
40		Prepare and Submit Rev. 0 FFS Report	91 d	Fri 10/7/16	38	Thu 1/5/17
41		Agency Review and Submit Comments on Rev. 0 FFS Report	61 d	Fri 1/6/17	40	Tue 3/7/17
42		Prepare and Submit Rev. 1 FFS Report	35 d	Wed 3/8/17	41	Tue 4/11/17
43		**Record of Decision (ROD) Amendment**	**1769 d**	**Wed 4/12/17**		**Sun 2/13/22**
44	**P**	**Revised Proposed Plan (RPP)**	**145 d**	**Wed 4/12/17**		**Sun 9/3/17**
45		Prepare and Submit Rev. 0 RPP	70 d	Wed 4/12/17	42	Tue 6/20/17
46		Agency Review and Submit Comments on Rev. 0 RPP	61 d	Wed 6/21/17	45	Sun 8/20/17
47		Prepare and Submit Rev. 1 RPP	14 d	Mon 8/21/17	46	Sun 9/3/17
48		**Public Comment Period**	**53 d**	**Tue 9/12/17**		**Fri 11/3/17**
49		Notice of RPP Comment Period and Public Meeting	7 d	Tue 9/12/17	47FS+8 d	Mon 9/18/17
50		RPP Public Comment Period	31 d	Wed 10/4/17	49FS+15 d	Fri 11/3/17
51		Public Meeting	7 d	Sat 10/14/17	50SS+10 d	Fri 10/20/17

Note:
P: Primary document
S: Secondary document
Designation per Section XV. Federal Facilities Agreement, DDMT (USEPA, 1995)

Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
52	**P**	**ROD Amendment**	**252 d**	**Mon 9/4/17**		**Sun 5/13/18**
53		Prepare and Submit Rev. 0 ROD Amendment	119 d	Mon 9/4/17	47	Sun 12/31/17
54		Agency Review and Submit Comments on Rev. 0 ROD Amendment	61 d	Mon 1/1/18	53	Fri 3/2/18
55		Prepare and Submit Rev. 1 ROD Amendment	30 d	Sat 3/3/18	54	Sun 4/1/18
56		Process MI ROD Amendment through ODB, TDEC, EPA	30 d	Mon 4/2/18	55	Tue 5/1/18
57		Final MI ROD Amendment	0 d	Tue 5/1/18	56	Tue 5/1/18
58		Notice of MI ROD Amendment	7 d	Mon 5/7/18	57FS+5 d	Sun 5/13/18
59		**New MI Remedial Action**	**1638 d**	**Mon 8/21/17**		**Sun 2/13/22**
60	**P**	**New MI Remedial Design**	**163 d**	**Mon 8/21/17**		**Tue 1/30/18**
61		Prepare and Submit Rev. 0 New MI RD	75 d	Mon 8/21/17	46	Fri 11/3/17
62		Agency Review and Submit Comments on Rev. 0 New MI RD	60 d	Sat 11/4/17	61	Tue 1/2/18
63		Prepare and Submit Rev. 1 New MI RD	28 d	Wed 1/3/18	62	Tue 1/30/18
64	**P**	**New MI Remedial Action Work Plan**	**158 d**	**Wed 1/31/18**		**Sat 7/7/18**
65		Prepare and Submit Rev. 0 New MI RAWP	70 d	Wed 1/31/18	63	Tue 4/10/18
66		Agency Review and Submit Comments on Rev. 0 New MI RAWP	60 d	Wed 4/11/18	65	Sat 6/9/18
67		Prepare and Submit Rev. 1 New MI RAWP	28 d	Sun 6/10/18	66	Sat 7/7/18
68		**New MI Remedial Action Years 1-3**	1097 d	Sun 8/5/18	67FS+28 d	Thu 8/5/21
69	**S**	**New MI RA Annual Report Year 1**	**193 d**	**Mon 8/5/19**		**Thu 2/13/20**
70		Prepare & Submit Rev. 0 Y1 MI RA Report	105 d	Mon 8/5/19	68SS+365 d	Sun 11/17/19
71		Agency Review & Submit Comments on Rev. 0 Y1 MI RA Report	60 d	Mon 11/18/19	70	Thu 1/16/20
72		Prepare & Submit Rev. 1 Y1 MI RA Report	28 d	Fri 1/17/20	71	Thu 2/13/20
73	**S**	**New MI RA Annual Report Year 2**	**193 d**	**Wed 8/5/20**		**Sat 2/13/21**
74		Prepare & Submit Rev. 0 Y3 MI RA Report	105 d	Wed 8/5/20	70SS+366 d	Tue 11/17/20
75		Agency Review & Submit Comments on Rev. 0 Y2 MI RA Report	60 d	Wed 11/18/20	74	Sat 1/16/21
76		Prepare & Submit Rev. 1 Y2 MI RA Report	28 d	Sun 1/17/21	75	Sat 2/13/21
77	**S**	**New MI RA Annual Report Year 3**	**193 d**	**Thu 8/5/21**		**Sun 2/13/22**
78		Prepare & Submit Rev. 0 Y3 MI RA Report	105 d	Thu 8/5/21	74SS+365 d	Wed 11/17/21
79		Agency Review & Submit Comments on Rev. 0 Y3 MI RA Report	60 d	Thu 11/18/21	78	Sun 1/16/22
80		Prepare & Submit Rev. 1 Y3 MI RA Report	28 d	Mon 1/17/22	79	Sun 2/13/22
81		**MI Annual LUCIP Inspections**	**761 d**	**Fri 7/1/16**		**Tue 7/31/18**
82	S	MI Annual LUCIP Inspection and Report - 2016	31 d	Fri 7/1/16		Sun 7/31/16
83	S	MI Annual LUCIP Inspection and Report - 2017	31 d	Sat 7/1/17		Mon 7/31/17
84	S	MI Annual LUCIP Inspection and Report - 2018	31 d	Sun 7/1/18		Tue 7/31/18
85		**MI RA-O Long Term Monitoring**	2922 d	Wed 1/1/14		Fri 12/31/21

Note:
P: Primary document
S: Secondary document
Designation per Section XV. Federal Facilities Agreement, DDMT (USEPA, 1995)

Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
86		**Main Installation Compliance Monitoring**	365 d	Sat 1/1/22	85	Sat 12/31/22
87	**P**	**Main Installation RA Completion Report**	**300 d**	**Sun 1/1/23**		**Fri 10/27/23**
88		Prepare & Submit Rev. 0 MI RACR	60 d	Sun 1/1/23	86	Wed 3/1/23
89		Agency Review & Submit Comments on Rev. 0 MI RACR	60 d	Thu 3/2/23	88	Sun 4/30/23
90		Respond to Agency Comments on Rev. 0 MI RACR	60 d	Mon 5/1/23	89	Thu 6/29/23
91		Prepare & Submit Rev. 1 MI RACR	120 d	Mon 5/1/23	89	Mon 8/28/23
92		Agency Review of Rev. 1 MI RACR w/ Concurrence	60 d	Tue 8/29/23	91	Fri 10/27/23
93		**Main Installation Well Abandonment**	90 d	Sat 10/28/23	92	Thu 1/25/24
94						
95						
96		**DUNN FIELD**	**4933 d**	**Wed 7/25/07**		**Sun 1/24/21**
97		**Dunn Field Fluvial SVE Remedial Action**	**3962 d**	**Wed 7/25/07**		**Tue 5/29/18**
98		Fluvial SVE Operations Years 1 to 5	1827 d	Wed 7/25/07		Tue 7/24/12
99		Fluvial SVE Rebound Monitoring	1986 d	Wed 7/25/12	98	Sun 12/31/17
100		**Abandon Fluvial SVE System**	84 d	Wed 3/7/18	143	Tue 5/29/18
101		**Dunn Field Off Depot GW Remedial Action**	**3221 d**	**Fri 12/18/09**		**Fri 10/12/18**
102		**Dunn Field Off Depot RA-O AS/SVE Operations Years 1 to 7**	2935 d	Fri 12/18/09		Sat 12/30/17
103	**S**	**Year 5 Extended AS/SVE Report**	**558 d**	**Mon 1/4/16**		**Fri 7/14/17**
104		Prepare & Submit Rev. 0 Y5 Extended AS/SVE Report	57 d	Mon 1/4/16		Mon 2/29/16
105		Agency Review & Submit Comments on Rev. 0 Y5 Extended AS/SVE Report	60 d	Tue 3/1/16	104	Fri 4/29/16
106		Prepare & Submit Rev. 1 Y5 Extended AS/SVE Report	60 d	Sat 4/30/16	105	Tue 6/28/16
107	**S**	**Year 6 AS/SVE Report**	**179 d**	**Tue 1/17/17**		**Fri 7/14/17**
108		Prepare & Submit Rev. 0 Y6 AS/SVE Report	59 d	Tue 1/17/17		Thu 3/16/17
109		Agency Review & Submit Comments on Rev. 0 Y6 AS/SVE Report	60 d	Fri 3/17/17	108	Mon 5/15/17
110		Prepare & Submit Rev. 1 Y6 AS/SVE Report	60 d	Tue 5/16/17	109	Fri 7/14/17
111	**S**	**Year 7 AS/SVE Report**	**179 d**	**Wed 1/17/18**		**Sat 7/14/18**
112		Prepare & Submit Rev. 0 Y7 AS/SVE Report	59 d	Wed 1/17/18		Fri 3/16/18
113		Agency Review & Submit Comments on Rev. 0 Y7 AS/SVE Report	60 d	Sat 3/17/18	112	Tue 5/15/18
114		Prepare & Submit Rev. 1 Y7 AS/SVE Report	60 d	Wed 5/16/18	113	Sat 7/14/18
115		**Abandon AS/SVE System**	90 d	Sun 7/15/18	114	Fri 10/12/18
116		**Dunn Field Annual LUCIP Inspections**	**761 d**	**Fri 7/1/16**		**Tue 7/31/18**
117	S	Dunn Field Annual LUCIP Inspection and Report - 2016	31 d	Fri 7/1/16		Sun 7/31/16
118	S	Dunn Field Annual LUCIP Inspection and Report - 2017	31 d	Sat 7/1/17		Mon 7/31/17
119	S	Dunn Field Annual LUCIP Inspection and Report - 2018	31 d	Sun 7/1/18		Tue 7/31/18

Note:
P: Primary document
S: Secondary document
Designation per Section XV. Federal Facilities Agreement, DDMT (USEPA, 1995)

Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
120		**Dunn Field RA-O Long Term Monitoring**	1826 d	Wed 1/1/14		Mon 12/31/18
121		**Dunn Field Compliance Monitoring**	365 d	Tue 1/1/19	120	Tue 12/31/19
122	**P**	**Dunn Field RA Completion Report**	**300 d**	**Wed 1/1/20**		**Mon 10/26/20**
123		Prepare & Submit Rev. 0 Dunn Field RACR	60 d	Wed 1/1/20	121	Sat 2/29/20
124		Agency Review & Submit Comments on Rev. 0 Dunn Field RACR	60 d	Sun 3/1/20	123	Wed 4/29/20
125		Respond to Agency Comments on Rev. 0 Dunn Field RACR	60 d	Thu 4/30/20	124	Sun 6/28/20
126		Prepare & Submit Rev. 1 Dunn Field RACR	120 d	Thu 4/30/20	124	Thu 8/27/20
127		Agency Review of Rev. 1 Dunn Field RACR w/ Concurrence	60 d	Fri 8/28/20	126	Mon 10/26/20
128		**Dunn Field Well Abandonment**	90 d	Tue 10/27/20	127	Sun 1/24/21
129						
130						
131		**Memphis Depot NPL Site-Wide Activities**	**3146 d**	**Mon 9/14/15**		**Wed 4/24/24**
132		**Site-Wide (MI and Dunn Field) LTM Reports**	**1244 d**	**Mon 11/9/15**		**Fri 4/5/19**
133	**S**	**2015 LTM Report**	**170 d**	**Mon 11/9/15**		**Tue 4/26/16**
134		Prepare & Submit Rev. 0 2015 LTM Report	80 d	Mon 11/9/15		Wed 1/27/16
135		Agency Review & Submit Comments on Rev. 0 2015 LTM Report	60 d	Thu 1/28/16	134	Sun 3/27/16
136		Prepare & Submit Rev. 1 2015 LTM Report	30 d	Mon 3/28/16	135	Tue 4/26/16
137	**S**	**2016 LTM Report**	**150 d**	**Mon 11/7/16**		**Wed 4/5/17**
138		Prepare & Submit Rev. 0 2016 LTM Report	60 d	Mon 11/7/16		Thu 1/5/17
139		Agency Review & Submit Comments on Rev. 0 2016 LTM Report	60 d	Fri 1/6/17	138	Mon 3/6/17
140		Prepare & Submit Rev. 1 2016 LTM Report	30 d	Tue 3/7/17	139	Wed 4/5/17
141	**S**	**2017 LTM Report**	**150 d**	**Tue 11/7/17**		**Thu 4/5/18**
142		Prepare & Submit Rev. 0 2017 LTM Report	60 d	Tue 11/7/17		Fri 1/5/18
143		Agency Review & Submit Comments on Rev. 0 2017 LTM Report	60 d	Sat 1/6/18	142	Tue 3/6/18
144		Prepare & Submit Rev. 1 2017 LTM Report	30 d	Wed 3/7/18	143	Thu 4/5/18
145	**S**	**2018 LTM Report**	**150 d**	**Wed 11/7/18**		**Fri 4/5/19**
146		Prepare & Submit Rev. 0 2018 LTM Report	60 d	Wed 11/7/18		Sat 1/5/19
147		Agency Review & Submit Comments on Rev. 0 2018 LTM Report	60 d	Sun 1/6/19	146	Wed 3/6/19
148		Prepare & Submit Rev. 1 2018 LTM Report	30 d	Thu 3/7/19	147	Fri 4/5/19
149		**Site Management Plan (SMP) Updates**	**869 d**	**Mon 9/14/15**		**Mon 1/29/18**
150	**P**	**2016 Site Management Plan**	**177 d**	**Mon 9/14/15**		**Tue 3/8/16**
151		Prepare & Submit Rev 0 2016 SMP (extended)	117 d	Mon 9/14/15		Fri 1/8/16
152		Agency Review & Submit Comments on Rev 0 2016 SMP	30 d	Sat 1/9/16	151	Sun 2/7/16
153		Prepare & Submit Rev 1 2016 SMP	30 d	Mon 2/8/16	152	Tue 3/8/16

Note:
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Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
154	**P**	**2017 Site Management Plan**	**140 d**	**Mon 9/12/16**		**Sun 1/29/17**
155		Prepare & Submit Rev 0 2017 SMP	80 d	Mon 9/12/16		Wed 11/30/16
156		Agency Review & Submit Comments on Rev 0 2017 SMP	30 d	Thu 12/1/16	155	Fri 12/30/16
157		Prepare & Submit Rev 1 2017 SMP	30 d	Sat 12/31/16	156	Sun 1/29/17
158	**P**	**2018 Site Management Plan**	**140 d**	**Tue 9/12/17**		**Mon 1/29/18**
159		Prepare & Submit Rev 0 2018 SMP	80 d	Tue 9/12/17		Thu 11/30/17
160		Agency Review & Submit Comments on Rev 0 2018 SMP	30 d	Fri 12/1/17	159	Sat 12/30/17
161		Prepare & Submit Rev 1 2018 SMP	30 d	Sun 12/31/17	160	Mon 1/29/18
162	**P**	**CERCLA Fourth 5-Year Review**	**341 d**	**Mon 2/27/17**		**Fri 2/2/18**
163		Notice of Five-Year Review	14 d	Mon 2/27/17		Sun 3/12/17
164		Document Review, Interviews, Inspection, Technical Assessment	70 d	Mon 3/13/17	163	Sun 5/21/17
165		Prepare & Submit Rev. 0 4th 5-Year Review	84 d	Mon 3/27/17	164SS+14 d	Sun 6/18/17
166		Agency Review & Submit Comments on Rev. 0 4th 5-Year Review	61 d	Mon 6/19/17	165	Fri 8/18/17
167		Respond to Agency Comments on Rev. 0 4th 5-Year Review	28 d	Sat 8/19/17	166	Fri 9/15/17
168		Prepare & Submit Rev. 1 4th 5-Year Review	63 d	Sat 8/19/17	166	Fri 10/20/17
169		Agency Review of Rev. 1 4th 5-Year Review	60 d	Sat 10/21/17	168	Tue 12/19/17
170		Prepare & Submit Final 4th 5-Year Review	21 d	Wed 12/20/17	169	Tue 1/9/18
171		Final 4th 5-Year Review Signed	10 d	Wed 1/10/18	170	Fri 1/19/18
172		Notification of 4th 5-Year Review Completion	7 d	Sat 1/27/18	171FS+7 d	Fri 2/2/18
173	**P**	**CERCLA Fifth 5-Year Review**	**341 d**	**Sun 2/27/22**		**Thu 2/2/23**
174		Notice of Five-Year Review	14 d	Sun 2/27/22		Sat 3/12/22
175		Document Review, Interviews, Inspection, Technical Assessment	70 d	Sun 3/13/22	174	Sat 5/21/22
176		Prepare & Submit Rev. 0 5th 5-Year Review	84 d	Sun 3/27/22	175SS+14 d	Sat 6/18/22
177		Agency Review & Submit Comments on Rev. 0 5th 5-Year Review	61 d	Sun 6/19/22	176	Thu 8/18/22
178		Respond to Agency Comments on Rev. 0 5th 5-Year Review	28 d	Fri 8/19/22	177	Thu 9/15/22
179		Prepare & Submit Rev. 1 5th 5-Year Review	63 d	Fri 8/19/22	177	Thu 10/20/22
180		Agency Review of Rev. 1 5th 5-Year Review	60 d	Fri 10/21/22	179	Mon 12/19/22
181		Prepare & Submit Final 5th 5-Year Review	21 d	Tue 12/20/22	180	Mon 1/9/23
182		Final 5th 5-Year Review Signed	10 d	Tue 1/10/23	181	Thu 1/19/23
183		Notification of 5th 5-Year Review Completion	7 d	Fri 1/27/23	182FS+7 d	Thu 2/2/23
184	**P**	**Final Closeout Report (FCOR)**	**180 d**	**Sat 10/28/23**		**Wed 4/24/24**
185		Prepare & Submit Rev. 0 FCOR	60 d	Sat 10/28/23	127,92	Tue 12/26/23
186		Agency Review & Submit Comments on Rev. 0 FCOR	60 d	Wed 12/27/23	185	Sat 2/24/24
187		Respond to Agency Comments on Rev. 0 FCOR	15 d	Sun 2/25/24	186	Sun 3/10/24

Note:
P: Primary document
S: Secondary document
Designation per Section XV. Federal Facilities Agreement, DDMT (USEPA, 1995)

Figure 27
Master Schedule

ID	Status	Task Name	Duration	Start	Predecessors	Finish
188		Prepare & Submit Rev. 1 FCOR	30 d	Sun 2/25/24	186	Mon 3/25/24
189		Agency Review of Rev. 1 FCOR w/ Concurrence	30 d	Tue 3/26/24	188	Wed 4/24/24
190		Final FCOR	0 d	Wed 4/24/24	189	Wed 4/24/24
191		**Site Completion**	0 d	Wed 4/24/24	190	Wed 4/24/24

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Designation per Section XV. Federal Facilities Agreement, DDMT (USEPA, 1995)

APPENDIX A

RESPONSES TO USEPA AND TDEC COMMENTS

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

April 18, 2016

UPS NEXT DAY AIR
RETURN RECEIPT REQUESTED

Ms. Carolyn Jones
Assistant Chief of Staff for Installation Management
Base Realignment and Closure Division (ACSIM-ODB)
2530 Crystal Drive (Taylor Building), Room 5000
Arlington, VA 22202-3940

Dear Ms. Jones:

The U.S. Environmental Protection Agency (EPA) has received and reviewed the Department of Army, Defense Depot of Memphis 2016 Site Management Plan (SMP) Draft Responses to EPA Comments.

EPA approves the above mentioned Department of the Army (DDMT) draft responses to EPA Comments with the understanding that additional modeling efforts will be investigated and a potential modeling effort discussed and potentially undertaken, once site delineation has been completed. Upon further investigation and discussion, the modeling effort may be included during the future Focused Feasibility Study for DDMT.

EPA appreciates the US Army's efforts in the continuing supplemental remedial investigation and efforts to date on the DDMT Site.

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: Ms. Carolyn Jones, (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
Above Letter was also emailed to list below and can be found at the e-file location noted below.

ec: carolyn.a.jones28.civ@mail.mil; jamie.woods@tn.gov; joan.hutton@calibresys.com; thomas.holmes@hdrinc.com; Tyler.P.Jones@usace.army.mil; Laura.W.Roebuck@usace.army.mil

e-bbc: Hammond.richard@epa.gov

C:\DDMT\DDMT_2016 SMP

Responses to
U.S. Environmental Protection Agency (EPA) Region 4 Comments on:
2016 Site Management Plan, Defense Depot Memphis, Tennessee (TN4210020570)
February 2016 (Revision 0)

EPA Comments:

1) **Section 1.0, Introduction:** Please include the location of the information repository and all locations for the administrative record in the third paragraph.

   Response: The Information Repository is maintained at TDEC's Memphis office. Administrative Record files stored at DDMT were sent to the National Archives, Washington National Records Center in December 2013; additional files will be shipped to the archive periodically. Prior to shipment, the files are maintained in a locked file cabinet at the DDMT field office. This summary and the physical addresses for the IR and AR will be added to Section 1.0.

2) **Section 3.3, Property Transfer:** In all future DDMT reports, please state that the off-site plume is a "suspected or potential" off-site plume since this plume hasn't been definitively proven to be off-site to date. EPA appreciates the efforts of the U.S. Army and the Tennessee Department of Environment and Conservation (TDEC) investigations to date and looks forward to future data providing more definitive information

   Response: Army will use the term "suspected off-site" when referring to either the source or the plume. Army considers the plume to be actual, not potential since monitoring wells upgradient of Dunn Field have consistently contained CVOCs above MCLs, but agrees that the source of the plume has not been definitively located. The change will be made in the referenced section and throughout the SMP and future documents, including LTM report, as applicable.

3) **Section 4.2.2, Supplemental Remedial Investigation and Focused Feasibility Study:** EPA would like to open a dialogue to discuss updated groundwater modeling efforts during the review/discussion of the Supplemental Remedial Investigation and Focused Feasibility Study. Updated groundwater modeling is needed to better understand the complex onsite hydrogeologic conditions, along with additional information to assess the groundwater gradient. It has been over 9 years since the last modeling effort and additional data collected to date along with the suggested additional monitor well water level data from the Allen Well Field and MAQ wells would improve understanding of the hydraulic parameters along with fate and transport characteristics for all aquifers. This would enable any potential system design specifications to be optimized in future remedial efforts to address the onsite groundwater contamination. Please include this in the revised Site Management Plan Schedule.

   Response: As stated in the SRI Phase 1 Report, the results of the previous groundwater model from 2009 are considered reasonable. The additional information required to update the model, primarily "additional MAQ monitoring wells to obtain data on the hydraulic parameters and fate and transport characteristics of the MAQ and recent data on water levels at the Allen Well Field" has not been developed and is not within the current scope of the SRI. The Army is open to discussions on all aspects of the SRI including additional groundwater modeling. However, since the activity is not currently scoped or scheduled, revision of the SMP schedule to include modeling is not appropriate.

4) Please include a public community meeting in future site plans, preferably in the late 2016 and at the latest the early 2017 timeframe. As has been mentioned several times, it is important to update the surrounding community with respect to site status and future plans and it has been several years since a public meeting was held. A public meeting is required anytime a Record of Decision has an Amendment and should be included in the revised Site Management Plan Schedule.

   Response: Army understands that public meeting/presentation and comment period is required if a ROD Amendment is proposed. A public meeting to present a Revised Proposed Plan following the Focused Feasibility Study is tentatively planned in early FY18; it is listed in Section 5.1 and on Line 51 of the Master Schedule (Figure 27).

5) EPA would also like to see the present vapor intrusion investigation inclusive of soil and groundwater will be included in the Site Management Plan, potentially in **Section 4.0, Activities Required for Site Completion** or as deemed appropriate.

   Response: Sub-section 4.2.4 Vapor Intrusion will be added to summarize site conditions and the general scope of the planned VI risk evaluation.

   a. The current status of all vapor intrusion investigations (groundwater and soil) should also be included in the Site Management Plan for both Dunn Field and the Main Installation. Please include the applicable data for the residential properties down gradient of Dunn Field.

   Response: A summary of the vapor intrusion study performed in the Off Depot area will be added to sub-section 3.2.3.4.

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

April 12, 2016

Carolyn Jones
Program Manager
Office of the Chief of Staff for Installation Management
Attn: BRAC Division (DAIM-ODB)
2530 Crystal Drive (Taylor Bldg.), Room 5000
Arlington, VA 22202-3940

Subject: **2016 Site Management Plan (SMP) – Response to Comments**
Main Installation and Dunn Field
Defense Depot Memphis, Tennessee
TDoR ID # 79-736
EPA ID # TN 4210020570

Dear Ms. Jones,

TDEC-DoR has reviewed the **2016 Site Management Plan's Response to Comments**, as compiled by T. Holmes (HDRInc), and approves of these responses. 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: Thomas C. Holmes (HDRInc)
Diedre Lloyd (EPA-PM)
Joan Hutton (CALIBRE)
TDoR NCO: file 79-736
TDoR MEFO: file 79-736

Responses to
Tennessee Department of Environment and Conservation (TDEC) Comments on:
2016 Site Management Plan, Defense Depot Memphis, Tennessee (TN4210020570)
February 2016 (Revision 0)

TDEC Comments:

1) **Section 3.1.2, Record of Decision (Main Installation); page 3-2:** While it's not an RAO as defined by the ROD for the Site, this section needs to document that the vapor intrusion risk will be evaluated for the Main Installation, for both the soil and groundwater scenarios.

   Response: Sub-section 4.2.4 Vapor Intrusion will be added to summarize site conditions and the general scope of the planned VI risk evaluation.

2) **Section 3.2.2, Record of Decision and ROD Amendment (Dunn Field); page 3-10:** While we have an RAO for VI regarding subsurface soils for Dunn Field, the Site Management Plan should indicate that the vapor intrusion risk for groundwater has been evaluated for the residential properties down gradient of Dunn Field (Gas Light community).

   Response: A summary of the VI sampling conducted in the Off Depot area will be added in Section 3.2.3.4.