DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH WING (ACC)
HOLLOMAN AIR FORCE BASE NEW MEXICO

May 6, 2016

ADAM M. KUSMAK, GS-13, USAF
Chief, Installation Management Flight (49 CES/CEI)
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Holloman Air Force Base, NM

New Mexico Environment Department
Attn: Mr. John Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6063

Re: **Final Supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan, Sites TU521 (SWMUs 122 & 123) and Building 823**
EPA ID# NM6572124422, HWB-HAFB-12-011 and HWB-HAFB-MISC
Holloman Air Force Base, Alamogordo, NM
Contract No. FA3002-07-D-0015

Dear Mr. Kieling,

Attached is the *Final Supplemental RCRA Facility Investigation (RFI) Work Plan, Sites TU521 (SWMUs 122 & 123) and Building 823.* This work plan is submitted in response to the NMED's 14 August 2014 Disapproval Letter for the previous RFI Report for SWMUs 122 & 123 dated June 2012, and the NMED's 20 April 2015 Notification of Discovery of Two Suspected Areas of Concern letter. The work plan is also included on the enclosed CD(s), with native and PDF files.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions regarding this submittal, please contact me at (575) 572-6675 or by email at adam.kusmak@us.af.mil.

Sincerely,

KUSMAK.ADAM.M.1263331806

Digitally signed by KUSMAK.ADAM.M.1263331806
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=KUSMAK.ADAM.M.1263331806
Date: 2016.05.06 12:46:43 -06'00'

ADAM M. KUSMAK, GS-13, USAF

Attachment(s): *Final Supplemental RCRA Facility Investigation (RFI) Work Plan, Sites TU521 (SWMUs 122 & 123) and Building 823.* Hard copy and CD.

cc: Mr. Dave Strasser, NMED HWB (w/Atch, CD)
Mr. Brian Salem, NMED HWB (w/Atch, CD)
Mr. Cornelius Amindyas, NMED HWB (w/o Atch)
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FINAL
SUPPLEMENTAL
RCRA FACILITY INVESTIGATION
WORK PLAN

Sites:
TU521 (SWMUs 122 and 123)
and
Building 823

Holloman Air Force Base, New Mexico

Prepared for
Air Force Civil Engineer Center
2261 Hughes Ave, Suite 155
Joint Base San Antonio Lackland, Texas 78236-9853

Contract No.: FA3002-07-D-0015

AECOM

Greenwood Village, Colorado

April 2016

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
amsl	above mean sea level
bgs	bgs
CAC	Corrective Action Complete
COPC	chemical of potential concern
CSM	conceptual site model
DBMS	Database Management System
DPT	direct-push technology
DRO	diesel range organics
ERPIMS	Environmental Resources Program Information Management System
ft	foot/feet
GC	gas chromatography
GIS	geographic information system
GRO	gasoline range organics
HSA	hollow stem auger
IDW	investigation-derived waste
MCL	maximum contaminant level
mg/cm^3	milligrams per cubic centimeter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
ORO	oil range organics
PAH	polynuclear aromatic hydrocarbon
PBR	Performance Based Remediation
PCS	petroleum-contaminated soil
PID	photoionization detector
POL	Petroleum, Oils, and Lubricants
ppbv	parts per billion volume
PPE	personal protective equipment
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan

SWMU	Solid Waste Management Unit
SOP	Standard Operating Procedure
SSL	Soil Screening Level
SVOC	semivolatile organic compound
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
UFP	Uniform Federal Policy
µg/L	micrograms per liter
USAF	United States Air Force
U.S. Census	United States Census Bureau
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VISL	vapor intrusion screening level
VOC	volatile organic compound
WSMR	White Sands Missile Range

1.0 INTRODUCTION

This Supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan addresses two sites located at Holloman Air Force Base (AFB) near Alamogordo, New Mexico (Figure 1-1), which require further investigation and evaluation of the nature and extent of petroleum hydrocarbon releases:

- TU521 (Solid Waste Management Units [SWMUs] 122 and 123), and
- Building 823.

This Supplemental RFI Work Plan has been prepared by AECOM on behalf of the United States Air Force Civil Engineer Center (AFCEC), under Contract Number FA3002-07-D-0015, in accordance with Holloman AFB's RCRA Hazardous Waste Facility Permit (Permit Number - NM6572124422) (NMED 2004).

Multiple investigations and remedial activities (including petroleum contaminated soil [PCS] removal) have been conducted at TU521 (SWMUs 122 and 123). However, the New Mexico Environment Department (NMED) issued an RFI Disapproval Letter on 14 August 2014 (**Appendix A**) (NMED 2014) based on total xylene concentrations greater than the New Mexico Water Quality Control Commission (NMWQCC) standard, observed soil staining, and elevated photoionization detector (PID) readings in the vicinity of SWMU122-MW09. In the Disapproval Letter, NMED requested additional investigation, including a soil gas survey.

Building 823 is a more recently identified site where no investigations have been conducted, but soils contaminated with total petroleum hydrocarbons (TPH) were discovered in 2014. In order to conduct an efficient RFI, the Work Plan, field work, and report for TU521 (SWMUs 122 and 123) and Building 823 will be conducted simultaneously.

1.1 Purpose and Objectives

The purpose of this Supplemental RFI is to collect data to adequately characterize the sites and determine if remedial action is warranted. Specific objectives include:

- TU521 (SWMUs 122 and 123) – Determine the nature and extent of xylene contamination in the area of monitoring well SWMU122-MW09.
- Building 823 – Determine the nature and extent of subsurface PCS, and associated dissolved constituents in groundwater at Building 823.
- Estimate risk to human health and the environment.

These objectives will be accomplished by:

- Identifying potential contamination sources;
- Delineating the lateral and vertical extent of soil contamination;
- Delineating the downgradient extent of groundwater contamination, if necessary;

- Collecting hydrological, chemical, and other data pertinent to the evaluation; and
- Installing groundwater monitoring wells including upgradient, source area, and downgradient wells so groundwater constituent concentrations can be monitored.

1.2 Holloman AFB History

Holloman AFB is in south central New Mexico, in the northwest central part of Otero County, approximately 75 miles north-northeast of El Paso, Texas (United States Air Force [USAF] 2013). Holloman AFB has a population of approximately 3,054 (United States Census Bureau [U.S. Census] 2010) and occupies 59,639 acres in the northeast quarter of Section 1, Township 17 South, Range 8 East. The White Sands Missile Range (WSMR) testing facilities occupy additional land extending northward and westward from the Base. Privately and publicly owned lands border the remainder of Holloman AFB. The major highway servicing Holloman AFB is United States Route 70, which runs southwest from the town of Alamogordo, New Mexico, and separates Holloman AFB from publicly owned lands to the south. Alamogordo, which has a population of approximately 30,401 (U.S. Census 2010), is approximately 7 miles northeast of the Base.

Holloman AFB was first established in 1942 as Alamogordo Army Air Field. From 1942 through 1945, Alamogordo Army Air Field served as the training grounds for over 20 different flight groups, primarily flying B-17s, B-24s, and B-29s. After World War II, most operations at the Base had ceased. In 1947, Air Material Command announced that the air field would be its primary site for testing and development of unmanned aircraft, guided missiles, and other research programs (USAF 2013). On 13 January 1948, the Alamogordo installation was renamed in honor of the late Colonel George V. Holloman, a pioneer in guided missile research. In 1968, the 49th Tactical Fighter Wing arrived at Holloman AFB and has remained there since. Today, Holloman AFB also serves as the German Air Force's Tactical Training Center.

1.3 Summary of Existing Assessment Data

1.3.1 Site TU521 (SWMUs 122 and 123)

As shown on **Figure 1-1**, SWMUs 122 and 123 are located within the northeastern portion of the main base area in an industrial area. SWMUs 122 and 123 are former waste oil tanks located at the northwestern and northeastern corners, respectively, of the Petroleum, Oils, and Lubricants (POL) wash rack, inside the POL facility (**Figure 1-2**). The two former underground waste oil tanks received oil and fuels from two underground oil/water separators (SWMUs 21 and 22) that collected wash water from the POL Washrack. During the early 1990s POL Washrack renovation, the two waste oil tanks (SWMUs 122 and 123) and the associated oil/water separators (SWMUs 21 and 22) were removed and replaced (NationView, LLC [NationView] 2012).

Previous investigations and remedial actions for SWMUs 122 and 123 include:

- *RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report* (A.T. Kearney, Inc. 1988).
- *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units* (Radian Corporation 1994).
- *Closure Report for Remediation of POL-Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November, 1995* (EBASCO Services, Inc. and Groundwater Technology Government Services, Inc. 1995).
- *Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123 and OT-44, Holloman Air Force Base, New Mexico* (Groundwater Technology Government Services, Inc. 1996).
- *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico* (Foster Wheeler Environmental Corporation 1997).
- *Results of Additional Soil Sampling for Remediation of the POL-Contaminated 123, at Holloman Air Force Base, New Mexico* (Foster Wheeler Environmental Corporation 1999).
- *Site Investigation Report SWMU 123, Holloman Air Force Base, New Mexico* (Bhate Environmental Associates, Inc. 2004).
- *Voluntary Corrective Measures Work Plan SWMU 123, Holloman Air Force Base, New Mexico* (Bhate Environmental Associates, Inc. 2005).
- *RCRA Facility Investigation Report, SWMUs 122 and 123, Holloman Air Force Base, New Mexico* (NationView 2012).

Detailed summaries of these previous investigations and remedial actions are included in the RFI Report (NationView 2012). These previous investigations identified volatile organic compounds (VOCs) (benzene, toluene, ethylbenzene, and xylenes), semivolatile organic compounds (SVOCs) (naphthalene and phenol), and TPH gasoline and diesel range organics (GRO and DRO, respectively) at SWMU 123. Remedial actions were conducted in 1995, 1997, and 2005 to excavate and remove the PCS associated with SWMU 123 (NationView 2012). The most recent investigation in 2009 was the RFI (NationView 2012) which included further investigation of groundwater at SWMU 123 and subsurface soil at SWMU 122. The RFI involved five new direct push soil sampling points and 12 new groundwater monitoring wells (SWMU122-MW01 through SWMU122-MW12) associated with SWMU 122. These wells were sampled along with three existing monitoring wells (SWMU123-MW03 through SWMU123-MW05).

The following conclusions were presented in the NationView 2012 RFI Report:

- Soil containing TPH in excess of the NMED Soil Screening Levels (SSLs) and/or TPH Screening Guidelines (NMED 2006) had been removed from the site.

- Total Dissolved Solids (TDS) concentrations in groundwater at TU521 ranged from 1,750 micrograms per liter (mg/L) (SWMU122-MW03) to 23,000 mg/L (SWMU122-MW12).
- Results of groundwater analysis from 2009 indicate total xylenes (sum of m-, p-, and o-isomers) were present at a concentration which exceeded the NMWQCC standard (620 micrograms per liter [µg/L]) in only one well (SWMU122-MW09, 725 µg/L). The total xylenes concentration at SWMU122-MW09 was more than an order of magnitude below the current United States Environmental Protection Agency (USEPA) maximum contaminant level (MCL) of 10,000 µg/L (USEPA 2015).
- TPH was also identified in groundwater samples at concentrations which exceeded the prior NMED TPH screening levels. However, NMED has discontinued use of groundwater TPH concentrations as a screening tool (NMED 2015a), leaving total xylenes in groundwater as the only chemical of potential concern (COPC) for TU521.
- A human health risk assessment for potential future residents, current commercial/industrial workers, and future construction workers resulted in cumulative risk for each potential receptor below the acceptable target risk level for each potential receptor. Current residual concentrations of COPCs in soil and groundwater at SWMUs 122 and 123 do not result in adverse risk to potential future residents (adults and children), current commercial/industrial workers, and future construction workers (NationView 2012).
- No Further Action (NFA) was recommended based on NMED Closure Criterion #5, for SWMUs 122 and 123 (Building 702 and Building 704 Waste Oil Tanks).
    - NFA (now Corrective Action Complete [CAC]) Criterion 5: The SWMUs have been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use (NationView 2012).

In a letter dated 14 August 2014, NMED disapproved the RFI Report (**Appendix A)** (NMED 2014) and requested additional delineation work surrounding well SWMU122-MW09, which had reported xylene concentrations in excess of the NMWQCC standard in New Mexico Administrative Code (NMAC) 20.6.2.3103. NMED also requested plans for a passive soil gas survey to assist in determining the extent of soil contamination and locations for additional soil borings and wells.

Groundwater flow direction at the site, as presented in the RFI Report (NationView 2012), is to the southeast, due to localized influences – groundwater flow in this part of the Base is typically to the southwest. In the RFI Report, NationView suggested that the xylene contamination from well SWMU122-MW09 may not be attributed to SWMUs 122 and 123 because six wells (SWMU122-MW03 through -MW05 and SWMU123-MW3 through -MW5), which are up-gradient of well SWMU122-MW09, did not contain exceedances of xylenes. Instead, it was suggested in the RFI Report that the contamination at well SWMU122-MW09 may be related to the up-/cross-gradient POL tank farm located less than 100 feet (ft) to the north-northeast. This

Supplemental RFI Work Plan presents the additional delineation activities proposed around SWMU-MW09.

1.3.2 Building 823

Building 823 is located in the south central portion of the Base, directly adjacent to the Controlled Area of the Holloman AFB airfield (**Figures 1-1 and 1-3**). During excavation to install electrical lines in 2014, soil contaminated with petroleum hydrocarbons was discovered, and a single composite sample contained TPH (TPH-Diesel) at a concentration of 975 milligrams per kilogram (mg/kg), less than the NMED (2015a) residential SSL for diesel #2/crankcase oil of 1,000 mg/kg. The NMED (2015a) industrial/occupational SSL is 3,000 mg/kg. Site cleanup decisions cannot be based solely on the results of TPH sampling, but must be used in conjunction with the screening levels for individual petroleum-related contaminants (NMED 2015a). Currently there are no monitoring wells in the vicinity of Building 823, and groundwater impacts are unknown.

In a letter dated 15 January 2015 (**Appendix B**) (Holloman AFB 2015), Holloman AFB notified NMED that a two-point composite soil sample was collected at Building 823, and that soils containing TPH (TPH-Diesel) at a concentration of 975 mg/kg. The notification letter appears to indicate that only one location at Building 823 was sampled, and it does not specify the precise location of the two-point composite sample.

A review of the available laboratory reports indicates that two separate soil samples were collected to characterize PCS identified at Building 823 and delivered to different laboratories for analysis:

- Sample "GT158009" was collected on 4 April 2014 and has a TPH concentration of 160.7 mg/kg.
- Sample "GT148037" was collected on 8 June 2014 and has a TPH-Diesel concentration of 975 mg/kg. The sum of all TPH fractions is 1,652.7 mg/kg.
- The chains-of-custody state that "GT158009" was collected from surface soil (0 to 0 ft bgs), and that "GT148037" was collected from 0 to 1 ft bgs.

Based on the specification of "975 mg/kg TPH" in the Holloman AFB notification letter (Holloman AFB 2015), it appears that analytical results for sample "GT148037" are the subject of the notification to NMED. No further details regarding the location or composition of sample "GT158009" (that was collected prior to sample “GT148037”) are available.

In the notification letter, Holloman AFB proposed to submit an RFI Work Plan to determine the nature and extent of contamination (Holloman AFB 2015). NMED concurred with this proposal in a 20 April 2015 letter (**Appendix B)** (NMED 2015b). The RFI activities for Building 823 described in this Work Plan will be conducted to delineate the nature and extent of petroleum

hydrocarbon contamination associated with the previously identified elevated TPH concentrations at Building 823.

1.4 Supplemental RFI Work Plan Organization

This Supplemental RFI Work Plan is divided into nine sections and two appendices. The sections of this Work Plan include:

- **Section 1** – Introduction, purpose and objectives, Holloman AFB history, and a summary of relevant existing assessment data.
- **Section 2** – Environmental Setting that includes details of the climate, geology, soils, hydrogeology, surface water hydrology, land use, and current and future water use.
- **Section 3** – Source Characterization description.
- **Section 4** – Potential Receptors, provides a description of the human and ecological receptors that may be exposed to contaminants at the sites. Includes a summary of the previous risk evaluation for TU521.
- **Section 5** – Sampling and Analysis Plan (SAP), documents monitoring procedures necessary to characterize the extent of contamination. Specifically, the sampling strategy, procedures, and analyses are described.
- **Section 6** – Data Management Plan, describes the plan to document and track investigation data and results.
- **Section 7** – Project Management Plan, provides a schedule of implementation and project organization.
- **Section 8** – RFI Report Elements, describes the information anticipated to be included within the RFI Report generated as a result of the tasks described in this Work Plan.
- **Section 9** – References, includes a list of documents referenced in this Work Plan.
- **Appendix A** contains the NMED Disapproval Letter for the TU521 (SWMUs 122 and 123) RFI Report.
- **Appendix B** contains the Holloman AFB Notification Letter to conduct an RFI at Building 823, and the NMED Response/Approval Letter.

2.0 ENVIRONMENTAL SETTING

2.1 Climate

In general, New Mexico has a mild, arid to semiarid continental climate characterized by low precipitation totals, abundant sunshine, relatively low humidity, and relatively large annual and diurnal temperature ranges (Western Regional Climate Center 2013). The climate of the Central Closed Basins varies with elevation. The Base is located in the lower elevation areas, characterized by warm temperatures and dry air. Daytime temperatures often exceed 100 degrees Fahrenheit (°F) in summer and are in the middle 50-°F range in winter. A preponderance of clear skies and relatively low humidity permits rapid cooling resulting in average diurnal temperature ranges of 25 to 35°F. Potential evapotranspiration, at 73 inches per year, significantly exceeds annual precipitation, usually less than 12 inches. Arid conditions resulting from very low rainfall amounts, coupled with topographically induced wind patterns and combined with sparse vegetation, tend to cause localized "dust devils." The annual rainfall for Alamogordo is 12 inches per year. Much of the precipitation falls during the mid-summer monsoonal period (July and August) from brief, yet frequent, intense thunderstorms accounting for 30 to 40 percent of the total annual rainfall.

2.2 Regional Geology and Soils

2.2.1 Geology

Holloman AFB is located within the Basin and Range Physiographic Province, in the Sacramento Section on the western edge of the Sacramento Mountains, at a mean elevation of 4,093 ft above mean sea level (amsl) (United States Geological Survey [USGS] 2003). The region is characterized by high tablelands with rolling summit plains, cuesta-formed mountains dipping eastward and west-facing escarpments. Holloman AFB is within the Tularosa Basin, which is part of the Central Closed Basins (NMED 2004). The bordering mountains rise abruptly to altitudes of 7,000 to 12,000 ft amsl. The San Andres Mountains are approximately 30 miles to the west and bound the basin to the west, with the Sacramento Mountains approximately 10 miles to the east. At its widest, the basin is approximately 60 miles east to west and stretches approximately 150 miles north to south.

The sedimentary rocks, which make up the adjacent mountain ranges, are between 500 and 250 million years old. During the period when the area was submerged beneath a shallow intracontinental sea, layers of limestone, shale, gypsum, and sandstone were deposited. In time, these layers were pushed upward through various tectonic forces, forming a large bulge on the surface. Approximately 10 million years ago, the center began to subside, resulting in a vertical drop of thousands of feet leaving the edges still standing (the present-day Sacramento and San Andres mountain ranges). In the millions of years following, rainfall, snowmelt, and wind eroded the mountains, depositing sediments in the valley (i.e., the Tularosa Basin) (NationView/Bhate 2011).

The Tularosa Basin is an endoheric basin (a closed basin with no surface drainage outlet). Sediments carried by surface water into a closed basin are referred to as bolson deposits. The overlying alluvium generally consists of unconsolidated gravels, sands, and clays. Soils in the basin are derived from the adjacent ranges as erosional deposits of limestone, dolomite, and gypsum. A fining sequence from the ranges towards the basin's center characterizes the area with the near surface soils being alluvial, eolian, and lacustrine deposits. The alluvial fan deposits are laterally discontinuous units of interbedded sand, silt, and clay. The eolian deposits are primarily gypsum sands. The eolian and alluvial deposits are usually indistinguishable due to reworking of the alluvial sediment by eolian processes. The playa, or lacustrine deposits, are clay containing gypsum and are contiguous with the alluvial fan and eolian deposits throughout the Base. Stiff caliche layers, varying in thickness, have been identified at different areas of the Base (NationView/Bhate 2011).

2.2.2 Soils

The United States Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service) has identified three soil associations in the vicinity of Holloman AFB—the Holloman-Gypsum Land-Yesum Complex, Nasa-Yesum Complex, and Mead silty clay loam. The hydraulic conductivity of these horizons ranges from 2.7×10^{-4} to 1.5×10^{-2} centimeters per second (NRCS 2015).

The soil type found across the main drainage area for the Base is the Holloman-Gypsum Land-Yesum Complex (0 to 5 percent slopes), and consists of larger areas of shallow and deep, well-drained soils and areas of exposed gypsum. The Holloman soil makes up approximately 35 percent of the complex. Typically, the surface layer is light brown, very fine sandy loam approximately 3 inches thick. The upper 13 inches of the substratum is pink, very fine sandy loam that is very high in gypsum. Below that, the substratum is white gypsum to a depth of more than 60 inches. This soil is calcareous and mildly to moderately alkaline throughout. Permeability is moderate, and available water capacity is very low (NRCS 2015).

Gypsum Land makes up approximately 30 percent of the Holloman-Gypsum Land-Yesum Complex (0 to 5 percent slopes). Typically less than 1 inch of very fine sandy loam overlies soft to hard, white gypsum. The deeper Yesum horizon consists of very fine sandy loam that makes up approximately 20 percent of the complex. Typically, the surface layer is light brown, very fine sandy loam approximately 3 inches thick. The upper 9 inches of the substratum is light brown, fine sandy loam that is very high in gypsum. Below that, the substratum is pink, very fine sandy loam to a depth of more than 60 inches. The soil is calcareous throughout and is mildly alkaline. Permeability is moderate, and available water capacity is moderate. Many fine gypsum crystals are found throughout the soil profile (NRCS 2015).

The Nasa-Yesum Complex (0 to 6 percent slopes) occurs in the western and northern portions of the Base. This complex has larger areas of shallow and deep, well-drained soils and areas of exposed gypsum. Nasa soil makes up about 50 percent of the complex, and Yesum makes up

approximately 35 percent. Typically, the surface layer is a sandy loam approximately 5 inches thick. The upper 27 inches of the substratum is a gypsiferous sandy loam. Below that, the substratum is cemented material (caliche) and additional gypsiferous sandy loam to a depth of more than 60 inches. This soil is calcareous and moderately alkaline to alkaline throughout. Permeability is very low to high, and available water capacity is low to moderate (NRCS 2015).

The Mead silty clay loam (0 to 1 percent slopes) underlies a small portion of the Base. This deep, poorly drained, nearly level soil occurs on outer fringes of alluvial fans. This soil formed in fine-textured alluvium over lacustrine lake sediment. It is very high in salt content because of periodic flooding and poor drainage. Slopes are smooth and concave. Typically, the surface layer is reddish-brown, silty clay loam and clay loam approximately 5 inches thick. The substratum, to a depth of 48 inches, is light reddish-brown clay that has a high salt content. Below that, the substratum is lacustrine material of variable texture and color to a depth of more than 60 inches. Included within this soil are areas of Holloman and Gypsum Land along the margins of the unit of steep, short gully sides and knolls. These inclusions make up approximately 15 percent of the map unit for this soil type. Individual areas are generally smaller than 10 acres. This soil is moderately calcareous throughout and moderately to strongly alkaline. It has a layer of salt that is more soluble than gypsum. Permeability is very low, and available water capacity is low (NRCS 2015).

2.2.3 Regional Hydrogeology

Groundwater occurs as an unconfined aquifer in the unconsolidated deposits of the central Tularosa Basin, with the primary source of recharge being rainfall percolation, with minor amounts of stream runoff along the western edge of the Sacramento Mountains. Surface water/rainfall migrates downward into the alluvial sediments at the edge of the shallow aquifer near the ranges, and flows downgradient through progressively finer-grained sediments towards the central basin. Because the Tularosa Basin is a closed system, water that enters the area leaves either through evaporation or percolation. This condition results in a fairly high water table. Beneath Holloman AFB, groundwater is 5 to 50 ft below ground surface (bgs). Groundwater flow for the Base is generally towards the southwest with localized influences from variations in topography (**Figure 2-1**). In the northern and western portions of the Base, groundwater flows more to the west towards the Ritas Draw, Malone Draw, and Lost River drainages. Groundwater flow is affected by local topography in areas immediately adjacent to arroyos, where groundwater flows directly toward the drainages regardless of the regional flow pattern (NationView/Bhate 2011).

Groundwater in the Tularosa Basin is of potable quality at the recharge areas in close proximity to the Sacramento Mountains, and becomes increasingly mineralized toward the central portion of the basin where Holloman AFB is located. Groundwater beneath Holloman AFB is naturally of poor quality due to high TDS within the Tularosa Basin Aquifer, with a mean concentration of approximately 22,000 mg/L and maximum observed concentration of greater than 100,000 mg/L.

Groundwater TDS concentrations, and lack of interconnectedness with other aquifers, result in classification of the majority of this aquifer by the USEPA as a Class III B aquifer (unsuitable for human consumption and not a potential source of drinking water). Surface waters present at Holloman AFB include Lost River and Lake Holloman, which also have high TDS concentrations, and are not considered potential drinking water sources (NationView/Bhate 2011).

Hydrogeological data from previous investigations indicate low to moderate hydraulic conductivity (3.48×10^{-3} ft/minute) at sites near SWMUs 122 and 123. Based on data from slug tests conducted at sites near SWMUs 122 and 123, the groundwater velocity is estimated to be approximately 19 ft/year (NationView 2012). During the RFI, the horizontal gradient was calculated as approximately 0.004 ft/ft between wells SWMU122-MW01 and SWMU122-MW12.

Based on recent groundwater observations, the depth to water at TU521 (SWMUs 122 and 123) is approximately 9.5 to 11.5 ft bgs. The groundwater is present in sands and silty sands in a shallow unconfined aquifer. A potentiometric surface map is shown on **Figure 1-4**. The groundwater flow direction is generally towards the south-southeast which differs from the typical Holloman AFB groundwater flow direction of south-southwest. SWMUs 122 and 123 are located close to the Dillard Draw Arroyo (approximately 1,000 ft due east), and this surface water feature has likely influenced the groundwater flow direction (NationView 2012).

At the Building 823 area, the depth to groundwater is anticipated to be approximately 7 to 8.5 ft bgs, based on depths to groundwater at nearby sites. Based on regional groundwater flow at Holloman AFB, groundwater beneath Building 823 is anticipated to flow in a generally southwest direction.

2.2.4 Surface Water Hydrology

The Tularosa Basin contains all of the surface flow in its boundaries (NMWQCC 2006). The nearest inflow of surface waters to the Base comes from the Lost River, located in the north-central region of the Base. The upper reaches of the Three Rivers and Sacramento River are perennial in the basin. Holloman AFB is dissected by several southwest-trending arroyos that control surface drainage. Hay Draw arroyo is located in the far north. Malone and Ritas draws, which drain into the Lost River and Dillard Draw arroyos, are located along the eastern perimeter of the Base. Indications are that the climate was much wetter approximately 10,000 years ago. The present-day Lake Otero formerly encompassed a much larger area, possibly upwards of several hundred square miles. Its remains are the Alkali Flat and Lake Lucero. Lake Lucero is a temporary feature merely a few inches deep during the rainy season. Ancient lakes and streams deposited water-bearing deposits over older bedrock basement materials. Fractures, cracks, and fissures in the Permian and Pennsylvanian bedrock yield small quantities of relatively good quality water in the deeper periphery. Potable water is only found in wells near the edges of the basin with more saline water found towards the center. Two of the principal sources of potable

water are a long narrow area on the upslope sides of Tularosa and Alamogordo and another area in the far southwestern part of the basin. A portion of the city of Alamogordo's water and Holloman AFB's water were formerly supplied from Bonito Lake (which is in the Pecos River Basin) prior to the Little Bear Fire in 2012 (NationView/Bhate 2011).

2.2.5 Land Use

The land surrounding Holloman AFB includes residential areas 5 miles to the east (upgradient) and northeast (City of Alamogordo), rangeland to the south, White Sands National Monument 4 miles to the west, and WSMR to the north and west. The desert terrain immediately surrounding Holloman AFB has limited development. Mesa Verde Ranch operates along the eastern border, and there are no residential communities or large industrial operations located adjacent to the Base. Holloman AFB is an active military installation and is expected to remain active for the foreseeable future. No transfer of military property to the public is anticipated, and public access to the Base is restricted (Foster Wheeler 2002). Future land use is not expected to differ significantly from current land use practices (Foster Wheeler 2002).

2.2.6 Current and Future Water Use

Currently, there are no potable supplies of groundwater or surface water located on the Base. Holloman AFB obtains its water supply from the city of Alamogordo and Holloman AFB wells in the Boles, San Andres, and Douglas well fields at the base of the Sacramento Mountains. No water supply wells are located on or near the Base because of poor groundwater quality with TDS concentrations greater than 10,000 mg/L. There are no potable or irrigation wells near or immediately downgradient of the Base.

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3.0 SOURCE CHARACTERIZATION

3.1 TU521 (SWMUs 122 and 123)

As summarized in **Section 1.3.1**, SWMUs 122 and 123 are former waste oil tanks located at the northwestern and northeastern corners, respectively, of the POL wash rack, inside the POL facility (**Figure 1-2**). The tanks were approximately 5 ft long by 5 ft in diameter (750 gallons), and were located below grade (NationView 2009). The POL wash rack was renovated in the early 1990s and the tanks were removed, but information on the tank integrity is unavailable. The RCRA Facility Assessment conducted in 1988 (A.T. Kearney, Inc. 1988) noted that the tanks were not equipped with automatic fill controls or level monitoring devices. These waste oil tanks likely received wash water, waste oil, and fuels from associated oil/water separators that were located along the northern side of the current POL wash rack (NationView 2012).

Although contaminant sources for SWMUs 122 and 123 are described above, the potential source of total xylenes in monitoring well SWMU122-MW09 that are the focus of this investigation are the tanks in the POL tank farm (**Figure 3-1**). The POL tank farm is located less than 100 ft to the north-northeast of monitoring well SWMU122-MW09 where total xylenes were detected at concentrations exceeding the NMWQCC groundwater standard.

3.2 Building 823

At Building 823 no specific sources have been identified, but the previously collected samples were located on the east side of the building (**Figure 3-2**). The additional data collected as part of this RFI will be used to identify potential sources.

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4.0 POTENTIAL RECEPTORS

4.1 TU521 (SWMUs 122 and 123)

As described above, an RFI was previously conducted at TU521 (SWMUs 122 and 123) (NationView 2009, 2012). Potential human and ecological receptors were identified as part of the RFI process. Land uses and site conditions have not changed at TU521 (SWMUs 122 and 123) since the RFI, and therefore, the receptors selected for the RFI are considered appropriate for potential use in the Supplemental RFI. The receptors identified in the previous RFI are summarized herein and adopted for use in the Supplemental RFI.

As shown on **Figure 1-1**, SWMUs 122 and 123 are located within the northeastern portion of the Base in an industrial area. SWMUs 122 and 123 are former waste oil tanks located at the northwestern and northeastern corners, respectively, of the POL wash rack, inside the POL facility (**Figure 1-2**). Potential human receptors identified during the RFI for SWMUs 122 and 123 include residents, military and civilian workers, construction and maintenance workers, vendors and service providers, and transient visitors. Human use facilities at Holloman AFB primarily consist of residential housing and industrial/operational facilities. The Base also has a hospital, three schools, and a variety of other public service facilities. While groundwater is not locally extracted for use (due to high TDS), human exposure to pollutants may result from dermal contact or ingestion from physical contact with contaminated soils, or indoor vapor intrusion from VOC contamination of soils or groundwater.

Based on current land use and site activities at SWMUs 122 and 123, a commercial/industrial worker was considered a receptor of potential concern under then current conditions for the RFI. Residential development at Holloman AFB is limited and future land use is not expected to differ significantly from current land use. However, for the RFI it was conservatively assumed that residential development at or near SWMUs 122 and 123 could potentially occur. Therefore, a resident was considered a receptor of potential concern under future conditions. Additionally, construction activities may occur in the future, and therefore, a potential future construction worker was also considered a receptor of potential concern. (As described in **Section 1.3.1**, the human health risk assessment conducted as part of the RFI concluded that current residual concentrations of COPCs in soil and groundwater at SWMUs 122 and 123 do not result in adverse risk to current commercial/industrial workers, future residents [adults and children], and future construction workers [NationView 2012].)

Potential ecological receptors considered in the RFI for SWMUs 122 and 123 include the flora and fauna of the surrounding Holloman AFB ecosystem. As noted above, SWMUs 122 and 123 are located in an industrial area. Additionally, there are no ecological habitats in or adjacent to SWMUs 122 and 123. The NMED Scoping Assessment was considered during the RFI. As part of the Site Assessment Checklist, no habitats (wetlands, aquatic, terrestrial, wooded, shrub, grassland, and/or desert) were identified in or adjacent to the site. Therefore, an ecological risk assessment is not warranted for SWMUs 122 and 123.

4.2 Building 823

Land use and habitats at Building 823 are similar to those at TU521 (SWMUs 122 and 123). Building 823 is located in an industrial area of Holloman AFB and there are no ecological habitats in or adjacent to the site. Therefore, the potential human and ecological receptors identified for TU521 (SWMUs 122 and 123) are also appropriate for Building 823. Potential human receptors at Building 823 include current commercial/industrial workers, future residents (adults and children), and future construction workers. An ecological risk assessment is not warranted for Building 823.

4.3 Risk Evaluation for Potential Receptors

As part of this Supplemental RFI, the risk-based evaluation and conceptual site model (CSM) presented in the RFI for TU521 (SWMUs 122 and 123) will be updated based on new site data. For Building 823, a human health risk assessment will be performed to evaluate potential risk to current and future human health receptors (see **Section 4.2**). Methodology for the risk assessment used in the RFI (NationView 2012) will be updated based on the July 2015 NMED *Risk Assessment Guidance for Site Investigations and Remediation* (NMED 2015a). The risk based evaluations will include compilation of relevant historic and supplemental data, identification of COPCs, development of exposure model(s), calculation of representative exposure concentrations, calculation of risks, calculation of cumulative risks, an uncertainty analysis, and conclusions and recommendations, as applicable. Identification of COPCs will include initial comparison to background concentrations of selected metals in soils and groundwater in consideration of the *Basewide Background Study Report* (NationView/Bhate 2011) and associated 12 August 2011 NMED response letter (NMED 2011a).

5.0 SAMPLING AND ANALYSIS PLAN FOR CHARACTERIZATION OF RELEASES OF HAZARDOUS WASTE/HAZARDOUS CONSTITUENTS

This section includes general procedures for implementing the characterization work to be undertaken for the Supplemental RFI. Several project-related plans have also been prepared to support work at Holloman AFB as follows:

- A Uniform Federal Policy – Quality Assurance Project Plan (UFP-QAPP) establishes the overarching analytical and data collection protocols and documentation requirements so that data are generated, reviewed, and analyzed in a consistent manner for the investigation activities performed in the scope of work presented in this Work Plan. The SAP/QAPP (AECOM 2015a) contains the AECOM Standard Operating Procedures (SOPs) that will be used to conduct various activities associated with Work Plan implementation.
- A Health and Safety Plan (AECOM 2016) defines the health and safety guidelines developed to protect AECOM personnel, subcontractors, and government personnel involved in the Supplemental RFI field activities.

5.1 TU521 (SWMUs 122 and 123)

In the RFI Disapproval Letter (NMED 2014), NMED requested that a passive soil gas survey be conducted to assist in determining the extent of any soil contamination, as well as to assist in determining locations of future borings and monitoring wells. To better accomplish the stated goals of this soil gas survey, an investigation of soil gas in the vicinity of SWMU122-MW09 will be conducted by direct-push drilling technology (DPT) and field gas chromatography (GC). Additionally, due to the age of the previous groundwater analytical data collected during the RFI (circa July 2009), new groundwater samples for VOCs and TDS will be analyzed from existing monitoring well SWMU122 -MW09.

Based on a review of site conditions and Supplemental RFI goals, the proposed soil gas survey and groundwater monitoring will likely provide the information necessary to define the nature and extent of total xylenes in the subsurface surrounding SWMU122-MW09, within the context of the TU521 site. However, based on planning discussions with NMED (Pers. Comm., David Strasser, NMED, March 16, 2016), a concern is that the contamination observed in SWMU122-MW09 is not attributable to TU521, but instead is potentially related to the tank farm located adjacent and to the east of TU521 (**Figures 1-2 and 3-1**).

It is anticipated that no new soil borings and/or monitoring wells will be installed at TU521; however, results of the soil gas survey and/or groundwater monitoring at SWMU122-MW09 may indicate that additional soil and/or groundwater sampling locations are necessary to delineate the nature and extent of total xylenes associated with SWMU122-MW09 as they pertain to either TU521 and/or the adjacent tank farm. Should additional environmental sampling become necessary, such efforts (including step-out locations) will be performed in accordance with the methods and procedures presented within this Work Plan.

A summary of the environmental analyses for TU521 is shown below:

- Groundwater
    - VOCs; and
    - Total Dissolved Solids (TDS).

Groundwater monitoring procedures are described in **Section 5.4**, and information regarding the soil gas survey is presented in **Section 5.5**.

5.2 Building 823

Field work at Building 823 will include drilling five borings with a hollow stem auger (HSA) rig to a total depth of approximately 16 ft bgs. DPT is unpredictable at Holloman AFB and use of a HSA is more likely to achieve project objectives. Lithologic data obtained during HSA drilling will also be used to confirm consistency with existing hydrogeologic data and allow well construction similar to existing wells. It is anticipated that soil borings and/or monitoring wells may be drilled during two mobilizations to account for preliminary groundwater sample results that may exceed background and/or regulatory levels, and therefore, require step-outs and further delineation to characterize the extent of contamination. If field observations (e.g., PID readings) during the initial drilling mobilization indicate the presence of petroleum hydrocarbon contamination, then step-out borings may be drilled during that initial mobilization to expedite comprehensive delineation.

Soil samples will be collected at two intervals with the highest PID readings and submitted for laboratory analysis of oil range organics (ORO), DRO, GRO, VOCs, SVOCs, polynuclear aromatic hydrocarbons (PAHs), and metals. It is anticipated that soil borings will be completed during two mobilizations to account for preliminary sample results that may exceed background levels and/or SSLs (or adjusted USEPA RSLs if an SSL is not available), and therefore, require step-outs and further delineation to achieve the Supplemental RFI goal of delineating the nature and extent of contamination.

The soil borings (initial and step-out) will be converted to 2-inch groundwater monitoring wells. Initial planning for monitoring well locations is based on the general assumption that groundwater flows to the southwest at Building 823. Monitoring wells will be developed and sampled for analysis of VOCs, SVOCs, PAHs, metals and TDS. Groundwater delineation will be based on sample results greater than NMWQCC standards and USEPA MCLs. Sampling frequency is described in **Section 5.4**. Monitoring wells will be surveyed by a New Mexico-licensed surveyor.

A summary of the environmental analyses for Building 823 is shown below:

- Soil
    - TPH-GRO, -DRO, and -oil range organics (ORO);
    - VOCs;

  - Semivolatile organic compounds (SVOCs);
  - Polynuclear aromatic hydrocarbons (PAHs); and
  - Target Analyte List (TAL) Metals.
- Groundwater
  - VOCs;
  - SVOCs;
  - PAHs;
  - TAL Metals (Total and Dissolved); and
  - Total Dissolved Solids (TDS).

Sites with TDS concentrations greater than 10,000 mg/L are not considered sources of potable groundwater, but risks must be evaluated to ensure that the water does not pose an unacceptable risk to human health or potentially impact ecological receptors (NMAC 20.6.2.3103). The vapor intrusion pathway will be evaluated in accordance with NMED's *Risk Assessment Guidance for Site Investigations and Remediation* (NMED 2015a). As an initial screening step, analytical results for soil and groundwater will be compared to background concentrations, NMED SSLs and USEPA Regional Screening Levels (RSLs) for soil, and NMWQCC standards and USEPA MCLs for groundwater. Based on the screening results, a baseline risk assessment may be conducted, if necessary, to quantify potential risk to human health.

Monitoring wells will initially be sampled once during the Supplemental RFI. Following a review of the new groundwater analytical results and trend analyses for existing wells, additional sampling may be necessary to achieve a CAC determination. Groundwater level measurements will be taken prior to each sampling event and a potentiometric map will be generated to determine groundwater flow direction. Upon completion of field work, a comprehensive analysis of the data will be conducted as part of the RFI Report, which will include a tabular presentation of the analytical data and potentiometric maps. If groundwater analytical results are less than NMWQCC standards and USEPA MCLs, and NMED vapor intrusion screening levels (VISLs), or if TDS exceeds 10,000 mg/L, additional investigation and/or remediation may not be necessary at this site.

5.3 Field Implementation

The following field work tasks will be performed under this Work Plan:

- Pre-mobilization activities,
- Mobilization/site setup,
- Monitoring well installation and development,
- Groundwater monitoring,
- Soil gas survey,

- Waste management,
- Site restoration, and
- Surveying.

5.3.1 Pre-mobilization Activities

Prior to mobilization of equipment, subcontractors (e.g., drilling subcontractor, New Mexico-licensed surveyor, and approved analytical laboratory) will be procured. Necessary permits (e.g., digging permits and well permits) will be initiated. Site activities will be coordinated with appropriate Holloman AFB personnel.

Prior to initiating intrusive activities, a completed and approved Air Force Form 332 will be obtained for authorization of construction work at Holloman AFB. A request for locating underground utilities in the area will be submitted to the local one-call utility notification center, as applicable. Additionally, Air Force Form 103 will be submitted to request that the location of underground utilities be marked at the specific sites (i.e., TU521 and/or Building 823). Drilling and excavation locations will be identified with paint, flags, or stakes as appropriate to the surface material. Utility clearance approvals will be completed by the appropriate Holloman AFB utility office (e.g., telephone, sewer, water, natural gas, etc.).

Site work in Controlled or Restricted Areas will be conducted while escorted by Holloman AFB approved personnel.

5.3.2 Mobilization/Site Setup

Personnel, equipment, and resources necessary to implement this Work Plan will be mobilized to the site. Warning signs and safety fencing may be used, where necessary, to indicate the danger of entering a work zone and to keep the work area clear of obstructions such as facility-worker vehicles. Setup will also include establishing a location for material storage and other equipment staging areas.

5.3.3 Monitoring Well Installation and Development

5.3.3.1 Monitoring Well Installation

Based on previous data, monitoring wells are anticipated to be installed near Building 823, at the approximate locations shown on **Figure 3-2**. However, these locations may be modified if new groundwater analytical results indicate a different distribution of contaminants. Modifications to proposed soil boring and/or monitoring well locations will be made with the approval of AFCEC and NMED.

Well drilling activities will be performed by an individual with a current and valid well driller license issued by the State of New Mexico. Monitoring wells will be installed using HSA drilling techniques in accordance with the NMED Ground Water Quality Bureau *Monitoring*

Well Construction and Abandonment Guidelines (NMED 2011b). The boreholes will be advanced into the water table using HSAs such that the borehole diameter will be at least 4 inches larger than the outside diameter of the well casing to allow for proper placement of filter pack and sealant. Care will be taken so that the completed monitoring wells are sufficiently straight and plumb to allow passage of measuring and sampling devices.

During drilling, an AECOM geologist will document the following information for each boring:

- Boring or well identification (this identification will be unique, and not previously used at the Base);
- Purpose of the boring (e.g., soil sampling, monitoring well);
- Location in relation to an easily identifiable landmark;
- Names of drilling subcontractor and logger;
- Start and finish dates and times;
- Drilling method;
- Diameter of surface casing, casing type, and methods of installation;
- Depth at which saturated conditions were first encountered;
- Lithologic descriptions and depths of lithologic boundaries;
- Sampling-interval depths; and
- Other pertinent field observations.

Field forms including soil boring logs for documentation of field activities are provided in the SOPs. Well installation equipment will be decontaminated according to specifications of the Decontamination SOP.

Soil samples will be collected from split-spoons (or similar devices) during advancement of each well boring at the two intervals with the highest PID field screen results, or the interval immediately above groundwater if no elevated PID readings are observed. Well borings will be advanced approximately 8 ft into the water table at Building 823 and completed such that the well screen intersects the water table. The wells will be constructed of 2-inch diameter Schedule 40 polyvinyl chloride (PVC) riser and screen. The screened section of the wells will consist of 10 ft of 0.010-inch slotted screen (or other field determined slot size). A silica sand filter pack will be placed around the screen to approximately 2 ft above the top of the screen. A 2-ft thick bentonite seal will be placed above the filter pack. The remaining annular space will be grouted with neat cement.

For wells that will be finished aboveground ("stick-up"), the casing will extend from the top of the screen to approximately 2 to 3 ft above ground surface. The top of the casing will be fitted with a removable cap, and the exposed casing will be protected by a locking steel protective casing. The protective casing will be large enough in diameter to allow easy access for removal of the cap. A concrete pad (2-ft minimum radius, 4-inch minimum thickness) will be installed

around the protective casing and wellhead. The concrete and surrounding soil will be sloped to direct rainfall and runoff away from the wellhead. Protective steel posts (bollards) will be installed around the wells, where needed, to protect the wellhead from damage by vehicles or equipment.

Monitoring wells that are completed as "flush-mounted" will be constructed with water-tight well vaults that are rated to withstand traffic loads and fitted with locking, expandable well plugs. Concrete pads will be poured around the well vaults. Vault covers will be secured with bolts. Additionally, the vault cover will be labeled to indicate that the wellhead of a monitoring well is contained within the vault.

To document specific details of monitoring well installations, the AECOM geologist will prepare drilling logs and as-built well construction diagrams in the field as the activity is taking place. Specific procedures and example forms for installing monitoring wells are provided in SOPs. Monitoring wells will be constructed in accordance with NMED guidance (NMED 2011b).

5.3.3.2 Monitoring Well Development

The newly installed monitoring wells will be developed to create an effective filter pack around the well screen, remove fine particles from the formation near the borehole, and assist in restoring the natural water quality of the aquifer in the vicinity of the well. Newly installed monitoring wells will be developed no sooner than a day after installation to allow for grout curing.

Monitoring wells will be developed using surge blocks, bailers, or pumps to achieve effective well development.

During well development, documentation of the activity will take place in accordance with SOPs and will include recording of water level and depth-to-bottom measurements, water quality parameters, discharge water color, water volume, and time period.

Well development will continue until the following criteria are met:

- Water that has been removed from the well is visually clear, and turbidity is less than or equal to 50 nephelometric turbidity units (NTUs); and
- The pH, temperature, and specific conductance parameters have stabilized (less than 10 percent variation for three successive readings).

In the event that fine-grained deposits are present in the subsurface, it may be difficult to achieve a turbidity of 50 NTUs during well development. This is primarily a concern when a well has been screened in a formation that contains a high level of fine material (silt and clay). Silt and clay can occasionally travel through filter packs on properly constructed wells, resulting in turbid water. While selection of proper filter pack and screen materials minimizes turbidity, fine-grained particles may still flow through. Proper well construction and development procedures will be followed to reduce measured turbidity in monitoring wells. If turbidity remains greater

than 50 NTUs after 4 hours of well development, well development will cease. If the well is pumped dry, it will be allowed to recharge and be repumped as much as practical within a 4-hour time limit.

5.3.4 Groundwater Monitoring

Groundwater samples will be collected as follows:

- TU521 (SWMUs 122 and 123) – Monitoring well SWMU122-MW09 will be sampled once, as described in **Section 5.1**.
- Building 823 – Each monitoring well will be sampled once, as described in **Section 5.2**.

If groundwater analytical results are below NMWQCC standards and USEPA MCLs, and NMED VISLs, or if TDS exceeds 10,000 mg/L for one quarter, a conference call/meeting with NMED will be scheduled to discuss whether further sampling is necessary. Groundwater samples will be analyzed for VOCs, SVOCs, PAHs, metals and TDS at Building 823, and for VOCs and TDS at TU521. Sampling and analytical method requirements for soil samples are described in the SAP/QAPP (AECOM 2015a).

Groundwater samples will be collected from site monitoring wells in accordance with the procedures provided in the SAP/QAPP (AECOM 2015a). If groundwater at the site exceeds NMWQCC standards and USEPA MCLs, the TDS concentrations will be used to determine if the groundwater in the immediate vicinity of the site(s) is greater than the NMWQCC 10,000-mg/L TDS potable water threshold. NMWQCC does not regulate groundwater that has a TDS over this threshold. However, if contaminant concentrations exceed regulatory thresholds, it may be necessary to assess potential risks associated with vapor intrusion.

Groundwater sampling will occur no sooner than 1 day following monitoring well development at any monitoring well. Depth to groundwater will be measured at all site monitoring wells prior to groundwater sample collection to confirm flow direction. Groundwater monitoring wells will be purged and samples will be collected in accordance with the SAP/QAPP and SOPs. Field parameters (e.g., temperature, conductivity, pH, and turbidity) will be measured during well purging. Groundwater samples will be collected after three well volumes have been purged, or after the well has been purged dry and allowed to recharge. Groundwater samples for metals analysis will be submitted to the analytical laboratory for both total and dissolved metals analyses; samples for dissolved metals analysis will be field filtered prior to submittal.

Quality Assurance (QA)/Quality Control (QC) samples will be collected so that sample results can be properly validated. QA/QC samples will be collected at the following frequencies per matrix as detailed in the SAP/QAPP (AECOM 2015a):

- Trip Blanks: one for every cooler containing samples to be analyzed for GRO and/or VOCs.
- Field Duplicates: one for every 20 field samples.

- Matrix Spike, Matrix Spike Duplicate pairs: one for every 20 field samples.
- Rinsate (Equipment) Blanks: one for every 20 field samples collected with non-disposable/non-dedicated equipment. Dedicated/disposable equipment is anticipated to be used for groundwater sampling.

5.3.5 Soil Gas Survey

To address the "passive soil gas survey" required by the 4 August 2014, NMED Disapproval Letter (**Appendix A**) (NMED 2014) for the previous RFI Report (NationView 2012), a soil gas survey will be performed in real time using DPT and a field GC. In general, soil gas sampling may be used to observe the partitioning of VOCs from liquid or sorbed phases to the soil atmosphere, and the transport of these vapors through the vadose zone to provide an indication of soil or groundwater contamination. However, because soil gas analytical results provide a semi-quantitative indication of contamination, they are best suited for site screening and delineation. Conventional monitoring activities such as groundwater sampling may be necessary to confirm and/or monitor subsurface contamination. The purpose of the soil gas survey at TU521 is to assist with delineation of the source of total xylenes in the subsurface, and potentially with the strategic placement of additional monitoring wells, if necessary.

NMED has noted elevated PID readings and staining present at TU521 in the SWMU122-MW09 borehole (NMED 2014) several feet into the saturated zone (approximately 10 to 16 ft bgs, NationView 2012) as being primary drivers for the soil gas survey. Given the relative position of this monitoring well to the former oil-water separators associated with TU521, the elevated total xylenes and PID readings observed in SWMU122-MW09 are not likely attributable to TU521, but may instead be related to the tank farm located adjacent and to the north-northeast of TU521 (**Figure 3-1**). The soil gas survey will be performed with the understanding that the source of the previously identified total xylenes present in SWMU122-MW09 (NationView 2012) may, in fact, originate from the tank farm.

Field work associated with the soil gas survey will include drilling a series of DPT boreholes and analyzing the concentration of xylene(s) in soil gas at several depths with a field/mobile GC using Modified EPA Method 8260. An initial eight soil gas boreholes will be drilled approximately 10 ft to the north, east, south, and west of SWUM122-MW09, and 20 ft to the northeast, southeast, southwest, and northwest of the monitoring well. After these initial boreholes are completed, additional step-out boreholes will be drilled no closer than approximately 10 ft from any previous borehole. Actual distances between step-out boreholes will be determined in the field, based on the xylene(s) results provided by the field/mobile GC. Step-out borings will be discontinued when suitable data have been collected to determine the approximate source of total xylenes previously identified in SWMU122-MW09, or once the absence of elevated total xylenes in the subsurface has been confirmed.

Soil gas boreholes (initial and step-out) will be drilled to total depths of no more than 10 ft bgs, and soil gas samples will be analyzed only from the vadose zone (approximately 0 to 11 ft bgs).

Soil gas samples will initially be analyzed at two intervals: approximately 3 and 6 ft bgs. Soil gas delineation will be based on sample results greater than the NMED VISL (NMED 2015a) for total xylenes in a residential land use setting (104 micrograms per cubic meter [µg/m^3], approximately 24 parts per billion by volume [ppbv] at 24.5° Celsius and one atmosphere pressure). However, this soil gas survey is not designed to support a human health or ecological risk assessment and is to be used as a delineation and screening tool only. No sampling or continuous monitoring of ambient air will be conducted during the soil gas survey. However, a PID will be used to monitor potential vapor emanations from boreholes during drilling.

It is anticipated that the soil gas survey (including initial and step-out borings) will be completed during one mobilization due to the use of the field/mobile GC. The approximate area selected for the soil gas survey (**Figure 3-1**) is based on the assumption that groundwater flows to the south-southeast at TU521. The proposed survey area will allow for delineation of elevated xylene(s) at locations up-, down-, and cross-gradient of SWMU122-MW09.

The soil borings will not be converted to groundwater monitoring wells. Soil gas survey boreholes will be abandoned at the conclusion of the soil gas survey, and these locations will be surveyed for northing, easting, and elevation by a New Mexico-licensed surveyor.

Soil gas boreholes will not be drilled within the fenced portion of the tank farm (**Figure 3-1**), or within approximately 10 ft of any marked or suspected underground utility.

Although experience derived from the New Mexico-Arizona Performance-Based Remediation (PBR) work has shown that drilling with DPT at Holloman AFB is unpredictable and often ineffective due to subsurface caliche layers and compact soil, the targeted depth interval for the soil gas survey is shallow enough that adequate penetration of the subsurface should not be problematic.

It is anticipated that no new soil borings and/or monitoring wells will be installed as part of the investigation at TU521. However, results of the soil gas survey and/or groundwater monitoring at SWMU122-MW09 may indicate that additional soil and/or groundwater sampling locations are necessary to delineate the nature and extent of total xylenes associated with SWMU122-MW09, as they relate to TU521. Should additional environmental sampling be necessary to determine this relationship, such efforts (including step-out locations) will be performed in accordance with the methods and procedures presented in this Work Plan.

5.3.6 Waste Management

Waste management options in order of preference are reuse, recycling, treatment, and disposal. Waste may be classified as non-investigative waste or investigative waste:

- Non-investigative waste, such as trash and office garbage, will be collected on an as-needed basis to maintain the site in a clean and orderly manner. This waste will be accumulated in plastic garbage bags and transported to a designated sanitary landfill or collection bin.

- Investigation-derived waste (IDW) generated during the Supplemental RFI will be segregated into the following categories:
    - Suspected contaminated soil;
    - Decontamination, well development, and purge water; and
    - Personnel protective equipment (PPE), sampling debris, and plastic sheeting.

IDW will be properly containerized and temporarily stored at a location specified by Holloman AFB prior to disposal. Depending on the waste characterization, fencing or other special marking may be required. Acceptable waste containers include sealed, Department of Transportation-approved, steel 55-gallon drums; small dumping bins with lids; and roll-off boxes with liners and covers. Containers will be transported in such a manner as to prevent spillage or particulate loss to the atmosphere. When required, sampling of drums or roll-off boxes will be done in accordance with SOPs.

IDW will be segregated at the site according to the categories specified above. Each waste container will be properly labeled with site identification, matrix, date of generation, and other pertinent information for handling.

5.4 Site Restoration

Following field activities at TU521 (SWMUs 122 and 123) and Building 823, site conditions will be restored to similar states as initial conditions. The areas will be graded to maintain positive drainage to conform to site conditions. The ground covering will then be restored to surrounding site conditions or other covering as directed by Holloman AFB.

5.5 Surveying

Surveying locations (northing, easting, and elevation coordinates) of monitoring wells and other pertinent site features will be conducted by a State of New Mexico-licensed surveyor. Elevation data for monitoring wells will include the top of the PVC riser and ground surface elevation at the well locations. Surveying data will be provided in a spreadsheet format for import into the geographic information system (GIS), and the data will also be incorporated into report figures.

Horizontal coordinates will be referenced to the New Mexico Central State Plane Coordinate System, and surveyed to an accuracy of ±1.0 ft. Vertical elevations will be referenced to North American Datum 1983 coordinate system to an accuracy of ±0.01 ft.

Geospatial information will also be submitted as a separate deliverable to the USAF. All applicable federal, United States Department of Defense, and USAF geospatial data standards will be followed. Spatial data will be compliant with the Spatial Data Standards for Facilities, Infrastructure, and Environment v2.6.

Each geospatial data set will be accompanied by metadata that conforms to the Spatial Data Facilities, Infrastructure, and Environment standards. The horizontal accuracy of any geospatial

data created will be tested and reported in accordance with the National Standard for Spatial Data Accuracy, and the results will be recorded in the metadata.

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6.0 DATA MANAGEMENT PLAN

Data management for the Supplemental RFI at Holloman AFB will facilitate effective management of investigation data collected during the course of the field work. The program will provide for efficient upload of field parameters and laboratory analytical data, QA, routine data analysis, and reporting. Many of the routine tasks involved in data management are automated under this program.

The data management system consists of a back-end relational database and a customized Database Management System (DBMS) developed specifically for environmental data management. The database is generally compliant with the AFCEC Environmental Resources Program Information Management System (ERPIMS; AFCEC 2013), but includes a number of enhancements to the database structure specified under ERPIMS. The DBMS provides the basic user interface to the database.

A variety of customized tabular and/or cross-tabulated data reports may be produced from the DBMS for inclusion in investigation documents. The DBMS also includes an integrated tool for quickly generating time-series graphs.

For maps, a current version of GIS ArcMap/ArcGIS (currently version 10.2) will be used to present data visually.

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7.0 PROJECT MANAGEMENT PLAN – SCHEDULE OF IMPLEMENTATION

A preliminary project schedule for the Supplemental RFI field work is presented in **Figure 7-1**. The schedule is dependent on many independent factors including, but not limited to, USAF and NMED review and comment, subcontractor availability, weather, and site conditions.

USAF and NMED will be notified 30 days prior to the start of Supplemental RFI field work. If requested, brief daily status reports may be submitted to Environmental representatives at Holloman AFB by electronic mail. These reports would summarize the previous day's activities, the planned activities for the following day, and other pertinent information.

7.1 Management Control Structure

The following personnel will be involved in implementation of this Supplemental RFI Work Plan:

- Dr. Steve Geiger, Lead/Senior Engineer, will provide technical oversight, coordinate project activities, support technical report preparation, and review of documents.
- Mr. Brian Powers, Lead Geologist and Task Manager, will provide technical direction and support technical report preparation and review of documents.
- Ms. Sheri Fling, Project Chemist, will coordinate with laboratories, direct review of analytical data generated, oversee data management and data validation requirements, and confirm that data are uploaded in accordance with ERPIMS requirements.
- Mr. Carl Crane will support development of the human health risk assessments.
- Ms. Teresa Doenges will support development of ecological risk assessments, if necessary.
- Mr. Patrick Ostrye will support field activities, provide general oversight, and coordinate day-to-day operations.
- Mr. Jon Mallonee will direct field activities and provide geological oversight, technical direction, and support preparation of technical documents.

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8.0 RFI REPORT ELEMENTS

Documentation of the project will be maintained, including field notes/forms, photographs, analytical, and survey data. A Supplemental RFI Report will be prepared to include this documentation, interpretation of the data collected during the RFI, and recommendations for paths forward at TU521 and Building 823.

8.1 Supplemental RFI Report

A Supplemental RFI Report detailing the nature and extent of contamination will be prepared and submitted to NMED for review. The Supplemental RFI Report will include the following elements:

- Introduction – The Introduction will describe the purpose of the Supplemental RFI and provide a summary description of the project.
- Environmental Setting – The Environmental Setting presented in this Work Plan will be included in the Supplemental RFI Report along with any additional information collected that clarifies or improves the understanding of the Environmental Setting, including a revised CSM.
- Source Characterization – Sources of contamination and nature of releases identified will be described.
- Sampling and Analysis Results – Data collected during the Supplemental RFI field work will be presented along with analysis/interpretation of how the sampling data meet the Supplemental RFI objective. Data will include results of all soil and groundwater laboratory analyses conducted under the Supplemental RFI, as well as any pre-existing data contained in ERPIMS for TU521 (SWMUs 122 and 123) and Building 823. Data quality and data review results will be included in this section.
- Data QA/QC Review – A summary of the QA/QC data review will be presented, and will include holding times, blanks, laboratory control samples, field duplicates, matrix spikes/matrix spike duplicates, and data assessment/data usability.
- Conclusions – The Conclusions section will summarize information and data acquired during the Supplemental RFI field work pertaining to the environmental setting, source characterization, sampling and analysis results, and data quality review. If data gaps are identified, recommendations will be made in the Recommendations section of the report.
- Recommendations – Recommendations for site disposition based on the data collected and risk evaluations performed during the RFI, including RCRA Hazardous Waste Facility Permit modifications and/or further actions necessary to complete characterization of release(s) from the site(s), will be included in this section.
- Work Plan for Additional Investigations (if needed) – If additional information is needed through further investigation, a work plan to complete the characterization will be provided.

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9.0 REFERENCES

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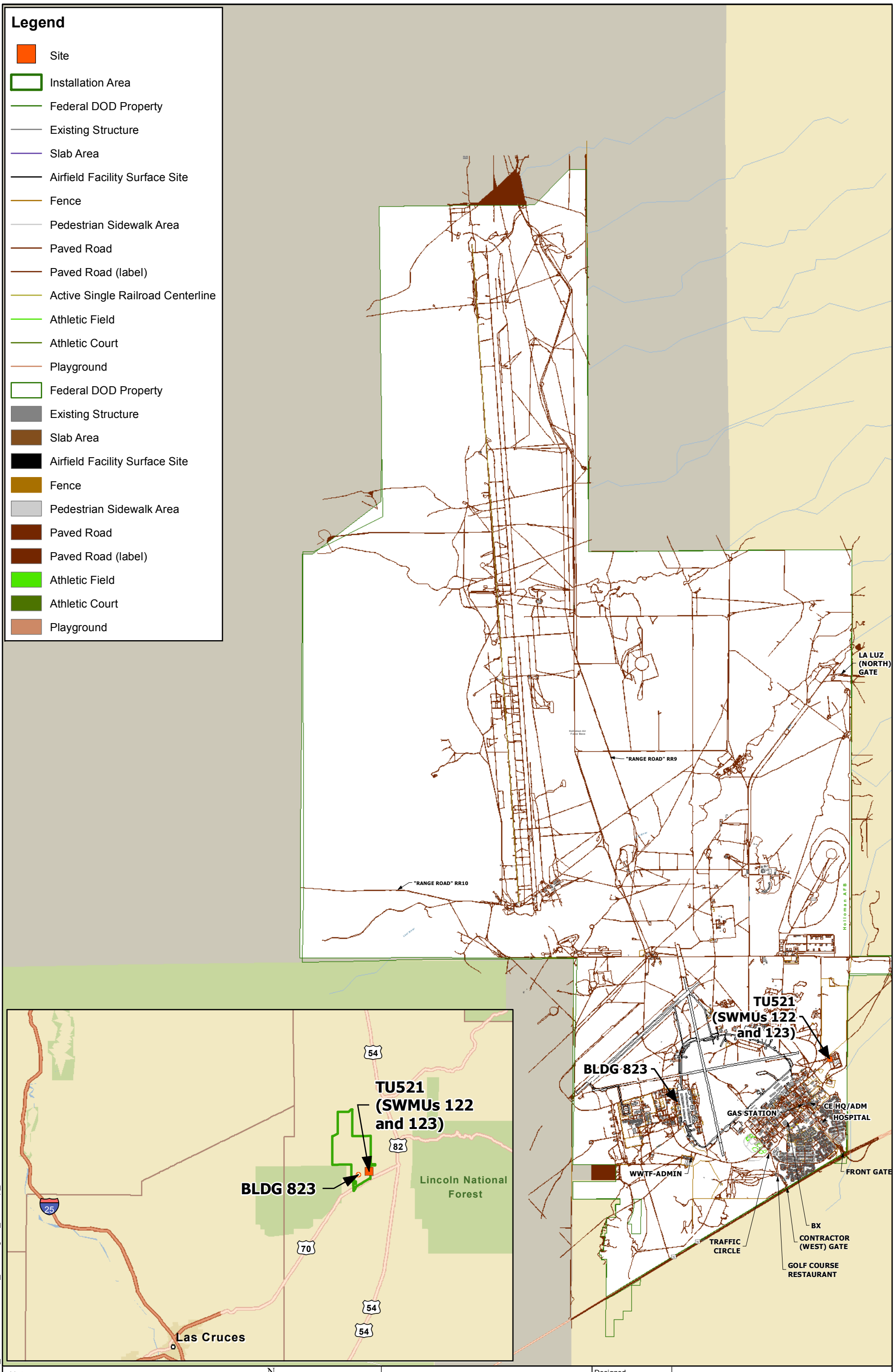
Figures

Legend

- Site
- Installation Area
- Federal DOD Property
- Existing Structure
- Slab Area
- Airfield Facility Surface Site
- Fence
- Pedestrian Sidewalk Area
- Paved Road
- Paved Road (label)
- Active Single Railroad Centerline
- Athletic Field
- Athletic Court
- Playground
- Federal DOD Property
- Existing Structure
- Slab Area
- Airfield Facility Surface Site
- Fence
- Pedestrian Sidewalk Area
- Paved Road
- Paved Road (label)
- Athletic Field
- Athletic Court
- Playground



Note:

Sources:
HAFB, CBI, ULS Services Corp.

Coordinate System:
NAD 1983 State Plane,
New Mexico Central Zone, Feet

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Scale in Feet
1 inch = 7,000 feet

AECOM

Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 1-1

Location Map

Holloman Air Force Base
USAF

April 12, 2016

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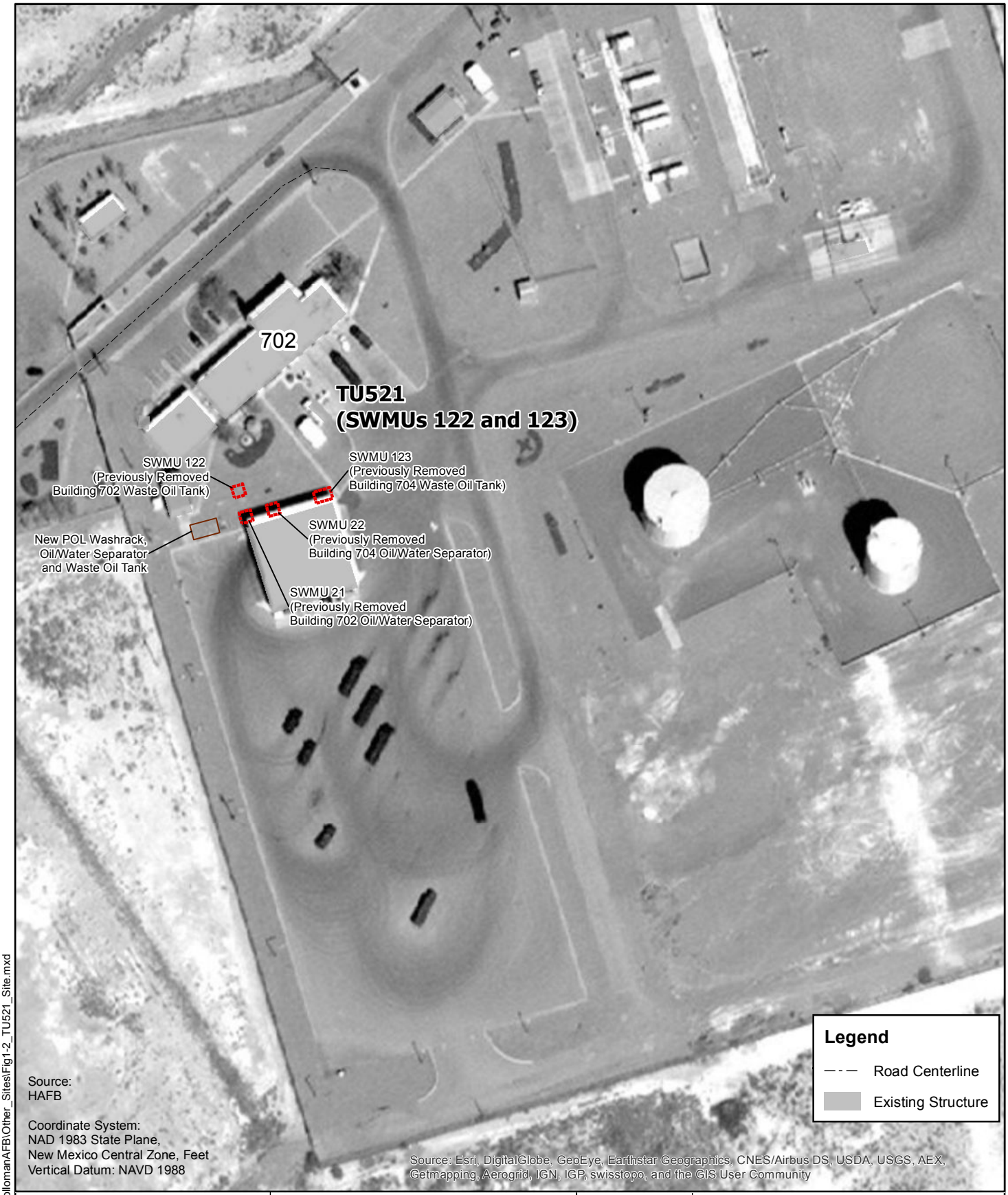

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1 inch = 120 feet

AECOM

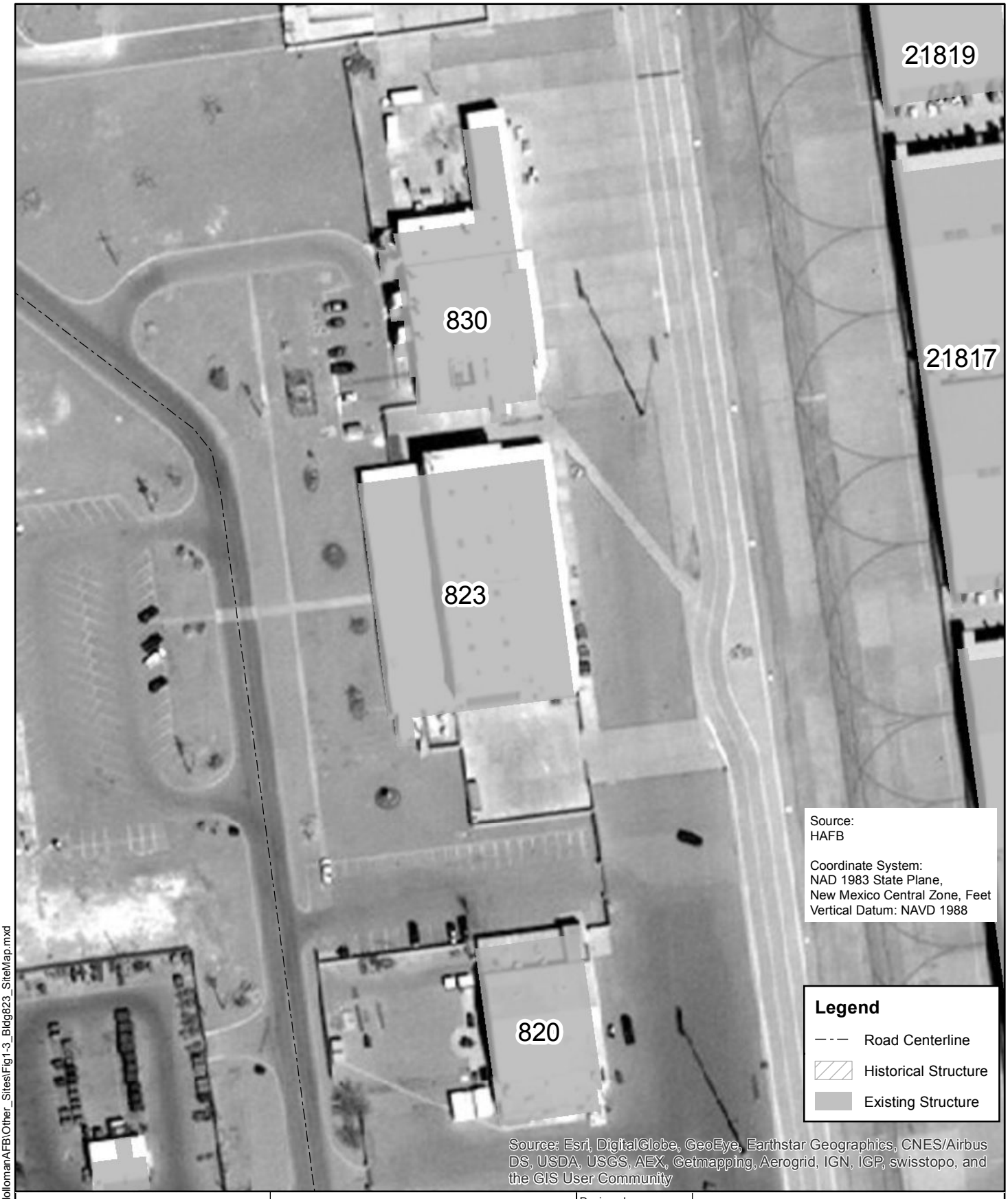
Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 1-2

TU521
(SWMUs 122 and 123)
Location Map

Holloman Air Force Base

USAF April 12, 2016



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1 inch = 100 feet

AECOM

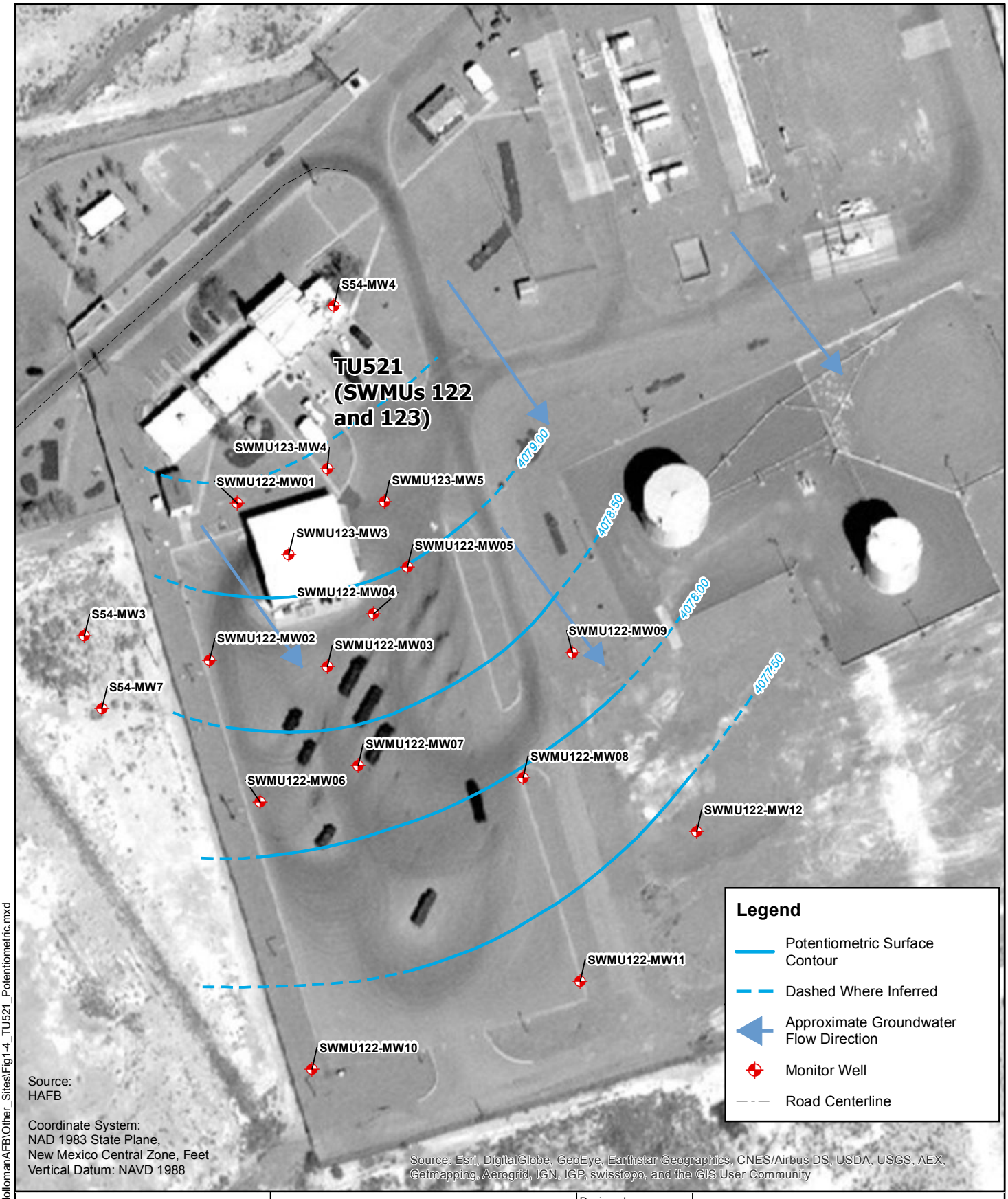
Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 1-3

Building 823
Site Map

Holloman Air Force Base

USAF April 12, 2016



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1 inch = 120 feet

AECOM

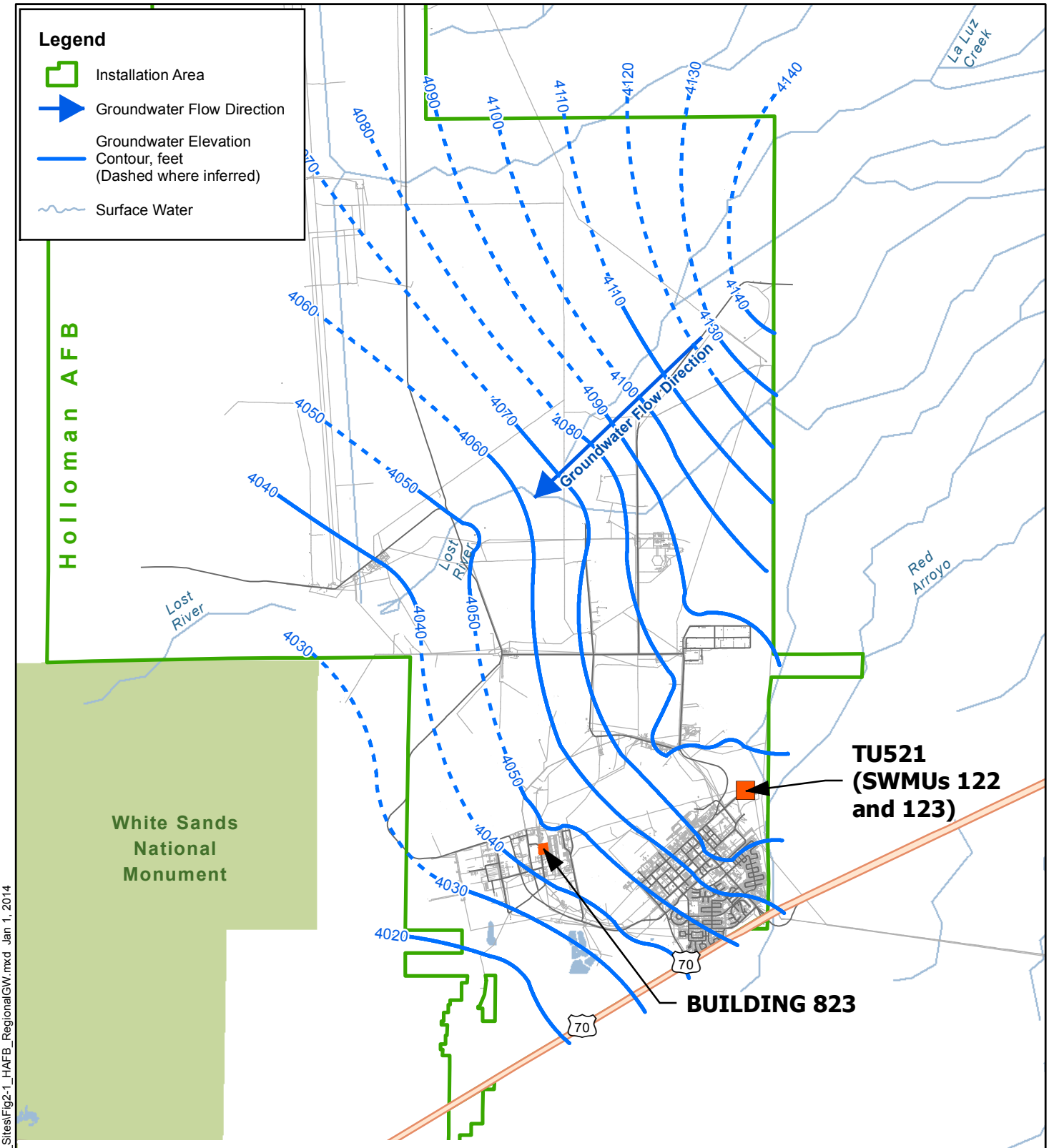
Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 1-4

TU521
(SWMUs 122 and 123)
Potentiometric Surface Map

Holloman Air Force Base

USAF April 12, 2016



Note:
1) Groundwater contour map showing groundwater elevation contours across Holloman Air Force Base, New Mexico, are based on 2002 measurements taken from the shallow aquifer.
2) Source: CBI geodatabase named HAFB_GIS_Layers, feature class: GwContour. Attribution shows date as 1/1/2012 and source as Holloman AFB GIS, 2002 LTM.

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Scale in Feet
1 inch = 8,000 feet

AECOM

Coordinate System:
NAD 1983 State Plane, New Mexico Central Zone, Feet

Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 2-1

Regional Groundwater Flow Direction

Holloman Air Force Base

USAF

April 18, 2016

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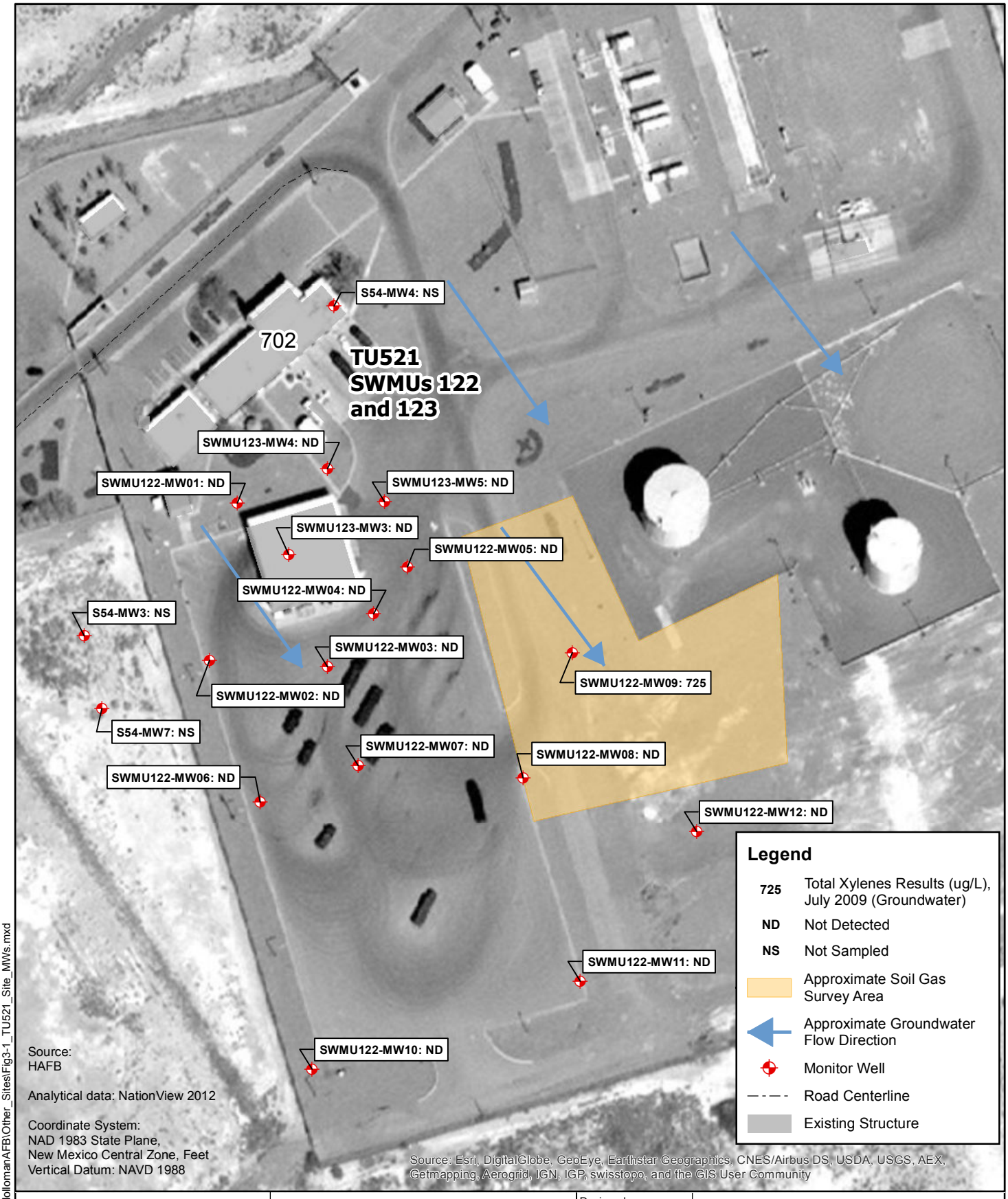

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Scale in Feet
1 inch = 120 feet

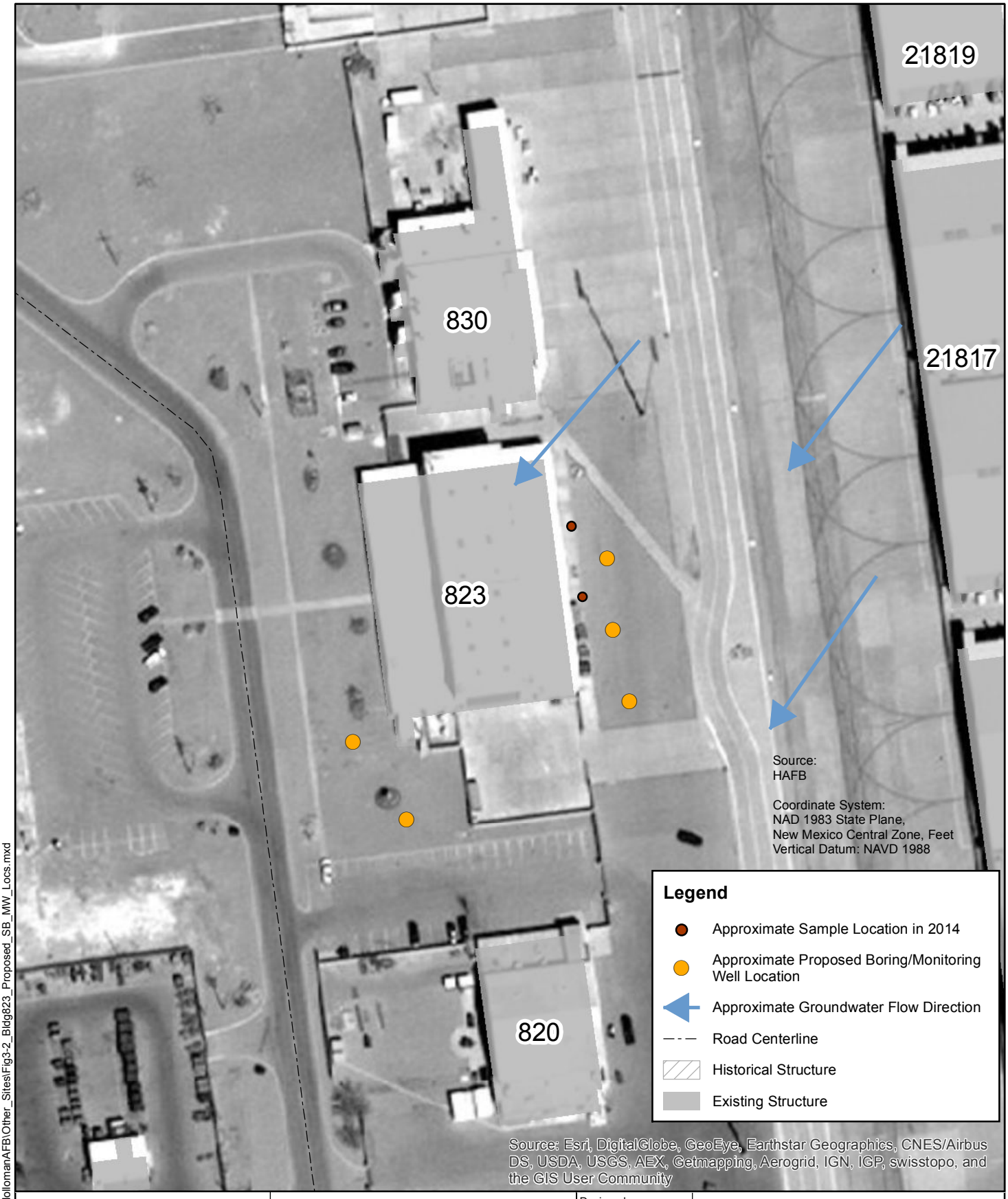
AECOM

Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 3-1
TU521
(SWMUs 122 and 123)
Proposed Soil Boring/
Monitoring Well Locations

Holloman Air Force Base

USAF April 12, 2016



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Scale in Feet
1 inch = 100 feet

AECOM

Designed	SL
Drawn	LED
Checked	TD
Peer Review	JDM
Project Manager	BGP
Project Number	60440693

Figure 3-2

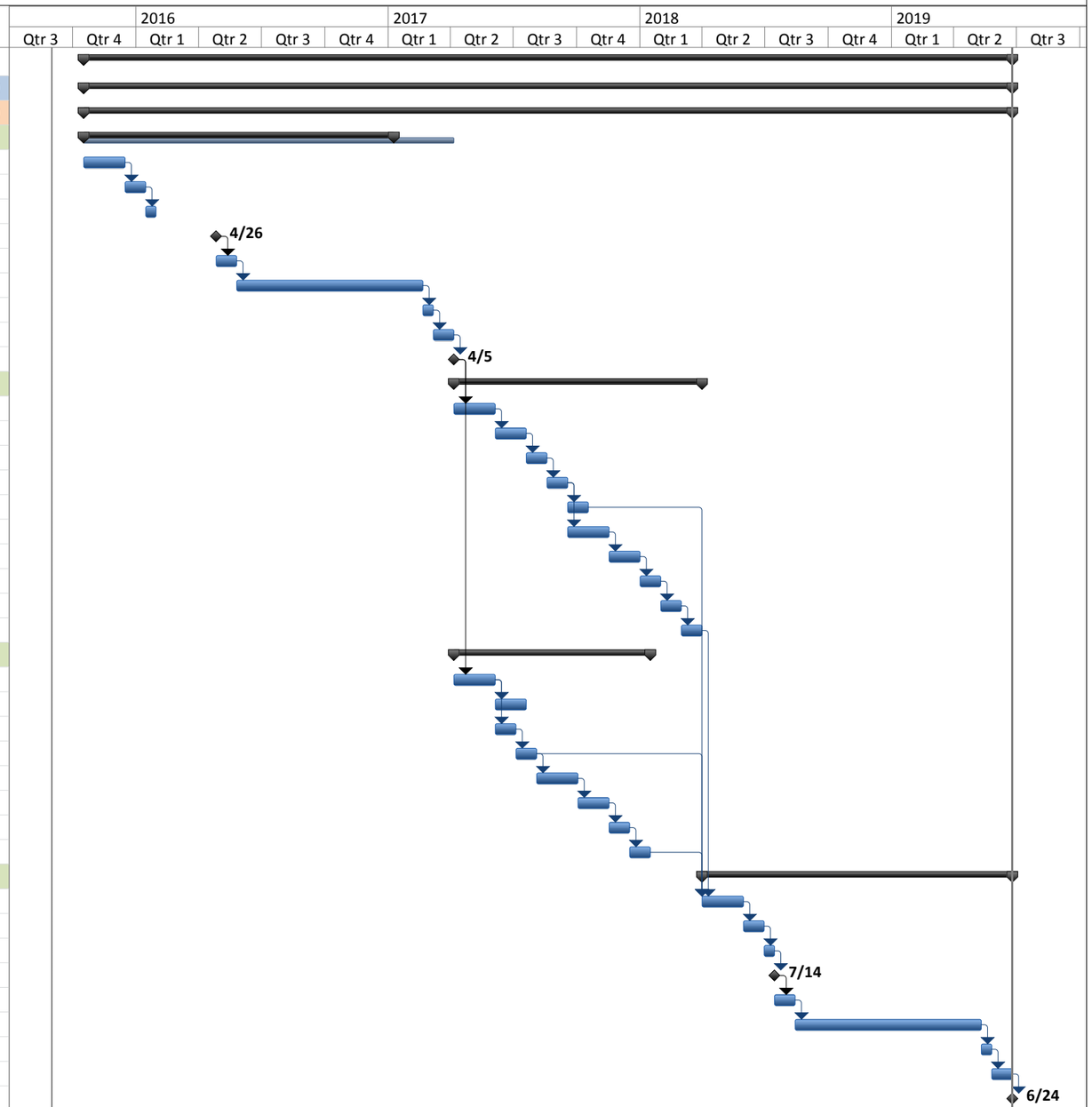
Building 823
Proposed Soil Boring/
Monitoring Well Locations

Holloman Air Force Base

USAF April 12, 2016

Figure 7-1
Preliminary Project Schedule
TU521 (SWMUs 122 and 123) and Building 823 Supplemental RFI
Holloman AFB, NM

ID	Task Name	Duration	Start	Finish
1	Holloman AFB - Supplemental RFI	1347 d	Sat 10/17/15	Mon 6/24/19
2	Holloman AFB	1347 d	Sat 10/17/15	Mon 6/24/19
3	TU521 and Building 823	1347 d	Sat 10/17/15	Mon 6/24/19
4	Quality Program Plan (QPP) includes WP, HSP, UFP-QAPP	450 d	Sat 10/17/15	Sun 1/8/17
5	Prepare and Submit Draft QPP	60 d	Sat 10/17/15	Tue 12/15/15
6	Government Review Draft QPP	30 d	Wed 12/16/15	Thu 1/14/16
7	RTC (incl comment resolution and prepare/check Draft Final version)	15 d	Fri 1/15/16	Fri 1/29/16
8	Government Accept Draft Final QPP	0 d	Tue 4/26/16	Tue 4/26/16
9	Government Pay Regulator Fee	30 d	Tue 4/26/16	Wed 5/25/16
10	Regulator Review Draft Final QPP	270 d	Thu 5/26/16	Sun 2/19/17
11	RTC	15 d	Mon 2/20/17	Mon 3/6/17
12	Government/Regulator Concurrence with Final	30 d	Tue 3/7/17	Wed 4/5/17
13	Government/Regulator Accept Final QPP	0 d	Wed 4/5/17	Wed 4/5/17
14	Supplemental RFI Field Work (Building 823)	360 d	Thu 4/6/17	Sat 3/31/18
15	Acquire Dig Permit and Mob	60 d	Thu 4/6/17	Sun 6/4/17
16	Collect Subsurface Soil Samples	45 d	Mon 6/5/17	Wed 7/19/17
17	Sampling Analysis (Soil)	30 d	Thu 7/20/17	Fri 8/18/17
18	Collect Groundwater Samples	30 d	Sat 8/19/17	Sun 9/17/17
19	Sampling Analysis (Groundwater)	30 d	Mon 9/18/17	Tue 10/17/17
20	Optional Step Out - Acquire Dig Permit and Mob	60 d	Mon 9/18/17	Thu 11/16/17
21	Optional Step Out - Collect Subsurface Soil Samples	45 d	Fri 11/17/17	Sun 12/31/17
22	Optional Step Out - Sampling Analysis (Soil)	30 d	Mon 1/1/18	Tue 1/30/18
23	Optional Step Out - Collect Groundwater Samples	30 d	Wed 1/31/18	Thu 3/1/18
24	Optional Step Out - Sampling Analysis (Groundwater)	30 d	Fri 3/2/18	Sat 3/31/18
25	Supplemental RFI Field Work (TU521)	285 d	Thu 4/6/17	Mon 1/15/18
26	Acquire Dig Permit and Mob	60 d	Thu 4/6/17	Sun 6/4/17
27	Soil Gas Survey	45 d	Mon 6/5/17	Wed 7/19/17
28	Collect Groundwater Samples	30 d	Mon 6/5/17	Tue 7/4/17
29	Sampling Analysis (Groundwater)	30 d	Wed 7/5/17	Thu 8/3/17
30	Optional Step Out - Acquire Dig Permit and Mob	60 d	Fri 8/4/17	Mon 10/2/17
31	Optional Step Out - Well Installation	45 d	Tue 10/3/17	Thu 11/16/17
32	Optional Step Out - Collect Groundwater Samples	30 d	Fri 11/17/17	Sat 12/16/17
33	Optional Step Out - Sampling Analysis (Groundwater)	30 d	Sun 12/17/17	Mon 1/15/18
34	Supplemental RFI Report	450 d	Sun 4/1/18	Mon 6/24/19
35	Prepare and Submit Draft Supplemental RFI Report	60 d	Sun 4/1/18	Wed 5/30/18
36	Government Review Draft Supplemental RFI Report	30 d	Thu 5/31/18	Fri 6/29/18
37	RTC (incl comment resolution and prepare/check Draft Final version)	15 d	Sat 6/30/18	Sat 7/14/18
38	Government Accept Draft Final Supplemental RFI Report	0 d	Sat 7/14/18	Sat 7/14/18
39	Government Pay Regulator Fee	30 d	Sun 7/15/18	Mon 8/13/18
40	Regulator Review Draft Final Supplemental RFI Report	270 d	Tue 8/14/18	Fri 5/10/19
41	RTC	15 d	Sat 5/11/19	Sat 5/25/19
42	Government/Regulator Concurrence with Final	30 d	Sun 5/26/19	Mon 6/24/19
43	Government/Regulator Accept Final Supplemental RFI Report	0 d	Mon 6/24/19	Mon 6/24/19



Appendix A

14 August 2014, NMED Disapproval Letter for the SWMUs 122 and 123 RFI Report

ENTERED

NEW MEXICO
ENVIRONMENT DEPARTMENT

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

August 14, 2014

DeAnna Rothhaupt
Chief, Holloman AFB Environmental
550 Tabosa Avenue
Holloman AFB, NM 88330

RE: DISAPPROVAL
RCRA FACILITY INVESTIGATION REPORT
SWMUS 122 AND 123, JUNE 2012
HOLLOMAN AIR FORCE BASE
EPA ID # NM6572124422, HWB-HAFB-12-011

Dear Ms. Rothhaupt:

The New Mexico Environment Department (NMED) has reviewed the Holloman Air Force Base (Permittee) *RCRA Facility Investigation Report, SWMUs 122 and 123* (the Report), dated June 2012 and received on June 18, 2012. NMED hereby issues this Disapproval for the reason discussed below.

According to the reported groundwater analytical results, groundwater at monitoring well SWMU122-MW09, located to the west of the site's petroleum product tank farm, contained a total xylene concentration in excess of the NM Water Quality Control Commission standard at NMAC 20.6.2.3103. The total xylene standard is 620 micrograms per liter (µg/L), and the total xylene concentration detected in groundwater at monitoring well SWMU122-MW09 was 725 µg/L. In addition, according to the Drilling Log for this well included in Appendix B of the Report, soil at a depth of between 10 and 16 feet below ground surface exhibited what appeared to be gray petroleum staining and field screening of soils from the boring using a photo-ionization detector (PID) generated readings between 952 and 1168 parts per million. The associated Monitoring Well Development Form for this well also indicated that the groundwater exhibited a petroleum odor.

Given these results, the Permittee must submit an investigation work plan to NMED proposing to determine the nature and extent of soil and groundwater contamination in the vicinity of monitoring well SWMU122-MW09. The work plan must include plans for a passive soil gas

survey to be conducted to assist in determining the extent of any soil contamination, as well as to assist in determining the locations of any needed future monitoring wells and soil borings.

The Permittee must submit this work plan no later than **November 17, 2014**. All submittals (including figures and tables) must be in the form of a paper copy and one electronic copy (in MS Word/EXCEL™ format).

If you have any questions regarding this matter, please contact Mr. David Strasser of my staff at (505) 222-9526.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Rizzuto, HAFB
C. Hendrickson, EPA-Region 6 (6PD-N)

File: HAFB 2014 and Reading
HAFB-12-011

Appendix B

15 January 2015, Holloman AFB and 20 April 2015, NMED Notification of Discovery Letters for Building 823

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

DeAnna Rothhaupt
Chief, Holloman AFB Environmental
550 Tabosa Avenue
Holloman AFB NM 88330-8458

New Mexico Environment Department
Attn: Mr. John Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe NM 87505-6303

Dear Mr. Kieling

The purpose of this letter is to notify the New Mexico Environment Department about two Areas of Concern that were discovered during construction activities at Holloman AFB. These two areas were identified at buildings 823 and 883. A two-point composite sample was taken at each area to determine if contaminants were present in soil.

The soil sample result at building 823 indicated presence of Total Petroleum Hydrocarbons (TPH) at 975 mg/kg. Due to this detection, the Air Force has determined that further investigation is warranted at this site. The review of soil results and sample locations occurred on January 09, 2015. Therefore, we are making this notification to you per the requirements of Holloman AFB Resource Conservation and Recovery Act (RCRA) Permit. Based on the information, a RCRA Facility Investigation (RFI) has been proposed at Bldg. 823 to determine the nature and extent of contamination. The RFI work plan will be coordinated with the New Mexico Environment Department and is expected to be available in November 2016. The map and lab result for Bldg. 823 is attached for your records.

The soil sample result at Bldg. 883 indicated presence of TPH at 116 mg/kg. Based on this low detection, the Air Force does not believe this area should be identified as an Area of Concern. Please provide additional input if your office believes that additional investigation is warranted. The review of soil results and sample locations occurred on January 09, 2015. Therefore, we are making this notification to you per the Holloman AFB RCRA Permit. The map and lab result for Bldg 883 is also attached for your records.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me at 575-572-3931 or by e-mail at deanna.rothhaupt@holloman.af.mil.

Sincerely

DEANNA ROTHHAUPT, GS-12, DAF

cc:

Mr. David Strasser
Hazardous Waste Bureau
5500 San Antonio Dr, NE
Albuquerque NM 87109-4127

Mr. Will Moats
Hazardous Waste Bureau
5500 San Antonio Dr, NE
Albuquerque NM 87109-4127

Mr. Chuck Hendrickson
USEPA, Region 6 (6PD-F)
1445 Ross Ave, Ste 1200
Dallas TX 75202-2750

NEW MEXICO
ENVIRONMENT DEPARTMENT

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

April 20, 2015

Ms. DeAnna Rothhaupt
Chief, Holloman AFB Environmental
49 CES/CEIE
550 Tabosa Avenue
Holloman AFB, NM 88330-8261

RE: NOTIFICATION OF DISCOVERY OF TWO SUSPECTED AREAS OF CONCERN
HOLLOMAN AIR FORCE BASE, EPA ID # NM6572124422
HWB-HAFB-MISC

Dear Ms. Rothhaupt:

The New Mexico Environment Department (NMED) has received Holloman Air Force Base's (the Permittee's) notification of the discovery of two suspected areas of concern (AOCs) on January 15, 2015. The two sites are identified as Building 823 and Building 883.

Analytical results from two soil samples collected at Building 823 during construction activities indicated the presence of Total Petroleum Hydrocarbons (TPH) at 975 milligrams per kilogram (mg/kg). Due to this detection, the Permittee has determined that further investigation is warranted at this site and has proposed to submit a RCRA Facility Investigation Work Plan (RFI WP) to determine the nature and extent of contamination.

Analytical results from two soil samples collected at Building 883 indicated the presence of TPH at 116 mg/kg. Based on this result, the Permittee does not believe that the site warrants further investigation, nor should it be identified as an AOC.

After reviewing the analytical reports and other information submitted with the referenced notification, the NMED concurs that a RFI WP is required for the Building 823 site and that the Building 883 site does not require further investigation. The Permittee shall prepare the RFI WP as outlined in Permit Part 4, Section IV.E.1.b and submit said RFI WP by no later than

November 29, 2016. All submittals (including figures and tables) must be in the form of two paper copies and one electronic copy (in MS Word/EXCEL™ format).

If you have any questions regarding this matter, please contact Mr. David Strasser of my staff at (505) 222-9526.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Rizzuto, HAFB
C. Hendrickson, EPA-Region 6 (6PD-N)
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File: HAFB 2015 and Reading
HAFB-MISC