DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

21 May 2021

Colonel David S. Miller, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland AFB NM 87117

Mr. Kevin M. Pierard
Hazardous Waste Bureau (HWB) Chief
New Mexico Environment Department (NMED)
2905 Rodeo Park Drive East Building 1
Santa Fe NM 87505-6303

Dear Mr. Pierard

Attached please find the draft "*Work Plan for the Shallow Soil Vapor Monitoring Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111*." In accordance with the New Mexico Environment Department's letter dated February 25, 2019, "*Bulk Fuels Facility Spill; Solid Waste Management Unit ST-106/SS-111 Kirtland Air Force Base HWB-KAFB-19-MISC,*" the objective of this work plan is to confirm the conclusions reached in the July 15, 2017 Risk Assessment Report that there are no vapor intrusion risks to off-site receptors located north of Kirtland Air Force Base. Specifically, because "*off-Base soil vapor data are limited to nested vapor probes, the shallowest of which are approximately 25 feet below ground surface, and none of which are located in the residential area north of Ridgecrest or amid buildings on the Veteran Affairs (VA) hospital campus. The Permittee must confirm this conclusion by collecting additional data to demonstrate that [sic] there is no risk to off-site receptors located north of the Base*." Since this letter was issued, NMED and the Air Force have been engaged in multiple discussions regarding the objectives and scope of the shallow soil vapor investigation. These discussions culminated in the meeting between Secretary Kenney and Mr. Correll held on April 20, 2021.

As agreed in that meeting, the Air Force is submitting the enclosed Work Plan, which is based upon the conceptual work plan presented to NMED on February 1, 2021. As discussed, this Work Plan does not include a response to the comments in the May 26, 2020 letter, *"Disapproval Work Plan for Shallow Soil Vapor Sampling, Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111, November 2019 Kirtland Air Force Base, New Mexico EPA ID# NM9570024423 HWB-KAFB-19-014."*

This proposed scope of work would use a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor. The first phase, presented in the enclosed work plan, focuses on vapor sampling at locations most likely to have detectable vapor

concentrations. In the event that data collected during the initial phase identifies any vapor concentrations that indicate additional sampling is needed to "*demonstrate that [sic] there is no risk to off-site receptors located north of the Base*," the Air Force would work with NMED to develop an additional work plan that would extend sampling beyond Bullhead Memorial Park. If you have any questions or concerns, please contact Mr. Sheen Kottkamp at commercial line (505) 846-7674 or by email at sheen.kottkamp.1@us.af.mil.

Sincerely

DAVID S. MILLER, Colonel, USAF
Commander

Attachment:
Work Plan for Shallow Soil Vapor Monitoring Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111

cc:
NMED Resource Protection Division (Stringer), letter and CD
NMED HWB (Pierard, Andress), two hard copies, letters and two CDs
NMED GWQB (Hunter), hard copy letter and CD
EPA Region 6 (King, Ellinger), letter and CD
SAF-IEE (Lynnes), electronic only
AFCEC/CZ (Clark, Kottkamp, Segura, Wortman), electronic only
USACE-ABQ District Office (Moayyad, Phaneuf, Dreeland, Kunkel, Lovato), electronic only
Public Info Repository, Administrative Record/Information Repository (AR/IR) and File

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111

May 2021

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Kirtland Air Force Base, New Mexico 87117-5270

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KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

WORK PLAN FOR
SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111

May 2021

Prepared for
U.S. Air Force
Kirtland Air Force Base
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Kirtland Air Force Base NM 87117

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14. ABSTRACT

This Work Plan (WP) is prepared for the U.S. Air Force for the purpose of performing shallow soil vapor sampling associated with the Kirtland Air Force Base (AFB) Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111. This WP is part of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor off-Base near Bullhead Memorial Park. The first phase, described in this WP, focuses on vapor sampling at locations most likely to have detectable vapor concentrations. The data will be used to confirm the conclusions presented in the Risk Assessment (KAFB, 2017a), as requested in the February 25, 2019, NMED letter (NMED, 2019a)

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DOCUMENT CERTIFICATION
May 2021

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 fines and imprisonment for knowing violations.

DAVID S. MILLER, Colonel, USAF
Commander, 377th Air Base Wing

21 May 2021
Date

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

19 May 21
Date

PREFACE

This Work Plan (WP) is prepared for the U.S. Air Force for the purpose of performing shallow soil vapor sampling associated with the Kirtland Air Force Base (AFB) Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111. This work is performed under the U.S. Air Force Environmental Restoration Program, in accordance with the corrective action provisions set forth in Part 6 of the Hazardous Waste Treatment Facility Operating Permit (U.S. Environmental Protection Agency [EPA] Identification (ID) No. NM9570024423) issued to Kirtland AFB (Resource Conservation and Recovery Act Permit), with the New Mexico Environment Department (NMED) serving as the lead regulatory agency.

This WP is part of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor off-Base near Bullhead Memorial Park. The first phase, described in this WP, focuses on vapor sampling at locations most likely to have detectable vapor concentrations. The data will be used to confirm the conclusions presented in the Risk Assessment (KAFB, 2017a), as requested in the February 25, 2019, NMED letter (NMED, 2019a)

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	micrograms per cubic meter
AFB	Air Force Base
ALS	ALS Global Environmental Laboratory
ASTM	American Society of Testing and Materials
BFF	Bulk Fuels Facility
bgs	below ground surface
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
COA	City of Albuquerque
COPC	contaminants of potential concern
DPT	Direct Push Technology
EDB	ethylene dibromide (also known as 1,2-dibromoethane)
EPA	U.S. Environmental Protection Agency
ft	foot/feet
GWM	groundwater monitoring
HC	hydrocarbons
ID	identification
IDW	investigation-derived waste
in.	inch
KAFB	Kirtland Air Force Base
LOQ	limit of quantification
MDL	minimum detection limit
MRL	method reporting limit
NMED	New Mexico Environment Department
No.	number
O_2	oxygen

ACRONYMS AND ABBREVIATIONS (CONCLUDED)

PVC	polyvinyl chloride
Q	quarter
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RLS	Registered Land Surveyor
Site	Bulk Fuels Facility site
SVE	soil vapor extraction
SVM	soil vapor monitoring
SVMP	soil vapor monitoring point
SWMU	Solid Waste Management Unit
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USCS	Unified Soil Classification System
VA	Veterans Affairs
VI	vapor intrusion
VISL	vapor intrusion screening level
VOC	volatile organic compound
WP	Work Plan

EXECUTIVE SUMMARY

This Work Plan (WP) is part of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor off-Base. This WP covers the first phase of the approach and describes the installation and sampling activities for eight shallow soil vapor monitoring locations that are most likely to have detectable vapor concentrations. This data is being collected in response to a New Mexico Environment Department (NMED) letter dated February 25, 2019. In this letter, NMED requested additional shallow soil vapor data to confirm the Risk Assessment conclusion that there is no vapor intrusion risk to off-site receptors. On February 01, 2021, the Air Force presented a conceptual approach for the implementation of additional shallow soil vapor monitoring points north of Kirtland Air Force Base (AFB). During the April 20, 2021, meeting between NMED and the Air Force, NMED requested that Kirtland AFB submit a formal WP outlining the February 01, 2021, conceptual approach.

Included in this WP is a brief history of the site, current site conditions, and the technical approach for soil vapor monitoring point installation. This WP has been developed in accordance with Part 6.2.4.2 of the Kirtland AFB Hazardous Waste Treatment Facility Operating Permit, U.S. Environmental Protection Agency Identification No. NM9570024423. The methodology for the selection of soil vapor monitoring point locations is included to ensure representative samples are collected. As required in the February 25, 2019, NMED letter, this WP includes a proposed schedule for two sampling events, one in summer 2021 and one in winter 2021. The results of the monitoring point installation and sampling will be summarized in a final investigative report.

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1. INTRODUCTION

This Shallow Soil Vapor Monitoring (SVM) Work Plan (WP) was prepared for the U.S. Air Force for the purpose of performing shallow soil vapor well installation and sampling associated with the Kirtland Air Force Base (AFB) Bulk Fuels Facility (BFF), Solid Waste Management Units (SWMUs) ST-106/SS-111. This work is performed under the U.S. Air Force Environmental Restoration Program, in accordance with the corrective action provisions set forth in Part 6 of the Hazardous Waste Treatment Facility Operating Permit (U.S. Environmental Protection Agency [EPA] Identification (ID) No. NM9570024423) issued to Kirtland AFB (Resource Conservation and Recovery Act [RCRA] Permit), with the New Mexico Environment Department (NMED) serving as the lead regulatory agency.

1.1. Overview

As discussed in the cover letter, the objective of this WP is to satisfy the NMED's request in its February 25, 2019, letter "*Bulk Fuels Facility Spill; Solid Waste Management Unit ST-106/SS-111 Kirtland Air Force Base HWB-KAFB-19-MISC*" to confirm the conclusion reached in the July 15, 2017, Risk Assessment Report that there are no vapor intrusion risks to off-site receptors located north of Kirtland AFB (KAFB, 2017a).

This WP is part of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor contamination. This WP describes the first phase in this approach, which focuses on installing SVM locations that are most likely to have detectable vapor concentrations. The results of the SVM location installation and sampling will be summarized in an Investigation Report. Based on the results, additional sampling locations may be proposed to further understand shallow soil vapor contamination north of the Base.

1.2. Report Organization

The BFF site (Site) SVM WP is formatted in accordance with the requirements of Part 6.2.4.2 of the RCRA Permit and divided into the following sections:

- **Section 1**—Presents an introduction, overview, and organization of the WP
- **Section 2**—Summarizes regulatory oversight, directives, and guidance documents
- **Section 3**—Provides background information on the Site and current conditions
- **Section 4**—Identifies the investigative approach and justification
- **Section 5**—Describes the proposed sampling locations and rationale for their selection
- **Section 6**—Presents the scope of activities to be conducted for this project
- **Section 7**—Outlines the investigation methods that will be utilized
- **Section 8**—Refers to the monitoring and sampling protocols

- **Section 9**—Presents the schedule for this sampling event

Associated appendices are provided at the end of this WP as follows:

Appendix A: Regulatory Correspondence

Appendix B: Fourth Quarter 2020 Soil Vapor Monitoring Results for EDB and Benzene

Appendix C: Field Forms

2. REGULATORY CRITERIA

NMED is the regulating agency for the investigation being conducted at Kirtland AFB BFF SWMUs ST-106/SS-111. The RCRA Permit (NMED, 2010) is the primary guidance for environmental investigations and remediation regulated by NMED at Kirtland AFB. This permit is enforced by NMED's Hazardous Waste Bureau, which is authorized to administer RCRA by the EPA. Site-specific investigations are conducted in accordance with approved WPs and additional written guidance from NMED. SVM occurs semiannually and in accordance with the approved WP (NMED, 2017, 2018; Kirtland AFB, 2017b).

The following screening levels and regulatory guidance are used for the investigation being conducted at SWMUs ST-106/SS-111:

- New Mexico Environment Department – Risk Assessment Guidance for Site Investigations and Remediation, Volume I Soil Screening Guidance for Human Health Risk Assessments, Revision 2, February 2019

- U.S. Environmental Protection Agency – OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, Office of Solid Waste and Emergency Response, OSWER Publication 9200.2-154, June 2015

NMED has directed Kirtland AFB to compare detected soil vapor concentrations to a regulatory standard for the purpose of assessing the presence and location of contaminants of concern. NMED's Risk Assessment Guidance for Site Investigations and Remediation (2019b and as updated) vapor intrusion screening levels (VISLs) must be used as a first-tier screening assessment. NMED VISLs were calculated using EPA default attenuation factors, which are based on conservative assumptions and empirical data. VISLs are intended to be screened against soil vapor samples collected from below buildings or occupied structures (sub slab samples) where vapors can migrate through cracks or other foundation deficiencies and cause an exposure to the human occupants. There are currently no residential or industrial buildings in the off-Base investigation area and as a result, no sub-slab soil vapor samples will be collected as part of this field effort. Kirtland AFB is currently screening the shallowest SVM points (SVMPs) at SWMUs ST-106/SS-111 with screen intervals ranging from 10 to 30 feet (ft) below ground surface (bgs) against NMED VISLs as reported in the Q4 2020 monitoring report (KAFB, 2021a). This screening interval is referred to nominally as the 25-ft horizon. This WP will compare the shallow soil vapor sampling results collected as part of this investigation against NMED VISLs as a first-tier screening assessment.

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3. BACKGROUND INFORMATION AND SITE CONDITIONS

3.1. Site Description

Kirtland AFB is located in Bernalillo County in central New Mexico, southeast of and adjacent to the city of Albuquerque and the Albuquerque International Sunport (**Figure 3-1**). The Base has an approximate area of 52,287 acres. The Site is located in the northwestern portion of Kirtland AFB along the northern Base boundary.

It is important to note there are currently no residential or industrial buildings in the off-Base area proximal to the Site; most of the area is comprised of Bullhead Memorial Park (**Figure 3-2**). The large open area to the northeast, between Bullhead Memorial Park and the residential areas, is owned by the Air Force and the Air National Guard. The Raymond G. Murphy Veterans Affairs Medical Center (VA Hospital) is located to the northwest of Bullhead Memorial Park.

3.2. Site History

Kirtland AFB discovered a fuel release in November 1999 at the Former Fuel Offloading Rack at the BFF and determined through environmental investigations that subsurface fuel releases occurred over a period of decades. The fuel traveled downward through the subsurface until it encountered the water table. In the vadose zone, the fuel constituents volatilized and contributed to the soil vapor contamination in the spaces between sand grains, creating the soil vapor plume. In the saturated zone, fuel constituents dissolved into groundwater, creating the dissolved-phase plume. SVM of the contamination has been performed at the Site since 2001.

Kirtland AFB responded to the subsurface contamination by performing interim measures, including soil removal actions and soil vapor extraction (SVE) in the vicinity of the original release (KAFB, 2017a). Interim measures continue to be implemented to date at the Site to address the mobile dissolved-phase ethylene dibromide (EDB, also referred to as 1,2-dibromomethane) groundwater plume (KAFB, 2021a).

3.2.1. Soil Vapor Interim Measure History

Both soil removal and SVE activities have been performed at the Site. These interim measures have impacted the concentrations of soil vapor constituents in the shallow vadose zone. These interim measures are discussed in detail in the RCRA Facility Investigation (RFI) Phase I (KAFB, 2018).

Approximately 3,000 cubic yards of impacted soil were excavated from the Site from 1999 to 2014. In 2014, the final removal activity was completed and included the removal of all impacted soil down to 20 ft bgs, except for a few local areas associated with existing infrastructure.

SVE was performed from 2003 through first quarter (Q1) 2015, at which point SVE activities were suspended, and the system was shut down in second quarter (Q2) 2015. Approximately 775,000 equivalent gallons of jet fuel have been removed from the subsurface by vacuum extraction (SVE and modified bioslurping). This calculated volume includes the total removed by SVE and biodegradation combined.

Post-SVE shutdown, soil vapor rebound and respiration testing was performed to assess residual contamination in the vadose zone without the influence of the SVE system (KAFB, 2017a). SVM data continue to be collected and to provide information for understanding the nature and extent of soil vapor contamination at near steady state conditions.

3.2.2. Soil Vapor Monitoring History

SVM activities have been performed at SWMUs ST-106/SS-111 since 2001. Currently, SVM wells are sampled semiannually during the Q2 and fourth quarter (Q4) of each calendar year, and sampling results are presented in the corresponding Quarterly Monitoring Report.

The SVM network includes 59 SVM locations (**Figure 3-3**). These SVM locations are nested wells comprised of up to six individual SVMPs that are screened at discrete intervals ranging from approximately 15 ft to 450 ft bgs. Five SVM locations are located off-Base, consisting of 28 SVMPs ranging from 15 ft to 450 ft bgs. Each sampling event includes the collection of field parameters, including hydrocarbons (HC), carbon dioxide (CO_2), and oxygen (O_2), and samples that are analyzed for EPA Toxic Organics – 15 (Method TO-15). Benzene, EDB, and field measured HC are the primary constituents evaluated in the corresponding quarterly reports.

SVM sampling practices have improved over the 20 plus years of monitoring activities at the Site. These improvements are summarized below and discussed in detail within the RFI Phase I (KAFB, 2018):

- In 2004 quarterly SVM began; initially only field measurements were collected.
- In third quarter (Q3) 2010, field measurements were supplemented with laboratory analysis at all SVM locations for the following analyses:
    - Method TO-15
    - Total petroleum hydrocarbons (TPH)-gasoline by EPA Method SW846-8015M
    - Fixed Gases (Nitrogen, O_2, carbon monoxide [CO], CO_2, and methane [CH_4])
- In Q1 2015, updates to the soil vapor sampling apparatus included capping and sealing SVMPs to reduce the influence of barometric pressure fluctuations on soil vapor concentrations during SVM sampling and analysis. The points and wells were sealed by securing an air-tight cap onto the top of each SVMP and adding a pneumatic quick-connect fitting to each well to serve as a sampling port for ease of access and to ensure that an air-tight seal was maintained.
- In January 2017 NMED approved the SVM Optimization Memorandum (NMED, 2017). Sampling frequency was optimized from quarterly to semiannually and the analyte list was optimized to only include analytes that were consistently detected at the Site. In addition, all laboratory methods were removed, except for Method TO-15. As a result, the full sample volume was used for TO-15 analysis, resulting in lower detection limits.

These improvements demonstrate that the recent SVM data collected is the most representative of the current site conditions. The Q4 2020 Monitoring Report (KAFB, 2021a) presents the most recent and representative soil vapor data. The Q4 2020 soil vapor data set was evaluated for the development of this WP, and the off-Base soil vapor data is summarized in Section 3.3.3.

3.3. Site Conditions

The geologic setting, utility corridors, and the Q4 2020 SVM data are discussed below. Understanding these site conditions is important for determining the sampling locations and methodology laid out in this WP.

3.3.1. Geologic Setting

As discussed in the RFI Phase I, the BFF site is located within the Albuquerque Basin of the Rio Grande Rift, which has been filled with sediment identified as the Santa Fe Group. In general, the Site is underlain by approximately 200 ft of relatively fine-grained alluvial fan deposits, with some alternating and laterally discontinuous coarse-grained zones. Underlying these easterly derived alluvial fan deposits are relatively coarse-grained Ancestral Rio Grande deposits, with a few laterally discontinuous fine-grained zones (AECOM, 2015).

The groundwater impacted by the BFF site is located within an unconfined aquifer in the Upper Santa Fe Group, which is composed of deposits of the ancestral Rio Grande fluvial system that co-mingle with alluvial deposits towards the basin margins (Hawley, 1996). As of Q4 2020, depth to groundwater ranges from approximately 435 to 490 ft bgs across the groundwater monitoring (GWM) network (KAFB, 2021a).

3.3.2. Utility Corridors

Shallow soil vapor can potentially migrate along utility corridors because most utilities use coarse grain backfill to protect the underground infrastructure. Since the shallow subsurface at the Site is composed of laterally discontinuous alluvial fan deposits, it is possible that soil vapor could migrate further distances laterally along utility corridors than through the natural deposits. In an effort to better understand the potential impacts of utility corridors on shallow soil vapor contamination, NMED submitted a request for information to Kirtland AFB asking for the locations and depths of utilities proximal to the Site (NMED, 2020). Kirtland AFB provided the utility corridor information to NMED as documented in the January 28, 2021, letter (KAFB, 2021b) and is summarized below.

As shown on **Figure 3-2**, the major utility corridor near the Site is located on-Base along Randolph Avenue. All utilities identified proximal to the Site are less than 12 ft bgs. One natural gas utility line leaves the Base near the Site and travels north to the VA Hospital. This line is 1.5 to 6 in. in diameter and approximately 18 to 24 in. deep.

3.3.3. Fourth Quarter 2020 Soil Vapor Monitoring Data Summary

The most recent data provided in the Q4 2020 Monitoring Report submitted in March 2021 indicates low contaminant concentrations in the off-Base SVM locations (KAFB, 2021a; Appendix B). Figures in **Appendix B** are excerpted from the Q4 2020 Quarterly report. **Figure B-1 through Figure B-7** illustrate benzene, EDB, and HC concentrations at each nominal depth horizon from 25 ft bgs to 450 ft bgs. **Table B-1** compares detected concentrations of EDB and

benzene to NMED residential soil gas VISLs at all nominal depth horizons for off-Base SVMPs. **Table B-2** illustrates EDB and benzene results in the 25-foot horizon both on-Base and off-Base compared to the NMED residential soil gas VISLs.

Off Base SVMPs: All Depths

As shown in **Table B-1** and on **Figure B-1 through Figure B-7**, EDB was not detected at any off-Base SVMPs in the 25-ft, 50-ft, 150-ft, 250-ft, or 350-ft nominal depth horizons. Off-Base, only one SVMP had a detected concentration of EDB: KAFB-106028-450 at 450 ft bgs. This SVMP had a detected EDB concentration of 3.6 micrograms per cubic meter ($\mu g/m^3$), which exceeds the NMED residential soil gas VISL of 1.56 $\mu g/m^3$. As shown on **Figure B-7**, this location is the closest off-Base location to the Kirtland AFB boundary. Benzene was detected at 19 of 28 off-Base SVMPs; however, no detections exceeded the NMED residential soil gas VISL of 120 $\mu g/m^3$. The off-Base benzene concentration was 50 $\mu g/m^3$ measured at 450 ft bgs at KAFB-106142-450 (**Table B-1**; **Figure B-7**).

On-Base and Off-Base SVMPs: 25-Ft Nominal Depth Horizon

As shown in **Table B-2**, and on **Figure B-1**, no results at the 25-ft depth horizon exceeded the NMED residential soil gas VISLs for EDB and benzene of 1.56 $\mu g/m^3$ and 120 $\mu g/m^3$, respectively. At the 25-ft depth horizon, EDB was nondetectable at all locations but one, KAFB-106128-025 with a J-flagged concentration of 0.43 $\mu g/m^3$. Benzene had a detected concentration of 5 $\mu g/m^3$ at this location. Benzene was detected at 28 out of 35 SVM locations with 25-ft sample ports. The maximum detected concentration was 5.3 $\mu g/m^3$ at KAFB-106140-025.

4. INVESTIGATIVE APPROACH, RATIONALE, AND GUIDANCE

The proposed scope of work consists of a phased, step-out investigative approach to assess the current nature and extent of shallow soil vapor off-Base. The first phase would focus on vapor sampling at locations that are most likely to have detectable vapor concentrations. If data collected during the first phase identifies soil vapor concentrations that indicate additional sampling is needed to "*demonstrate that [sic] there is no risk to off-site receptors located north of the Base,*" the Air Force would work with NMED to develop a second phase WP that would extend sampling from the point of detection outward. Additional step outs may be warranted based on the results of the subsequent sampling events. This approach builds on the concepts detailed in EPA (2015, Sections 4.0, 6.2.1, and 6.3.1), which require investigations to delineate the areal extent of a subsurface vapor plume as well as preferential pathways.

As indicated in Section 3.3.2 of this WP, soil vapors can migrate via advection (and diffusion) along a preferential subsurface pathway, such as a utility corridor or more porous zones of soil or rock, or beneath surface barriers that limit the direction(s) of vapor migration, such as asphalt. As indicated in EPA (2015), soil gas concentrations generally decrease with increasing distance from a subsurface vapor source, and eventually at some distance the concentrations become negligible. The distance at which soil gas concentrations become negligible is a function of the strength and dimensions of the vapor source, the type of vapor source, the soil types and layering in the vadose zone, the presence of physical barriers (e.g., asphalt covers or ice) at the ground surface, and the presence of preferential pathways (utility corridors).

As a result of the SVE operations described in Section 3.2.1 of this WP, the Kirtland AFB BFF project has a robust SVM network that has been in operation for two decades. Fifty-nine SVM locations (consisting of 299 SVMPs) were installed to measure soil vapor concentrations on a semi-annual basis at the site. As part of this monitoring well network, KAFB BFF has off-Base vapor monitoring points at the VA Hospital as well as into Bullhead Memorial Park screened from 15 ft bgs to 450 ft bgs across six to seven different horizons (35 vapor monitoring points). The SVMPs in Bullhead Memorial Park are directly between the release point on Kirtland AFB and the Siesta Hills community. These vapor monitoring points serve as an early warning system for any potential vapor migration towards the Siesta Hills community both vertically and laterally. The most recent sampling data set (see Section 3.3.3) collected in December 2020 (most representative of current conditions) for off-Base monitoring points are all below VISLs (residential sub-slab values) from ground surface to 350 ft bgs. The proposed investigation detailed in this WP would add eight additional permanent SVM locations (24 SVMPs) to the off-Base monitoring network. The SVMPs would collect semiannual samples from three horizons at 5, 10, and 15 ft bgs and near existing utilities along the northern base perimeter and into Bullhead Memorial Park. If additional step outs are required, additional permanent SVM locations may be needed.

As indicated in EPA (2015), human health risk evaluations are based on data that represent current conditions. As indicated above, current and future conditions are reassessed every six months at Kirtland AFB BFF in quarterly reports. Therefore, the information collected from this investigation and combined with the most current semiannual sampling events will be used to confirm the conclusions of the *Risk Assessment Report, Bulk Fuels Facility Spill; Solid Waste*

Management Unit ST-106/SS-111, dated July 15, 2017, to "*demonstrate that [sic]there is no risk to off-site receptors located north of the Base.*"

As the EPA (2015) states, the vapor intrusion pathway is referred to as "complete" for a building or collection of buildings when five conditions are met under current conditions: (1) a subsurface source of vapor-forming chemicals is present underneath or near the building(s); (2) vapors form and have a route along which to migrate (be transported) toward the building(s); (3) the building(s) is (or are) susceptible to soil gas entry, which means openings exist for the vapors to enter the building(s), and driving forces exist to draw the vapors from the subsurface into the building(s); (4) one or more vapor-forming chemicals comprising the subsurface vapor source(s) is (or are) present in the indoor environment; and (5) the building(s) is (or are) occupied by one or more individuals when the vapor-forming chemical(s) is (or are) present indoors. If any one of the criteria above is not satisfied, the vapor intrusion pathway is considered incomplete. As a result, in accordance with Section 6.3.2 of EPA (2015), information about subsurface vapor migration, combined with other lines of evidence, can support a determination that the vapor intrusion pathway is incomplete under current conditions.

5. SAMPLING LOCATIONS

SVM locations have been selected within the residential area north of Ridgecrest, the VA Medical Center campus, and in the utility easement south of Gibson Boulevard Southeast.

5.1. Soil Vapor Monitoring Locations

Figure 5-1 provides proposed SVM locations. A detailed listing of each SVM location, sample depths, analytical methods, and rationale for placement is provided on **Table 5-1**. Proposed shallow SVM locations were selected to provide information to support two data quality objectives:

1. Provide data to determine whether existing underground utilities provide a transport pathway for soil vapor contamination.

2. Provide additional data points to supplement the quantitative evaluation of potential vapor intrusion (VI) risk to off-site receptors performed in 2017 (KAFB, 2017a).

The NMED Risk Assessment Guidance for Site Investigations and Remediation sets forth maximum acceptable VISLs for volatile compounds in soils that are less than 10 ft below grade for comparison and evaluation of risk to human and ecological receptors at land surface (NMED, 2019b). The proposed shallow SVM locations will provide data at 5, 10, and 15 ft for comparison to NMED residential VISLs.

Four SVM locations, SVMW-16 through SVMW-19, are proposed for installation just south of the boundary between Kirtland AFB and Bullhead Memorial Park. These locations are proposed to monitor contaminant migration along the northern base boundary and to evaluate utility corridors in the area. SVMW-16 is proposed to be located adjacent to the only utility running off-Base. Three proposed SVM locations, SVMW-20 through SVMW-22, are located in the parking lot of Bullhead Memorial Park. Paved areas were chosen because vapors may accumulate under low permeability surfaces such as asphalt or concrete. In addition, these three locations are proposed to bisect the area of the benzene groundwater plume (approximately 470 ft bgs). One location, SVMW-23, is proposed for the VA Hospital parking lot in the open space adjacent to a sewer main. This location is located at the historical leading edge of the groundwater benzene plume. Finally, this location is also proximal to KAFB-106141, the most distal existing SVM location and will provide supplementary data to KAFB-106141. Locations that are planned to evaluate underground utilities will be placed as close to the utility corridor as safety precautions allow.

Proposed SVM locations were selected carefully to avoid areas in roadways and parking lots with heavy vehicular traffic for the following reasons:

- Potential sources of benzene, toluene, ethylbenzene, and xylenes may exist in shallow soils beneath roadways that could interfere with the objectives of this sampling event.

- Interference from vehicular traffic during the sampling may impact vapor concentrations in shallow soils under certain barometric pressure conditions and potentially result in false positives.

In addition, the proposed sampling protocol includes the collection and analysis of ambient air samples during soil vapor sample collection to evaluate the potential for volatile organic compounds (VOCs) present in ambient air. This could bias soil vapor sample results as discussed further in Section 8.2.

6. SCOPE OF ACTIVITIES

6.1. Soil Vapor Monitoring Point Installation and Sampling

The scope of this WP includes the installation of SVMPs and collection of shallow soil vapor samples. Installation of SVMPs will be conducted using Direct Push Technology (DPT) drilling methods where possible; detailed drilling and SVMP installation methodology is described further in Section 7. Shallow soil vapor samples will be collected from SVMPs utilizing the methodology described in Section 8.

6.2. Mobilization/Demobilization

Once the final sampling locations and schedule are approved by NMED, Kirtland AFB will coordinate with the City of Albuquerque (COA) and the Department of Veterans Affairs. A list of permits and access agreements include, but are not limited to, the following:

1. COA Noise Control Permit
2. COA Excavation Permit
3. NM 811 Damage Prevention Center – Dig Permitting/Clearance
4. COA Right-of-Way License, expiration date September 2026
5. Department of Veterans Affairs Permit for Right of Entry

Because all proposed drilling and SVMP installation sites are located off-Base and in nonsecure areas, all equipment and personnel will be mobilized to and from the drilling locations daily. At the end of each workday all investigation derived waste (IDW) will be removed and SVMPs will be covered and secured. All work sites will be restored to initial conditions and documented with pre- and post-work photographs in compliance with the COA Construction Services permit and the VA Right of Entry.

6.3. Site Security

Safe and secure construction sites will be maintained during the execution of all activities pursuant to off-site SVMP installation and sampling. Site and safety personnel will conduct work activities in accordance with U.S. Air Force safety standards and practices. Monitoring point sites (traffic control, noise control, and site security) will be implemented to control public access and reduce interference, and a safe work environment for the field teams and the surrounding community will be established.

6.4. Barricading/Traffic Control

Work areas for SVMP drilling and installation will be protected from pedestrian and vehicular access. Barricades, temporary traffic control measures, and detour routes will be established where necessary in accordance with COA Construction Services Division requirements and in coordination with the VA Right of Entry. Kirtland AFB will comply with the COA's Construction Coordination Section for work within the public right-of-way, including barricade and excavation permits and fees, providing data for traffic reports, and any requirements established by the VA Hospital during work activities on the VA property.

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7. INVESTIGATION METHODS

7.1. Drilling Equipment and Methods

SVMPs will be drilled using DPT when possible. Where DPT methods cannot penetrate to design depths, 6 in. hollow-stem auger methods will be used to complete the installations. The proposed drilling equipment is a Geoprobe 7822DT drilling rig, or similar. The drilling rig is rubber tracked and designed to traverse variable terrain with minimal surface disturbance. The rig employs hydraulic ram and percussion hammer technology to advance hollow steel tubing to collect core samples in acetate core tubes and to allow vapor points, tubing, gravel packs, and annular seals to be deployed to precise depths. The drilling rig is also equipped to drill with 6 in. hollow-stem augers that will be used only if necessary to advance borings. All drilling will be conducted in accordance with RCRA Permit Sections 6.5.9 and 6.5.11.

Proposed DPT drilling will be performed in two penetration passes. Where DPT methods are successful, an initial penetration will be made to total depth (15 ft) using 2.25 in. outside diameter x 48 in. length rods to capture 1.5 in. diameter soil cores in acetate tubes. A second pass will be made to total depth using 3.5 in. outside diameter x 48 in. length rods, to widen the hole and allow deployment of soil vapor probes to the proposed depths and construction of multiple ports, tubing strings, gravel packs and annular seals in the borings. During advancement of the DPT tools, cores will be collected in the lead rod in acetate core tubes on 4 ft intervals and brought to land surface. Acetate core tubes will be cut longitudinally such that retrieved cores may be inspected visually and for lithologic logging. Documentation for logging as well as collection of other field parameters will be conducted using the field forms included in **Appendix C**.

Where DPT methods cannot penetrate to design depths, partial DPT cores will be retained, and hollow stem auger cuttings will be collected to complete descriptions of penetrated sediments. Soil cores will be visually inspected and logged by the Unified Soil Classification System (USCS) in accordance with the American Society of Testing and Materials (ASTM) D5434 by an experienced field geologist. Soil core descriptions will include mineralogy, texture, sorting, rounding, degree of induration, plasticity, moisture content, and USCS and Munsell Soil Chart color.

7.2. Proposed Vapor Monitoring Point Construction

Permanent SVMPs will be completed to accommodate additional future sampling events and will be repaired or replaced as necessary to maintain compliance with regulatory monitoring requirements. All SVMP installations will be equipped with permanent flush to grade traffic rated vault and concrete slab surface completions.

For the DPT sampling tools, Teflon tubing was selected over stainless-steel tubing to improve analytical data quality and repeatability due to its resistance to contaminant adhesion and constructability considerations. The proposed DPT drilling methodology will require that the SVMPs be built in slender open holes after the DPT drilling tools are withdrawn. Hole diameters will be small (3.5 in.), and hole stability will be an issue with stainless steel tubing, which is delivered in coiled segments and requires extensive handling to straighten. This has the propensity to excessively contact and abrade the open holes, risking hole caving and collapse.

Teflon tubing is light and flexible, requires minimal handling, and provides the best opportunity to complete the SVMP nests with minimal risk of hole sloughing or introduction of contaminants by excessive handling. Details of proposed soil vapor well completions are shown on **Figure 7-1**.

7.2.1. Proposed Well Construction Materials

Proposed SVM points materials include:

- Soil Vapor Probes – Geoprobe 6 in. AT86 Series double woven stainless wire screen
- Well Tubing – 1/4 in. Teflon tubing
- Pervious Annular Fills – 10/20 grade silica sand (opposite wire screen probes)
- Annular Seals – 3/8 in. granular bentonite, placed, hydrated (between screened zones)
- Tubing Vault Seals – SWAGELOK quick connect sample connection fittings, or equivalent (part no. SS-QC4-B-2PM)
- Well Vault – 12 in. x 12 in. cast iron flush to grade traffic rated vault with tamper proof security bolts and waterproof seals on the vault covers and bolts
- Vault Drain Tube – 1/2 in. schedule 40 polyvinyl chloride (PVC) pipe, set through vault concrete to natural materials below
- Concrete Surface Pad – Portland ready concrete mix meeting ASTM C387

7.2.2. Proposed Well Construction

Components for SVMP well construction are identified in Section 7.2.1 above. Installation methods to ensure the proper positioning of vapor probes, annular gravel packs, and annular seals are detailed below and illustrated on **Figure 7-1**. Wells will be advanced using DPT and/or a 6 in. hollow-stem auger, as required and described in Section 7.1. Well probe and annular fill placements, as well as surface completions will be performed as follows:

- Vapor Probe Placement—Prior to installing the vapor probes at prescribed depths in each well, the well depth will be sounded using a weighted fiberglass or steel tape to tag the bottom of the hole and to verify that the hole depth matches the well design depth for that probe. The probe will then be affixed to a length of Teflon tubing and lowered to the bottom of the hole and the placement depth verified by additional hole depth sounding. Approximately 5 ft of excess Teflon tubing will be placed on each vapor probe to allow the excess tubing to be bundled and positioned away from the hole during annular fill and surface completion operations. Depth stamped quick connect sample connection fittings will be affixed to each Teflon tubing run to prohibit entry of foreign media into the tubing during well construction operations.
- Pervious Annular Fill Placement—After placing each vapor probe to its prescribed depth, 10/20 silica sand will be incrementally trickled into the hole from land surface until the

annular space opposite the vapor probe is flooded with sand. The level of the annular sand fill will be verified by continuous sounding with the weighted tape as incremental filling progresses to ensure that overfilling or bridging does not occur.

- Annular Seal Placement—After the annular sand fill opposite each vapor probe has been placed, 3/8 in. granular bentonite will be placed by slowly pouring the granular bentonite into the hole from land surface until the annulus above the probe/sand interval has been filled to the bottom of the next probe/sand interval, or (for the shallowest probe in each well) to approximately 4 in. below the projected base of the well vault on the completed installation. The bentonite fill will be continuously sounded with the weighted tape to ensure that bridging or overfilling does not occur. During placement of granular bentonite, potable water will be added by tremie pipe in 1-foot lifts such that the bentonite is hydrated to form an annular seal between probes and between the upper probe and land surface.

- Well Vault and Concrete Surface Slab Placement—After probes, Teflon tubing, and annular fills have been placed in each well, the ground (turf or unimproved dirt) will be excavated around the well to a depth of 6 in. and width of 4 ft x 4 ft. A square concrete form constructed of 2 x 6 in. lumber will be placed in the excavation and centered on the well boring such that the top of the form is roughly level to adjacent grade. The 12 in. vault will be pushed into the well boring hole until its upper ring surface is approximately 1 inch higher than the lumber concrete form. Ready mix concrete will be prepared and flooded inside the form and around the well vault until an adequate volume of concrete has been placed to the top of the form and to the upper surface of the well vault.

  A drain tube consisting of an 8 in. length of 1/2 in. diameter PVC tubing will be placed inside the well vault and pushed into the soil until its upper terminus is approximately 5 in. above the bottom of the well vault. The well vault will then be flooded with concrete until it nearly tops the PVC tube. The Teflon tubing for each vapor probe with affixed depth stamped quick connect sample connection fittings will be coiled and placed into the well vault, and the well vault cover will be placed, and security bolts fastened. The concrete slab will be floated and surfaced such that a smooth surface sloping radially from the upper well vault ring to the concrete form results. Finally, the concrete slab will be broom finished.

7.3. Decontamination

All DPT and drilling tools and equipment that are used to penetrate below grade will be decontaminated prior to arriving on site and will be decontaminated after use at each SVM location. All decontamination procedures will be performed in accordance with RCRA Permit Section 6.5.3.

Soil vapor sampling equipment will consist of single use disposable Teflon tubing and dedicated SVMP single use hose barbs and flow control valves; therefore, no decontamination of soil vapor sampling equipment will be necessary.

Decontamination of drilling tools will take place in designated decontamination areas specific to the work activity and approved by Kirtland AFB. All decontamination wastewater will be

managed in accordance with Kirtland AFB waste containment and disposal procedures. The objective of field decontamination is to remove contaminants of concern from the drilling tools to minimize risks of cross contamination and negative impact on study objectives. Specifications for decontamination materials are as follows:

1. Use a standard brand of phosphate-free laboratory detergent, preferably either liquid Liquinox® or powder Alconox®.
2. Use tap water from a municipal water treatment system. Detergent and tap water will remove the gross contamination from the sampling equipment.
3. Use deionized water for the final rinse of sampling equipment that has direct contact with the sampling medium.

7.4. Drilling Investigation Derived Waste

The DPT drilling method proposed for SVMP installations will not penetrate saturated soils and will not require liquids to advance. The DPT soil coring will produce small amounts of IDW, up to 3.5 gallons of soil core per monitoring point, and 15 lineal ft of acetate core barrel per monitoring point. Derived soil will be captured and contained in sealed 5-gallon containers pending receipt of waste characterization profiling results. It is not anticipated that soils will contain any level of contamination; however, IDW samples will be screened for fuel components and toxic metals using totals analysis. Based on the totals analysis screening results, additional testing will be conducted using Toxicity Characteristic Leaching Procedure methodology if needed. All IDW will be handled in accordance with RCRA Permit Section 6.5.7.

Once the analytical results for soil tests are received and reviewed, a Request for Disposal letter will be provided to Kirtland AFB for approval to dispose of the soil in the Kirtland Construction and Demolition Landfill, assuming it meets waste acceptance criteria. All documentation regarding waste characterization and disposal will be provided in the appendices of the document describing the activities during which waste was generated.

7.5. Borehole Logging

During drilling, each boring will be fully described by a geologist on the boring log form in accordance with ASTM International D5434 and will include the following, when applicable:

1. Identification number and location of each boring
2. A general description of the drilling equipment used, including rod size, bit type, pump type, rig manufacturer, and model
3. Date and time of start and completion of boring
4. Name of contractor, driller, and drill site geologist
5. Size and length of casing (soil vapor port and tubing type) used in each borehole
6. Soil classification in accordance with the USCS, and color, relative density and consistency, soil components, soil moisture, stratification, hardness, grain size and size distribution, and odor will be logged
7. Mineralogical content of the core (for correlation)

8. Observations during drilling, such as bit chatter, rod binding, and rod drops
9. Depth limits, type, and number of each sample taken
10. Observations of visible contamination for each sample

7.6. Site Restoration

Site restoration will consist of backfilling and compaction, surface restoration/resurfacing, and landscaping restoration. Work areas will be restored to original conditions and, in the areas where pavement is disturbed, pavement of the type and thickness meeting COA Department of Municipal Development or VA Right of Entry requirements will be replaced as applicable.

7.7. Soil Vapor Monitoring Point Survey

Upon completion, each SVM location will be surveyed by a Registered Land Surveyor (RLS) in accordance with RCRA Permit Section 6.5.8 and New Mexico Administrative Code 12.8.2. The surveys will establish northings, eastings, and elevations within 0.01 ft accuracy at all SVM locations, referenced as follows:

1. New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983
2. North American Vertical Datum 1988

A tabular summary of the XYZ coordinates for each monitoring point, as well as a map showing the locations of the monitoring points and bearing the RLS seal will be prepared and included in the Final Investigation Report.

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8. MONITORING AND SAMPLING

8.1. Soil Vapor Sample Collection and Analysis

Proposed soil vapor sampling will be conducted after each of the proposed SVMPs have been completed and adequate time has elapsed to allow perturbed soil vapor conditions from monitoring point installation to return to ambient conditions (proposed 14 days minimum). Barometric pressures and trends will be noted during sample collection to assess propensity for air to move into or out of shallow soils during soil vapor sampling. Two sampling events will be conducted, one in summer and one in winter, contingent on NMED approval of this WP. Sampling will be conducted to determine if seasonal changes affect sampling results. However, it is unlikely to be conducted during bioventing pilot testing as described in the NMED letter dated February 25, 2019, due to the length of time required for review and approval of this WP. Any new SVM wells that exceed a VISL after the first two samples are collected will be added to the semiannual SVM schedule.

Proposed sampling train and equipment are depicted on **Figure 8-1**. Proposed equipment includes a vacuum pump and vapor ports for production of formation-representative soil vapor samples. Additionally, sensitive vacuum/pressure gauges assess pre-purging and pre-sampling subsurface soil pressure/vacuum conditions, evaluate vacuum propagation during monitoring point purging, and evaluate for possible interference between vapor ports in the monitoring point nest. Teflon tubing has been selected for the proposed sampling train to improve analytical data quality due to its resistance to contaminant adhesion. SVMPs will be sealed when not in use and as such will not be able to off-gas soil vapor or allow infiltration of the atmosphere.

The proposed sampling train includes connections to allow collection of vapor streams during monitoring point purging for testing of volatile and fixed gases using field instruments, as well as for collection of SUMMA® canister samples at the conclusion of monitoring point purging. The vacuum pump is equipped with a check valve to prevent backflow through the pump during non-operation. The sampling train will also be equipped with a three-way valve above the SUMMA® canister to ensure the sample will only be collected from the well side of the sample train. An isolation valve positioned between the vacuum pump/field sensors and the SUMMA® canister will also be utilized as a secondary isolation point during sample collection but will be open during purging to allow for monitoring of purge vapors. The three-way valve and the isolation valve will ensure that vapor taken into the SUMMA® canister does not flow backwards through the vacuum pump or field sensors. All Teflon tubing and connections proposed for the sample train upstream from the isolation valve will be new, single-use disposable for each individual port at each monitoring point.

Vapor samples will be collected and analyzed for VOCs using Method TO-15. The following paragraphs are included to provide specific information regarding sampling procedures, to include pre-sampling steps for the maintenance and calibration of field instruments, sample train procedures to prevent cross contamination, and leak checking of the sample chain. Also detailed below are specific sampling activities to include static pressure measurements, vapor monitoring point purging, and SUMMA® canister sample collection.

During purging and prior to sampling, each SVMP purge influent vapor streams will be screened for composition to ensure that vapors have been fully evacuated from the monitoring points, tubing, and annular sand packs and that formation-representative samples are collected for laboratory analysis. Influent purge vapor streams will be field screened for total ionizable volatile HC and O_2 using an RKI Instruments GX6000 gas monitor equipped with an 11.7 electron-volt ionizer lamp. CO_2 will be measured using a Landtec GEM™2000 gas detector with a dual beam infrared absorption sensor.

Prior to beginning soil vapor sampling each day, the field instruments will be calibrated for ionizable petroleum HC and O_2, CH_4, and CO_2 against calibration standards of known concentrations in premixed gas cylinders. Calibration gases will include 100 parts per million isobutylene for volatile HC, and CH_4 50%, CO_2 35%, and O_2 0%. Instruments will be zeroed at CO_2 of 0% and O_2 of 20.9% as appropriate for atmospheric conditions.

At the middle of each workday, a calibration check will be performed on each instrument to determine whether any of the parameters drifted since the morning calibration. If the results are outside of 5% of the calibration gas standards, then the instrument will be recalibrated prior to additional purging and sampling. All equipment calibration will be performed in accordance with RCRA Permit Section 6.5.4.

The proposed sampling train shown on **Figure 8-1** will consist of new Teflon tubing, hose barb t-connections, and an isolation valve positioned between the SUMMA® canister and the vacuum pump and field gas sensors. The tubing assembly will allow for pressure isolation to the sample container that prevents atmospheric air from entering the sample container. Teflon tubing and t-connectors upstream of the isolation valve will be disposed of upon completion of sampling at each port and each monitoring point. Each gas field instrument will be completely purged with atmospheric air after sampling each SVM port.

Prior to purging, static vapor pressures will be measured in each soil vapor port with magnehelic gauges. Monitoring point purging, field data, and SUMMA® canister sample collection will be completed in accordance with the proposed parameters and estimated schedules shown on **Figure 8-1**. Proposed soil vapor point purging and SUMMA® canister sample collection methodology is as follows:

1. Connect the Teflon tubing to the monitoring point port, the SUMMA® canister, the isolation valve, the field gas detectors, and the vacuum pump as shown on **Figure 8-1**.
2. Read static vacuum/pressures on the magnehelic gauges in the vapor port that is being sampled, as well as the other two or three vapor ports, and record the values.
3. Ensure that the isolation valve is in the open position prior to initiating purge pump operation.
4. Turn on the vacuum purging pump, verify proper operation by monitoring pump exhaust flow.
5. Start timing the purge cycle. Based upon the calculated volume of the tubing set and sampling train (15 ft x 1/4 in. diameter) and the flow rate of the proposed vacuum pump (0.75 cubic feet per minute), the time required to fully purge one bore volume of the

tubing is less than one minute. A purge volume of one to three tubing volumes is adequate. Therefore, to achieve at least three full bore volumes, the proposed four minutes of purge time is adequate to purge the tubing and sample train.

6. Measure and record the O_2, CO_2, and photoionization detector readings during purging to ensure that a stable formation-representative soil vapor stream is being produced prior to vapor sample collection in the SUMMA® canister.
7. Close the isolation valve between the SUMMA® canister and the vacuum pump and turn off the vacuum pump. Open the valve on the SUMMA® canister and allow the soil vapor stream to enter the SUMMA® canister for two minutes.
8. Prior to closing the valve on the SUMMA® canister, check and record the vacuum/pressure in the SUMMA® canister and sample train tubing. Ensure that the SUMMA® canister has fully filled and that there is no residual vacuum in the canister or sample train.
9. Close the valve on the SUMMA® canister tightly to ensure sample integrity.
10. Ship SUMMA® canisters to the specified laboratory and analyze the samples for the analytical methods listed in the WP.

8.2. Quality Assurance/Quality Control (QA/QC) Samples

In addition to SVMP sampling, additional QA/QC samples will be collected over the duration of the sampling event. Two blind field duplicate samples will be taken during the sampling event to identify potential sampling or laboratory error or contamination. A time-weighted atmospheric sample will be taken for each day SVMP sampling is conducted to determine if potential interference from outside sources, such as vehicular exhaust, runoff, or asphalt, may affect the sampling results. Two trip blanks will be submitted to the laboratory for analysis for the sampling event.

8.3. Laboratory Analysis

Analytical services will be provided by ALS Global Environmental Laboratory (ALS) located in Simi Valley, California. ALS laboratory is accredited under the Department of Defense Environmental Laboratory Accreditation Program. All samples submitted to ALS will be handled in accordance with RCRA Permit Section 6.5.5. Laboratory analyses will be performed in accordance with RCRA Permit Section 6.5.18.

Proposed 6-liter SUMMA® canister samples will be used to analyze for VOCs for each sample. Samples will be analyzed for VOCs by method TO-15. The target analyte list was based on vapor monitoring conducted between 2001 and 2015. The contaminants of potential concern (COPC) are listed in **Table 8-1** along with the laboratory detection limits and the residential VI screening limits as included in NMED's "*Risk Assessment Guidance for Site Investigations and Remediation*," February 2019 (NMED, 2019b).

Table 8-1 shows the limit of quantification (LOQ) and minimum detection limit (MDL) values for samples collected in 6-liter canisters. After the pressurization dilution factor is applied to the base LOQ and MDL, these values are expected to increase by approximately 1.5 times for 6-liter samples. Consequently, 6-liter SUMMA® canister samples are proposed to be collected and

analyzed to ensure that minimum detection and concentration quantitation levels for EDB will be below the NMED residential VISL screening level.

Additionally, soil gas samples typically have elevated VOC concentrations as compared to ambient air samples. In the unlikely event that high-level VOCs are present, a secondary dilution may be required, which would result in elevated LOQ for the sample. Where possible, laboratory processes will be used to minimize dilution for any non-COPC analytes so that the COPC maintain the lowest possible LOQs.

8.4. Reporting

After both the summer and winter sampling events are completed and when the final validated data is received from the sampling events, the Air Force will reach out to NMED to discuss the final data and determine the path forward for the shallow soil vapor investigation. Regardless of the path forward determined in this meeting, the SVM locations installed as part of this WP will be incorporated into the routine semiannual SVM program for the BFF.

As part of the phased, step-out investigative approach, this meeting will lead to either a Final Investigation Report or an Interim Investigation Report that requires additional investigation. A Final Investigation Report will be submitted only if the final validated data support the Risk Assessment conclusions that there is no vapor intrusion risk to off-base receptors. If the final validated show areas with elevated soil vapor contamination, then an Interim Investigation Report will be submitted summarizing the data and indicating the areas that warrant additional investigation. Subsequently, an additional WP describing the installation and sampling of step-out shallow SVM locations will be submitted to NMED.

The Investigation Report will be prepared and submitted in accordance with the requirements of RCRA Permit Section 6.2.4.3 for Investigative Reports. Data validation and summary tables will be prepared for ease of data review. A summary of field activities and screening data will be included in the investigation report. An electronic copy of the validated analytical data will be included. The final report will include:

- Certification by a facility representative
- Executive summary, introduction, and background information
- Description of the scope of field sampling activities
- Sampling results included in tables with identifier, date, and time of all samples. Tables shall also include QA/QC designation for each sample
- Results of field screening data, in tabular format
- Regulatory criteria
- Description of vapor point construction and lithologic description
- Text summary of data validation procedures and results

- Soil boring logs, as an attachment/appendix
- Specifications for vapor probe construction, as an attachment/appendix
- Survey data, as an attachment/appendix
- Waste disposal documentation, as an attachment/appendix
- Validated analytical data deliverable in an electronic format such as Microsoft Excel, Microsoft Access database, or other compatible format
- Tables, figures, and appendices as appropriate
- Conclusions and recommendations

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9. SCHEDULE

See schedule of activities included in **Table 9-1**.

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TABLES

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Table 2-1: Known Utility Information in Study Area

Utility Type	General Location/Operator	Pipe Diameter (inches)[a]	Approximate Depth (bgs)[b]
Natural Gas Distribution	On Base/KAFB	1.5–6.0	18–24 in.
Natural Gas Service	On Base/KAFB	1.5–4.0	18–24 in.
Sewer Main – Pressurized	On Base/KAFB	4.0–6.0	4–12 ft
Sewer Main – Gravity	On Base/KAFB	4.0–72.0	4–12 ft
Sewer Service – Gravity	On Base/KAFB	2.0–18.0	2–6 ft
Storm Water – Gravity	On Base/KAFB	8.0–60.0	2–6 ft
Water Main	On Base/KAFB	3.0–24.0	2–7ft
Water Service	On Base/KAFB	1.5–12.0	2–7 ft
Natural Gas Distribution	Off Base	NA	3–6ft
Sewer Main – Gravity	Off Base	NA	6–10 ft
Communication Lines	On Base/Off Base	NA	4–5 ft
PNM Electrical	Off Base	NA	3–5 ft
Water Main	Off Base	NA	2–3 ft

[a] Pipe diameters are ranges for each utility depending on the specific segment. All on base pipe diameters are from the Kirtland AFB Geo database
[b] Utility depths are based on general construction specifications for the given utility
AFB – Air Force Base
bgs – below ground surface
ft – feet
in. – inches
KAFB – Kirtland Air Force Base
NA – Not Available
PNM – Public Service Company of New Mexico

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Table 5-1: Soil Vapor Monitoring Point Locations, Depths, Analytical Methods, and Rationale

Soil Vapor Monitoring Location	Soil Vapor Monitoring Point ID	Proposed Location[1]		Proposed Screened Interval (ft bgs)		Analyses/ Methods	Rationale for Location
		X	Y	Top	Bottom	VOCs by Method TO-15	
SVMW-16	SVMW-16-005	-106.581664	35.051187	4.5	5.0	X	Strategically located adjacent to the only utility running off base. Location will monitor natural gas, potable water, and sanitary sewer lines.
	SVMW-16-010			9.5	10.0	X	
	SVMW-16-015			14.5	15.0	X	
SVMW-17	SVMW-17-005	-106.57988	35.051242	4.5	5.0	X	Monitoring northern perimeter along water and sanitary sewer utilities
	SVMW-17-010			9.5	10.0	X	
	SVMW-17-015			14.5	15.0	X	
SVMW-18	SVMW-18-005	-106.578142	35.051072	4.5	5.0	X	Monitoring northern perimeter along the sanitary sewer utilities and over the known benzene footprint.
	SVMW-18-010			9.5	10.0	X	
	SVMW-18-015			14.5	15.0	X	
SVMW-19	SVMW-19-005	-106.577486	35.051174	4.5	5.0	X	Monitoring northern perimeter along the water utilities and over the known fuel plume footprint.
	SVMW-19-010			9.5	10.0	X	
	SVMW-19-015			14.5	15.0	X	
SVMW-20	SVMW-20-005	-106.576059	35.052846	4.5	5.0	X	Monitoring western edge of the known fuel plume in Bullhead Memorial Park.
	SVMW-20-010			9.5	10.0	X	
	SVMW-20-015			14.5	15.0	X	
SVMW-21	SVMW-21-005	-106.577116	35.052902	4.5	5.0	X	Monitoring the centerline of the fuel plume in Bullhead Memorial Park.
	SVMW-21-010			9.5	10.0	X	
	SVMW-21-015			14.5	15.0	X	
SVMW-22	SVMW-22-005	-106.578109	35.05314	4.5	5.0	X	Monitoring eastern edge of the known fuel plume in Bullhead Memorial Park.
	SVMW-22-010			9.5	10.0	X	
	SVMW-22-015			14.5	15.0	X	
SVMW-23	SVMW-23-005	-106.57691	35.054358	4.5	5.0	X	Monitoring leading edge of the known fuel plume in Bullhead Memorial Park. Strategically located adjacent to an off-base sanitary sewer line. Proximal to KAFB-106141.
	SVMW-23-010			9.5	10.0	X	
	SVMW-23-015			14.5	15.0	X	

[1]Coordinates are provided in decimal degrees, World Geodetic System 1984 (WGS84)

bgs below ground surface
ft feet
ID identification
VOC volatile organic compound

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Table 8-1: Contaminants of Potential Concern

Analyte	Residential VISL (µg/m^3)	TO-15 MRL/LOQ (µg/m^3)**	TO-15 MDL (µg/m^3)***
Benzene	1.20E+02	0.53	0.077
tert-Butyl methyl ether (MTBE)	3.60E+03	0.54	0.063
1,2-Dibromoethane	1.56E+00	0.53	0.062
1,2-Dichloroethane	3.60E+01	0.51	0.078
Ethylbenzene	3.74E+02	0.53	0.075
n-Hexane	2.43E+04	0.53	0.11
Naphthalene	2.75E+01	0.53	0.13
Toluene	1.74E+05	0.53	0.065
m-Xylene	3.48E+03	1.1	0.14
o-Xylene	3.48E+03	0.53	0.077
p-Xylene	3.48E+03	1.1	0.14
Xylenes*	3.48E+03	2.73	NA
1,2,4-Trimethylbenzene	NA	0.53	0.074
Cyclohexane	NA	1.1	0.15
n-Heptane	NA	0.53	0.085

µg/m^3 micrograms per cubic meter
LOQ Limit of quantification
MDL Minimum Detection limit
MRL Method reporting limit
NA Not applicable
VISL vapor intrusion screening level
* Total Xylenes will be reported as the sum of m, p-xylene, and o-xylene. No MDL or limit of detection evaluation is performed for Total Xylenes.
** Actual reporting limits will be higher depending on the canister pressurization dilution factor and/or sample matrix effects. Typical canister pressurization dilution factors are between 1.5-2.0.
*** MRLs assume a standard sample analysis volume (1 liter for 6-liter canister) canister.

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Table 9-1: Field Sampling Schedule

Activity	Schedule
WP delivered to NMED	May 2021
NMED Comments	To be determined. If sampling is to be completed in 2021 as proposed in this schedule, the Air Force will need comments by July 30, 2021.
Response to Comments	30 days from receipt of NMED letter
Field Mobilization	14 days from notice to proceed and NMED approval of WP
Drilling	Complete within 14 days of mobilization
1st Sampling	Summer[1] 2021 (at least 14 days post-installation, before September 30)
2nd Sampling	Winter[2] 2021 (within 6 months of 1st sampling)[3]
Laboratory Analytical and Validation	60 days from 2nd sample collection
Meeting with NMED to Discuss Results of Investigation	Confer with NMED after data validation
Investigation Report to NMED	To be determined based on meeting with NMED

1. Summer is defined as June 2021 through September 2021.
2. Winter is defined as December 2021 through March 2022.
3. Future sampling events will be synchronized with semi-annual monitoring events.

NMED New Mexico Environment Department
WP Work Plan

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FIGURES

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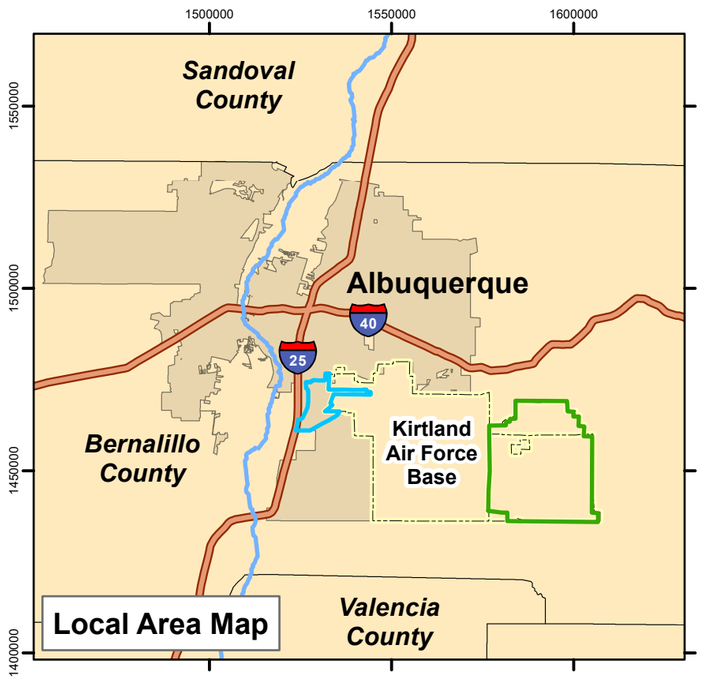

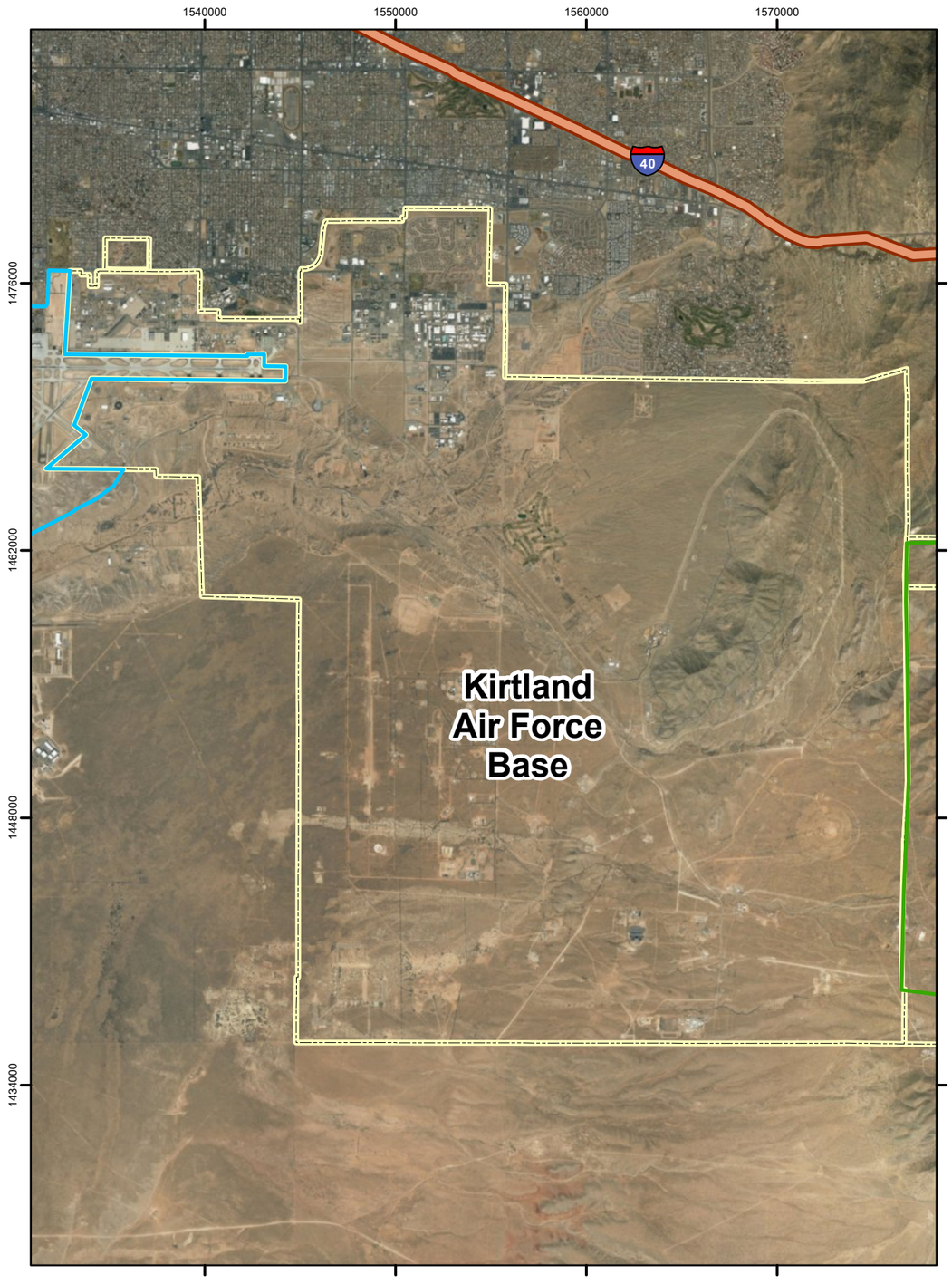

Legend

- Installation Boundary
- USAF Withdrawl Area
- ABQ Sunport Boundary
- Rio Grande
- Interstate
- US Highway
- State/County Highway

Revision Date: 10/17/2019

N

0 2,500 5,000 10,000

Feet

1 inch = 7,193 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-1

SITE VICINITY MAP

Document Path: N:\Kirtland\GIS\GIS_Projects\BFF_new_well_plan\Figure 1. Site Location.mxd

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1541000 1542000 1543000

1475000 1474000 1473000

Randolph Rd SE

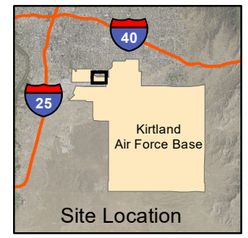
Air Guard Dr SE

Air Guard Dr

San Mateo Blvd SE

Legend

- Ridgecrest Drive
- Kirtland Air Force Base Installation Area
- Sewer Main - Gravity
- Sewer Main - Pressurized
- Sewer Service - Gravity
- Water Main
- Water Service
- Natural Gas Distribution
- Natural Gas Service
- Stormwater Gravity
- Steam Main
- Steam Service



Imagery Source: National Agricultural Imagery Program June 2014

Revision Date: 5/10/2021

N

0 100 200 400 600 800

Feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

WORK PLAN FOR SHALLOW SOIL VAPOR
SAMPLING BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT, ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-2

KNOWN UTILITY LOCATIONS

Document Path: N:\Kirtland\GIS\GIS_Projects\Q2_2021\ProposedLocations_BasePerimeter\Figure. Kirtland Utilities.mxd

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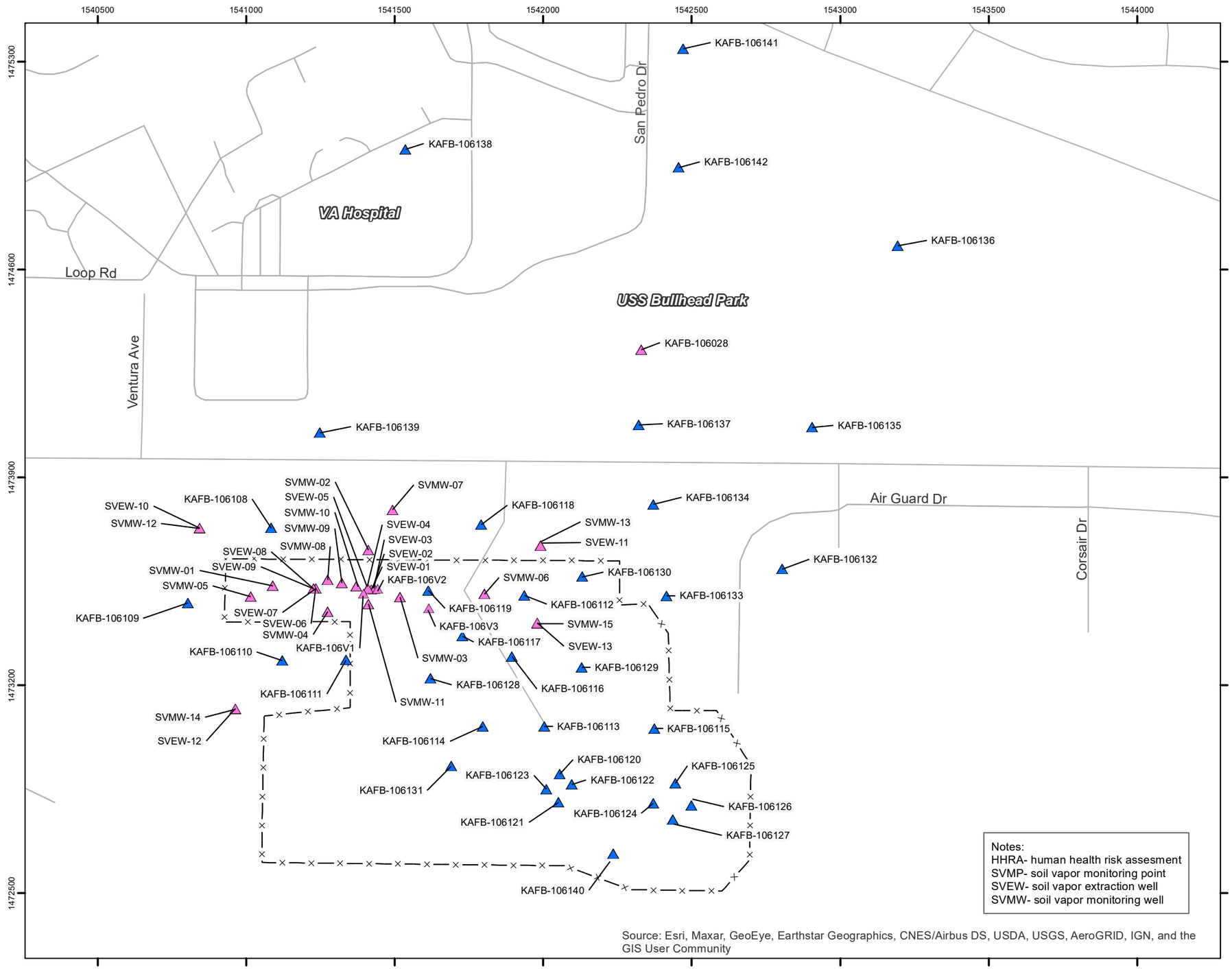


Notes:
HHRA- human health risk assesment
SVMP- soil vapor monitoring point
SVEW- soil vapor extraction well
SVMW- soil vapor monitoring well

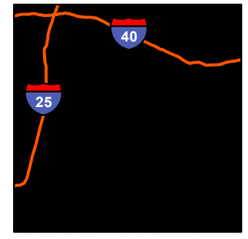
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Kirtland Air Force Base Installation Area
- Source Area
- Bulk Fuels Facility Area
- Road
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Former Aboveground Storage Tank

Soil Vapor Monitoring Point

- Location with shallow SVMP (15-25ft) evaluated in the HHRA for potential vapor intrusion
- Location without shallow SVMP (15-25ft) not evaluated in the HHRA for potential vapor intrusion



Imagery Source: National Agricultural Imagery Program June 2014

Revision Date: 5/20/2021

N

0 200 400 800

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT, ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-3

SOIL VAPOR MONITORING LOCATIONS

Document Path: N:\Kirtland\GIS\GIS_Projects\Q2_2021\ProposedLocations_BasePerimeter\Figure 3-3. monitoring_locations.mxd

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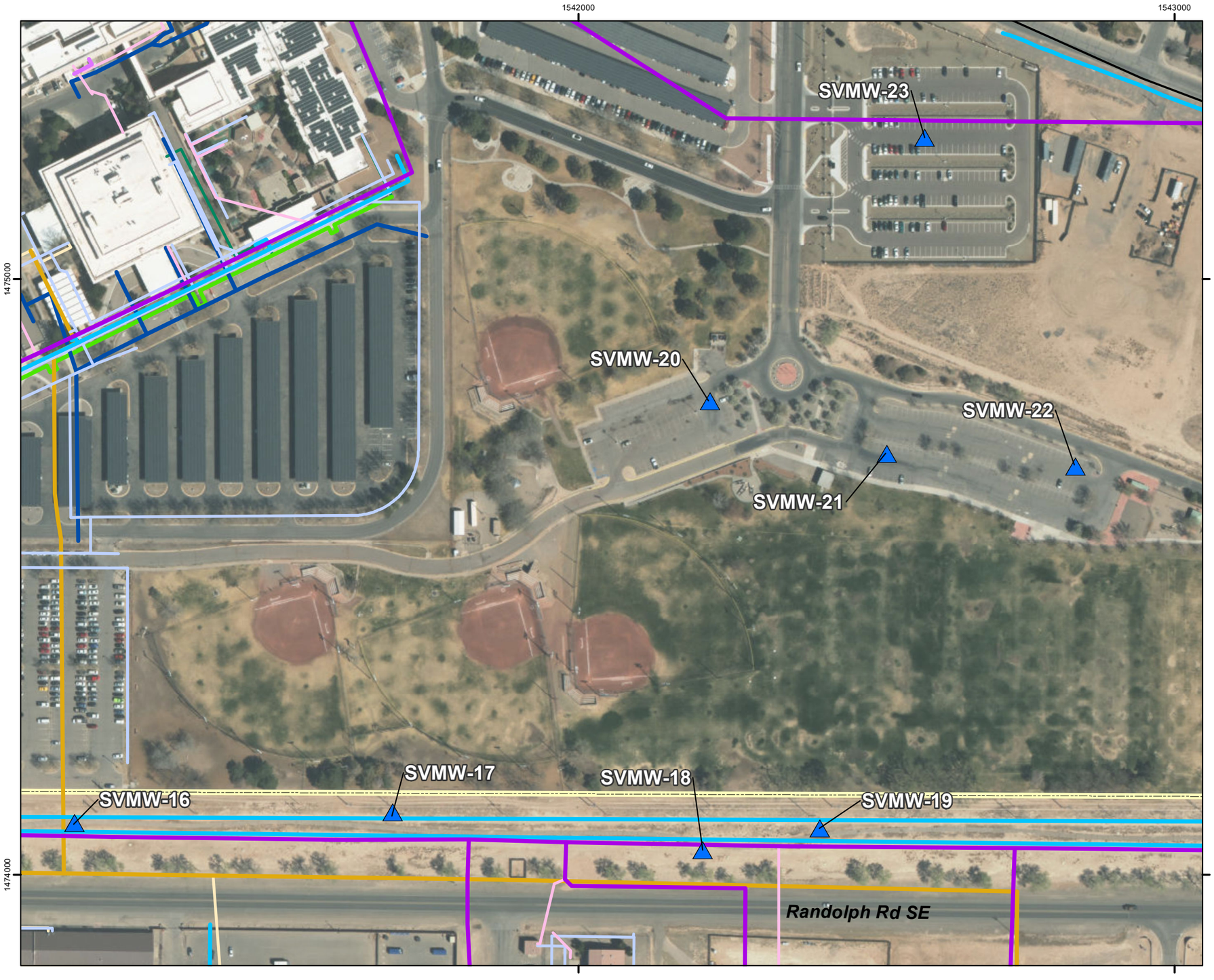
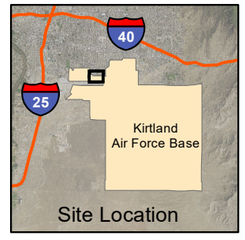


Legend

- Proposed Locations
- Ridgecrest Drive
- Kirtland Air Force Base Installation Area
- Sewer Main - Gravity
- Sewer Main - Pressurized
- Sewer Service - Gravity
- Water Main
- Water Service
- Natural Gas Distribution
- Natural Gas Service
- Stormwater Gravity
- Steam Main
- Steam Service



Imagery Source: National Agricultural Imagery Program June 2014

Revision Date: 5/4/2021

N

0 50 100 200 300 400

Feet

1 inch = 172 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

WORK PLAN FOR SHALLOW SOIL VAPOR SAMPLING
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-1

PROPOSED SOIL VAPOR MONITORING LOCATIONS

Document Path: N:\Kirtland\GIS\GIS_Projects\Q2_2021\ProposedLocations_BasePerimeter\Figure 2-1. Proposed Wells & Q2 EDB Results2.mxd

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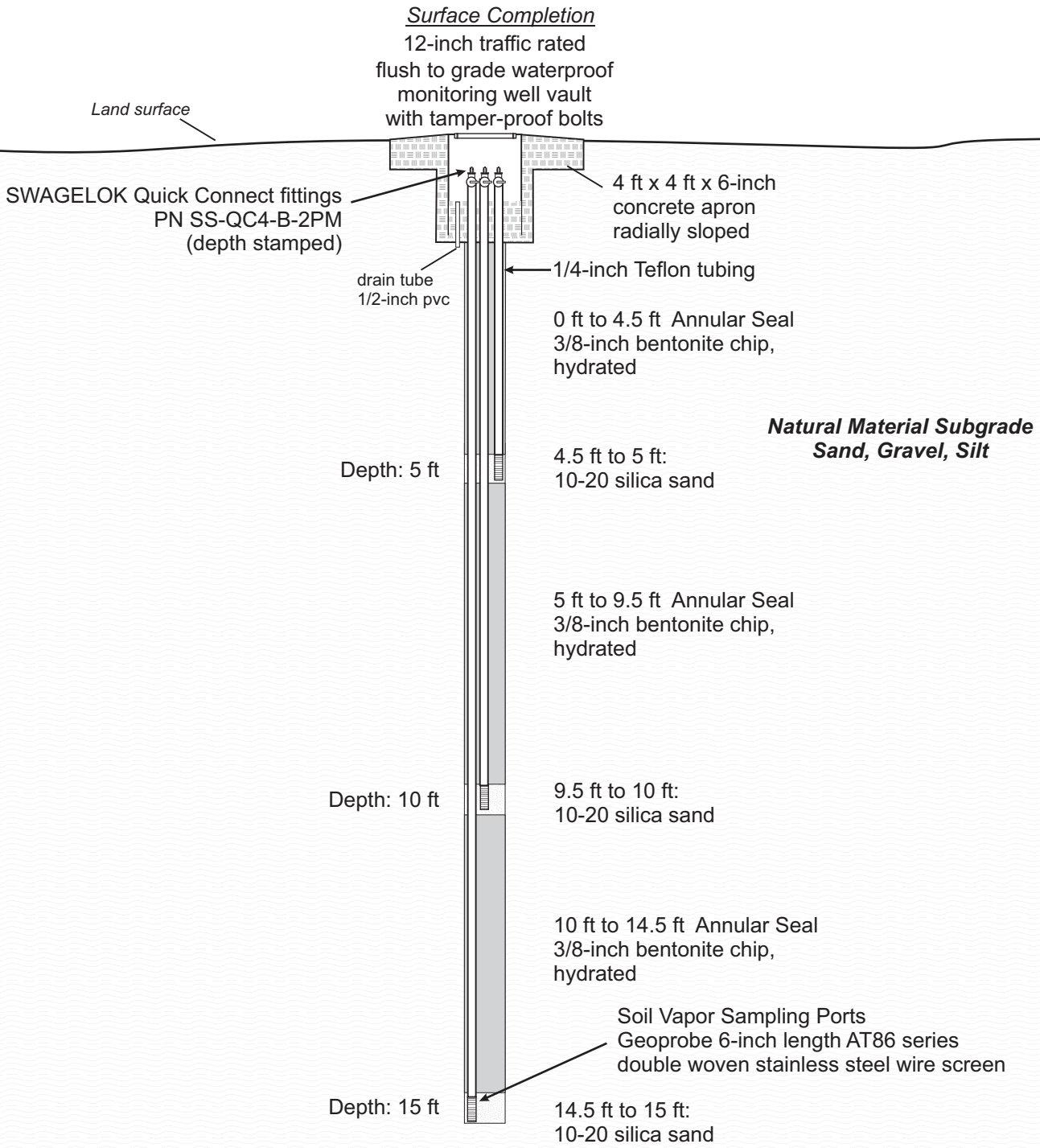
FIGURE 7-1. PROPOSED SHALLOW SOIL VAPOR MONITORING POINT CONSTRUCTION



Proposed Boring Methods:
Attempted completion using DPT (3-inch hole)
Switch to 6-inch auger if refusal to DPT

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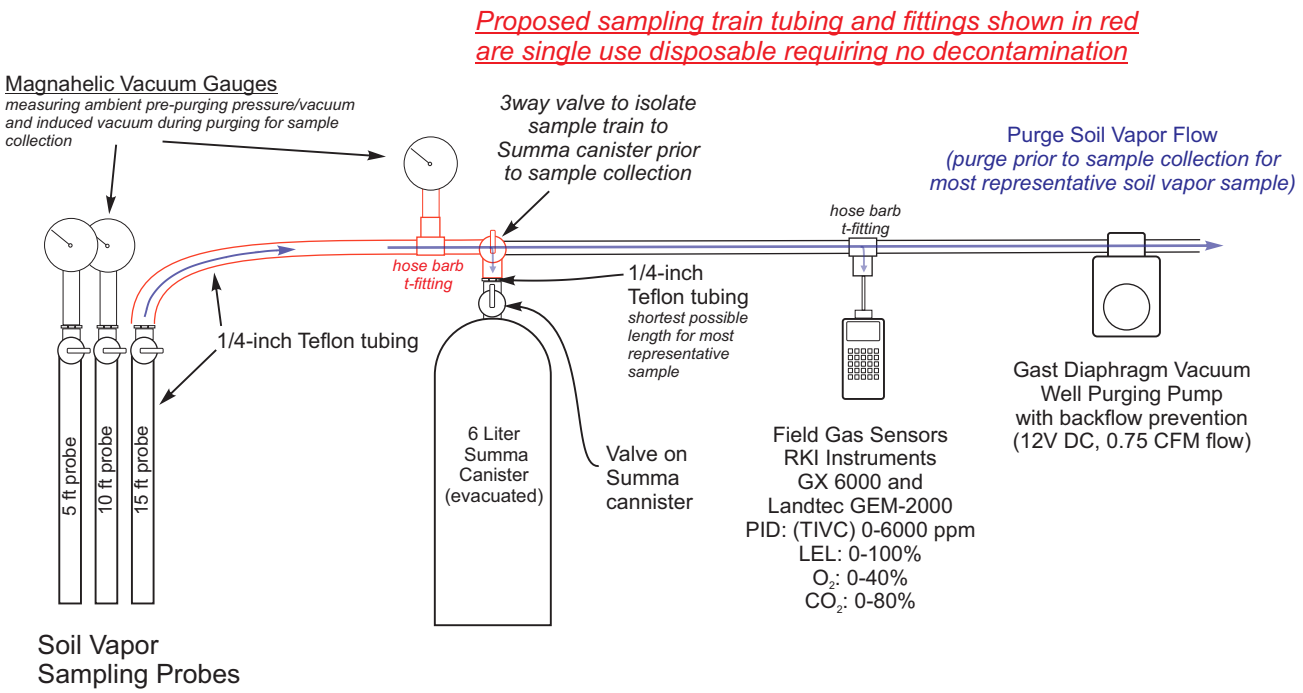
FIGURE 8-1. PROPOSED SOIL VAPOR SAMPLING EQUIPMENT, METHODS AND PURGE PARAMETERS



PROPOSED SOIL VAPOR PURGING PARAMETERS

Probe Depth (ft)	Date-Time	Elapsed Purge Time (min)	Purge Duration (min)	Pre-Purge Ambient Well Pressure (vacuum) Inches H_20				Induced Vacuum During Well Purge (Inches H_20)				Field Vapor Screening Parameters				Comments
				5 ft probe	10 ft probe	15 ft probe	25 ft probe	5 ft probe	10 ft probe	15 ft probe	25 ft probe	PID (ppm)	CO_2 (%)	O_2 (%)	CH_4 (%)	
15-Foot Completions																
5 ft		-5.0														Pre-purge pressure/vacuum
5 ft		0.0														Begin Purge
5 ft		5.0														
5 ft		10.0														Collect Sample
10 ft		-5.0														Pre-purge pressure/vacuum
10 ft		0.0														Begin Purge
10 ft		5.0														
10 ft		10.0														Collect Sample
15 ft		-5.0														Pre-purge pressure/vacuum
15 ft		0.0														Begin Purge
15 ft		5.0														
15 ft		10.0														Collect Sample

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TABLES

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Table 2-1: Known Utility Information in Study Area

Utility Type	General Location/Operator	Pipe Diameter (inches)[a]	Approximate Depth (bgs)[b]
Natural Gas Distribution	On Base/KAFB	1.5–6.0	18–24 in.
Natural Gas Service	On Base/KAFB	1.5–4.0	18–24 in.
Sewer Main – Pressurized	On Base/KAFB	4.0–6.0	4–12 ft
Sewer Main – Gravity	On Base/KAFB	4.0–72.0	4–12 ft
Sewer Service – Gravity	On Base/KAFB	2.0–18.0	2–6 ft
Storm Water – Gravity	On Base/KAFB	8.0–60.0	2–6 ft
Water Main	On Base/KAFB	3.0–24.0	2–7ft
Water Service	On Base/KAFB	1.5–12.0	2–7 ft
Natural Gas Distribution	Off Base	NA	3–6ft
Sewer Main – Gravity	Off Base	NA	6–10 ft
Communication Lines	On Base/Off Base	NA	4–5 ft
PNM Electrical	Off Base	NA	3–5 ft
Water Main	Off Base	NA	2–3 ft

[a] Pipe diameters are ranges for each utility depending on the specific segment. All on base pipe diameters are from the Kirtland AFB Geo database
[b] Utility depths are based on general construction specifications for the given utility
AFB – Air Force Base
bgs – below ground surface
ft – feet
in. – inches
KAFB – Kirtland Air Force Base
NA – Not Available
PNM – Public Service Company of New Mexico

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Table 5-1: Soil Vapor Monitoring Point Locations, Depths, Analytical Methods, and Rationale

Soil Vapor Monitoring Location	Soil Vapor Monitoring Point ID	Proposed Location[1]		Proposed Screened Interval (ft bgs)		Analyses/ Methods	Rationale for Location
		X	Y	Top	Bottom	VOCs by Method TO-15	
SVMW-16	SVMW-16-005	-106.581664	35.051187	4.5	5.0	X	Strategically located adjacent to the only utility running off base. Location will monitor natural gas, potable water, and sanitary sewer lines.
	SVMW-16-010			9.5	10.0	X	
	SVMW-16-015			14.5	15.0	X	
SVMW-17	SVMW-17-005	-106.57988	35.051242	4.5	5.0	X	Monitoring northern perimeter along water and sanitary sewer utilities
	SVMW-17-010			9.5	10.0	X	
	SVMW-17-015			14.5	15.0	X	
SVMW-18	SVMW-18-005	-106.578142	35.051072	4.5	5.0	X	Monitoring northern perimeter along the sanitary sewer utilities and over the known benzene footprint.
	SVMW-18-010			9.5	10.0	X	
	SVMW-18-015			14.5	15.0	X	
SVMW-19	SVMW-19-005	-106.577486	35.051174	4.5	5.0	X	Monitoring northern perimeter along the water utilities and over the known fuel plume footprint.
	SVMW-19-010			9.5	10.0	X	
	SVMW-19-015			14.5	15.0	X	
SVMW-20	SVMW-20-005	-106.576059	35.052846	4.5	5.0	X	Monitoring western edge of the known fuel plume in Bullhead Memorial Park.
	SVMW-20-010			9.5	10.0	X	
	SVMW-20-015			14.5	15.0	X	
SVMW-21	SVMW-21-005	-106.577116	35.052902	4.5	5.0	X	Monitoring the centerline of the fuel plume in Bullhead Memorial Park.
	SVMW-21-010			9.5	10.0	X	
	SVMW-21-015			14.5	15.0	X	
SVMW-22	SVMW-22-005	-106.578109	35.05314	4.5	5.0	X	Monitoring eastern edge of the known fuel plume in Bullhead Memorial Park.
	SVMW-22-010			9.5	10.0	X	
	SVMW-22-015			14.5	15.0	X	
SVMW-23	SVMW-23-005	-106.57691	35.054358	4.5	5.0	X	Monitoring leading edge of the known fuel plume in Bullhead Memorial Park. Strategically located adjacent to an off-base sanitary sewer line. Proximal to KAFB-106141.
	SVMW-23-010			9.5	10.0	X	
	SVMW-23-015			14.5	15.0	X	

[1]Coordinates are provided in decimal degrees, World Geodetic System 1984 (WGS84)

bgs below ground surface
ft feet
ID identification
VOC volatile organic compound

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Table 8-1: Contaminants of Potential Concern

Analyte	Residential VISL (µg/m^3)	TO-15 MRL/LOQ (µg/m^3)**	TO-15 MDL (µg/m^3)***
Benzene	1.20E+02	0.53	0.077
tert-Butyl methyl ether (MTBE)	3.60E+03	0.54	0.063
1,2-Dibromoethane	1.56E+00	0.53	0.062
1,2-Dichloroethane	3.60E+01	0.51	0.078
Ethylbenzene	3.74E+02	0.53	0.075
n-Hexane	2.43E+04	0.53	0.11
Naphthalene	2.75E+01	0.53	0.13
Toluene	1.74E+05	0.53	0.065
m-Xylene	3.48E+03	1.1	0.14
o-Xylene	3.48E+03	0.53	0.077
p-Xylene	3.48E+03	1.1	0.14
Xylenes*	3.48E+03	2.73	NA
1,2,4-Trimethylbenzene	NA	0.53	0.074
Cyclohexane	NA	1.1	0.15
n-Heptane	NA	0.53	0.085

µg/m^3 micrograms per cubic meter
LOQ Limit of quantification
MDL Minimum Detection limit
MRL Method reporting limit
NA Not applicable
VISL vapor intrusion screening level
* Total Xylenes will be reported as the sum of m, p-xylene, and o-xylene. No MDL or limit of detection evaluation is performed for Total Xylenes.
** Actual reporting limits will be higher depending on the canister pressurization dilution factor and/or sample matrix effects. Typical canister pressurization dilution factors are between 1.5-2.0.
*** MRLs assume a standard sample analysis volume (1 liter for 6-liter canister) canister.

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Table 9-1: Field Sampling Schedule

Activity	Schedule
WP delivered to NMED	May 2021
NMED Comments	To be determined. If sampling is to be completed in 2021 as proposed in this schedule, the Air Force will need comments by July 30, 2021.
Response to Comments	30 days from receipt of NMED letter
Field Mobilization	14 days from notice to proceed and NMED approval of WP
Drilling	Complete within 14 days of mobilization
1st Sampling	Summer[1] 2021 (at least 14 days post-installation, before September 30)
2nd Sampling	Winter[2] 2021 (within 6 months of 1st sampling)[3]
Laboratory Analytical and Validation	60 days from 2nd sample collection
Meeting with NMED to Discuss Results of Investigation	Confer with NMED after data validation
Investigation Report to NMED	To be determined based on meeting with NMED

1. Summer is defined as June 2021 through September 2021.
2. Winter is defined as December 2021 through March 2022.
3. Future sampling events will be synchronized with semi-annual monitoring events.

NMED New Mexico Environment Department
WP Work Plan

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APPENDIX A

Regulatory Correspondence

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NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

MICHELLE LUJAN GRISHAM
Governor

HOWIE MORALES
Lieutenant Governor

JAMES C. KENNEY
Cabinet Secretary

JENNIFER J. PRUETT
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 25, 2019

Colonel Richard W. Gibbs
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117-5606

Mr. Chris Segura
Chief, Installation Support Section
AFCEC/CZOW
2050 Wyoming Blvd SE, Suite 124
Kirtland AFB, NM 87117-5270

RE: BULK FUELS FACILITY SPILL;
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE
HWB-KAFB-19-MISC

Dear Colonel Gibbs and Mr. Segura:

The New Mexico Environment Department (NMED) provides this letter to address several projects that Kirtland Air Force Base (Permittee) is undertaking as investigative or interim corrective measures related to the implementation of the Resource Conservation and Recovery Act (RCRA) *Hazardous Waste Treatment Facility Operating Permit EPA ID No.* NM9570024423 dated July 2010.

Item 1

NMED received the Permittee's *Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Bulk Fuels Facility, Solid Waste Management Unit (SWMU) ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision R1* dated December 15, 2017. The Work Plan proposed additional vadose zone and groundwater investigation and monitoring, and was approved by NMED on February 23, 2018. Well drilling and vadose zone coring activities are ongoing since 2018 and expected to be complete within several weeks. The Permittee shall submit a report to NMED summarizing the LNAPL investigation findings by November 1, 2019.

Item 2

The Permittee's *Risk Assessment Report, Bulk Fuels Facility Spill; Solid Waste Management Unit ST-106/SS-111* (Report), dated July 15, 2017 was received by NMED on July 21, 2017. The Report concluded that contaminant exposure via vapor intrusion into indoor air in buildings located off-Base was an incomplete pathway. However, off-Base soil vapor data are limited to nested vapor probes, the shallowest of which are approximately 25 feet below ground surface, and none of which are located in the residential area north of Ridgecrest or amid buildings on the Veteran Affairs (VA) hospital campus. The Permittee must confirm this conclusion by collecting additional data to demonstrate that that there is no risk to off-site receptors located north of the Base. The Permittee shall send a work plan to NMED no later than May 30, 2019 that proposes to collect shallow soil vapor samples to evaluate for the presence of benzene, ethylene dibromide (EDB), and other volatile organic compounds (if present) in the residential area north of Ridgecrest, and on the campus of the VA Hospital.

The work plan shall select analytical methods for soil vapor analysis that comply with the requirements of Permit Section 6.5.18. (Laboratory Analyses Requirements for all Environmental Media). The work plan also shall include a schedule for at least two soil vapor sampling events, one in the summer and one in the winter, that shall be timed to verify that bioventing pilot testing is not causing an increase in shallow soil vapor contaminant levels in the residential and VA hospital areas.

Item 3

The Permittee has been conducting an EDB in-situ biodegradation pilot test in accordance with the work plan dated October 26, 2016, as most recently amended with NMED's August 7, 2018 approval letter. The Permittee shall submit a report summarizing the results of the in-situ biodegradation pilot test by May 1, 2019.

Item 4

The Permittee submitted a work plan for a bioventing pilot test that NMED approved by letter dated April 6, 2018. The Permittee submitted proposed bioventing respiration pilot testing procedures by letter dated September 7, 2018. The Permittee's proposed bioventing respiration pilot testing procedures are hereby approved subject to the following condition. Prior to the initiation of the dry and wet short-term pilot tests, the Permittee shall measure relative humidity (water activity) in the soil vapor probes that will be used for pilot testing in order to determine whether underlying groundwater caused relative humidity to increase following the 2015 shutdown of the soil vapor extraction system and subsequent biorespiration monitoring. Since the approved bioventing work plan involves delivering moisture to soil bacteria that were desiccated by 12 years of soil vapor extraction, the Permittee shall measure relative humidity prior to

initiation of bioventing pilot tests. The Permittee shall submit the result the results of the bioventing pilot tests by January 31, 2020.

Pursuant to the RCRA corrective action permit, the Permittee shall submit to NMED by certified mail or hand delivery all reports, notifications, or other submittals. The Permittee shall submit two hard (paper) copies and one electronic copy of such reports to:

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

The Permittee shall also submit one hard (paper) copy and one electronic copy of such reports to:

Jennifer J. Pruett, Deputy Secretary
New Mexico Environment Department
1190 St. Francis Drive, Room N-4050
Santa Fe, New Mexico 87505-6303

Pursuant to 40 C.F.R. § 270.11(d)(1), all corrective action documents, including those outlined in this letter, shall include a certification, signed by a responsible official, stating:

> *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.*

Failure to submit any of the work plans, schedules, reports, and other deliverable documents described in this letter may be deemed a violation of the permit and subject the Permittee to enforcement action under § 74-4-10 of the Hazardous Waste Act (HWA), or other applicable provisions of law, which may include fines, civil penalties, or suspension or revocation of the Permit.

Any noncompliance with approved plans and schedules shall be noncompliance with this Permit. The Department may grant extensions of written requests for due dates for submittals of reports and other deliverables, provided that the Permittee includes a written justification showing good

cause and a proposed schedule for submittal.

If you have any questions regarding this letter, please contact me at 505-476-6035.

Sincerely,

John Kieling
Bureau Chief

JP:DM

cc:J. Kenney, NMED Cabinet Secretary
J. Pruett, NMED Deputy Secretary
Col. J. Alvarez, KAFB
K. Lynnes, KAFB
B. Renaghan, AFCEC
S. Clark, KAFB-AFCEC
B. Faris, AEHD
F. Shean, ABCWUA
L. King, EPA-Region 6 (6PD-N)
A. Romero, NMED-GWQB
M. Hunter, NMED-GWQB
D. McQuillan, NMED-OOTS

File: KAFB 2019 Bulk Fuels Facility Spill and Reading

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

18 December 2020

Colonel David S. Miller, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland AFB NM 87117

Mr. Kevin Pierard
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Dear Mr. Pierard

This letter is in response to New Mexico Environment Department (NMED) letter *Request for Information, Kirtland Air Force Base, New Mexico, EPA ID # NM9570024423, HWB-KAFB-19-014* dated December 8, 2020.

The Air Force respectfully requests a 45 day extension from December 22, 2020 to February 5, 2021 for the submittal of the requested information on the "major" underground utilities in the area of interest indicated on the December 8, 2020 letter. Additional time is needed to gather and compile the information on the underground utilities located outside of Kirtland AFB within the area of interest.

Kirtland AFB has contacted NM811 and identified the managers of the utilities within the off base portion the area of interest. Neither NM811 nor Albuquerque's City Engineer have a complete record of the requested information on underground utilities in this area. Both parties indicated that the specifications for the utilities are maintained by the individual utility managers. Kirtland AFB is currently working with the following underground utility managers to obtain the requested information: Water Utility Authority (WUA), Albuquerque Parks and Recreation Department, City of Albuquerque, and the Veterans Affairs Hospital. In communication with Mr. Mark Halstad from the WUA, the Air Force was informed that the WUA potable water lines are approximately two to three feet in depth and the WUA sanitary sewer lines are approximately six to ten feet.

Kirtland AFB has gathered and compiled the requested utility information for the on base portion of the area of interest and for off base utilities that Kirtland AFB has records of along the installation boundary. Please see attached map and table providing the requested information on underground utilities on base. The utilities identified on this map are derived from the Kirtland AFB Geodatabase. Upon NMED concurrence, the Air Force plans to include the provided information as well as the information on the off base utilities within the area of interest by February 5, 2021.

If you have any questions or concerns, please contact Mr. Sheen Kottkamp at commercial line 505-846-7674 or email sheen.kottkamp.1@us.af.mil.

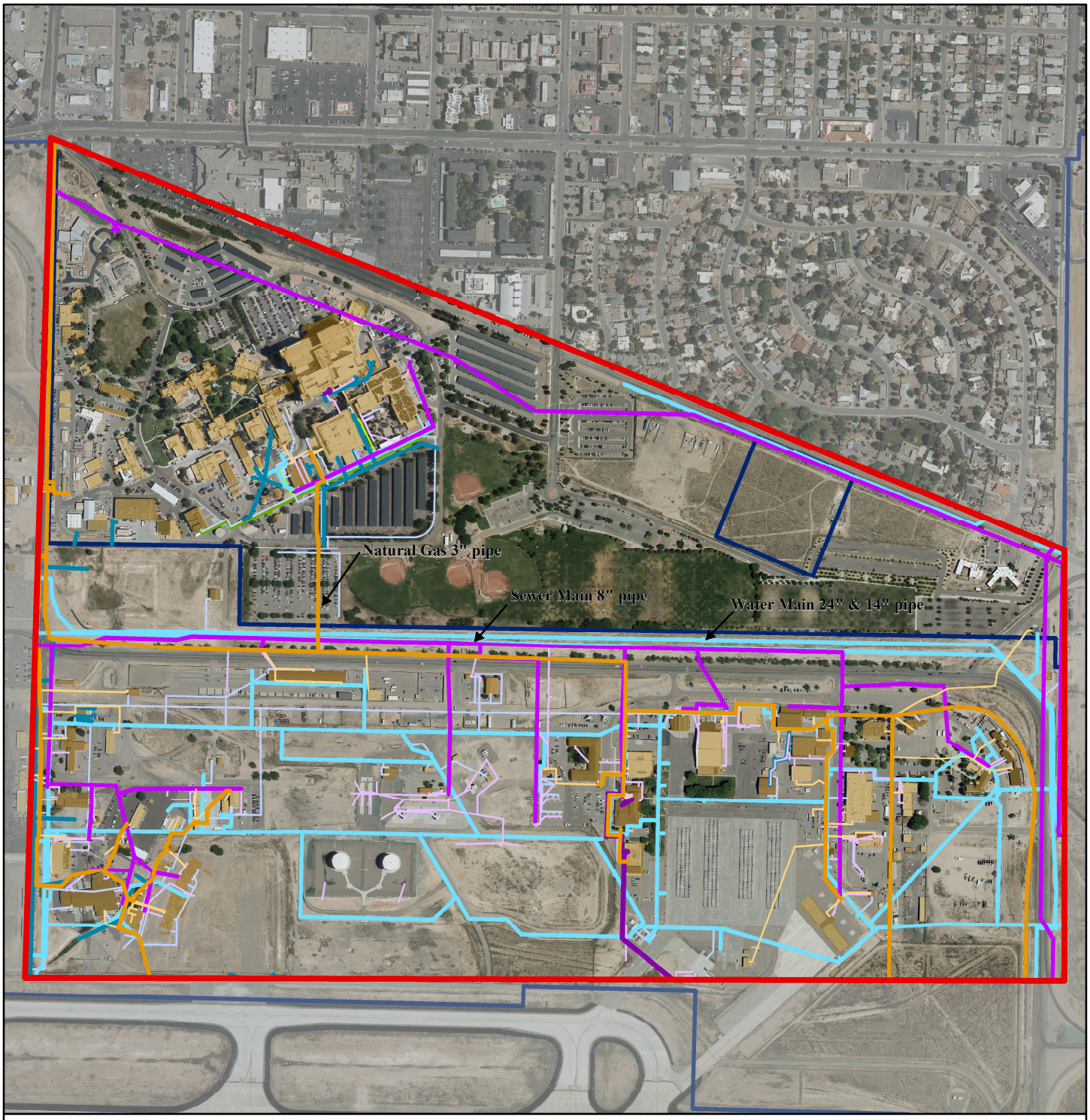
Sincerely

DAVID S. MILLER, Colonel, USAF
Commander

Attachments:

Area of Interest Utilities Map
Table 1 Utilities Information

cc:
NMED Resource Protection Division (Stringer), letter and CD
NMED HWB (Cobrain), letter and CD
NMED GWQB (Hunter), letter and CD
SAF-IEE (Lynnes), electronic only
AFCEC/CZ (Renaghan, Clark, Kottkamp, Segura, Banks), electronic only
USACE-ABQ District Office (Moayyad, Phaneuf, Dreeland, Cordova, Lovato), electronic only
Public Info Repository, Administrative Record/Information Repository (AR/IR) and File



Kirtland AFB

Aera of Interest
Utilities

Scale: 1:9,000

N

Coordinate System: WGS 1984 UTM Zone 13N

Feet

0 750 1,500

Legend

- AreaOfInterest
- Natural Gas Distribution
- Natural Gas Service
- Sewer Main - Pressurized
- Sewer Main - Gravity
- Sewer Service - Gravity
- Stormwater - Gravity
- Water Main
- Water Service
- Steam Main
- Steam Service
- Kirtland AFB Boundary
- Buildings

Cooperative Agreement Number:
W9126G-14-2-0018 -
W9126G-20-2-0004

Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed

Prepared By:
Dennis Mccrumb
CSU-CEMML GIS Analyst
Aric.Mccrumb.ctr@us.af.mil

Last Save Date: 12/15/2020

Document Path: C:\work\Projects\KAFB\Restoration\Utilities\KAFB_Utilities_AreaOfInterest.mxd

Table 1
Utility Information

Utility Type	General Location/ Operator	Pipe Diameter (inches)[a]	Approximate Depth (bgs)[b]
Natural Gas Distribution	On Base/KAFB	1.5 - 6.0	18-24 inches
Natural Gas Service	On Base/KAFB	1.5 - 4.0	18-24 inches
Sewer Main- Pressurized	On Base/KAFB	4.0 - 6.0	4-12ft
Sewer Main- Gravity	On Base/KAFB	4.0 -72.0	4-12ft
Sewer Service- Gravity	On Base/KAFB	2.0 - 18.0	2-6ft
Storm Water - Gravity	On Base/KAFB	8.0 - 60.0	2-6ft
Water Main	On Base/KAFB	3.0 - 24.0	2-7ft
Water Service	On Base/KAFB	1.5 - 12.0	2-7ft

Notes

a. Pipe diameters are ranges for each utility depending on the specific segment. All on base pipe diameters are from the Kirtland AFB Geo database

b. Utility depths are based on general construction specifications for the given utility.

Acronyms and Abbreviations

AFB - Air Force Base
bgs - below ground surface
KAFB - Kirtland Air Froce Base
ft - feet

40 CFR 270.11
DOCUMENT CERTIFICATION

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 fines and imprisonment for knowing violations.

DAVID S. MILLER, Colonel, U.S. Air Force
Commander, 377th Air Base Wing

18 December 2020
Date

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

18 Dec 20
Date

NEW MEXICO
ENVIRONMENT DEPARTMENT

Harold Runnels Building
1190 Saint Francis Drive, PO Box 5469
Santa Fe, NM 87502-5469
Telephone (505) 827-2855
www.env.nm.gov

Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

January 4, 2020

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil Engineering Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

RE: APPROVAL – REQUEST FOR EXTENSION TO SUBMIT THE REQUEST FOR INFORMATION
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID # NM9570024423
HWB-KAFB-19-014

Dear Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) has received the Kirtland Air Force Base (Permittee) request for an extension of time, dated December 18, 2020, to submit the requested utility information (requested information). The original due date for the requested information is December 22, 2020, as required by NMED's December 8, 2020 Request for Information letter for the Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111 (NOD).

The Air Force's request for an extension of time to submit the requested information to NMED is hereby approved. The Permittee must submit the requested information to NMED no later than **February 5, 2021**.

If you have any questions regarding this letter, please contact me at (505) 476-6035.
Sincerely,

Kevin M. Pierard, Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
B. Wear, NMED HWB
R. Murphy, NMED HWB
L. Andress, NMED HWB
S. Kottkamp, KAFB
K. Lynnes, KAFB
C. Cash, KAFB
D. Agnew, ABCWUA
A. Tafoya, VA

File: KAFB 2020 and Reading

DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

28 January 2021

Colonel David S. Miller, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland AFB NM 87117

Mr. Kevin Pierard
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Dear Mr. Pierard

This letter is in response to New Mexico Environment Department letter *Request for Information, Kirtland Air Force Base, New Mexico, EPA ID # NM9570024423, HWB-KAFB-19-014* dated December 8, 2020 and is to supplement the on base utility information provided in the Air Force's initial response letter submitted December 18, 2020.

Kirtland AFB has requested information for the underground utilities within the off base portion of the area of interest. Neither NM811 nor Albuquerque's City Engineer had a complete record of the requested information on underground utilities in this area. NM811 provided a list of utility managers in the area of interest and the Air Force worked with these individual utility managers to obtain the requested information. The Air Force was provided with the utility maps for the off base portion of the area of interest from PNM, Century Link, New Mexico Gas, Water Utility Authority, Veteran Affairs, and the Parks and Recreations Department. Please see attached maps providing the requested information on utilities.

In addition, the Air Force has attached the utility map provided in the December 18, 2020 letter and has updated the attached Table 1 with the information collected from off base utility managers. If you have any questions or concerns, please contact Mr. Sheen Kottkamp at commercial line 505-846-7674 or email sheen.kottkamp.1@us.af.mil.

Sincerely

DAVID S. MILLER, Colonel, USAF
Commander

Attachments:
Area of Interest off Base Utility Maps
Area of Interest Utilities Map
Table 1 Utilities Information

cc:
NMED Resource Protection Division (Stringer), letter and CD
NMED HWB (Pierard, Wear), letter and CD
NMED GWQB (Hunter), letter and CD
SAF-IEE (Lynnes), electronic only

AFCEC/CZ (Renaghan, Clark, Kottkamp, Segura, Banks), electronic only
USACE-ABQ District Office (Moayyad, Phaneuf, Dreeland, Cordova, Lovato), electronic only
Public Info Repository, Administrative Record/Information Repository (AR/IR) and File

40 CFR 270.11
DOCUMENT CERTIFICATION

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 fines and imprisonment for knowing violations.

DAVID S. MILLER, Colonel, U.S. Air Force
Commander, 377th Air Base Wing

28 January 2021
Date

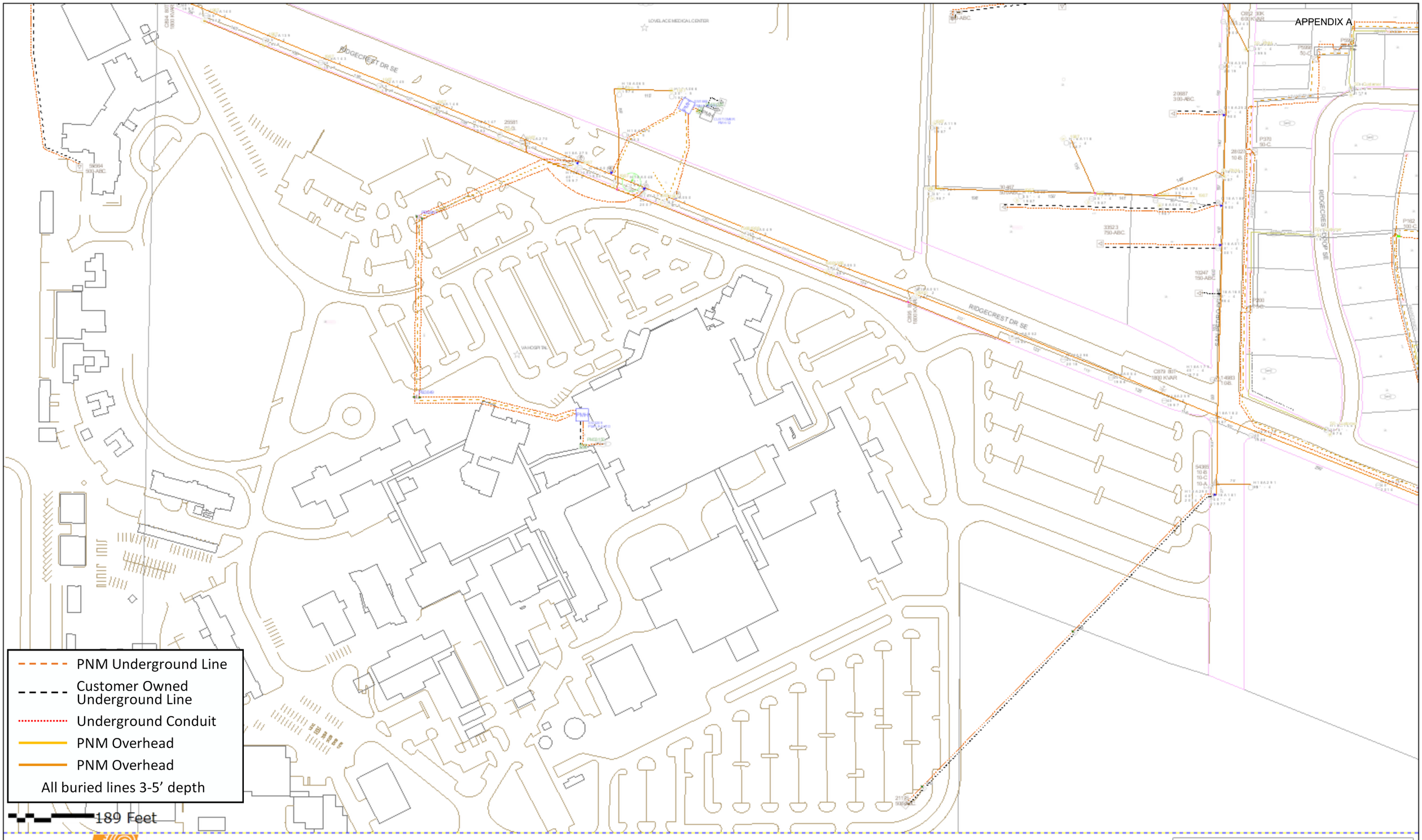
This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

1/27/21
Date

Attachment

Area of Interest
off Base Utility Maps



Map Title:	1501 San Pedro SE
Map Type:	Design Locate 20DE080425 1
Printed By:	Josie Scholten
Printed Date:	12/10/2020

RIDGECREST LOOP SE
RIDGECREST PL SE
DAKOTA ST SE
MITCHELL RD SE
ODLUM DR SE
HERTZ DR SE
LOVELACE RD SE
RIDGECREST DR SE
KENTUCKY ST SE
LOUISIANA BLVD SE
SAN PEDRO DR NE
PARK

- PNM Underground Line
- Customer Owned Underground Line
- Underground Conduit
- PNM Overhead
- PNM Overhead
- All buried lines 3-5’ depth

189 Feet

1:188 Feet

Map Title:	1501 San Pedro SE
Map Type:	Design Locate 20DE080425 2
Printed By:	Josie Scholten
Printed Date:	12/10/2020


UPN Facilities in Project Area
APPENDIX A
N
Gibson Blvd SE
Gibson Blvd SE
Gibson Blvd SE
Gibson Blvd SE
Gibson Blvd SE
Gibson Blvd SE
Gibson Blvd SE
Dakota St SE
San Pedro Dr SE
Ridgecrest Loop SE
Ridgecrest Dr SE
Ridgecrest Pl SE
Mitchell Ave SE
Odlum Dr SE
Hertz Dr SE
Lovelace Rd SE
Louisiana Blvd SE
Kentucky St SE
Raymond G. Murphy VA Medical Center
Lasseter Park
USS Bullhead Memorial Park
Ventura Ave SE
Randolph Ave SE
Fuel Dr SE
Ridgecrest Ave SE
Legend
UPN Overhead Cable
UPN Underground Cable
Project Area
A-18
© 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020) Distribution Airbus DS © 2020 HERE

DigView - Logged in as Hill, Clayton (USICWeb) USIC, LLC

Search | Map Link | GPS | Clear Map | Ruler | Draw | Note | Place Markers | Options | Capture | Century Link-Lumen | Layers | Clone

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Screenshot taken on 12/14/2020 12:36:42 PM


Century Link Copper
Century Link Fiber
Comcast Underground
PENDING
Above Ground
All buried lines 4-5’ depth

DigView - Logged in as Hill, Clayton (USICWeb) USIC, LLC

Search | Map Link | GPS | Clear Map | Ruler | Draw | Note | Place Markers | Options | Capture | Century Link-Lumen | Layers | Clone

APPENDIX A

Property of United States Infrastructure Corporation
Screenshot taken on 12/9/2020 6:32:51 AM

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Search | Map Link | GPS | Clear Map | Ruler | Draw | Note | Place Markers | Options | Capture | Comcast | Layers | Clone

DigView - Logged in as Hill, Clayton (USICWeb) USIC, LLC

Search | Map Link | GPS | Clear Map | Ruler | Draw | Note | Place Markers | Options | Capture | Century Link-Lumen | Layers | Clone

Hospital Loop

Veterans Hospital Loop SE

Ridgecrest Dr SE

Randolph Ave SE

Air Guard Rd SE

- Century Link Copper
- Century Link Fiber
- Comcast Underground
- PENDING
- Above Ground

All buried lines 4-5’ depth

Property of United States Infrastructure Corporation
Screenshot taken on 12/14/2020 12:37:18 PM

DigView - Logged in as Hill, Clayton (USICWeb) USIC, LLC

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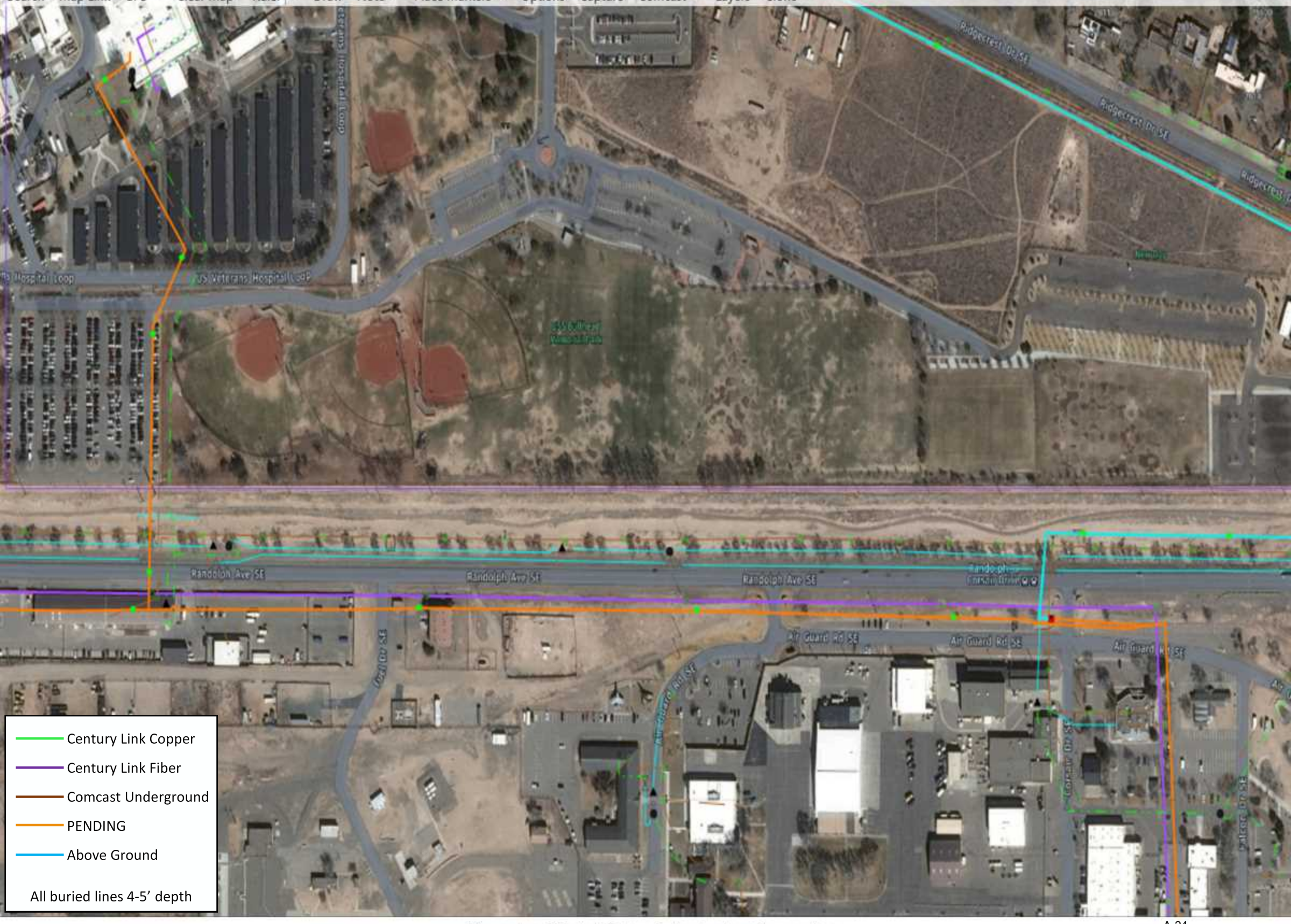
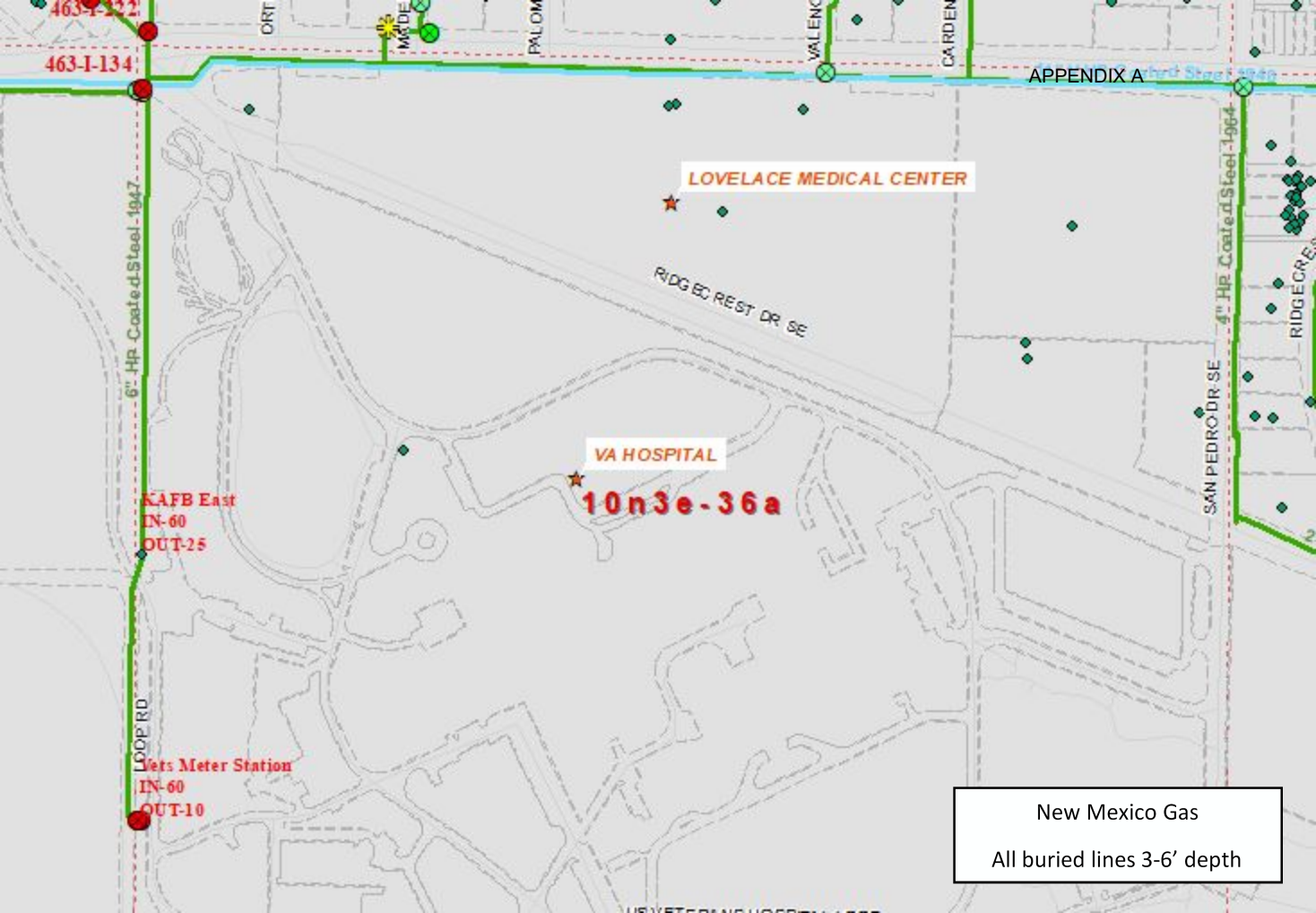
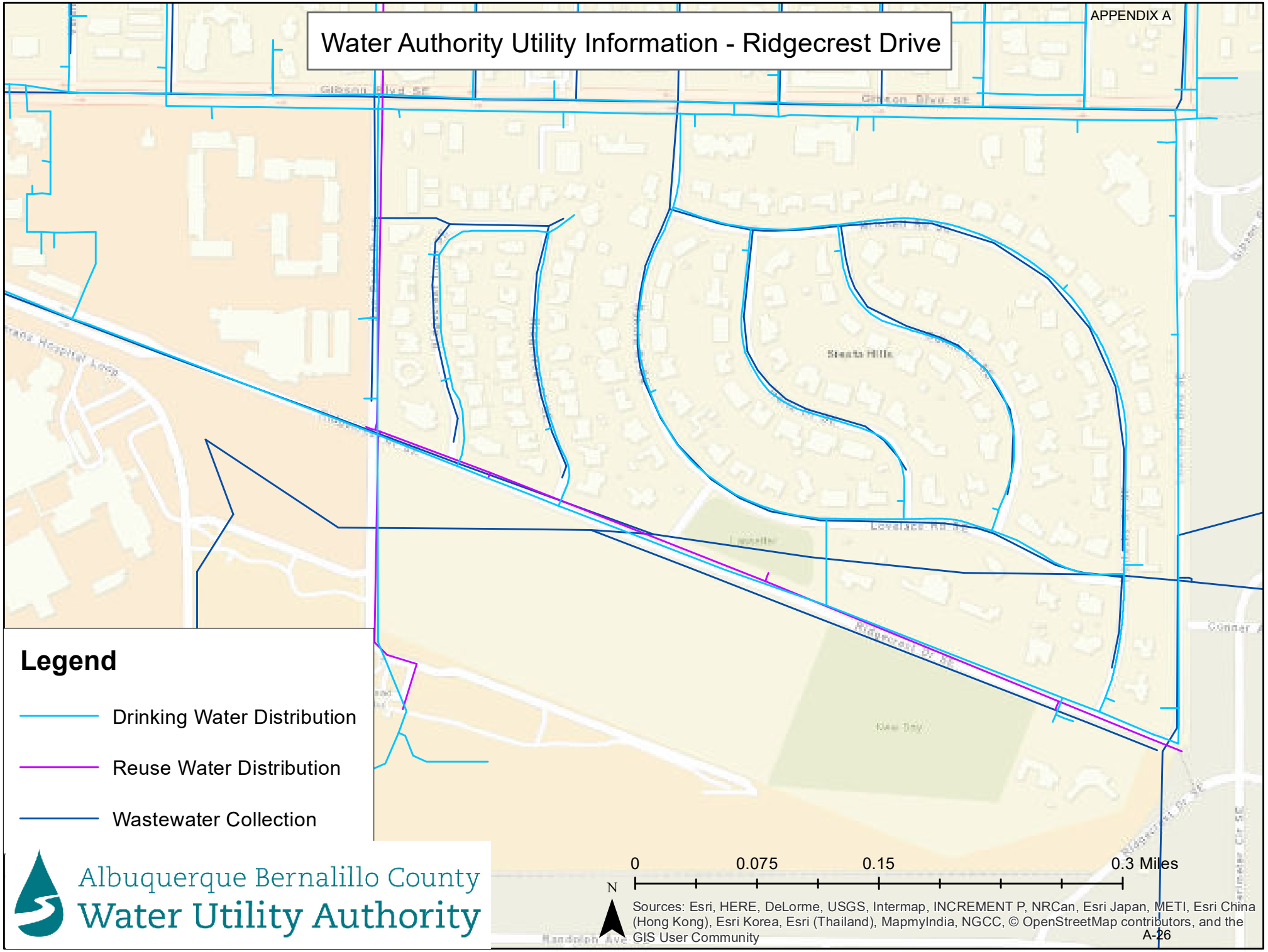


Property of United States Infrastructure Corporation
Screenshot taken on 12/14/2020 12:37:12 PM


463-I-134
LOVELACE MEDICAL CENTER
RIDGECREST DR SE
VA HOSPITAL
10n3e-36a
6" HP Coated Steel 1947
4" HP Coated Steel 1964
SAN PEDRO DR SE
RIDGECREST
LOOP RD
KAFB East
IN-60
OUT-25
Vets Meter Station
IN-60
OUT-10
New Mexico Gas
All buried lines 3-6' depth

Water Authority Utility Information - Ridgecrest Drive



Legend

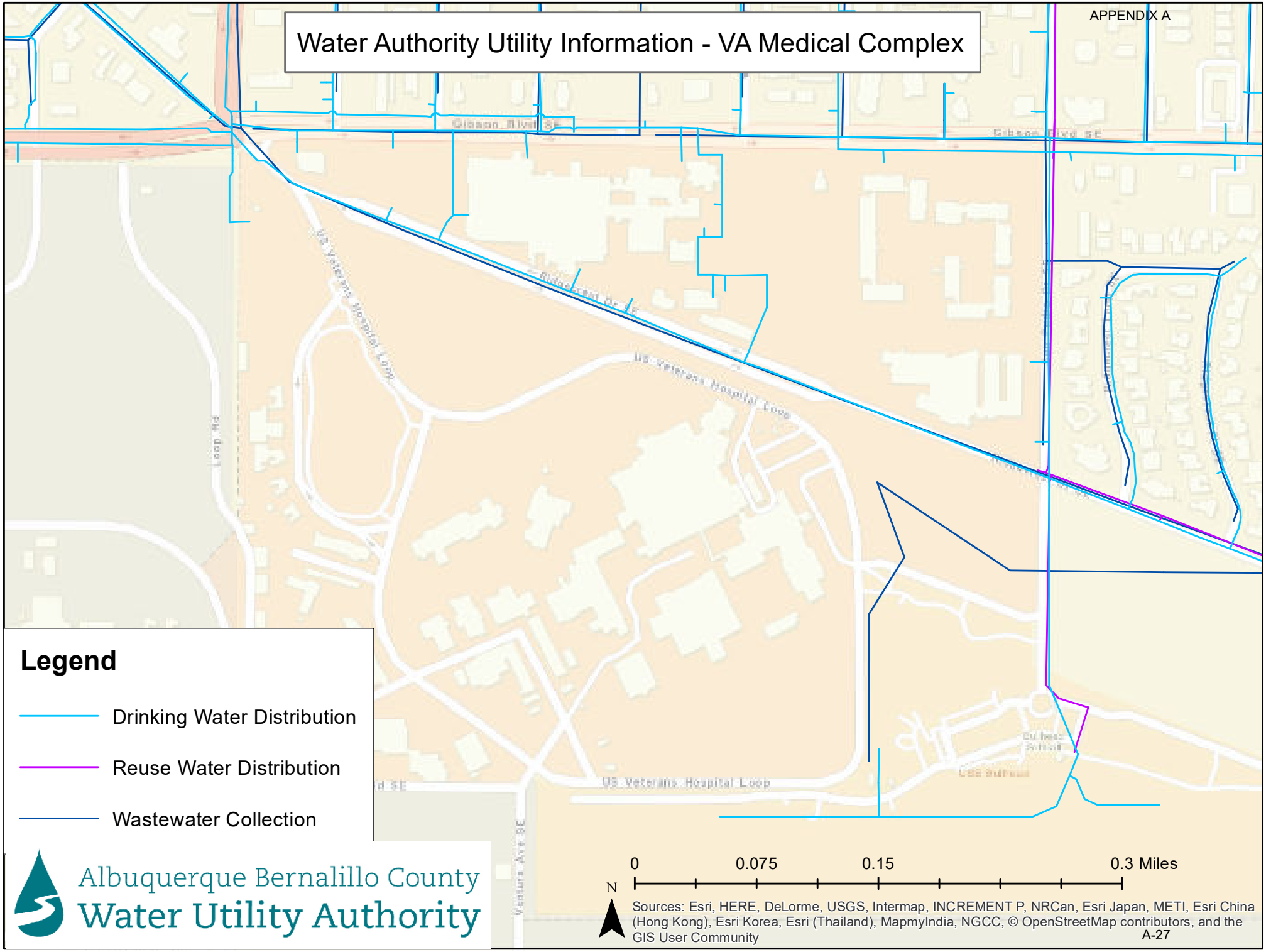
- Drinking Water Distribution
- Reuse Water Distribution
- Wastewater Collection

Albuquerque Bernalillo County
Water Utility Authority

0 0.075 0.15 0.3 Miles

N

Water Authority Utility Information - VA Medical Complex



Albuquerque Bernalillo County
Water Utility Authority

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

ABBREVIATIONS

AC	AIR CONDITIONER
ABD	ABANDONED
BTUH HTG	BRITISH THERMAL UNITS PER HOUR, HEATING
BTUH DHW	BRITISH THERMAL UNITS PER HOUR, DOMESTIC HOT WATER
CFH	CUBIC FEET PER HOUR
CPB	TELECOM PULL BOX
CO	CLEAN OUT
COMM	COMMUNICATIONS
COMM MH	COMMUNICATIONS MANHOLE
CR	CONDENSATE RETURN
C/T	"
CHWS/R	CHILLED WATER SUPPLY AND RETURN
CW	CHILLED WATER
CWR	CHILLED WATER RETURN
D.P.	PRESSURE DROP
DCO	DOUBLE CLEAN OUT
DFU	DRAINAGE FIXTURE UNITS
DHW	DOMESTIC HOT WATER
DISC	DISCONNECT
ELEC MH	ELECTRIC MANHOLE
EO	ELECTRIC OUTLET
EPB	ELECTRIC PULL BOX
FH	FIRE HYDRANT
FPS	FEET PER SECOND
GAL	GALLON
GPM	GALLON PER MINUTE
HHW	HEATING HOT WATER
INV	INVERT
IRR	IRRIGATION
MLP	METAL LIGHT POLE
MLP/C	METAL LIGHT POLE ON CONC. BASE
NFRD	NOT FOUND-FROM RECORD DRAWINGS
OHC	OVERHEAD COMMUNICATION
OHE	OVERHEAD ELECTRIC
PRV	PRESSURE RELIEF VALVE
RTU	ROOF TOP UNIT
SAS	SANITARY SEWER
SAS CO	SANITARY SEWER CLEANOUT
SAS DCO	SANITARY SEWER DOUBLE CLEANOUT
SAS MH	SANITARY SEWER MANHOLE
SD	STORM DRAIN
SD CO	STORM DRAIN CLEANOUT
SD MH	STORM DRAIN MANHOLE
SDFM	STORM DRAIN FORCE MAIN
SER	SERVICE
SI	STORM INLET
SQFT or SF	SQUARE FOOT / SQUARE FEET
STM	STEAM
STM MH	STEAM MANHOLE
SWC	SIDEWALK CULVERT
UGC	UNDERGROUND COMMUNICATION
UGE(L)	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
UGG	UNDERGROUND GAS
UNK	UNKNOWN
W	WITH
WLP	WOOD LIGHT POLE
WLHB	WATER LINE HOT BOX
WLMH	WATER LINE MANHOLE
WM	WATER METER
WSP/U	WATER SUPPLY FIXTURE UNITS
WVB	WATER VALVE BOX

BUILDING SCHEDULE

BLDG. NO.	BLDG. NAME
1	Behavior Health/Outpatient
1-4X	Annex building
2	Canteen and Recreation Building
3	Behavior Health/Inpatient
4	Fiscal Services and Human Resources
5	Engineering Shops
6	Engineering Shops
7	Engineering Office and Shops
8	Laundry Building
9	Research Building
10	Research Building
10A	Switch Gear Building
11	Research and Day Treatment
12	Research Office
13	Behavior Health Inpatient
14	Research Offices
15	Non-Institutional Care/CCHT
16	Not Used/Regional Counsel
17	Not Used
18	Legal Services
19	Water Tank (Hard)
20	GM and South Meter House
21	Water Tank (Soft)
22	Gas Meter House
23	Flagpole
24	Not Used
25	Not Used
26	Engineering and Supply Storage
27	Garage
28	Not Used
29	Not Used
30	Not Used
31	Garage
32	Gate House
33	Tool House
34	Not Used
35	Not Used
36	Not Used
37	Not Used
38	Not Used
39	Education Building
40	Air Chiller Pad
41	Clinical Services and Bed Building
42	Electrical Equipment Building
43	Power Plant
43A	Power Plant Support Building
44	Oxygen Storage Pad
45	SCIU
46	Warehouse
47	Air Force Outpatient Clinic
48	Air Force Dental Clinic
49	MRI Building
50	Lithotripsy Building
51	Supply Storage Building
52	Behavior Health Care Line
53	Outpatient Mental Health
54	Accomodations
55	Accomodations
56	Engineering/Contracting
57	PIV Office
58	Penal Control Service
59	Not Used
60	Well Pump House
61	Well Sand Filter House
62	Pump House (For City Supply)
63	Chloronator Building
64	Engineering Well House
65	Pump House
66	Research Lab Office
67	Research Lab
67A	Research Lab Support Building
T-2	Engineering Shops
T-3	Storage Building
T-12A	Warehouse
T-15C	Pharmacy Building Addition
T-15D	Information Technology
T-35	Paint Shop
T-36A	Storage
T-38A	Engineering Shops
T-38B	Engineering Shops
T-46	Animal Research
T-51	Warehouse Storage
T-60	Education Trailer
T-62	Rio Grande FCU Trailer
T-70	Engineering Storage
T-71	Engineering Storage
T-72	Engineering Storage
T-73	Laundry Storage
T-74	Warehouse
T-75	Warehouse

PROJECTS LEGEND

- EXISTING BUILDING OUTLINE
- FUNDED PROJECTS BUILDING OUTLINE
- FUTURE PROJECTS BUILDING OUTLINE
- EXISTING PROJECTS UTILITY INFORMATION
- FUNDED PROJECTS UTILITY INFORMATION
- FUTURE PROJECTS UTILITY INFORMATION

UTILITY LEGEND

- EXISTING CHILLED WATER LINE
- PROPOSED FUTURE CHILLED WATER LINE
- EXISTING CHILLED WATER LINE TO BE REMOVED

KEY PLAN

UTILITY MASTER PLAN

0 50'-0" 100'-0" 200'-0"

NO	REVISIONS	DATE

PROJECT TEAM

TRIPLE C - THE A&E GROUP
1120 NORTH TATUM BLVD, SUITE 160
PHOENIX, AZ 85028
CONTACT: DAVID POTTER
PHONE: 307 460-2554

BRIDGERS & PAXTON CONSULTING ENGINEERS, INC.
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ARCHITECTS/ENGINEERS

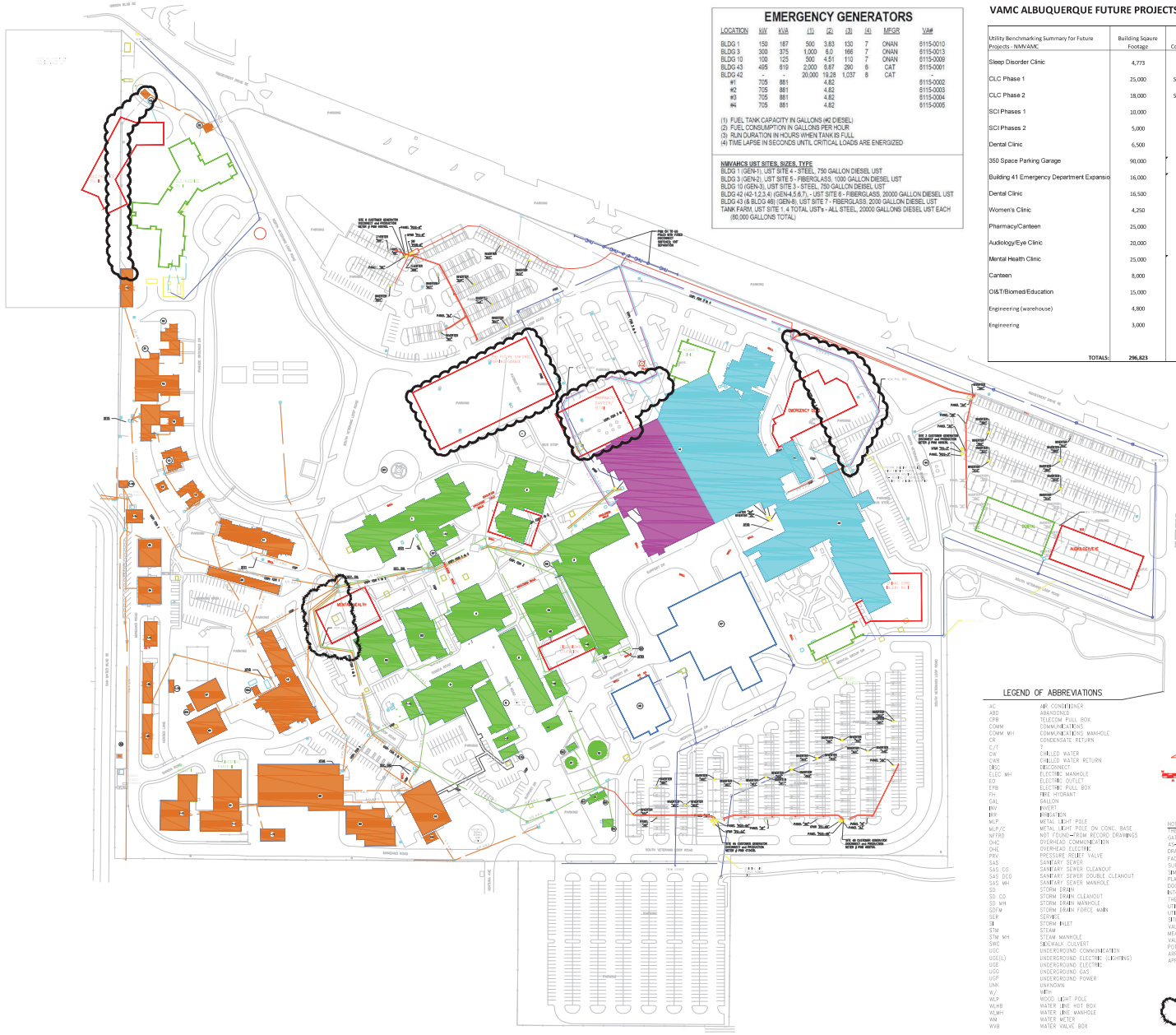
TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

HDR
3200 East Camelback Road, Suite 250
Phoenix, AZ 85018-2311

Drawing Title	SITE UTILITIES PLAN - CHILLED WATER
Approved - Project Director	
Project Title	NMVAMCS ABQ SITE UTILITIES
Location	1501 San Pedro Drive Southeast Albuquerque, NM 87108
Date	2/06/2015
Checked by	M. Perkins
Drawn	D. Young
Project Number	501-14-104
Building Number	
Drawing number	AS109
	0

Office of Construction and Facilities Management
Department of Veterans Affairs



EMERGENCY GENERATORS

LOCATION	KW	KVA	(1)	(2)	(3)	(4)	MFGR	VA#
BLDG 1	150	187	500	3.83	130	7	ONAN	6115-0010
BLDG 3	300	375	1,000	8.0	166	7	ONAN	6115-0013
BLDG 10	100	125	500	4.51	110	7	ONAN	6115-0009
BLDG 43	495	619	2,000	5.87	290	6	CAT	6115-0001
BLDG 42	-	-	20,000	19.28	1,037	8	CAT	-
#1	705	881		4.82				6115-0002
#2	705	881		4.82				6115-0003
#3	705	881		4.82				6115-0004
#4	705	881		4.82				6115-0005

(1) FUEL TANK CAPACITY IN GALLONS (#2 DIESEL)
(2) FUEL CONSUMPTION IN GALLONS PER HOUR
(3) RUN DURATION IN HOURS WHEN TANK IS FULL
(4) TIME LAPSE IN SECONDS UNTIL CRITICAL LOADS ARE ENERGIZED

NMVAMCS UST SITES, SIZES, TYPE

BLDG 1 (GEN-1), UST SITE 4 - STEEL, 750 GALLON DIESEL UST
BLDG 3 (GEN-2), UST SITE 5 - FIBERGLASS, 1000 GALLON DIESEL UST
BLDG 10 (GEN-3), UST SITE 3 - STEEL, 750 GALLON DIESEL UST
BLDG 42 (42-1,2,3,4) (GEN-4,5,6,7), - UST SITE 6 - FIBERGLASS, 20000 GALLON DIESEL UST
BLDG 43 (& BLDG 46) (GEN-8), UST SITE 7 - FIBERGLASS, 2000 GALLON DIESEL UST
TANK FARM, UST SITE 1, 4 TOTAL USTs - ALL STEEL, 20000 GALLONS DIESEL UST EACH (80,000 GALLONS TOTAL)

VAMC ALBUQUERQUE FUTURE PROJECTS - ELECTRICAL LOAD ESTIMATES

Utility Benchmarking Summary for Future Projects - NMVAMC	Building Square Footage	Proposed Construction Date	Estimate W/S.F.	Estimated KW	Estimated Ampacity @ 480 V	Estimated Ampacity @ 12470 V
Sleep Disorder Clinic	4,773	March 2015	17.5	83.5	101	4
CLC Phase 1	25,000	September 2015	15.0	375.0	451	17
CLC Phase 2	18,000	September 2017	15.0	270.0	325	13
SCI Phases 1	10,000	February 2017	15.0	150.0	181	7
SCI Phases 2	5,000	February 2018	15.0	75.0	90	3
Dental Clinic	6,500	February 2015	15.0	97.5	117	5
360 Space Parking Garage	90,000	2018	3.0	270.0	325	13
Building 41 Emergency Department Expansio	16,000	2018	17.5	280.0	337	13
Dental Clinic	16,500	February 2015	15.0	247.5	298	11
Women's Clinic	4,250	May 2015	12.0	51.0	61	2
Pharmacy/Canteen	25,000	July 2017	15.0	375.0	451	17
Audiology/Eye Clinic	20,000	May 2018	15.0	300.0	361	14
Mental Health Clinic	25,000	2018	15.0	375.0	451	17
Canteen	8,000	January 2018	8.0	64.0	77	3
OI&T/Biomed/Education	15,000	April 2016	12.0	180.0	217	8
Engineering (warehouse)	4,800	May 2015	5.0	24.0	29	1
Engineering	3,000	January 2015	12.0	36.0	43	2
TOTALS:	296,823		222	3,254	3,915	151

BUILDING SCHEDULE

BLDG. NO:	BLDG. NAME
1	Behavior Health Outpatient
1-AX	Annex building
2	Canteen and Recreation Building
3	Behavior Health Inpatient
4	Fiscal Services and Human Resources
5	Engineering Shops
6	Engineering Shops
7	Engineering Office and Shops
8	Laundry Building
9	Research Building
10	Research Building
10A	Switch Gear Building
11	Research and Day Treatment
12	Research Office
13	Behavior Health Inpatient
14	Research Offices
15	Non-Institutional Care/CCHT
16	Not Used/Regional Counsel
17	Not Used
18	Legal Services
19	Water Tank (Hard)
20	GM and South Meter House
21	Water Tank (Soft)
22	Gas Meter House
23	Flagpole
24	Not Used
25	Not Used
26	Engineering and Supply Storage
27	Garage
28	Not Used
29	Not Used
30	Not Used
31	Garage
32	Gate House
33	Tool House
34	Not Used
35	Not Used
36	Not Used
37	Not Used
38	Not Used
39	Education Building
40	Air Chiller Pad
41	Clinical Services and Bed Building
42	Electrical Equipment Building
43	Power Plant
43A	Power Plant Support Building
44	Oxygen Storage Pad
45	SCU
46	Warehouse
47	Air Force Outpatient Clinic
48	Air Force Dental Clinic
49	MRI Building
50	Lithotripsy Building
51	Supply Storage Building
52	Behavior Health Care Line
53	Outpatient Mental Health
54	Accomodations
55	Accomodations
56	Engineering/Contracting
57	P&V Office
58	Pest Control Service
59	Not Used
60	Well Pump House
61	Well Sand Filter House
62	Pump House (For City Supply)
63	Chlorinator Building
64	Engineering Well House
65	Pump House
66	Research Lab Office
67	Research Lab
67A	Research Lab Support Building
T-2	Engineering Shops
T-3	Storage Building
T-12A	Warehouse
T-15C	Pharmacy Building Addition
T-15D	Information Technology
T-35	Paint Shop
T-35A	Storage
T-38A	Engineering Shops
T-38B	Engineering Shops
T-46	Animal Research
T-51	Warehouse Storage
T-60	Education Trailer
T-62	Rio Grande PCU Trailer
T-70	Engineering Storage
T-71	Engineering Storage
T-72	Engineering Storage
T-73	Laundry Storage
T-74	Warehouse
T-75	Warehouse

SPARE CAPACITY AND APPROXIMATE GROWTH:

FEEDER # 1:	117 A.	21,599 SF
FEEDER # 2:	121 A.	153,732 SF
FEEDER # 3:	101 A.	128,322 SF
FEEDER # 4:	101 A.	128,322 SF

UNDERGROUND CONDUCTOR COLOR LEGEND:

- UNDERGROUND FEEDER # 1
- UNDERGROUND FEEDER # 2
- UNDERGROUND FEEDER # 3
- UNDERGROUND FEEDER # 4
- POWER LINE (UTILITY OR A.F.)
- PHOTOVOLTAIC LINE

BUILDING COLOR INDICATES MEDIUM VOLTAGE FEEDER SERVING BUILDING OR PORTION OF BUILDING.

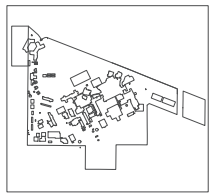
LEGEND OF ABBREVIATIONS

AC	AIR CONDITIONER
ABD	ABANDONED
CPB	TELECOM. PULL BOX
COMM	COMMUNICATIONS
COMM. MH	COMMUNICATIONS MANHOLE
CR	CONDENSATE RETURN
C/T	?
CW	CHILLED WATER
CWR	CHILLED WATER RETURN
DISC	DISCONNECT
ELEC. MH	ELECTRIC MANHOLE
EO	ELECTRIC OUTLET
EPB	ELECTRIC PULL BOX
FH	FIRE HYDRANT
GAL	GALLON
INV	INVERT
IRR	IRRIGATION
MLP	METAL LIGHT POLE
MLP/C	METAL LIGHT POLE ON CONC. BASE
NFTRD	NOT FOUND—FROM RECORD DRAWINGS
OHC	OVERHEAD COMMUNICATION
OHE	OVERHEAD ELECTRIC
PRV	PRESSURE REUCE VALVE
SAS	SANITARY SEWER
SAS CO	SANITARY SEWER CLEANOUT
SAS DCO	SANITARY SEWER DOUBLE CLEANOUT
SAS MH	SANITARY SEWER MANHOLE
SD	STORM DRAIN
SD CO	STORM DRAIN CLEANOUT
SD MH	STORM DRAIN MANHOLE
SDFM	STORM DRAIN FORCE MAIN
SER	SERVICE
SI	STORM INLET
STM	STEAM
STM MH	STEAM MANHOLE
SWC	SIDEWALK CULVERT
UGC	UNDERGROUND COMMUNICATION
UGE(L)	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
UGG	UNDERGROUND GAS
UGP	UNDERGROUND POWER
UNK	UNKNOWN
W/	WITH
WLP	WOOD LIGHT POLE
WLHB	WATER LINE HOT BOX
WLMH	WATER LINE MANHOLE
WM	WATER METER
WVB	WATER VALVE BOX

NOTE:
THESE DRAWINGS REFLECT INFORMATION GATHERED BY SITE OBSERVATIONS, SITE AS-BUILT UTILITY DRAWINGS, SITE SURVEY DRAWINGS, AND DISCUSSIONS WITH NMVAMCS FACILITIES STAFF. IN ADDITION, TWO (2) SITE SURVEYS WERE BEING CONDUCTED SIMULTANEOUSLY DURING THE MASTER UTILITY PLAN STUDY. THE SITE SURVEY DOCUMENTATION SHOULD BE INCORPORATED INTO THE MASTER UTILITY PLAN AS SOON AS THE DATA IS AVAILABLE. ALL UNDERGROUND UTILITY SIZES DENOTED ON THE MASTER UTILITY PLANS SHOULD BE RE-VERIFIED VIA SITE OBSERVATION; ACCESSING UTILITY VAULTS, VALVE BOXES, AND MANHOLES; FIELD MEASUREMENT AT EXISTING UTILITY VAULTS, VALVE BOXES, AND MANHOLES; AND POTHOLING. ALL SITE UTILITY LOCATIONS AND ARRANGEMENTS SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY.

CLOUD REPRESENTS AREAS OF NEW WORK AND/OR RE-ROUTING OF UTILITIES TO AVOID FUTURE BUILDING FOOTPRINTS.

KEY PLAN



UTILITY MASTER PLAN

NO	REVISIONS	DATE

PROJECT TEAM

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TRIPLE C—THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

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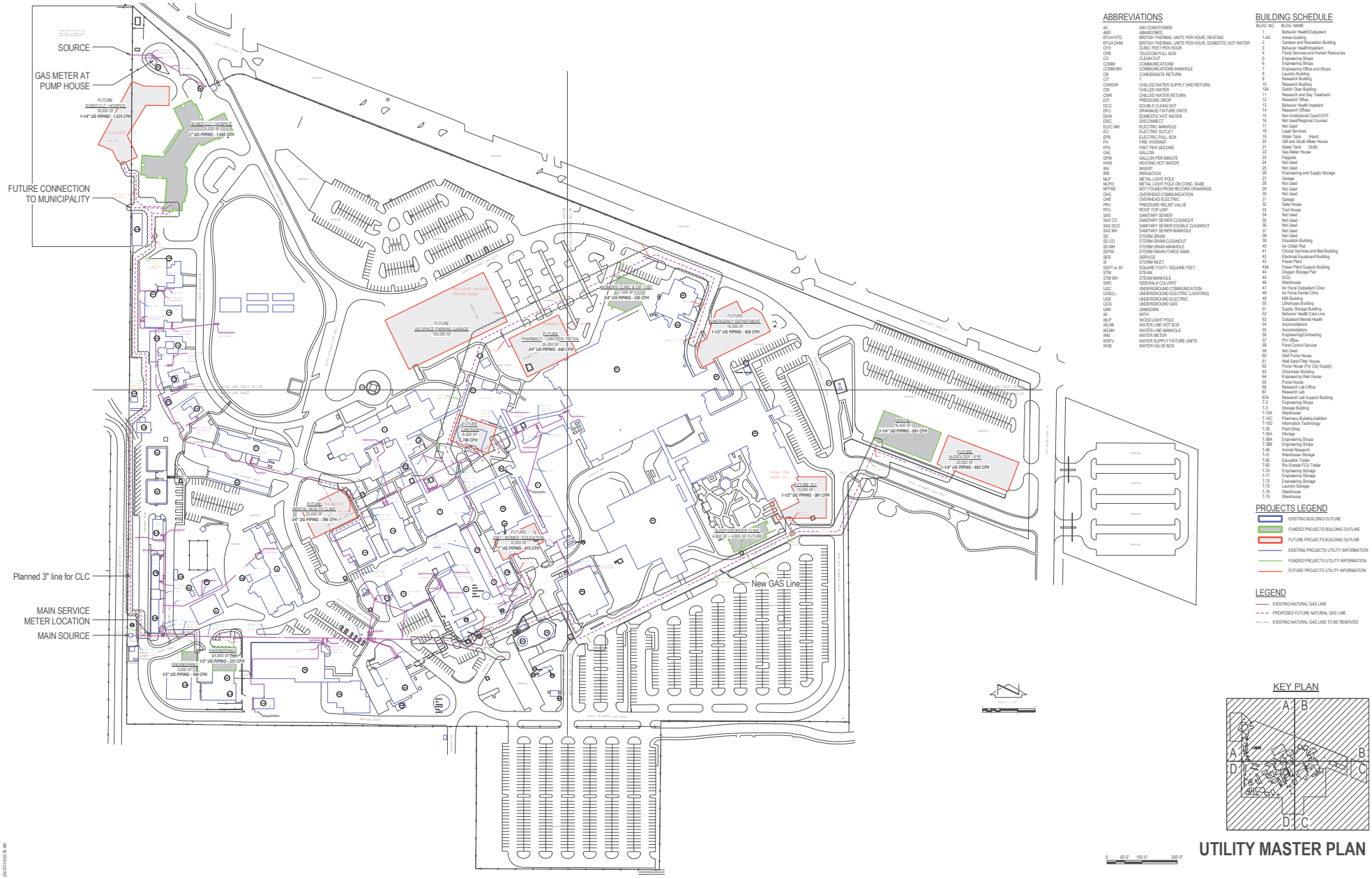
Drawing Title	SITE UTILITY PLAN - ELECTRICAL
Approved: Project Director	
Project Title	NMVAMCS ABQ SITE UTILITIES
Location	1501 San Pedro Drive Southeast Albuquerque, NM 87108
Date	02/06/2015
Checked by	J. MONTAÑO
Drawn	D. COCCO
Project Number	501-14-104
Building Number	
Drawing number	AS 102

Office of Construction and Facilities Management
Department of Veterans Affairs



ABBREVIATIONS

AC	AIR CONDITIONER
ABD	ABANDONED
BTUH HTG	BRITISH THERMAL UNITS PER HOUR, HEATING
BTUH DHW	BRITISH THERMAL UNITS PER HOUR, DOMESTIC HOT WATER
CFH	CUBIC FEET PER HOUR
CPB	TELECOM PULL BOX
CO	CLEAN OUT
COMM	COMMUNICATIONS
COMM MH	COMMUNICATIONS MANHOLE
CR	CONDENSATE RETURN
CJT	T
CHWSR	CHILLED WATER SUPPLY AND RETURN
CW	CHILLED WATER
CWR	CHILLED WATER RETURN
D.P.	PRESSURE DROP
DCO	DOUBLE CLEAN OUT
DFU	DRAINAGE FIXTURE UNITS
DHW	DOMESTIC HOT WATER
DISC	DISCONNECT
ELEC MH	ELECTRIC MANHOLE
EO	ELECTRIC OUTLET
EPB	ELECTRIC PULL BOX
FH	FIRE HYDRANT
FPS	FEET PER SECOND
GAL	GALLON
GPM	GALLON PER MINUTE
HHW	HEATING HOT WATER
INV	INVERT
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SD	STORM DRAIN
SD CO	STORM DRAIN CLEANOUT
SD MH	STORM DRAIN MANHOLE
SDFM	STORM DRAIN FORCE MAIN
SER	SERVICE
SI	STORM INLET
SQFT or SF	SQUARE FOOT / SQUARE FEET
STM	STEAM
STM MH	STEAM MANHOLE
SWC	SIDEWALK CULVERT
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UGE(LL)	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
UGG	UNDERGROUND GAS
UNK	UNKNOWN
W	WITH
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WLHB	WATER LINE HOT BOX
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WSFU	WATER SUPPLY FIXTURE UNITS
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BUILDING SCHEDULE

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56	Engineering/Contracting
57	PIV Office
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PROJECTS LEGEND

- EXISTING BUILDING OUTLINE
- FUNDED PROJECTS BUILDING OUTLINE
- FUTURE PROJECTS BUILDING OUTLINE
- EXISTING PROJECTS UTILITY INFORMATION
- FUNDED PROJECTS UTILITY INFORMATION
- FUTURE PROJECTS UTILITY INFORMATION

LEGEND

- EXISTING NATURAL GAS LINE
- PROPOSED FUTURE NATURAL GAS LINE
- EXISTING NATURAL GAS LINE TO BE REMOVED

KEY PLAN

UTILITY MASTER PLAN

0 50'-0" 100'-0" 200'-0"

NO	REVISIONS	DATE

PROJECT TEAM

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ARCHITECTS/ENGINEERS

TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

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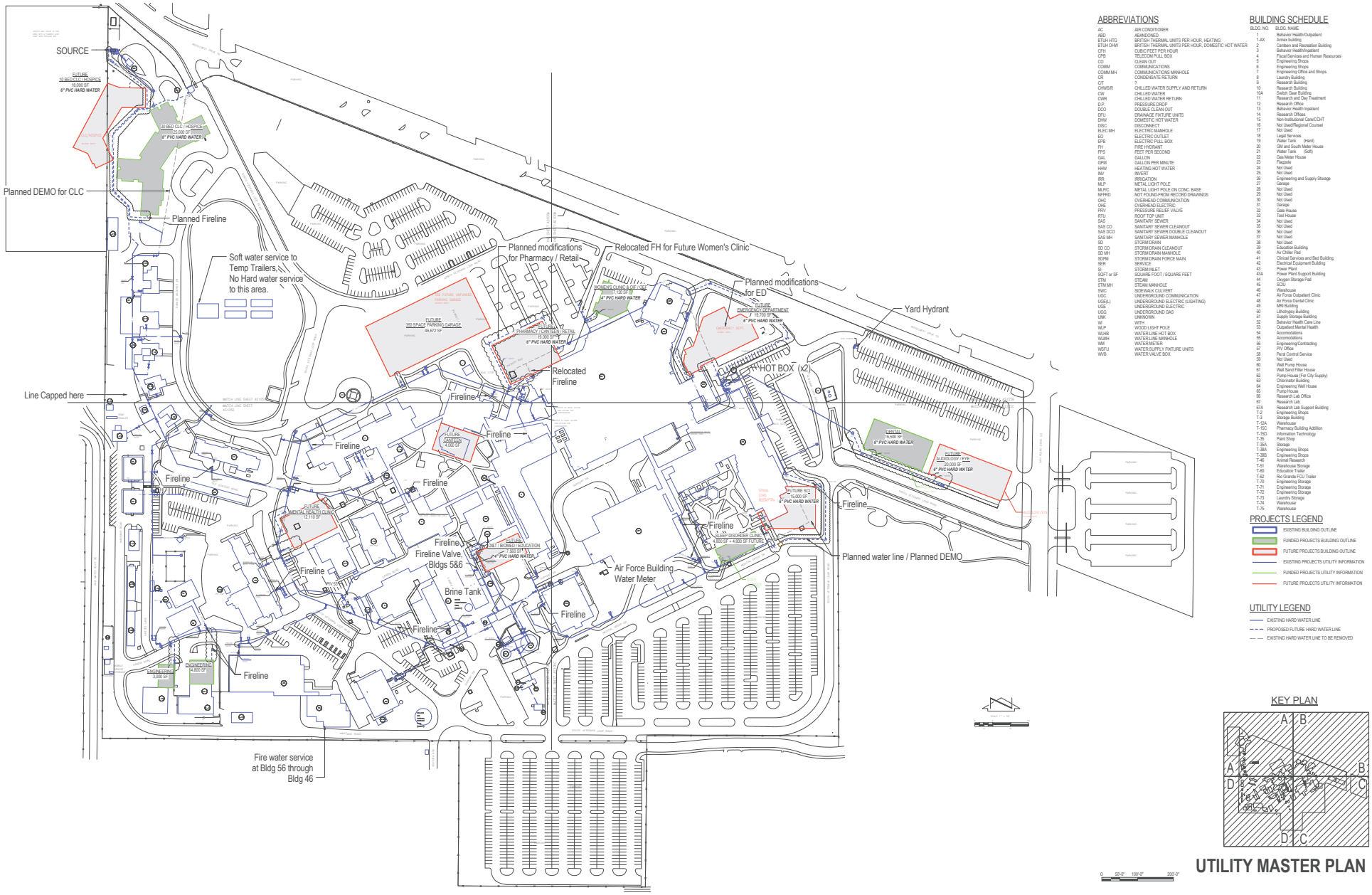
Phoenix, AZ 85018-2311

Drawing Title	SITE UTILITIES PLAN - NATURAL GAS
Approved - Project Director	
Project Title	NMVAMCS ABQ SITE UTILITIES
Location	1501 San Pedro Drive Southeast Albuquerque, NM 87108
Date	2/06/2015
Checked by	M. Perkins
Drawn	D. Young
Project Number	501-14-104
Building Number	
Drawing number	AS113
	0

Office of Construction and Facilities Management
Department of Veterans Affairs



ABBREVIATIONS

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CFH	CUBIC FEET PER HOUR
CPB	TELECOM PULL BOX
CO	CLEAN OUT
COMM	COMMUNICATIONS
COMM MH	COMMUNICATIONS MANHOLE
CR	CONDENSATE RETURN
CT	?
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D.P.	PRESSURE DROP
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DFU	DRAINAGE FIXTURE UNITS
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MLP/C	METAL LIGHT POLE ON CONC. BASE
NFRD	NOT FOUND-FROM RECORD DRAWINGS
OHC	OVERHEAD COMMUNICATION
OHE	OVERHEAD ELECTRIC
PRV	PRESSURE RELIEF VALVE
RTU	ROOF TOP UNIT
SAS	SANITARY SEWER
SAS CO	SANITARY SEWER CLEANOUT
SAS DCO	SANITARY SEWER DOUBLE CLEANOUT
SAS MH	SANITARY SEWER MANHOLE
SD	STORM DRAIN
SD CO	STORM DRAIN CLEANOUT
SD MH	STORM DRAIN MANHOLE
SDFM	STORM DRAIN FORCE MAIN
SER	SERVICE
SI	STORM INLET
SQFT or SF	SQUARE FOOT / SQUARE FEET
STM	STEAM
STM MH	STEAM MANHOLE
SWC	SIDEWALK CULVERT
UGC	UNDERGROUND COMMUNICATION
UGE(L)	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
UGG	UNDERGROUND GAS
UNK	UNKNOWN
W	WITH
WLP	WOOD LIGHT POLE
WLHB	WATER LINE HOT BOX
WLMH	WATER LINE MANHOLE
WM	WATER METER
WSFU	WATER SUPPLY FIXTURE UNITS
WVB	WATER VALVE BOX

BUILDING SCHEDULE

BLDG. NO.	BLDG. NAME
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T-75	Warehouse

PROJECTS LEGEND

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- FUNDED PROJECTS BUILDING OUTLINE
- FUTURE PROJECTS BUILDING OUTLINE
- EXISTING PROJECTS UTILITY INFORMATION
- FUNDED PROJECTS UTILITY INFORMATION
- FUTURE PROJECTS UTILITY INFORMATION

UTILITY LEGEND

- EXISTING HARD WATER LINE
- PROPOSED FUTURE HARD WATER LINE
- EXISTING HARD WATER LINE TO BE REMOVED

KEY PLAN

UTILITY MASTER PLAN

0 50'-0" 100'-0" 200'-0"

NO	REVISIONS	DATE

PROJECT TEAM

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ARCHITECTS/ENGINEERS

TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

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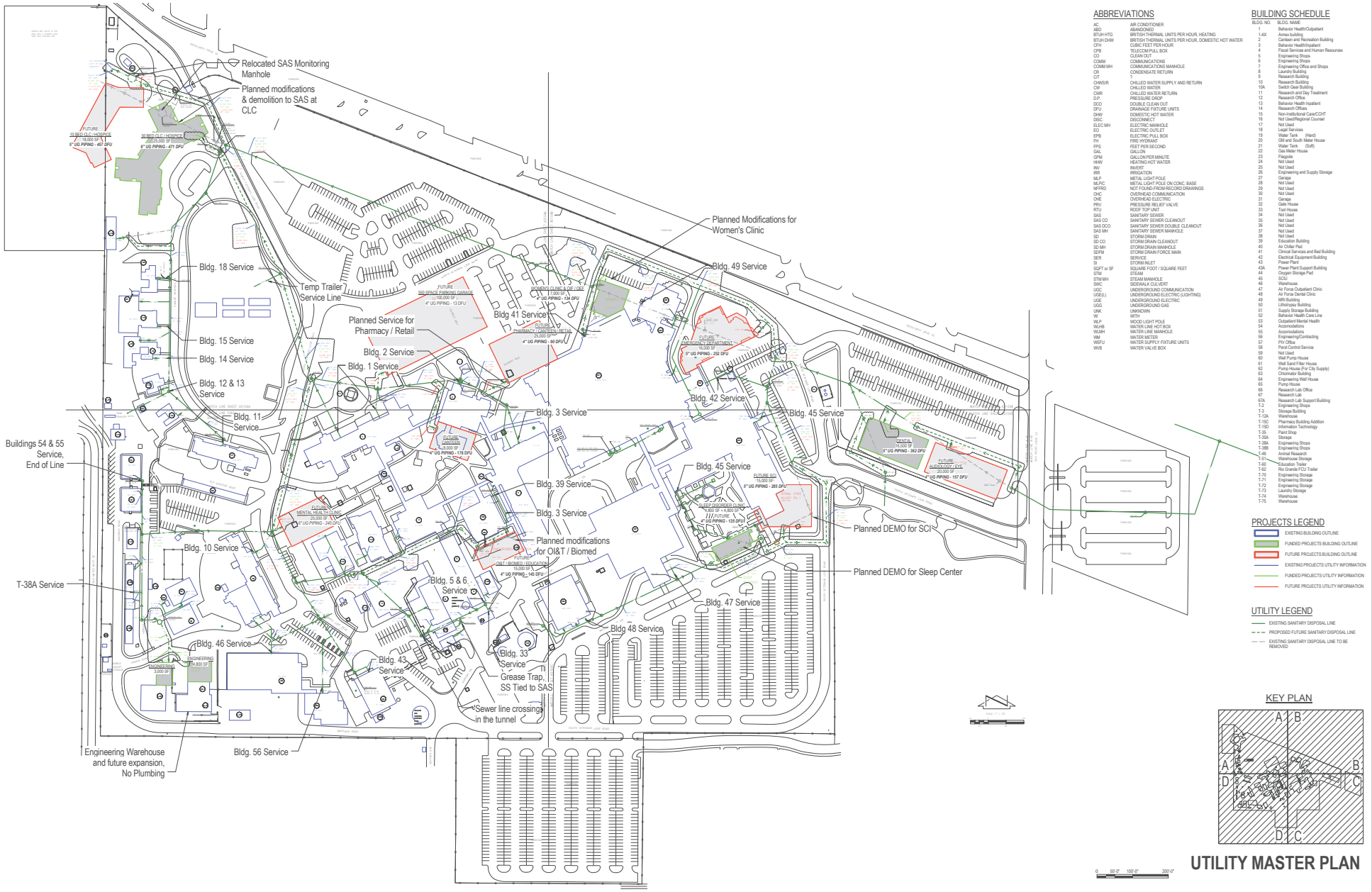
Phoenix, AZ 85018-2311

Drawing Title	SITE UTILITIES PLAN - HARD WATER SYSTEMS
Approved - Project Director	
Project Title	NMVAMCS ABQ SITE UTILITIES
Location	1501 San Pedro Drive Southeast Albuquerque, NM 87108
Date	2/06/2015
Checked by	M. Perkins
Drawn	D. Young
Project Number	501-14-104
Building Number	
Drawing number	AS105
0	

Office of Construction and Facilities Management
Department of Veterans Affairs



ABBREVIATIONS

AC	AIR CONDITIONER
ABD	ABANDONED
BTUH HTG	BRITISH THERMAL UNITS PER HOUR, HEATING
BTUH DHW	BRITISH THERMAL UNITS PER HOUR, DOMESTIC HOT WATER
CFH	CUBIC FEET PER HOUR
CPB	TELECOM PULL BOX
CO	CLEAN OUT
COMM	COMMUNICATIONS
COMM MH	COMMUNICATIONS MANHOLE
CR	CONDENSATE RETURN
CIT	?
CHWS/R	CHILLED WATER SUPPLY AND RETURN
CW	CHILLED WATER
CWR	CHILLED WATER RETURN
DJT	PRESSURE DROP
DCO	DOUBLE CLEAN OUT
DFU	DRAINAGE FIXTURE UNITS
DHW	DOMESTIC HOT WATER
DISC	DISCONNECT
ELEC MH	ELECTRIC MANHOLE
EO	ELECTRIC OUTLET
EPB	ELECTRIC PULL BOX
FH	FIRE HYDRANT
FPS	FEET PER SECOND
GAL	GALLON
GPM	GALLON PER MINUTE
HHW	HEATING HOT WATER
INV	INVERT
IRR	IRRIGATION
MLP	METAL LIGHT POLE
MLPC	METAL LIGHT POLE ON CONC. BASE
NFRFD	NOT FOUND-FROM RECORD DRAWINGS
OHC	OVERHEAD COMMUNICATION
OHE	OVERHEAD ELECTRIC
PRV	PRESSURE RELIEF VALVE
RTU	ROOF TOP UNIT
SAS	SANITARY SEWER
SAS CO	SANITARY SEWER CLEANOUT
SAS DCO	SANITARY SEWER DOUBLE CLEANOUT
SAS MH	SANITARY SEWER MANHOLE
SD	STORM DRAIN
SD CO	STORM DRAIN CLEANOUT
SD MH	STORM DRAIN MANHOLE
SDFM	STORM DRAIN FORCE MAIN
SER	SERVICE
SI	STORM INLET
SQFT or SF	SQUARE FOOT / SQUARE FEET
STM	STEAM
STM MH	STEAM MANHOLE
SWC	SIDEWALK CULVERT
UGC	UNDERGROUND COMMUNICATION
UGE(L)	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
UGG	UNDERGROUND GAS
UNK	UNKNOWN
W	WITH
WLP	WOOD LIGHT POLE
WLWB	WATER LINE HOT BOX
WLMH	WATER LINE MANHOLE
WM	WATER METER
WSFU	WATER SUPPLY FIXTURE UNITS
WVB	WATER VALVE BOX

BUILDING SCHEDULE

BLDG. NO.	BLDG. NAME
1	Behavior Health/Outpatient
1-AX	Annex building
2	Canteen and Recreation Building
3	Behavior Health/Inpatient
4	Fiscal Services and Human Resources
5	Engineering Shops
6	Engineering Shops
7	Engineering Office and Shops
8	Laundry Building
9	Research Building
10	Research Building
10A	Switch Gear Building
11	Research and Day Treatment
12	Research Office
13	Behavior Health Inpatient
14	Research Offices
15	Non-Institutional Care/CCHT
16	Not Used/Regional Counsel
17	Not Used
18	Legal Services
19	Water Tank (Hard)
20	GM and South Meter House
21	Water Tank (Soft)
22	Gas Meter House
23	Flagpole
24	Not Used
25	Not Used
26	Engineering and Supply Storage
27	Garage
28	Not Used
29	Not Used
30	Not Used
31	Garage
32	Gate House
33	Tool House
34	Not Used
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39	Education Building
40	Air Chiller Pad
41	Clinical Services and Bed Building
42	Electrical Equipment Building
43	Power Plant
43A	Power Plant Support Building
44	Oxygen Storage Pad
45	SCU
46	Warehouse
47	Air Force Outpatient Clinic
48	Air Force Dental Clinic
49	MRI Building
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51	Supply Storage Building
52	Behavior Health Care Line
53	Outpatient Mental Health
54	Accomodations
55	Accomodations
56	Engineering/Contracting
57	PIV Office
58	Parcel Control Service
59	Not Used
60	Well Pump House
61	Well Sand Filter House
62	Pump House (For City Supply)
63	Chlorinator Building
64	Engineering Well House
65	Pump House
66	Research Lab Office
67	Research Lab
67A	Research Lab Support Building
T-2	Engineering Shops
T-3	Storage Building
T-12A	Warehouse
T-15C	Pharmacy Building Addition
T-15D	Information Technology
T-35	Paint Shop
T-35A	Storage
T-38A	Engineering Shops
T-38B	Engineering Shops
T-45	Animal Research
T-61	Warehouse Storage
T-60	Education Trailer
T-62	Rio Grande FCU Trailer
T-70	Engineering Storage
T-71	Engineering Storage
T-72	Engineering Storage
T-73	Laundry Storage
T-74	Warehouse
T-75	Warehouse

PROJECTS LEGEND

- EXISTING BUILDING OUTLINE
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- EXISTING PROJECTS UTILITY INFORMATION
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UTILITY LEGEND

- EXISTING SANITARY DISPOSAL LINE
- PROPOSED FUTURE SANITARY DISPOSAL LINE
- EXISTING SANITARY DISPOSAL LINE TO BE REMOVED

KEY PLAN

UTILITY MASTER PLAN

NO	REVISIONS	DATE

PROJECT TEAM

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ARCHITECTS/ENGINEERS

TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

HDR
3200 East Camelback Road, Suite 250
Phoenix, AZ 85018-2311

Drawing Title	SITE UTILITIES PLAN - SANITARY DISPOSAL
Approved - Project Director	
Project Title	NMVAMCS ABQ SITE UTILITIES
Location	1501 San Pedro Drive Southeast Albuquerque, NM 87108
Date	2/06/2015
Checked by	M. Perkins
Drawn	D. Young
Project Number	501-14-104
Building Number	
Drawing number	AS104
	0

Office of Construction and Facilities Management
Department of Veterans Affairs

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UGELU	UNDERGROUND ELECTRIC (LIGHTING)
UGE	UNDERGROUND ELECTRIC
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LEGEND

- EXISTING STEAM AND CR LINE
- PROPOSED FUTURE STEAM AND CR LINE
- EXISTING STEAM AND CR LINE TO BE REMOVED

KEY PLAN

UTILITY MASTER PLAN

0 50'-0" 100'-0" 200'-0"

NO	REVISIONS	DATE

PROJECT TEAM

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ARCHITECTS/ENGINEERS

TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

HDR
3200 East Camelback Road, Suite 250
Phoenix, AZ 85018-2311

Drawing Title: SITE UTILITIES PLAN - STEAM AND CONDENSATE RETURN

Approved - Project Director

Project Title: NMVAMCS ABQ SITE UTILITIES

Location: 1501 San Pedro Drive Southeast Albuquerque, NM 87108

Date: 2/06/2015 | Checked by: M. Perkins | Drawn: D. Young

Project Number: 501-14-104

Building Number:

Drawing number: AS108 0

Office of Construction and Facilities Management
Department of Veterans Affairs

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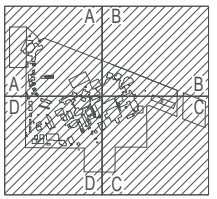
UTILITY LEGEND

- EXISTING STORM WATER DRAINAGE LINE
- PROPOSED FUTURE STORM WATER DRAINAGE LINE
- EXISTING STORM WATER DRAINAGE LINE TO BE REMOVED

KEY PLAN



NOTE: KNOW THE COLORS
The color-coded surface marks (paint or a similar coating) used on-site to indicate the locations and route of buried lines follow The ULCC Uniform Color Code using the ANSI standard Z53.1 Safety Colors. Variations in the hue and shading of surface marking colors may exist but generally follow this pattern:

RED	=	ELECTRIC POWER LINES
ORANGE	=	TELECOMMUNICATION LINES
YELLOW	=	GAS AND STEAM LINES
GREEN	=	STORM AND SEWER DRAIN LINES
BLUE	=	POTABLE WATER LINES (HARD AND SOFT)
PURPLE	=	IRRIGATION LINES
PINK	=	TEMPORARY / UNKNOWN
WHITE	=	PROPOSED EXCAVATION LIMITS

0 50'-0" 100'-0" 200'-0"

UTILITY MASTER PLAN

NO	REVISIONS	DATE

PROJECT TEAM

TRIPLE C - THE A&E GROUP
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ARCHITECTS/ENGINEERS

TRIPLE C – THE A&E GROUP
A MULTI-DISCIPLINE COMPANY

BRIDGERS & PAXTON

HDR
3200 East Camelback Road, Suite 250
Phoenix, AZ 85018-2311

Drawing Title: SITE UTILITIES PLAN - STORM WATER DRAINAGE

Approved - Project Director

Project Title: NMVAMCS ABQ SITE UTILITIES

Location: 1501 San Pedro Drive Southeast Albuquerque, NM 87108

Date: 2/06/2015 | Checked by: M. Perkins | Drawn: D. Young

Project Number: 501-14-104

Building Number:

Drawing number: AS116 0

Office of Construction and Facilities Management
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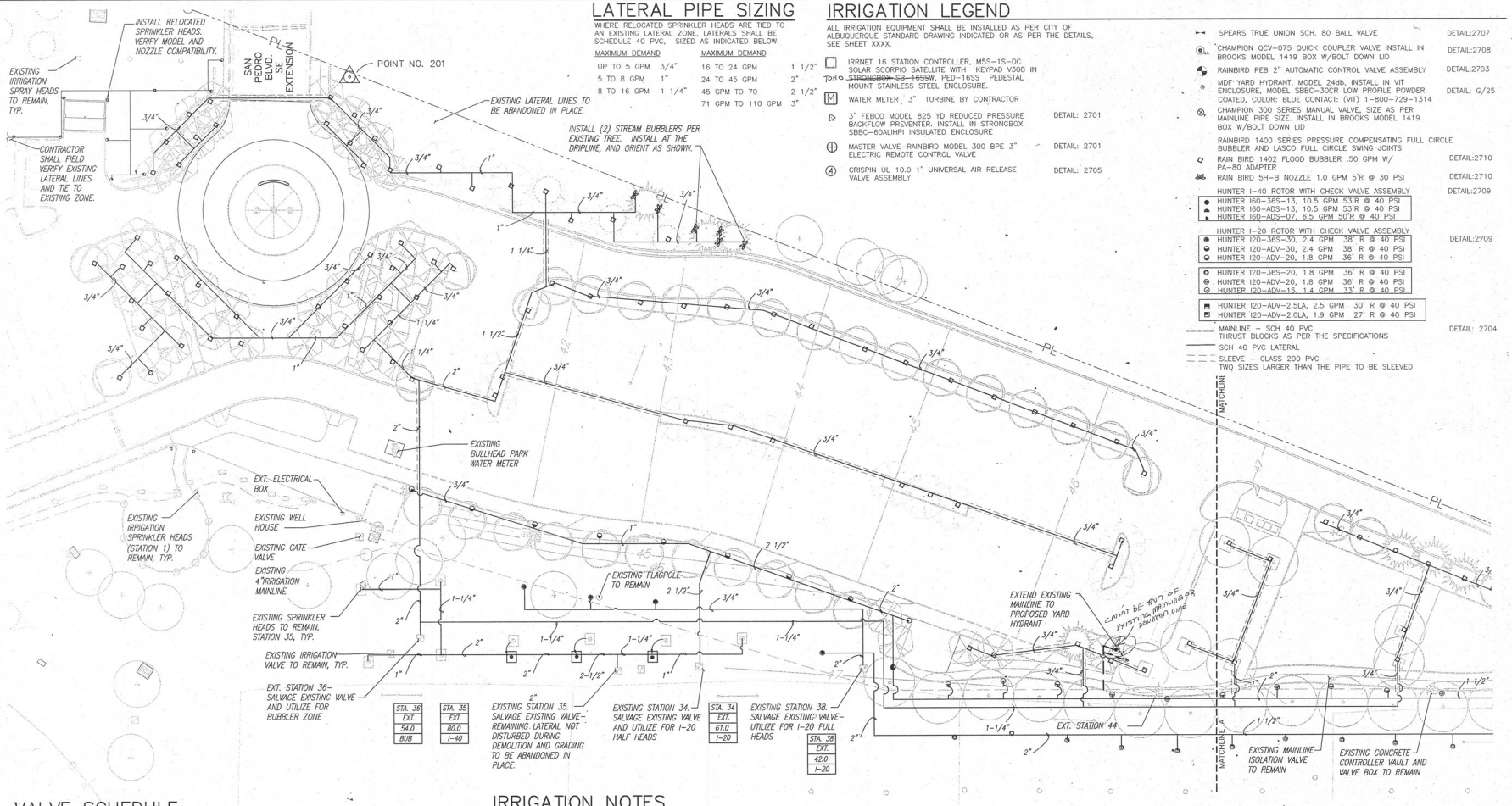


LATERAL PIPE SIZING

WHERE RELOCATED SPRINKLER HEADS ARE TIED TO AN EXISTING LATERAL ZONE, LATERALS SHALL BE SCHEDULE 40 PVC, SIZED AS INDICATED BELOW.

MAXIMUM DEMAND		MAXIMUM DEMAND	
UP TO 5 GPM	3/4"	16 TO 24 GPM	1 1/2"
5 TO 8 GPM	1"	24 TO 45 GPM	2"
8 TO 16 GPM	1 1/4"	45 GPM TO 70	2 1/2"
		71 GPM TO 110 GPM	3"

IRRIGATION LEGEND

ALL IRRIGATION EQUIPMENT SHALL BE INSTALLED AS PER CITY OF ALBUQUERQUE STANDARD DRAWING INDICATED OR AS PER THE DETAILS, SEE SHEET XXXX.

- IRRNET 16 STATION CONTROLLER, M5S-1S-DC SOLAR SCORPIO SATELLITE WITH KEYPAD V308 IN ~~STRONGBOX SB-1555W~~, PED-16SS PEDESTAL MOUNT STAINLESS STEEL ENCLOSURE.
- WATER METER 3" TURBINE BY CONTRACTOR
- 3" FEBCO MODEL 825 YD REDUCED PRESSURE BACKFLOW PREVENTER. INSTALL IN STRONGBOX SBBC-60ALIHPI INSULATED ENCLOSURE — DETAIL: 2701
- MASTER VALVE-RAINBIRD MODEL 300 BPE 3" ELECTRIC REMOTE CONTROL VALVE — DETAIL: 2701
- CRISPIN UL 10.0 1" UNIVERSAL AIR RELEASE VALVE ASSEMBLY — DETAIL: 2705
- SPEARS TRUE UNION SCH. 80 BALL VALVE — DETAIL:2707
- CHAMPION QCV-075 QUICK COUPLER VALVE INSTALL IN BROOKS MODEL 1419 BOX W/BOLT DOWN LID — DETAIL:2708
- RAINBIRD PEB 2" AUTOMATIC CONTROL VALVE ASSEMBLY — DETAIL:2703
- MDF YARD HYDRANT, MODEL 24db, INSTALL IN VIT ENCLOSURE, MODEL SBBC-30CR LOW PROFILE POWDER COATED, COLOR: BLUE CONTACT: (VIT) 1-800-729-1314 — DETAIL: G/25
- CHAMPION 300 SERIES MANUAL VALVE, SIZE AS PER MAINLINE PIPE SIZE. INSTALL IN BROOKS MODEL 1419 BOX W/BOLT DOWN LID
- RAINBIRD 1400 SERIES PRESSURE COMPENSATING FULL CIRCLE BUBBLER AND LASCO FULL CIRCLE SWING JOINTS
- RAIN BIRD 1402 FLOOD BUBBLER .50 GPM W/ PA-80 ADAPTER — DETAIL:2710
- RAIN BIRD 5H-B NOZZLE 1.0 GPM 5'R @ 30 PSI — DETAIL:2710
- HUNTER I-40 ROTOR WITH CHECK VALVE ASSEMBLY — DETAIL:2709
  - HUNTER I60-36S-13, 10.5 GPM 53'R @ 40 PSI
  - HUNTER I60-ADS-13, 10.5 GPM 53'R @ 40 PSI
  - HUNTER I60-ADS-07, 6.5 GPM 50'R @ 40 PSI
- HUNTER I-20 ROTOR WITH CHECK VALVE ASSEMBLY — DETAIL:2709
  - HUNTER I20-36S-30, 2.4 GPM 38' R @ 40 PSI
  - HUNTER I20-ADV-30, 2.4 GPM 38' R @ 40 PSI
  - HUNTER I20-ADV-20, 1.8 GPM 36' R @ 40 PSI
  - HUNTER I20-36S-20, 1.8 GPM 36' R @ 40 PSI
  - HUNTER I20-ADV-20, 1.8 GPM 36' R @ 40 PSI
  - HUNTER I20-ADV-15, 1.4 GPM 33' R @ 40 PSI
  - HUNTER I20-ADV-2.5LA, 2.5 GPM 30' R @ 40 PSI
  - HUNTER I20-ADV-2.0LA, 1.9 GPM 27' R @ 40 PSI
- MAINLINE - SCH 40 PVC THRUST BLOCKS AS PER THE SPECIFICATIONS — DETAIL: 2704
- SCH 40 PVC LATERAL
- SLEEVE - CLASS 200 PVC - TWO SIZES LARGER THAN THE PIPE TO BE SLEEVED

VALVE SCHEDULE

	VALVE NO.	SIZE	NOZZLE/RADIUS	DESCRIPTION	MAX. DEMAND	RUN TIME FOR 1/2" PRECIPITATION
SPRAY	V-1	2"	53'	TURF	40.5 GPM	42 MIN.
	V-2	2"	53'	TURF	40.5 GPM	42 MIN.
	V-3	2"	53'	TURF	42.5 GPM	83 MIN.
	V-4	2"	53'	TURF	42.5 GPM	83 MIN.
	V-5	2"	53'	TURF	42.5 GPM	83 MIN.
	V-6	2"	53'	TURF	34 GPM	42 MIN.
	V-7	2"	53'	TURF	34 GPM	42 MIN.
	V-8	2"	53'	TURF	51 GPM	83 MIN.
	V-9	2"	53'	TURF	42.5 GPM	83 MIN.
	V-10	2"	53'	TURF	51 GPM	83 MIN.
	V-11	2"	53'	TURF	40.5 GPM	42 MIN.
	V-12	2"	53'	TURF	40.5 GPM	42 MIN.
	V-13	2"	30'	TURF	44 GPM	57 MIN.
BUBBLER	V-14	1-1/2"		TREES	24.5 GPM	XXX MIN.

Total Spray Runtime 7 hrs. 12 min.

PROGRAM	STATION	CALCULATED PRECIPITATION	RUN TIME IN MINUTES	CYCLES PER IRRIGATION	IRRIGATIONS PER MONTH	COMMENTS
1	1,2	.72"/ HR	42	1	15	
2	4,5	.36"/ HR	83	1	15	
3	3,10	.36"/ HR	83	1	15	
4	6,7	.72"/ HR	42	1	15	
5	8,9	.36"/ HR	83	1	15	
6	11,12	.72"/ HR	42	1	15	
7	13	.25"/ HR	120	1	15	

IRRIGATION NOTES

1. PRIOR TO SEEDING, CONTRACTOR SHALL PERFORM A WATER AUDIT AS PER THE CITY OF ALBUQUERQUE WATER CONSERVATION ORDINANCE. IRRIGATION SYSTEM MUST HAVE A MINIMUM DISTRIBUTION UNIFORMITY OF 65% AS PER COA WATER ORDINANCE (SECTION 6-1-1-9). RESULTS SHALL BE PROVIDED TO THE OWNER, PRIOR TO PROCEEDING WITH SEEDING OPERATION.
2. IRRIGATION SYSTEM AS DESIGNED ASSUMES A STATIC WATER PRESSURE OF APPROXIMATELY X PSI.
3. PLANS ARE DIAGRAMMATIC AND APPROXIMATE DUE TO SCALE OF DRAWINGS. ALL VALVES SHALL BE LOCATED IN PLANTING AREAS WHERE SHOWN AND ALL PIPING SHALL BE INSTALLED PRIOR TO LANDSCAPING OR PAVING WORK. NO TEES, ELLS OR OTHER TURNS IN PIPING SHALL BE LOCATED UNDER PAVING. CAP ALL ENDS HAND TIGHT, PRIOR TO BACKFILL.
4. IF THE CONTRACT DRAWINGS AND/OR SPECIFICATIONS DO NOT THOROUGHLY DESCRIBE THE METHOD OR TECHNIQUES TO BE USED FOR INSTALLATION, THEN THE CONTRACTOR SHALL FOLLOW THE INSTALLATION METHODS RECOMMENDED BY THE MANUFACTURER.
5. CONTRACTOR SHALL FIELD LOCATE AND VERIFY OPERATION OF EXISTING VALVES AND IRRIGATION SPRINKLER HEADS TO BE RELOCATED AND RE-USED. LOCATIONS AS SHOWN ARE NOT BASED ON AS-BUILT PLANS.
6. WHERE EXISTING IRRIGATION SPRINKLER HEADS ARE SHOWN TO BE RELOCATED, HEADS SHALL BE INSTALLED AT PROPOSED GRADE AS PER THE SPECIFICATIONS, AND THE RADII SHALL BE ADJUSTED AS NEEDED FOR HEAD TO HEAD COVERAGE.
7. TRENCHING ADJACENT TO EXISTING TREES - CONTRACTOR SHALL NOT TRENCH WITHIN 6' OF THE TRUNK AND SHALL AVOID TRENCHING UNDER THE DRIPLINE OF EXISTING TREES. NO TREE ROOTS LARGER THAN 3" IN DIAMETER SHALL BE CUT. ALL TRENCHING WITHIN DRIPLINE OF EXISTING TREES MUST BE DONE BY HAND.
8. CONCRETE THRUST BLOCKS SHALL BE PROVIDED WHERE NECESSARY TO RESIST SYSTEM PRESSURE. THRUST BLOCKS SHALL BE CONSTRUCTED AT ALL DIRECTION CHANGES, SIZE CHANGES, VALVES AND TERMINATIONS, OR AT ANY OTHER POINTS OF THE SYSTEM THAT WILL RESULT IN AN UNBALANCED THRUST LINE FOR EQUIPMENT 2 (TWO) INCHES AND LARGER. DO NO OBSTRUCT THE OUTLETS OF FITTINGS WHICH ARE INTENDED FOR FUTURE CONNECTIONS. THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH AN IN ACCORDANCE WITH THE PLANS OR STANDARD DETAILS.

V5 VALVE NUMBER
2" VALVE SIZE
53.6 GPM
36V-15 HEAD TYPE

30 15 0 30
SCALE: 1" = 30'

AS-BUILT INFORMATION
CONTRACTOR — DATE
DRAWN BY — DATE
INSPECTED BY — DATE
REVISIONS BY — DATE
FIELD CHECKED BY — DATE
DRAWINGS BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE

LANDSCAPE ARCHITECT'S SEAL
STATE OF NEW MEXICO
THOMAS A. GAY
No. 240
REGISTERED LANDSCAPE ARCHITECT
8-23-00

No.	Date	REMARKS	BY	DATE
		REVISIONS		
		DESIGN		

Designed By: TAG — DATE: 6/22/00
Drawn By: PAA — DATE: 6/22/00
Checked By: TAG — DATE: 6/22/00

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

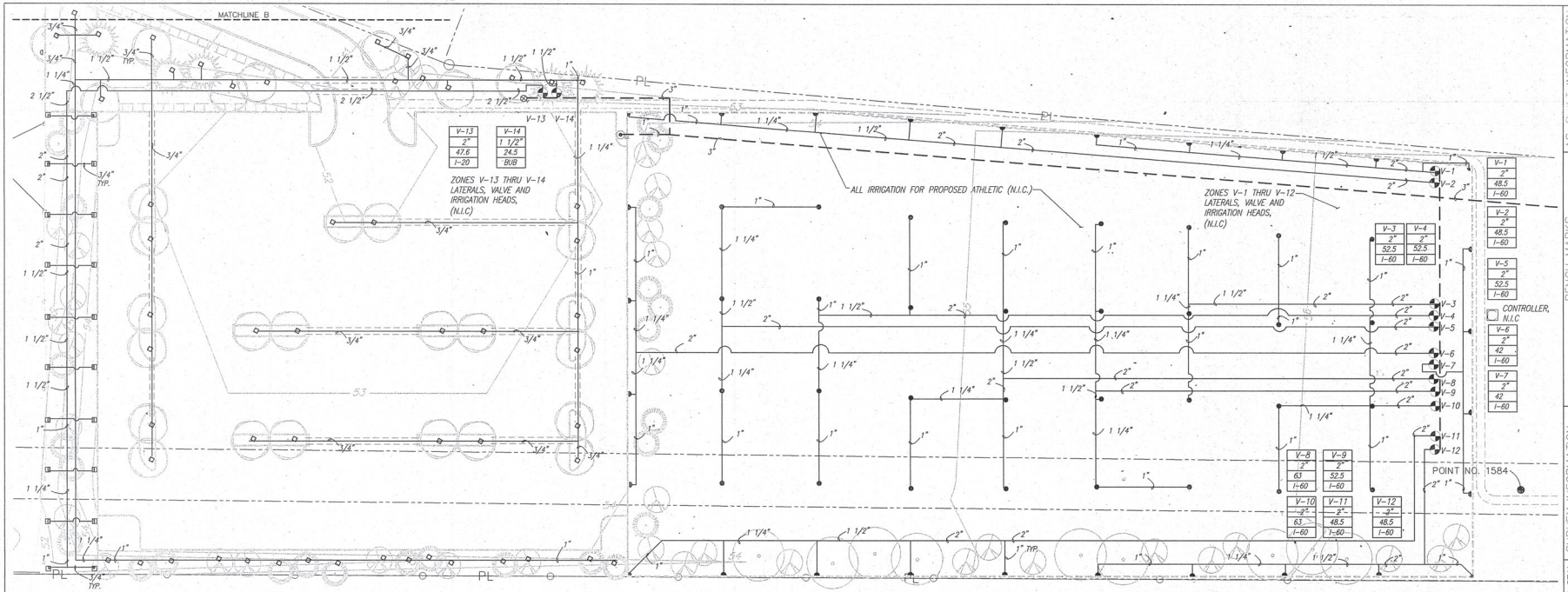
BULLHEAD PARK
IRRIGATION PLANS

Design Review Committee	City Engineer Approval	Last Design Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No.	Zone Map No.	Sheet	Of
5734.00	M-18	20	26

sites southwest

FILE: p:/98192/B192irr.DWG
XREF: p:/98192/B192BS06.DWG



IRRIGATION LEGEND

ALL IRRIGATION EQUIPMENT SHALL BE INSTALLED AS PER CITY OF ALBUQUERQUE STANDARD DRAWING INDICATED OR AS PER THE DETAILS, SEE SHEET XXXX.

- IRRNET 16 STATION CONTROLLER, M5S-1S-DC SOLAR SCORPIO SATELLITE WITH KEYPAD V308 IN STRONGBOX SB-16SSW, PED-16SS PEDESTAL MOUNT STAINLESS STEEL ENCLOSURE.
- WATER METER 3" TURBINE BY CONTRACTOR
- 3" FEBCO MODEL 825 YD REDUCED PRESSURE BACKFLOW PREVENTER. INSTALL IN STRONGBOX SBBC-60ALIHPI INSULATED ENCLOSURE — DETAIL: 2701
- MASTER VALVE-RAINBIRD MODEL 300 BPE 3" ELECTRIC REMOTE CONTROL VALVE — DETAIL: 2701
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- SPEARS TRUE UNION SCH. 80 BALL VALVE — DETAIL:2707
- CHAMPION QCV-075 QUICK COUPLER VALVE INSTALL IN BROOKS MODEL 1419 BOX W/BOLT DOWN LID — DETAIL:2708
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- CHAMPION 300 SERIES MANUAL VALVE, SIZE AS PER MAINLINE PIPE SIZE. INSTALL IN BROOKS MODEL 1419 BOX W/BOLT DOWN LID — DETAIL: sht 21

RAINBIRD 1400 SERIES PRESSURE COMPENSATING FULL CIRCLE BUBBLER AND LASCO FULL CIRCLE SWING JOINTS

- RAIN BIRD 1402 FLOOD BUBBLER .50 GPM W/ PA-80 ADAPTER — DETAIL:2710
- RAIN BIRD 5H-B NOZZLE 1.0 GPM 5'R @ 30 PSI — DETAIL:2710

HUNTER I-40 ROTOR WITH CHECK VALVE ASSEMBLY — DETAIL:2709
- HUNTER I60-36S-13, 10.5 GPM 53'R @ 40 PSI
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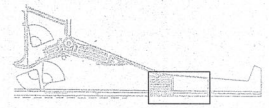
- HUNTER I20-36S-20, 1.8 GPM 36' R @ 40 PSI
- HUNTER I20-ADV-20, 1.8 GPM 36' R @ 40 PSI
- HUNTER I20-ADV-15, 1.4 GPM 33' R @ 40 PSI
- HUNTER I20-ADV-2.5LA, 2.5 GPM 30' R @ 40 PSI
- HUNTER I20-ADV-2.0LA, 1.9 GPM 27' R @ 40 PSI

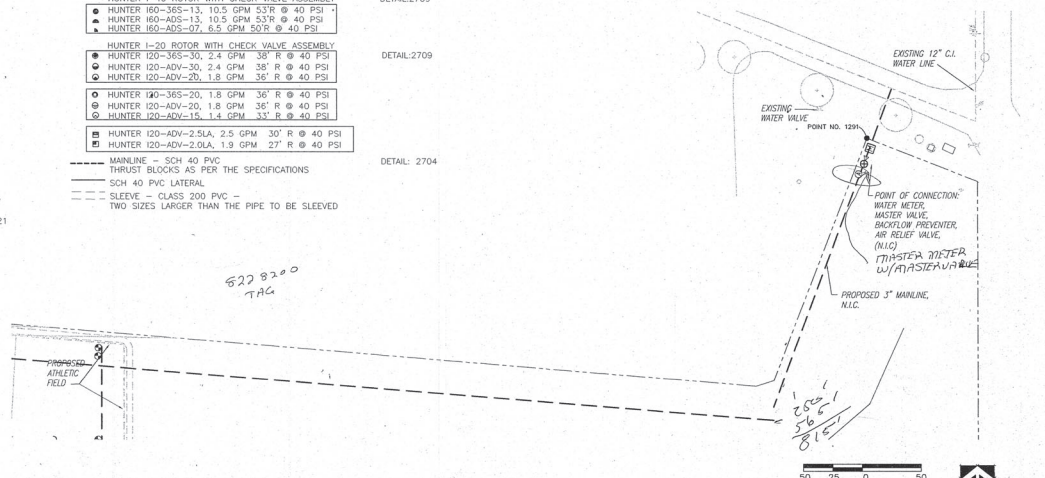
- MAINLINE - SCH 40 PVC THRUST BLOCKS AS PER THE SPECIFICATIONS — DETAIL: 2704
- SCH 40 PVC LATERAL
- SLEEVE - CLASS 200 PVC - TWO SIZES LARGER THAN THE PIPE TO BE SLEEVED

VALVE LEGEND: V5 / 2" / 53.6 / 36V-15 (VALVE NUMBER / VALVE SIZE / GPM / HEAD TYPE)

SCALE: 1" = 30'

KEY MAP





POINT OF CONNECTION

AS-BUILT INFORMATION — CONTRACTOR, WORK INSPECTED BY, FIELD LOCATION BY, DRAWINGS BY, MICRO-FILM INFORMATION, RECORDED BY, NO., DATE

BENCH MARKS

SURVEY INFORMATION — FIELD NOTES — NO., BY, DATE

LANDSCAPE ARCHITECTS SEAL — STATE OF NEW MEXICO, THOMAS A. GAY, No. 240, REGISTERED LANDSCAPE ARCHITECT, 3.23.00

No.	Date	REMARKS	BY
		REVISIONS	
		DESIGN	

Designed By: TAG — DATE: 8/22/00
Drawn By: PAA — DATE: 8/22/00
Checked By: TAG — DATE: 8/22/00

G. Robert Johns, ASLA LANDSCAPE ARCHITECTS

sites southwest

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

USS BULLHEAD PARK
IRRIGATION PLANS

Design Review Committee	City Engineer Approval	Last Design Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No.	Zone Map No.	Sheet	Of
5734.00	M-18	22	25

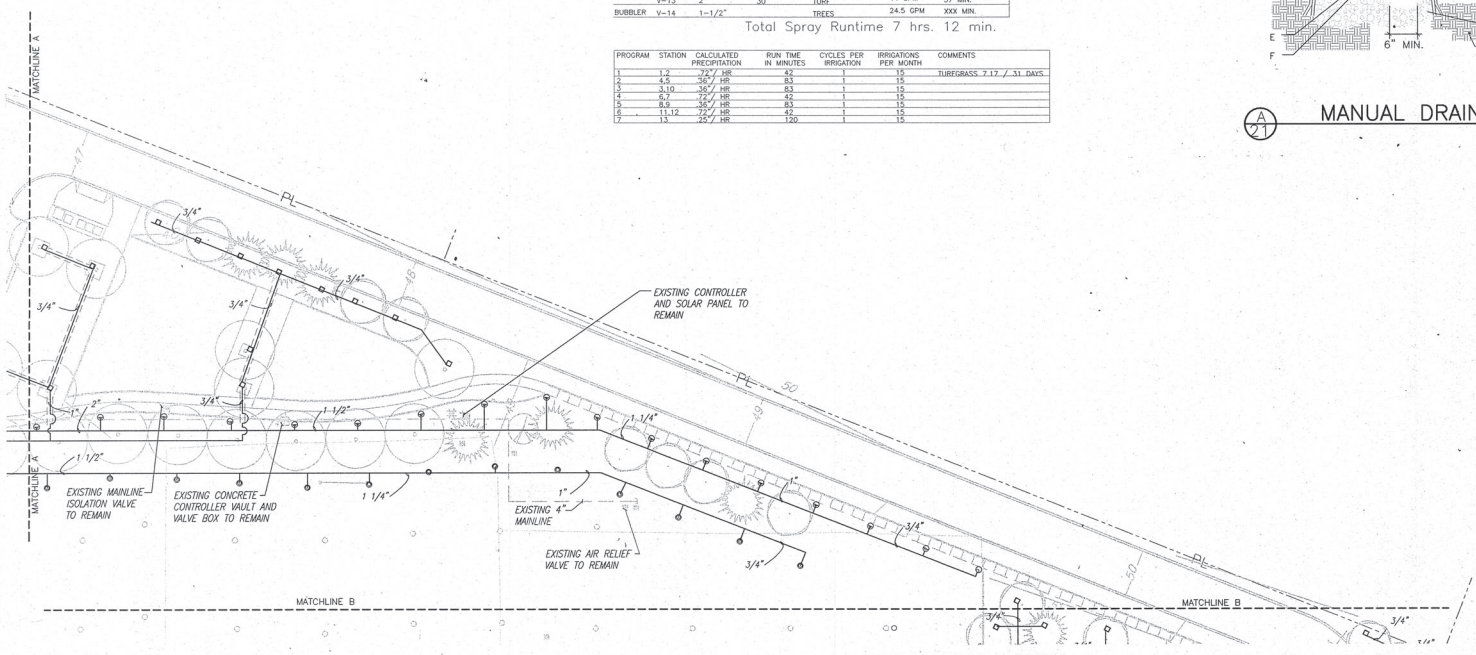
FILE: p:/98192/8192irr.DWG
XREF: p:/98192/8192BS06.DWG

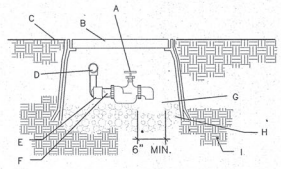
VALVE SCHEDULE

	VALVE NO.	SIZE	NOZZLE/RADIUS	DESCRIPTION	MAX. DEMAND	RUN TIME FOR 1/2" PRECIPITATION
SPRAY	V-1	2"	53'	TURF	40.5 GPM	42 MIN.
	V-2	2"	53'	TURF	40.5 GPM	42 MIN.
	V-3	2"	53'	TURF	42.5 GPM	83 MIN.
	V-4	2"	53'	TURF	42.5 GPM	83 MIN.
	V-5	2"	53'	TURF	42.5 GPM	83 MIN.
	V-6	2"	53'	TURF	34 GPM	42 MIN.
	V-7	2"	53'	TURF	34 GPM	42 MIN.
	V-8	2"	53'	TURF	51 GPM	83 MIN.
	V-9	2"	53'	TURF	42.5 GPM	83 MIN.
	V-10	2"	53'	TURF	51 GPM	83 MIN.
	V-11	2"	53'	TURF	40.5 GPM	42 MIN.
	V-12	2"	53'	TURF	40.5 GPM	42 MIN.
	V-13	2"	30'	TURF	44 GPM	57 MIN.
BUBBLER	V-14	1-1/2"		TREES	24.5 GPM	XXX MIN.

Total Spray Runtime 7 hrs. 12 min.

PROGRAM	STATION	CALCULATED PRECIPITATION	RUN TIME IN MINUTES	CYCLES PER IRRIGATION	IRRIGATIONS PER MONTH	COMMENTS
1	1,2	.72"/ HR	42	1	15	TURFGRASS 7.17 / 31 DAYS
2	4,5	.36"/ HR	83	1	15	
3	3,10	.36"/ HR	83	1	15	
4	6,7	.72"/ HR	42	1	15	
5	8,9	.36"/ HR	83	1	15	
6	11,12	.72"/ HR	42	1	15	
7	13	.25"/ HR	120	1	15	





A MANUAL DRAIN— SEE IRRIGATION LEGEND

B BROCKS PRODUCTS, INC. 1419-16 VALVE BOX WITH BOLT DOWN COVER & ONE 8" EXTENSION

C FINISH GRADE

D MAINLINE OR LATERAL LINE

E THREADED PVC ELL

F GALVANIZED NIPPLE

G BUILD 4" LAYER OF 3/4" GRAVEL

H GRAVEL SLUMP

I COMPACTED SUBGRADE

A/21 MANUAL DRAIN VALVE

NOT TO SCALE

IRRIGATION LEGEND

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IRRIGATION NOTES

1 PRIOR TO SEEDING, CONTRACTOR SHALL PERFORM A WATER AUDIT AS PER THE CITY OF ALBUQUERQUE WATER CONSERVATION ORDINANCE. IRRIGATION SYSTEM MUST HAVE A MINIMUM DISTRIBUTION UNIFORMITY OF 65% AS PER COA WATER ORDINANCE (SECTION 6-1-1-9). RESULTS SHALL BE PROVIDED TO THE OWNER, PRIOR TO PROCEEDING WITH SEEDING OPERATION.

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PLANS ARE DIAGRAMMATIC AND APPROXIMATE DUE TO SCALE OF DRAWINGS. ALL VALVES SHALL BE LOCATED IN PLANTING AREAS WHERE SHOWN AND ALL PIPING SHALL BE INSTALLED PRIOR TO LANDSCAPING OR PAVING WORK. NO TEES, ELLS OR OTHER TURNS IN PIPING SHALL BE LOCATED UNDER PAVING. CAP ALL ENDS HAND TIGHT, PRIOR TO BACKFILL.

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VALVE LEGEND

V5	VALVE NUMBER
2"	VALVE SIZE
53.6	GPM
36V-15	HEAD TYPE

30 15 0 30

SCALE: 1" = 30'

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK BY DATE
INSPECTED BY DATE
APPROVED BY DATE
FIELD DATE
CHECKED BY DATE
DRAWING MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
XXXXXXXXXXXXXXXXXXXXXX

SURVEY INFORMATION
NO. FIELD NOTES BY DATE

LANDSCAPE ARCHITECT'S SEAL
STATE OF NEW MEXICO
THOMAS A. GAY
No. 260
REGISTERED LANDSCAPE ARCHITECT
8-23-00

No.	Date	REMARKS	BY	
		REVISIONS		
		DESIGN		DATE: 8/22/00
Designed By:	TAG			DATE: 8/22/00
Drawn By:	PAA			DATE: 8/22/00
Checked By:	TAG			

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

BULLHEAD PARK
IRRIGATION PLANS

Design Review Committee	City Engineer Approval	Last Design Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No.	Zone Map No.	Sheet	Of
5734.00	M-18	21	25

sites southwest

FILE: p:/98192/8192irr.DWG
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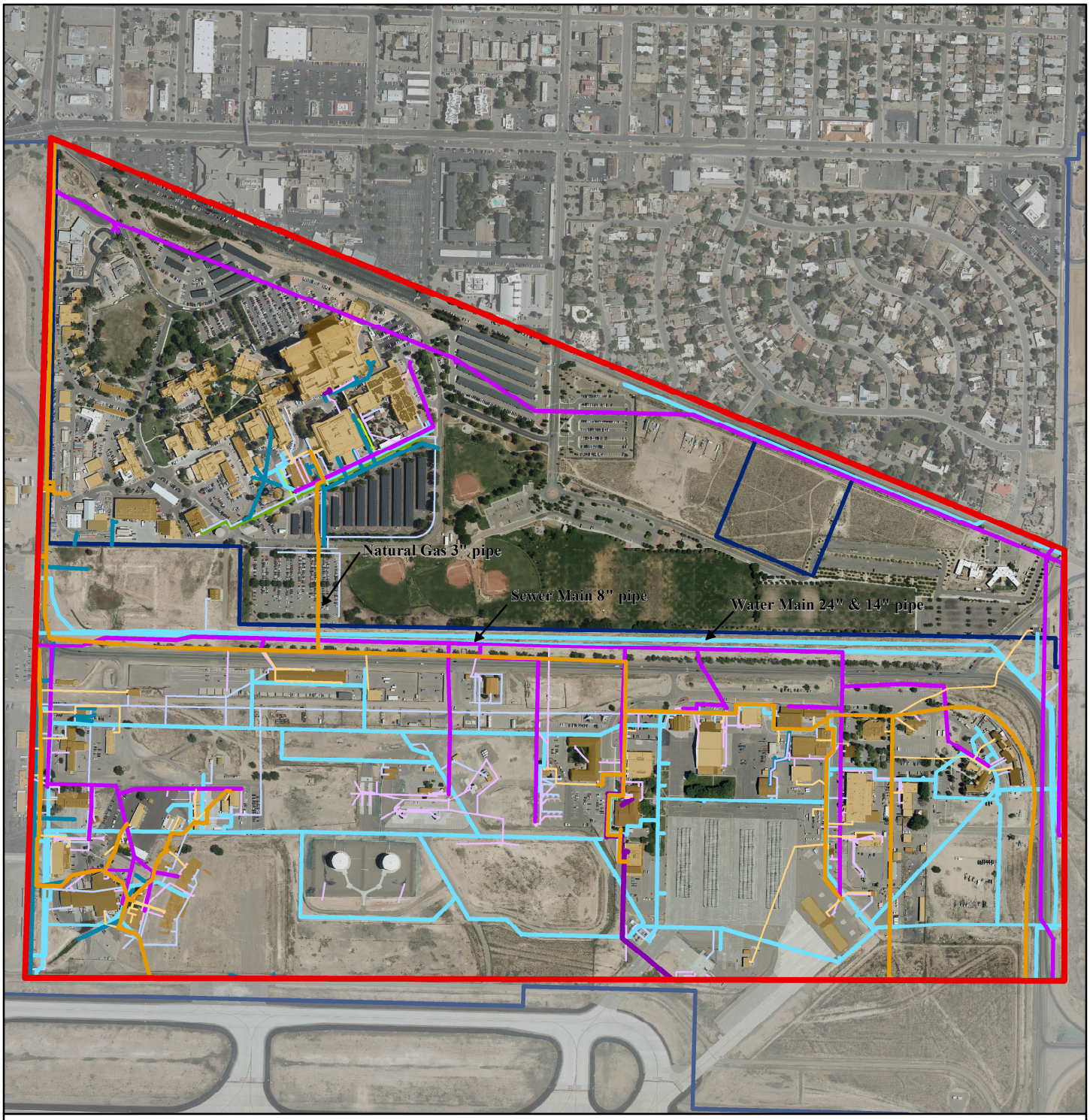

Kirtland AFB

Aera of Interest
Utilities

Scale: 1:9,000

N

Coordinate System: WGS 1984 UTM Zone 13N

Feet

0 750 1,500

Legend

- AreaOfInterest
- Natural Gas Distribution
- Natural Gas Service
- Sewer Main - Pressurized
- Sewer Main - Gravity
- Sewer Service - Gravity
- Stormwater - Gravity
- Water Main
- Water Service
- Steam Main
- Steam Service
- Kirtland AFB Boundary
- Buildings

Prepared By:
Dennis Mccrumb
CSU-CEMML GIS Analyst
Aric.Mccrumb.ctr@us.af.mil
Last Save Date: 12/15/2020

Cooperative Agreement Number:
W9126G-14-2-0018 -
W9126G-20-2-0004

Map created for presentation purposes only. Although efforts have been made to verify data, accuracy cannot be guaranteed

Document Path: C:\work\Projects\KAFB\Restoration\Utilities\KAFB_Utilities_AreaOfInterest.mxd

Table 1
Utility Information

Utility Type	General Location/ Operator	Pipe Diameter (inches)[a]	Approximate Depth (bgs)[b]
Natural Gas Distribution	On Base/KAFB	1.5 - 6.0	18-24 inches
Natural Gas Service	On Base/KAFB	1.5 - 4.0	18-24 inches
Sewer Main- Pressurized	On Base/KAFB	4.0 - 6.0	4-12ft
Sewer Main- Gravity	On Base/KAFB	4.0 -72.0	4-12ft
Sewer Service- Gravity	On Base/KAFB	2.0 - 18.0	2-6ft
Storm Water - Gravity	On Base/KAFB	8.0 - 60.0	2-6ft
Water Main	On Base/KAFB	3.0 - 24.0	2-7ft
Water Service	On Base/KAFB	1.5 - 12.0	2-7ft
Natural Gas Distribution	Off Base	NA	3-6ft
Sewer Main- Gravity	Off Base	NA	6-10ft
Communication Lines	On Base/Off Base	NA	4-5ft
PNM Electrical	Off Base	NA	3-5ft
Water Main	Off Base	NA	2-3ft

Notes

a. Pipe diameters are ranges for each utility depending on the specific segment. All on base pipe diameters are from the Kirtland AFB Geo database

b. Utility depths are based on general construction specifications for the given utility.

Acronyms and Abbreviations

AFB - Air Force Base
bgs - below ground surface
KAFB - Kirtland Air Force Base
NA - Not Available

USPS Tracking®

FAQs >

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Delivered

February 2, 2021 at 12:01 pm
Delivered, Front Desk/Reception/Mail Room
SANTA FE, NM 87505

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SANTA FE, NM 87505

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Delivered

February 3, 2021 at 11:30 am
Delivered, Individual Picked Up at Postal Facility
SANTA FE, NM 87507

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FAQs

APPENDIX B

Historical Benzene Concentrations in off-Base Shallow Soil Vapor Monitoring Points
Fourth Quarter 2020 off-Base Soil Vapor Monitoring Results

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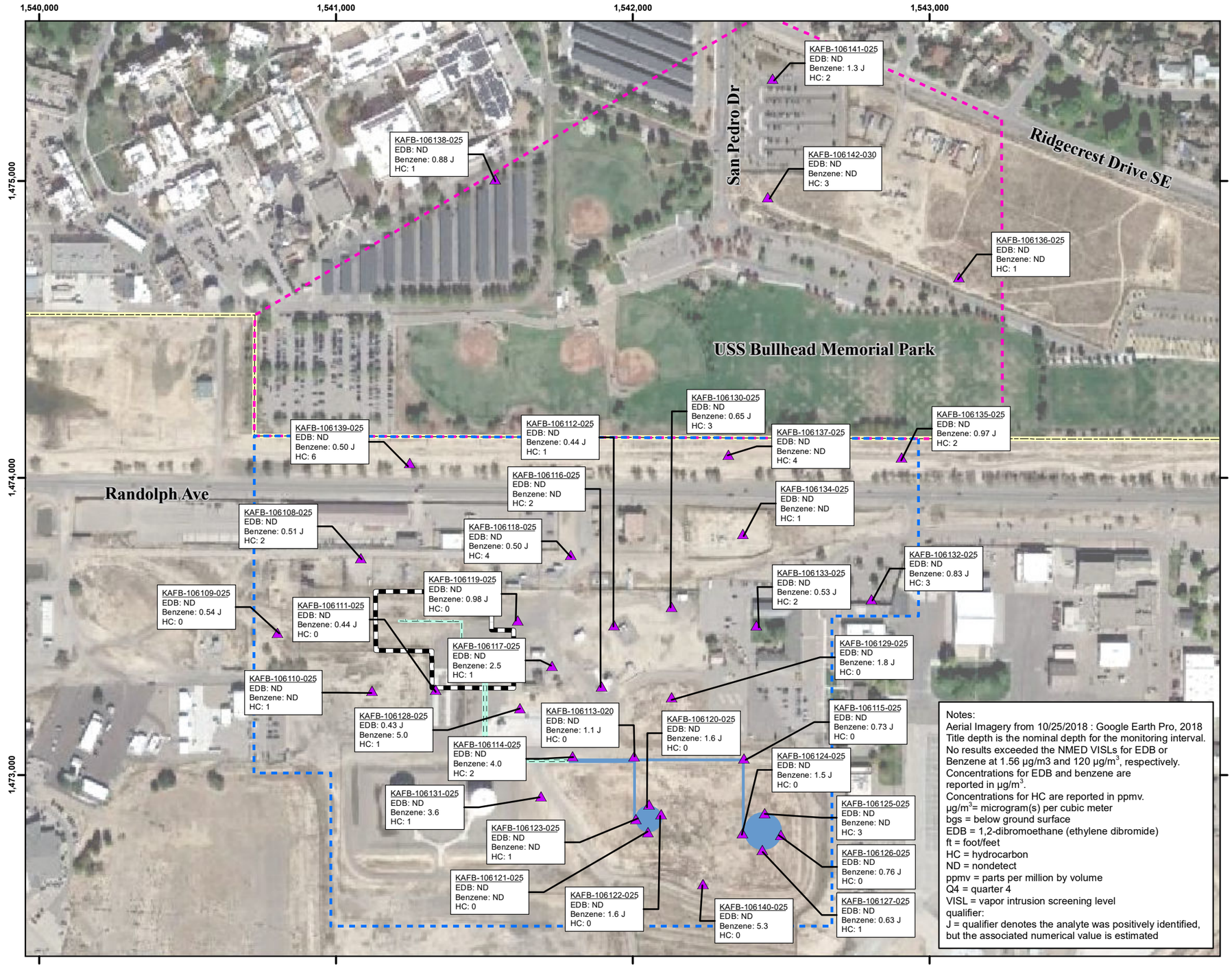


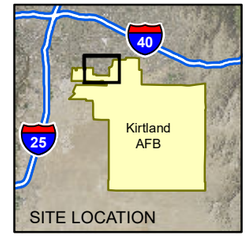
Notes:
Aerial Imagery from 10/25/2018 : Google Earth Pro, 2018
Title depth is the nominal depth for the monitoring interval.
No results exceeded the NMED VISLs for EDB or Benzene at 1.56 µg/m3 and 120 µg/m^3, respectively.
Concentrations for EDB and benzene are reported in µg/m^3.
Concentrations for HC are reported in ppmv.
µg/m^3= microgram(s) per cubic meter
bgs = below ground surface
EDB = 1,2-dibromoethane (ethylene dibromide)
ft = foot/feet
HC = hydrocarbon
ND = nondetect
ppmv = parts per million by volume
Q4 = quarter 4
VISL = vapor intrusion screening level
qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated

Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source Area
- Source Area



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
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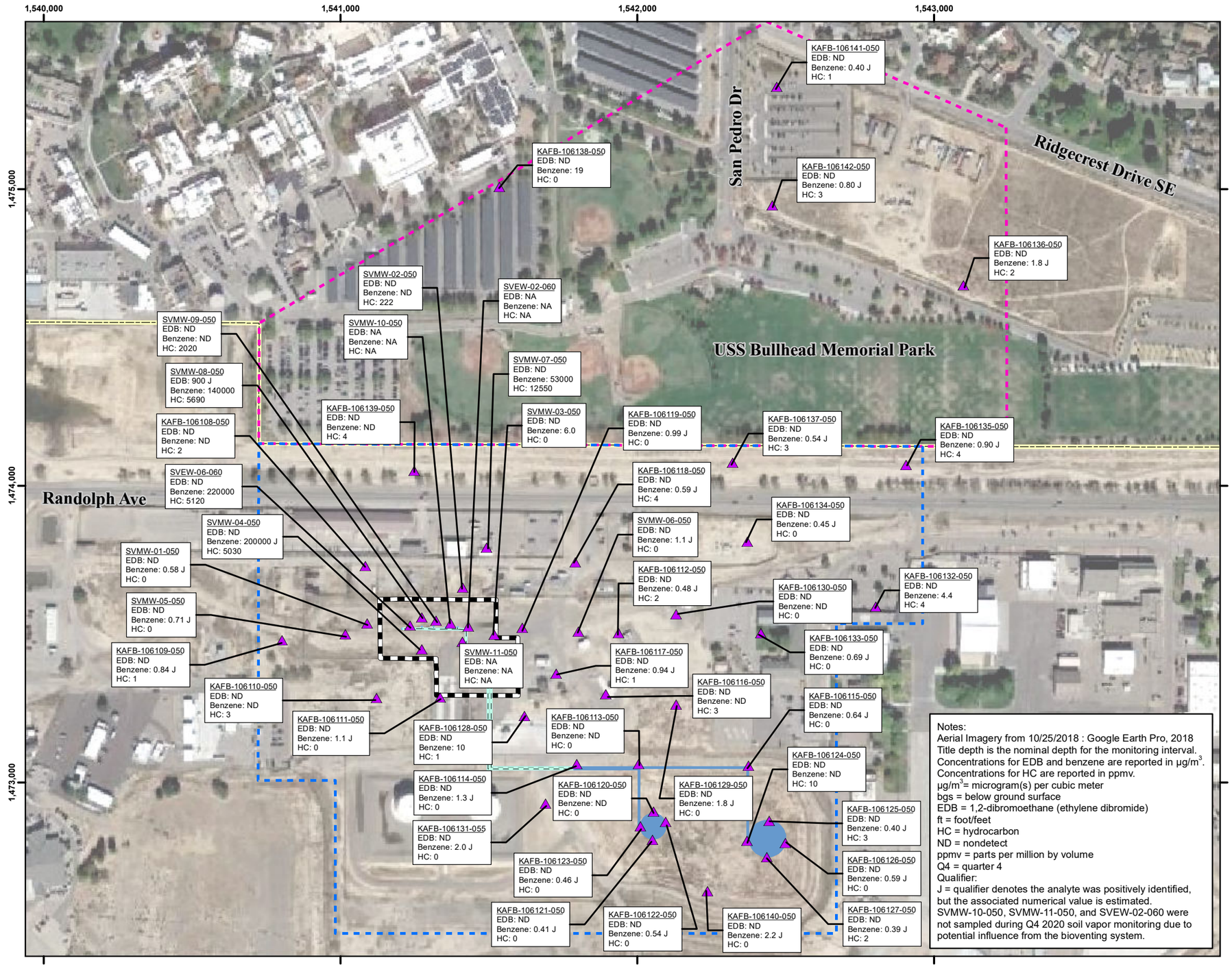
FIGURE B-1

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 25 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-2 Benzene_EDB_HC_Conc_25ft_Q420.mxd 3/25/2021 EA ecarpio

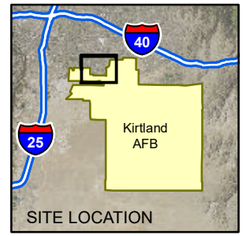


Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source Area
- Source Area



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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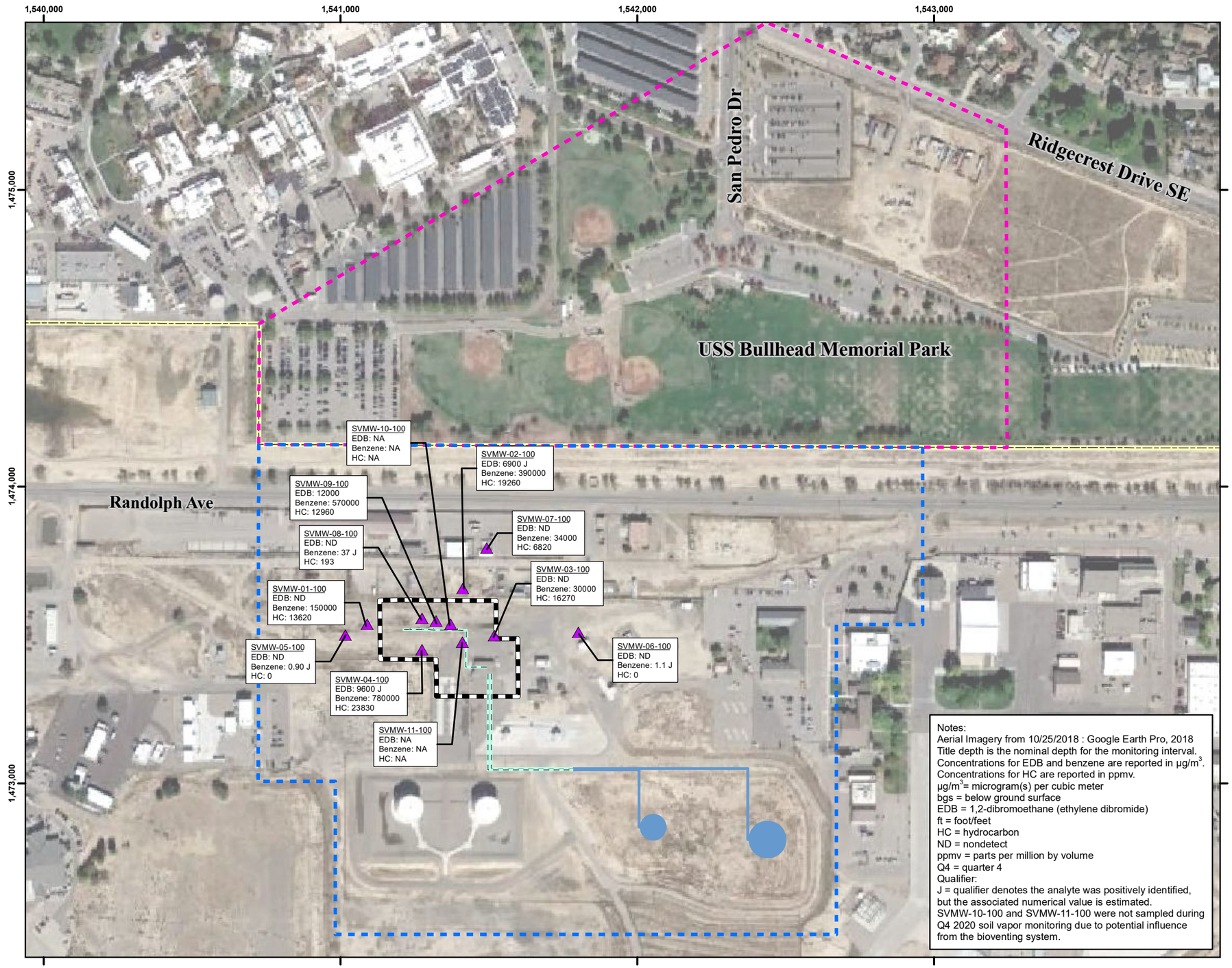
FIGURE B-2

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 50 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-3 Benzene_EDB_HC_Conc_50ft_Q420.mxd 3/16/2021 EA ecarpio



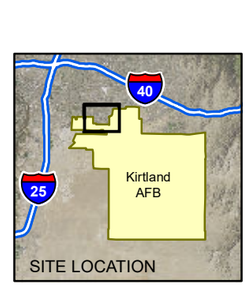
Notes:
Aerial Imagery from 10/25/2018 : Google Earth Pro, 2018
Title depth is the nominal depth for the monitoring interval.
Concentrations for EDB and benzene are reported in $\mu g/m^3$.
Concentrations for HC are reported in ppmv.
$\mu g/m^3$= microgram(s) per cubic meter
bgs = below ground surface
EDB = 1,2-dibromoethane (ethylene dibromide)
ft = foot/feet
HC = hydrocarbon
ND = nondetect
ppmv = parts per million by volume
Q4 = quarter 4
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
SVMW-10-100 and SVMW-11-100 were not sampled during Q4 2020 soil vapor monitoring due to potential influence from the bioventing system.

Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source
- Source



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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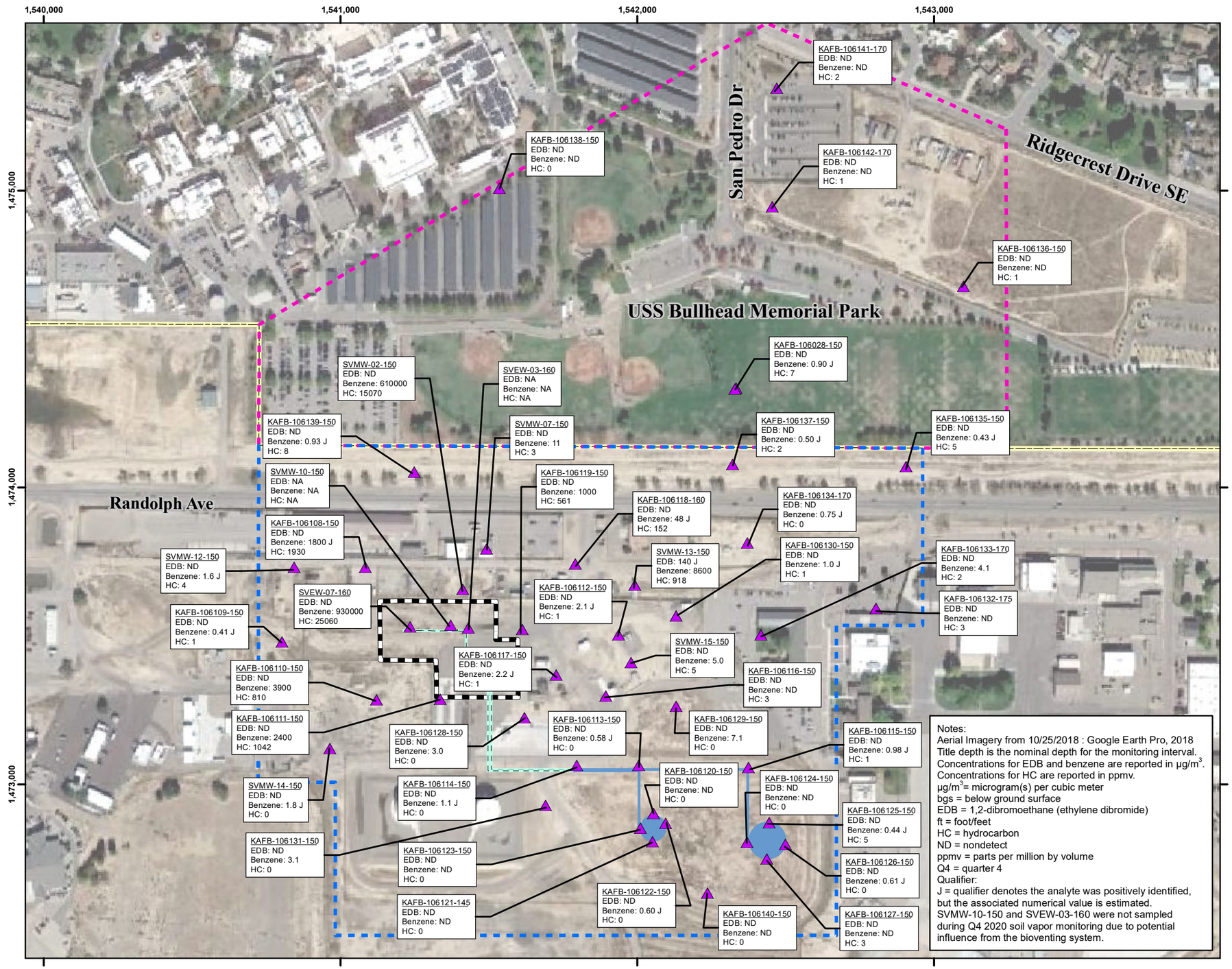
FIGURE B-3

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 100 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-4 Benzene_EDB_HC_Conc_100ft_Q420.mxd 3/16/2021 EA ecarpio



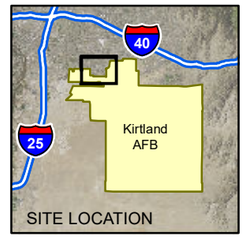
Notes:
Aerial Imagery from 10/25/2018 : Google Earth Pro, 2018
Title depth is the nominal depth for the monitoring interval.
Concentrations for EDB and benzene are reported in µg/m^3.
Concentrations for HC are reported in ppmv.
µg/m^3= microgram(s) per cubic meter
bgs = below ground surface
EDB = 1,2-dibromoethane (ethylene dibromide)
ft = foot/feet
HC = hydrocarbon
ND = nondetect
ppmv = parts per million by volume
Q4 = quarter 4
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
SVMW-10-150 and SVEW-03-160 were not sampled during Q4 2020 soil vapor monitoring due to potential influence from the bioventing system.

Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source
- Source



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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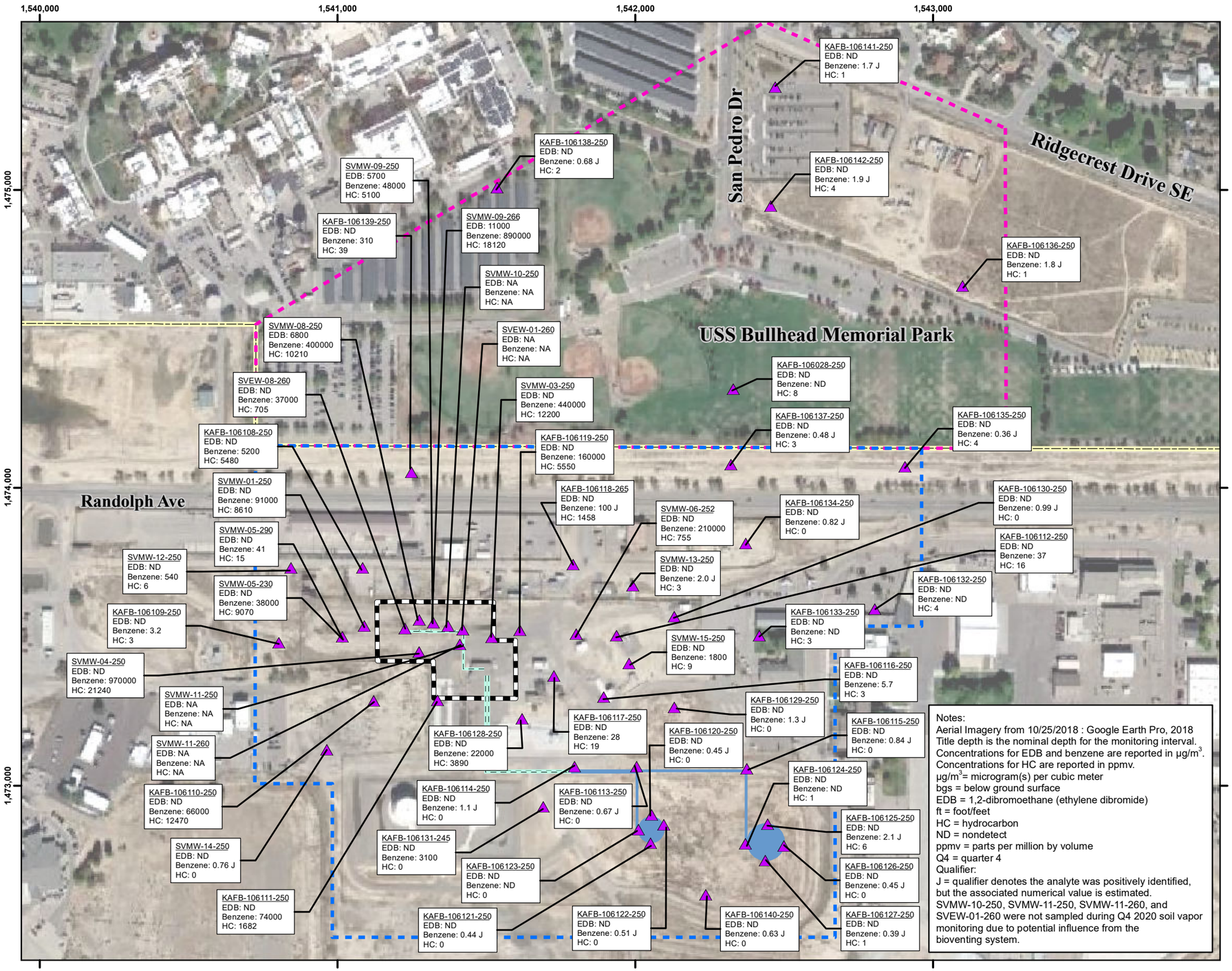
FIGURE B-4

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 150 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-5 Benzene_EDB_HC_Conc_150ft_Q420.mxd 3/16/2021 EA ecarpio

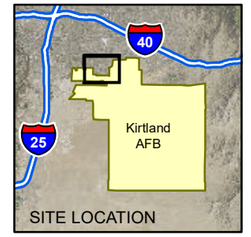


Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source
- Source Area



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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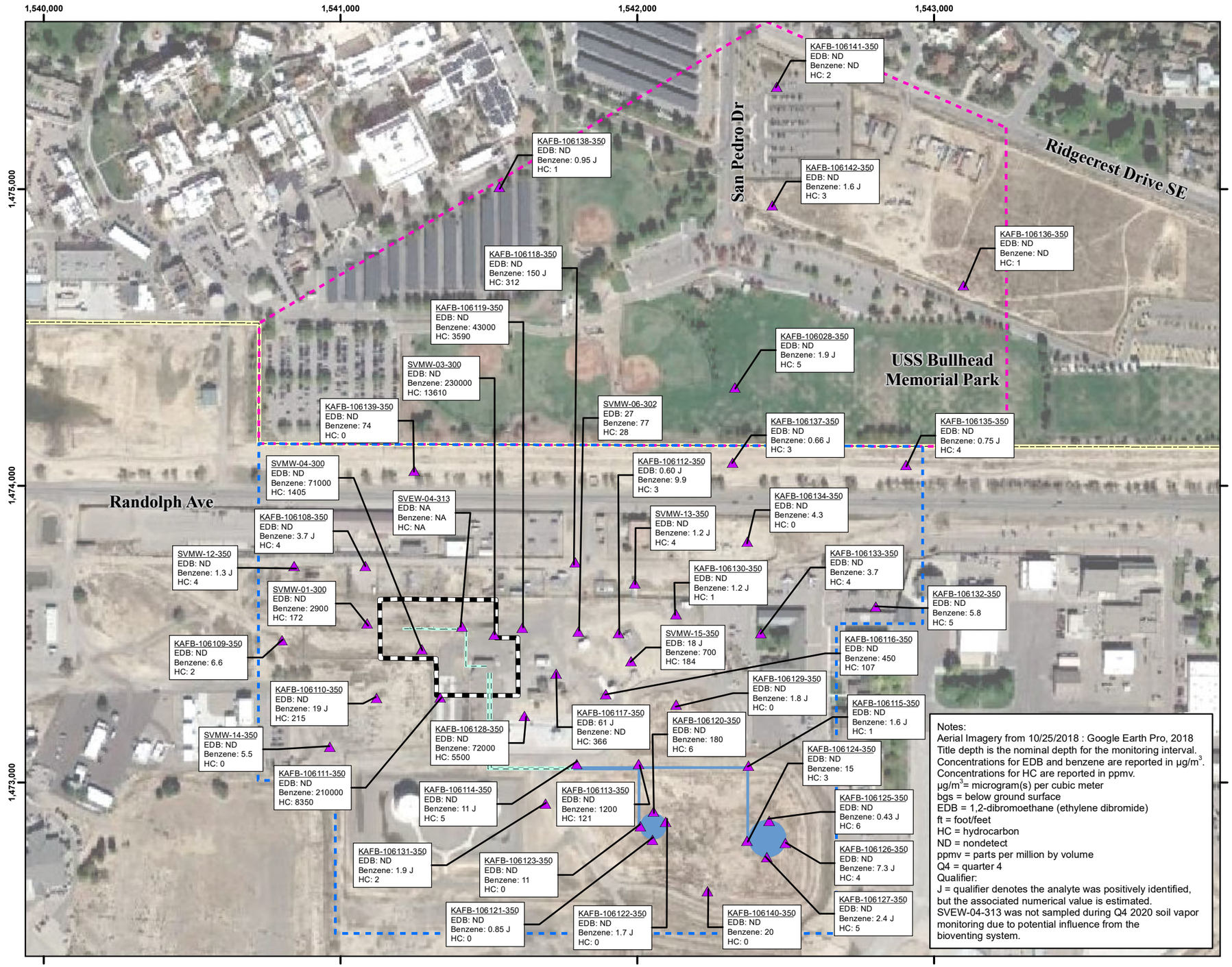
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE B-5

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 250 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-6 Benzene_EDB_HC_Conc_250ft_Q420.mxd 3/16/2021 EA ecarpio

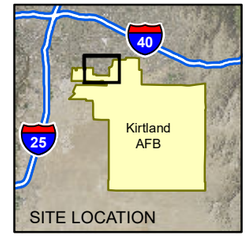


Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source Area
- Source Area



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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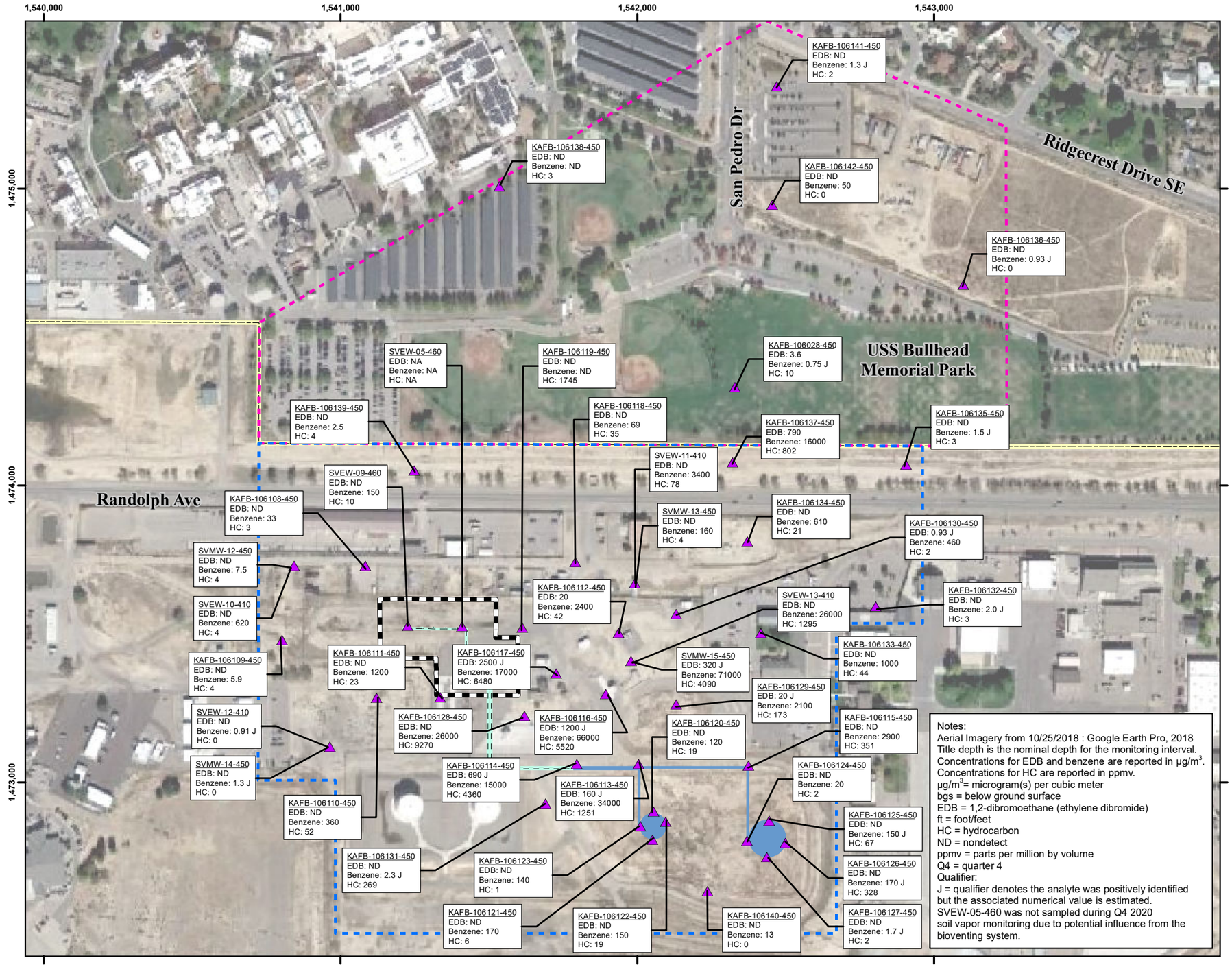
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE B-6

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 350 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-7 Benzene_EDB_HC_Conc_350ft_Q420.mxd 3/16/2021 EA ecarpio

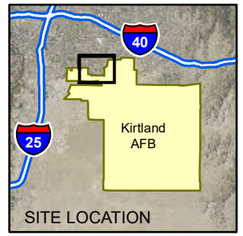


Legend

- Soil Vapor Monitoring Point
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Boundary

Area of Interest

- Off-Base
- On-Base Outside of Source Area
- Source Area



N

0 175 350 700

Feet

1 inch = 350 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

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SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE B-7

BENZENE, EDB, AND HC CONCENTRATIONS IN SOIL VAPOR IN THE SOURCE AREA PLUME AT 450 FT BGS, Q4 2020

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 3 New\3-8 Benzene_EDB_HC_Conc_450ft_Q420.mxd 3/16/2021 EA ecarpio

Table B-1
EDB and Benzene Concentrations in Off-Base Soil Vapor Monitoring Points All Depths, Q4 2020

	Location ID:		NMED	KAFB-106028-150			KAFB-106028-250			KAFB-106028-350			KAFB-106028-450			KAFB-106136-025			KAFB-106136-050			KAFB-106136-150			KAFB-106136-250			KAFB-106136-350	
	Field Sample ID:		Residential	SV028-150-204			SV028-250-204			SV028-350-204			SV028-450-204			SV136-025-204			SV136-050-204			SV136-150-204			SV136-250-204			SV136-350-204	
	Sample Date:		Soil Gas VISL[1]	10/5/2020			10/5/2020			10/5/2020			10/5/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020	
	Sample Type:			REG			REG			REG			REG			REG			REG			REG			REG			REG	
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**
TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	1.3	ND	U	0.81	ND	U	1.2	**3.6**	--	0.91	ND	U	0.85	ND	U	0.8	ND	U	0.86	ND	U	0.87	ND	U
	Benzene	ug/m^3	1.20E+02	0.9	J	1.3	ND	U	0.81	1.9	J	1.2	0.75	J	0.91	ND	U	0.85	1.8	J	0.8	ND	U	0.86	1.8	J	0.87	ND	U

Notes, Acronyms, and Abbreviations
µg/m^3 = microgram per cubic meter
AFB = Air Force Base
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold = detected concentrations above the VISL
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the limit of detection.
-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-1
EDB and Benzene Concentrations in Off-Base Soil Vapor Monitoring Points All Depths, Q4 2020

	Location ID:		NMED	)	KAFB-106136-450			KAFB-106138-025			KAFB-106138-050			KAFB-106138-150			KAFB-106138-150			KAFB-106138-250			KAFB-106138-350			KAFB-106138-450			KAF
	Field Sample ID:		Residential		SV136-450-204			SV138-025-204			SV138-050-204			SV138-150-204			SV138-150-604			SV138-250-204			SV138-350-204			SV138-450-204			SV
	Sample Date:		Soil Gas VISL[1]		10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			
	Sample Type:				REG			REG			REG			REG			FD			REG			REG			REG			
Analytical Method	**Analyte**	**Units**		**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**
TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	0.81	ND	U	0.8	ND	U	0.82	ND	U	0.82	ND	U	0.79	ND	U	0.82	ND	U	0.78	ND	U	0.81	ND	U	0.77	ND
	Benzene	ug/m^3	1.20E+02	0.81	0.93	J	0.8	0.88	J	0.82	19	--	0.82	ND	U	0.79	ND	U	0.82	0.68	J	0.78	0.95	J	0.81	ND	U	0.77	1.3

Notes, Acronyms, and Abbreviations
µg/m^3 = microgram per cubic meter
AFB = Air Force Base
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold = detected concentrations above the VISL
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the limit of detection.
-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-1
EDB and Benzene Concentrations in Off-Base Soil Vapor Monitoring Points All Depths, Q4 2020

	Location ID:		NMED	B-106141-025		KAFB-106141-050			KAFB-106141-170			KAFB-106141-250			KAFB-106141-350			KAFB-106141-450			KAFB-106142-030			KAFB-106142-050			KAFB-106142-170		
	Field Sample ID:		Residential	141-025-204		SV141-050-204			SV141-170-204			SV141-250-204			SV141-350-204			SV141-450-204			SV142-030-204			SV142-050-204			SV142-170-204		
	Sample Date:		Soil Gas VISL[1]	10/6/2020		10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/6/2020			10/5/2020			10/5/2020			10/5/2020		
	Sample Type:			REG		REG			REG			REG			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	U	0.74	ND	U	0.77	ND	U	0.76	ND	U	0.78	ND	U	0.91	ND	U	0.78	ND	U	0.83	ND	U	0.82	ND	U	1.1
	Benzene	ug/m^3	1.20E+02	J	0.74	0.4	J	0.77	ND	U	0.76	1.7	J	0.78	ND	U	0.91	1.3	J	0.78	ND	U	0.83	0.8	J	0.82	ND	U	1.1

Notes, Acronyms, and Abbreviations
µg/m^3 = microgram per cubic meter
AFB = Air Force Base
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold = detected concentrations above the VISL
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the limit of detection.
-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-1
EDB and Benzene Concentrations in Off-Base Soil Vapor Monitoring Points All Depths, Q4 2020

	Location ID:		NMED	KAFB-106142-170			KAFB-106142-250			KAFB-106142-350			KAFB-106142-450		
	Field Sample ID:		Residential	SV142-170-604			SV142-250-204			SV142-350-204			SV142-450-204		
	Sample Date:		Soil Gas VISL[1]	10/5/2020			10/5/2020			10/5/2020			10/5/2020		
	Sample Type:			FD			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.81	ND	U	0.69	ND	U	0.82	ND	U	0.82
	Benzene	ug/m^3	1.20E+02	2.4	J	0.81	1.9	J	0.69	1.6	J	0.82	50	--	0.82

Notes, Acronyms, and Abbreviations
µg/m^3 = microgram per cubic meter
AFB = Air Force Base
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold = detected concentrations above the VISL
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the limit of detection.
-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED	KAFB-106108-025			KAFB-106109-025			KAFB-106110-025			KAFB-106111-025			KAFB-106112-025			KAFB-106113-020			KAFB-106114-025		
	Field Sample ID:		Residential	SV108-025-204			SV109-025-204			SV110-025-204			SV111-025-204			SV112-025-204			SV113-020-204			SV114-025-204		
	Sample Date:		Soil Gas	10/19/2020			10/13/2020			10/13/2020			10/6/2020			10/19/2020			10/13/2020			10/6/2020		
	Sample Type:		VISL[1]	REG			REG			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.78	ND	U	0.69	ND	U	0.69	ND	U	0.87	ND	U	0.78	ND	U	0.99	ND	U	1.2
	Benzene	ug/m^3	1.20E+02	0.51	J	0.78	0.54	J	0.69	ND	U	0.69	0.44	J	0.87	0.44	J	0.78	1.1	J	0.99	4	--	1.2

Notes, Acronyms, and Abbreviations

µg/m^3 = microgram per cubic meter
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ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold = detected concentrations above the VISL
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the limit of
-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED	KAFB-106115-025			KAFB-106115-025			KAFB-106116-025			KAFB-106117-025			KAFB-106118-025			KAFB-106119-025			KAFB-106120-025		
	Field Sample ID:		Residential	SV115-025-204			SV115-025-604			SV116-025-204			SV117-025-204			SV118-025-204			SV119-025-204			SV120-025-204		
	Sample Date:		Soil Gas	10/13/2020			10/13/2020			10/6/2020			10/6/2020			10/19/2020			10/20/2020			10/12/2020		
	Sample Type:		VISL[1]	REG			FD			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.79	ND	U	0.84	ND	U	0.82	ND	U	0.72	ND	U	0.82	ND	U	0.89	ND	U	0.79
	Benzene	ug/m^3	1.20E+02	0.73	J	0.79	1.9	J	0.84	ND	U	0.82	2.5	--	0.72	0.5	J	0.82	0.98	J	0.89	1.6	J	0.79

Notes, Acronyms, and Abbreviations

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VOC = volatile organic compound
Shading = detected concentrations above the detection limit
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Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
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-- = Validation qualifier not assigned.

Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED	KAFB-106120-025			KAFB-106121-025			KAFB-106122-025			KAFB-106123-025			KAFB-106124-025			KAFB-106125-025			KAFB-106126-025		
	Field Sample ID:		Residential	SV120-025-604			SV121-025-204			SV122-025-204			SV123-025-204			SV124-025-204			SV125-025-204			SV126-025-204		
	Sample Date:		Soil Gas	10/12/2020			10/12/2020			10/12/2020			10/12/2020			10/5/2020			10/5/2020			10/20/2020		
	Sample Type:		VISL[1]	FD			REG			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.71	ND	U	0.74	ND	U	0.91	ND	U	0.77	ND	U	0.75	ND	U	1.3	ND	U	0.79
	Benzene	ug/m^3	1.20E+02	0.85	J	0.71	ND	U	0.74	1.6	J	0.91	ND	U	0.77	1.5	J	0.75	ND	U	1.3	0.76	J	0.79

Notes, Acronyms, and Abbreviations

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ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
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Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
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Results for additional TO-15 analytes are included in the Periodic Monitoring Report –October–December 2020 and Annual Report for 2020 Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111 Kirtland Air Force Base, New Mexico. March.

Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED	KAFB-106127-025			KAFB-106128-025			KAFB-106129-025			KAFB-106130-025			KAFB-106131-025			KAFB-106132-025			KAFB-106133-025		
	Field Sample ID:		Residential	SV127-025-204			SV128-025-204			SV129-025-204			SV130-025-204			SV131-025-204			SV132-025-204			SV133-025-204		
	Sample Date:		Soil Gas	10/5/2020			10/6/2020			10/19/2020			10/20/2020			10/19/2020			10/12/2020			10/6/2020		
	Sample Type:		VISL[1]	REG			REG			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.78	0.43	J	0.86	ND	U	0.79	ND	U	0.93	ND	U	0.89	ND	U	0.83	ND	U	0.88
	Benzene	ug/m^3	1.20E+02	0.63	J	0.78	5	--	0.86	1.8	J	0.79	0.65	J	0.93	3.6	--	0.89	0.83	J	0.83	0.53	J	0.88

Notes, Acronyms, and Abbreviations

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REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
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J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
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Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED	KAFB-106134-025			KAFB-106135-025			KAFB-106136-025			KAFB-106137-025			KAFB-106138-025			KAFB-106139-025			KAFB-106140-025		
	Field Sample ID:		Residential	SV134-025-204			SV135-025-204			SV136-025-204			SV137-025-204			SV138-025-204			SV139-025-204			SV140-025-204		
	Sample Date:		Soil Gas	10/12/2020			10/12/2020			10/6/2020			10/12/2020			10/6/2020			10/12/2020			10/12/2020		
	Sample Type:		VISL[1]	REG			REG			REG			REG			REG			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.79	ND	U	0.75	ND	U	0.85	ND	U	1.2	ND	U	0.82	ND	U	0.74	ND	U	0.78
	Benzene	ug/m^3	1.20E+02	ND	U	0.79	0.97	J	0.75	ND	U	0.85	ND	U	1.2	0.88	J	0.82	0.5	J	0.74	5.3	--	0.78

Notes, Acronyms, and Abbreviations

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REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
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Table B-2
Results of EDB and Benzene Soil Vapor Monitoring Data in the 25-foot Nominal Depth Horizon On-Base and Off-Base, Q4 2020

	Location ID:		NMED Residential Soil Gas VISL[1]	KAFB-106141-025			KAFB-106142-030		
	Field Sample ID:			SV141-025-204			SV142-030-204		
	Sample Date:			10/6/2020			10/5/2020		
	Sample Type:			REG			REG		
Analytical Method	**Analyte**	**Units**		**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EPA Method TO-15	1,2-dibromoethane	ug/m^3	1.56E+00	ND	U	0.74	ND	U	0.83
	Benzene	ug/m^3	1.20E+02	1.3	J	0.74	ND	U	0.83

Notes, Acronyms, and Abbreviations

µg/m^3 = microgram per cubic meter
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ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
ND = not detected
REG = normal field sample
Val Qual = validation qualifier
VOC = volatile organic compound
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APPENDIX C

Field Forms

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HazAir

Field Activity Log

Job Number:	Task Description:	Date:

Weather:	Important Notes:	Onsite Employees:	Visitors:

Name:	Signature:	Date:

HazAir

Field Activity Log (Continuation)

Page_____of _____

Job Number:	Task Description:	Date:

HazAir

Well Integrity Checklist

Well ID: _____
Date: _____
Time: _____

Before Opening Well

1. Is well cement pad in good condition? _____
2. Is lid securely tightened to vault? _____
3. Is well clearly labeled? _____
4. Do wells outside of BFF have security bolts? _____
5. Photograph well.

After Removing Lid Before Sampling Well

1. Is gasket worn or damaged? _____
2. Is vault flooded? _____
3. Are ports capped/labeled? _____
4. Are ports angled correctly? _____
5. Are all fittings and quick connects intact and operational?

   _____

6. Can you hear well breathing? _____
7. Photograph well with lid off.

During Sampling

1. Do all tubing connects fit securely to sample system? _____
2. Does static pressure after purging return to initial static pressure within one minute?

   _____

3. Is well clogged? _____

Comments: _____

_____

Inspector's Name: _____

Inspector's Signature: _____

HazAir

Field Gas Detector Calibration Sheet

Instrument type and ID #: ___

	Known Gas Mixture			Calibrationl Reading			
Date/Time	TIVC(ppm)	% CO2	% O2*	TIVC (ppm)	% CO2	% O2*	Initials
	100	35	20.9				

* = Atmospheric %O2 Concentrations

HazAir

Leak Test Log

Date	Initial Vacuum Reading	Time	Vacuum Reading After 2 Min.*	Time	Initials

*Min Minutes

HazAir

Sample Collection Log

Date: _____

Time: _____

Project No.: _____

Project Name: _____

Sample No.: _____

Sample Location: _____

Sample Type: _____

Composite: (Y/N) _____

Sample Team: _____

Trip Blank: _____

Sample: _____

Analytical Suite	Preservative	Container	TAT	Initials

Comments: _____

_____

_____

_____

_____

_____

Logged by: _____ Reviewed by: _____