AMBIENT AIR MONITORING NETWORK PLAN

2025

STATE OF NEVADA
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY PLANNING

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Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
AQS	Air Quality System
BAQP	Bureau of Air Quality Planning
BAM	Beta Attenuation Monitor
CBSA	Core-Based Statistical Area
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CSA	Combined Statistical Area
DRR	Data Requirement Rule
FEM	Federal Equivalent Method
FR	Federal Register
FRM	Federal Reference Method
IMPROVE	Interagency Monitoring of Protected Visual Environments
LMP	Limited Maintenance Plan
MADT	Monthly Average Daily Traffic
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NDEP	Nevada Division of Environmental Protection
NEI	National Emissions Inventory
NO_2	Nitrogen Dioxide
O_3	Ozone
OAQPS	Office of Air Quality Planning and Standards
Pb	Lead
PM	Particulate Matter (2.5 or 10 microns)
POC	Pollutant Occurrence Code
PWEI	Population Weighted Emission Index
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
SPMS	Special Purpose Monitoring Station
TEOM	Tapered Oscillating Microbalance Monitor
TRI	Toxics Release Inventory
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

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Overview

The monitoring program of the Nevada Division of Environmental Protection Bureau of Air Quality Planning (NDEP-BAQP) operates an ambient air quality monitoring network of gaseous and particulate pollutant monitors in communities throughout Nevada. In the metropolitan areas of Reno and Las Vegas, the Northern Nevada Public Health, Air Quality Management Division and the Clark County Department of Environment and Sustainability, Division of Air Quality operate and maintain their respective monitoring networks separate from the NDEP-BAQP. Those agencies submit their Network Plans independently to the United States Environmental Protection Agency (USEPA). There are also several federally recognized tribes that conduct air monitoring within Nevada; these tribes submit their Annual Network Plans directly to the USEPA.

The NDEP Bureaus of Air Quality Planning and Air Pollution Control regulate air quality in Nevada to protect public health and the environment. Monitoring data is a crucial component of regulations used to determine compliance with the USEPA primary and secondary air quality standards. Other important uses of monitoring data include support and issuance of air quality forecasts; support of long-term health assessments; and tracking long-term air quality both to gauge effectiveness of emission control and abatement strategies, and to quantify accuracy of ambient pollutant monitoring.

Goals

The NDEP-BAQP created an ambient air quality monitoring program to provide useful and accurate information on air quality, which is used to evaluate the success of Nevada's air quality programs. The Clean Air Act of 1970 and subsequent amendments require the USEPA to define national ambient air quality standards (NAAQS) for various air pollutants necessary to protect the public from injurious pollution concentrations. Air pollution concentrations that exceed the NAAQS can cause a public health hazard, and/or cause damage to flora, fauna, and personal property.

The NAAQS, published by the USEPA, can be found in Title 40 of the Code of Federal Regulations (CFR) Part 50. The NAAQS for each pollutant define the levels of air quality necessary to protect human health and welfare. An area is considered to be in nonattainment for a pollutant if it has violated the NAAQS for that pollutant. The CFR includes procedures for evaluating measured air quality against the NAAQS. State ambient air quality standards can be found in Nevada Administrative Code 445B.22097.

Background

The State of Nevada has four jurisdictions that independently manage their own air programs as designated by statute: Department of Conservation and Natural Resources, NDEP-BAQP; Northern Nevada Public Health, Air Quality Management Division; Clark County Department of Environment and Sustainability, Division of Air Quality; and various tribal agencies.

State agencies that conduct ambient air monitoring using State and Local Air Monitoring Stations (SLAMS) or Special Purpose Monitoring Stations (SPMS) must use Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) that comply with federal quality assurance requirements listed in 40 CFR 58, Appendix A. In conjunction with the Network Plan, a NDEP-BAQP quality assurance project plan (QAPP) was developed to form the framework for planning, implementing, assessing, and reporting work performed by the NDEP-BAQP and for implementing quality assurance and quality control protocols.

The QAPP defines the policies, procedures, specifications, standards, and documentation necessary to 1) provide data of adequate quality to meet monitoring objectives, and 2) minimize loss of air quality data due to malfunctions or out-of-control conditions. Along with the QAPP, the Quality Management Plan (QMP) describes the organizational structure; functional responsibilities of management and staff; lines of authority; and required interfaces between planning, implementing, assessing, and reporting activities involving environmental data operations. The latest QAPP was approved in August 2024. An updated QMP will be submitted to the USEPA in summer 2025.

Additionally, the NDEP-BAQP has developed ambient monitoring guidelines in order to ensure that ambient air quality data collected at regulated facilities in the State are of the highest quality and conform to federal requirements for quality assurance listed under 40 CFR 58.

Ambient air quality monitoring data must be certified annually as accurate and complete. The certification process begins with the complete submittal of all SLAMS data to the federal Air Quality System (AQS) for the calendar year. The 2023 data was submitted for certification in April 2024 and the 2024 data was submitted April 2025. Submittal of precision and accuracy data into AQS for 2023 and 2024 was accomplished at least quarterly as per 40 CFR 58.16(a).

Network Design

Air quality monitoring is represented by eleven ambient air quality monitoring stations under the jurisdiction of the NDEP-BAQP. Table 1 shows the locations and types of monitors operated by NDEP.

Table 1. NDEP's Ambient Air Monitoring Network

Location	Ozone	PM_{10}	$PM_{2.5}$
Elko		1 (SLAMS)	
Fallon	1 (SLAMS)		
Fernley	1 (SLAMS)		
Carson City Armory	1 (SLAMS)		2 (SLAMS)
Pahrump-Church		1 (SLAMS)	
Pahrump-Manse Elementary		1 (SLAMS)	
Pahrump-Glen Oaks		1 (SLAMS)	
Pahrump-Linda		1 (SLAMS)	
Gardnerville Ranchos			1 (SPMS)
Total	**3**	**5**	**3**

SLAMS – State and Local Air Monitoring Station
SPMS – Special Purpose Monitoring Station

NDEP-BAQP also operates and maintains three meteorological stations; one in Carson City, one in Pahrump, and one mobile tower that can be deployed at locations throughout the State. These meteorological stations are used to confirm local meteorological data.

In addition to the four independent monitoring networks managed by state and local agencies, air quality monitoring is conducted through the Interagency Monitoring of Protected Visual

Environments (IMPROVE) network by the federal land management agencies. There are two IMPROVE monitoring sites in Nevada; one in the Jarbidge Wilderness area and the other at Great Basin National Park, Lehman Caves. The IMPROVE program is a cooperative measurement effort governed by a steering committee composed of representatives from federal and regional-state organizations. The IMPROVE monitoring program was established in 1985 to aid in the creation of state and federal implementation plans for the protection of visibility in federal Class I areas. To meet the site objectives, the IMPROVE site must meet the methodologies and quality assurance and quality control (QA/QC) procedures approved by the USEPA Regional Administrator. Utilizing the criteria set for the Jarbidge site, in cooperation with the U.S. Forest Service, the NDEP-BAQP is able to satisfy the USEPA's regional and transport monitoring requirements. According to 40 CFR Part 58 Appendix D 4.7.3, "each state shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and regional transport." The NDEP-BAQP utilizes the Jarbidge site to meet this particular requirement.

Minimum Monitoring Requirements

The USEPA provides minimum site requirements to monitor for ozone (O_3) and particulate matter (PM) based on metropolitan statistical area (MSA) population (40 CFR Part 58, Appendix D). The NDEP-BAQP's air monitoring network meets or, in most cases, exceeds the minimum network requirements. The monitors currently operating in the NDEP-BAQP monitoring network are located in Carson City (O_3, $PM_{2.5}$), Fallon (O_3), Fernley (O_3), Pahrump (PM_{10}), Elko (PM_{10}), and Gardnerville ($PM_{2.5}$). Based on the MSA population in Carson City, NDEP-BAQP is required to and operates one ozone monitor and two $PM_{2.5}$ monitors. The four PM_{10} monitoring sites in Pahrump were originally established through a Memorandum of Understanding between the NDEP, USEPA, Nye County, and the Town of Pahrump.

According to 40 CFR Part 58 Appendix D, Tables D-4 and D-5, sections 4.2, 4.3.2, 4.3.3, 4.4.2, 4.5, and based on the 2010 Revisions to Lead [Pb] Ambient Air Monitoring Requirements (75 Federal Register [FR] 81126 (Dec. 27, 2010)), 2010 Sulfur Dioxide [SO_2] NAAQS Final Rule (75 FR 35520 (June 22, 2010)), and the 2010 Nitrogen Dioxide [NO_2] NAAQS Final Rule (75 FR 6474, 6502-6517 (Feb. 9, 2010), *as revised by* 78 FR 16184 (Mar. 14, 2013), the NDEP-BAQP is not required to have additional monitoring for these criteria pollutants. Specifically:

- The revised monitoring requirements for the Pb NAAQS now require Pb monitoring near sources such as industrial facilities that emit one-half ton or more of Pb per year and at NCORE sites in Core Based Statistical Areas (CBSA) with populations greater than 500,000 (75 FR 81126 [Dec. 27, 2010]). In 2023, in NDEP-BAQP's jurisdiction, BAQP was made aware of two sources that emit one-half ton or more of Pb per year, as reported by the 2020 National Emission Inventory (NEI). One source overestimated emissions to the NEI, and more information can be found in Appendix C. The other source is the Hawthorne Army Depot New Bomb facility. In August 2024, NDEP submitted a waiver to EPA which demonstrates that Hawthorne Army Depot does not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS. EPA approved the waiver in October 2024. The waiver and approval are in Appendix E and F respectively. The 5-year waiver renewal is in Appendix G and will be submitted as part of the 2025 Network Assessment. NDEP has no NCORE sites in CBSAs with populations greater than 500,000. NDEP discontinued monitoring for Pb in 1990.

- NDEP-BAQP does not meet the CBSA of a population of 2.5 million or more persons for near-road NO_2 minimum monitoring requirements or the CBSA of a population of 1,000,000 or more persons for microscale near-road and area-wide NO_2 minimum monitoring requirements. Since no near-road NO_2 monitor is required, no near-road CO or $PM_{2.5}$ is required. The Regional Administrators, in collaboration with the States, must require a minimum of forty additional NO_2 monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. NDEP does not operate any required NO_2 monitors for susceptible and vulnerable populations. Therefore, NO_2 monitoring is not required within the NDEP's jurisdiction.

- Based on the latest Census Bureau population estimates and SO_2 emissions reported to the NEI for each county, the highest calculated Population Weighted Emission Index (PWEI) for CBSAs within NDEP-BAQP's jurisdiction is 246.5 million persons-tons per

year. This PWEI value is well below the established 5,000 million persons-tons per year threshold; therefore, SO_2 monitoring is not required within the NDEP's jurisdiction. Since NDEP is not required to monitor for SO_2, we are not required to report SO_2 data to the AQS database.

Based on data obtained through special study monitoring in Carson City and Gardnerville, the NDEP-BAQP has established a $PM_{2.5}$ monitoring network. These sites allow the NDEP-BAQP to ascertain $PM_{2.5}$ conditions within both areas. The Ranchos monitoring site is currently classified as a SPMS and meets the requirements of Appendix A and E.

Since the Carson City site is NDEP-BAQP's first $PM_{2.5}$ SLAMS monitor, 40 CFR part 58 Appendix A requires this site to be collocated. NDEP-BAQP has designated the primary $PM_{2.5}$ monitor at this site as a continuous FEM; therefore, the first collocated monitor at this site must be an FRM. NDEP-BAQP uses a MetOne EFRM instrument as the FRM analyzer.

Table 2. Collocation Requirements

Method Code	# Primary Monitors	# Required Collocated Monitors	# Active Collocated FRM Monitors	# Active Collocated FEM Monitors
170	2	1	1	0

Based on 40 CFR 58 Appendix D, the NDEP-BAQP understands that some monitors in the network may not be required (ozone, PM_{10}, $PM_{2.5}$). However, based on data from the various monitoring sites, the NDEP-BAQP believes that it is important to have these monitors to protect public health. Table 3 outlines the monitors within the NDEP-BAQP ambient air monitoring network and their associated parameters. The 2024 population estimates were obtained from the United States Census Bureau.

Table 3. Minimum Monitoring Requirements by Pollutant

Minimum Monitoring Requirements for Ozone (Note: Refer to section 4.1 and Table D-2 of Appendix D to 40 CFR Part 58).

MSA	County(ies)	2024 Estimated Population	8-hr Design Value [ppm], DV Years	Design Value site (name, AQS ID)	# Required Sites	# Active Sites	# Additional Sites Needed
Carson City Metropolitan Statistical Area (MSA)*	Carson City	58,148	0.065, 2022-2024	Carson City Armory 32-510-0020	1	1	0
Fallon Micropolitan Statistical Area (μMSA)*, **	Churchill	26,033	0.063, 2022-2024	Fallon 32-001-0002	0	1	0
Fernley Micropolitan Statistical Area (μMSA)*, **	Lyon	63,718	0.063, 2022-2024	Fernley 32-019-0006	0	1	0

Source-Oriented Pb Monitoring (including airports; Note: Refer to section 4.5 of Appendix D to 40 CFR Part 58).

Source Name	Address	Pb Emissions (tons per year)	Emission Inventory Source & Data Year	Max 3-Month Design Value [μg/m^3]	Design Value date (third month, year)	# Required Monitors	# Active Monitors	# Additional Monitors Needed
No CBSA/source monitoring in NDEP-BAQP's jurisdiction	N/A	N/A	N/A	N/A	N/A	0	0	0

Minimum Monitoring Requirements for NO_2 (Note: Refer to section 4.3 of Appendix D to 40 CFR Part 58).

CBSA	2023 Estimated Population	Max AADT*** counts (year)	# Required Near-road Monitors	# Active Near-road Monitors	# Additional Near-road Monitors Needed	# Required Area-wide Monitors	# Active Area-wide Monitors	# Additional Area-wide Monitors Needed
No CBSA in NDEP-BAQP's jurisdiction over 1,000,000	N/A	N/A	0	0	0	0	0	0

Minimum Monitoring Requirements for SO_2 (Note: Refer to section 4.4 of Appendix D to 40 CFR Part 58).

CBSA	County(ies)	2024 Estimated Population	Total SO_2**** [tons/year]	Population Weighted Emissions Index***** [million persons-tons per year]	Data Requirements Rule Source(s) using Monitoring	# Required Monitors	# Active Monitor	# Additional Monitors Needed
Reno	Washoe, Storey, Lyon	575,110	428.66041	246.5	N/A	0	1 in Washoe County	0
Pahrump	Nye	55,990	57.58857	3.2	N/A	0	0	0
Carson City	Carson City	58,148	19.74281	1.1	N/A	0	0	0
Gardnerville Ranchos	Douglas, NV Alpine, CA	50,663	562.87797	28.5	N/A	0	0	0
Elko	Elko, Eureka	56,240	389.52189	21.9	N/A	0	0	0
Fallon	Churchill	26,033	47.69481	1.2	N/A	0	0	0
Winnemucca	Humboldt	17,116	2011.4418	34.4	N/A	0	0	0

Minimum Monitoring Requirements for PM_{10} (Note: Refer to section 4.6 and Table D-4 of Appendix D to 40 CFR Part 58).

MSA	County(ies)	2024 Estimated Population	Max Concentration [µg/m^3]	Max Concentration site (name, AQS ID)	# Required Sites	# Active Sites	# Additional Sites Needed
Elko Micropolitan Statistical Area (µMSA)[*, **]	Elko	54,363	128	Elko 32-007-0005	0	1	0
Pahrump Micropolitan Statistical Area (µMSA)[*, **]	Nye	55,990	387	Glen Oaks 32-023-0015	0	4	0

Minimum Monitoring Requirements for $PM_{2.5}$ SLAMS (FRM/FEM/ARM, see 40CFR 58 App D Section 4.7.1 and Table D-5).

MSA	County (ies)	2024 Estimated Population	Annual Design Value [µg/m^3], DV Years	Annual Design Value site (name, AQS ID)	Daily Design Value [µg/m^3], DV years	Daily Design Value site (name, AQS ID)	# Required SLAMS Sites	# Active SLAMS Sites	# Additional SLAMS Sites Needed
Carson City Metropolitan Statistical Area (MSA)[*]	Carson City	58,148	5.5, 2022-2024	Carson City Armory 32-510-0020	23, 2022-2024	Carson City Armory 32-510-0020	0-1	1	0

Minimum Monitoring Requirements for continuous $PM_{2.5}$ monitors (FEM/ARM and non-FEM, see 40CFR 58 App D Section 4.7.2).

MSA	County (ies)	2024 Estimated Population	Annual Design Value [µg/m^3], DV Years	Annual Design Value site (name, AQS ID)	Daily Design Value [µg/m^3], DV years	Daily Design Value site (name, AQS ID)	# Required Continuous Sites	# Active Continuous Sites	# Additional Continuous Sites Needed
Carson City Metropolitan Statistical Area (MSA)[*]	Carson City	58,148	5.5, 2022-2024	Carson City Armory 32-510-0020	23, 2022-2024	Carson City Armory 32-510-0020	0-1	1	0

Minimum Monitoring Requirements for CO (Note: Refer to section 4.2 of Appendix D to 40 CFR Part 58).

CBSA	2023 Estimated Population	# Required Near-road Monitors	# Active Near-road Monitors	# Additional Monitors Needed
No CBSA in NDEP-BAQP's jurisdiction over 1,000,000	N/A	0	0	0

Minimum Monitoring Requirements for Near-road NO_2, $PM_{2.5}$, and CO (Note: Refer to 40 CFR Part 58.13 and sections 4.2, 4.3, 4.7 of Appendix D to 40 CFR Part 58).

CBSA	2023 Estimated Population	Max AADT counts (year)	# Required NO_2 Monitors	# Active NO_2 Monitors	# Required $PM_{2.5}$ Monitors	# Active $PM_{2.5}$ Monitors	# Required CO Monitors	# Active CO Monitors	# Additional Monitors Needed
No CBSA in NDEP-BAQP's jurisdiction over 1,000,000	N/A	N/A	0	0	0	0	0	0	0

* Except otherwise noted, all the above monitors listed meet the requirements of appendices A, B, C, D and E where applicable.
** These sites do not meet the criteria for an MSA/Source/CBSA as described in 40 CFR Appendix D and are not required.
*** AADT: Annual Average Daily Traffic
****Using NEI data.
*****Calculated by multiplying CBSA population and total SO_2 and dividing product by one million.

Changes in Monitoring Network

This annual network plan and a five-year network assessment are used to evaluate the need for any changes to the NDEP-BAQP ambient air monitoring network. The NDEP-BAQP does not expect any changes to the monitoring network in the next 12-18 months. If there is a change in the monitoring network, it will be submitted to USEPA for approval, and there will be a public notification and comment period. If any changes impact the location of a violating $PM_{2.5}$ monitor, there will be a public notification and comment period, and any comments received will be included in the plan.

Purpose of Monitors

The purpose of the Nevada Air Monitoring Network is to provide useful and accurate information on air quality, which is used to evaluate the success of the State's air quality programs. To accomplish this task, the NDEP-BAQP utilizes the NAAQS for each criteria pollutant set forth in the Clean Air Act: CO, Pb, NO_2, O_3, coarse and fine particulate matter (PM_{10} and $PM_{2.5}$, respectively), and SO_2. Also, the NDEP-BAQP utilizes the NAAQS of measured criteria pollutants set forth in the Clean Air Act to assess air quality status and potentially classify areas of the state as either attainment or nonattainment.

The NAAQS are broken down into primary and secondary standards. Primary standards are those established to protect public health. Secondary standards are those established to protect the public welfare from adverse pollution effects on soils, water, vegetation, man-made materials, animals, weather, visibility, climate, property, and the economy. The scientific criteria upon which the standards are based are reviewed periodically by the USEPA; the USEPA may reestablish or change the standards according to its findings.

A pollutant measurement that is greater than the ambient air quality standard for its specific averaging time is called an exceedance. An exceedance is not necessarily a violation; for each pollutant, there are specific rules about how many exceedances are allowed within a given time period before a pattern of exceedances is considered to be a violation of the NAAQS. A violation may result in regulatory action to improve the air quality in that area. Exceptions are made to allow for certain limited exceedances of the standard that may occur; for example, during exceptional events, such as an unusual weather pattern or wildfire. Regulatory action is typically reserved for cases where the exceedances are too large or too frequent and cause violation of the NAAQS.

Historically, ambient air quality monitoring by the NDEP-BAQP has looked at trends in air quality to aid in the local planning process. Traffic, wood burning stoves, and growth-related activities have prompted air quality monitoring in specific areas around the State. Data from these sites has led to public education and outreach to communities, identifying the potential

health effects caused by air pollutants in the environment. Ordinances have also been developed and implemented to help control surface area disturbances and other related activities that produce dust.

Overview of Monitored Parameters

O_3

Ground-level ozone, or photochemical smog, is not emitted into the atmosphere as ozone, but rather is formed by the reactions of other pollutants. The primary pollutants entering into this reaction, volatile organic compounds (VOCs) and oxides of nitrogen, create ozone in the presence of sunlight. According to the USEPA, ozone is a strong irritant of the upper respiratory system and causes damage to crops.

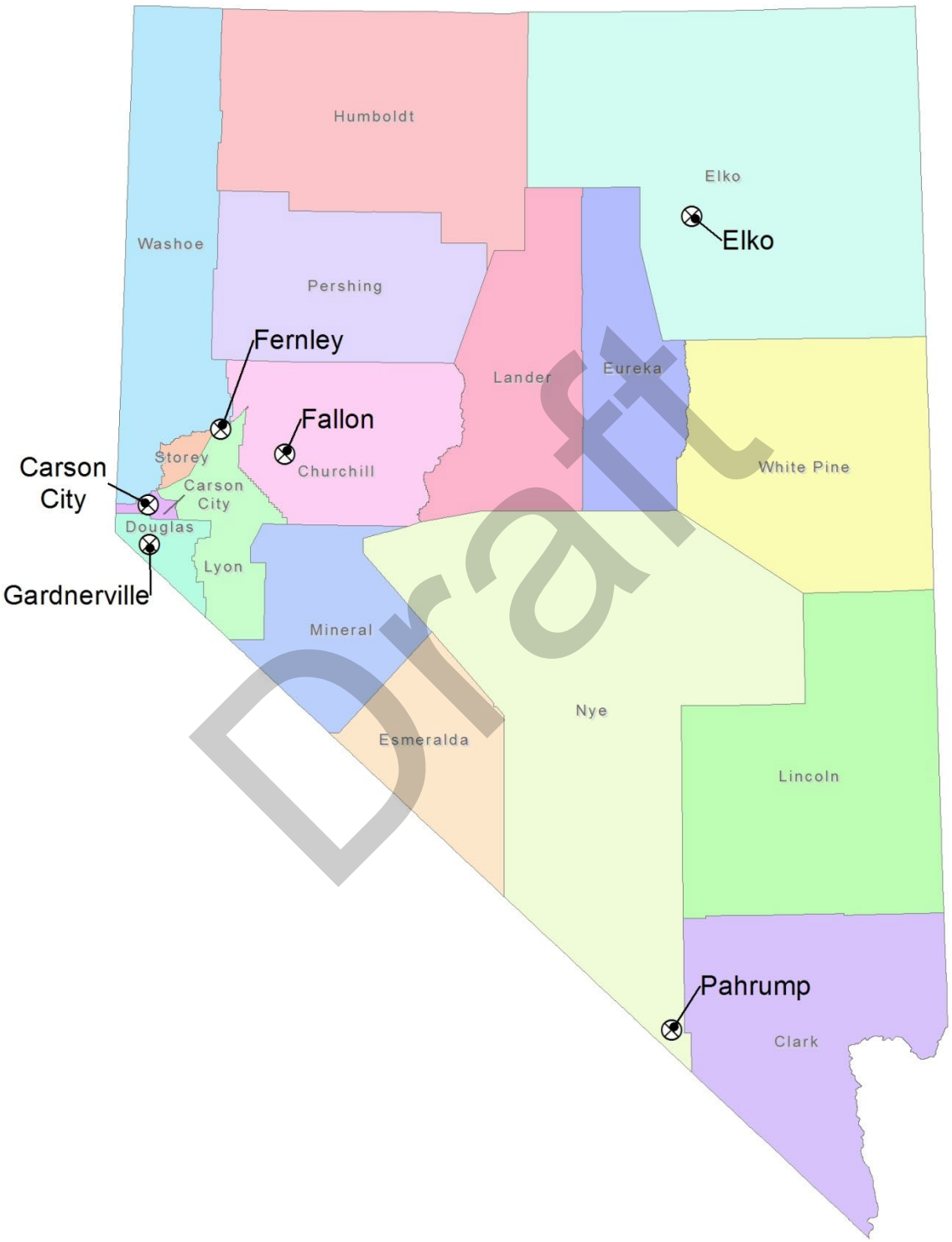
PM_{10}

Particulate matter with an aerodynamic diameter of 10 microns or less is emitted from transportation and industrial sources. According to the USEPA, exposure to particle pollution is linked to a variety of significant health problems ranging from aggravated asthma to premature death in people with heart and lung disease.

$PM_{2.5}$

Fine particulate matter with a diameter of 2.5 microns or less is created primarily from industrial processes and fuel combustion. According to the USEPA, these particles are breathed deeply into the lungs. Exposure to fine particle pollution is linked to a variety of significant health problems ranging from aggravated asthma to premature death in people with heart and lung disease.

Figure 1: Locations of monitoring stations maintained in the NDEP-BAQP's network.



Elko: Detailed Site Information

Prior to 1992, the location for this sampler was at the fire station in a commercial area. In November 1992, this continuous PM_{10} monitoring site was relocated to the roof of the State offices at 850 Elm Street in a predominantly residential area. The monitoring objective was to determine typical concentration/population oriented. The manual sampler was replaced with a continuous Tapered Element Oscillating Microbalance (TEOM) PM_{10} monitor in December 1998. In September 2008, the TEOM monitor was closed, and a Beta Attenuation Monitor (BAM) 1020 monitor was sited at the Elko Grammar School #2. In July 2024, the BAM1020 was replaced with a T640x monitor.

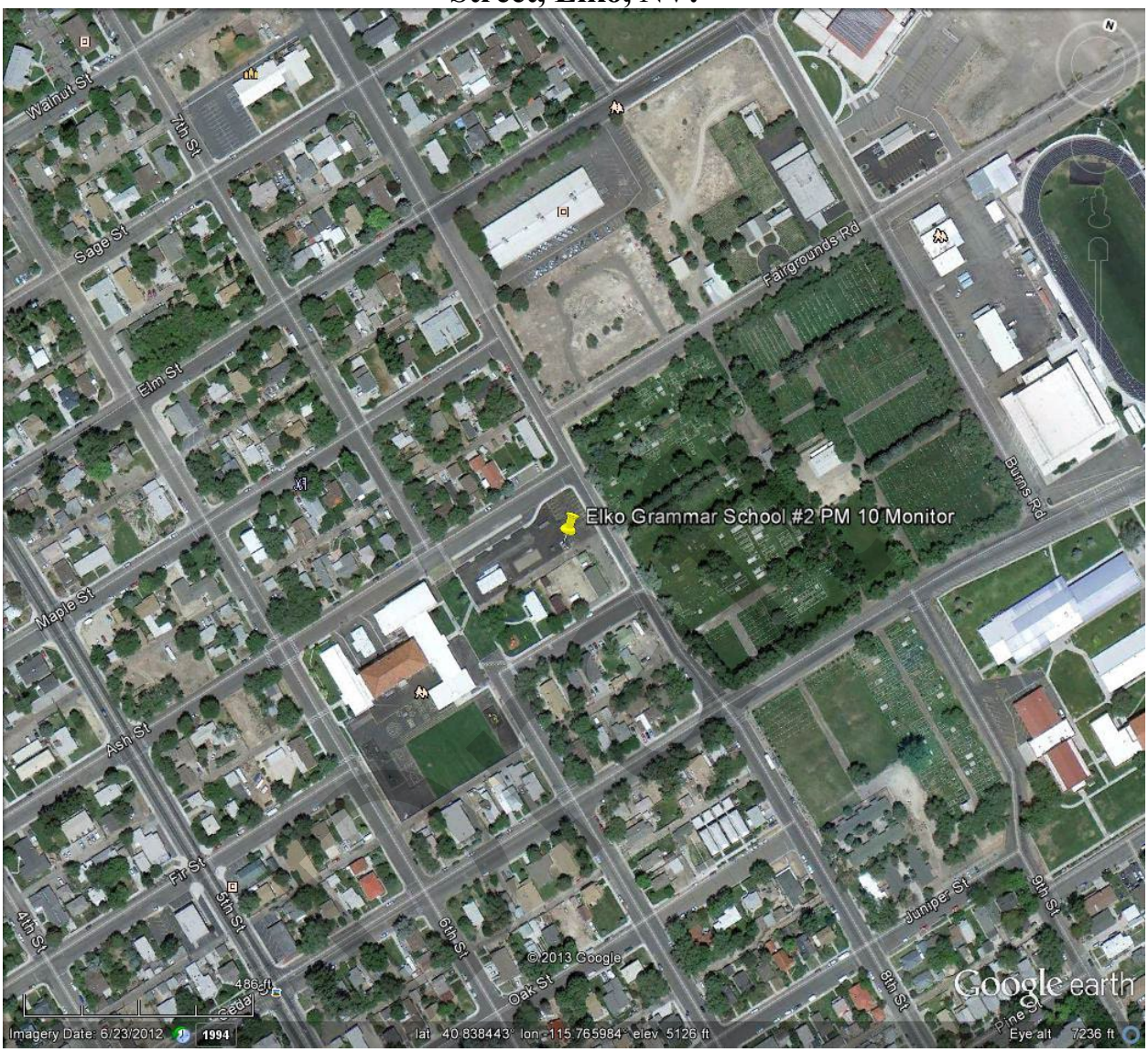
Local site name	**Elko**
AQS ID (XX-XXX-XXXX)	**32-007-0005**
GPS coordinates (decimal degrees)	**+40.838350, -115.766029**
Street Address	**1055 7th Street, Elko, NV 89801**
County	**Elko**
Distance to roadways (meters)	**8th Street – 25 meters***
Traffic count (AADT, year)	**8th Street – 730 AADT (2023) Station #0070203 (100 meters from site)** **Cedar Street – 2,100 AADT (2023) Station #0070208 (165 meters from site)**
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	**Asphalt**
Representative statistical area name (i.e. MSA, CBSA, other)	**Elko Micropolitan Statistical Area**
Pollutant, Pollutant Occurrence Code (POC)	**PM_{10}, 1**
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	**N/A**
Parameter code	**81102**
Basic monitoring objective(s)	**NAAQS**
Site type(s)	**Population Exposure**
Monitor type	**SLAMS**
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	**N/A**
Instrument manufacturer and model	**Teledyne T640x**
Method code	**639**
FRM/FEM/ARM/other	**FEM**
Collecting Agency	**NDEP-BAQP**
Analytical Lab (i.e. weigh lab, toxics lab, other)	**N/A**
Reporting Agency	**NDEP-BAQP**
Spatial scale (e.g. micro, neighborhood)	**Neighborhood**
Monitoring start date	**09/25/2008**

Local site name	Elko
(MM/DD/YYYY)	
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	2.2 meters
Distance from supporting structure (meters)	2.2 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: shed to SE = 9 meters Vertical height above probe: shed to SE = 3 meters Horizontal distance: tree to SW = 11 meters Vertical height above probe: tree to SW = 1 meter
Distance from tree drip-lines (meters)	11 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (seconds)	N/A
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Monthly
Frequency of one-point QC check for	N/A

Local site name	Elko
gaseous instruments	
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	N/A
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	03/14/2024, 07/30/2024

*Distance is measured to the nearest roadway, not to the nearest NDOT station # reference for AADT.

Figure 2: PM_{10} Monitor located at Elko Grammar School #2, 1055 7th Street, Elko, NV.



Fallon: Detailed Site Information

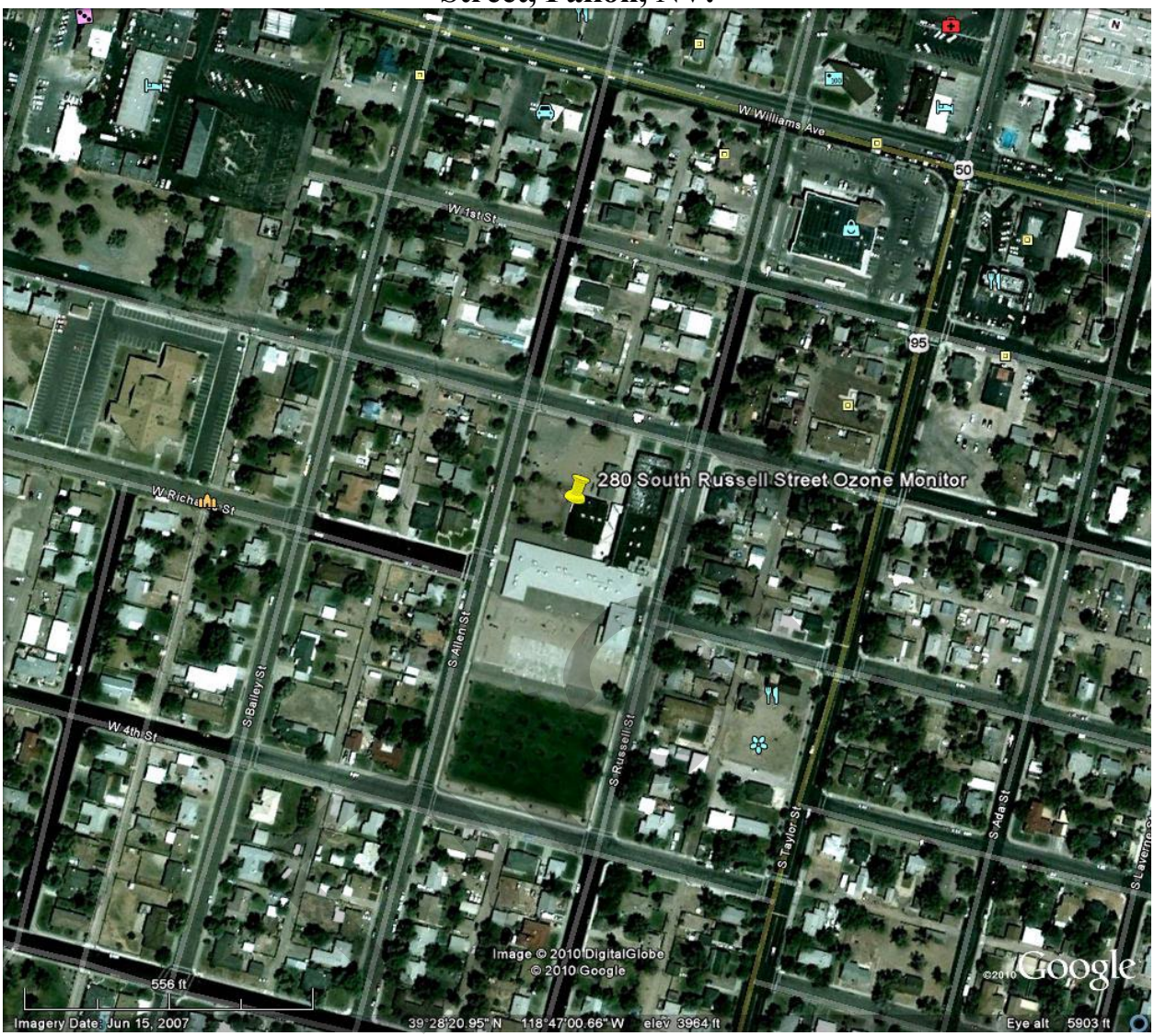
The ozone monitoring site at 280 South Russell Street is at the West End Facility in a residential neighborhood that may be affected by agricultural operations surrounding the City of Fallon. The monitoring objective is to determine typical concentration/population oriented and transport downwind of Reno and Fernley.

Local site name	Fallon
AQS ID (XX-XXX-XXXX)	32-001-0002
GPS coordinates (decimal degrees)	+39.472471, -118.783624
Street Address	280 South Russell Street, Fallon, NV 89406
County	Churchill
Distance to roadways (meters)	S. Allen – 40 meters
Traffic count (AADT, year)	S. Bailey Street – 240 AADT (2023) Station #0010135 (150 meters from site); S. Taylor Street– 8,300 AADT (2023) Station #0010016 (200 meters from site); S. Allen Street – <2,501 (2023, estimated from NDOT for W. Center Street, adjacent to site to the north)
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Dirt and gravel
Representative statistical area name (i.e. MSA, CBSA, other)	Fallon Micropolitan Statistical Area
Pollutant, POC	Ozone, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	44201
Basic monitoring objective(s)	NAAQS
Site type(s)	Population Exposure
Monitor type	SLAMS
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Instrument manufacturer and model	Teledyne API Model 400 Series
Method code	087
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A
Reporting Agency	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Neighborhood

Local site name	Fallon
Monitoring start date (MM/DD/YYYY)	10/01/1999
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	5.5 meters
Distance from supporting structure (meters)	1.5 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to SW = 16 meters Vertical height above probe: tree to SW = 2.1 meters
Distance from tree drip-lines (meters)	12 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	Teflon
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (seconds)	11.95 seconds
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check for gaseous instruments	Every two weeks

Local site name	Fallon
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	**12/23/2024**
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	**N/A**

Figure 3: Ozone Monitor located at West End Facility, 280 South Russell Street, Fallon, NV.



Fernley Intermediate School: Detailed Site Information

Ozone monitoring is conducted at the Fernley Intermediate School, which is located at 320 Hardie Lane. This is an area of mainly residential and agricultural use. However, there has recently been a large growth of industry both upwind and downwind of this site. Ozone monitoring (SPMS) was previously conducted at the Fernley Volunteer Fire Department starting in October 1997 and discontinued in October 2003. Ozone monitoring began at this site in July 2007. Monitoring for PM_{10} at this site commenced in May 1995 to determine the agricultural and industrial source impacts and population exposure. PM_{10} sampling was discontinued in November 1998.

Local site name	Fernley
AQS ID (XX-XXX-XXXX)	32-019-0006
GPS coordinates (decimal degrees)	+39.602787, -119.247741
Street Address	320 Hardie Lane, Fernley, NV 89408
County	Lyon
Distance to roadways (meters)	Hardie Lane – 103 meters*
Traffic count (AADT, year)	US95A, US50A – 8,650 AADT (2023) Station #0190022 (520 meters from site); SR427, E. Main Street – 10,900 AADT (2023) Station #0190023 (590 meters from site); Hardie Lane – 1,350 AADT (2023) Station #0190119 (525 meters from site)
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Paved, cement, gravel, and dirt
Representative statistical area name (i.e. MSA, CBSA, other)	Reno-Carson City-Fernley Combined Statistical Area (CSA) and Fernley Micropolitan Statistical Area
Pollutant, POC	Ozone, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	44201
Basic monitoring objective(s)	NAAQS
Site type(s)	Population Exposure
Monitor type	SLAMS
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Instrument manufacturer and model	Teledyne API Model 400 Series
Method code	087
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A
Reporting Agency	NDEP-BAQP

Local site name	Fernley
Spatial scale (e.g. micro, neighborhood)	Neighborhood
Monitoring start date (MM/DD/YYYY)	07/06/2007
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	6.5 meters
Distance from supporting structure (meters)	1.5 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to W = 16 meters Vertical height above probe: tree to W = 2 meters
Distance from tree drip-lines (meters)	14.6 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	Teflon
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (seconds)	7.49 seconds
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A

Local site name	Fernley
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check for gaseous instruments	Every two weeks
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	12/18/2024
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	N/A

*Distance is measured to the nearest roadway, not to the nearest NDOT station # reference for AADT.

Figure 4: Ozone Monitor located at Fernley Intermediate School, 320 Hardie Lane Fernley, NV.

2601 S. Carson Street: Detailed Site Information

Due to the city of Carson City re-purposing use of the old monitoring location on 3300 East Fifth Street, the SLAMS monitoring site is now adjacent to Hwy 395, in a residential neighborhood and a light industrial area. The collocated $PM_{2.5}$ and ozone monitoring site is located at 2601 S. Carson Street, previous site of the old Army National Guard site. The monitoring objective for $PM_{2.5}$ and ozone is to determine maximum concentration based on Appendix D CFR 58 (4.1) (b) for this site. The primary monitor at this site is the SLAMS BAM 1020 continuous monitor.

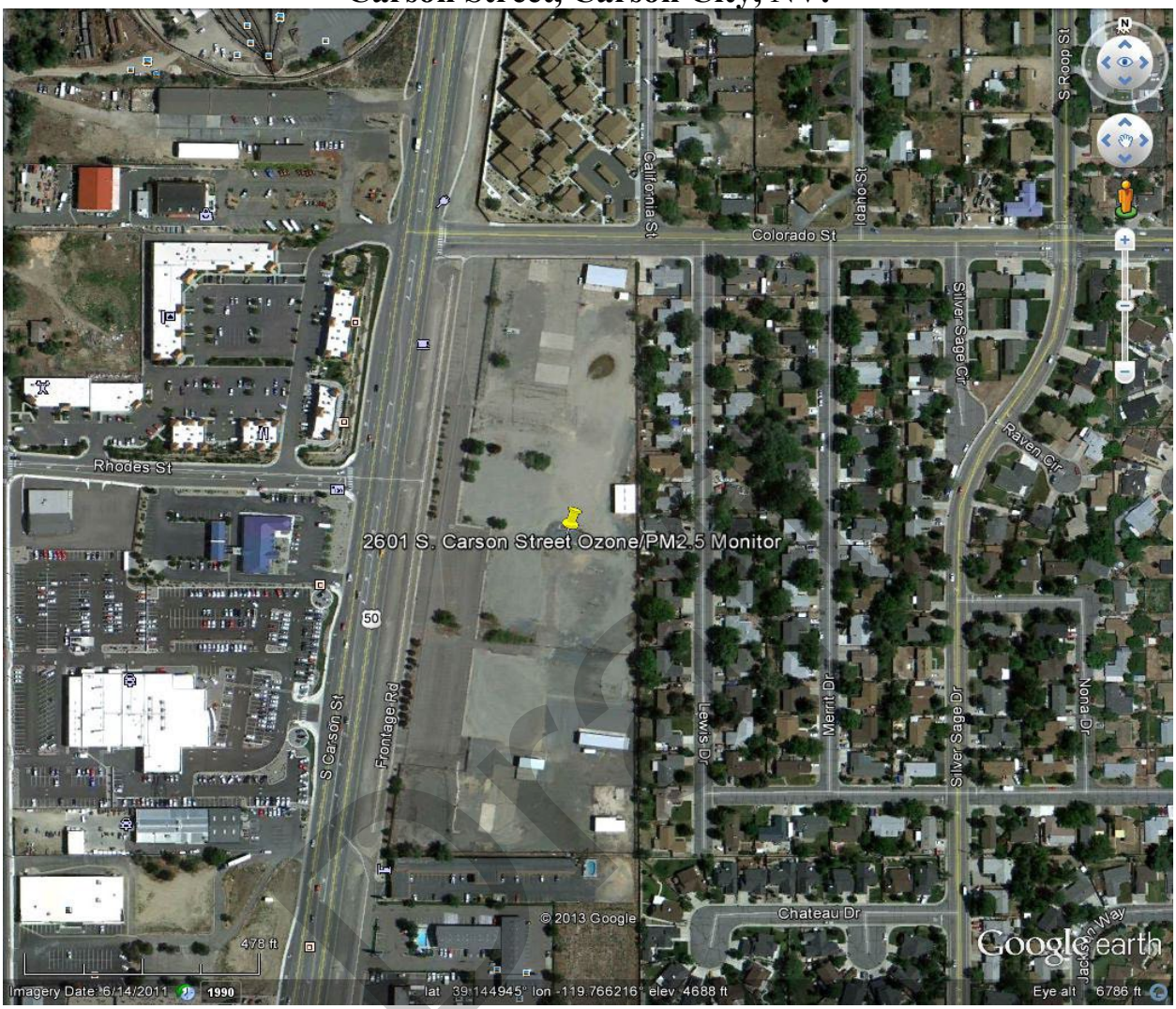
Local site name	**Carson City Armory**		
AQS ID (XX-XXX-XXXX)	**32-510-0020**		
GPS coordinates (decimal degrees)	**+39.1447, -119.7661**		
Street Address	**2601 S. Carson Street, Carson City, NV 89701**		
County	**Carson City**		
Distance to roadways (meters)	**Lewis Drive – 87 meters South Carson Street – 105 meters**		
Traffic count (AADT, year)	**Carson Street, SR529 – 17,300 AADT (2023) Station #0250148 (1.1 kilometers from site); Colorado Street –2,400 AADT (2023) Station #0250060 (450 meters from site); Sonoma Street – 1,600 AADT (2023) Station #0250050 (375 meters from site); Lewis Street – 2,501 to 5,000 (2023, estimated from NDOT for Roop Street, two blocks east)**		
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	**Gravel**		
Representative statistical area name (i.e. MSA, CBSA, other)	**Reno-Carson City-Fernley CSA and Carson City Metropolitan Statistical Area (MSA)**		
Pollutant, POC	**$PM_{2.5}$, 1**	**$PM_{2.5}$, 2**	**Ozone, 1**
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	**Primary**	**QA Collocated**	**N/A**
Parameter code	**88101**	**88101**	**44201**
Basic monitoring objective(s)	**NAAQS**	**NAAQS**	**NAAQS**
Site type(s)	**Highest concentration**	**Highest concentration**	**Max O_3 concentration**
Monitor type(s)	**SLAMS**	**SLAMS**	**SLAMS**
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	**N/A**	**N/A**	**N/A**
Instrument manufacturer and model	**Met One BAM 1020**	**Met One EFRM, VSCC**	**Teledyne API 400 Series**
Method code	**170**	**521**	**087**

Local site name	Carson City Armory		
FRM/FEM/ARM/other	FEM	FRM	FEM
Collecting Agency	NDEP-BAQP	NDEP-BAQP	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A	Desert Research Institute	N/A
Reporting Agency	NDEP-BAQP	NDEP-BAQP	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Neighborhood	Neighborhood	Neighborhood
Monitoring start date (MM/DD/YYYY)	04/01/2013	04/01/2013	04/01/2013
Current sampling frequency (e.g. 1:3, continuous)	Continuous (primary)	1:6	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	Continuous	1:3*	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31	01/01-12/31	01/01-12/31
Probe height (meters)	4.6 meters	4.6 meters	4.1 meters
Distance from supporting structure (meters)	2.0 meters	2.0 meters	1.5 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof	No obstructions on the roof	No obstructions on the roof
Distance from obstruction not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to W = 40 meters Vertical height above probe: tree to W = 5.3 meters Horizontal distance: tree to NW = 44 meters Vertical height above probe: tree to NW = 5.3 meters	Horizontal distance: tree to W = 40 meters Vertical height above probe: tree to W = 5.3 meters Horizontal distance: tree to NW = 44 meters Vertical height above probe: tree to NW = 5.3 meters	Horizontal distance: tree to W = 40 meters Vertical height above probe: tree to W = 5.3 meters Horizontal distance: tree to NW = 44 meters Vertical height above probe: tree to NW = 5.3 meters
Distance from tree drip-lines (meters)	37/44 meters	37/44 meters	37/44 meters
Distance to furnace or incinerator flue (meters)	N/A	N/A	N/A

Local site name	Carson City Armory		
Distance between monitors fulfilling a QA collocation requirement (meters)	1.8 meters	1.8 meters	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees	360 degrees	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A	N/A	Teflon
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A	N/A	4.89 seconds
Will there be changes within the next 18 months? (Y/N)	No	No	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	Yes	Yes	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A	Monthly	N/A
Frequency of flow rate verification for automated PM analyzers	Monthly	N/A	N/A
Frequency of one-point QC check for gaseous instruments	N/A	N/A	Every two weeks
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	N/A	N/A	12/19/2024
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	03/18/2024, 09/16/2024	03/18/2024, 09/16/2024	N/A

*This requirement is met by the continuous sampling of the primary monitor.

Figure 5: Ozone/$PM_{2.5}$ Monitors located at Carson City Armory, 2601 S. Carson Street, Carson City, NV.



Church: Detailed Site Information

The Church Site began operation in 2004 to complement the existing three other sites in the Pahrump monitoring network. Monitoring is accomplished with a continuous T640x analyzer located in the southeast corner of the Catholic Church property. This site represents the southern-most monitoring location in Pahrump Valley. The monitoring objective of this site is a significant source of PM_{10}. The surrounding area is characterized by residential use with little commercial use, as well as some native desert with a mix of dirt and paved roads.

Local site name	Church
AQS ID (XX-XXX-XXXX)	32-023-0013
GPS coordinates (decimal degrees)	+36.159639, -115.996263
Street Address	781 E. Gamebird Road, Pahrump, NV 89048
County	Nye
Distance to roadways (meters)	Gamebird Road – 147 meters
Traffic count (AADT, year)	Pahrump Valley Boulevard – 8,150 AADT (2023) Station #0230025 (5 kilometers from site); Pahrump Valley Boulevard (intersection with Gamebird Road) –16,188 AADT (2024)*
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Desert
Representative statistical area name (i.e. MSA, CBSA, other)	Las Vegas – Henderson, NV-AZ CSA and Pahrump Micropolitan Statistical Area
Pollutant, POC	PM_{10}, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	81102
Basic monitoring objective(s)	NAAQS
Site type(s)	Population Exposure – Dry lake bed 6 miles to the south
Monitor type	SLAMS
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Instrument manufacturer and model	Teledyne T640x
Method code	639
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A
Reporting Agency	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Urban

Local site name	Church
Monitoring start date (MM/DD/YYYY)	02/14/2004
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	2.7 meters
Distance from supporting structure (meters)	2.7 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: shed to W = 14 meters Vertical height above probe: shed to W = 1.5 meters
Distance from tree drip-lines (meters)	45 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A
Will there be changes within the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification manual PM samplers, including Pb samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Monthly
Frequency of one-point QC check for gaseous instruments	N/A

Local site name	Church
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	**N/A**
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	**03/26/2024, 10/23/2024**

*This AADT value was estimated by extrapolating between actual 2003 AADT and projected 2025 AADT values as listed in the Pahrump Regional Planning District Adequate Public Facilities Plan and Policy report, dated August 7, 2006.

Figure 6: PM_{10} Monitor located at Church Site, 781 E. Gamebird Road, Pahrump, NV.

Manse Elementary: Detailed Site Information

The Manse site represents the monitoring objective for the highest concentrations of PM_{10} in Pahrump. This site replaces the Community Pool site, which, at the time it was operating, also represented the highest concentrations of PM_{10} in Pahrump. Located at 1020 E. Wilson Road, the Manse Elementary site is located on the roof of the school and monitors for PM_{10} using the continuous T640x analyzer. The area adjacent to this site is characterized by mostly commercial use with some residential use and is adjacent to the busiest activity area of Pahrump. This site is located downwind from residential construction developments that have cleared large parcels of ground for building, as well as agricultural areas that cultivate large areas of farm-ground and raise livestock. Roads surrounding this site are both paved and dirt.

Local site name	Manse Elementary
AQS ID (XX-XXX-XXXX)	32-023-0014
GPS coordinates (decimal degrees)	+36.212787, -115.994802
Street Address	1020 E. Wilson Road, Pahrump, NV 89048
County	Nye
Distance to roadways (meters)	Yellowhand Ave – 77 meters Wilson Road – 50 meters
Traffic count (AADT, year)	SR372, Charles Brown Highway – 12,400 AADT (2023) Station #0230006 (850 meters from site); SR160, Pahrump Valley Highway – 23,200 AADT (2023) Station #0230008 (875 meters from site); Wilson Road (intersection with SR160) –9,919 AADT (2024)*
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Gravel
Representative statistical area name (i.e. MSA, CBSA, other)	Las Vegas – Henderson, NV-AZ CSA and Pahrump Micropolitan Statistical Area
Pollutant, POC	PM_{10}, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	81102
Basic monitoring objective(s)	NAAQS
Site type(s)	Highest Concentration
Monitor type	SLAMS
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Instrument manufacturer and model	Teledyne T640x
Method code	639
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics	N/A

Local site name	Manse Elementary
lab, other)	
Reporting Agency	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Middle
Monitoring start date (MM/DD/YYYY)	11/17/2005
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	6 meters
Distance from supporting structure (meters)	2.5 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to W = 18 meters Vertical height above probe: tree to W = 5 meters Horizontal distance: tree to E = 24 meters Vertical height above probe: tree to E = 5 meters
Distance from tree drip–lines (meters)	18 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (seconds)	N/A
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for	N/A

Local site name	Manse Elementary
manual PM samplers, including Pb samplers	
Frequency of flow rate verification for automated PM analyzers	Monthly
Frequency of one-point QC check for gaseous instruments	N/A
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	N/A
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	03/26/2024, 10/23/2024

*This AADT value was estimated by extrapolating between actual 2003 AADT and projected 2025 AADT values as listed in the Pahrump Regional Planning District Adequate Public Facilities Plan and Policy report, dated August 7, 2006.

Figure 7: PM_{10} Monitor located at Manse Elementary, 1020 E. Wilson Road Pahrump, NV.

Glen Oaks: Detailed Site Information

Monitoring began at the Willow Creek site in 2003. The monitor was located at 1500 Red Butte on the roof of a building in which irrigation equipment for a golf course was housed. The monitoring objective of this site was to measure typical concentrations/population oriented of PM_{10} using the BAM 1020. The surrounding area adjacent to this site was fairway/golf course and residential structures. Due to closure of the golf course, the Willow Creek site was relocated to the Glen Oaks sewage treatment plant in 2009. The Glen Oaks site is a short distance away from the existing golf course site and the monitoring objective did not change. PM_{10} is measured using the continuous T640x analyzer.

Local site name	**Glen Oaks**
AQS ID (XX-XXX-XXXX)	**32-023-0015**
GPS coordinates (decimal degrees)	**+36.193469, -116.007584**
Street Address	**410 S. Glenoaks Street, Pahrump NV, 89048**
County	**Nye**
Distance to roadways (meters)	**East Glenoaks Street – 104 meters**
Traffic count (AADT, year)	**SR372, Charles Brown Highway – 12,400 AADT (2023) Station #0230006 (1.6 kilometers from site); Calvada Boulevard (intersection with SR160) – 21,552 AADT (2024)***
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	**Gravel**
Representative statistical area name (i.e. MSA, CBSA, other)	**Las Vegas – Henderson, NV-AZ CSA and Pahrump Micropolitan Statistical Area**
Pollutant, POC	**PM_{10}, 1**
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	**N/A**
Parameter code	**81102**
Basic monitoring objective(s)	**NAAQS**
Site type(s)	**Population Exposure**
Monitor type	**SLAMS**
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	**N/A**
Instrument manufacturer and model	**Teledyne T640x**
Method code	**639**
FRM/FEM/ARM/other	**FEM**
Collecting Agency	**NDEP-BAQP**
Analytical Lab (i.e. weigh lab, toxics lab, other)	**N/A**
Reporting Agency	**NDEP-BAQP**
Spatial scale (e.g. micro, neighborhood)	**Neighborhood**

Local site name	Glen Oaks
Monitoring start date (MM/DD/YYYY)	07/10/2009
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	2.7 meters
Distance from supporting structure (meters)	2.7 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof.
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: shed to W = 11 meters Vertical height above probe: shed to W = N/A height < probe Horizontal distance: tree to N = 30 meters Vertical height above probe: tree to N = 7 meters
Distance from tree drip-lines (meters)	30 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A
Will there be changes within the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A

Local site name	Glen Oaks
Frequency of flow rate verification for automated PM analyzers	**Monthly**
Frequency of one-point QC check for gaseous instruments	**N/A**
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	**N/A**
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	**03/25/2024, 10/23/2024**

*This AADT value was estimated by extrapolating between actual 2003 AADT and projected 2025 AADT values as listed in the Pahrump Regional Planning District Adequate Public Facilities Plan and Policy report, dated August 7, 2006.

Figure 8: PM_{10} Monitor located at 410 S. Glenoaks Street, Pahrump, NV.

Linda Street: Detailed Site Information

Monitoring at the Linda Street site was initiated in 2003. The site is located at 8825 North Linda Street. The T640x is located on the roof of an old railroad box car and represents not only the northern-most site in the Pahrump monitoring network, but the most rural area. There is some residential surrounding this site, but mainly native desert vegetation with little or no surface disturbances. Due to distance from the probe to the nearest roadway, this is a regional scale site. The monitoring objective for this site is upwind background levels of PM_{10} in Pahrump.

Local site name	Linda Street
AQS ID (XX-XXX-XXXX)	32-023-0011
GPS coordinates (decimal degrees)	+36.349408, -116.031976
Street Address	8825 N. Linda Street, Pahrump, NV 89060
County	Nye
Distance to roadways (meters)	Linda Street – 53 meters
Traffic count (AADT, year)	SR160, Blue Diamond Road – 2,000 AADT (2023) Station #0230009* (4.25 kilometers from site)
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Desert
Representative statistical area name (i.e. MSA, CBSA, other)	Las Vegas – Henderson, NV-AZ CSA and Pahrump Micropolitan Statistical Area
Pollutant, POC	PM_{10}, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	81102
Basic monitoring objective(s)	NAAQS
Site type(s)	Upwind Background
Monitor type	SLAMS
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Instrument manufacturer and model	Teledyne T640x
Method code	639
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A
Reporting Agency	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Urban
Monitoring start date (MM/DD/YYYY)	05/03/2003

Local site name	Linda Street
Current sampling frequency (e.g. 1:3, continuous)	Continuous
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	6 meters
Distance from supporting structure (meters)	2.8 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to NE = 35 meters Vertical height above probe: tree to NE = 4 meters
Distance from tree drip-lines (meters)	35 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	N/A
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Monthly
Frequency of one-point QC check for gaseous instruments	N/A

Local site name	Linda Street
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters	**N/A**
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	**03/25/2024, 10/23/2024**

*SR160/Pahrump Valley Highway is 1.5 kilometers from the site. There are no estimated traffic counts on any roads closer to the site, and traffic on Pahrump Valley Highway is much heavier than the neighborhood streets adjacent to the site. The residential roads are used by local residents to access their properties. The actual traffic count on Linda Street is likely much lower).

Figure 9: PM_{10} Monitor located at 8825 N. Linda Street, Pahrump, NV.

Ranchos Aspen Park: Detailed Site Information

The Ranchos Aspen Park site is a SPMS site within the NDEP-BAQP network. The monitoring objective is to determine typical concentration/population exposure.

Local site name	Ranchos Aspen Park
AQS ID (XX-XXX-XXXX)	32-005-0007
GPS coordinates (decimal degrees)	+38.897557, -119.732507
Street Address	820 Lyell Way, Gardnerville, NV 89460
County	Douglas
Distance to roadways (meters)	Lyell Way – 18 meters
Traffic count (AADT, year)	Kimmerling Road – 5,000 AADT (2023) Station #0050066 (1.1 kilometers from site)
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Gravel
Representative statistical area name (i.e. MSA, CBSA, other)	Reno-Carson City-Fernley CSA and Gardnerville Ranchos Micropolitan Statistical Area
Pollutant, POC	$PM_{2.5}$, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	88101
Basic monitoring objective(s)	NAAQS
Site type(s)	Population Exposure
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	N/A
Monitor type(s)	SPMS
Instrument manufacturer and model	Met One BAM 1020
Method code	170
FRM/FEM/ARM/other	FEM
Collecting Agency	NDEP-BAQP
Analytical Lab (i.e. weigh lab, toxics lab, other)	N/A
Reporting Agency	NDEP-BAQP
Spatial scale (e.g. micro, neighborhood)	Neighborhood
Monitoring start date (MM/DD/YYYY)	04/01/2013
Current sampling frequency (e.g. 1:3, continuous)	Continuous

Local site name	Ranchos Aspen Park
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	N/A
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	3.5 meters
Distance from supporting structure (meters)	2.8 meters
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	No obstructions on the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	Horizontal distance: tree to S = 13.2 meters Vertical distance above probe: tree to S = 2 meters
Distance from tree drip-lines (meters)	10.4 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2, O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A
Will there be changes within the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	Yes
Frequency of flow rate verification for manual PM samplers, including Pb samplers	N/A
Frequency of flow rate verification for automated PM analyzers	Monthly
Frequency of one-point QC check for gaseous instruments	N/A

Local site name	Ranchos Aspen Park
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	N/A
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	05/23/2024, 12/10/2024

Figure 10: $PM_{2.5}$ Monitor located at Ranchos Aspen Park, 820 Lyell Way Gardnerville, NV.

IMPROVE Station: Detailed Site Information

According to 40 CFR Part 58 Appendix D 4.7.3, "each state shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and regional transport." The NDEP-BAQP utilizes the Jarbidge site to meet this particular requirement.

Local site name	Jarbidge Wilderness IMPROVE
AQS ID (XX-XXX-XXXX)	32-007-9000
GPS coordinates (decimal degrees)	+41.8926, -115.4261
Street Address	Jarbidge Wilderness, Mahoney Forest Service Station
County	Elko
Distance to roadways (meters)	30 meters
Traffic count (AADT, year)	Negligible (No traffic counts conducted)
Groundcover (e.g. paved, vegetative, dirt, sand, gravel)	Dirt/Grass
Representative statistical area name (i.e. MSA, CBSA, other)	Elko Micropolitan Statistical Area
Pollutant, POC	$PM_{2.5}$, 1
Primary/QA Collocated/Other (provide for all $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, Pb, and NO_2 monitors. Non-PM, Pb, NO_2 monitors should be listed as "N/A")	N/A
Parameter code	88502
Basic monitoring objective(s)	Research Support
Site type(s)	General/Background
Monitor type	EPA
Network affiliation(s), if applicable (a monitor may have none, one, or multiple)	IMPROVE
Instrument manufacturer and model	Air Quality Research Center, IMPROVE Sampler
Method code	707
FRM/FEM/ARM/other	Other
Collecting Agency	US Forest Service (USFS)
Analytical Lab (i.e. weigh lab, toxics lab, other)	Air Quality Research Center at UC Davis
Reporting Agency	US Forest Service (USFS)
Spatial scale (e.g. micro, neighborhood)	Regional
Monitoring start date (MM/DD/YYYY)	01/1988
Current sampling frequency (e.g. 1:3, continuous)	1:3 Filters Collected Weekly

Local site name	Jarbidge Wilderness IMPROVE
Required sampling frequency (e.g. 1:3 excluding exceptional events/1:1 including exceptional events)	1:3
Sampling season (MM/DD-MM/DD)	01/01-12/31
Probe height (meters)	4 meters
Distance from supporting structure (meters)	2 meters
Distance from obstructions on roof. Include horizontal dist. + vertical height above probe for obstructions nearby (meters)	No obstructions on/near the roof
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters)	18 meters Unable to determine obstruction height above probe from AQS or site operator
Distance from tree drip lines (meters)	15 meters
Distance to furnace or incinerator flue (meters)	N/A
Distance between monitors fulfilling a QA collocation requirement (meters)	N/A
Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)	360 degrees
Probe material for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls (e.g. Pyrex, stainless steel, Teflon)	N/A
Residence time for reactive gases $NO/NO_2/NO_y$, SO_2 O_3; PAMS: VOCs, Carbonyls	N/A
Will there be changes in the next 18 months? (Y/N)	No
Is it suitable for comparison against the annual $PM_{2.5}$? (Y/N)	No
Frequency of flow rate verification for manual PM samplers, including Pb samplers	Weekly
Frequency of flow rate verification for automated PM analyzers	N/A
Frequency of one-point QC check for gaseous instruments	N/A

Local site name	Jarbidge Wilderness IMPROVE
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY)	N/A
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY)	7/25/2023

Figure 11: Mahoney Forest Service IMPROVE Station, Jarbidge, NV

Appendix A – Comment Submittal Information

This 2025 Ambient Air Monitoring Network Plan was posted on the NDEP website for review and comment for thirty (30) days starting May 23, 2025 and ending June 23, 2025.

Comments were directed to:
Elizabeth Grainey (egrainey@ndep.nv.gov)

or mailed to,
Elizabeth Grainey
Ambient Air Monitoring Program
Bureau of Air Quality Planning
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701

Appendix B – 2025 Annual Emission Report for the 2015 SO_2 Data Requirements Rule, North Valmy Generating Station

INTRODUCTION/HISTORY

On June 22, 2010, the Environmental Protection Agency (EPA) revised the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO_2) by promulgating a new primary SO_2 standard at a level of 75 parts per billion (ppb) (196 $\mu g/m^3$), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The Primary NAAQS for Sulfur Dioxide, Final Rule[1] was effective on August 23, 2010. (75 FR 35520)

August 21, 2015 the EPA published the final Data Requirements Rule (DRR) (40 CFR Part 51, Subpart BB) for the 2010 1-hour SO_2 primary NAAQS (effective on September 21, 2015).[2] Per the requirements of the DRR (§ 51.1203(b)), the Nevada Division of Environmental Protection (NDEP) sent a list to the EPA identifying one source, North Valmy Generating Station (Valmy) that exceeded 2,000 tons per year (tpy) of SO_2 emissions (January 13, 2016).

Per the DRR for each area identified that would be characterized through air quality modeling, a modeling protocol was required to be submitted to the EPA Regional Administrator by July 1, 2016 (§ 51.1203(d)). June 24, 2016 the NDEP submitted a modeling protocol for Valmy to the EPA. The Modeling Protocol described the NDEP's methodology for conducting the modeling analysis.

The NDEP adopted the modeling approach to characterize the ambient air quality surrounding Valmy, but it firmly believes that modeling is not an appropriate substitute for monitoring for attainment designations (Comments to DDR Docket EPA-HQ-OAR-2013-0711, July 14, 2014), and monitoring data are not available in HA64 to make an attainment or nonattainment designation. Section 107(d)(1)(A)(iii) of the Clean Air Act states that an unclassifiable designation is appropriate for "any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant."

[1] https://www.gpo.gov/fdsys/pkg/FR-2010-06-22/pdf/2010-13947.pdf
[2] https://www.gpo.gov/fdsys/pkg/FR-2015-08-21/pdf/2015-20367.pdf

The DRR also requires for sources proposed to be characterized by modeling, that a modeling analysis be conducted and submitted to the EPA by January 13, 2017 (§ 51.1203(d)(2)) which states that "Modeling analyses shall characterize air quality based on either actual SO_2 emissions from the most recent three years, or on any federally enforceable allowable emission limit or limits established by the air agency or the EPA and that are effective and require compliance by January 13, 2017". The NDEP submitted the modeling analysis to the EPA Region 9 January 4, 2017 with updated recommendations for the hydrographic area HA64 of the State of Nevada to be designated unclassifiable.

NDEP conducted the modeling for Valmy using meteorological data from years 2012, 2013 and 2014 and actual emissions data, Continuous Emission Monitoring System (CEMS), for Boiler Units #1 and #2 from years 2013, 2014, and 2015. The modeling demonstrated that ambient concentrations of SO_2 at Valmy would be below the 3-year average of the annual (99^{th} percentile) daily maximum 1-hour average concentration less than or equal to 75 ppb. The 4^{th} high max daily 1-hour 3-year average value at Valmy was 166 $\mu g/m^3$ (66 ppb), which equates to 85% of the standard.

Per the SO_2 DRR Subpart BB § 51.1205(b) "Ongoing data requirements, for modeled areas", "For any area where modeling of actual SO_2 emissions serve as the basis for designating such area as attainment for the 2010 SO_2 NAAQS, the air agency shall submit an annual report to the EPA Regional Administrator by July 1 of each year, either as a stand-alone document made available for public inspection, or as an appendix to its Annual Monitoring Network Plan (also due on July 1 each year under 40 CFR 58.10), that documents the annual SO_2 emissions of each applicable source in each such area and provides an assessment of the cause of any emissions increase from the previous year. The first report for each such area is due by July 1 of the calendar year after the effective date of the area's initial designation."

EPA completed the third round of sulfur dioxide designations December 21, 2017 and the entire State of Nevada was designated attainment/unclassifiable based on the modeling analysis.

On March 1, 2024, the Public Utility Commission of Nevada approved NV Energy's 5^{th} amendment to its 2021 integrated resource plan. This amended plan includes the conversion of Valmy from coal to natural gas-fired burners, which is expected to be completed in 2026. Once

completed the estimated SO_2 emissions are expected to be 1.48 ton/yr for unit one and 1.96 ton/yr for unit 2.

EMISSION DATA

The initial modeling analysis used annual SO_2 CEMS data from Boilers #1 and #2 from years 2013 through 2015. Boilers #1 and #2 are the main sources of SO_2 emissions at Valmy. Other minor emission units within the facility were modeled using their permitted allowable emissions. No other stationary sources significantly contribute to SO_2 emissions in the area. The table below shows SO_2 CEMS data for Valmy from 2013 through 2024. Annual emissions of SO_2 have shown significant decreases for both Boiler Units #1 and #2 since 2013 and 2014.

Table 4. Annual SO_2 CEMS data (tpy) North Valmy Generating Station Units 1 and 2 for 2013 to 2024 (Air Markets Id 8224)3

Year/ Unit (tpy)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Boiler Unit #1	5,123	6,363	4,470	1,848	1,232	2,357	4,041	1,458	1646	2,722	2,204	2,767
Boiler Unit #2	1,543	1,454	413	431	356	716	517	461	747	736	494	602
Total emissions Units 1 & 2	6,666	7,817	4,883	2,279	1,558	3,073	4,558	1,919	2,393	3,458	2,698	3,369

The annual emissions of SO_2 for 2024 was 3,369 tons, which is an increase from 2023. This is due to an increase in heat input and variation in the SO_2 emissions rate for both Units. The 2024 emissions of SO_2 remain substantially less than the 6,455 tons per year average for 2013 through 2015, used for the modeling analysis, which showed that Valmy was below the 1-hour SO_2 NAAQS. Therefore, the NDEP maintains that no additional modeling is required at this time.

[3] https://ampd.epa.gov/ampd/ (Data taken from the EPA Air Markets Program database and confirmed by review of annual emissions reporting from the source to NDEP)

Appendix C – 2025 Annual Emission Report for Pb Data for Phoenix Mine

In 2023, BAQP was made aware that, according to the 2020 NEI, Phoenix Mine, owned by Newmont – Phoenix Mining Corporation, emitted 1.37 tons of Pb. This exceeded the 0.50 ton per year threshold for Pb sources which triggers ambient air monitoring. After an investigation, it was identified that the Pb emissions were largely from fugitive emissions from mine haul trucks and the methodology for estimating those emissions was overly conservative. It was demonstrated using GPS trackers that the actual miles travelled was one-third of the conservative methodology. Phoenix submitted a corrected Pb emission to the Toxics Release Inventory (TRI) for 2020.

To demonstrate the 2020 NEI was an outlier, NDEP will include Pb emissions from Phoenix Mine in this document through the 2026 Ambient Air Monitoring Network Plan, as agreed with USEPA Region 9. The table below shows the Pb emissions submitted to the TRI and NEI.

Table 5. Annual Pb Emissions for Phoenix Mine Reported to the TRI and NEI

Reporting Year	TRI Tons Pb Emitted	NEI Tons Pb Emitted
2017	No Data	0.16705
2018	0.28665	No Data
2019	0.2817	No Data
2020	0.4565	1.37
2021	0.32318	No Data
2022	0.3347	No Data
2023	0.0805	Not yet available

Since the 2020 NEI data was incorrect, and Phoenix Mine has not exceeded the 0.5 ton per year threshold, Pb monitoring is not required.

Appendix D – 2025 Annual Emission Report for Pb Data for Hawthorne Army Depot New Bomb Facility

In 2023, BAQP was made aware that, according to the 2020 NEI, Hawthorne Army Depot New Bomb Facility exceeded the 0.50 ton per year threshold for Pb sources which triggers ambient air monitoring. As stated in 40 CFR 58 Appendix D Section 4.5(a)(ii), the Regional EPA Administrator may waive this requirement if NDEP can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS, based on historical monitoring data, modeling, or other means.

Hawthorne New Bomb's air permit has a Pb emission limit of 5.4 tons per year. BAQP modeled the 5.4 tons per year Pb emission limit, and it resulted in a maximum Pb concentration in ambient air of approximately 20% of the NAAQS. BAQP submitted a waiver request in August 2024 and received approval from the EPA in October 2024. The waiver request and approval documents are in Appendix E and F respectively. The waiver renewal request is in Appendix G and will also be included in the 2025 Network Assessment. Table 6 shows the annual Pb emissions for Hawthorne New Bomb as reported to the Nevada State and Local Emissions Inventory System (SLEIS).

Table 6. Annual Pb Emissions for Hawthorne New Bomb Reported to the Nevada SLEIS

Reporting Year	SLEIS Tons Pb Emitted
2020	2.46
2021	0.85
2022	0.86
2023	0.35

Appendix E – Request to Waive Pb Monitoring Requirements for Hawthorne Army Depot New Bomb Facility

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Joe Lombardo, *Governor*
James A. Settelmeyer, *Director*
Jennifer L. Carr, *Administrator*

August 26, 2024

Matthew Lakin, Ph.D.
Director, Air and Radiation Division
US EPA, Region 9 (AIR-1)
75 Hawthorne St.
San Francisco, CA 94105

Dear Matthew,

The lead (Pb) monitoring design rule in 40 Code of Federal Regulations (CFR), Part 58 Appendix D Section 4.5(a) requires the Nevada Division of Environmental Protection (NDEP) conduct ambient air Pb monitoring near Pb sources emitting 0.50 or more tons per year. As stated in 40 CFR 58 Appendix D Section 4.5(a)(ii), the Regional EPA Administrator may waive this requirement if NDEP can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the National Ambient Air Quality Standard (NAAQS), based on historical monitoring data, modeling, or other means. Currently in Nevada, the Hawthorne Army Depot New Bomb Facility (Hawthorne) is the only source that meets this requirement.

NDEP conducted air dispersion modeling of Pb emissions at Hawthorne. Modeling indicates the Pb emissions from Hawthorne contribute to less than 50 percent of the NAAQS. The enclosed document details the modeling protocol, including all assumptions and results. Based on the results of this demonstration, NDEP is requesting a waiver to the Pb ambient air quality monitoring requirements at Hawthorne.

If you have any questions concerning the contents of this submittal, please direct them to the state of Nevada's Bureau Chief of Air Quality Planning, Andrew Tucker, at atucker@ndep.nv.gov.

Sincerely,

Jennifer L. Carr, PE, CPM, CEM
Administrator
Nevada Division of Environmental Protection

Air-Dispersion Model Supporting Waiver Request for State Lead Monitoring Requirement at Hawthorne New Bomb Facility, Mineral County, Nevada

June 2024

Bureau of Air Quality Planning

Nevada Division of Environmental Protection

Nevada Department of Conservation and Natural Resources

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Acronyms

ug/m^3	Micrograms(s) Per Cubic Meter
AP	Air Permit
AERMET	AERMOD Meteorological Processor
AERMOD	AMS/EPA Regulatory Model
AERMAP	AERMOD Terrain Processor
AERSURFACE	AERMET Surface Properties Processor
AMS	American Meteorological Society
AQS	Air Quality System
AWS	Automated Weather Station
CA	State of California
CFR	Code of Federal Regulations
DA	Detonation Area
DEM	Digital Elevation Model
DoD	Department of Defense
EM	Excelsior Mountains
EPA	United States Environmental Protection Agency
LEADPOST	AERMOD Lead Postprocessor
LST	Local Standard Time
MMGRMA	Meteorological Monitoring Guidance for Regulatory Modeling Applications
HMA	Hawthorne Municipal Airport
HNB	Hawthorne New Bomb
km	kilometer
m/s	meters per second
NAAQS	National Ambient Air Quality Standard(s)
NAAQMG	Nevada Bureau of Air Quality Planning Ambient Air Quality Monitoring Guidelines
NAC	Nevada Administrative Code
NED	National Elevation Dataset
NDEP	Nevada Division of Environmental Protection

NV	State of Nevada
NLCD	USGS National Land Cover Database
NWS	National Weather Service
SCRAM	Support Center for Regulatory Atmospheric Modeling
SLAMS	State and Local Air Monitoring Station(s)
TSP	Total Suspended Particulates
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WBAN	Weather Bureau Army Navy
WMR	Wassuk Mountain Range
WFV	Whiskey Flat Valley

1. Introduction

On November 12, 2008, the United States Environmental Protection Agency (EPA), modified the lead National Ambient Air Quality Standards (NAAQS) (see 73 FR 66964). Both the primary (health-based) and secondary (welfare-base) standards were modified to a value of 0.15 ug/m^3 (measured as total suspended particulates [TSP]) calculated for a rolling, three-month period. In addition, lead monitoring requirements were added as new design requirements (see 40 CFR Part 58, Appendix D, paragraph 4.5). Currently, these requirements mandate the installation of one or more State and Local Air Monitoring Stations (SLAMS) for each non-airport source having an annual lead emissions inventory of 0.5 tons or greater. This requirement may be waived by the Regional EPA Administrator provided the reviewing agency demonstrates that the facility contributions to ambient-air lead contributions do not exceed 50% of the lead NAAQS (40 CFR Part 58, Appendix D, paragraph 4.5). This demonstration may be based on modeling, historical ambient-air data, or other analysis methods.

The United States Army Depot, Hawthorne New Bomb (HNB) facility, reported 2.46 tons of lead emissions for 2020; consequently, HNB is subject to the aforementioned lead monitoring requirement. The Nevada Division of Environmental Protection (NDEP) is requesting EPA Region 9 administrator to grant a lead monitoring requirement waver for HNB. This request is supported by an ambient-air modeling analysis demonstration, presented in this current report, which indicates that ambient-air impacts from HNB operations are less than 50% of the lead NAAQS.

The presented modeling incorporates guidance provided by the EPA. This guidance includes the latest, final revisions of the following: Dispersion Modeling for Lead (Pb) Sources (U. S. EPA, 2008); The Guideline on Air Quality Models, known as Appendix W, (U. S. EPA, 2017); The User's Guide for the AMS/EPA Regulatory Model (AERMOD) (U. S. EPA, 2023a); The AERMOD Implementation Guide (U. S. EPA, 2023b); and the U. S. EPA's Support Center for Regulatory Atmospheric Modeling (U. S. EPA, 2023c).

2. Source Description

2.1 Geographical and Political Features

The Hawthorne New Bomb facility (HNB) (Nevada Air Quality Permit AP 9711-1134; Facility Identifier A2148) (Nevada Division of Environmental Protection [NDEP], 2023) is in Mineral County, Nevada approximately 10 kilometers from the Nevada/California state border and 35 kilometers south of the town of Hawthorne Nevada (population 3,534) (U. S. Census Bureau, 2022a). This is shown in Figure 1.

Figure 1. Regional Hawthorne New Bomb (HNB) Location.

HNB is surrounded by very sparsely populated, arid land in Mineral County, Nevada and Mono County, California as shown Figure 2. Mineral County's population is 4,552 (U. S. Census Bureau, 2022b), approximately 75% of which reside in the town of Hawthorne, over an area of 9,710 square kilometers. (U. S. Census Bureau, 2022b) This results in an average population density of 0.5 residents per square kilometer. Mono County, California (The county across the Nevada/California border from HNB) has a population of 12,987 over an area of 7,900 square kilometers, resulting in an average population density of 1.6 residents per square kilometer. (U. S. Census Bureau, 2022b). The town of Mammoth Lakes accounts for approximately 60% of the Mono County population (U. S. Census Bureau, 2022a) and is located approximately 65 kilometers southwest of HNB.

The terrain within ten kilometers of HNB boundary is complex as shown in Figure 3. The site is in the foothills of the Wassuk Mountain Range (WMR) which have a topographical relief of about 1,000 meters above the Whiskey Flat Valley (WFV) to the East. The Excelsior Mountains (EM) are opposite of the WMR across the WFV. Together, both the WMR, WFV, and EM are oriented in a roughly northeast-southwest orientation, about 45 degrees east of north at HNB. The WFV is couple of kilometers miles wide at HNB. To the north, the WFV significantly widens as it descends (at a slope of about 30 m/km) toward the town of Hawthorne. To the south by southwest, the WFV floor briefly ascends (at the same slope as to the north) and widens from the "bottleneck" occurring at the HNB before terminating in mountainous terrain. Nevada State Highway 359, which straddles the southeast HNB boundary, travels along the WFV, while connecting the town of Hawthorne to Mono County.

The land use classification near HNB, based on 2016 NLCD United States Geological Survey National Land Cover Database (U. S. Geological Survey [USGS], 2023) , is shown in Figure 4. The surrounding area is primarily composed of two land classifications: "Evergreen Forest" (located in the elevated mountainous terrain) and "Shrub/Scrub" located in the WFV. Sections of "Barren Land (Rock/Sand/Clay)" also appear within HNB, at the location at which HNB conducts ordnance detonations, and other locations surrounding HNB. Nevada State Highway 359 results in the "Developed" classification (with intensity varying from "Open Space" to "High Intensity") being assigned to the highway footprint. Finally, the land classifications "Pasture / Hay" and "Cultivated Crops" are applied to agricultural land approximately ten kilometers northwest of the HNB facility boundary.

Based on the very low level of development near the HNB, based on guidance given by the EPA in Appendix W (U. S. EPA, 2017), any modeling may safely designate HNB and its surroundings as being rural instead of alternative options specifying urban surroundings.

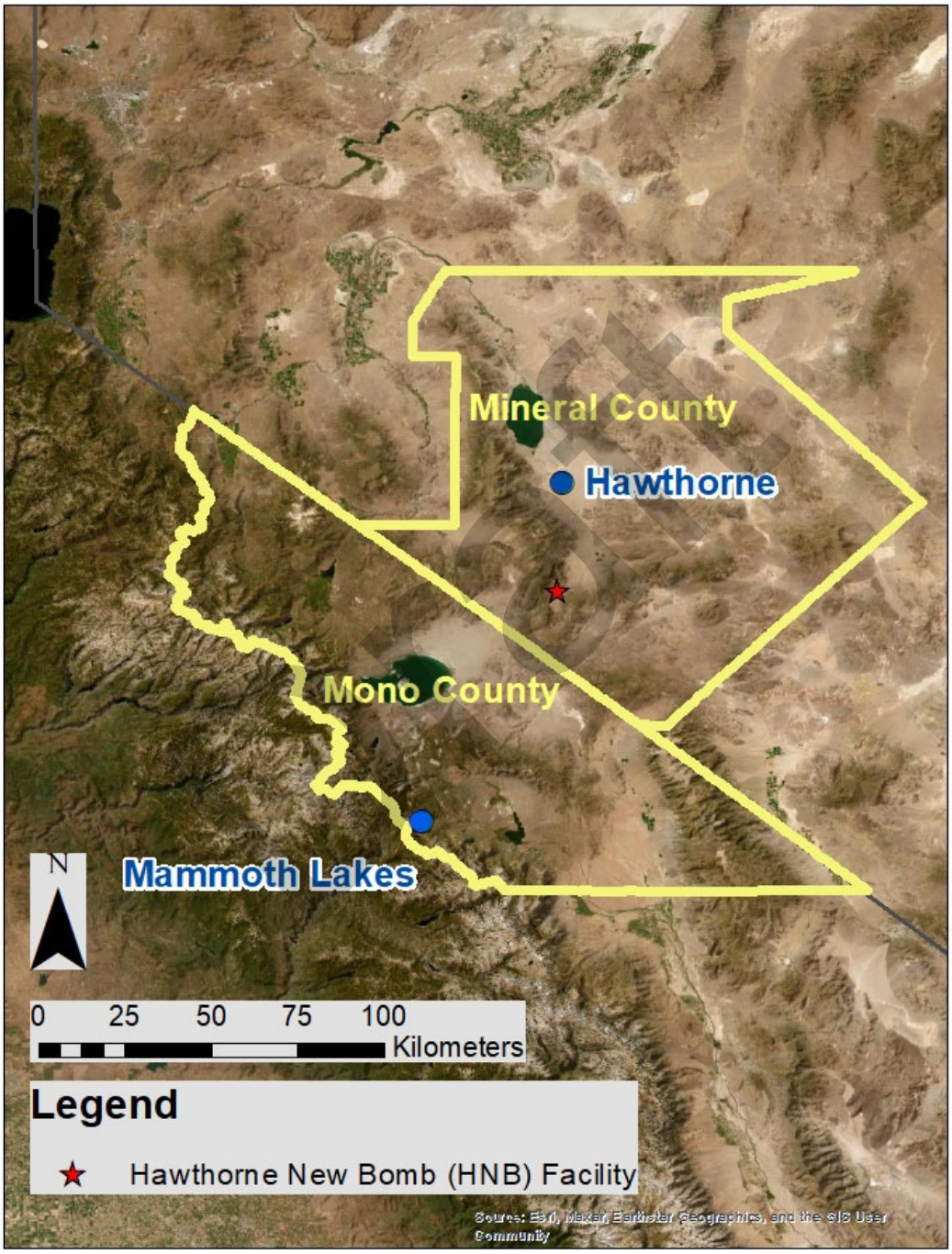

Figure 2. Detailed Hawthorne New Bomb (HNB) Location.

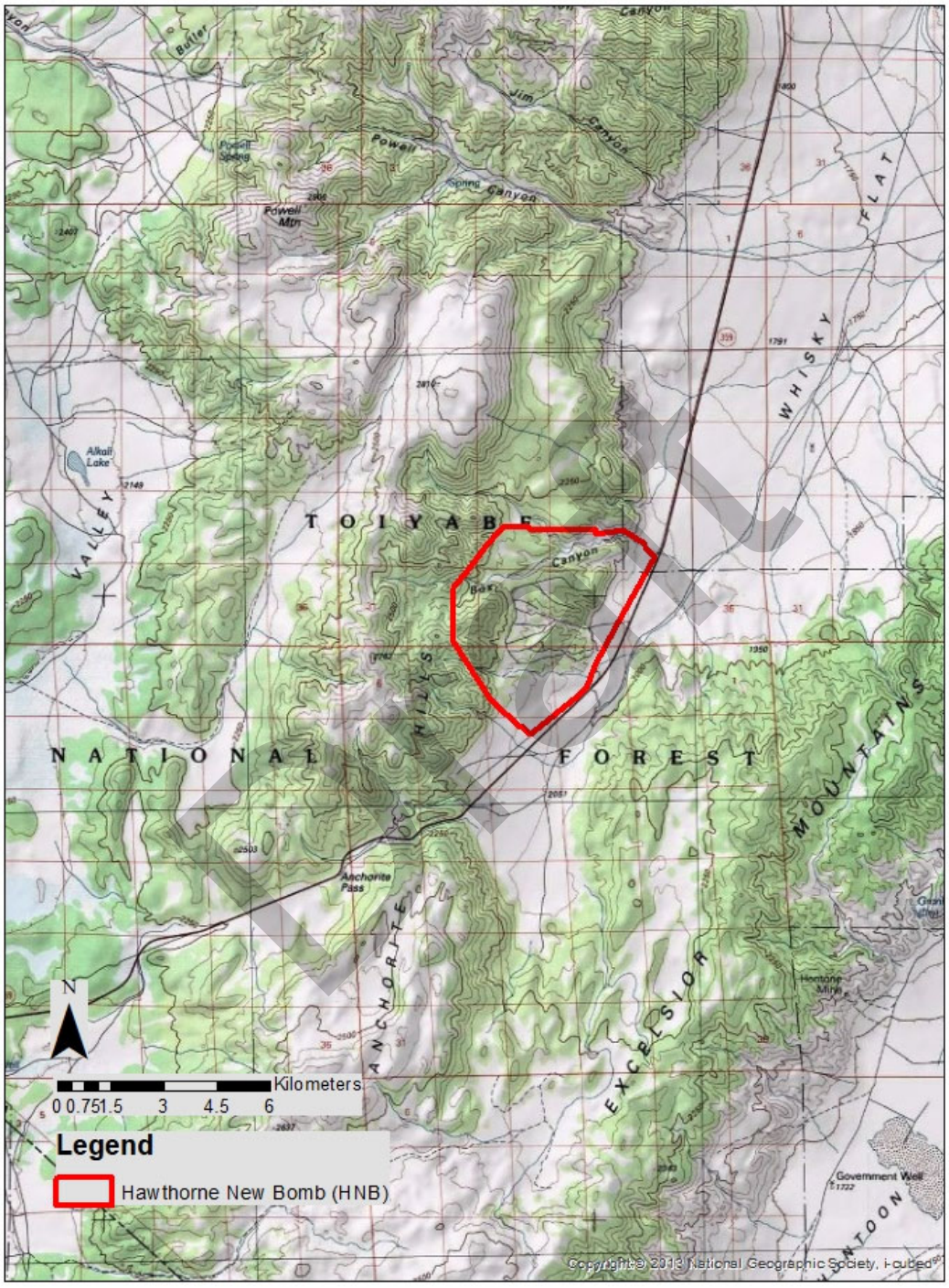

Figure 3. Terrain Surrounding Hawthorne New Bomb (HNB).

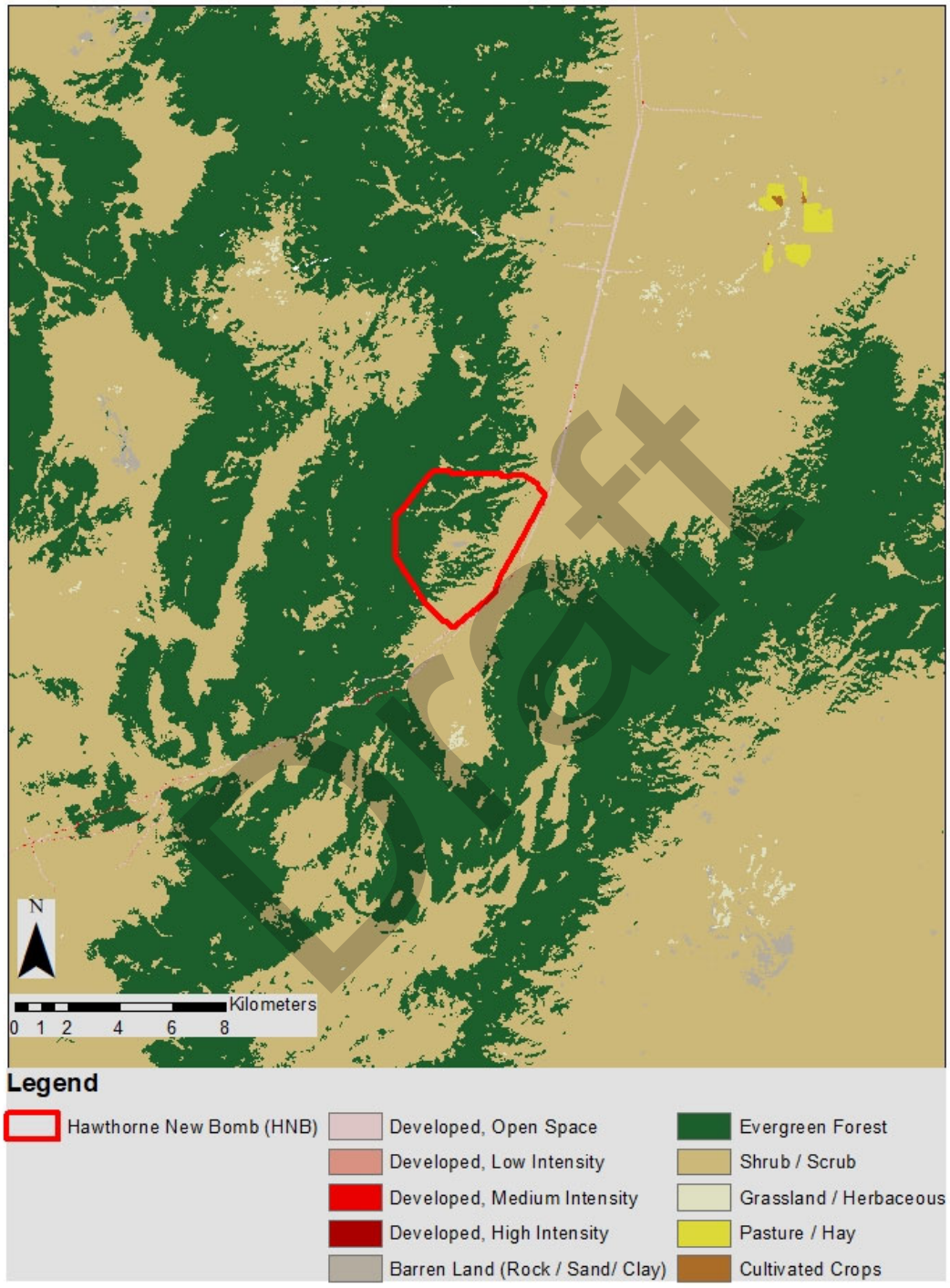

Figure 4. Land Classification Near Hawthorne New Bomb (HNB).

2.2 Facility Characteristics

The operations conditions for the Hawthorne New Bomb (HNB) are presented in the Class II state permit issued by the Nevada Division of Environmental Protection (NDEP) Class II permit (AP 9711-1134; Facility Identifier A2148) (Nevada Division of Environmental Protection [NDEP], 2023). HNB is used to deactivate explosive munitions that are "unserviceable, unstable or where there is no market for reuse, recycling or re-utilization." (Nevada Division of Environmental Protection [NDEP], 2023). The method of deactivation utilized at HNB is detonation. The HNB detonation area covers 743 acres that are contained within the approximately 3,000-acre HNB property. This is shown in Figure 5. Public access is not granted within the HNB property.

The HNB detonation area (DA) is shown in detail in Figure 6. The DA is located on an east-west oriented hill located in a box canyon. There are 20 earthen pits permitted for detonations (10 on the north hillside and the other 20 on the south hillside). Each pit is approximately 20 by 6 feet with a depth of 4 feet. For a detonation event, a utilized pit is filled with waste (disposed munitions) and donor munitions (new munitions to initiate the detonation).

Detonative events are subject to permit conditions limiting operations to specific meteorological conditions (Nevada Division of Environmental Protection [NDEP], 2023). First, detonative activities may only occur during the daylight hours between 9 AM and 30 minutes prior to sunset. In addition, the mean windspeed must be between 3 and 20 miles per hour (1.3 and 8.9 m/s, respectively).

Finally, because of the intermittent and fugitive nature of the facility, along with the varied munition composition, the permit does not contain hourly emission rate limits. Instead, daily detonation throughput limits along with tons per year emission restrictions provide facility operational limits for assurance of NAAQS compliance.

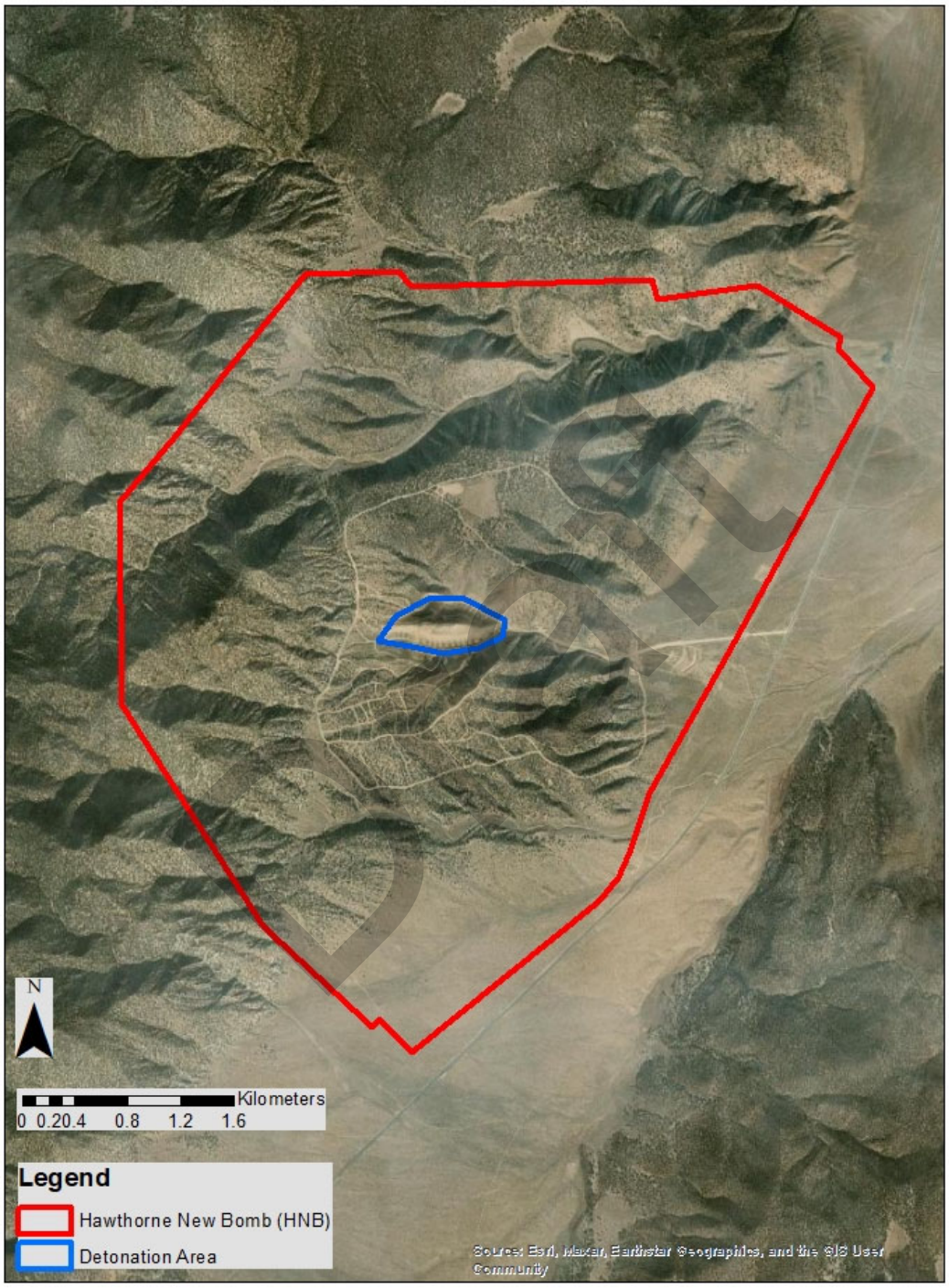

Figure 5. Hawthorne New Bomb (HNB) Detonation Area.

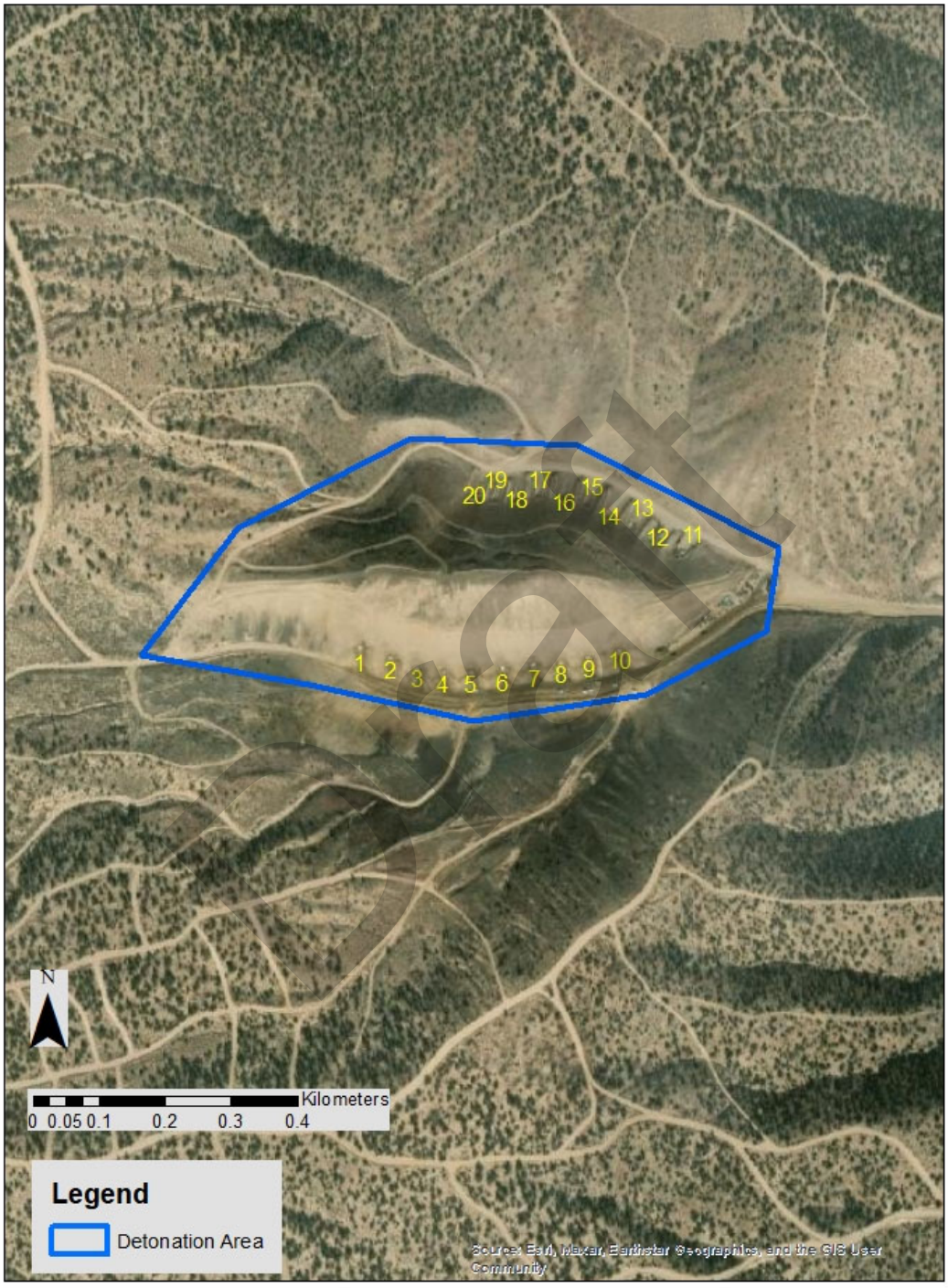

Figure 6. HNB Detonation Area Detail. Detonation pits are numbered in yellow.

3. Model Selection

The American Meteorological Society/EPA Model (AERMOD) is considered as the preferred model for near-field dispersion modeling (U. S. EPA, 2017). Near-field is specified as the area 50 km or from the emission source being modeled. The current AERMOD version 23132 was utilized for the model analysis.

AERMOD contains a suite of preprocessing and postprocessing models relevant to the current work. These are listed in Table 1.

Table 1. AERMOD Pre and Postprocessors.

Processor	Version	AERMOD/AERMET Pre or Postprocessor	Purpose
AERSURFACE	20060	AERMET Preprocessor	Defines surface characteristics, such as Bowen Ratio and Aerodynamic roughness length (U. S. EPA, 2023d).
AERMET	23132	AERMOD Preprocessor	Meteorological model which defines Boundary-Layer parameters, such as Monin-Obukhov length scale, required for AERMOD (U. S. EPA, 2023b).
AERMAP	18081	AERMOD Preprocessor	Terrain Preprocessor. Defines elevation for sources and receptors (U. S. EPA, 2023c).
LEADPOST	13262	AERMOD Postprocessor	Calculates lead NAAQS standard using a monthly average file generated by AERMOD (U. S. EPA, 2023c).

AERSURFACE defines surface characteristics for a meteorological station. It incorporates land use data provided by the United States Geological Survey (USGS). These data include land classification, canopy, and impervious datasets (U. S. EPA, 2023d). For land classification, data from 2001, 2006, 2011, and 2016 are available. This work utilizes the 2016 land classification.

AERMET is the meteorological preprocessor for AERMOD. AERMET utilizes the surface characteristics, such as Bowen ratio and surface roughness, along with meteorological data to calculate boundary-layer parameters pertinent to calculating dispersion in AERMOD. These include parameters such as the Monin-Obukhov length scale.

AERMAP calculates the elevation for receptors, emission sources, and if present buildings. AERMAP uses data from varied sources such as USGS' Digital Elevation Model (DEM) and National Elevation Dataset

(NED). DEM and NED files are available in spatial resolutions varying between 90 and 10 m. This work uses the NED 1 dataset. This dataset has a resolution of about 30 m.

Once AERMOD has calculated ambient-air concentrations, an additional step is needed because AERMOD can calculate monthly averages, not a three-month rolling average, such as the lead NAAQS. Consequently, the LEADPOST post processor is required. LEADPOST uses a file containing monthly concentration averages provided by AERMOD and calculates the design value for lead.

4. Emissions Characterization

Hawthorne New Bomb's (HNB) air permit contains a condition limiting HAP emissions to less than 10 tons per year for each HAP and less than 25 tons per year for all HAPs. Without this HAP emission limit, HNB would be a major source as defined in Nevada Administrative Code (NAC) 445B.094 and required to obtain a Class I (Title V) operating permit. The definition of a "Federally Enforceable Emissions Cap" contained in NAC 445B.070 and the definition of "Potential to Emit" in NAC 445B.138, enable HNB to currently operate as a Class II (State Permit) source as defined in NAC 445B.037 with the HAP emission limit.

The 5.4 tons/year lead emission limit (which is assumed to be comprised of lead compounds) is the difference between the permitted total HAPs emissions (24.9 tons/year) and permitted non-lead HAP, emissions (19.5 tons/year) (Mehrdad Moghimi, 2016).

The 5.4 tons/year emissions are distributed equally for each of the 20 pits. In addition, the emissions are distributed equally among the hours for which detonations are allowed. The permit conditions for determining when detonations are allowed are in Section 2.2.

5. Meteorological Data

5.1 Surface Data

As a permit condition, Hawthorne New Bomb (HNB) conducts onsite meteorological monitoring (Nevada Division of Environmental Protection [NDEP], 2023). The location of the meteorological data site is shown in Figure 7. The site is within the HNB boundary located approximately 1 km north-east of the detonation area. The site consists of a 10 m tower, along with the required solar panels and environmental enclosures (Dennis M. Lundy and Steve Francis, 2021).

The variables measured at HNB include horizontal wind speed and direction, relative humidity, and dry-bulb temperature, as noted in Table 2. The wind rose for HNB is shown in Figure 8. As expected, the predominate wind direction is from the southwest. These observations are consistent with regional scale observations and are parallel/antiparallel to the Whiskey Flat Valley (WFV). The windspeeds vary from 27 m/s to calm (the anemometer threshold speed [0.5 m/s]). The maximum observed windspeeds generally originate from the southwest; however, these high windspeeds are sometimes observed orthogonally to the WFV. Winds originating from the northeast are generally the calmest.

To conduct AERMOD modeling using on-site meteorological data, AERMET must quantify boundary-layer stability. Generally, delta T and incoming short-wave measurements are utilized for this purpose (U. S. EPA, 2023a). Neither of these measurements nor any suitable surrogates are monitored at HNB. However, cloud-cover data, which are suitable for AERMET boundary-layer stability calculation, (such data are generally used with National Weather Service [NWS] data) are available at the Hawthorne Municipal Airport (HMA). These cloud-cover data are used as shown in Table 2. The HMA is located approximately 35 km to the north of HNB as shown in Figure 9.

When utilizing off-site meteorological data, it is important to note any possible non-representativeness caused by the substitution. While 35 km is a small spatial scale compared to regional cloud cover variability, HNB is approximately 900 m higher in elevation than HMA. In addition, HMA is 6 -10 km from Walker Lake and is 50 – 100 m higher (depending on lake level). (HNB is approximately 45 km from Walker Lake and is about 1000 m higher in elevation.) Consequently, HMA is more prone to winter morning fog than HNB. Also, during active weather, cloud cover may vary between HNB and HMA because of the elevation difference. Due to permit restrictions prohibiting denotative actives before 9 AM, during active weather, or when the visibility is less than one mile (Nevada Division of Environmental Protection [NDEP], 2023), the HMA cloud cover data are considered representative of HMB during permitted detonative hours.

The HNB meteorological data were audited and verified to satisfy the standards prescribed in the Meteorological Monitoring guidance for Regulatory Modeling Applications (MMGRMA) (U. S. EPA, 2000) and the Nevada Bureau of Air Quality Planning Ambient Air Quality Monitoring Guidelines (NAAQMG) (Nevada Division of Environmental Protection [NDEP], 2016) The MMGRMA and NAAQMG prescribe anemometer specifications and siting requirements. The NAAQMG combines EPA monitoring guidance from multiple sources into one document. In addition to sensor monitoring requirements, the NAAQMG prescribes audit and verification requirements.

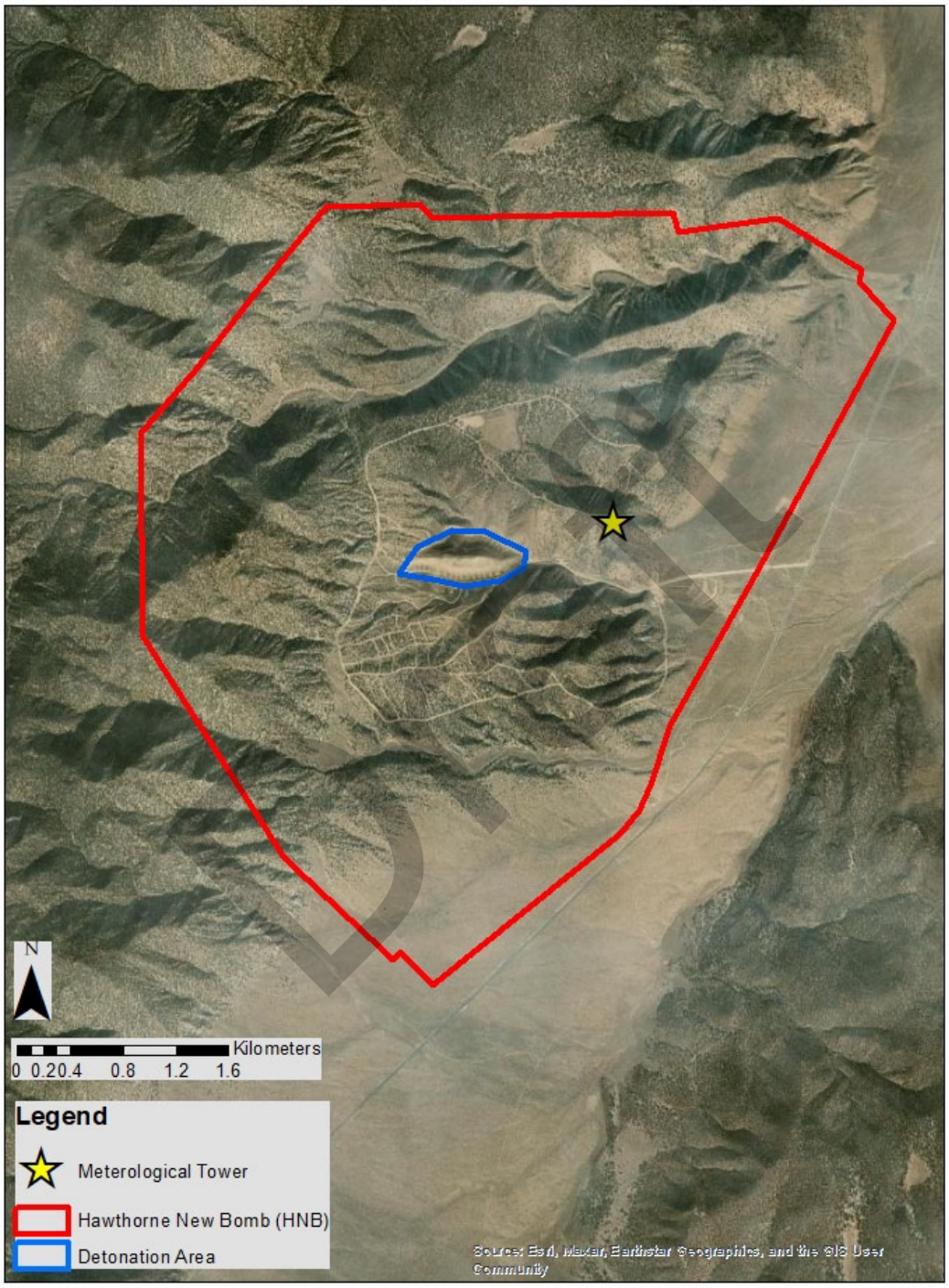

Figure 7. Hawthorne New Bomb (HNB) Meteorological Station Site.

Table 2. Utilized Meteorological Variables with Monitoring Site, Hawthorne New Bomb (HNB) or Hawthorne Municipal Airport (HMA).

Variable	Site	Height Above Ground
Horizontal Windspeed/Direction	HNB	10.0 m
Temperature	HNB	2.0 m
Cloud-Cover	HMA	NA (Profile measurement)
Relative Humidity	HNB	2.0 m

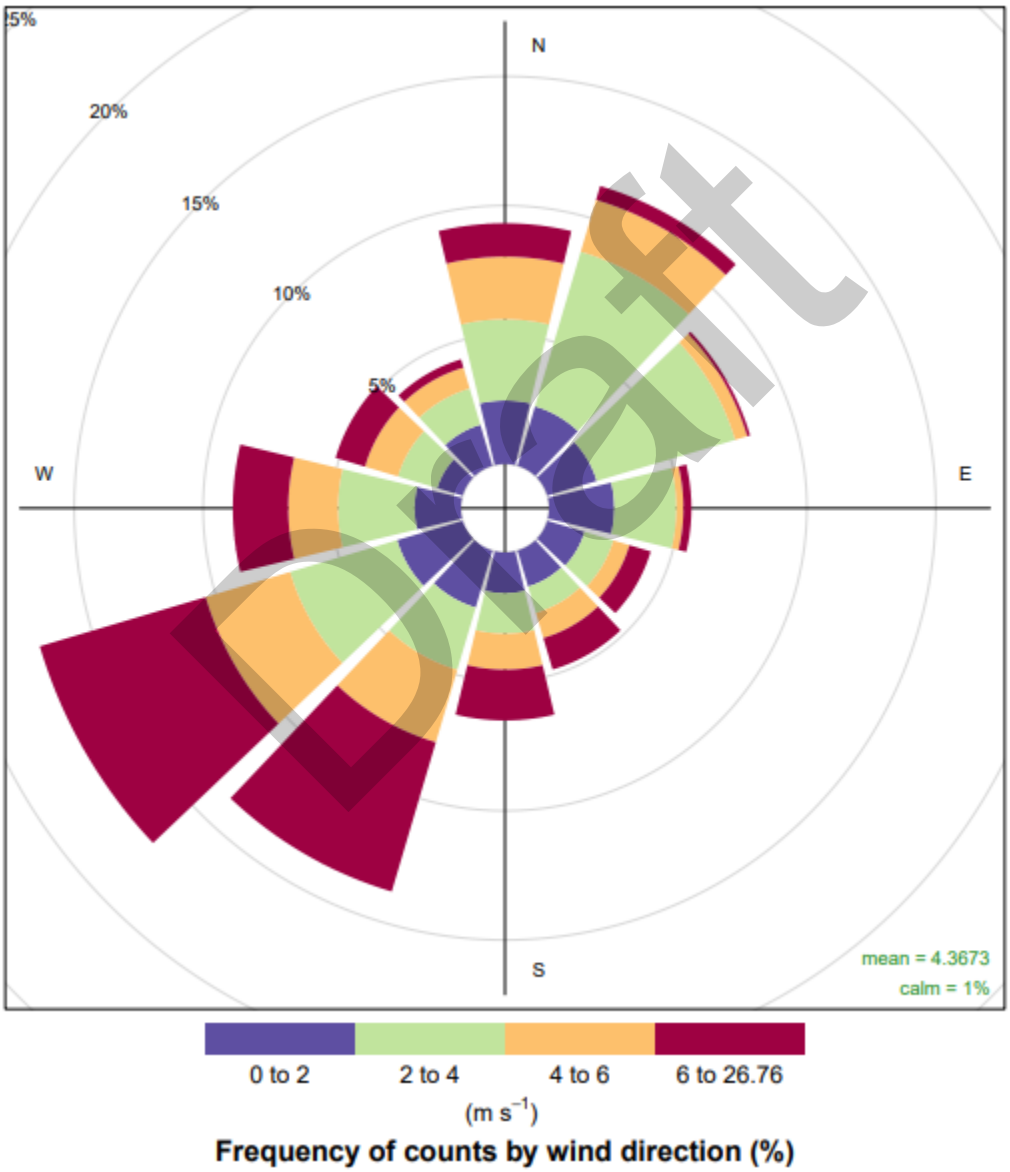

Figure 8. Hawthorne New Bomb (HNB) Wind Rose. (OpenAir R package, University of York and Ricardo Energy & Environment, 2019)

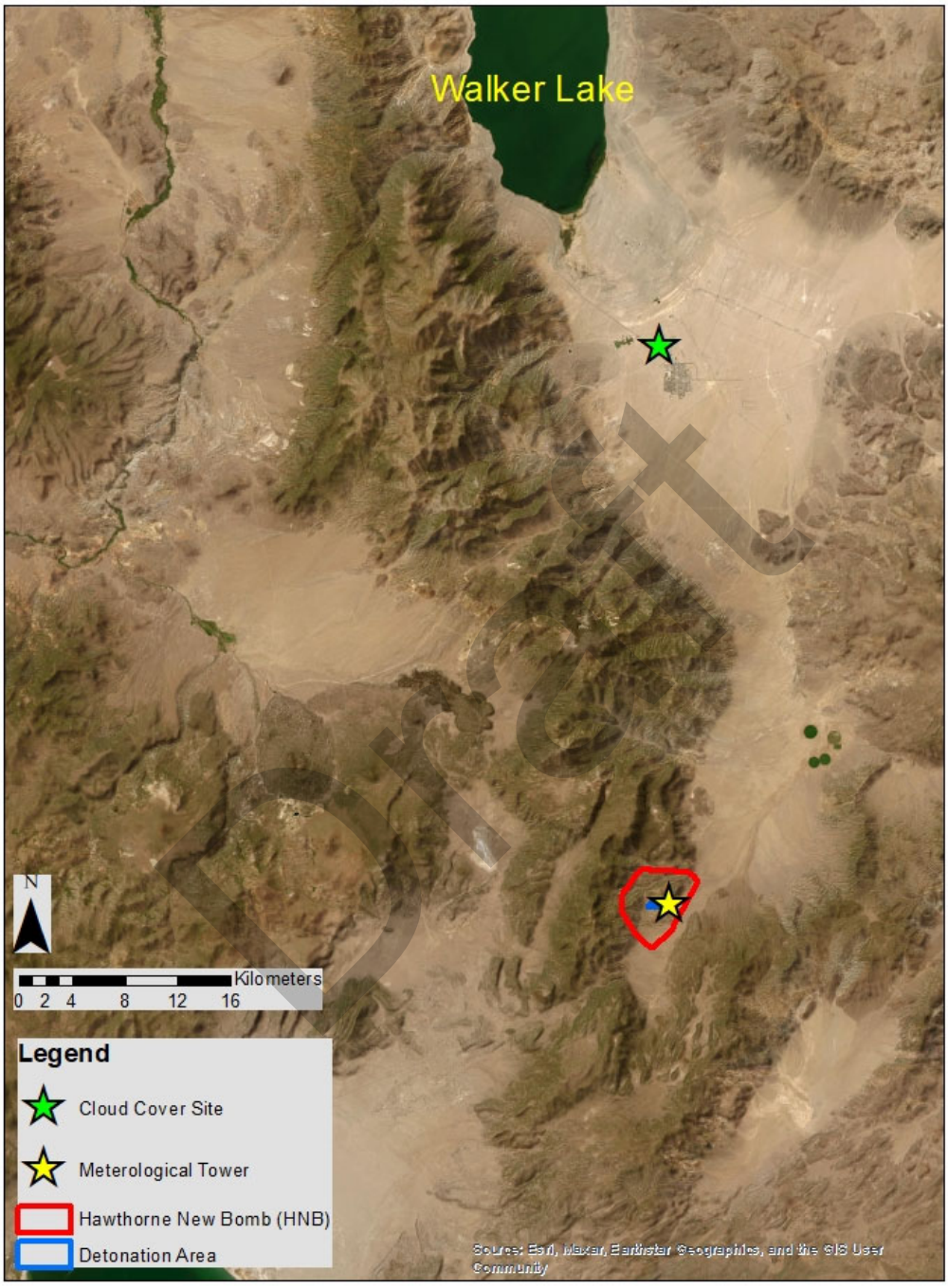

Figure 9. Hawthorne New Bomb (HNB) and Hawthorne Municipal Airport (HMA) Meteorological Sites. All utilized surface meteorological data, except for cloud cover, are from HNB, while cloud cover data are from HMA.

5.2 Upper-Air Data

Two upper-air monitoring sites were considered, Reno and Las Vegas, NV. The location of both sites compared to HNB is shown in Figure 1. The results of the analysis are shown in Table 3.

Table 3. Upper-Air Meteorological Data Stations Considered for Analysis (Underline indicates site considered as best available).

Location	WBAN Code	Distance to Hawthorne New Bomb (HNB)	Topographical similarities/differences (HNB is on the leeward side of the Nevada Sierra mountain range)
Reno, NV	3198	170 km to the northwest	Reno, NV, is on the leeward side of the Nevada Sierra mountain range.
Las Vegas, NV	3120	400 km to the southeast	Las Vegas, NV, is located near isolated, mountain ranges of limited extent compared to the Nevada Sierra.

The upper-air data from Reno, NV, were chosen because of its similar spatial relationship with the Sierra Nevada as that of HNB. In addition, the proximity of Reno to HNB was used as a justification for the choice. The Las Vegas, NV, alternative is farther from HNB and is not located near a mountain range significant as the Sierra Nevada.

6. Receptor Array

The receptor array around Hawthorne New Bomb (HNB) was parameterized to satisfactorily resolve gradients in high-concentration areas and provide coverage over an area for which HNB impacts are significant compared to background concentrations. Specifically:

- Along the fence line, for a depth of 60 m, receptors are placed every 20 m both along and perpendicular to the fence line.
- For a square 36 km^2 area surrounding HNB, receptors were placed every 100 m.
- For a square 1600 km^2 area surrounding HNB, receptors were placed every 500 m.

Per EPA guidelines, areas inaccessible to the public are excluded from modeling consideration (U. S. EPA, 2019). These excluded areas are described as “land owned or controlled by the [stationary] source.” HNB contains locked gates and signage and other measures to deter public access typical at stationary sources. Being a military installation conducting detonations, additional measures unique to DoD facilities are present. To remove the HNB area from consideration, receptors are removed from land belonging to HNB.

A total of 11,664 receptors were utilized. The complete receptor array (the far-field) is shown in Figure 10, while a near-source detailed view is shown in Figure 11.

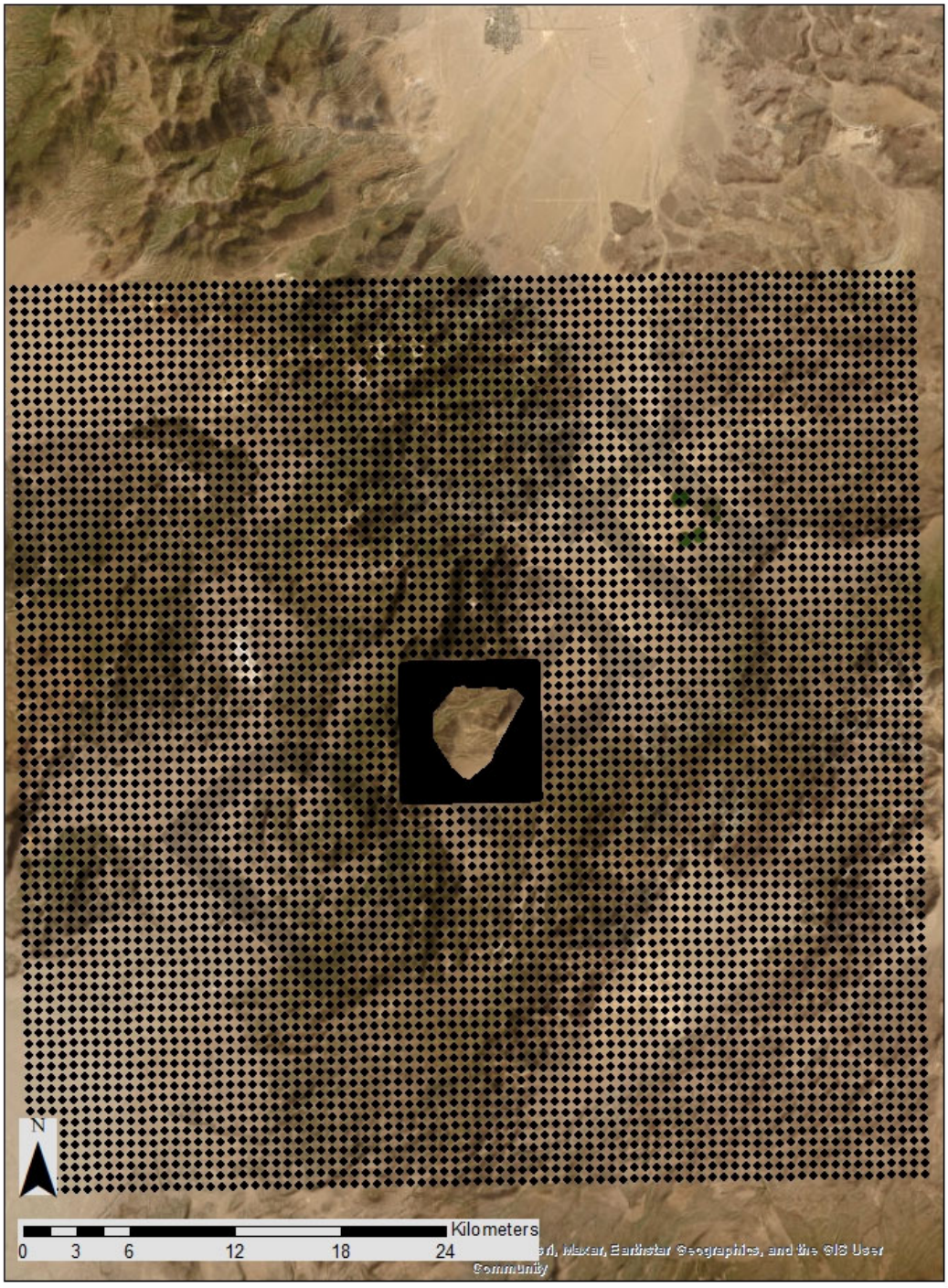

Figure 10. Far-Field Receptor Array for Hawthorne New Bomb (HNB).

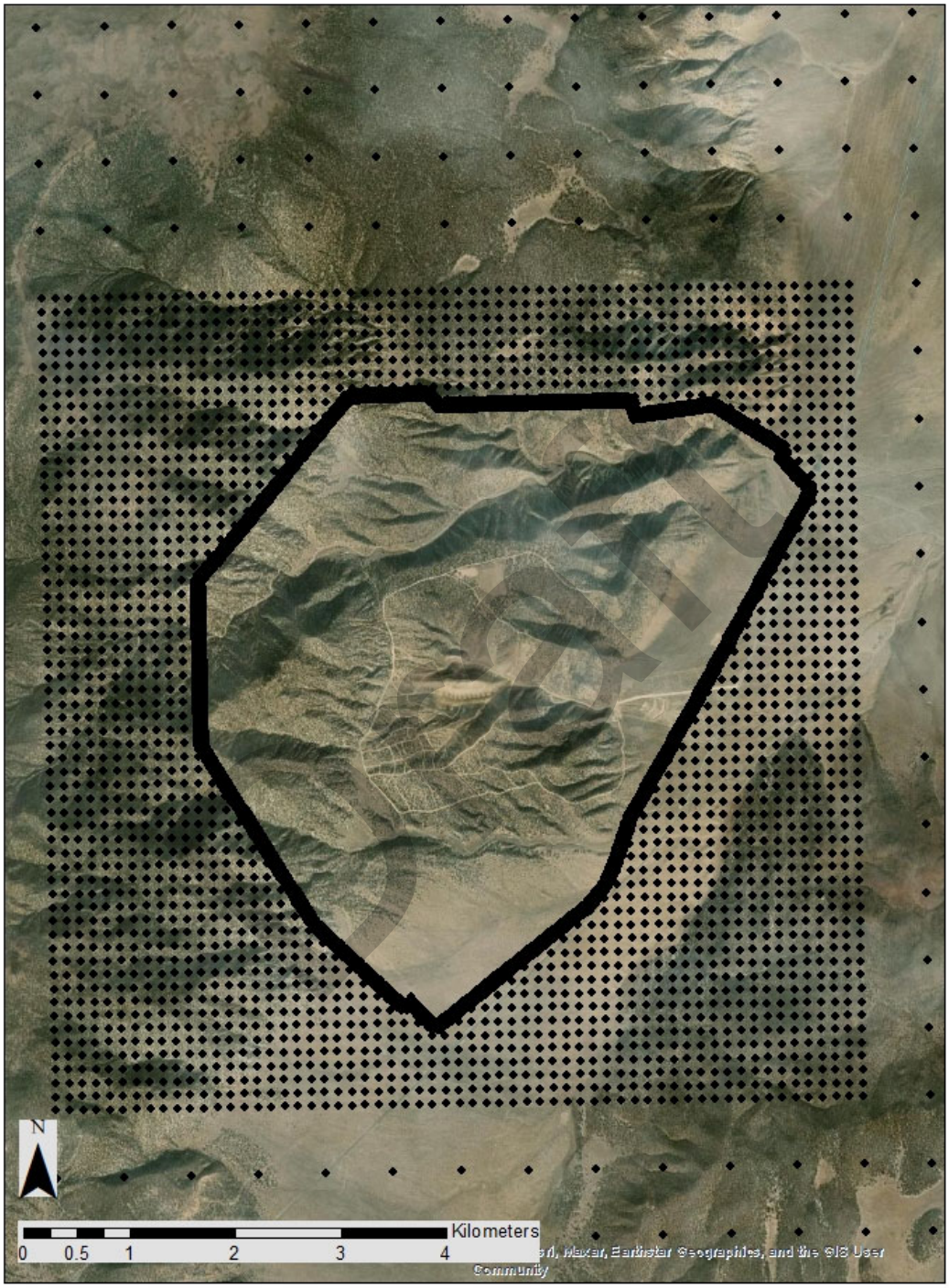

Figure 11. Near-Field Receptor Array for Hawthorne New Bomb (HNB).

7. Background Lead Concentration

To perform a complete modeling analysis, the contribution of sources surrounding Hawthorne New Bomb (HNB), including at the regional scale, must be considered. Because HNB is isolated from other facilities and urban areas, as noted in Section 2.1, local, non-HNB lead emissions are negligible. Lead emissions from permitted stationary sources within 50 km are approximately 0.1 tons/year. Modeling supporting these stationary permits indicates that lead concentrations at HNB are orders of magnitude less than HNB and regional background contributions. Consequently, only the regional background level is considered in this analysis.

To determine a regional background, five upwind monitors located in California were utilized. These monitors were identified by using the EPA AirData Air Quality Monitors Application (U. S. EPA, 2023e) and are shown in Figure 12. These monitors cover an arc located in the California Central Valley. This arc extends from Chico in the north to Bakersfield in the south. All monitors are located 200 – 300 km from Hawthorne New Bomb (HNB) and cover a substantial upwind arc for HNB.

A summary of the retrieved data is included in Table 4. None of the monitors contain data sufficiently complete to calculate the lead NAAQS, a rolling, three-month average. Instead, the annual average of daily averages is reported. The maximum reported annual average of daily averages is used as the regional value for the lead standard. This value was observed in Fresno CA during 2022 and has a value of 0.00751 ug/m^3. This result will be added to the modeled result for determining a complete cumulative analysis.

Table 4. A Summary of Ambient-air Monitors Used to Quantify Regional Lead Background.

Site	Air Quality System(AQS) Code	Latitude	Longitude	Parameter	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2020	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2021	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2022
Bakersfield	06-029-0014	35.3566	-119.063	Lead (TSP)	0.003922 (7)	0.003795 (22)	0.003779 (30)
Fresno	06-019-0011	36.7853	-119.773	Lead (TSP)	0.002931 (7)	0.002447 (17)	**0.00751 (12)**
Stockton	06-077-1003	37.9615	-121.281	Lead (TSP)	NA (0)	0.00333 (5)	0.003815 (30)
Roseville	06-061-0006	38.7464	-121.265	Lead (TSP)	0.001343 (29)	0.000997 (22)	0.001255 (30)
Chico	06-007-0008	39.7616	-121.84	Lead (TSP)	0.001179 (7)	0.001107 (23)	0.001288 (28)

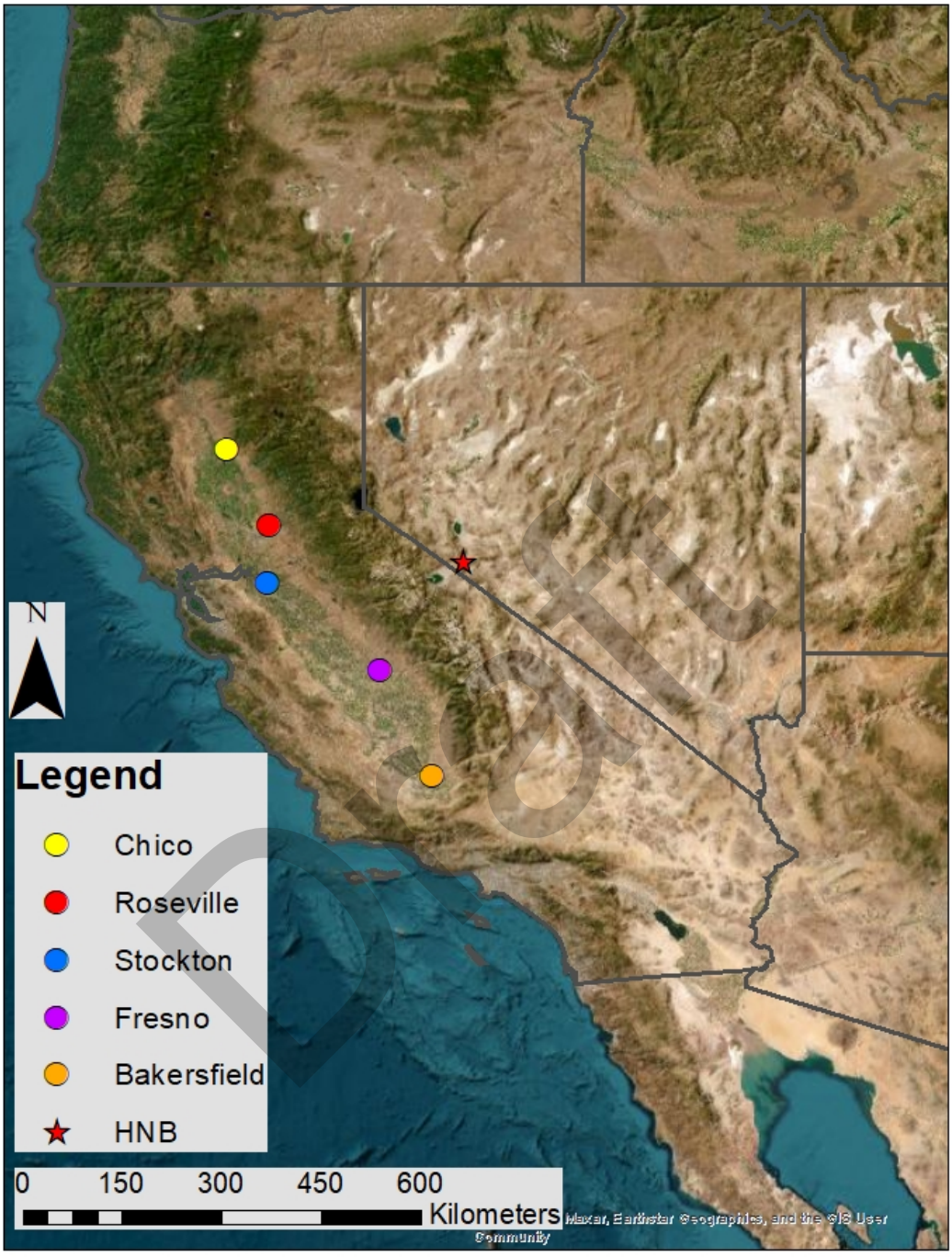

Figure 12. Ambient-air Monitors Utilized for Determining the Regional Background for Lead.

8. Additional Model Parameters

While modeling Hawthorne New Bomb (HNB), several modeling parameters not mentioned in the prior section were defined.

First, due to the nature of detentions, substantial plume rise is observed and provided detailed information regarding mutations, such as heat of combustion, plume rise may be calculated (Strategic Environmental Research and Development Program [SERDP], West Desert Test Center , 1998). However, often the required information is not available; consequently the 20 detention pits are modeled as simple volume sources in AERMOD. The volume parameters are shown in Table 5. Note the release height is much lower than plausible plume-rise heights resulting from detonation; consequently, the calculated ambient-air concentrations are significantly greater than if a more representative plume rise height were utilized (Arya, 2000). Also note that the initial lateral and vertical dimensions are rather small given the volume occupied by the initial detonation. In summary, the chosen volume parameters used in AERMOD are very conservative.

Table 5. AERMOD Source Parameters Used to Model the 20 HNB Detonation Pits.

Source Type	Release Height (m)	Initial Lateral Dimension (m)	Initial Vertical Dimension (m)
Volume	1.0	0.465	0.930

In addition, as noted in Section 2.2, detonation may only occur from 9 AM (LST) to 30 minutes prior to sunset. An addition, the mean windspeed must be between 3 and 20 miles per hour (1.3 and 8.9 m/s). The later restriction can be currently incorporated as an AERMOD input using the WSPEED keyword (U. S. EPA, 2023a); however, currently there is no AERMOD inputs which can modify emissions depending on the time of sunset.

To incorporate the permit restriction, an R code (The R Foundation., 2023a) was written to generate an AERMOD hourly emissions file. This file indicated emissions of 0.0 g/s during hours for which operations were not permitted. During the hours for which emissions were permitted, the permitted tons/year value, documented in Section 4, was evenly distributed. The resulting R code was used to incorporate both the wind speed and hour of day restrictions.

The windspeed restriction used the reported windspeed in the AERMOD surface meteorological file. To calculate the time of sunset, the AERMET subroutine “sundat” (written in Fortran) located in the “mod_pbl.f90” AERMET source file. (The source code for AERMET, along with other regulatory models is available at the EPA SCRAM website (U. S. EPA, 2023c)). The “sundat” subroutine calculates the time of sunrise and sunset along with the hourly solar elevation angle, given the day of year and meteorological station’s longitude and latitude. AERMET uses this information to calculate boundary-layer properties such as Monin-Obukhov length scale. The user, however, generally does not have access to the output data generated by the “sundat” subroutine. To access “sundat” within the R code generating the hourly emissions file indicating permitted detonation hours, R’s C API (The R Foundation., 2023b) was utilized to create a R code which accessed the “sundat” subroutine.

With both permit conditions incorporated into the hourly emissions file, detonations were permitted 2,636 of 8,760 hours for the utilized meteorological data.

9. Modeling Results

The spatial variation of results is shown in Figure 13. Comparatively high concentrations are observed on the northern and southeast facility boundaries. At locations greater than a few km away from the Hawthorne New Bomb (HNB) facility, the calculated ambient-air concentrations are marginally elevated above the regional background lead value determined in Section 7 (0.0075 ug/m^3). The contours indicate that at distances of 10 km and greater, HNB impacts would be undistinguishable from the regional background value.

The maximum modeled concentration occurs along the southeast HNB perimeter at the UTM location indicated in Table 6. At the maximum modeled concentration, the calculated lead NAAQs is greater than the regional background by a factor of approximately 4.5 but is still well below the NAAQS. The cumulative impact indicates a design value which is approximately 20% of the lead NAAQS.

It is important to note that because of conservative assumptions, such as neglecting plume-rise, utilized in Section 8, these modeled values should be sufficiently conservative as an upper-bound estimate instead of a representative number.

Full electronic modeling files, including all model preprocessor, input, and output files are available upon request.

10. Summary

This work documents a model representing a conservative, upper bound estimate for the contributions of Hawthorne New Bomb's (HNB) detonative activities to the ambient-air lead concentrations. The estimate is computed by an AERMOD model using a volume source approximation for the detention pits. The volume source is conservative because plume rise due to the heat of detonation is neglected. Detonation emission limits are provided by permit limits. These limits include not only tons/year, but permissible hours and meteorological conditions for detonative operations. Onsite meteorological data were utilized with cloud cover being substituted from a site approximately 30 km from HNB. Regional background concentrations for lead were obtained from a sensor array of five upwind lead monitors in California's Central Valley. A receptor array comprised of 11,664 covering 1600 km^2 is utilized in the AERMOD model. The model indicates that HNB's detonative activities, including background, are approximately 20% of the lead NAAQS.

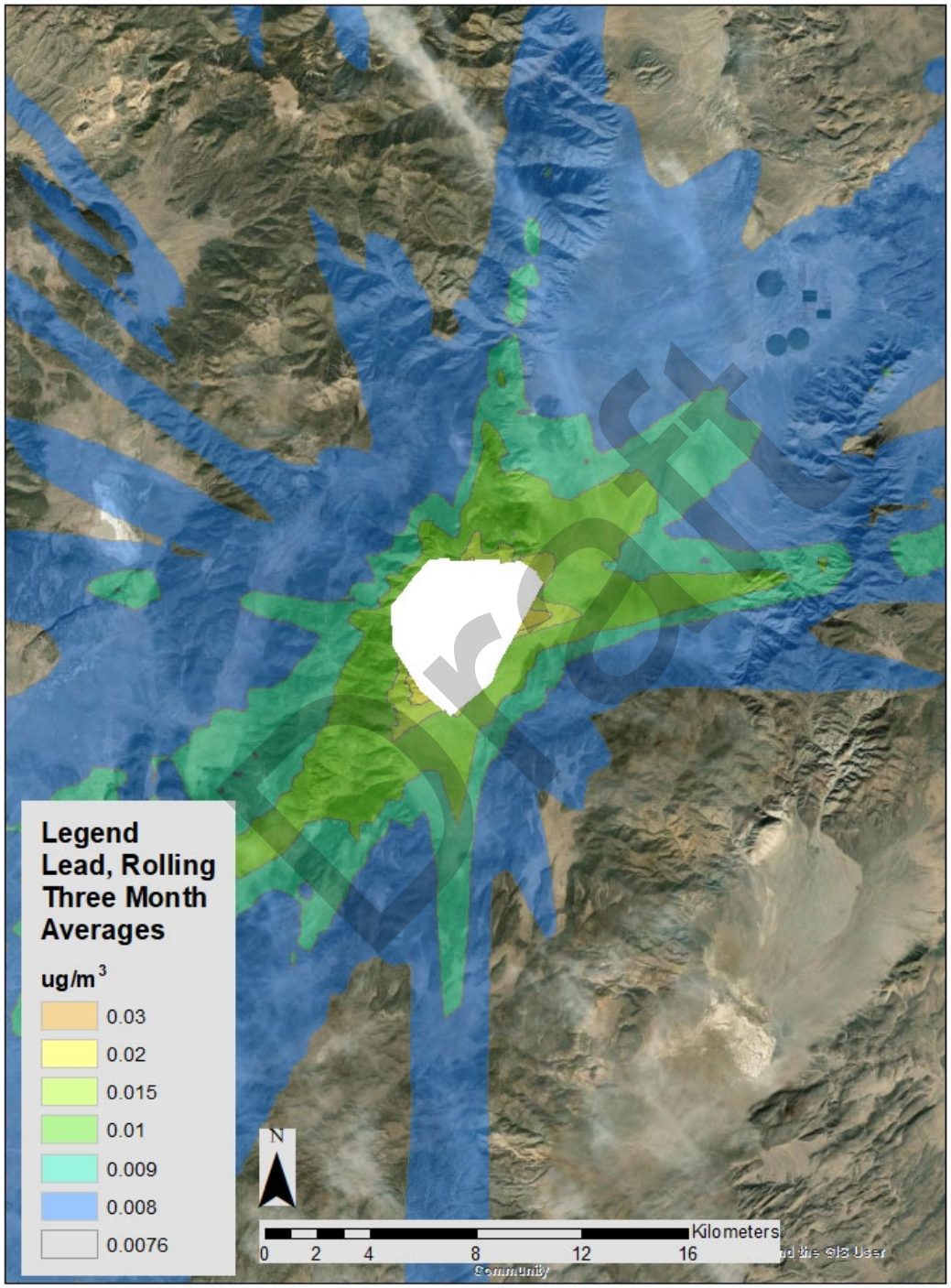

Figure 13. Hawthorne New Bomb (HNB) Lead NAAQS Contours. (Note: the background value is 0.0075 ug/m^3)

Table 6. Summary of Maximum Modeled Concentration.

Location of Observed Maximum (NAD 83, UTM, Zone 11)		Modeled Max 3-Month Average Concentration	Background Concentration	Cumulative Impacts	Percent of NAAQS
Easting	Northing				
(m)	(m)	(ug/m^3)	(ug/m^3)	(ug/m^3)	(%)
358418.56	4234516.50	0.0228067	0.0075100	0.0303167	20.2

11. Conclusions

This work has demonstrated that the upper-bound, conservative, modeled estimate of Hawthorne New Bomb (HNB) impacts to the lead NAAQS, including the regional background, are less than the 50% threshold indicated in (40 CFR Part 58, Appendix D, paragraph 4.5). This value is an upper bound because of the neglecting of plume rise, which generally reduces ambient-air concentrations (Arya, 2000). Consequently, NDEP is requesting the EPA Region 9 administrator to wave the SLAMs ambient-air monitoring requirement for HNB.

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Appendix F – EPA Approval of Pb Monitoring Waiver for Hawthorne Army Depot New Bomb Facility

C. Approval of Pb waiver for the Hawthorne Army Depot New Bomb Facility

This enclosure provides the U.S. Environmental Protection Agency's (EPA) review and approval for the Nevada Division of Environmental Protection (NDEP) request to waive lead (Pb) monitoring near Pb sources emitting 0.5 or more tons per year for the Hawthorne Army Depot New Bomb Facility (Hawthorne) source in Hawthorne, NV. Pb monitoring is required when sources may contribute to a Pb concentration that exceeds the 2008 Pb National Ambient Air Quality Standards (NAAQS), however, per 40 CFR 58 Appendix D, Section 4.5(a)(ii), the EPA may waive the monitoring requirement if "the State or, where appropriate, or local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means)."

To support this request, NDEP provided detailed a modeling report for this facility. NDEP used the most recent versions of AERMOD (23132), the recommended model for the near-field, and its associated preprocessing programs. NDEP based emissions inputs for the model on the Nevada state permit's annual Potential to Emit, evenly distributed among the 20 detonation pits at the facility. NDEP developed an hourly emissions input file for AERMOD that reflected permit conditions restricting detonations to daylight hours and moderate wind speeds. NDEP documented the representativeness and quality of the meteorological data used in the model, combining meteorological data from an on-site station with cloud-cover data from a nearby station. The receptor array (locations at which to calculate concentrations) was suitably dense, with spacing as low as 20 m near the facility. For source characterization, NDEP defined volume sources to represent the pits, using a low release height of 1 m and small initial vertical and horizontal dimensions of 2 m, which provided conservatism to the impact estimates. The maximum concentration found was 0.03 $\mu g/m^3$, about 20 percent of the 2008 3-month Pb NAAQS. The EPA believes that the modeling procedures followed were reasonable and provide a conservative estimate of Pb concentrations contributed by the facility. Based on this analysis, the EPA has determined that the waiver request demonstrates the Hawthorne facility will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS. Therefore, in accordance with 40 CFR part 58, appendix D, section 4.5(a)(ii), EPA approves a waiver for the ambient air Pb monitoring near this source which would have otherwise been required by 40 CFR part 58, appendix D, section 4.5(a).

Please include the waiver request and this enclosure in next year's NDEP annual network plan and per 40 CFR §58.10(b)(10), in all future annual network plans, include the date the waiver was approved. Finally, please note that per 40 CFR 58 Appendix D, Section 4.5(a)(ii) this waiver needs to be renewed every 5 years as part of the network assessment.

Appendix G – Request to Renew Pb Monitoring Waiver for Hawthorne Army Depot New Bomb Facility

NEVADA DIVISION OF
ENVIRONMENTAL PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Joe Lombardo, *Governor*
James A. Settelmeyer, *Director*
Jennifer L. Carr, *Administrator*

June 30, 2025

Matthew Lakin, Ph.D.
Director, Air and Radiation Division
US EPA, Region 9 (AIR-1)
75 Hawthorne St.
San Francisco, CA 94105

Dear Matthew,

The lead (Pb) monitoring design rule in 40 Code of Federal Regulations (CFR), Part 58 Appendix D Section 4.5(a) requires the Nevada Division of Environmental Protection (NDEP) conduct ambient air Pb monitoring near Pb sources emitting 0.50 or more tons per year. As stated in 40 CFR 58 Appendix D Section 4.5(a)(ii), the Regional EPA Administrator may waive this requirement if NDEP can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the National Ambient Air Quality Standard (NAAQS), based on historical monitoring data, modeling, or other means. Currently in Nevada, the Hawthorne Army Depot New Bomb Facility (Hawthorne) is the only source that meets this requirement.

In October 2024, EPA Region 9 approved NDEP's request to waive Pb monitoring requirements for Hawthorne. As part of the Network Assessment every five years, NDEP is required to reevaluate the facility and, if warranted, request renewal of the Pb monitoring waiver. The permitted Pb emissions used in NDEP's initial air dispersion modeling have not changed, so a new modeling assessment is not necessary. Modeling indicates the Pb emissions from Hawthorne contribute to less than 50 percent of the NAAQS. The enclosed document details the modeling protocol, including all assumptions and results.

Based on the results of this demonstration, NDEP respectfully requests your approval to extend the Pb monitoring waiver for Hawthorne. If you have any questions concerning the contents of this submittal, please direct them to the state of Nevada's Bureau Chief of Air Quality Planning, Andrew Tucker, at atucker@ndep.nv.gov.

Sincerely,

Jennifer L. Carr, PE, CPM, CEM
Administrator
Nevada Division of Environmental Protection

Air-Dispersion Model Supporting Waiver Request for State Lead Monitoring Requirement at Hawthorne New Bomb Facility, Mineral County, Nevada

June 2024

Bureau of Air Quality Planning

Nevada Division of Environmental Protection

Nevada Department of Conservation and Natural Resources

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Acronyms

ug/m^3	Micrograms(s) Per Cubic Meter
AP	Air Permit
AERMET	AERMOD Meteorological Processor
AERMOD	AMS/EPA Regulatory Model
AERMAP	AERMOD Terrain Processor
AERSURFACE	AERMET Surface Properties Processor
AMS	American Meteorological Society
AQS	Air Quality System
AWS	Automated Weather Station
CA	State of California
CFR	Code of Federal Regulations
DA	Detonation Area
DEM	Digital Elevation Model
DoD	Department of Defense
EM	Excelsior Mountains
EPA	United States Environmental Protection Agency
LEADPOST	AERMOD Lead Postprocessor
LST	Local Standard Time
MMGRMA	Meteorological Monitoring Guidance for Regulatory Modeling Applications
HMA	Hawthorne Municipal Airport
HNB	Hawthorne New Bomb
km	kilometer
m/s	meters per second
NAAQS	National Ambient Air Quality Standard(s)
NAAQMG	Nevada Bureau of Air Quality Planning Ambient Air Quality Monitoring Guidelines
NAC	Nevada Administrative Code
NED	National Elevation Dataset
NDEP	Nevada Division of Environmental Protection

NV	State of Nevada
NLCD	USGS National Land Cover Database
NWS	National Weather Service
SCRAM	Support Center for Regulatory Atmospheric Modeling
SLAMS	State and Local Air Monitoring Station(s)
TSP	Total Suspended Particulates
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WBAN	Weather Bureau Army Navy
WMR	Wassuk Mountain Range
WFV	Whiskey Flat Valley

1. Introduction

On November 12, 2008, the United States Environmental Protection Agency (EPA), modified the lead National Ambient Air Quality Standards (NAAQS) (see 73 FR 66964). Both the primary (health-based) and secondary (welfare-base) standards were modified to a value of 0.15 ug/m^3 (measured as total suspended particulates [TSP]) calculated for a rolling, three-month period. In addition, lead monitoring requirements were added as new design requirements (see 40 CFR Part 58, Appendix D, paragraph 4.5). Currently, these requirements mandate the installation of one or more State and Local Air Monitoring Stations (SLAMS) for each non-airport source having an annual lead emissions inventory of 0.5 tons or greater. This requirement may be waived by the Regional EPA Administrator provided the reviewing agency demonstrates that the facility contributions to ambient-air lead contributions do not exceed 50% of the lead NAAQS (40 CFR Part 58, Appendix D, paragraph 4.5). This demonstration may be based on modeling, historical ambient-air data, or other analysis methods.

The United States Army Depo, Hawthorne New Bomb (HNB) facility, reported 2.46 tons of lead emissions for 2020; consequently, HNB is subject to the aforementioned lead monitoring requirement. The Nevada Division of Environmental Protection (NDEP) is requesting EPA Region 9 administrator to grant a lead monitoring requirement waver for HNB. This request is supported by an ambient-air modeling analysis demonstration, presented in this current report, which indicates that ambient-air impacts from HNB operations are less than 50% of the lead NAAQS.

The presented modeling incorporates guidance provided by the EPA. This guidance includes the latest, final revisions of the following: Dispersion Modeling for Lead (Pb) Sources (U. S. EPA, 2008); The Guideline on Air Quality Models, known as Appendix W, (U. S. EPA, 2017); The User's Guide for the AMS/EPA Regulatory Model (AERMOD) (U. S. EPA, 2023a); The AERMOD Implementation Guide (U. S. EPA, 2023b); and the U. S. EPA's Support Center for Regulatory Atmospheric Modeling (U. S. EPA, 2023c).

2. Source Description

2.1 Geographical and Political Features

The Hawthorne New Bomb facility (HNB) (Nevada Air Quality Permit AP 9711-1134; Facility Identifier A2148) (Nevada Division of Environmental Protection [NDEP], 2023) is in Mineral County, Nevada approximately 10 kilometers from the Nevada/California state border and 35 kilometers south of the town of Hawthorne Nevada (population 3,534) (U. S. Census Bureau, 2022a). This is shown in Figure 1.

Figure 1. Regional Hawthorne New Bomb (HNB) Location.

HNB is surrounded by very sparsely populated, arid land in Mineral County, Nevada and Mono County, California as shown Figure 2. Mineral County's population is 4,552 (U. S. Census Bureau, 2022b), approximately 75% of which reside in the town of Hawthorne, over an area of 9,710 square kilometers. (U. S. Census Bureau, 2022b) This results in an average population density of 0.5 residents per square kilometer. Mono County, California (The county across the Nevada/California border from HNB) has a population of 12,987 over an area of 7,900 square kilometers, resulting in an average population density of 1.6 residents per square kilometer. (U. S. Census Bureau, 2022b). The town of Mammoth Lakes accounts for approximately 60% of the Mono County population (U. S. Census Bureau, 2022a) and is located approximately 65 kilometers southwest of HNB.

The terrain within ten kilometers of HNB boundary is complex as shown in Figure 3. The site is in the foothills of the Wassuk Mountain Range (WMR) which have a topographical relief of about 1,000 meters above the Whiskey Flat Valley (WFV) to the East. The Excelsior Mountains (EM) are opposite of the WMR across the WFV. Together, both the WMR, WFV, and EM are oriented in a roughly northeast-southwest orientation, about 45 degrees east of north at HNB. The WFV is couple of kilometers miles wide at HNB. To the north, the WFV significantly widens as it descends (at a slope of about 30 m/km) toward the town of Hawthorne. To the south by southwest, the WFV floor briefly ascends (at the same slope as to the north) and widens from the "bottleneck" occurring at the HNB before terminating in mountainous terrain. Nevada State Highway 359, which straddles the southeast HNB boundary, travels along the WFV, while connecting the town of Hawthorne to Mono County.

The land use classification near HNB, based on 2016 NLCD United States Geological Survey National Land Cover Database (U. S. Geological Survey [USGS], 2023) , is shown in Figure 4. The surrounding area is primarily composed of two land classifications: "Evergreen Forest" (located in the elevated mountainous terrain) and "Shrub/Scrub" located in the WFV. Sections of "Barren Land (Rock/Sand/Clay)" also appear within HNB, at the location at which HNB conducts ordnance detonations, and other locations surrounding HNB. Nevada State Highway 359 results in the "Developed" classification (with intensity varying from "Open Space" to "High Intensity") being assigned to the highway footprint. Finally, the land classifications "Pasture / Hay" and "Cultivated Crops" are applied to agricultural land approximately ten kilometers northwest of the HNB facility boundary.

Based on the very low level of development near the HNB, based on guidance given by the EPA in Appendix W (U. S. EPA, 2017), any modeling may safely designate HNB and its surroundings as being rural instead of alternative options specifying urban surroundings.

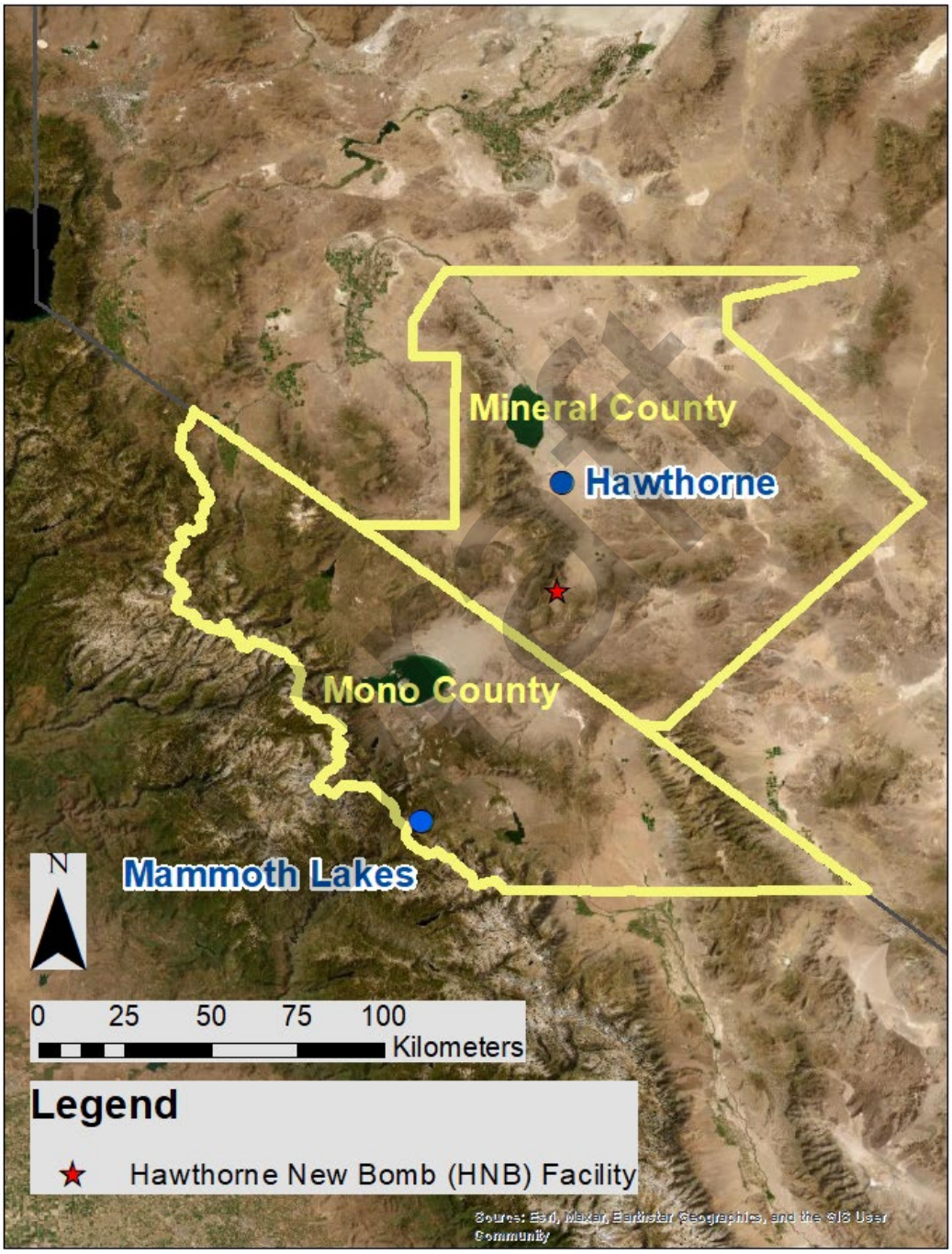

Figure 2. Detailed Hawthorne New Bomb (HNB) Location.

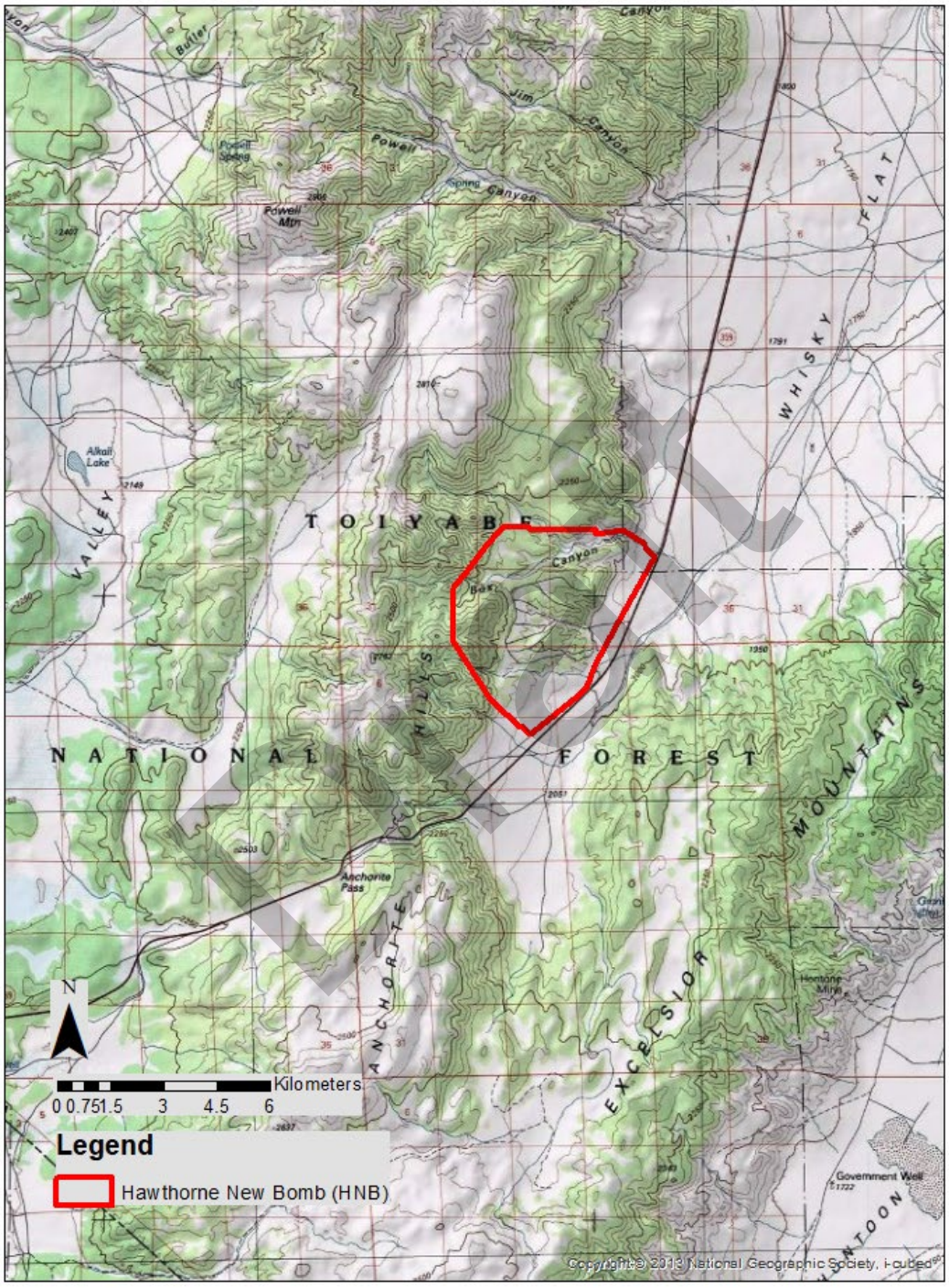

Figure 3. Terrain Surrounding Hawthorne New Bomb (HNB).

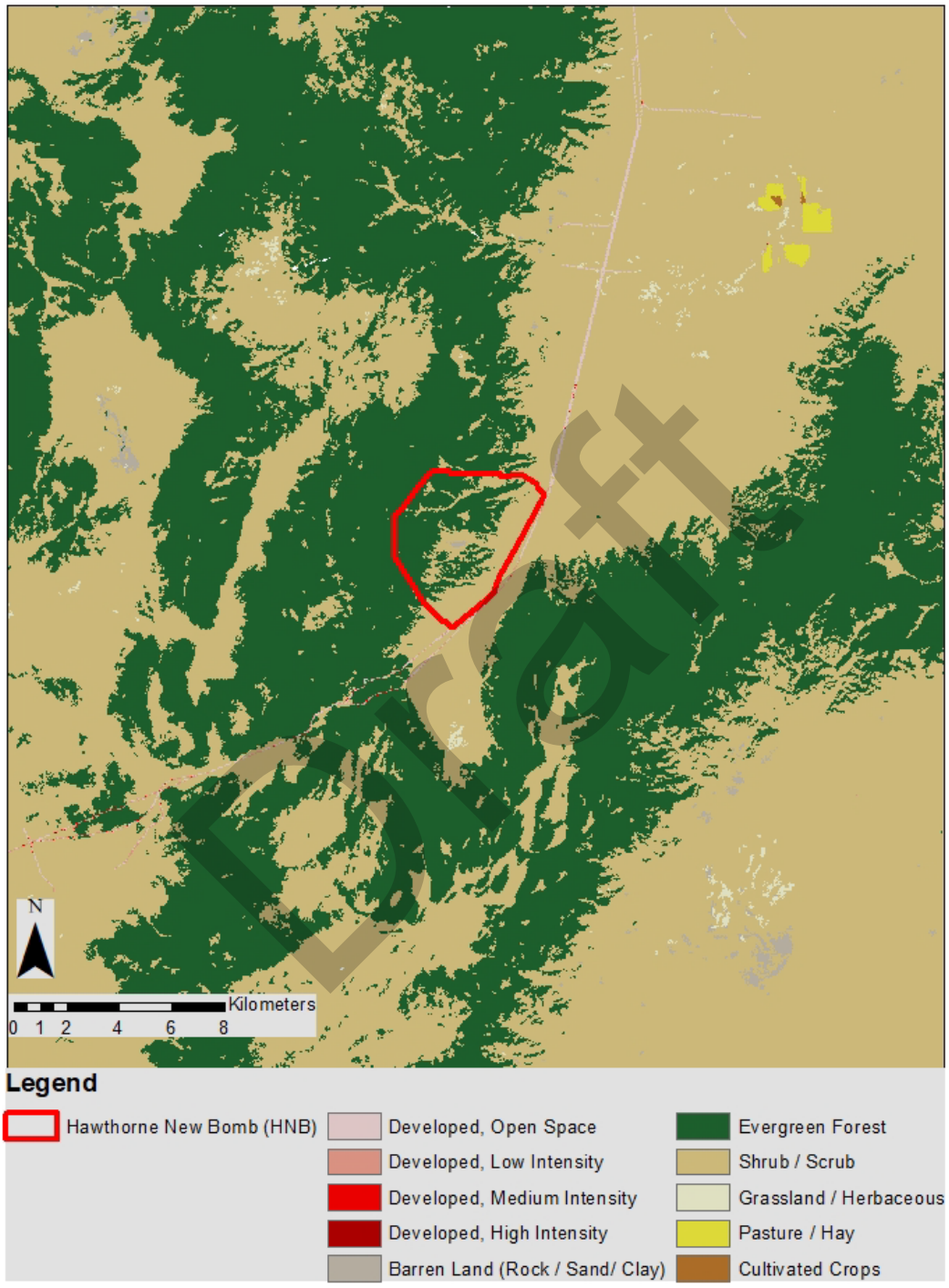

Figure 4. Land Classification Near Hawthorne New Bomb (HNB).

2.2 Facility Characteristics

The operations conditions for the Hawthorne New Bomb (HNB) are presented in the Class II state permit issued by the Nevada Division of Environmental Protection (NDEP) Class II permit (AP 9711-1134; Facility Identifier A2148) (Nevada Division of Environmental Protection [NDEP], 2023). HNB is used to deactivate explosive munitions that are "unserviceable, unstable or where there is no market for reuse, recycling or re-utilization." (Nevada Division of Environmental Protection [NDEP], 2023). The method of deactivation utilized at HNB is detonation. The HNB detonation area covers 743 acres that are contained within the approximately 3,000-acre HNB property. This is shown in Figure 5. Public access is not granted within the HNB property.

The HNB detonation area (DA) is shown in detail in Figure 6. The DA is located on an east-west oriented hill located in a box canyon. There are 20 earthen pits permitted for detonations (10 on the north hillside and the other 20 on the south hillside). Each pit is approximately 20 by 6 feet with a depth of 4 feet. For a detonation event, a utilized pit is filled with waste (disposed munitions) and donor munitions (new munitions to initiate the detonation).

Detonative events are subject to permit conditions limiting operations to specific meteorological conditions (Nevada Division of Environmental Protection [NDEP], 2023). First, detonative activities may only occur during the daylight hours between 9 AM and 30 minutes prior to sunset. In addition, the mean windspeed must be between 3 and 20 miles per hour (1.3 and 8.9 m/s, respectively).

Finally, because of the intermittent and fugitive nature of the facility, along with the varied munition composition, the permit does not contain hourly emission rate limits. Instead, daily detonation throughput limits along with tons per year emission restrictions provide facility operational limits for assurance of NAAQS compliance.

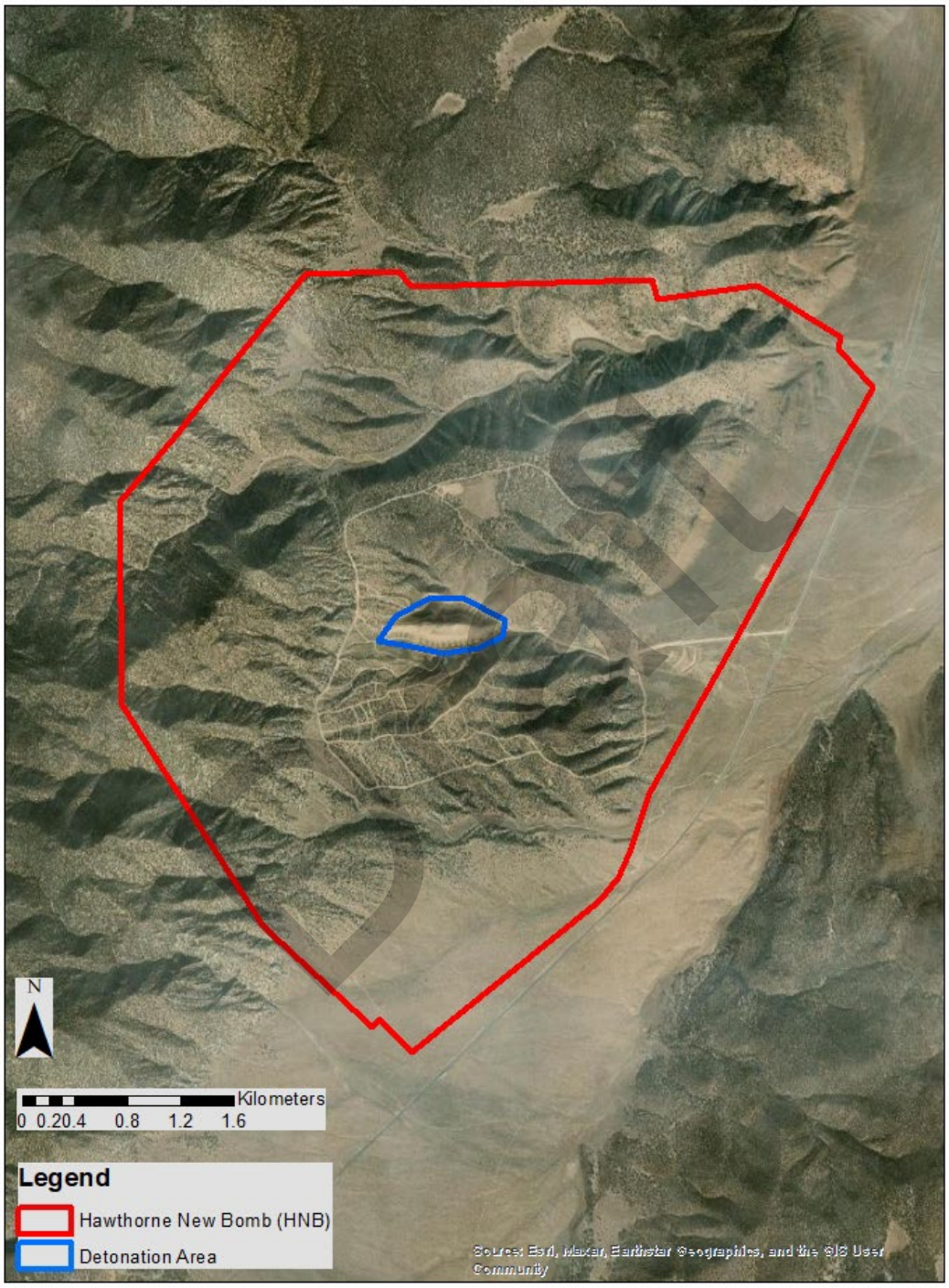

Figure 5. Hawthorne New Bomb (HNB) Detonation Area.

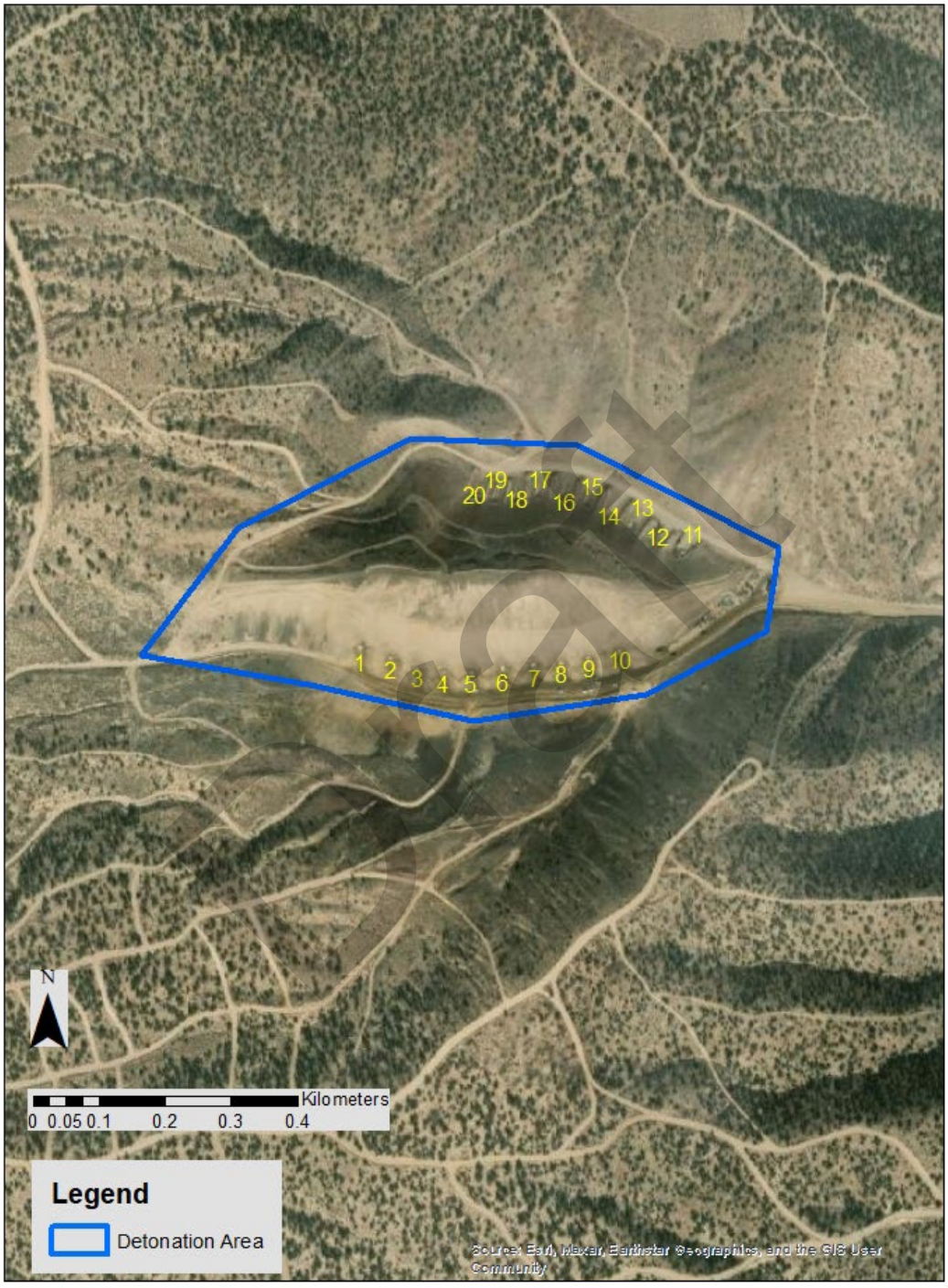

Figure 6. HNB Detonation Area Detail. Detonation pits are numbered in yellow.

3. Model Selection

The American Meteorological Society/EPA Model (AERMOD) is considered as the preferred model for near-field dispersion modeling (U. S. EPA, 2017). Near-field is specified as the area 50 km or from the emission source being modeled. The current AERMOD version 23132 was utilized for the model analysis.

AERMOD contains a suite of preprocessing and postprocessing models relevant to the current work. These are listed in Table 1.

Table 1. AERMOD Pre and Postprocessors.

Processor	Version	AERMOD/AERMET Pre or Postprocessor	Purpose
AERSURFACE	20060	AERMET Preprocessor	Defines surface characteristics, such as Bowen Ratio and Aerodynamic roughness length (U. S. EPA, 2023d).
AERMET	23132	AERMOD Preprocessor	Meteorological model which defines Boundary-Layer parameters, such as Monin-Obukhov length scale, required for AERMOD (U. S. EPA, 2023b).
AERMAP	18081	AERMOD Preprocessor	Terrain Preprocessor. Defines elevation for sources and receptors (U. S. EPA, 2023c).
LEADPOST	13262	AERMOD Postprocessor	Calculates lead NAAQS standard using a monthly average file generated by AERMOD (U. S. EPA, 2023c).

AERSURFACE defines surface characteristics for a meteorological station. It incorporates land use data provided by the United States Geological Survey (USGS). These data include land classification, canopy, and impervious datasets (U. S. EPA, 2023d). For land classification, data from 2001, 2006, 2011, and 2016 are available. This work utilizes the 2016 land classification.

AERMET is the meteorological preprocessor for AERMOD. AERMET utilizes the surface characteristics, such as Bowen ratio and surface roughness, along with meteorological data to calculate boundary-layer parameters pertinent to calculating dispersion in AERMOD. These include parameters such as the Monin-Obukhov length scale.

AERMAP calculates the elevation for receptors, emission sources, and if present buildings. AERMAP uses data from varied sources such as USGS' Digital Elevation Model (DEM) and National Elevation Dataset

(NED). DEM and NED files are available in spatial resolutions varying between 90 and 10 m. This work uses the NED 1 dataset. This dataset has a resolution of about 30 m.

Once AERMOD has calculated ambient-air concentrations, an additional step is needed because AERMOD can calculate monthly averages, not a three-month rolling average, such as the lead NAAQS. Consequently, the LEADPOST post processor is required. LEADPOST uses a file containing monthly concentration averages provided by AERMOD and calculates the design value for lead.

4. Emissions Characterization

Hawthorne New Bomb's (HNB) air permit contains a condition limiting HAP emissions to less than 10 tons per year for each HAP and less than 25 tons per year for all HAPs. Without this HAP emission limit, HNB would be a major source as defined in Nevada Administrative Code (NAC) 445B.094 and required to obtain a Class I (Title V) operating permit. The definition of a "Federally Enforceable Emissions Cap" contained in NAC 445B.070 and the definition of "Potential to Emit" in NAC 445B.138, enable HNB to currently operate as a Class II (State Permit) source as defined in NAC 445B.037 with the HAP emission limit.

The 5.4 tons/year lead emission limit (which is assumed to be comprised of lead compounds) is the difference between the permitted total HAPs emissions (24.9 tons/year) and permitted non-lead HAP, emissions (19.5 tons/year) (Mehrdad Moghimi, 2016).

The 5.4 tons/year emissions are distributed equally for each of the 20 pits. In addition, the emissions are distributed equally among the hours for which detonations are allowed. The permit conditions for determining when detonations are allowed are in Section 2.2.

5. Meteorological Data

5.1 Surface Data

As a permit condition, Hawthorne New Bomb (HNB) conducts onsite meteorological monitoring (Nevada Division of Environmental Protection [NDEP], 2023). The location of the meteorological data site is shown in Figure 7. The site is within the HNB boundary located approximately 1 km north-east of the detonation area. The site consists of a 10 m tower, along with the required solar panels and environmental enclosures (Dennis M. Lundy and Steve Francis, 2021).

The variables measured at HNB include horizontal wind speed and direction, relative humidity, and dry-bulb temperature, as noted in Table 2. The wind rose for HNB is shown in Figure 8. As expected, the predominate wind direction is from the southwest. These observations are consistent with regional scale observations and are parallel/antiparallel to the Whiskey Flat Valley (WFV). The windspeeds vary from 27 m/s to calm (the anemometer threshold speed [0.5 m/s]). The maximum observed windspeeds generally originate from the southwest; however, these high windspeeds are sometimes observed orthogonally to the WFV. Winds originating from the northeast are generally the calmest.

To conduct AERMOD modeling using on-site meteorological data, AERMET must quantify boundary-layer stability. Generally, delta T and incoming short-wave measurements are utilized for this purpose (U. S. EPA, 2023a). Neither of these measurements nor any suitable surrogates are monitored at HNB. However, cloud-cover data, which are suitable for AERMET boundary-layer stability calculation, (such data are generally used with National Weather Service [NWS] data) are available at the Hawthorne Municipal Airport (HMA). These cloud-cover data are used as shown in Table 2. The HMA is located approximately 35 km to the north of HNB as shown in Figure 9.

When utilizing off-site meteorological data, it is important to note any possible non-representativeness caused by the substitution. While 35 km is a small spatial scale compared to regional cloud cover variability, HNB is approximately 900 m higher in elevation than HMA. In addition, HMA is 6 -10 km from Walker Lake and is 50 – 100 m higher (depending on lake level). (HNB is approximately 45 km from Walker Lake and is about 1000 m higher in elevation.) Consequently, HMA is more prone to winter morning fog than HNB. Also, during active weather, cloud cover may vary between HNB and HMA because of the elevation difference. Due to permit restrictions prohibiting denotative actives before 9 AM, during active weather, or when the visibility is less than one mile (Nevada Division of Environmental Protection [NDEP], 2023), the HMA cloud cover data are considered representative of HMB during permitted detonative hours.

The HNB meteorological data were audited and verified to satisfy the standards prescribed in the Meteorological Monitoring guidance for Regulatory Modeling Applications (MMGRMA) (U. S. EPA, 2000) and the Nevada Bureau of Air Quality Planning Ambient Air Quality Monitoring Guidelines (NAAQMG) (Nevada Division of Environmental Protection [NDEP], 2016) The MMGRMA and NAAQMG prescribe anemometer specifications and siting requirements. The NAAQMG combines EPA monitoring guidance from multiple sources into one document. In addition to sensor monitoring requirements, the NAAQMG prescribes audit and verification requirements.

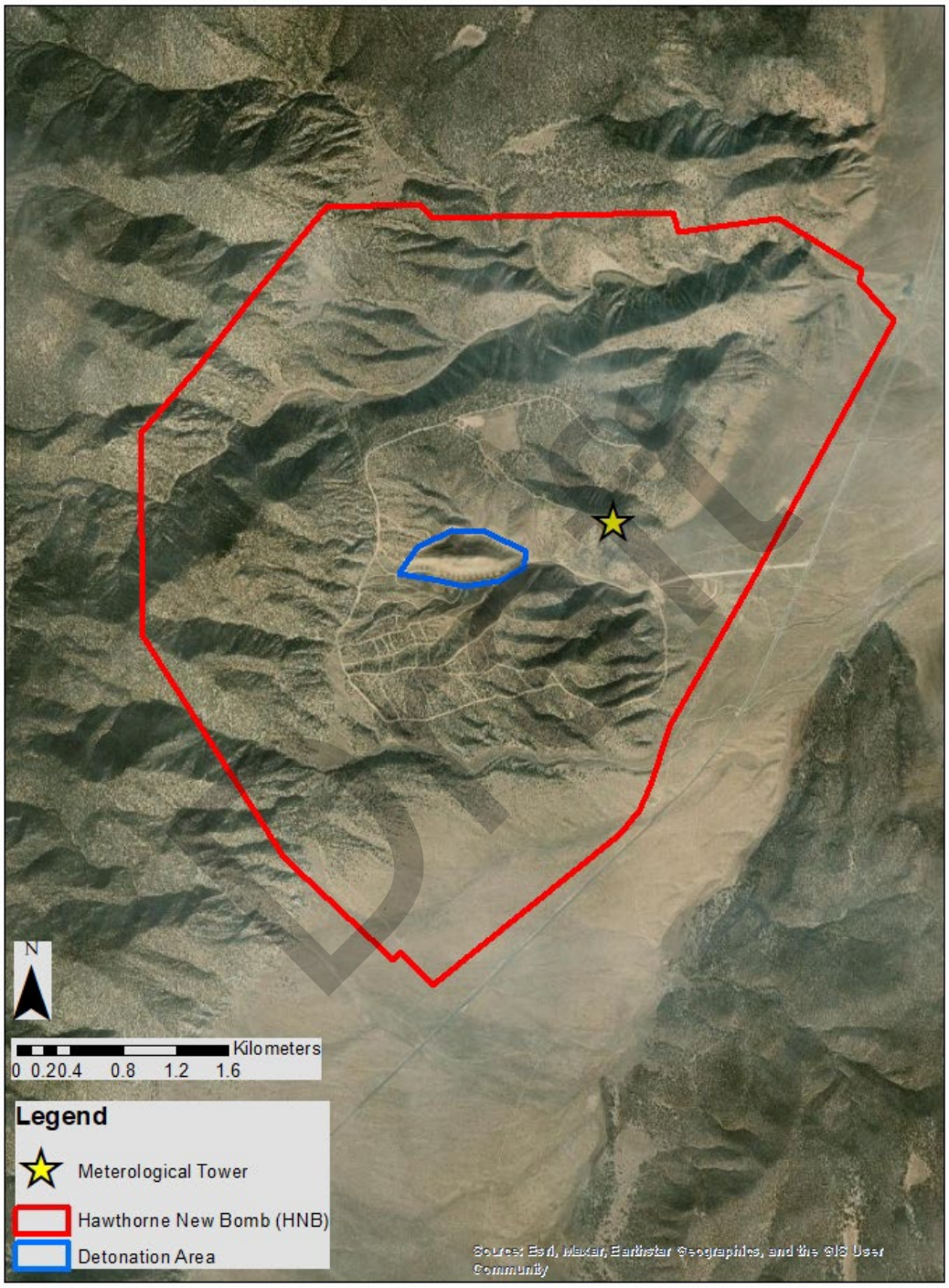

Figure 7. Hawthorne New Bomb (HNB) Meteorological Station Site.

Table 2. Utilized Meteorological Variables with Monitoring Site, Hawthorne New Bomb (HNB) or Hawthorne Municipal Airport (HMA).

Variable	Site	Height Above Ground
Horizontal Windspeed/Direction	HNB	10.0 m
Temperature	HNB	2.0 m
Cloud-Cover	HMA	NA (Profile measurement)
Relative Humidity	HNB	2.0 m

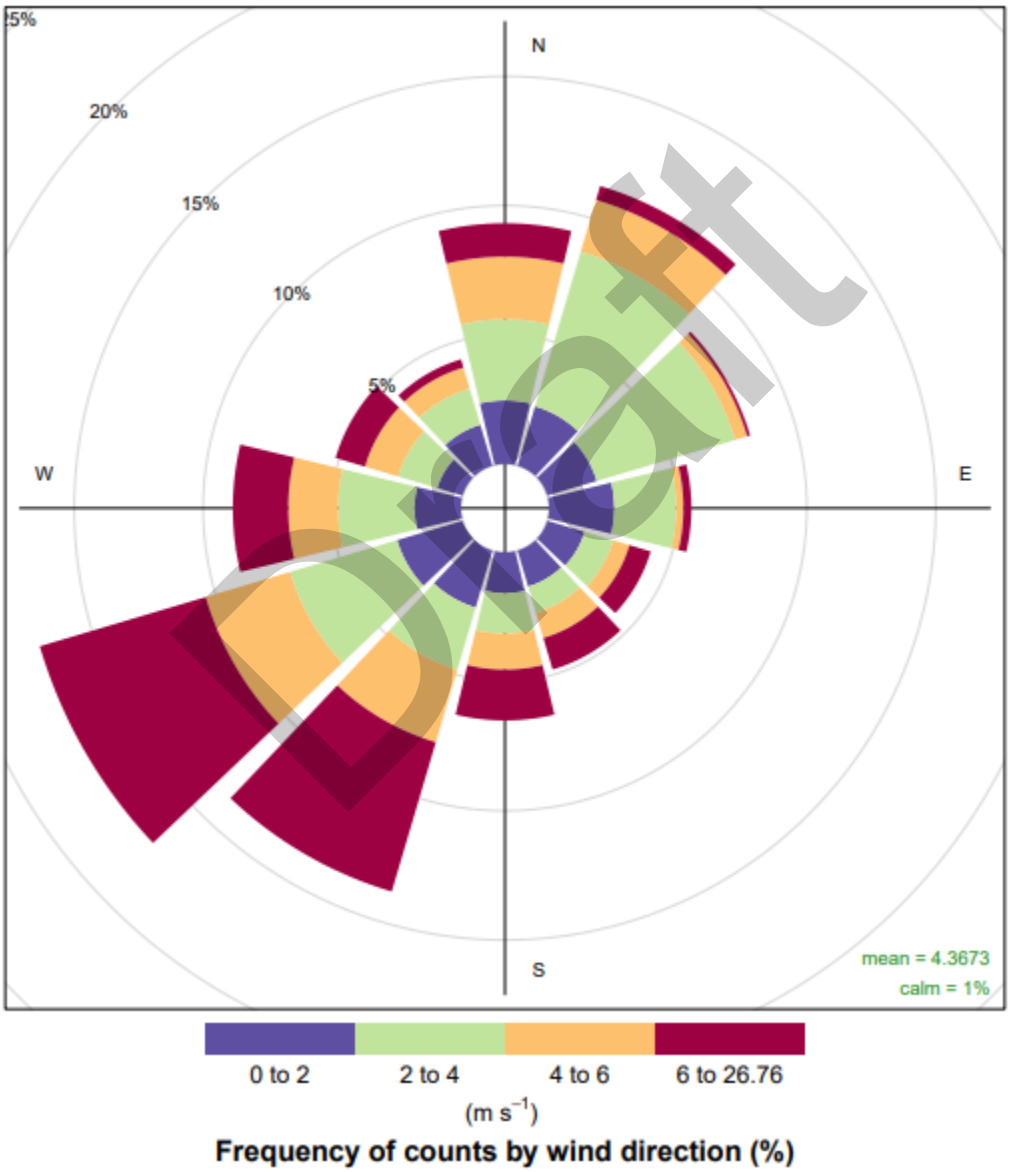

Figure 8. Hawthorne New Bomb (HNB) Wind Rose. (OpenAir R package, University of York and Ricardo Energy & Environment, 2019)

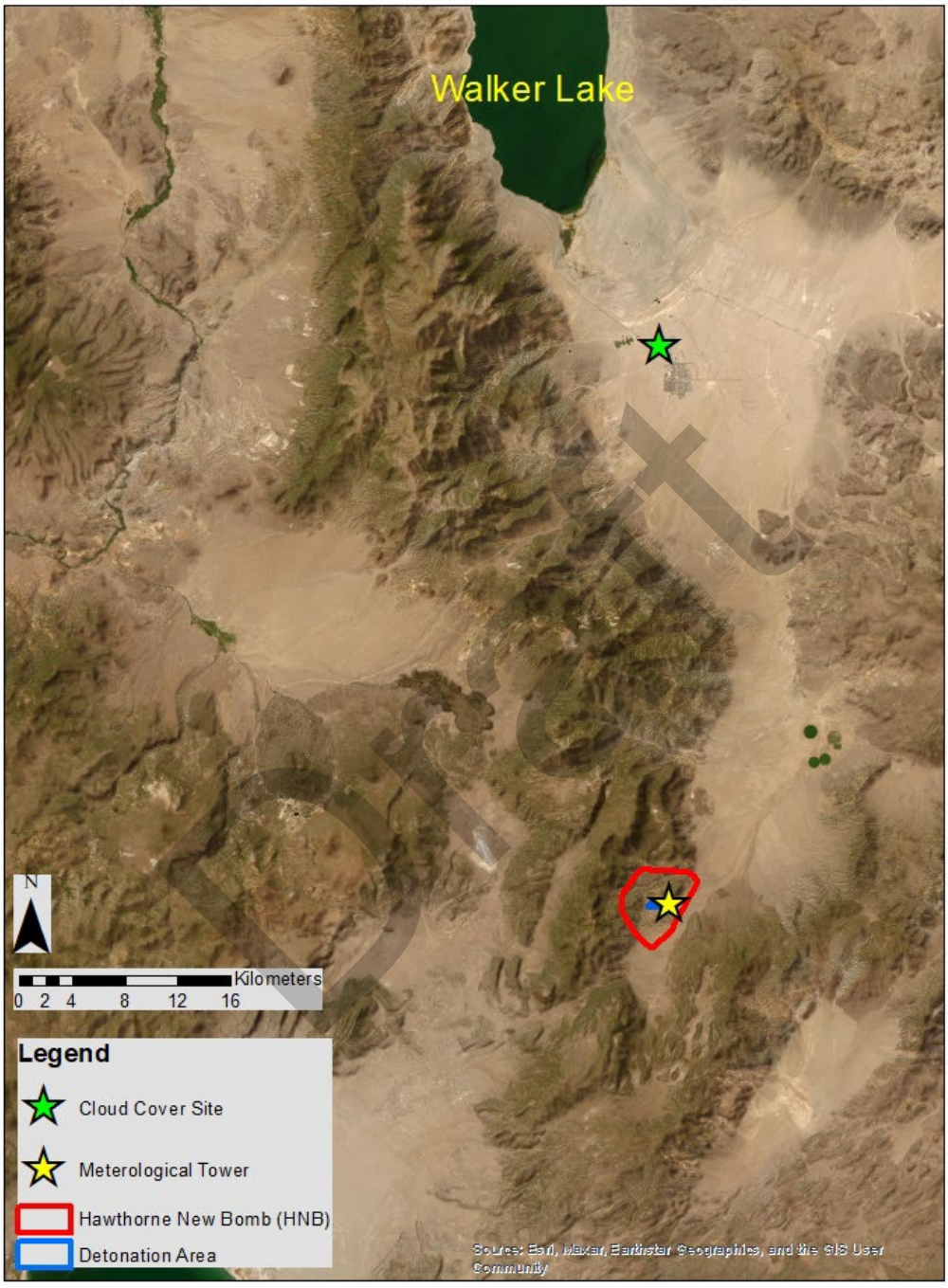

Figure 9. Hawthorne New Bomb (HNB) and Hawthorne Municipal Airport (HMA) Meteorological Sites. All utilized surface meteorological data, except for cloud cover, are from HNB, while cloud cover data are from HMA.

5.2 Upper-Air Data

Two upper-air monitoring sites were considered, Reno and Las Vegas, NV. The location of both sites compared to HNB is shown in Figure 1. The results of the analysis are shown in Table 3.

Table 3. Upper-Air Meteorological Data Stations Considered for Analysis (Underline indicates site considered as best available).

Location	WBAN Code	Distance to Hawthorne New Bomb (HNB)	Topographical similarities/differences (HNB is on the leeward side of the Nevada Sierra mountain range)
Reno, NV	3198	170 km to the northwest	Reno, NV, is on the leeward side of the Nevada Sierra mountain range.
Las Vegas, NV	3120	400 km to the southeast	Las Vegas, NV, is located near isolated, mountain ranges of limited extent compared to the Nevada Sierra.

The upper-air data from Reno, NV, were chosen because of its similar spatial relationship with the Sierra Nevada as that of HNB. In addition, the proximity of Reno to HNB was used as a justification for the choice. The Las Vegas, NV, alternative is farther from HNB and is not located near a mountain range significant as the Sierra Nevada.

6. Receptor Array

The receptor array around Hawthorne New Bomb (HNB) was parameterized to satisfactorily resolve gradients in high-concentration areas and provide coverage over an area for which HNB impacts are significant compared to background concentrations. Specifically:

- Along the fence line, for a depth of 60 m, receptors are placed every 20 m both along and perpendicular to the fence line.
- For a square 36 km^2 area surrounding HNB, receptors were placed every 100 m.
- For a square 1600 km^2 area surrounding HNB, receptors were placed every 500 m.

Per EPA guidelines, areas inaccessible to the public are excluded from modeling consideration (U. S. EPA, 2019). These excluded areas are described as “land owned or controlled by the [stationary] source.” HNB contains locked gates and signage and other measures to deter public access typical at stationary sources. Being a military installation conducting detonations, additional measures unique to DoD facilities are present. To remove the HNB area from consideration, receptors are removed from land belonging to HNB.

A total of 11,664 receptors were utilized. The complete receptor array (the far-field) is shown in Figure 10, while a near-source detailed view is shown in Figure 10.

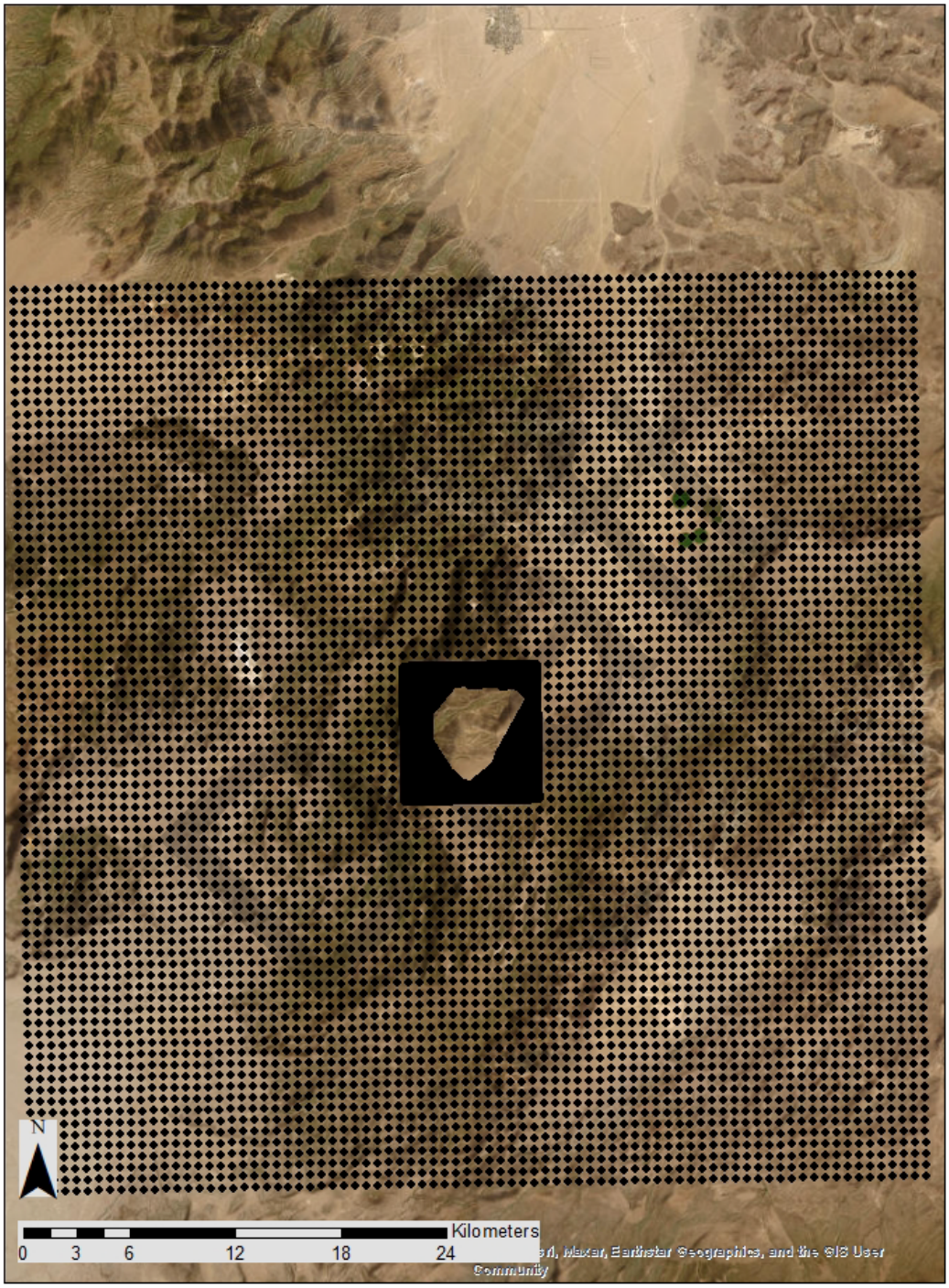

Figure 10. Far-Field Receptor Array for Hawthorne New Bomb (HNB).

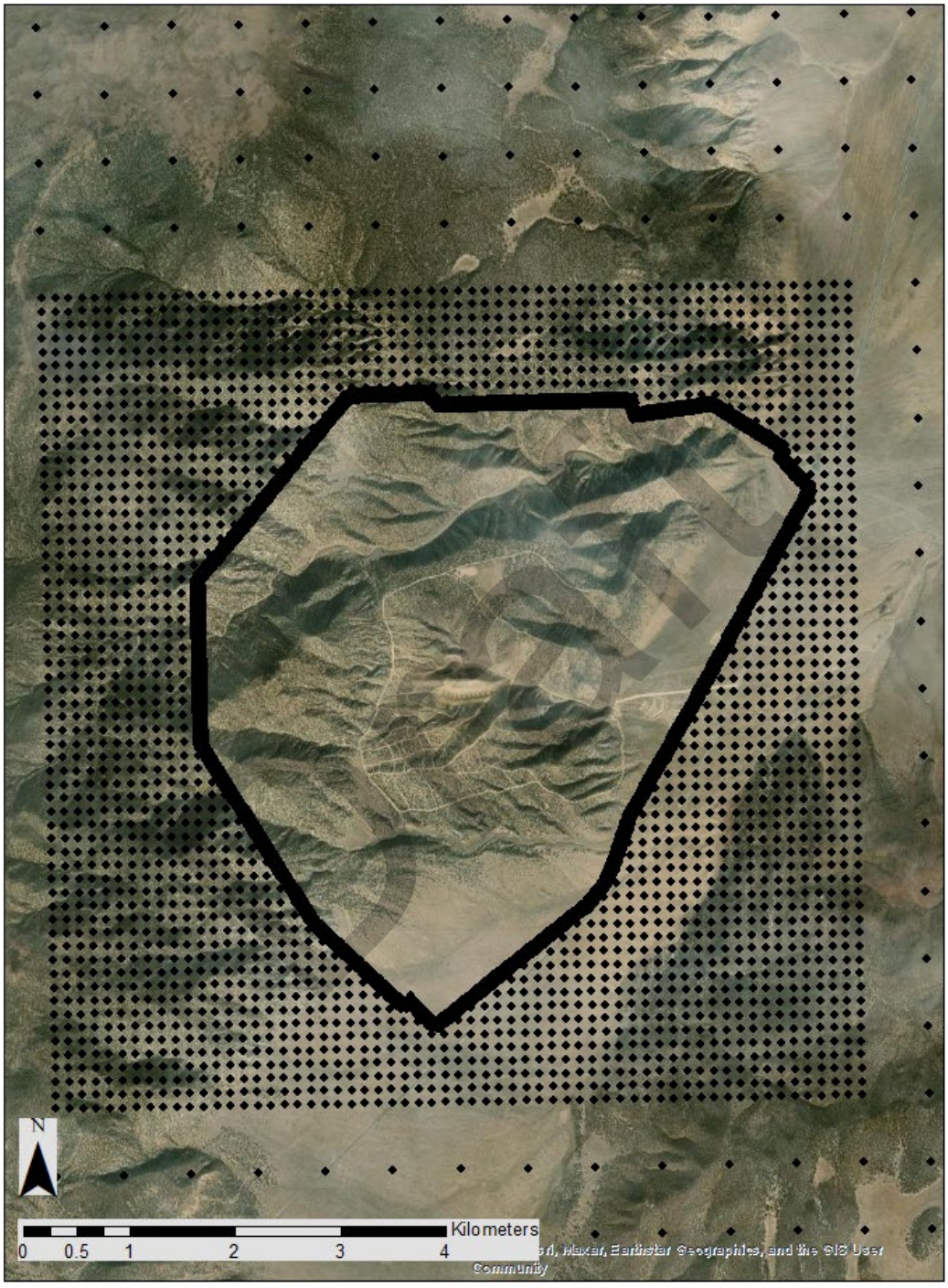

Figure 11. Near-Field Receptor Array for Hawthorne New Bomb (HNB).

7. Background Lead Concentration

To perform a complete modeling analysis, the contribution of sources surrounding Hawthorne New Bomb (HNB), including at the regional scale, must be considered. Because HNB is isolated from other facilities and urban areas, as noted in Section 2.1, local, non-HNB lead emissions are negligible. Lead emissions from permitted stationary sources within 50 km are approximately 0.1 tons/year. Modeling supporting these stationary permits indicates that lead concentrations at HNB are orders of magnitude less than HNB and regional background contributions. Consequently, only the regional background level is considered in this analysis.

To determine a regional background, five upwind monitors located in California were utilized. These monitors were identified by using the EPA AirData Air Quality Monitors Application (U. S. EPA, 2023e) and are shown in Figure 12. These monitors cover an arc located in the California Central Valley. This arc extends from Chico in the north to Bakersfield in the south. All monitors are located 200 – 300 km from Hawthorne New Bomb (HNB) and cover a substantial upwind arc for HNB.

A summary of the retrieved data is included in Table 4. None of the monitors contain data sufficiently complete to calculate the lead NAAQS, a rolling, three-month average. Instead, the annual average of daily averages is reported. The maximum reported annual average of daily averages is used as the regional value for the lead standard. This value was observed in Fresno CA during 2022 and has a value of 0.00751 ug/m^3. This result will be added to the modeled result for determining a complete cumulative analysis.

Table 4. A Summary of Ambient-air Monitors Used to Quantify Regional Lead Background.

Site	Air Quality System(AQS) Code	Latitude	Longitude	Parameter	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2020	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2021	Annual Average of Daily Averages (ug/m^3) (Number Valid Days) 2022
Bakersfield	06-029-0014	35.3566	-119.063	Lead (TSP)	0.003922 (7)	0.003795 (22)	0.003779 (30)
Fresno	06-019-0011	36.7853	-119.773	Lead (TSP)	0.002931 (7)	0.002447 (17)	**0.00751 (12)**
Stockton	06-077-1003	37.9615	-121.281	Lead (TSP)	NA (0)	0.00333 (5)	0.003815 (30)
Roseville	06-061-0006	38.7464	-121.265	Lead (TSP)	0.001343 (29)	0.000997 (22)	0.001255 (30)
Chico	06-007-0008	39.7616	-121.84	Lead (TSP)	0.001179 (7)	0.001107 (23)	0.001288 (28)

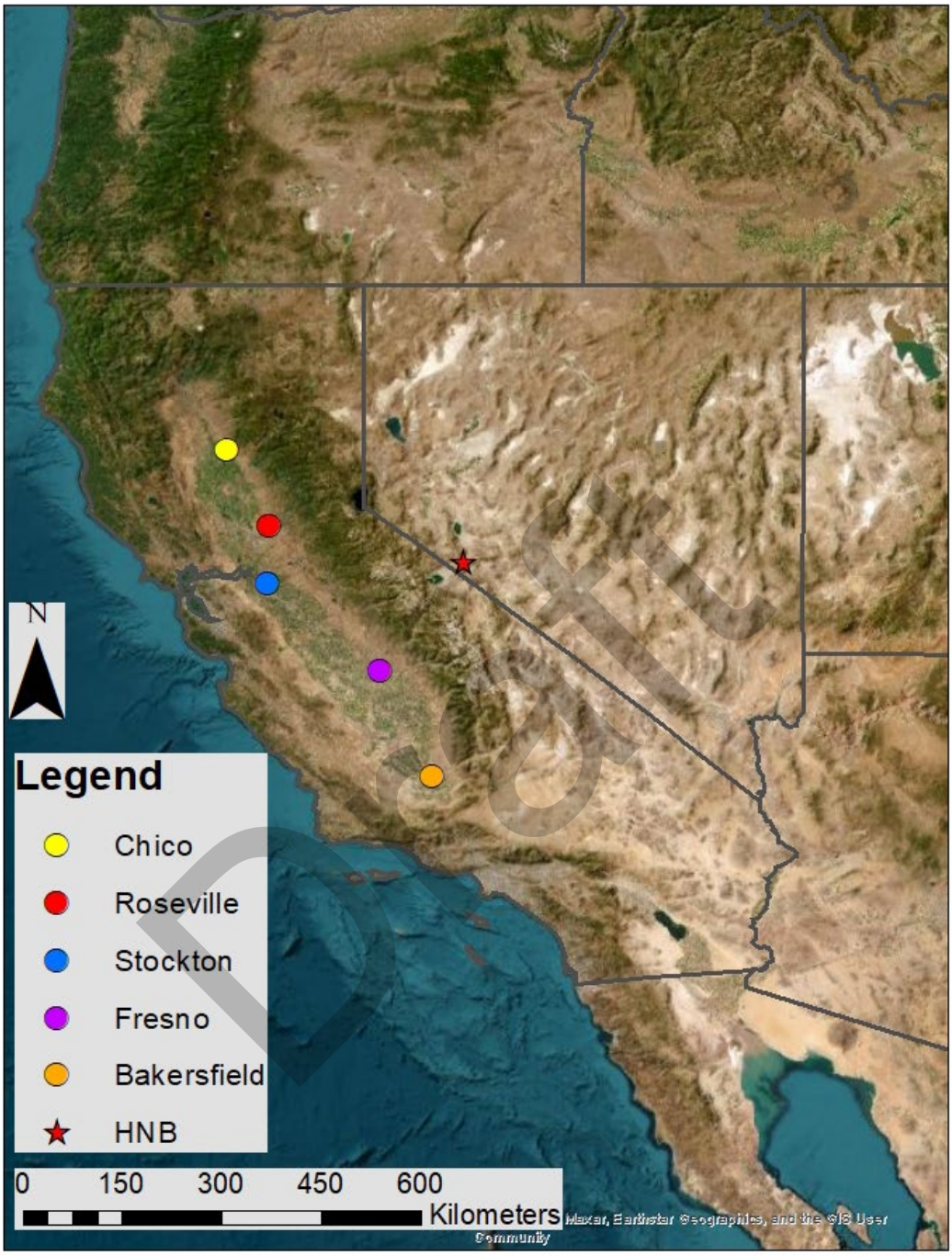

Figure 12. Ambient-air Monitors Utilized for Determining the Regional Background for Lead.

8. Additional Model Parameters

While modeling Hawthorne New Bomb (HNB), several modeling parameters not mentioned in the prior section were defined.

First, due to the nature of detentions, substantial plume rise is observed and provided detailed information regarding mutations, such as heat of combustion, plume rise may be calculated (Strategic Environmental Research and Development Program [SERDP], West Desert Test Center , 1998). However, often the required information is not available; consequently the 20 detention pits are modeled as simple volume sources in AERMOD. The volume parameters are shown in Table 5. Note the release height is much lower than plausible plume-rise heights resulting from detonation; consequently, the calculated ambient-air concentrations are significantly greater than if a more representative plume rise height were utilized (Arya, 2000). Also note that the initial lateral and vertical dimensions are rather small given the volume occupied by the initial detonation. In summary, the chosen volume parameters used in AERMOD are very conservative.

Table 5. AERMOD Source Parameters Used to Model the 20 HNB Detonation Pits.

Source Type	Release Height (m)	Initial Lateral Dimension (m)	Initial Vertical Dimension (m)
Volume	1.0	0.465	0.930

In addition, as noted in Section 2.2, detonation may only occur from 9 AM (LST) to 30 minutes prior to sunset. An addition, the mean windspeed must be between 3 and 20 miles per hour (1.3 and 8.9 m/s). The later restriction can be currently incorporated as an AERMOD input using the WSPEED keyword (U. S. EPA, 2023a); however, currently there is no AERMOD inputs which can modify emissions depending on the time of sunset.

To incorporate the permit restriction, an R code (The R Foundation., 2023a) was written to generate an AERMOD hourly emissions file. This file indicated emissions of 0.0 g/s during hours for which operations were not permitted. During the hours for which emissions were permitted, the permitted tons/year value, documented in Section 4, was evenly distributed. The resulting R code was used to incorporate both the wind speed and hour of day restrictions.

The windspeed restriction used the reported windspeed in the AERMOD surface meteorological file. To calculate the time of sunset, the AERMET subroutine “sundat” (written in Fortran) located in the “mod_pbl.f90” AERMET source file. (The source code for AERMET, along with other regulatory models is available at the EPA SCRAM website (U. S. EPA, 2023c)). The “sundat” subroutine calculates the time of sunrise and sunset along with the hourly solar elevation angle, given the day of year and meteorological station’s longitude and latitude. AERMET uses this information to calculate boundary-layer properties such as Monin-Obukhov length scale. The user, however, generally does not have access to the output data generated by the “sundat” subroutine. To access “sundat” within the R code generating the hourly emissions file indicating permitted detonation hours, R’s C API (The R Foundation., 2023b) was utilized to create a R code which accessed the “sundat” subroutine.

With both permit conditions incorporated into the hourly emissions file, detonations were permitted 2,636 of 8,760 hours for the utilized meteorological data.

9. Modeling Results

The spatial variation of results is shown in Figure 13. Comparatively high concentrations are observed on the northern and southeast facility boundaries. At locations greater than a few km away from the Hawthorne New Bomb (HNB) facility, the calculated ambient-air concentrations are marginally elevated above the regional background lead value determined in Section 7 (0.0075 ug/m^3). The contours indicate that at distances of 10 km and greater, HNB impacts would be undistinguishable from the regional background value.

The maximum modeled concentration occurs along the southeast HNB perimeter at the UTM location indicated in Table 6. At the maximum modeled concentration, the calculated lead NAAQs is greater than the regional background by a factor of approximately 4.5 but is still well below the NAAQS. The cumulative impact indicates a design value which is approximately 20% of the lead NAAQS.

It is important to note that because of conservative assumptions, such as neglecting plume-rise, utilized in Section 8, these modeled values should be sufficiently conservative as an upper-bound estimate instead of a representative number.

Full electronic modeling files, including all model preprocessor, input, and output files are available upon request.

10. Summary

This work documents a model representing a conservative, upper bound estimate for the contributions of Hawthorne New Bomb's (HNB) detonative activities to the ambient-air lead concentrations. The estimate is computed by an AERMOD model using a volume source approximation for the detention pits. The volume source is conservative because plume rise due to the heat of detonation is neglected. Detonation emission limits are provided by permit limits. These limits include not only tons/year, but permissible hours and meteorological conditions for detonative operations. Onsite meteorological data were utilized with cloud cover being substituted from a site approximately 30 km from HNB. Regional background concentrations for lead were obtained from a sensor array of five upwind lead monitors in California's Central Valley. A receptor array comprised of 11,664 covering 1600 km^2 is utilized in the AERMOD model. The model indicates that HNB's detonative activities, including background, are approximately 20% of the lead NAAQS.

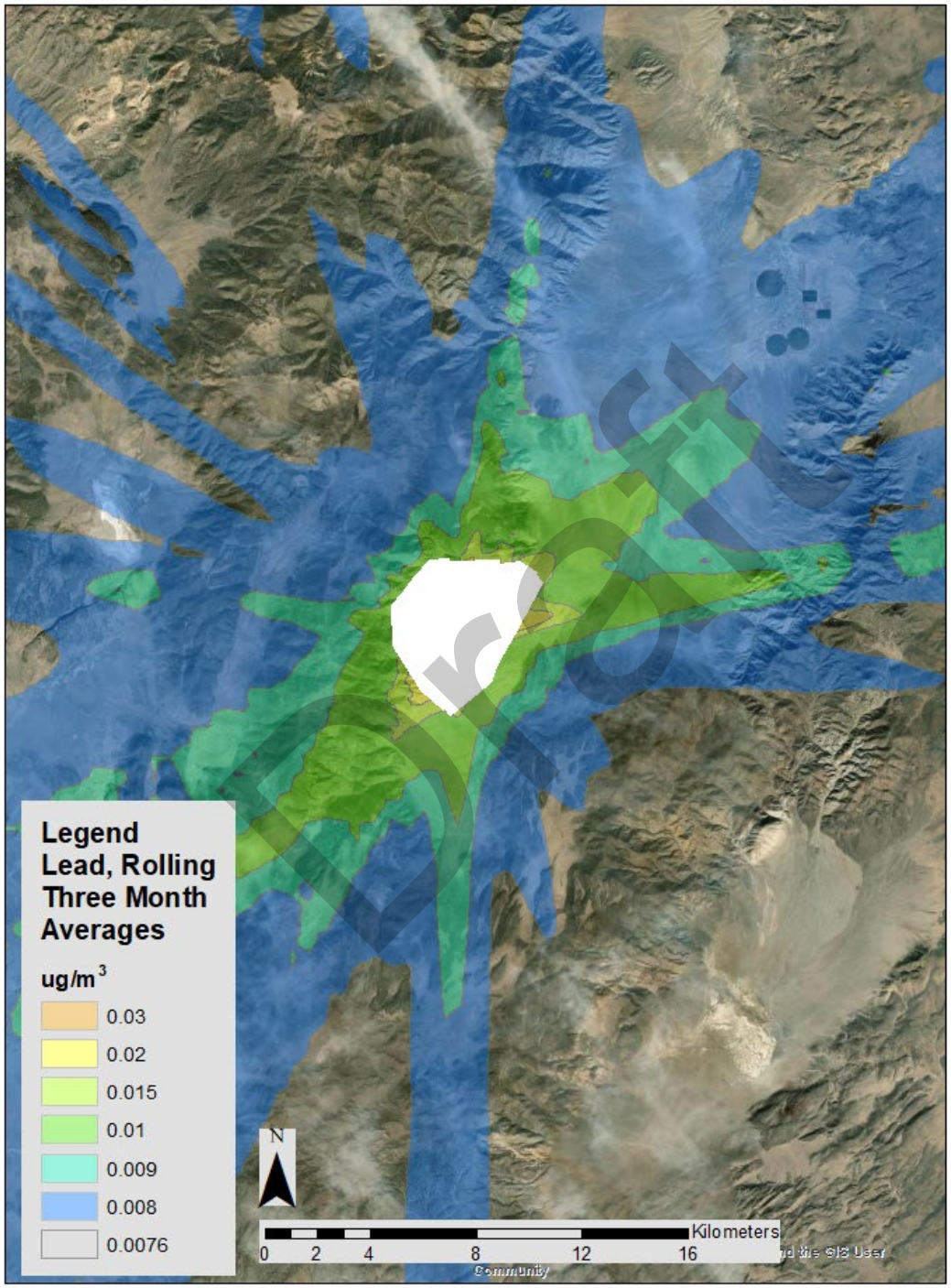

Figure 13. Hawthorne New Bomb (HNB) Lead NAAQS Contours. (Note: the background value is 0.0075 ug/m^3)

Table 6. Summary of Maximum Modeled Concentration.

Location of Observed Maximum (NAD 83, UTM, Zone 11)		Modeled Max 3-Month Average Concentration	Background Concentration	Cumulative Impacts	Percent of NAAQS
Easting	Northing				
(m)	(m)	(ug/m^3)	(ug/m^3)	(ug/m^3)	(%)
358418.56	4234516.50	0.0228067	0.0075100	0.0303167	20.2

11. Conclusions

This work has demonstrated that the upper-bound, conservative, modeled estimate of Hawthorne New Bomb (HNB) impacts to the lead NAAQS, including the regional background, are less than the 50% threshold indicated in (40 CFR Part 58, Appendix D, paragraph 4.5). This value is an upper bound because of the neglecting of plume rise, which generally reduces ambient-air concentrations (Arya, 2000). Consequently, NDEP is requesting the EPA Region 9 administrator to wave the SLAMs ambient-air monitoring requirement for HNB.

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