

Annual Monitoring Network Plan



June 2022

Clark County Department of Environment and Sustainability

4701 W. Russell Road, Suite 200, Las Vegas, Nevada 89118

Executive Summary

This Annual Monitoring Network Plan reports the status of the Clark County air monitoring network in 2022 as required by 40 Code of Federal Regulations (CFR) Part 58. This document describes network operation in 2021, changes planned for 2022 and beyond, and the ways in which Clark County disseminates network data to the public in a timely manner.

TABLE OF CONTENTS

1.0	Introduction.....	8
2.0	Minimum Monitoring Requirements	10
2.1	O ₃	10
2.2	PM _{2.5}	11
2.3	PM ₁₀	12
2.4	NO ₂	13
2.5	SO ₂	13
2.6	CO	13
2.7	Pb	14
2.8	Near-Road NO ₂ , PM _{2.5} , and CO Monitors.....	14
3.0	Collocated Monitors as of 2021	14
4.0	2021 Site Tables.....	16
5.0	Maps of Criteria Pollutant Monitoring Stations in 2021	62
6.0	National Performance Audit Program and Performance Evaluation Program	69
7.0	Network Modifications	70
7.1	Completed Changes	70
7.2	Upcoming Changes and Request for Approval	71
	7.2.1 Monitoring Site Relocation in the Apex Valley	74
7.3	Availability of Plan for Public Inspection and Comment and DES Response	76
7.4	O ₃ Monitoring Waiver	76
7.5	Near-Road Monitoring.....	76
7.6	Special Purpose Studies	76
7.7	Future Needs	77

Appendix A: EPA Approval Documents

LIST OF FIGURES

Figure 1:	Boulder City.....	16
Figure 2:	Casino Center: Near-Road Site 2.....	18
Figure 3:	Garrett Junior High.	21
Figure 4:	Green Valley.	23
Figure 5:	Indian Springs.	26
Figure 6:	Jean.	28
Figure 7:	Jerome Mack.....	31
Figure 8:	Joe Neal.....	35
Figure 9:	Liberty High School.....	38
Figure 10:	Mountains Edge Park.....	40
Figure 11:	Palo Verde.....	43
Figure 12:	Paul Meyer.	46
Figure 13:	Sunrise Acres.	48
Figure 14:	Rancho & Teddy: Near-Road Site 1.	51
Figure 15:	Virgin Valley High School.	54
Figure 16:	Walnut Community Center.	57
Figure 17:	Walter Johnson.....	60
Figure 18:	CO Monitors	62
Figure 19:	O ₃ Monitors.....	63
Figure 20:	NO _x Monitors.	64
Figure 21:	SO ₂ Monitor.....	65
Figure 22:	Continuous PM ₁₀ Monitors.	66
Figure 23:	Continuous PM _{2.5} Monitors.	67
Figure 24:	Filter-Based PM _{2.5} FRM Samplers.....	68
Figure 25:	Spring Mountain Youth Camp (SPM Site).....	72
Figure 26:	Apex (new site).....	74

LIST OF TABLES

Table 1.	Flow Rates for PM Monitoring Instruments.....	10
Table 2.	Minimum Monitoring Requirements for O ₃	10
Table 3.	Minimum Monitoring Requirements for PM _{2.5} (FRM ² – Filter Based).....	11
Table 4.	Minimum Monitoring Requirements for PM _{2.5} (FEM ² – Continuous).....	12
Table 5.	Minimum Monitoring Requirements for PM ₁₀	12
Table 6.	Minimum Monitoring Requirements for NO ₂	13
Table 7.	Minimum Monitoring Requirements for SO ₂	13
Table 8.	Minimum Monitoring Requirements for CO.....	13
Table 9.	Minimum Monitoring Requirements for Near-Road NO ₂ , PM _{2.5} , and CO.....	14
Table 10.	Filter-Based PM _{2.5} FRM Network.....	14
Table 11.	Continuous PM _{2.5} FEM Network.....	14
Table 12.	2021 NPAP and TTP Evaluations.....	69
Table 13.	2021 PEP Audit Activity.....	69
Table 14.	Summary of Recent Network Modifications.....	70
Table 15.	Upcoming Site and Equipment Changes.....	71

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AQS	Air Quality System
CAA	Clean Air Act
CBSA	Core-Based Statistical Area
CFR	Code of Federal Regulations
CO	carbon monoxide
DAQ	Division of Air Quality
DES	Department of Environment and Sustainability
EE	Exceptional Event
EPA	U.S. Environmental Protection Agency
FEM	federal equivalent method
FRM	federal reference method
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NCore	National Core Multi-Pollutant Monitoring Network
NDOT	Nevada Department of Transportation
NEI	National Emissions Inventory
NO _x	oxides of nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPAP	National Performance Audit Program
O ₃	ozone
PAMS	Photochemical Assessment Monitoring Stations
Pb	lead
PEP	Performance Evaluation Program
PM	particulate matter
PM _{2.5}	particulate matter 2.5 micrometers in diameter or smaller
PM ₁₀	particulate matter 10 micrometers in diameter or smaller
PM Coarse	particulate matter between 2.5 to 10 micrometers in diameter
POC	parameter occurrence code
PWEI	Population Weighted Emissions Index
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RA	Regional Administrator
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring System
SO ₂	sulfur dioxide
SPM	Special Purpose Monitor
TTP	through-the-probe
VOC	Volatile Organic Compounds

SCIENTIFIC UNITS

m	meters
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
s	seconds

1.0 INTRODUCTION

This report serves as a review of the current Clark County Department of Environment and Sustainability, Division of Air Quality (DAQ) ambient air monitoring network and as a plan for future network activities. Each State and Local Air Monitoring System (SLAMS) monitor meets the requirements of 40 CFR 58 Appendices A, B, C, D, and E. As outlined in 40 CFR 58.20, Special Purpose Monitors (SPMs) do not have to meet the same requirements as SLAMS monitors. Per 40 CFR 58.20, compliance with Appendix A is required for SPMs. Compliance with 40 CFR Part 58 Appendix E is optional by 40 CFR 58.20. To obtain specific, targeted information and to remain flexible, DAQ does not operate SPMs in full compliance with 40 CFR 58 App. E, Sec. 2, 3, 4, 5, 6, or 9. Therefore, these SPMs will not be used for regulatory purposes and have great siting flexibility. DAQ submitted its 2021 annual network plan to EPA on June 2, 2021 and received approval of the plan on October 29, 2021. DAQ submitted its 2021 annual data certification to EPA on February 3, 2022.

During 2021, the following conditions existed:

1. DAQ operated monitoring instruments to measure ambient concentrations of pollutants using continuous and filter-based methods, including continuous and filter-based particulate matter 2.5 micrometers in diameter or smaller (PM_{2.5}), continuous particulate matter 10 micrometers in diameter or smaller (PM₁₀), continuous particulate matter between 10 and 2.5 micrometers in diameter (PM Coarse), ozone (O₃), carbon monoxide (CO), oxides of nitrogen (NO, NO₂, and NO_y), and sulfur dioxide (SO₂).
2. DAQ operated under a quality-controlled and quality-assured system.
3. DAQ operated visibility instrumentation at the M Resort, which is located at 12300 South Las Vegas Blvd. Henderson, Nevada.

Criteria air pollutants are a group of six common air contaminants regulated by the U.S. Environmental Protection Agency (EPA), which developed [National Ambient Air Quality Standards \(NAAQS\)](#) for these pollutants to protect public health and the environment. The six criteria pollutants are O₃, PM_{2.5}/PM₁₀, CO, NO₂, SO₂, and lead (Pb). DAQ submits all criteria pollutant data quarterly, including precision and accuracy data, to the Air Quality System (AQS) database.

Currently, the Las Vegas Valley, defined as Hydrographic Area (HA) 212, in Clark County is designated as marginal nonattainment for the 2015 ozone NAAQS and attainment/unclassifiable for all other criteria pollutants. Portions of Clark County are subject to maintenance plans for PM₁₀, CO, and O₃. To address CO, DAQ submitted a CO State Implementation Plan (SIP) in 2000 that described the control measures and technologies required to bring the Las Vegas Valley into compliance with the CO NAAQS. The CO SIP was approved by EPA, effective October 21, 2004 (69 FR 56351). A Federal Register notice denoting EPA's determination of attainment of the CO NAAQS within the valley was issued in June 2005 (70 FR 31353). In 2008, DAQ submitted a CO Request for Re-designation and Maintenance Plan, which was approved by EPA, effective September 27, 2010 (75 FR 59090). A Second 10-Year CO Limited Maintenance Plan was submitted in June 2019 and was approved by EPA in October 2021, with an effective date of November 22, 2021 (86 FR 58579).

The Las Vegas Valley (HA 212) attained the PM₁₀ standard by December 31, 2006, and EPA issued a “Finding of Attainment” in August 2010 (75 FR 45485). In 2012, DAQ submitted a Request for Re-designation and Maintenance Plan for PM₁₀, which EPA approved in October 2014, with an effective date of November 5, 2014 (79 FR 60078).

In 1978, EPA designated the Las Vegas Valley (HA 212) as a nonattainment area for the one-hour photochemical oxidant NAAQS (43 FR 8962). Subsequently, EPA revised the photochemical oxidant standard to an ozone NAAQS. In 1986, EPA re-designated the Las Vegas Valley to attainment for the one-hour ozone NAAQS (51 FR 41788).

In 2004, that portion of Clark County that lies in HAs 164A, 164B, 165, 166, 167, 212, 213, 214, 216, 217, and 218, but excluding the Moapa River Indian Reservation and the Fort Mojave Indian Reservation, was designated nonattainment for the 1997 8-hour ozone NAAQS (69 FR 55956). All other areas of the county were designated attainment/unclassifiable. In 2012, the entire county was designated attainment/unclassifiable under the 2008 8-hour ozone NAAQS (77 FR 30088). In 2013, EPA re-designated those portions of Clark County that had been previously designated nonattainment under the 1997 standard to attainment subject to a ten-year maintenance plan (78 FR 1149). A Second 10-Year Maintenance Plan for the 1997 ozone NAAQS was submitted in January 2022 and is currently pending EPA action.

Under the 2015 ozone NAAQS standard, EPA proposed to designate the following portions of Clark County as marginal nonattainment: Las Vegas Valley (HA 212), North Ivanpah Valley (HA 164A), Jean Lake Valley (HA 165), and Garnet Valley (Apex) (HA 216). On February 20, 2018, DAQ sent a response for EPA’s consideration to exclude HAs 164A, 165 and 216 from the proposed marginal nonattainment designation based on recently certified 2017 data. EPA concurred and designated only the Las Vegas Valley (HA 212) marginal nonattainment for ozone on June 4, 2018, with an effective date of August 3, 2018 with an attainment date of August 3, 2021 (83 FR 25776). Under Section 181(b)(2)(A) of the Clean Air Act (CAA), EPA is required to issue a determination of attainment or reclassify the area to a higher category within six months of the attainment date. If an EPA determination is made based on existing monitoring data as-is, Clark County will potentially be reclassified into moderate ozone nonattainment status. However, if EPA concurs with 2020 and 2021 Exceptional Event demonstrations, the ozone attainment status will remain marginal.

As part of this report, DAQ is required to ensure that Clark County is meeting its minimum monitoring requirements, which, in part, includes traffic count considerations. In order to conduct a traffic count assessment, DAQ utilized the Nevada Department of Transportation’s (NDOT’s) online [Traffic Information System](#), which provided traffic count information where available. For those areas where traffic count information was not available, DAQ used nearby traffic counters that measured similar traffic patterns to estimate counts. Where there were no nearby traffic counters or similar traffic patterns, DAQ Monitoring staff knowledge of the monitoring site’s traffic pattern was used to estimate traffic counts. Due to the potential effects of COVID-19, NDOT has recorded lower traffic counts and annual average daily traffic (AADT) throughout its network.

Clark County’s air quality data is disseminated to the public in a timely manner through the DAQ website, and the AirNow and Enviroflash program. DAQ also provides customized data reports upon request.

2.0 MINIMUM MONITORING REQUIREMENTS

The tables below show that the Clark County air quality network meets or exceeds the 2022 minimum requirements of 40 CFR Part 58 of the CFR. Population census information was obtained from the Clark County Department of Comprehensive Planning 2020 report, which was based on the Metropolitan Statistical Area (MSA) and the Core-Based Statistical Area (CBSA). All particulate matter (PM) monitoring instruments are low-volume instruments (flow rates less than 200 liters per minute). The Jerome Mack monitoring site is DAQ’s National Core Multi-Pollutant Monitoring Network (NCore) and Photochemical Assessment Monitoring Stations (PAMS) site.

Table 1. Flow Rates for PM Monitoring Instruments

Instrument	Flow Rates (liters per minute)
Met One Super SASS	6.7
URG	22
MetOne PM _{2.5} FRM	16.67
Teledyne T640X	16.67 for PM ₁₀ ; 5 for PM _{2.5}

DAQ conducts monthly flow verifications on all PM instruments, and semi-annual flow rate audits are conducted twice per year at a minimum. For all gaseous monitoring operations at all sites, a two-point (zero/span) quality control (QC) check is conducted daily, a three-point (zero/precision/span) QC check is conducted weekly, and calibrations are conducted both quarterly and as needed.

2.1 O₃

Table 2. Minimum Monitoring Requirements for O₃

MSA	County	Population and Census Year	8-hr Design Value [ppb], Design Value Years ¹	Design Value Site (name, AQS ID ²)	Number of Required SLAMS Sites	Number of Active SLAMS Sites	Number of Additional SLAMS Sites Needed
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	73 ³ (2019-2021)	Paul Meyer (32-003-0045) ³ Walter Johnson (32-003-0071) ³ Joe Neal (32-003-0075) ³	2	13	0
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	69 ⁴ (2019-2021)	Green Valley (32-003-0298) ⁴ Paul Meyer (32-003-0043) ⁴ Walter Johnson	2	13	0

MSA	County	Population and Census Year	8-hr Design Value [ppb], Design Value Years ¹	Design Value Site (name, AQS ID ²)	Number of Required SLAMS Sites	Number of Active SLAMS Sites	Number of Additional SLAMS Sites Needed
				(32-003-0071) ⁴ Joe Neal (32-003-0075) ⁴			
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	71 ⁵ (2019-2021)	Paul Meyer (32-003-0043) ⁵ Walter Johnson (32-003-0071) ⁵	2	13	0
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	72 ⁶ (2019-2021)	Paul Meyer (32-003-0043) ⁶	2	13	0
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	71 ⁷ (2019-2021)	Paul Meyer (32-003-0043) ⁷	2	13	0

¹ Design Value Years = the three years for which the design value was calculated (i.e., 2019-2021).

² AQS (site) Identification.

³ Design Value without EPA concurrence on proposed 2020 and 2021 exceptional events (EEs)

⁴ Design Value with EPA concurrence on proposed 2020 and 2021 EEs

⁵ Design Value with EPA concurrence on proposed 2020 EEs but no 2021 EEs

⁶ Design Value with EPA concurrence on non-challenging 2020 EEs but no 2021 EEs

⁷ Design Value with EPA concurrence on non-challenging 2020 demos and proposed 2021 EEs

Notes: Monitors required for SIP or maintenance plan: NA.

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

2.2 PM_{2.5}

Table 3. Minimum Monitoring Requirements for PM_{2.5} (FRM² – Filter Based)

MSA	County	Population and Census Year	Annual Design Value (µg/m ³), Design Value Years ^{1,3}	Annual Design Value Site (name, AQS ID)	Daily Design Value (µg/m ³), Design Value Years ^{1,3}	Daily Design Value Site (name, AQS ID)	Number of Required SLAMS Sites ⁴	Number of Active SLAMS FRM Sites ⁵	Number of Additional SLAMS Sites Needed ⁵
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	10.0, (2019-2021)	Sunrise Acres (32-003-0561)	30, (2019-2021)	Sunrise Acres (32-003-0561)	2	2 + collocation	0

¹ µg/m³ = micrograms per cubic meter.

² FRM stands for federal reference method.

³ Design Value Years = the three years for which the design value was calculated (i.e., 2019-2021).

⁴ Pursuant to 40 CFR 58 App. D, Sec. 4.7.1 and 4.7.2, the number of required SLAMS sites includes both FRM and federal equivalent method (FEM) instruments.

⁵ Meets requirements in 40 CFR 58 App. D, Sec. 4.7.2 based on total number of FRM and FEM instruments.

Notes: Monitors required for SIP or maintenance plan: NA.
 This network meets the minimum monitoring requirement for the referenced criteria pollutant.

Table 4. Minimum Monitoring Requirements for PM_{2.5} (FEM² – Continuous)

MSA	County	Population and Census Year	Annual Design Value (µg/m ³), Design Value Years ^{1,3}	Annual Design Value Site (name, AQS ID)	Daily Design Value (µg/m ³), Design Value Years ^{1,3}	Daily Design Value Site (name, AQS ID)	Number of Required Continuous FEM Sites	Number of Active Continuous FEM Sites	Number of Additional Continuous FEM Sites Needed
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	10.0, (2019-2021)	Sunrise Acres (32-003-0561)	30, (2019-2021)	Sunrise Acres (32-003-0561)	1	9	0

¹ µg/m³ = micrograms per cubic meter.

² FEM stands for federal equivalent method.

³ Design Value Years = the three years for which the design value was calculated (i.e., 2019-2021).

⁴ Pursuant to 40 CFR 58 App. D, Sec. 4.7.1 and 4.7.2, the number of required SLAMS sites includes both FRM and federal equivalent method (FEM) instruments.

⁵ Meets requirements in 40 CFR 58 App. D, Sec. 4.7.1 based on total number of FRM and FEM instruments.

Notes: Monitors required for SIP or maintenance plan: NA.
 This network meets the minimum monitoring requirement for the referenced criteria pollutant.

2.3 PM₁₀

Table 5. Minimum Monitoring Requirements for PM₁₀

MSA	County	Population and Census Year	Maximum 24-Hour Concentration [µg/m ³] (2021)	Maximum 24-Hour Concentration Site (name, AQS ID) (2021)	Number of Required SLAMS Sites	Number of Active SLAMS Sites ¹	Number of Additional SLAMS Sites Needed
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	1194.2 (2021)	Paul Meyer (32-003-0043)	6-10	14	0

¹ Meets requirements in 40 CFR 58 App. D, Table D-4. Number of active sites falls within the required range of 6-10.

Notes: Monitors required for SIP or maintenance plan: NA
 This network meets the minimum monitoring requirement for the referenced criteria pollutant.

2.4 NO₂

Table 6. Minimum Monitoring Requirements for NO₂

CBSA	Population and Census Year	Max AADT Counts ¹ (2021)	Number of Required Near-Road Monitors ²	Number of Active Near-Road Monitors	Number of Additional Near-Road Monitors Needed	Number of Required Area-wide Monitors	Number of Active Area-wide Monitors ³	Number of Additional Area-wide Monitors Needed
Las Vegas-Paradise (29820)	2,376,683 (2020)	368,167	2	2	0	2	4	0

¹ This number represents the highest AADT count of any roadway segment in Clark County as measured by NDOT (counting station 0030074) on Interstate-15, 0.5 miles north of the Spring Mountain Interchange (Exit 39). This traffic counter is approximately 0.5 miles south of the Rancho & Teddy near-road monitoring site along the Interstate-15 corridor, both the monitoring site and traffic counting station have similar traffic patterns, and it is presumed that high traffic count locations are indicative of maximum hourly NO₂ concentrations. Due to potential inconsistencies with the 2020 AADT count related to COVID-19, the 2021 AADT estimate was obtained from NDOT through direct correspondence.

² Two near-road NO₂ monitors are required in any CBSA with one or more roadway segments having an AADT of 250,000 or more and population of 1,000,000 or more (40 CFR 58, App. D, Sec. 4.3.2(a)).

³ This number includes Regional Administrator (RA) 40, PAMS true NO₂, and general/background monitors.

Notes: Monitors required for SIP or maintenance plan: NA.

DAQ is required to have an area-wide monitor in a location of expected highest NO₂ concentrations representing the neighborhood or larger spatial scales. Sunrise Acres meets this requirement, and this site also has the designated RA40 monitor for NO₂.

Monitors required for Photochemical Assessment Monitoring Station (PAMS): 1.

2.5 SO₂

Table 7. Minimum Monitoring Requirements for SO₂

CBSA	County	Population and Census Year ¹	Total SO ₂ ² [tons/year]	Population Weighted Emissions Index ³ [million persons-tons/year]	Number of Required Monitors	Data Requirements Rule Source(s) Using Monitoring	Number of Active Monitors	Number of Additional Monitors Needed
Las Vegas-Paradise (29820)	Clark, NV	2,376,683 (2020)	1,227	2,916	1	0	1	0

¹ Used for Population Weighted Emissions Index (PWEI) calculation.

² Stationary source SO₂ emissions are based on 2019 data. All other categories are based on the 2017 National Emissions Inventory (NEI).

³ Calculated by multiplying CBSA population by total SO₂ and dividing product by one million.

Notes: PWEI, RA, and Data Requirements Rule met.

Monitors required for SIP or maintenance plan: NA.

EPA RA-required monitors per 40 CFR 58, App. D, Sec. 4.4.3: 0.

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

2.6 CO

Table 8. Minimum Monitoring Requirements for CO

CBSA	Population and Census Year	Number of Required Near-Road Monitors	Number of Active Near-Road Monitors	Number of Additional Monitors Needed
Las Vegas-Paradise (29820)	2,376,683 (2020)	1	1	0

Notes: Monitors required for SIP or maintenance plan: CO monitoring in the Las Vegas Valley is expected for ongoing demonstration of the CO Maintenance Plan.

EPA RA-required monitors per 40 CFR 58, App. D, Sec. 4.2.2: 0.

This network meets the minimum monitoring requirement for the referenced criteria pollutant.

2.7 Pb

On June 30, 2016, DAQ terminated Pb monitoring at the Jerome Mack National Core Multi-Pollutant Monitoring Network (NCore) site in accordance with 40 CFR 58.14(c) and EPA approval.

2.8 Near-Road NO₂, PM_{2.5}, and CO Monitors

Table 9. Minimum Monitoring Requirements for Near-Road NO₂, PM_{2.5}, and CO

CBSA	Population and Census Year	Max AADT counts ¹	Number of Required NO ₂ Monitors	Number of Active NO ₂ Monitors	Number of Required PM _{2.5} Monitors	Number of Active PM _{2.5} Monitors	Number of Required CO Monitors	Number of Active CO Monitors	Number of Additional Near-Road Monitors Needed
Las Vegas-Paradise (29820)	2,376,683 (2020)	368,167 (2021)	2	2	1	1	1	1	0

Note: The near-road network meets the minimum monitoring requirement as outlined in 40 CFR 58.13 and 40 CFR 58 App. D, Sec. 4.2, 4.3, and 4.7.

¹This number represents the highest AADT (annual average daily traffic) count of any roadway segment in Clark County as measured by NDOT (counting station 0030074) on Interstate-15, 0.5 miles north of the Spring Mountain Interchange (Exit 39). This traffic counter is approximately 0.5 miles south of the Rancho & Teddy near-road monitoring site along the Interstate-15 corridor, both the monitoring site and traffic counting station have similar traffic patterns, and it is presumed that high traffic count locations are indicative of maximum hourly NO₂ concentrations. Due to inconsistencies with the 2020 AADT count due to COVID-19, the 2021 AADT estimate was obtained from NDOT through direct correspondence.

3.0 COLLOCATED MONITORS AS OF 2021

Table 10. Filter-Based PM_{2.5} FRM Network

Method Code	Number of Primary Monitors, Site	Number of Required Collocated Monitors	Number of Active Collocated Monitors
RFPS-0717-245	1: Jerome Mack	1	1: Collocated at Jerome Mack

Table 11. Continuous PM_{2.5} FEM Network

Method Code	Number of Primary Monitors ¹ , Site	Number of Required Collocated Monitors ²	Number of Active Collocated FRM Monitors ²	Number of Active Collocated FEM Monitors (same method designation as primary) ²
FRM: RFPS-0717-245 FEM: EQPM-0516-238	14: Paul Meyer, Joe Neal, Palo Verde, Walter Johnson, Mountains Edge, Liberty High School, Green Valley, Sunrise Acres, Jerome Mack, Walnut Jean, Virgin Valley, Garrett, and Rancho & Teddy	2	1: Sunrise Acres	1: Palo Verde

¹PM_{2.5} SPMs are included in the count.

²Meets 40 CFR 58 App. A, Sec. 3.2.3 requirements

40 CFR 58, App. A Sec. 3.2.3 requires 15% of PM_{2.5} FRM and FEM instruments in a network to be collocated. For the PM_{2.5} FRM network (method RFPS-0717-245), the collocated sampler is located at the Jerome Mack (NCore-PAMS) site. For the PM_{2.5} FEM network (EQPM-0516-238), the first collocated sampler (FRM) is located at the Sunrise Acres site and the second collocated monitor (FEM) is located at the Palo Verde site.

DAQ has no manual PM₁₀ samplers in its network. Clark County has only continuous PM₁₀ monitors in its network, and there are no CFR requirements for collocation of continuous PM₁₀ monitors.

4.0 2021 SITE TABLES



Figure 1: Boulder City.

The Boulder City site was shut down in March 2021 and relocated to Garrett Middle School per an April 5, 2017 EPA approval. The Boulder City site did not fully satisfy its intended purposes due to sitting in a split-flow corridor that impacted pollutant measurements, and the shelter was sited directly below high-voltage power lines that prevented installation of a meteorological tower.

Local Site Name (AQS ID)	Boulder City (32-003-0601)
GPS Coordinates (latitude, longitude)	+35.978149°, -114.846313°
Street Address	1005 Industrial Rd., Boulder City, NV 89005
Distance to roadways (m)	Industrial Rd: 58; U.S. Highway 93: 96
Traffic counts (AADT, year)	Industrial Rd: 2,250; U.S. Highway 93: 12,000 (2020)
Ground cover	Paved, native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	O₃, 1
Parameter code	81102	44201

Pollutant, POC	PM ₁₀ , 1	O ₃ , 1
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure, regional transport
Network affiliation	NA	NA
Monitor type(s)	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	TAPI 400 series
Method code	EQPM-0516-239	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM
Collecting agency	DAQ	DAQ
Analytical lab	NA	NA
Reporting agency	DAQ	DAQ
Spatial scale	Neighborhood	Urban
Monitoring start date	01/01/1998	07/01/1998
Current sampling frequency	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous
Sampling season	Year-round	Year-round
Probe height (m)	4.7	4.6
Distance from supporting structure (m)	2.0	1.9
Distance from obstructions on roof – horizontal distance (m)	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA
Distance from trees (m)	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA
Distance to nearest PM instrument (m)	NA	NA
Unrestricted airflow (degrees)	360	360
Probe material for reactive gases	NA	Teflon
Residence time for reactive gases (s)	NA	6.9
Will there be changes within the next 18 months? (Y/N)	Y, site relocated	Y, site relocated
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	3/5/2020 ¹
Last two semiannual flow rate audits for PM monitors	2/18/2021 ¹	NA

¹Site shutdown in March 2021.



Figure 2: Casino Center: Near-Road Site 2.

Casino Center Near-Road Site 2 is located in the parking lot of Las Vegas Fire and Rescue, which is southeast of E. Bonanza Road and N. Veterans Memorial Drive, and adjacent to US Highway 93. This monitoring station is the second near-road site in the network. Casino Center Near-Road Site 2 was approved by EPA in 2014, and DAQ deployed it in July 2016.

At the request of NDOT, DAQ deployed CO, PM₁₀ and PM_{2.5} SPM monitors in addition to existing near-road NO₂ and meteorological monitors. Data from these monitors will be used for an Environmental Impact Statement related to the expansion of the US-95.

Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Casino Center (32-003-1502)
GPS Coordinates (latitude, longitude)	+36.174365°, -115.139770°
Street Address	500 N. Casino Center Boulevard, Las Vegas, NV
Distance to roadways (m)	U.S. Highway 93: 16; N. Casino Center Boulevard 120; Bonanza Road:180

Local Site Name (AQS ID)	Casino Center (32-003-1502)
Traffic counts (AADT, year)	U.S. Highway 93: 154,000; N. Casino Center Boulevard 4,300; Bonanza Road: 14,000 (2020)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	NO₂, 1	CO, 1	PM₁₀, 1	PM_{2.5} (continuous), 3
Parameter code	42602	42101	81102	88101
Basic monitoring objective(s)	NAAQS comparison	Research support	Research support	Research support
Site type(s)	Source oriented; Highest concentration	Source oriented	Source oriented	Source oriented
Network affiliation	Near Road	NA	NA	NA
Monitor type(s)	SLAMS	SPM	SPM	SPM
Primary, QA Collocated, or Other	Primary	Primary	Primary	Primary
Instrument manufacturer and model	TAPI 500 series	TAPI 300 series	Teledyne T640X	Teledyne T640X
Method code	EQNA-0514-212	RFCA-1093-093	EQPM-0516-239	EQPM-0516-238
FRM/FEM/ARM/other	FEM	other	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ
Spatial scale	Microscale	Microscale	Microscale	Microscale
Monitoring start date	07/01/2016	08/01/2021	09/01/2021	08/01/2021
Current sampling frequency	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.9	4.9	4.9	4.9
Distance from supporting structure (m)	2.2	2.2	2.1	2.1
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA	NA
Does obstruction(s) not on roof impede flow	No	No	No	No
Obstruction height above probe (m)	NA	NA	NA	NA
Distance from trees (m)	31.7	31.7	31.7	31.7
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA

Pollutant, POC	NO₂, 1	CO, 1	PM₁₀, 1	PM_{2.5} (continuous), 3
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360	360
Probe material for reactive gases	Teflon	Teflon	NA	NA
Residence time for reactive gases (s)	7.3	3.7	NA	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	NA	Monthly	Monthly
Frequency of one-point QC check for gaseous instruments	Daily	Daily	NA	NA
Last annual performance evaluation for gaseous parameters	9/1/2021	12/14/2021	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	11/19/2021 ¹	11/19/2021 ²

¹ Monitoring began 9/1/2021

² Monitoring began 8/1/2021



Figure 3: Garrett Junior High.

The Garrett Junior High School Monitoring Site has replaced the Boulder City site. This new location is more representative of Boulder City at the neighborhood scale and provides better population coverage. PM_{2.5} was started as SPM with potential for SLAMS monitoring, and the new site has a meteorological tower. Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Garrett Junior High (32-003-0602)
GPS Coordinates (latitude, longitude)	+35.969848°, -114.835007°
Street Address	1200 Ave G , Boulder City, NV
Distance to roadways (m)	Adams Blvd: 133 Avenue G: 305
Traffic counts (AADT, year)	Adams Blvd: 4,250; Avenue G: 1,550: (2020)
Ground cover	Grass, unpaved, paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} (continuous), 3	O ₃ , 1
Parameter code	81102	88101	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure
Network affiliation	NA	NA	NA
Monitor type(s)	SLAMS	SPM	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	TAPI 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	4/1/2021	4/1/2021	4/1/2021
Current sampling frequency	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.7	4.7	4.6
Distance from supporting structure (m)	2.0	2.0	1.9
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	50	50	50
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	7.0
Will there be changes within the next 18 months? (Y/N)	N	Y, change to SLAMS	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	4/28/2021
Last two semiannual flow rate audits for PM monitors	4/28/2021; 9/15/2021; 12/10/2021	4/28/2021; 9/15/2021; 12/10/2021	NA



Figure 4: Green Valley.

The Green Valley site in Henderson was established to monitor dust emissions from a gravel processing plant, and it continues to monitor PM₁₀ and PM_{2.5}. O₃ monitoring was established in 2015. Meteorological measurements at the Green Valley site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Green Valley (32-003-0298)
GPS Coordinates (latitude, longitude)	+36.048705°, -115.052942°
Street Address	298 Arroyo Grande Blvd., Henderson, NV 89014
Distance to roadways (m)	Santiago Drive: 18; Arroyo Grande Blvd: 198; North Stephanie: 533
Traffic counts (AADT, year)	Santiago Drive: 3,800 (est.); Arroyo Grande Blvd: 9,550; North Stephanie: 33,000 (2020)
Ground cover	Paved, gravel
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5} (continuous), 3	O₃, 1	CO, 1
Parameter code	81102	88101	44201	42101

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} (continuous), 3	O ₃ , 1	CO, 1
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	Research support
Site type(s)	Population exposure	Population exposure	Population exposure, regional transport	Population exposure
Network affiliation	NA	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS	SPM
Primary, QA Collocated, or Other	Primary	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	TAPI 400 series	TAPI 300 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087	RFCA-1093-093
FRM/FEM/ARM/other	FEM	FEM	FEM	other
Collecting agency	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ
Spatial scale	Middle	Middle (area-wide)	Neighborhood	Middle
Monitoring start date	06/02/2015	06/02/2015	07/01/2015	04/01/2021
Current sampling frequency	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	04/01/2021 – 09/30/2021
Probe height (m)	4.8	4.8	4.5	4.5
Distance from supporting structure (m)	2.0	2.0	1.7	1.7
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA	NA
Distance from trees (m)	10.5	10.5	13.2	13.2
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360	360

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} (continuous), 3	O ₃ , 1	CO, 1
Probe material for reactive gases	NA	NA	Teflon	Teflon
Residence time for reactive gases (s)	NA	NA	10.4	4.9
Will there be changes within the next 18 months? (Y/N)	N	N	N	Y, discontinue
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	Y	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	12/16/21	NA ¹
Last two semiannual flow rate audits for PM monitors	2/23/2021; 5/11/2021; 7/19/2021; 12/8/2021	2/23/2021; 5/11/2021; 7/19/2021; 12/8/2021	NA	NA

¹No audit conducted on special study SPM.



Figure 5: Indian Springs.

The O₃ monitor at Indian Springs is helpful in identifying high O₃ concentrations, characterizing transport, and filling spatial gaps. Additional justification for this site is provided in the 5-Year Network Assessment. This Indian Springs location is approximately 45 miles northwest of Las Vegas and may provide high-O₃ triangulation between Joe Neal and the Las Vegas Paiute Tribe (when active), which appears to be the highest O₃ location within Clark County. DAQ will continue to work with EPA in evaluating high O₃ locations within its jurisdiction.

Local Site Name (AQS ID)	Indian Springs (32-003-7772)
GPS Coordinates (latitude, longitude)	+36.569333°, -115.676651°
Street Address	668 Gretta Ln., Indian Springs, NV
Distance to roadway (m)	Gretta Ln: 97
Traffic count (AADT, year)	< 1,000 (2020)
Ground cover	Native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O ₃ , 1
Parameter code	44201
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Regional transport
Network affiliation	NA
Monitor type(s)	SLAMS
Instrument manufacturer and model	TAPI 400 series

Pollutant, POC	O ₃ , 1
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ
Analytical lab	NA
Reporting agency	DAQ
Spatial scale	Regional
Monitoring start date	05/11/2010
Current sampling frequency	Continuous, seasonal
Calculated sampling frequency	Continuous, seasonal
Sampling season	Seasonal: contingent upon waiver
Probe height (m)	5
Distance from supporting structure (m)	1.9
Distance from obstructions on roof – horizontal distance (m)	NA
Distance from obstructions on roof – vertical height (m)	NA
Distance from obstructions not on roof – horizontal distance (m)	4.1
Distance from obstructions not on roof – vertical height (m)	1.0 (building/obstruction is below probe)
Obstruction height above probe (m)	NA (probe is above obstruction)
Distance from trees (m)	NA
Distance to furnace or incinerator flue (m)	NA
Distance between collocated monitors (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	8.3
Will there be changes within the next 18 months? (Y/N)	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	NA
Frequency of flow rate verification for manual PM samplers	NA
Frequency of flow rate verification for automated PM analyzers	NA
Frequency of one-point QC check for gaseous instruments	Daily
Last annual performance evaluation for gaseous parameters	4/7/2021
Last two semiannual flow rate audits for PM monitors	NA



Figure 6: Jean.

The Jean site is approximately 30 miles south of Las Vegas. This site was originally set up as an upwind background site, and it still serves this purpose for PM. Its primary objective for O₃ monitoring is measuring transport from Southern California. Meteorological measurements at the Jean site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Jean (32-003-1019)
GPS Coordinates (latitude, longitude)	+35.785665°, -115.357087°
Street Address	1965 State Route 161, Jean, NV 89019
Distance to roadways (m)	State Route 161: 1,043
Traffic counts (AADT, year)	State Route 161: 1,800 (2020)
Ground cover	Gravel, native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	O₃, 1	PM_{2.5} Primary (continuous), 3
Parameter code	81102	44201	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Upwind background	Regional transport	Upwind background
Network affiliation	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	API 400 series	Teledyne T640X
Method code	EQPM-0516-239	EQOA-0992-087	EQPM-0516-238
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Regional	Regional	Regional
Monitoring start date	06/08/2017	08/01/1998	06/08/2017
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.7	4.0	4.7
Distance from supporting structure (m)	2.1	1.5	2.1
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	NA	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	Teflon	NA
Residence time for reactive gases (s)	NA	6.3	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	Y
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	NA	Monthly

Pollutant, POC	PM₁₀, 1	O₃, 1	PM_{2.5} Primary (continuous), 3
Frequency of one-point QC check for gaseous instruments	NA	Daily	NA
Last annual performance evaluation for gaseous parameters	NA	3/17/2021	NA
Last two semiannual flow rate audits for PM monitors	2/18/2021, 5/11/2021, 8/12/2021, 12/10/2021	NA	2/18/2021, 5/11/2021, 8/12/2021, 12/10/2021



Figure 7: Jerome Mack.

The Jerome Mack site in east Las Vegas is the Clark County NCore and PAMS site. Its primary objective is to monitor trace-level gaseous pollutants, O₃ and O₃ precursors, PM parameters (including PM₁₀, PM_{2.5}, particulate matter between 2.5 and 10 micrometers in diameter (PM Coarse), and speciated PM parameters), and meteorological measurements as part of the nationwide NCore network. This site operates the PM_{2.5} QA collocated FRM sampler for the PM_{2.5} FRM network. The SASS (parameter code 88502) and URG (parameter code 88355) are non-regulatory speciation samplers and are operated as non-FRM/FEM.

This site began PAMS operations as of June 2019. These operations are described in the PAMS Quality Assurance Project Plan (QAPP), which was approved on December 22, 2020.

Meteorological measurements at this site include wind speed, wind direction, ambient temperature, relative humidity, precipitation, barometric pressure, cloud mixing layer height, solar and UV radiation.

Local Site Name (AQS ID)	Jerome Mack (32-003-0540)
GPS Coordinates (latitude, longitude)	+36.141875°, -115.078742°
Street Address	4250 Karen Avenue, Las Vegas, NV 89121
Distance to roadways (m)	Sahara: 244; Lamb: 351; Karen: 130
Traffic counts (AADT, year)	Sahara: 27,700; Lamb: 26,000; Karen: 3,000 (est.) (2020)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 3	PM _{2.5} continuous, 3	PM _{10-2.5} continuous, 3	PM _{2.5} Primary (FRM), 1	PM _{2.5} Collocated (FRM), 2	Speciation SASS, 5	Speciation URG, 5	O ₃ , 1	NO, 1	NO ₂ , 1	NO _y , 1	Trace CO, 1	Trace SO ₂ , 1
Parameter code	81102	88101	86101	88101	88101	88502 Speciation, non-regulatory	88355 Speciation, non-regulatory	44201	42601	42602	42600	42101	42401
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	Research support	NAAQS comparison	NAAQS comparison	Research support	Research support	NAAQS comparison	Research support	NAAQS comparison	Research support	Research support, NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure; 2 nd highest concentration	Population exposure	Population exposure	Population exposure
Network affiliation	NCore	NCore	NCore	NCore	NCore	CSN Supplemental, NCore	CSN Supplemental, NCore	NCore	NCore	NCore	NCore	NCore	NCore
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Other	Primary	Primary	QA Collocated	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	Teledyne T640X	Met One E-SEQ-FRM	Met One E-SEQ-FRM	Met One Super SASS	URG 3000	TAPI 400 series	TAPI 200 series	TAPI 500 series	TAPI 200 series	TAPI 300 series	TAPI 100 series
Method code	EQPM-0516-239	EQPM-0516-238	EQPM-0516-240	RFPS-0717-245	RFPS-0717-245	811, 812	838	EQQA-0992-087	RFNA-1194-099	EQNA-0514-212	RFNA-1194-099	RFCA-1093-093	EQSA-0495-100
FRM/FEM/ARM/other	FEM	FEM	FEM	FRM Primary	FRM Collocated	Other	Other	FEM	Other	FEM	Other	FRM	FEM
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	Weigh	Weigh	UC Davis	UC Davis	NA	NA	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ	Sonoma Tech	Sonoma Tech	DAQ	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Urban	Urban	Urban	Neighborhood	Neighborhood
Monitoring start date	01/30/2018	01/30/2018	01/30/2018	01/01/2019	01/01/2019	05/2010	05/2010	01/01/2011	01/01/2011	05/01/2017	01/01/2011	01/01/2011	01/01/2011
Current sampling frequency	Continuous	Continuous	Continuous	1:3	1:3	1:3	1:3	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	1:3	1:3	1:3	1:3	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	5.2	5.2	5.2	3.1	3.1	3.0	3.3	3.4	7.0	3.4	7.0	3.4	3.4

Pollutant, POC	PM ₁₀ , 3	PM _{2.5} continuous, 3	PM _{10-2.5} continuous, 3	PM _{2.5} Primary (FRM), 1	PM _{2.5} Collocated (FRM), 2	Speciation SASS, 5	Speciation URG, 5	O ₃ , 1	NO, 1	NO ₂ , 1	NO _x , 1	Trace CO, 1	Trace SO ₂ , 1
Distance from supporting structure (m)	2.0	2.0	2.0	2.9	2.9	2.9	3.1	1.1	7.0	1.1	7.0	1.1	1.1
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	5.4	3.0	7.2	5.3	NA	NA	NA	NA	NA	NA
Distance from obstructions not on roof – vertical obstruction height (m)	NA	NA	NA	3.1	3.1	3.0	3.3	NA	NA	NA	NA	NA	NA
Obstruction height above probe (m)	NA	NA	NA	0.2	0.2	0.3	0.4	NA	NA	NA	NA	NA	NA
Distance from trees (m)	16.1	16.1	16.1	22.0	18.3	20.3	19.4	15.5	14.5	15.5	14.5	15.5	15.5
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA	3.6	3.6	NA	NA	NA	NA	NA	NA	NA	NA
Distance to nearest PM instrument (m)	8.4	8.4	8.4	3.6	3.6	2.8	2.2	NA	NA	NA	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360	360	360	360	360	360	360	360	360	360	360
Probe material for reactive gases	NA	NA	NA	NA	NA	NA	NA	Teflon	Teflon	Teflon	Teflon	Teflon	Teflon
Residence time for reactive gases (s)	NA	NA	NA	NA	NA	NA	NA	8.5	9.8	7.4	9.8	4.3	10.2
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	Y	N	Y	Y	N	N	N	N	N	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	Monthly	Monthly	Monthly	Monthly	NA	NA	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	Monthly	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Pollutant, POC	PM₁₀, 3	PM_{2.5} continuous, 3	PM_{10-2.5} continuous, 3	PM_{2.5} Primary (FRM), 1	PM_{2.5} Collocated (FRM), 2	Speciation SASS, 5	Speciation URG, 5	O₃, 1	NO, 1	NO₂, 1	NO_x, 1	Trace CO, 1	Trace SO₂, 1
Frequency of one-point QC check for gaseous instruments	NA	NA	NA	NA	NA	NA	NA	Daily	Daily	Daily	Daily	Daily	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	NA	NA	NA	NA	NA	10/4/2021	9/27/2021	10/4/2021	9/27/2021	9/28/2021	10/5/2021
Last two semiannual flow rate audits for PM monitors	3/16/2021, 6/16/2021, 9/22/2021, 12/7/2021	3/16/2021, 6/16/2021, 9/22/2021, 12/7/2021	3/16/2021, 6/16/2021, 9/22/2021, 12/7/2021	3/18/2021, 6/16/2021, 9/23/2021, 12/7/2021	3/18/2021, 6/16/2021, 9/23/2021, 12/7/2021	3/16/2021, 6/16/2021, 9/23/2021, 12/7/2021	3/16/2021, 6/16/2021, 9/23/2021, 12/13/2021	NA	NA	NA	NA	NA	NA



Figure 8: Joe Neal.

The primary objectives of the Joe Neal site, located in northwest Las Vegas, are to monitor O₃ and NO₂ in an area of high O₃ concentrations, and to support DAQ modeling efforts. Due to topography at this location, the summertime loft brings higher O₃ and precursor levels toward this site from the east end of the Las Vegas Valley. Although Joe Neal tends to measure the highest O₃ concentrations within the network, DAQ will continue working with EPA to evaluate if there are higher O₃ locations within Clark County. Meteorological measurements at the Joe Neal site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Joe Neal (32-003-0075)
GPS Coordinates (latitude, longitude)	+36.270592°, -115.238282°
Street Address	6651 W. Azure Way, Las Vegas, NV 89130
Distance to roadways (m)	Rebecca: 12.6; Azure: 213; Tropical: 130; North Rainbow: 366
Traffic counts (AADT, year)	Rebecca: 3,000 (est.); Azure 2,750; Tropical 3,850; North Rainbow 2,650 (2020)
Ground cover	Gravel, grass, pavement
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5}, 3	O₃, 1	NO₂, 1	CO, 1
Parameter code	81102	88101	44201	42602	42101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	Research support, NAAQS comparison	Research support
Site type(s)	Population exposure	Population exposure	Max.O3 concentration	Population exposure	Population exposure
Network affiliation	NA	NA	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS	SPM

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1	NO ₂ , 1	CO, 1
Primary, QA Collocated, or Other	Primary	Primary	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	TAPI 400 series	TAPI 500 series	TAPI 300 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087	EQNA-0514-212	RFCA-1093-093
FRM/FEM/ARM/other	FEM	FEM	FEM	FEM	other
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Middle	Regional
Monitoring start date	09/19/2017	09/19/2017	07/01/2000	10/01/2015	04/01/2020
Current sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	04/01/2021 – 09/30/2021
Probe height (m)	4.9	4.9	3.9	3.9	3.9
Distance from supporting structure (m)	2.4	2.4	1.3	1.3	1.3
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA	NA	NA
Distance from trees (m)	17.6	17.6	17.8	17.8	17.8
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA	NA	NA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1	NO ₂ , 1	CO, 1
Unrestricted airflow (degrees)	360	360	360	360	360
Probe material for reactive gases	NA	NA	Teflon	Teflon	Teflon
Residence time for reactive gases (s)	NA	NA	7.2	5.9	3.4
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	Y, discontinue
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	Y	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA	NA	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily	Daily	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	3/25/2021	3/24/2021	NA ¹
Last two semiannual flow rate audits for PM monitors	2/17/2021, 4/27/2021, 9/23/2021, 12/7/2021	2/17/2021, 4/27/2021, 9/23/2021, 12/7/2021	NA	NA	NA

¹No audit conducted on special study SPM.



Figure 9: Liberty High School.

The Liberty High School site was established to fill a spatial gap in the southeast Las Vegas Valley. The site measures O₃, PM₁₀ and PM_{2.5} (SPM). Meteorological measurements at the Liberty High School site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Liberty High School (32-003-0299)
GPS Coordinates (latitude, longitude)	+35.987908°, -115.148885°
Street Address	3700 Liberty Heights Ave. Henderson, NV
Distance to roadway (m)	Liberty Heights Ave: 16; Chaparral Rd: 16; Bermuda Rd: 575
Traffic count (AADT, year)	Liberty Heights Ave: 1,000 (est.); Chaparral Rd: 1,000 (est.); Bermuda Rd: 6,550 (2020)
Ground cover	Asphalt, gravel, and grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5}	O₃, 1
Parameter code	81102	88101	44201
Basic monitoring objective(s)	NAAQS comparison	Provide air pollution data to public in a timely manner	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure
Monitor type(s)	SLAMS	SPM	SLAMS
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	API 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087

Pollutant, POC	PM ₁₀ , 1	PM _{2.5}	O ₃ , 1
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DES	DES	DES
Analytical lab	NA	NA	NA
Reporting agency	DES	DES	DES
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	5/1/2021	5/1/2021	5/1/2021
Current sampling frequency	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.8	4.8	4.3
Distance from supporting structure (m)	2.2	2.2	1.6
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	41	41	41
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between collocated monitors (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	6.6
Will there be changes within the next 18 months? (Y/N)	N	Y, change to SLAMS	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	5/24/2021
Last two semiannual flow rate audits for PM monitors	5/10/2021, 9/15/2021, 11/4/2021	5/10/2021, 9/15/2021, 11/4/2021	NA



Figure 10: Mountains Edge Park.

The Mountains Edge site was established to fill a spatial gap in the southwest Las Vegas Valley. The site measures O₃, PM₁₀ and PM_{2.5} (SPM). Meteorological measurements at the Mountains Edge site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Mountains Edge Park (32-003-0044)
GPS Coordinates (latitude, longitude)	+36.004787°, -115.267671°
Street Address	8101 W Mountains Edge Pkwy, Las Vegas, NV
Distance to roadway (m)	Mountains Edge Pkwy.: 46; S. Buffalo Dr.: 488; Rumrill St.: 100
Traffic count (AADT, year)	Mountains Edge Pkwy.: 5,200; Buffalo Dr.: 10,300; Rumrill St.: <1,000 (est.) (2020)
Ground cover	Asphalt and gravel
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5}	O ₃ , 1
Parameter code	81102	88101	44201

Pollutant, POC	PM ₁₀ , 1	PM _{2.5}	O ₃ , 1
Basic monitoring objective(s)	NAAQS comparison	Provide air pollution data to public in a timely manner	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure
Monitor type(s)	SLAMS	SPM	SLAMS
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	API 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	10/1/2020	10/1/2020	10/1/2020
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.7	4.7	4.6
Distance from supporting structure (m)	2.0	2.0	1.9
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	13.4	13.4	13.4
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between collocated monitors (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	6.5
Will there be changes within the next 18 months? (Y/N)	N	Y, change to SLAMS	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	8/2/2021

Pollutant, POC	PM₁₀, 1	PM_{2.5}	O₃, 1
Last two semiannual flow rate audits for PM monitors	2/24/2021, 4/28/2021, 8/12/2021, 12/2/2021	2/24/2021, 4/28/2021, 8/12/2021, 12/2/2021	NA



Figure 11: Palo Verde.

The primary objective of the Palo Verde site in west Las Vegas is to monitor O₃, but it also monitors PM₁₀ and PM_{2.5} with a primary and collocated monitor. Due to topography at this location, the summertime loft brings higher O₃ and precursor levels toward this site from the east end of the Las Vegas Valley. Meteorological measurements at the Palo Verde site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Palo Verde (32-003-0073)
GPS Coordinates (latitude, longitude)	+36.173415°, -115.332728°
Street Address	333 Pavilion Center Dr., Las Vegas, NV 89144
Distance to roadways (m)	Pavilion Center Dr.: 14.7; Greenmoor Lane: 15.0
Traffic counts (AADT, year)	Pavilion Center Dr.: 7,000 (est.); Greenmoor Lane: 4,000 (est.) (2020)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5}, 3	PM_{2.5}, 4	O₃, 1
Parameter code	81102	88101	88101	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure	Population exposure

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	PM _{2.5} , 4	O ₃ , 1
Network affiliation	NA	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	QA Collocated	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	Teledyne T640X	API 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQPM-0516-238	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ
Spatial scale	Middle	Middle	Middle	Neighborhood
Monitoring start date	09/12/2017	1/1/2020	10/1/2021	07/01/1998
Current sampling frequency	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.7	4.7	4.7	3.7
Distance from supporting structure (m)	2.3	2.3	2.3	1.4
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA	NA
Distance from trees (m)	15.0	15.0	15.0	13.7
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	2.0	2.0	NA
Distance to nearest PM instrument (m)	NA	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360	360
Probe material for reactive gases	NA	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	NA	6.3
Will there be changes within the next 18 months? (Y/N)	N	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	Y	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	NA	6/23/2021

Pollutant, POC	PM₁₀, 1	PM_{2.5}, 3	PM_{2.5}, 4	O₃, 1
Last two semiannual flow rate audits for PM monitors	2/17/2021, 4/27/2021, 8/12/2021, 11/3/2021	2/17/2021, 4/27/2021, 8/12/2021, 11/3/2021	11/3/2021 ¹	NA

¹ Colocation began 10/1/2021



Figure 12: Paul Meyer.

The primary objective of the Paul Meyer site in southwest Las Vegas is to monitor O₃, but it also monitors PM₁₀ and PM_{2.5}. Due to topography at this location, the summertime loft brings higher O₃ and precursor levels toward this site from the east end of the Las Vegas Valley. Meteorological measurements at the Paul Meyer site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Paul Meyer (32-003-0043)
GPS Coordinates (latitude, longitude)	+36.106389°, -115.253333°
Street Address	4525 New Forest Dr., Las Vegas, NV 89147
Distance to roadways (m)	New Forest Dr.: 102; South Tenaya Way: 160
Traffic counts (AADT, year)	New Forest Dr.: 3,000 (est.); South Tenaya Way: 3,400 (2020)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5}, 3	O₃, 1
Parameter code	81102	88101	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure
Network affiliation	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	API 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQA-0992-087

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	09/12/2017	06/15/2017	07/01/1998
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.6	4.6	4.3
Distance from supporting structure (m)	1.9	1.9	1.6
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	10.8	10.8	11.9
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	7.0
Will there be changes within the next 18 months? (Y/N)	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	Y	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	3/15/2021
Last two semiannual flow rate audits for PM monitors	2/22/2021, 4/14/2021, 8/12/2021, 11/19/2021	2/22/2021, 4/14/2021, 8/12/2021, 11/19/2021	NA



Figure 13: Sunrise Acres.

Monitoring at the Sunrise Acres site near the center of the Las Vegas Valley began as part of a CO study in the 1990s. The primary objective of the Sunrise Acres site is to monitor CO, NO₂, and PM. DAQ is conducting area-wide NO₂ monitoring, which meets RA 40 requirements outlined in 40 CFR 58, App. D, Sec. 4.3.4 at this site. The site monitors PM₁₀, and it monitors PM_{2.5} using both filter-based and continuous methodologies. The PM_{2.5} FEM is the primary monitor at this site, and it is collocated with a PM_{2.5} FRM. Meteorological measurements at the Sunrise Acres site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Sunrise Acres (32-003-0561)
GPS Coordinates (latitude, longitude)	+36.163962°, -115.113930°
Street Address	2501 Sunrise Ave., Las Vegas, NV 89101
Distance to roadways (m)	Sunrise Ave: 128; Eastern Ave: 160
Traffic counts (AADT, year)	Sunrise Ave: 4,000 (est.); Eastern Ave: 28,500 (2020)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	CO, 1	PM_{2.5} Collocated FRM, 1	PM_{2.5} Primary FEM (continuous), 3	NO₂, 1
Parameter code	81102	42101	88101	88101	42602
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Highest concentration	Highest concentration	Highest concentration	Population exposure; highest concentration
Network affiliation	NA	NA	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	QA Collocated	Primary	Primary
Instrument manufacturer and model	Teledyne T640X	API 300 series	Met One E-SEQ-FRM	Teledyne T640X	TAPI 500 series
Method code	EQPM-0516-239	RFCA-1093-093	RFPS-0717-245	EQPM-0516-238	EQNA-0514-212
FRM/FEM/ARM/other	FEM	FRM	FRM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Analytical lab	NA	NA	Weigh	NA	NA
Reporting agency	DAQ	DAQ	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	09/25/2017	10/01/1996	01/01/2019	09/25/2017	01/01/2013
Current sampling frequency	Continuous	Continuous	1:3	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	1:3	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.7	3.6	3.0	4.7	3.6
Distance from supporting structure (m)	2.2	1.0	2.1	2.2	1.0
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	2.1	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	0.5 ¹	NA	NA
Distance from trees (m)	NA	NA	NA	NA	NA

Pollutant, POC	PM₁₀, 1	CO, 1	PM_{2.5} Collocated FRM, 1	PM_{2.5} Primary FEM (continuous), 3	NO₂, 1
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	Distance between PM _{2.5} FRM and PM _{2.5} FEM is 3.8	Distance between PM _{2.5} FRM and PM _{2.5} FEM is 3.8	NA
Distance to nearest PM instrument (m)	3.8	NA	3.8	3.8	NA
Unrestricted airflow (degrees)	360	360	360	360	360
Probe material for reactive gases	NA	Teflon	NA	NA	Teflon
Residence time for reactive gases (s)	NA	2.9	NA	NA	5.8
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	Y	Y	N
Frequency of flow rate verification for manual PM samplers	NA	NA	Monthly	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	NA	NA	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	Daily	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	9/22/2021	NA	NA	9/22/2021
Last two semiannual flow rate audits for PM monitors	1/4/2021, 5/11/2021, 8/16/2021, 12/6/2021	NA	2/23/2021, 5/11/2021, 8/16/2021, 12/8/2021	1/4/2021, 5/11/2021, 8/16/2021, 12/6/2021	NA

¹ Inlet above obstruction.



Figure 14: Rancho & Teddy: Near-Road Site 1.

Rancho & Teddy is the first near-road monitoring site that DAQ deployed, and it began operating in 2015. The site is in Las Vegas and at the southeast side of the intersection of South Rancho Drive and Teddy Drive, which is adjacent to Interstate 15. Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Rancho & Teddy (32-003-1501)
GPS Coordinates (latitude, longitude)	+36.139707°, -115.175654°
Street Address	2755 S. Rancho Drive, Las Vegas, NV
Distance to roadways (m)	Interstate 15: 13; South Rancho Drive: 8; Teddy Drive: 31
Traffic counts (AADT, year)	Interstate 15: 368,167 (2021); South Rancho Drive: 4,000; Teddy Drive: 4,000 (est.) (2020)
Ground cover	Gravel
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	NO ₂ , 1	CO, 1	PM _{2.5} , 1
Parameter code	42602	42101	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Highest concentration	Highest concentration	Highest concentration
Network affiliation	Near Road	Near Road	Near Road
Monitor type(s)	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	Primary
Instrument manufacturer and model	TAPI 500 series	API 300 series	Teledyne T640X
Method code	EQNA-0514-212	RFCA-1093-093	EQPM-0516-236
FRM/FEM/ARM/other	FEM	FRM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Microscale	Microscale	Microscale
Monitoring start date	08/01/2015	01/01/2017	01/01/2017
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.6	4.6	4.9
Distance from supporting structure (m)	1.8	1.8	2.1
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	101	103	103
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	Teflon	Teflon	NA
Residence time for reactive gases (s)	7.4	4.0	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	Y
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	NA	Monthly

Pollutant, POC	NO₂, 1	CO, 1	PM_{2.5}, 1
Frequency of one-point QC check for gaseous instruments	Daily	Daily	NA
Last annual performance evaluation for gaseous parameters	12/15/21	12/15/21	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	2/24/2021, 4/14/2021, 9/23/2021, 12/7/2021



Figure 15: Virgin Valley High School.

The Virgin Valley site is approximately 80 miles north of Las Vegas and monitors O₃, PM₁₀ and PM_{2.5} (as SPM). The site sits along a transport and exit corridor connecting jurisdictional boundaries, and serves as an indicator of population exposure to pollutants. Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Virgin Valley High School (32-003-0024)
GPS Coordinates (latitude, longitude)	+36.815897°, -114.050347°
Street Address	820 Valley View Dr., Mesquite, NV
Distance to roadway (m)	Valley View Dr.: 39; Hillside Dr.: 124; Interstate 15: 402
Traffic count (AADT, year)	Valley View Dr.: < 3,000 (est.); Hillside Dr.: 4,450; Interstate 15: 26,100 (2020)
Ground cover	Asphalt, gravel, and grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM₁₀, 1	PM_{2.5} (continuous), 3	O₃, 1
Parameter code	81102	88101	44201
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure, regional transport
Monitor type(s)	SLAMS	SPM	SLAMS
Instrument manufacturer and model	Teledyne T640X	Teledyne T640X	API 400 series
Method code	EQPM-0516-239	EQPM-0516-238	EQOA-0992-087
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	1/1/2021	1/1/2021	1/1/2021
Current sampling frequency	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.9	4.9	3.6
Distance from supporting structure (m)	2.4	2.4	1.2
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	30.5	30.5	30.5
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between collocated monitors (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	NA	NA	Teflon
Residence time for reactive gases (s)	NA	NA	5.5
Will there be changes within the next 18 months? (Y/N)	N	Y, change to SLAMS	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily

Pollutant, POC	PM₁₀, 1	PM_{2.5} (continuous), 3	O₃, 1
Last annual performance evaluation for gaseous parameters	NA	NA	2/2/2021
Last two semiannual flow rate audits for PM monitors	2/11/2021; 4/13/2021; 8/30/2021; 10/27/2021	2/11/2021; 4/13/2021; 8/30/2021; 10/27/2021	NA



Figure 16: Walnut Community Center.

The Walnut Community Center site began operation in June, 2021. This site was a replacement for the JD Smith site, which was shut down in December, 2017 due to poor siting. This site measures O₃, CO, NO₂, PM₁₀ and PM_{2.5}. All criteria pollutant measurements are SLAMS. Meteorological measurements at the Walnut site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Walnut (32-003-2003)
GPS Coordinates (latitude, longitude)	+36.214465°, -115.091437°
Street Address	3075 N Walnut Rd, Las Vegas, NV 89115
Distance to roadway (m)	Cecile Ave. 21, W. Walnut Rd. 125, E. Cheyenne Ave. 375
Traffic count (AADT, year)	Cecile Ave. 1,000 (est.), W. Walnut Rd.: 4,000, E. Cheyenne Ave. 17,000 (2020)

Local Site Name (AQS ID)	Walnut (32-003-2003)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O₃, 1	CO, 1	NO₂, 1	PM₁₀	PM_{2.5}
Parameter code	44201	42101	42602	81102	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure	Population exposure	Population exposure
Monitor type(s)	SLAMS	SLAMS	SLAMS	SLAMS	SLAMS
Instrument manufacturer and model	TAPI 400 series	TAPI 300 series	TAPI 500 series	Teledyne T640X	Teledyne T640X
Method code	EQOA-0992-087	RFCA-1093-093	EQNA-0514-212	EQPM-0516-239	EQPM-0516-238
FRM/FEM/ARM/other	FEM	FRM	FEM	FEM	FEM
Collecting agency	DES	DES	DES	DES	DES
Analytical lab	NA	NA	NA	NA	NA
Reporting agency	DES	DES	DES	DES	DES
Spatial scale	Neighborhood	Neighborhood	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	6/1/2021	6/1/2021	6/1/2021	6/1/2021	6/1/2021
Current sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4.5	4.5	4.5	4.9	4.9
Distance from supporting structure (m)	1.8	1.8	1.8	2.2	2.2
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA	NA	NA
Distance from trees (m)	11	11	11	10.5	10.5
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA
Distance between collocated monitors (m)	NA	NA	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360	360	360
Probe material for reactive gases	Teflon	Teflon	Teflon	NA	NA

Pollutant, POC	O₃, 1	CO, 1	NO₂, 1	PM₁₀	PM_{2.5}
Residence time for reactive gases (s)	6.4	3.0	5.2	NA	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	NA	NA	NA	NA	Y
Frequency of flow rate verification for manual PM samplers	NA	NA	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	NA	NA	Monthly	Monthly
Frequency of one-point QC check for gaseous instruments	Daily	Daily	Daily	NA	NA
Last annual performance evaluation for gaseous parameters	6/3/2021	6/16/2021	6/14/2021	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	NA	6/3/2021, 9/15/2021, 12/7/2021	6/3/2021, 9/15/2021, 12/7/2021



Figure 17: Walter Johnson.

The primary objective of the Walter Johnson site, located on the west side of Las Vegas, is to monitor O₃, PM₁₀ and PM_{2.5}. Due to topography at this location, the summertime loft brings high O₃ and precursor levels toward this site from the east end of the Las Vegas Valley. Meteorological measurements at the Walter Johnson site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Walter Johnson (32-003-0071)
GPS Coordinates (latitude, longitude)	+36.169760°, -115.263038°
Street Address	7701 Ducharme Ave., Las Vegas, NV 89145
Distance to roadways (m)	Villa Monterey Drive: 13.0; Ducharme Avenue: 46; South Buffalo Drive: 270
Traffic counts (AADT, year)	Villa Monterey Drive: 3,000 (est.); Ducharme Avenue: 5,000 (est.); South Buffalo Drive: 28,600 (2020)
Ground cover	Concrete/asphalt, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O₃, 1	PM₁₀, 1	PM_{2.5}, 3
Parameter code	44201	81102	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	NAAQS comparison
Site type(s)	Population exposure	Population exposure	Population exposure
Network affiliation	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SLAMS
Primary, QA Collocated, or Other	Primary	Primary	Primary
Instrument manufacturer and model	API 400 series	Teledyne T640X	Teledyne T640X
Method code	EQOA-0992-087	EQPM-0516-239	EQPM-0516-238
FRM/FEM/ARM/other	FEM	FEM	FEM
Collecting agency	DAQ	DAQ	DAQ
Analytical lab	NA	NA	NA
Reporting agency	DAQ	DAQ	DAQ
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Monitoring start date	08/01/1998	09/12/2017	1/1/2020
Current sampling frequency	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	4.3	5.0	5.0
Distance from supporting structure (m)	1.5	2.2	2.2
Distance from obstructions on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	NA	NA	NA
Distance from obstructions not on roof – vertical height (m)	NA	NA	NA
Distance from trees (m)	17.8	16.6	16.6
Distance to furnace or incinerator flue (m)	NA	NA	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA	NA	NA
Distance to nearest PM instrument (m)	NA	NA	NA
Unrestricted airflow (degrees)	360	360	360
Probe material for reactive gases	Teflon	NA	NA
Residence time for reactive gases (s)	6.6	NA	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	Monthly	Monthly
Frequency of one-point QC check for gaseous instruments	Daily	NA	NA
Last annual performance evaluation for gaseous parameters	3/16/2020	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	2/23/2021, 4/28/2021, 8/12/2021, 11/19/2021	2/23/2021, 4/28/2021, 8/12/2021, 11/19/2021

5.0 MAPS OF CRITERIA POLLUTANT MONITORING STATIONS IN 2021

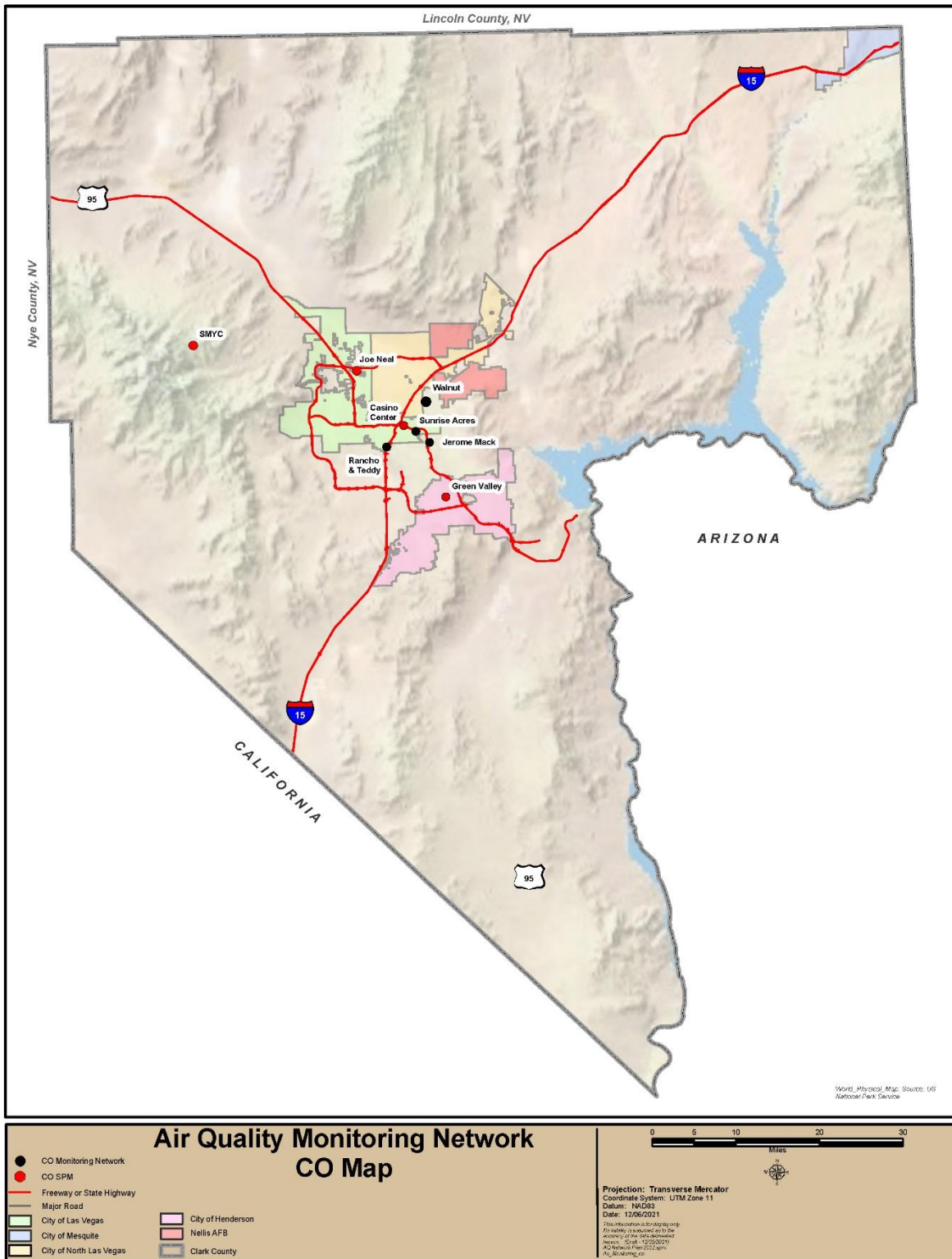


Figure 18: CO Monitors

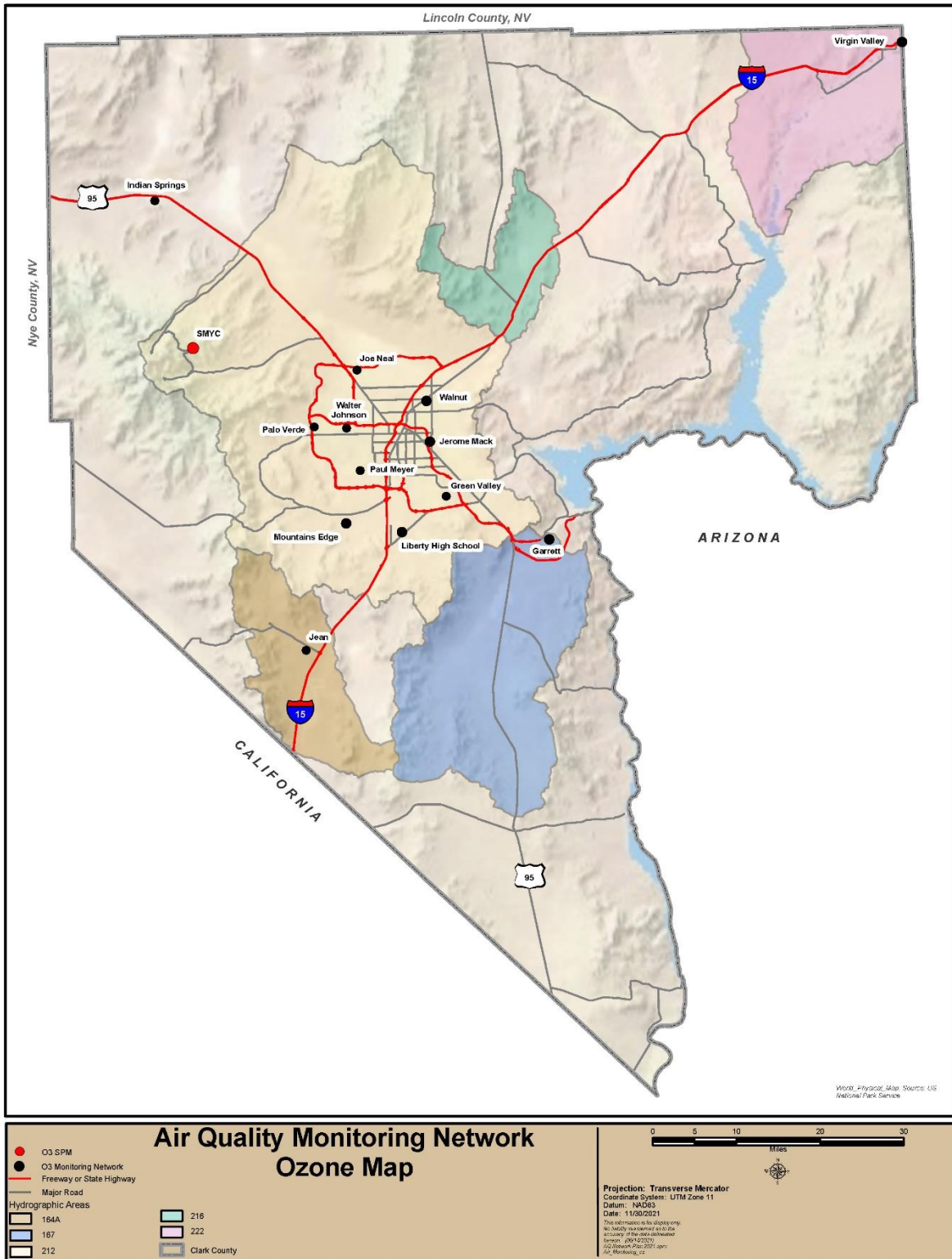


Figure 19: O₃ Monitors.

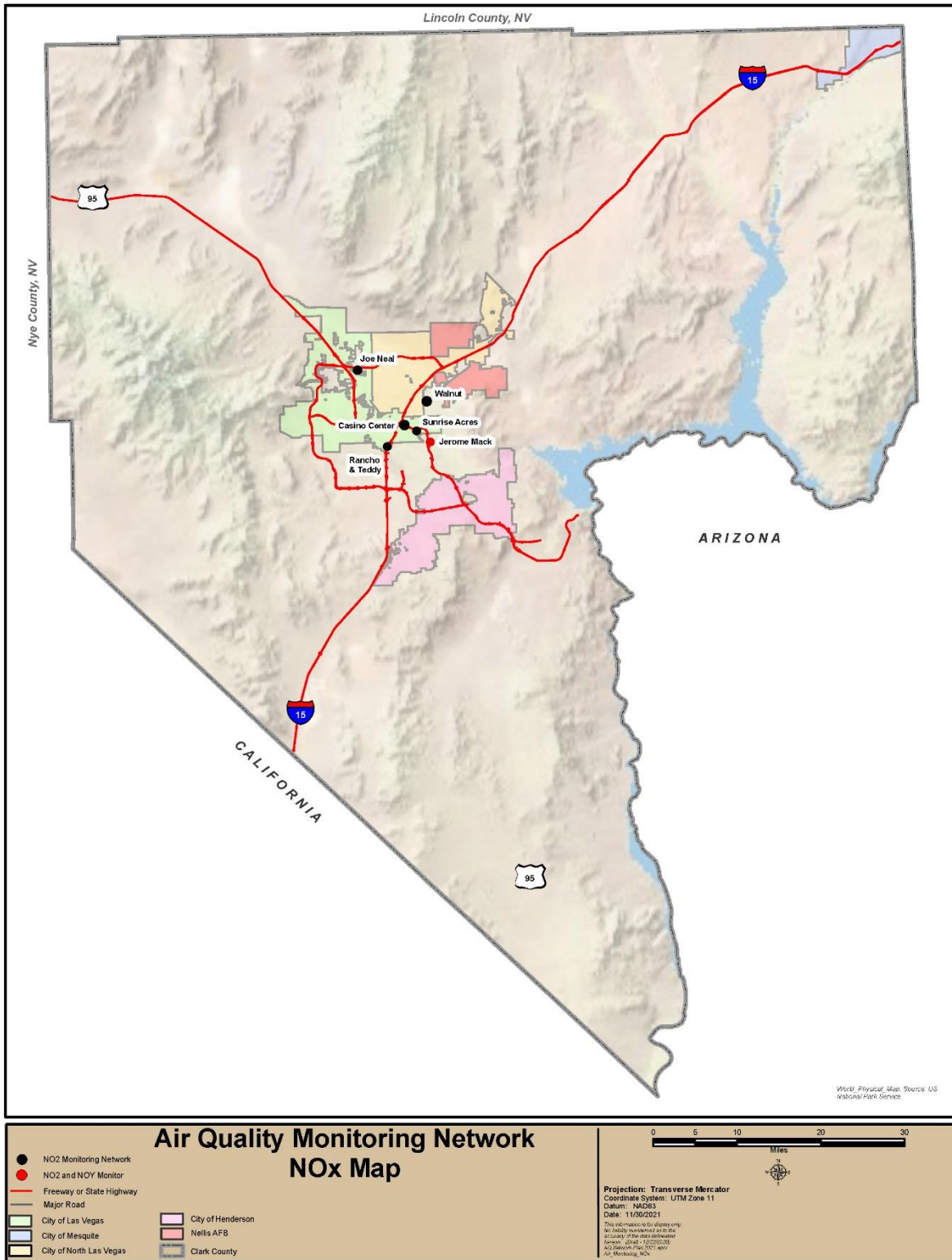


Figure 20: NO_x Monitors.

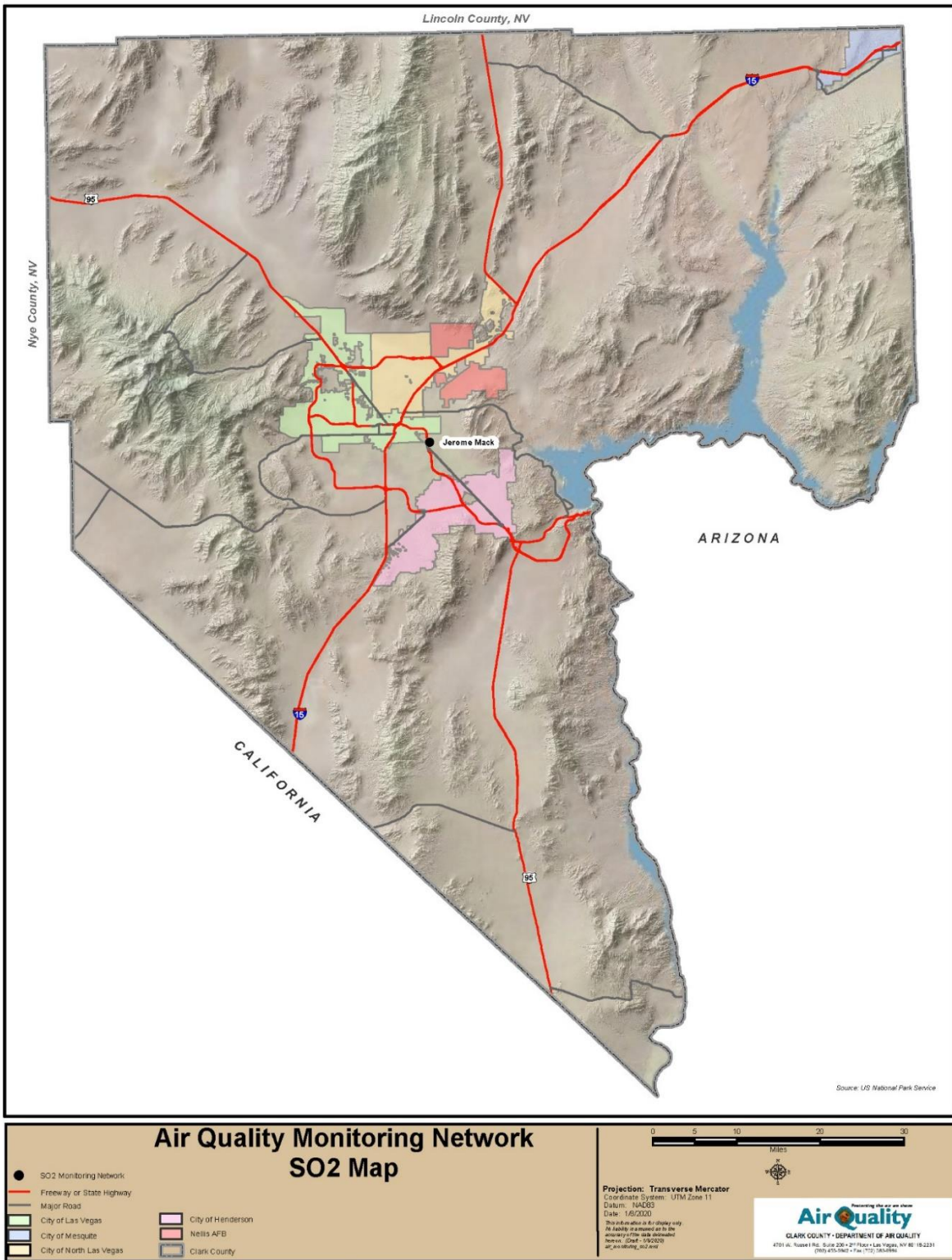


Figure 21: SO₂ Monitor.

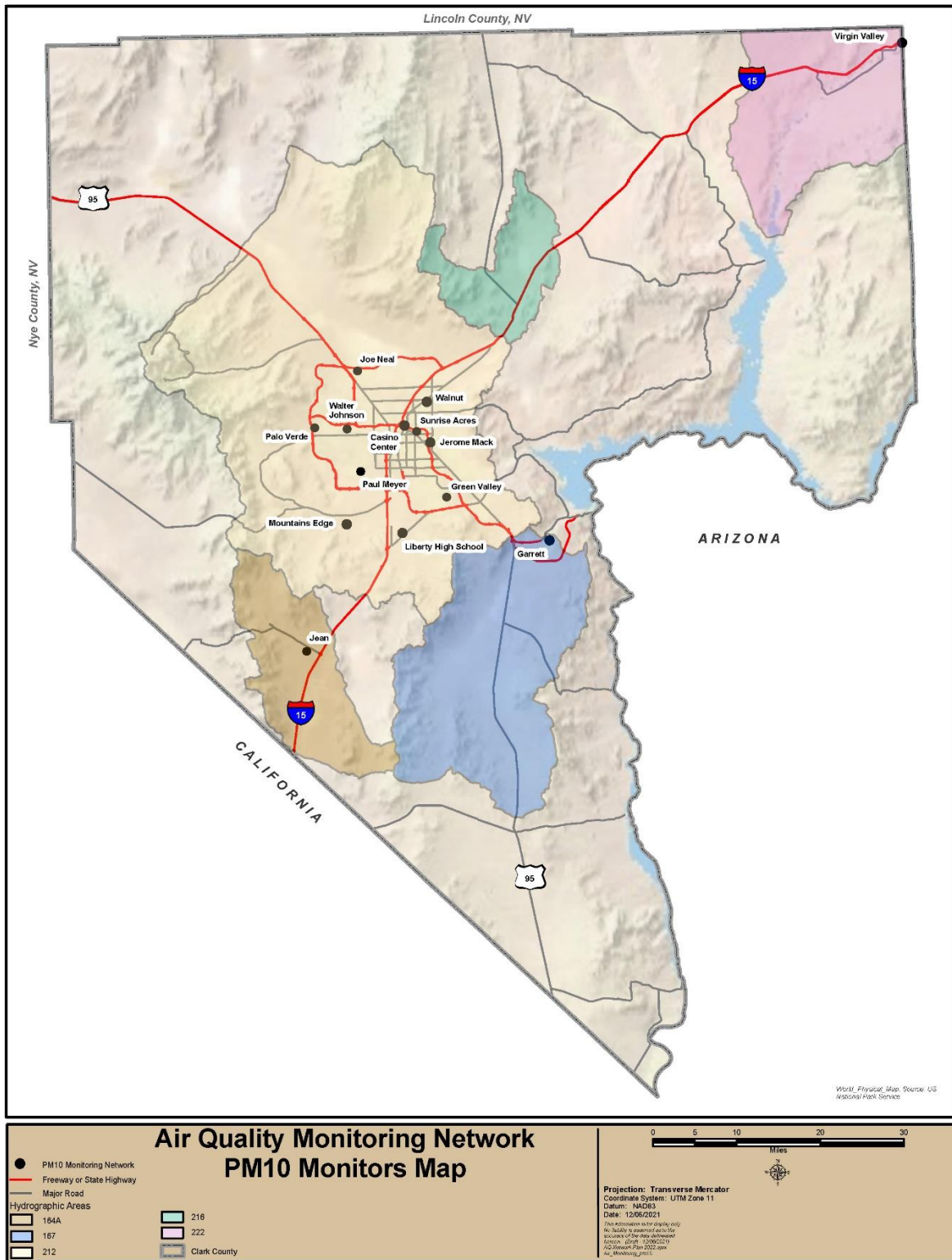


Figure 22: Continuous PM₁₀ Monitors.

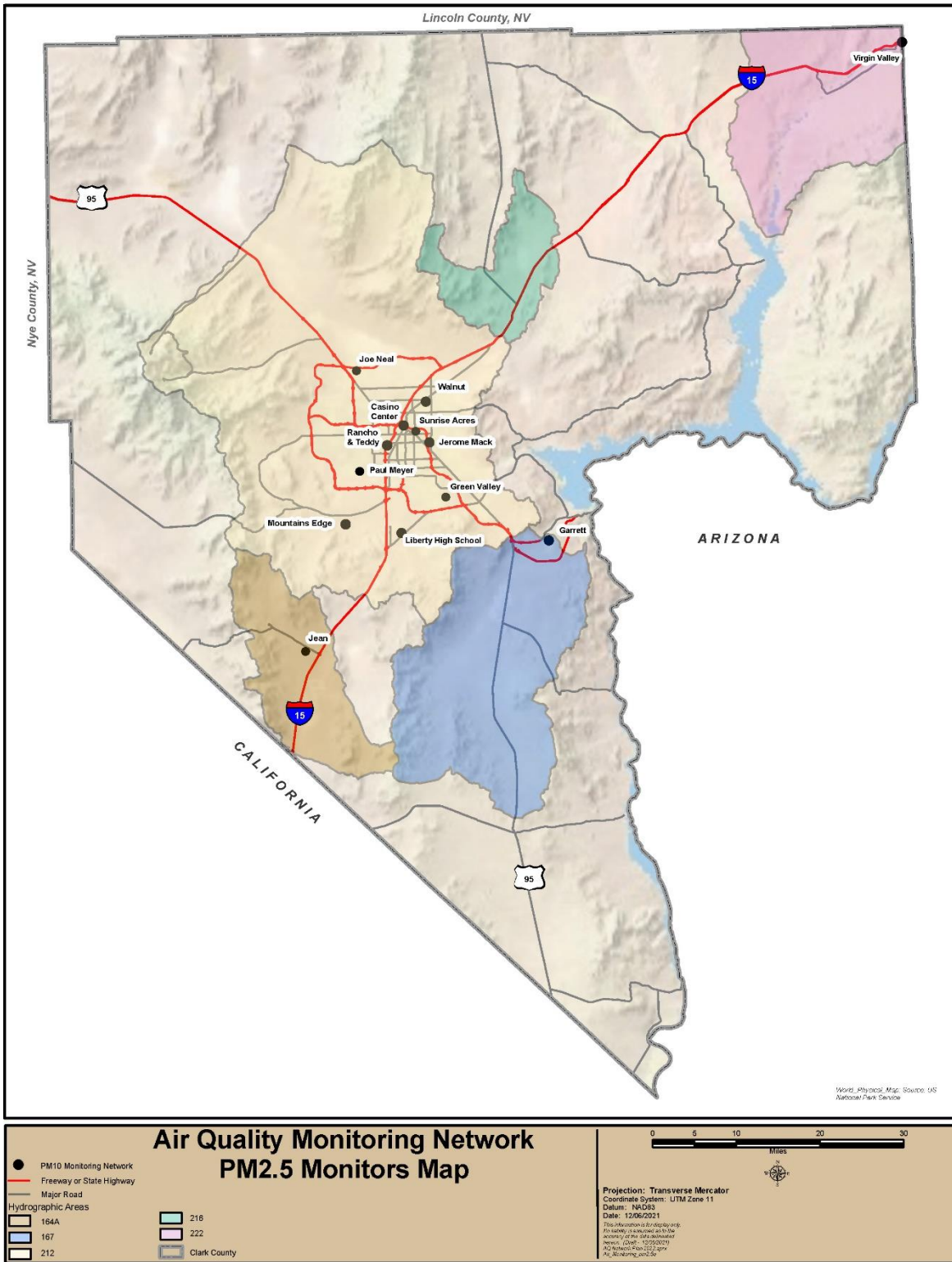


Figure 23: Continuous PM_{2.5} Monitors.

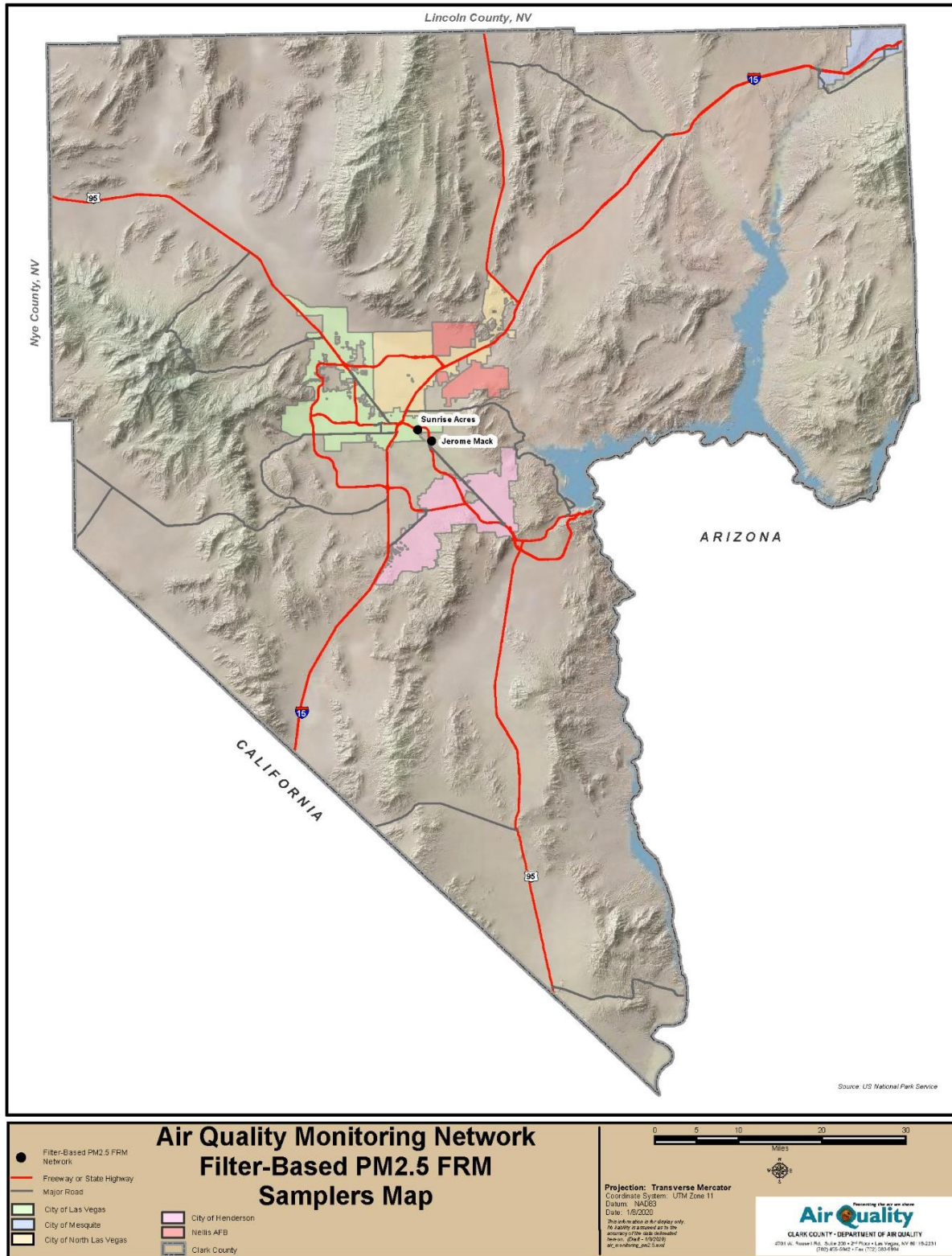


Figure 24: Filter-Based PM2.5 FRM Samplers.

6.0 NATIONAL PERFORMANCE AUDIT PROGRAM AND PERFORMANCE EVALUATION PROGRAM

Each year, EPA Region 9 performs National Performance Audit Program (NPAP) Through-the-Probe (TTP) performance evaluations in accordance with 40 CFR Part 58 Appendix A, which focus on gaseous criteria pollutants. EPA has not audited the direct NO₂ FEM instruments, and the TTP audits are carried out through a contractor.

Table 12. 2021 NPAP and TTP Evaluations

Monitoring Station	Pollutant	Evaluation Date
Paul Meyer	O ₃	10/20/2021
Joe Neal	O ₃	10/20/2021

Each year, the PM_{2.5} FRM sampling network undergoes Performance Evaluation Program (PEP) audits. PEP audit results (in µg/m³) are generated by an independent lab and then submitted to the AQS database through an EPA contractor.

Table 13. 2021 PEP Audit Activity

Sampler/Monitor Location	Pollutant	Audit Date
Green Valley	PM _{2.5} FEM	1/27/2021
Jean	PM _{2.5} FEM	1/27/2021
Jerome Mack	PM _{2.5} FRM	4/25/2021
Joe Neal	PM _{2.5} FEM	4/25/2021
Paul Meyer	PM _{2.5} FEM	4/25/2021
Rancho & Teddy	PM _{2.5} FEM	7/28/2021
Sunrise Acres	PM _{2.5} FEM	7/28/2021
Green Valley	PM _{2.5} FEM	10/20/2021

After a temporary halt due to COVID-19, EPA fully resumed NPAP and PEP operations in 2021.

7.0 NETWORK MODIFICATIONS

7.1 Completed Changes

Starting January 1, 2022 DES migrated over to a new data acquisition system (DAS), Agilaire. This move was necessary because the existing DAS vendor was unable to continue supporting its DAS. The new DAS provider/vendor, Agilaire, utilizes modern data logging and database architectures. This transition has also allowed DES to update its DAS technology.

With the exception of Walnut Recreation Center, DAQ started all PM_{2.5} monitors as SPM.

DAQ has made the following recent network changes:

Table 14. Summary of Recent Network Modifications

Action	Date	Explanation
Transitioned DAS to the Agilaire platform.	January 1, 2022	In order to support and upgrade DAS technology.
Deployed criteria pollutant monitoring at the Liberty High School site.	May 1, 2021	EPA approved the new Liberty High School site on October 30, 2017, as part of the 2017 Annual Network Plan. DAQ is measuring O ₃ and PM ₁₀ as SLAMS, and PM _{2.5} as SPM.
Deployed criteria pollutant monitoring at the Walnut Community Center site.	June 1, 2021	EPA approved the Walnut site on August 7, 2017, and the approval letter is in Appendix A of this document. The Walnut site was a replacement for the JD Smith site, and measures O ₃ , NO ₂ , CO, PM ₁₀ and PM _{2.5} . All criteria pollutant measurements are SLAMS.
The Boulder City site was relocated to Garrett Junior High School.	April 2021	EPA approved the Boulder City site relocation to Garrett Junior High School on April 5, 2017, and the approval letter is in Appendix A of this document. DAQ is measuring O ₃ and PM ₁₀ as SLAMS, and PM _{2.5} as SPM.
The Mesquite site was relocated to the Virgin Valley site.	January 1, 2021	EPA approved the Mesquite site relocation to the Virgin Valley site on March 22, 2017, and the approval letter is in Appendix A of this document. DAQ is measuring O ₃ and PM ₁₀ as SLAMS, and PM _{2.5} as SPM.
Changed Jerome Mack and Sunrise Acres PM _{2.5} collocated sampling from 1 in 6 to 1 in 3 day sampling.	April 2021	Helped with PM _{2.5} network bias assessments and data completeness.
O ₃ SPM deployed at Spring Mountain Youth Camp (SMYC).	May – June, 2021	Monitoring was in support of DAQ Planning initiatives. This initiative supported the assessment of stratospheric O ₃ intrusions.
Ran Trace CO SPMs at Joe Neal, Green Valley, and SMYC.	April – September, 2021	Monitoring was in support of DAQ Planning initiatives. This initiative assessed inverse CO to O ₃ correlation related to stratospheric O ₃ intrusions.
PM _{2.5} SPMs changed to SLAMS.	July 1, 2021	Walter Johnson and Palo Verde SPMs were converted to SLAMS per the 2021 Network Plan approval.

7.2 Upcoming Changes and Request for Approval

This section describes anticipated changes to the monitoring network over the next year and beyond. If not already approved, the proposed changes will be carried out in accordance with 40 CFR 58.14, as applicable. The following constitutes Clark County’s official request to Region 9 for approval of upcoming and proposed changes as outlined in Table 15.

Table 15. Upcoming Site and Equipment Changes

Site/Equipment Change	Date of Proposed Change	Explanation
Current PM _{2.5} monitoring at Virgin Valley, Mountains Edge, Liberty High School, and Garrett Jr. High School are SPM. DES proposed conversion to SLAMS.	July 1, 2022	These PM _{2.5} monitors provide valuable data and are good candidate for SLAMS/permanent monitoring.
Redeploy O ₃ and Trace CO SPMs at Spring Mountain Youth Camp.	May 2022	Monitoring anticipated in support DAQ Planning initiatives. This initiative will support the assessment of stratospheric O ₃ intrusions. An inverse CO to O ₃ correlation will provide further weight of evidence for these intrusions. Furthermore O ₃ and CO are expected to show direct correlation/relationship during wildfire smoke events.
Redeploy trace CO SPM at Joe Neal, deploy trace CO SPM at Paul Meyer, and redeploy trace CO SPM at Green Valley if resources allow.	May 2022	Deployment will support DAQ Planning initiatives related to O ₃ and PM measurements during wildfire smoke events. CO to O ₃ correlation will also support EE demonstrations.
Deploy CO, PM ₁₀ and PM _{2.5} as SPMs at Casino Center.	August 2021	At the request of NDOT, DAQ deployed CO, PM ₁₀ and PM _{2.5} SPM monitors for an Environmental Impact Statement related to the expansion of the US-95.
Apex site relocation.	2022	EPA approved the Apex site relocation (to a nearby location in the Apex Valley) on August 7, 2017. The BLM has approved a right-of-way agreement, but power hook-up issues have delayed site start-up until mid-2022. O ₃ SLAMS monitoring is planned for this site.



Figure 25: Spring Mountain Youth Camp (SPM Site).

DES routinely deploys O₃ monitoring at Spring Mountain Youth Camp (SMYC) to assist with the identification of stratospheric intrusions, pollutant mixing heights, and to assist with model validation. DES has recently introduced trace CO monitoring at SMYC, which provides an inverse O₃ correlation during stratospheric O₃ intrusion events. Measurements at this site are for special studies and strictly non-regulatory.

Local Site Name (AQS ID)	Spring Mountain Youth Camp (32-003-7771)
GPS Coordinates (latitude, longitude)	+ 36.318889 °, - 115.585278 °
Street Address	2400 Angel Peak Place
Distance to roadway (m)	30
Traffic count (AADT, year)	< 500 (est.) (2022)
Ground cover	Gravel, concrete
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O₃, 1	Trace CO, 1
Parameter code	44201	42101
Basic monitoring objective(s)	Research support	Research support
Site type(s)	Regional transport	Regional transport
Monitor type(s)	SPM (non-regulatory)	SPM (non-regulatory)
Instrument manufacturer and model	TAPI 400 series	TAPI 300 series

Pollutant, POC	O ₃ , 1	Trace CO, 1
Method code	EQOA-0992-087	RFCA-1093-093
FRM/FEM/ARM/other	other	other
Collecting agency	DAQ	DAQ
Analytical lab	NA	NA
Reporting agency	DAQ	DAQ
Spatial scale	Regional	Regional
Monitoring start date	04/1/2022 (anticipated)	4/1/2022 (anticipated)
Current sampling frequency	NA	NA
Calculated sampling frequency	Continuous	Continuous
Sampling season	Summer season	Summer season
Probe height (m)	6 (anticipated)	6 (anticipated)
Distance from supporting structure (m)	2 (anticipated)	2 (anticipated)
Distance from obstructions on roof – horizontal distance (m)	NA	NA
Distance from obstructions on roof – vertical height (m)	NA	NA
Distance from obstructions not on roof – horizontal distance (m)	1 (est.)	1 (est.)
Distance from obstructions not on roof – vertical height (m)	2 (est.)	2 (est.)
Distance from trees (m)	NA	NA
Distance to furnace or incinerator flue (m)	NA	NA
Distance between collocated monitors (m)	NA	NA
Unrestricted airflow (degrees)	360 ¹	360 ¹
Probe material for reactive gases	Teflon	Teflon
Residence time for reactive gases (s)	7.8 (previous operation)	3.5 (previous operation)
Will there be changes within the next 18 months? (Y/N)	N ²	N ³
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N	N
Frequency of flow rate verification for manual PM samplers	NA	NA
Frequency of flow rate verification for automated PM analyzers	NA	NA
Frequency of one-point QC check for gaseous instruments	Daily (anticipated)	Daily (anticipated)
Last annual performance evaluation for gaseous parameters	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	NA

¹Open fetch, but air flow is limited by obstructions.

² Anticipate O₃ monitor deployment.

³ Anticipate CO monitor deployment.

7.2.1 Monitoring Site Relocation in the Apex Valley

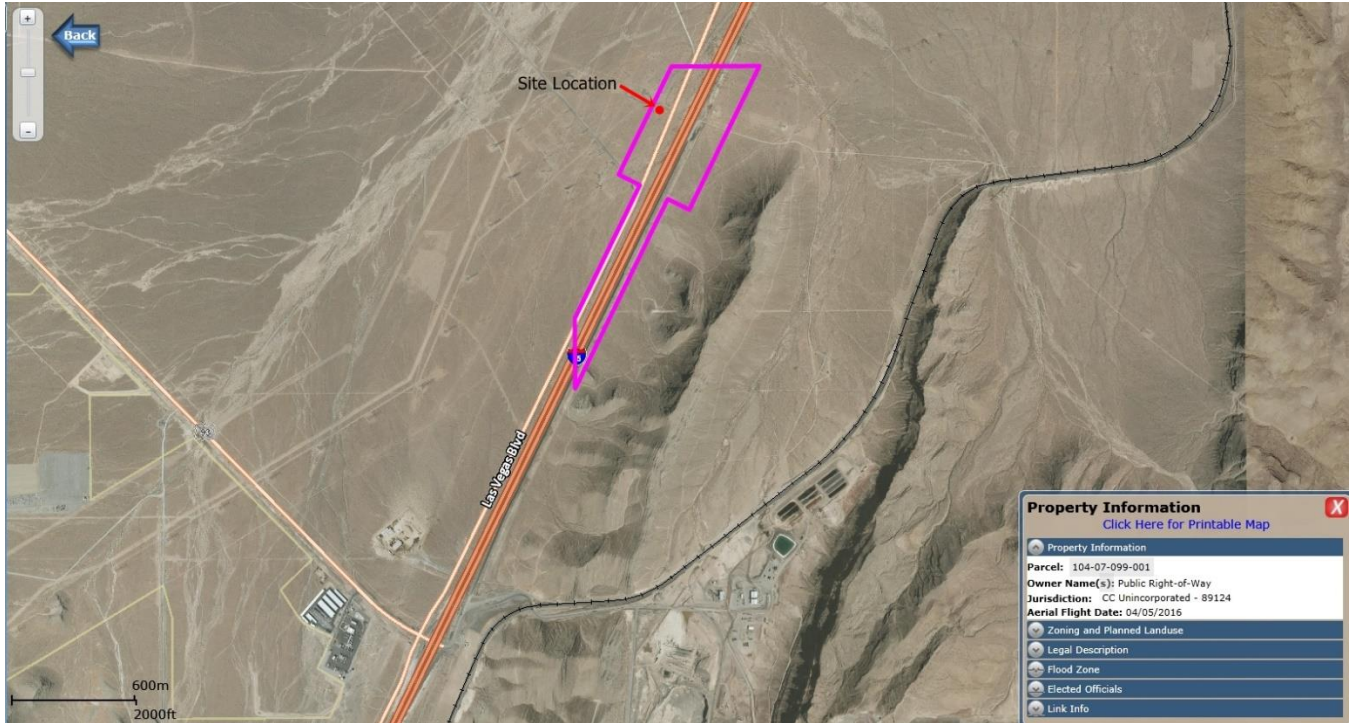


Figure 26: Apex (new site).

The primary objective of the relocated Apex site, located approximately 25 miles northeast of Las Vegas, will be to monitor transport and the ambient impacts from nearby processing facilities and power plants. This site will be the monitoring station that serves the Apex Valley. Since the site is downwind from Las Vegas, it will also serve as an indicator of pollutant transport flow out of the Las Vegas Valley. Meteorological measurements at this site will include wind speed, wind direction, and ambient temperature.

Local Site Name (AQS ID)	Apex Valley (32-003-0022)
GPS Coordinates (latitude, longitude)	36.406213, -114.878635
Street Address	14601 North Las Vegas Blvd. Moapa, NV
Distance to roadway (m)	N. Las Vegas Blvd: 20m (est.); I-15: 50m (est.)
Traffic count (AADT, year)	N. Las Vegas Blvd: < 1,000 (est.); I-15: 24,900 (2021)
Ground cover	Native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O₃, 1
Parameter code	44201
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Regional transport
Monitor type(s)	SLAMS
Instrument manufacturer and model	API 400 series

Pollutant, POC	O ₃ , 1
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DES
Analytical lab	NA
Reporting agency	DES
Spatial scale	Regional
Monitoring start date	2022
Current sampling frequency	NA
Calculated sampling frequency	Continuous
Sampling season	Year-round
Probe height (m)	4.0 (anticipated)
Distance from supporting structure (m)	1.2 (anticipated)
Distance from obstructions on roof – horizontal distance (m)	NA
Distance from obstructions on roof – vertical height (m)	NA
Distance from obstructions not on roof – horizontal distance (m)	NA
Distance from obstructions not on roof – vertical height (m)	NA
Distance from trees (m)	>100m (est.)
Distance to furnace or incinerator flue (m)	NA
Distance between collocated monitors (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	< 10 (est.)
Will there be changes within the next 18 months? (Y/N)	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	N
Frequency of flow rate verification for manual PM samplers	NA
Frequency of flow rate verification for automated PM analyzers	NA
Frequency of one-point QC check for gaseous instruments	Daily
Last annual performance evaluation for gaseous parameters	NA
Last two semiannual flow rate audits for PM monitors	NA

7.3 Availability of Plan for Public Inspection and Comment and DES Response

This plan was made available between April 6 and May 6, 2022, for the required 30-day public inspection and comment period per 40 CFR 58.10(a)(1). This plan was posted on DAQ's website, made available at the DAQ front counter, and noticed in the Las Vegas Review Journal. DES received no comments on this plan.

The annual network plan outlines all notices of proposed changes, in compliance with 40 CFR 58.10. In the event that DAQ needs to change the location of a PM_{2.5} monitor that records violations of the NAAQS, DAQ will notify EPA Region 9 of the violation, and DAQ will formulate a plan for moving the site. DAQ will post all such notices and relevant documents for public review on its website, and the public will have at least a 30-day comment period. DAQ will then submit formal notification to EPA. DAQ intends to discuss and obtain EPA approval prior to making any changes to its PM_{2.5} network, whether the changes affect monitors violating NAAQS or not; however, unforeseen circumstances (e.g. unexpected loss of site access) may preclude this process.

7.4 O₃ Monitoring Waiver

Due to the 2015 revised O₃ NAAQS, EPA has revoked all previous seasonal O₃ waivers. If agencies desire an O₃ waiver approval, they must reevaluate O₃ data and resubmit waiver requests. Based on this direction, DAQ submitted an O₃ waiver request for the Apex and Indian Springs sites on February 7, 2022. EPA approved this waiver on March 24, 2022.

7.5 Near-Road Monitoring

The Rancho & Teddy site (Near-Road Site 1) was approved by EPA as part of the 2014 Annual Network Plan response, and DAQ began operations in August 2015. The Casino Center (Near-Road Site 2) was approved by EPA as part of the 2014 Annual Network Plan response, and operations commenced in July 2016. 40 CFR Part 58 requires one CO monitor and one PM_{2.5} monitor to be placed at a near-road NO₂ monitoring site. DAQ deployed both of these monitors at the Rancho & Teddy site (Near-Road Site 1) beginning January 2017, as required.

7.6 Special Purpose Studies

DAQ plans to contribute to the goals of the Clean Air Act and the evolving science of air quality. DAQ's objectives include research of pollutants and precursor transport, identification of stratospheric intrusions and mixing heights, pollution impacts, and model validation. Many of these efforts will be focused on the O₃ season, and related studies are being projected over the next several years. DAQ will continue to deploy trace CO monitors, which provide an inverse O₃-CO correlation during O₃ intrusions and direct correlation during smoke events, and these initiatives contribute to DAQ modeling efforts. None of the upper-elevation O₃ or CO research monitors that are a part of these studies will be a part of the SLAMS or regulatory monitoring network.

DAQ will continue filter-based chemical speciation sampling during special events, such as New Year's Eve and Fourth of July, when PM_{2.5} can reach exceedance levels and where impacts from fireworks can

be documented. DAQ may also sample for markers of levoglucosan, which can assist development of O₃ exceptional event demonstration packages when smoke from wildfires may be a significant factor.

DAQ conducted a summertime O₃ study in 2021 to address questions related to the formation of high O₃ concentrations. The study seeks to define oxides of nitrogen (NO_x) and Volatile Organic Compounds (VOC) limiting ratios for local O₃ formation, both spatially and temporally during the O₃ season (typically May through August). DAQ will assess if these ratios change throughout the O₃ season. DAQ is working with the National Oceanic and Atmospheric Administration (NOAA) to perform this work. NOAA measured VOC, NO_x and trace gasses for three weeks at a fixed location using a wide array of specialized measuring equipment, followed by one week of mobile measurements. Upon completion of laboratory analysis and modeling, data assessments will be completed with the findings incorporated into a final report.

In anticipation of potential PM_{2.5} NAAQS reductions, DAQ embarked on a PM_{2.5} fingerprint study. DAQ ran PM_{2.5} special purpose samples, using 24-hour filter runs and routine sampling procedures. This took place at the Walnut and Green Valley sites, on a 1-in-3 day frequency, between December 2021 and February 2022. The objective of this short-term study was to better ascertain PM_{2.5} composition, which may assist in future control strategies and permitting. After thorough data analysis, DAQ may consider changes to the PM_{2.5} network to better characterize emission sources. Spatial coverage in low income areas are also being considered in order to meet environmental justice goals.

DAQ operates visibility cameras at the M Resort located at 12300 South Las Vegas Blvd. Henderson, Nevada. This location is at the south end of the Las Vegas Valley. These visibility cameras assist in documenting dust and transport events in the Las Vegas Valley.

7.7 Future Needs

As part of the revised O₃ rule, EPA is requiring PAMS measurements to be collocated with existing NCore sites in areas with population of one million or more, irrespective of O₃ NAAQS attainment status. Clark County meets these requirements and has deployed PAMS monitoring at the Jerome Mack NCore monitoring site. PAMS monitoring began before the regulatory deadline of June 1, 2021, and DAQ intends to follow the approved PAMS QAPP (see Appendix A of this document for official approval). Some of the PAMS measurements include, but are not limited to, VOC, carbonyl samples, and true NO₂. In addition to current NCore meteorological measurements, DAQ has deployed solar and UV radiation sensors, and upper air measurements are being conducted using an on-site ceilometer.

Through special studies, modeling, forecasting, and network assessments, DAQ has projected spatial gaps and other monitoring concerns in specific areas of Clark County. DAQ will continue exploring the possibility of gaseous, particulate, and meteorological monitoring in unrepresented/underrepresented areas and work to achieve environmental justice throughout the jurisdiction. Any special study sites will likely be started as SPM.