

Annual Monitoring Network Plan



June 2021

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 2021 as required by 40 Code of Federal Regulations (CFR) Part 58. This document describes network operation in 2020, changes planned for 2021 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	12
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	15
4.0	2020 Site Tables.....	16
5.0	Maps of Criteria Pollutant Monitoring Stations in 2020	58
6.0	National Performance Audit Program and Performance Evaluation Program	65
7.0	Network Modifications	66
7.1	Completed Changes	66
7.2	Upcoming Changes and Request for Approval	66
	7.2.1 Monitoring Site Relocation in Mesquite.....	70
	7.2.2 Monitoring Site Relocation in Boulder City (Garrett Junior High School).....	73
	7.2.3 Criteria Pollutant Monitoring at Walnut Community Center (New Site).....	74
	7.2.4 Criteria Pollutant Monitoring in Southeast Las Vegas (New Site).....	78
	7.2.5 Monitoring Site Relocation in the Apex Valley	80
7.3	Availability of Plan for Public Inspection and Comment and DAQ Response	82
7.4	O ₃ Monitoring Waiver	82
7.5	Near-Road Monitoring.....	82
7.6	Special Purpose Studies	82
7.7	Future Needs	83

Appendix A: EPA Approval Documents

LIST OF FIGURES

Figure 1:	Apex.....	16
Figure 2:	Boulder City.....	19
Figure 3:	Casino Center: Near-Road Site 2.....	22
Figure 4:	Green Valley.....	24
Figure 5:	Indian Springs.....	27
Figure 6:	Jean.....	29
Figure 7:	Jerome Mack.....	32
Figure 8:	Joe Neal.....	37
Figure 9:	Mesquite (Closed).....	40
Figure 10:	Mountains Edge Park.....	42
Figure 11:	Palo Verde.....	45
Figure 12:	Paul Meyer.....	48
Figure 13:	Sunrise Acres.....	50
Figure 14:	Rancho & Teddy: Near-Road Site 1.....	53
Figure 15:	Walter Johnson.....	56
Figure 16:	CO Monitors.....	58
Figure 17:	O ₃ Monitors.....	59
Figure 18:	NO _x Monitors.....	60
Figure 19:	SO ₂ Monitor.....	61
Figure 20:	Continuous PM ₁₀ Monitors.....	62
Figure 21:	Continuous PM _{2.5} Monitors.....	63
Figure 22:	Filter-Based PM _{2.5} FRM Samplers.....	64
Figure 23:	Spring Mountain Youth Camp (SPM Site).....	68
Figure 24:	Virgin Valley High School.....	70
Figure 25:	Boulder City (Garrett Junior High).....	73
Figure 26:	Walnut Community Center.....	75
Figure 27:	Liberty High School.....	78
Figure 28:	Apex (new site).....	80

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 – Filter Based).....	11
Table 4.	Minimum Monitoring Requirements for PM _{2.5} (FEM – Continuous).....	11
Table 5.	Minimum Monitoring Requirements for PM ₁₀	12
Table 6.	Minimum Monitoring Requirements for NO ₂	12
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.....	15
Table 11.	Continuous PM _{2.5} FEM Network.....	15
Table 12.	2020 NPAP and TTP Evaluations.....	65

Table 13.	2020 PEP Audit Activity	65
Table 14.	Summary of Recent Network Modifications	66
Table 15.	Upcoming Site and Equipment Changes	67

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AQS	Air Quality System
CBSA	Core-Based Statistical Area
CFR	Code of Federal Regulations
CO	carbon monoxide
DAQ	Division of Air Quality
DES	Department of Environment and Sustainability
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 Part 58.20, compliance with Appendix A is required for SPMs. Compliance with 40 CFR Part 58 Appendix E is optional by Part 58.20. To obtain specific, targeted information and to remain flexible, DAQ does not operate SPMs in full compliance with 40 CFR Part 58 Appendix E Sections 2, 3, 4, 5, 6, or 9. DAQ submitted its 2020 annual network plan to EPA on June 2, 2020 and received approval of the plan on October 28, 2020. DAQ submitted its 2020 annual data certification to EPA by May 1, 2021.

During 2020, 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). A CO Maintenance Plan and a request for redesignation to attainment were submitted to EPA in 2008 and approved by EPA, effective September 27, 2010 (75 FR 59090). A second 10-year CO Limited Maintenance Plan was submitted to EPA in June 2019 and is currently pending EPA action.

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). DAQ submitted a request for redesignation 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).

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 (83 FR 25776).

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.

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 2021 minimum requirements of 40 CFR Part 58 of the CFR. Population census information was obtained from the Clark County Department of Comprehensive Planning 2019 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	2,325,798 (2019)	74 ³ , (2018-2020)	Joe Neal ³ (32-003-0075)	2	12	0
Las Vegas- Paradise (29820)	Clark, NV	2,325,798 (2019)	70 ⁴ (2018-2020)	Green Valley (32- 003-0298) ⁴ Paul Meyer (32- 003-0043) ⁴	2	12	0

				Walter Johnson (32-003-0071)			
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¹ Design Value Years = the three years for which the design value was calculated (i.e., 2018-2020).

² AQS (site) Identification.

³ Design Value without EPA concurrence on proposed 2018 and 2020 exceptional events

⁴ Design Value with EPA concurrence on proposed 2018 and 2020 exceptional events

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} (FRM – Filter Based)

MSA	County	Population and Census Year	Annual Design Value [µg/m ³], Design Value Years ^{1,2}	Annual Design Value Site (name, AQS ID)	Daily Design Value [µg/m ³], Design Value Years 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	2,325,798 (2019)	9.7, (2018-2020)	Sunrise Acres (32-003-0561)	28, (2018-2020)	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., 2018-2020).

⁴ Pursuant to 40 CFR 58 Appendix D 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 Appendix D 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.

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

MSA	County	Population and Census Year	Annual Design Value [µg/m ³], Design Value Years ^{1,2}	Annual Design Value Site (name, AQS ID)	Daily Design Value [µg/m ³], Design Value Years ³	Daily Design Value Site (name, AQS ID)	Number of Required Continuous FEM Sites ²	Number of Active Continuous FEM Sites ²	Number of Additional Continuous FEM Sites Needed
Las Vegas-Paradise (29820)	Clark, NV	2,325,798 (2019)	9.7, (2018-2020)	Sunrise Acres (32-003-0561)	28, (2018-2020)	Sunrise Acres (32-003-0561)	1	9	0

¹ Design Value Years = the three years for which the design value was calculated (i.e., 2018-2020).

² Meets requirements in 40 CFR 58 Appendix D 4.7.2 and Table D-5; applies to both manual and continuous methods.

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] (2019-2020)	Maximum 24-Hour Concentration Site (name, AQS ID) (2018-2020)	Number of Required SLAMS Sites	Number of Active SLAMS Sites ¹	Number of Additional SLAMS Sites Needed
Las Vegas-Paradise (29820)	Clark, NV	2,325,798 (2019)	1676.1 (2020)	Jerome Mack (32-003-0540)	6-10	10	0

¹ Meets requirements in 40 CFR 58 Appendix 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 (2020)	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)	2,325,798 (2019)	332,000	2	2	0	2	3	0

¹ This number represents the highest AADT (annual average daily traffic) count of any roadway segment in Clark County as measured by NDOT (counting station 0030061) on Interstate-15, 0.4 miles south of the Flamingo Interchange (Exit 38). Exit 38 is approximately two 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.

² Two near-road NO₂ monitors are required in any CBSA with one or more roadway segments carrying traffic volumes of 250,000 or more vehicles (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 is also required as a RA 40 monitor.

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-Pahrump (332)	Clark, NV	2,325,798 (2019)	1,255	2,919	1	0	1	0

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

² Stationary source SO₂ emissions are based on 2018 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-Pahrump (332)	2,325,798 (2019)	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 Part 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)	2,325,798 (2019)	332,000 (2019)	2	2	1	1	1	1	0

Note: The near-road network meets the minimum monitoring requirement as outlined in 40 CFR Part 58.13 and sections 4.2, 4.3, 4.7 of Appendix D to 40 CFR Part 58.

¹ This number represents the highest AADT (annual average daily traffic) count of any roadway segment in Clark County as measured by NDOT (counting station 0030061) on Interstate-15, 0.4 miles south of the Flamingo Interchange (Exit 38). Exit 38 is approximately two 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.

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, Site ¹	Number of Required Collocated Monitors	Number of Active Collocated FRM Monitors	Number of Active Collocated FEM Monitors (same method designation as primary)
EQPM-0516-238	7: Paul Meyer, Joe Neal, Green Valley, Sunrise Acres, Jerome Mack, Jean, and Rancho & Teddy	1	1: Sunrise Acres	0

¹PM_{2.5} SPMs are not included in the count.

Appendix A of 40 CFR 58 Section 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. Paul Meyer, Joe Neal, Green Valley, Sunrise Acres, Jerome Mack, Jean, and Rancho & Teddy each have a PM_{2.5} continuous FEM monitor that serves as the primary PM_{2.5} monitor for the site. For the PM_{2.5} FEM network, the collocated FRM sampler (method RFPS-0717-245) is at the Sunrise Acres 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 2020 SITE TABLES



Figure 1: Apex

The primary objective of the Apex site, located approximately 25 miles northeast of Las Vegas, was to monitor transport and the ambient impacts from nearby processing facilities and power plants. This site was the monitoring station that served the Apex Valley. Since the site was downwind from Las Vegas, it also served as an indicator of pollutant transport flow out of the Las Vegas Valley. Meteorological measurements at the Apex site included wind speed, wind direction, and ambient temperature. This site terminated operations on October 1, 2020.

Due to expiration of the right of way grant, DAQ identified an alternate monitoring location in the Apex Valley (see Section 7 of this document). On August 7, 2017, DAQ received EPA approval to move this site to a nearby location (see Appendix A of this document), and on September 9, 2019 Clark County and the Bureau of Land Management (BLM) entered into a right-of-way agreement for this new location. Construction of this new site is nearing completion. However, the site will not receive power for approximately 12 - 18 months, which will delay operations.

Local Site Name (AQS ID)	Apex (32-003-0022)
GPS Coordinates (latitude, longitude)	+36.391030°, -114.907429°
Street Address	12101 Hwy 91, Nevada Las Vegas, NV 89165
Distance to roadways (meters (m))	U.S. Highway 93:108

Local Site Name (AQS ID)	Apex (32-003-0022)
Traffic counts (AADT, year)	U.S. Highway 93: 2,400 (2019)
Ground cover	Native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, Parameter Occurrence Code (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
Primary, Quality Assurance (QA) Collocated, or Other	Primary
Instrument manufacturer and model	TAPI 400 series
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	01/01/1998
Current sampling frequency	Continuous, seasonal
Calculated sampling frequency	Continuous, seasonal
Sampling season	Seasonal: contingent upon waiver
Probe height (m)	3.9
Distance from supporting structure (m)	1.4
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)	NA
Distance to furnace or incinerator flue (m)	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA
Distance to nearest PM instrument (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (seconds (s))	5.7
Will there be changes within the next 18 months? (Y/N)	Y, site relocation
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	5/19/2020

Pollutant, Parameter Occurrence Code (POC)	O ₃ , 1
Last two semiannual flow rate audits for PM monitors	NA



Figure 2: Boulder City.

The Boulder City site, approximately 25 miles southeast of Las Vegas, was established to serve as an indicator of population exposure to pollutants, particularly O_3 and PM_{10} . The current Boulder City site is in a split-flow corridor, which impacts pollutant measurements, and the shelter is sited directly below high-voltage power lines that prevent installation of a meteorological tower. This current location does not effectively monitor for population exposure, and on April 5, 2017, EPA approved an alternate location in Boulder City for more effective O_3 and PM_{10} monitoring (see Appendix A of this document). The approved Boulder City site relocation is at Garrett Junior High School, 1200 Avenue G, Boulder City, Nevada (see Section 7 of this document). In addition to continuing O_3 and PM_{10} monitoring, $PM_{2.5}$ monitoring shall commence as SPM and may later become SLAMS. Meteorological measurements at the new site will include wind speed, wind direction, and ambient temperature. This site is the monitoring station that serves the Eldorado Valley airshed (Hydrographic Basin Number 167).

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: 1,700; U.S. Highway 93: 9,650 (2019)

Local Site Name (AQS ID)	Boulder City (32-003-0601)
Ground cover	Paved, native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	O ₃ , 1
Parameter code	81102	44201
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 relocation	Y, site relocation
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	NA	NA
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

Pollutant, POC	PM ₁₀ , 1	O ₃ , 1
Last two semiannual flow rate audits for PM monitors	1/28/2020, 5/18/2020, 9/17/2020, 11/5/2020	NA



Figure 3: 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. Meteorological measurements at this site include wind speed, wind direction, ambient temperature, and barometric pressure.

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
Traffic counts (AADT, year)	U.S. Highway 93: 183,000; N. Casino Center Boulevard 5,400; Bonanza Road: 19,000 (2019)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	NO ₂ , 1
Parameter code	42602
Basic monitoring objective(s)	NAAQS comparison
Site type(s)	Highest concentration
Network affiliation	Near Road
Monitor type(s)	SLAMS
Primary, QA Collocated, or Other	Primary
Instrument manufacturer and model	TAPI 500 series
Method code	EQNA-0514-212
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ
Analytical lab	NA
Reporting agency	DAQ
Spatial scale	Microscale
Monitoring start date	07/01/2016
Current sampling frequency	Continuous
Calculated sampling frequency	Continuous
Sampling season	Year-round
Probe height (m)	4.9
Distance from supporting structure (m)	2.2
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
Does obstruction(s) not on roof impede flow	No
Obstruction height above probe (m)	NA
Distance from trees (m)	31.7
Distance to furnace or incinerator flue (m)	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA
Distance to nearest PM instrument (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	10.1
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	10/26/2020
Last two semiannual flow rate audits for PM monitors	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; Arroyo Grande Blvd: 10,300; North Stephanie: 34,500 (2019)
Ground cover	Paved, gravel
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} (continuous), 3	O ₃ , 1	CO, 1
Parameter code	81102	88101	44201	42101
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	EQA-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	06/01/2020
Current sampling frequency	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	06/01 – 09/30
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)	10.0	10.0	12.5	12.5
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	9.8	4.6
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	NA	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	3/5/2020	NA
Last two semiannual flow rate audits for PM monitors	1/24/2020, 5/19/2020, 9/23/2020, 11/4/2020	1/24/2020, 5/19/2020, 9/23/2020, 11/4/2020	NA	NA



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 (2019)
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)	7.9
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	5/21/2020
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: 1,700 (2019)
Ground cover	Gravel, native desert
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	O ₃ , 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	PM ₁₀ , 1	O ₃ , 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	11/2/2020	NA
Last two semiannual flow rate audits for PM monitors	1/28/2020, 5/14/2020, 9/17/2020, 11/2/2020	NA	1/28/2020, 5/14/2020, 9/17/2020, 11/2/2020



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, 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 approved PAMS Quality Assurance Project Plan (QAPP).

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

Local Site Name (AQS ID)	Jerome Mack (32-003-0540)
Distance to roadways (m)	Sahara: 244; Lamb: 351; Karen: 130
Traffic counts (AADT, year)	Sahara: 30,500; Lamb: 31,000; Karen: 3,000 (est.) (2019)
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 _x , 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	EQOA-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	1:6	1:3	1:3	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	Continuous	1:3	1:6	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 re-active gases	NA	NA	NA	NA	NA	NA	NA	Teflon	Teflon	Teflon	Teflon	Teflon	Teflon
Residence time for re-active 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	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
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	11/2/2020	9/30/2020	10/20/2020	12/17/2020	10/20/2020	10/1/2020
Last two semiannual flow rate audits for PM monitors	1/23/2020, 5/28/2020, 8/26/2020, 12/7/2020	1/23/2020, 5/28/2020, 8/26/2020, 12/7/2020	1/23/2020, 5/28/2020, 8/26/2020, 12/7/2020	2/5/2020, 5/28/2020, 8/26/2020, 12/15/2020	2/5/2020, 5/28/2020, 8/26/2020, 12/15/2020	2/5/2020, 5/28/2020, 8/26/2020, 12/15/2020	2/5/2020, 5/28/2020, 8/26/2020, 12/15/2020	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 measures 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: 4,000 (est.); Azure 3,550; Tropical 4,800; North Rainbow 3,550 (2019)
Ground cover	Gravel, grass, pavement
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1	NO ₂ , 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 – 09/30
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)	17.0	17.0	17.2	17.2	17.2
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
Unrestricted airflow (degrees)	360	360	360	360	360

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1	NO ₂ , 1	CO, 1
Probe material for reactive gases	NA	NA	Teflon	Teflon	Teflon
Residence time for reactive gases (s)	NA	NA	6.0	5.3	3.2
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	3/10/2020	3/12/2020	NA
Last two semiannual flow rate audits for PM monitors	1/23/2020, 5/28/2020, 8/26/2020,12/7/2020	1/23/2020, 5/28/2020, 8/26/2020,12/7/2020	NA	NA	NA



Figure 9: Mesquite (Closed).

The Mesquite site permanently terminated operations on October 1, 2020. The site was approximately 70 miles north of Las Vegas and monitored O₃. The site sat along a transport and exit corridor connecting jurisdictional boundaries, and it served as an indicator of population exposure of pollutants. Meteorological measurements at the Mesquite site included wind speed, wind direction, and ambient temperature.

On March 22, 2017, EPA approved the relocation of the existing Mesquite site to the Virgin Valley High School location (see Appendix A of this document). The new Virgin Valley site measures O₃, PM₁₀, PM_{2.5} as SPM, and meteorological parameters (see Section 7 of this document).

Local Site Name (AQS ID)	Mesquite (32-003-0023)
GPS Coordinates (latitude, longitude)	+36.807921°, -114.060887°
Street Address	465 E. Old Mill Rd., Mesquite, NV 89027
Distance to roadways (m)	E. Old Mill Rd: 7.8
Traffic counts (AADT, year)	<1,000 (est.), 2020
Ground cover	Pavement, gravel
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)	Population exposure
Network affiliation	NA
Monitor type(s)	SLAMS
Primary, QA Collocated, or Other	Primary
Instrument manufacturer and model	API 400 series
Method code	EQOA-0992-087
FRM/FEM/ARM/other	FEM
Collecting agency	DAQ
Analytical lab	NA
Reporting agency	DAQ
Spatial scale	Middle
Monitoring start date	10/01/2001
Current sampling frequency	Continuous, seasonal
Calculated sampling frequency	Continuous, seasonal
Sampling season	Seasonal: contingent upon waiver
Probe height (m)	3.6
Distance from supporting structure (m)	1.2
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)	3.2
Distance to furnace or incinerator flue (m)	NA
Distance between monitors fulfilling QA collocation requirements (m)	NA
Distance to nearest PM instrument (m)	NA
Unrestricted airflow (degrees)	360
Probe material for reactive gases	Teflon
Residence time for reactive gases (s)	5.3
Will there be changes within the next 18 months? (Y/N)	Y, site moved
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	5/19/2020
Last two semiannual flow rate audits for PM monitors	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.: 7,450; Buffalo Dr.: 11,500; Rumrill St.: <1,000 (est.) (2019)
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)	4.6	4.6	4.3
Distance from supporting structure (m)	2.0	2.0	1.7
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)	15.2	15.2	15.2
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	6.0
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)	NA	Y	NA
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	10/8/2020

Pollutant, POC	PM ₁₀ , 1	PM _{2.5}	O ₃ , 1
Last two semiannual flow rate audits for PM monitors	10/8/2020	10/8/2020	NA



Figure 11: Palo Verde.

The primary objective of the Palo Verde site in west Las Vegas is to monitor O_3 , but it also monitors PM_{10} and $PM_{2.5}$ as SPM. Due to topography at this location, the summertime loft brings higher O_3 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	PM_{10} , 1	$PM_{2.5}$, 3	O_3 , 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

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1
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	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	Middle	Neighborhood	Neighborhood
Monitoring start date	09/12/2017	1/1/2020	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)	4.7	4.7	3.7
Distance from supporting structure (m)	2.3	2.3	1.4
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)	15.0	15.0	13.7
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	6.3
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	Monthly	Monthly	NA
Frequency of one-point QC check for gaseous instruments	NA	NA	Daily
Last annual performance evaluation for gaseous parameters	NA	NA	10/29/2020

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} , 3	O ₃ , 1
Last two semiannual flow rate audits for PM monitors	1/23/2020, 5/7/2020, 9/25/2020, 11/5/2020	1/23/2020, 5/7/2020, 9/25/2020, 11/5/2020	NA



Figure 12: Paul Meyer.

The primary objective of the Paul Meyer site in southwest Las Vegas is to monitor O_3 , but it also monitors PM_{10} and $PM_{2.5}$. Due to topography at this location, the summertime loft brings higher O_3 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.: 3,500 (est.); South Tenaya Way: 4,150 (2019)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM_{10} , 1	$PM_{2.5}$, 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	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)	10.7	10.7	10.9
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	6/29/2020
Last two semiannual flow rate audits for PM monitors	1/23/2020, 5/7/2020, 9/25/2020, 11/4/2020	1/23/2020, 5/7/2020, 9/25/2020, 11/4/2020	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, Appendix 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: 35,000 (2019)
Ground cover	Paved
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	PM ₁₀ , 1	CO, 1	PM _{2.5} Collocated FRM, 1	PM _{2.5} Primary FEM (continuous), 3	NO ₂ , 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	1:6	Continuous	Continuous
Calculated sampling frequency	Continuous	Continuous	1:6	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
Distance to furnace or incinerator flue (m)	NA	NA	NA	NA	NA

Pollutant, POC	PM ₁₀ , 1	CO, 1	PM _{2.5} Collocated FRM, 1	PM _{2.5} Primary FEM (continuous), 3	NO ₂ , 1
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	2.7	NA	NA	6.0
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	10/28/2020	NA	NA	10/28/2020
Last two semiannual flow rate audits for PM monitors	1/24/2020, 5/15/2020, 9/23/2020, 11/4/2020	NA	2/5/2020, 6/16/2020, 9/23/2020, 11/25/2020	1/24/2020, 5/15/2020, 9/23/2020, 11/4/2020	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. DAQ established near-road CO and PM_{2.5} monitoring in January 2017. Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

Local Site Name (AQ5 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: 326,000; South Rancho Drive: 4,700; Teddy Drive: 5,600 (2019)
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)	6.6	3.4	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)	NA	NA	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

Frequency of one-point QC check for gaseous instruments	Daily	Daily	NA
Last annual performance evaluation for gaseous parameters	10/15/2020	10/15/2020	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	1/27/2020, 5/28/2020, 9/24/2020, 11/4/2020



Figure 15: Walter Johnson.

The primary objective of the Walter Johnson site, located on the west side of Las Vegas, is to monitor O_3 , PM_{10} and $PM_{2.5}$ as SMP. Due to topography at this location, the summertime loft brings high O_3 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: 39,000 (2019)
Ground cover	Concrete/asphalt, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O ₃ , 1	PM ₁₀ , 1	PM _{2.5} , 3
Parameter code	44201	81102	88101
Basic monitoring objective(s)	NAAQS comparison	NAAQS comparison	Provide air pollution data to public in a timely manner
Site type(s)	Population exposure	Population exposure	Population exposure
Network affiliation	NA	NA	NA
Monitor type(s)	SLAMS	SLAMS	SPM
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	2/27/2020	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	1/23/2020, 5/12/2020, 9/25/ 2020, 11/5/2020	1/23/2020, 5/12/2020, 9/25/ 2020, 11/5/2020

5.0 MAPS OF CRITERIA POLLUTANT MONITORING STATIONS IN 2020

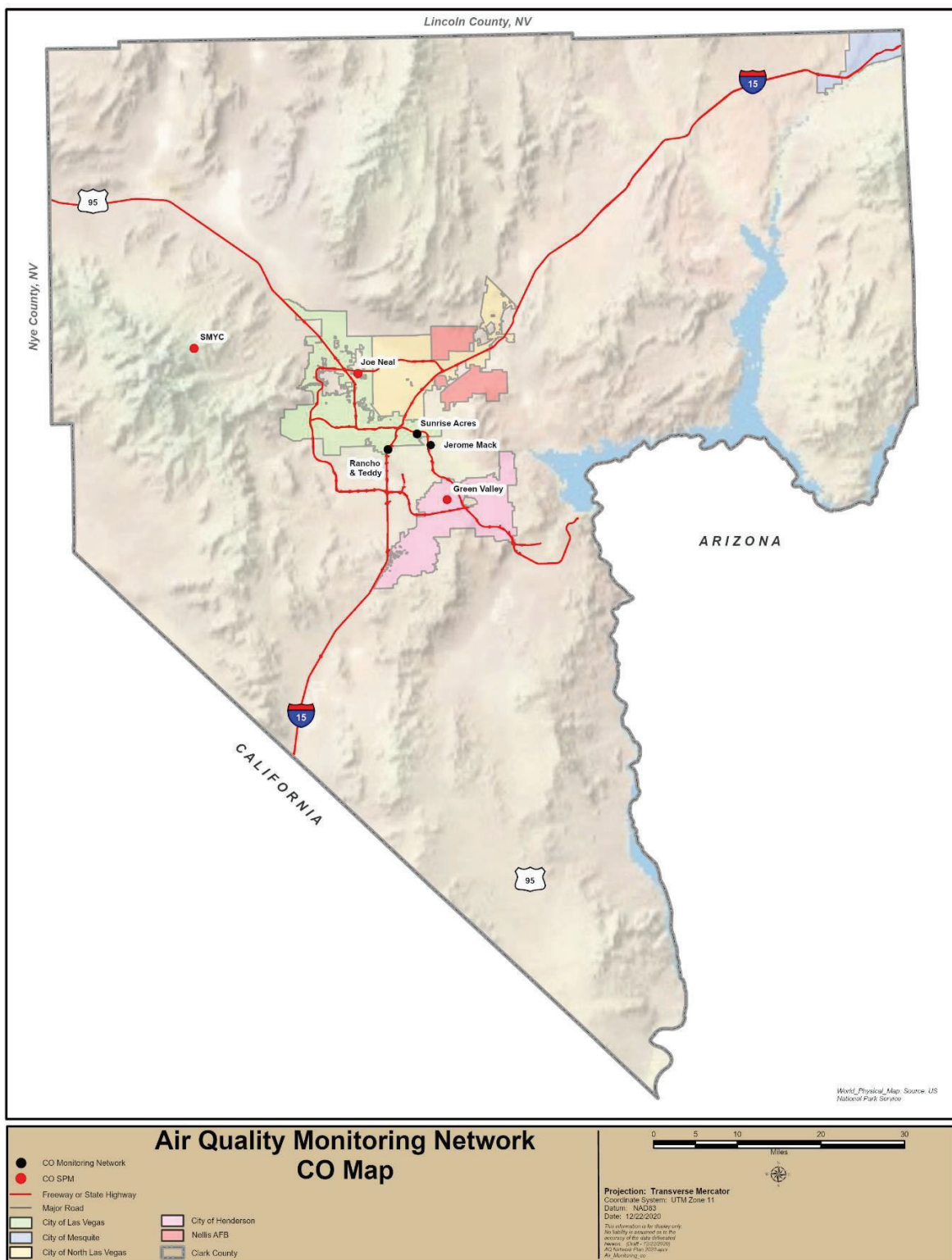


Figure 16: CO Monitors

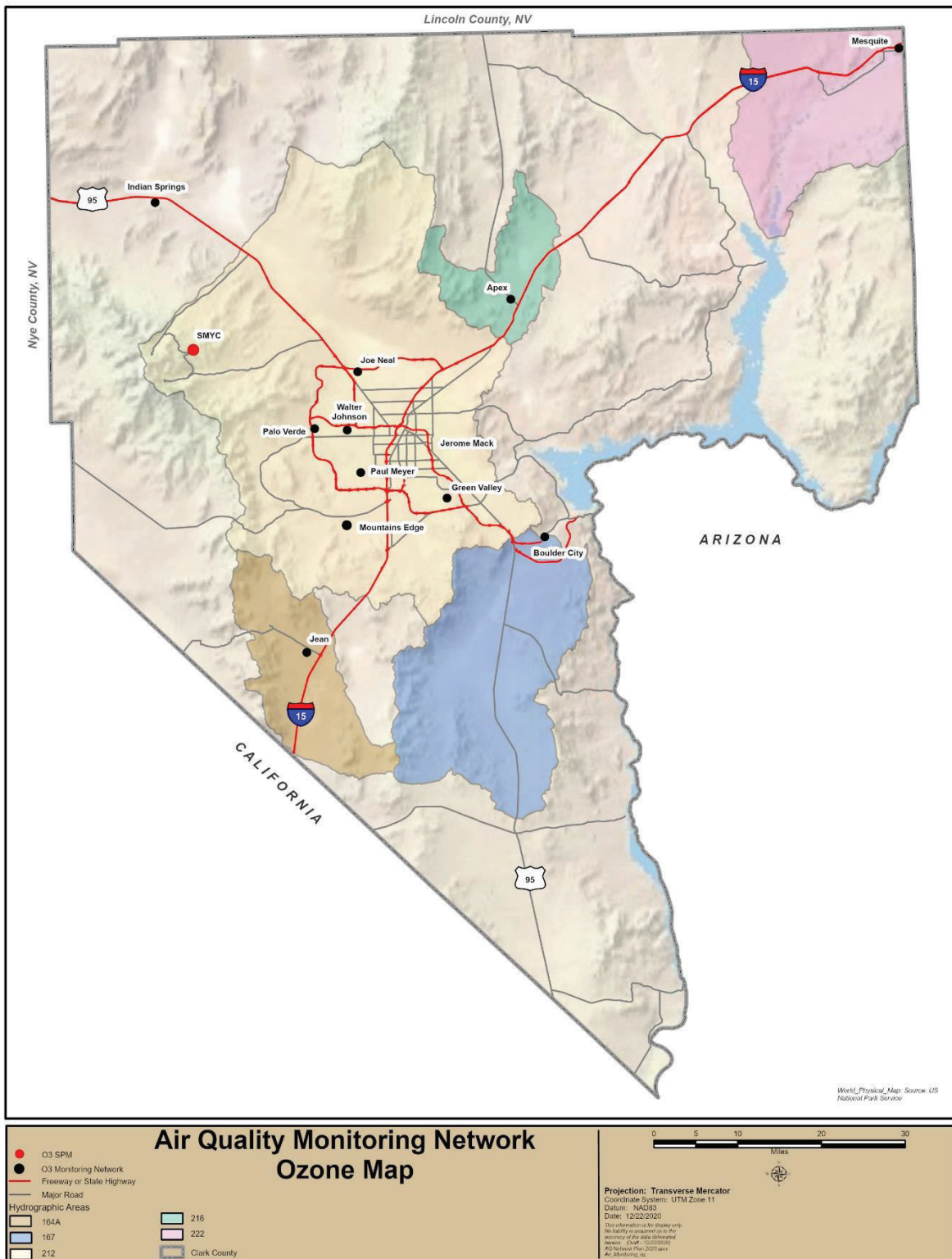


Figure 17: O₃ Monitors.

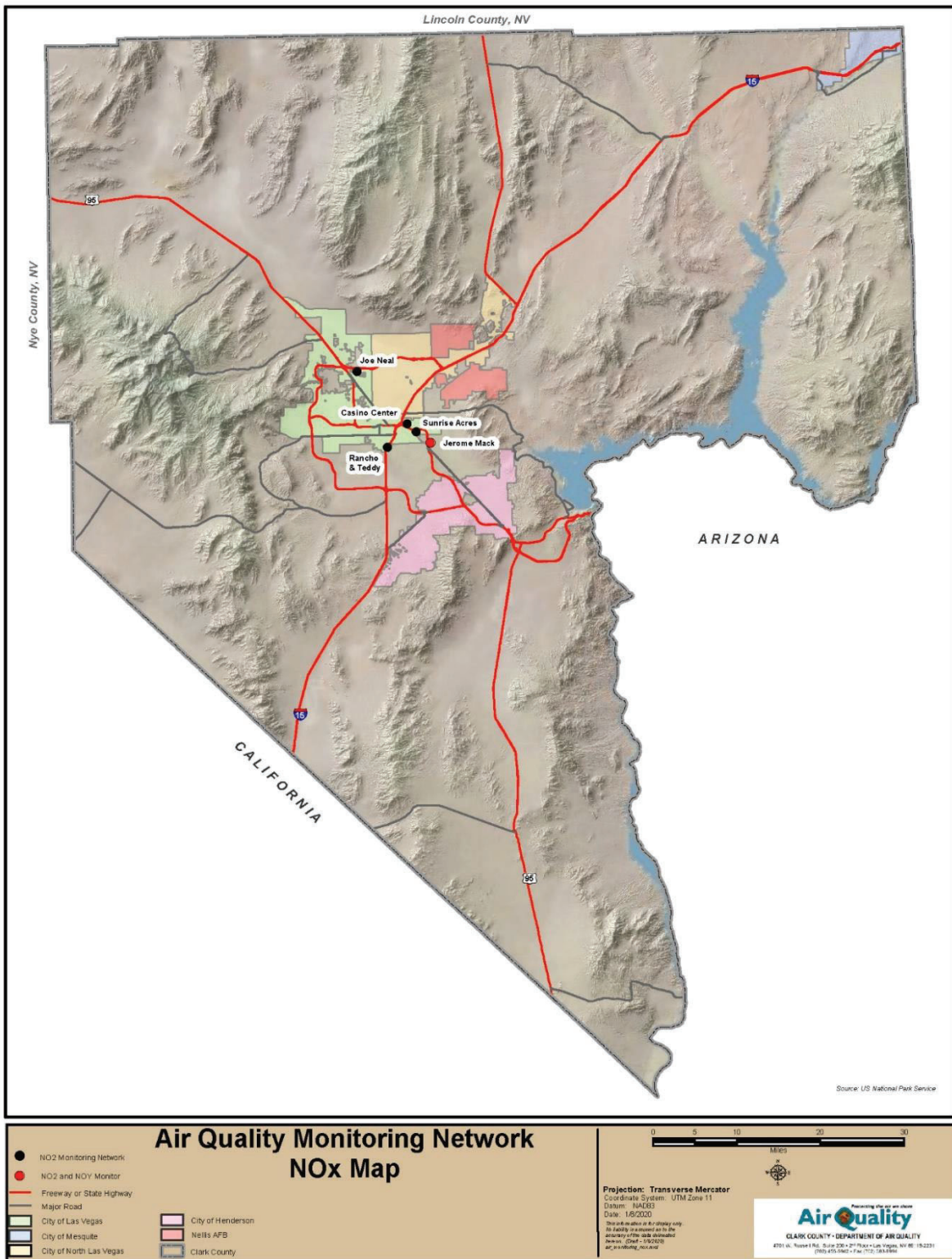


Figure 18: NO_x Monitors.

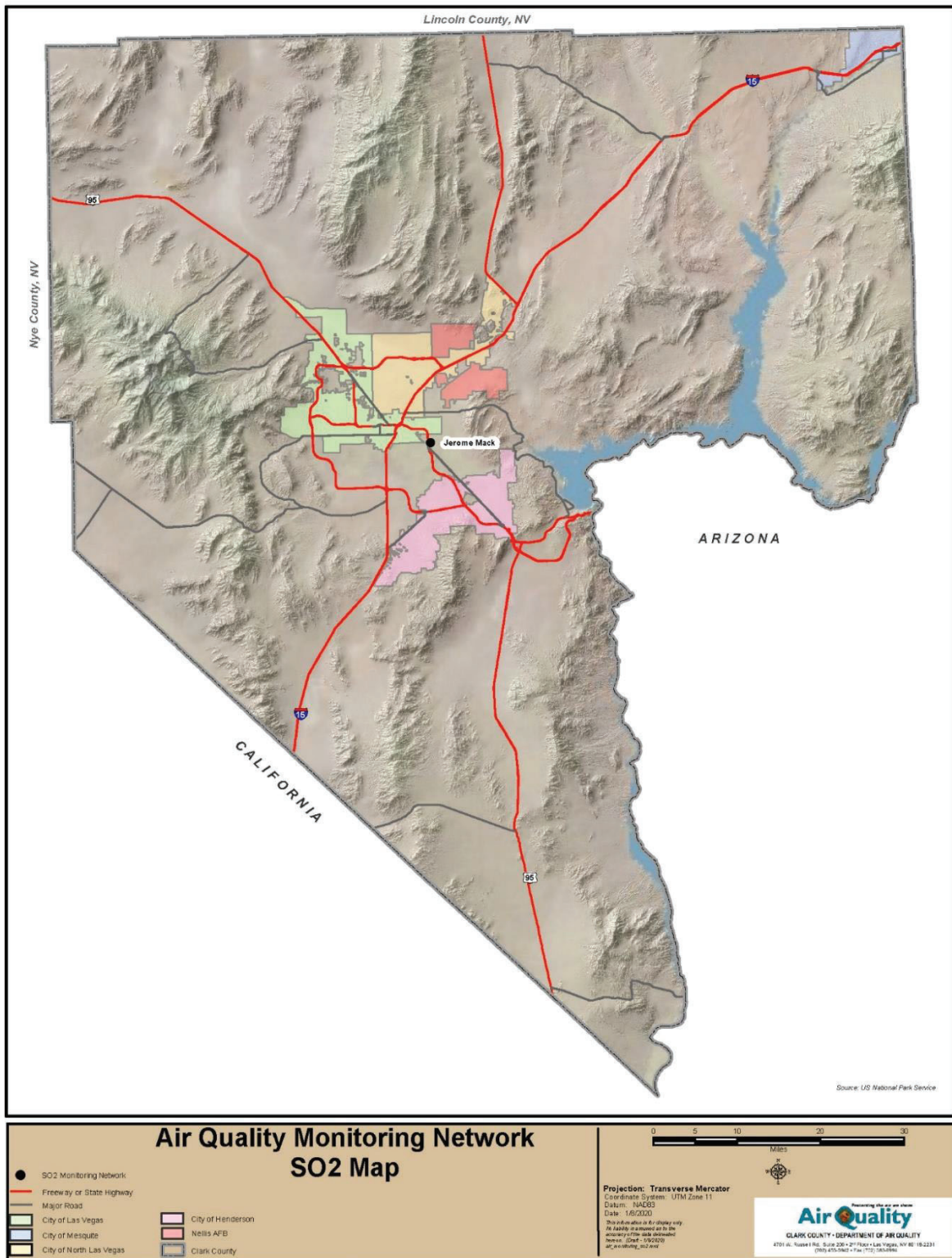


Figure 19: SO₂ Monitor.

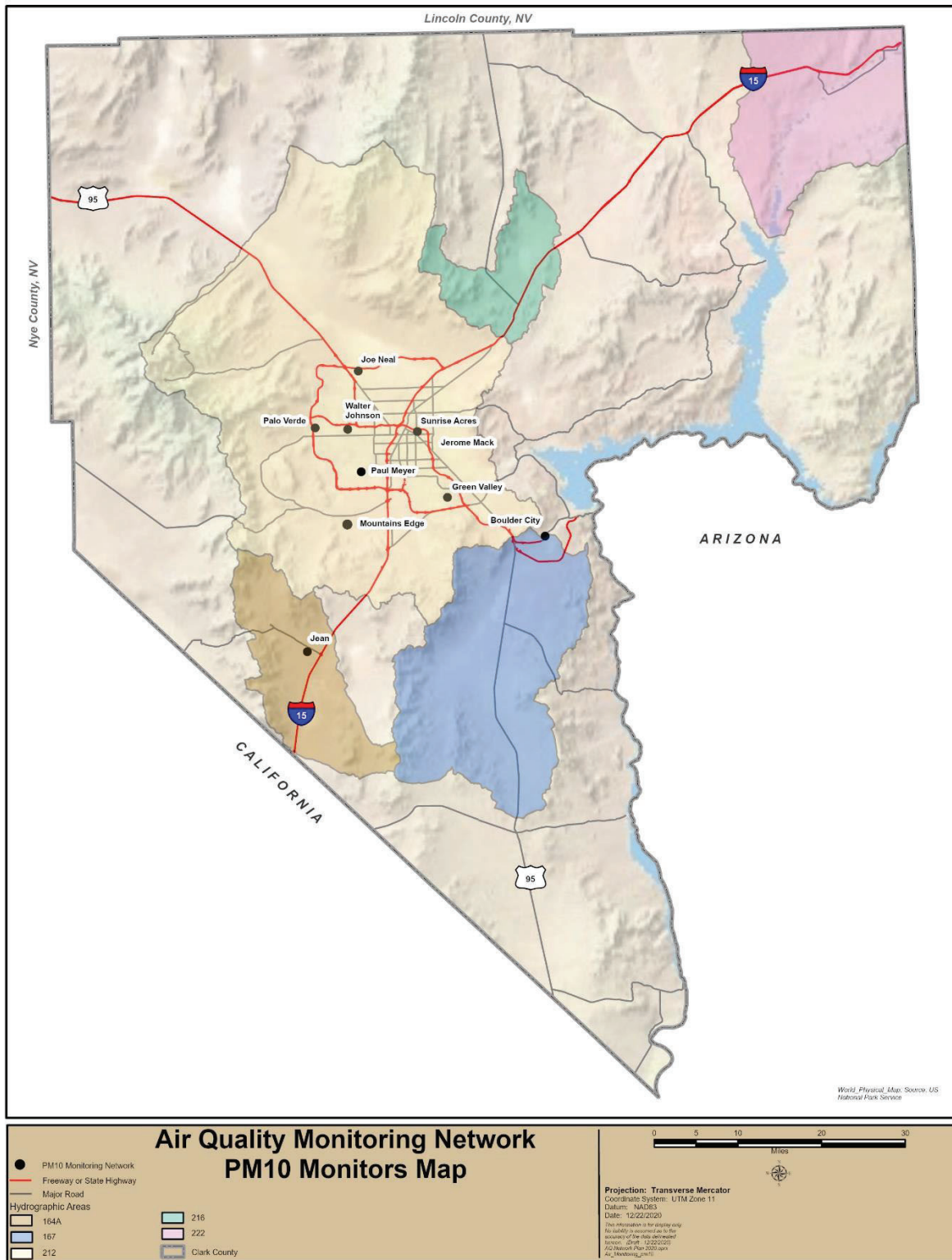


Figure 20: Continuous PM₁₀ Monitors.

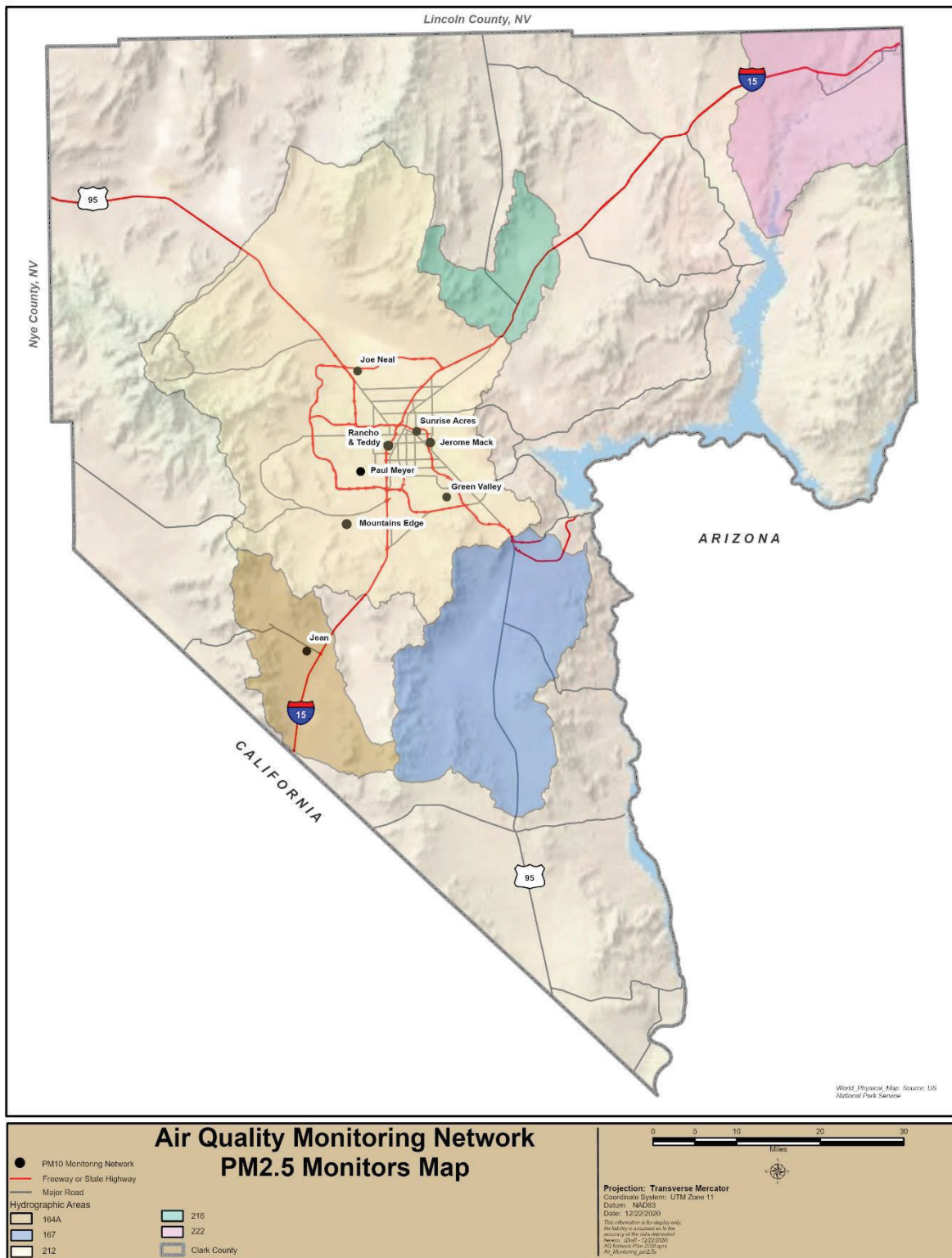


Figure 21: Continuous PM_{2.5} Monitors.

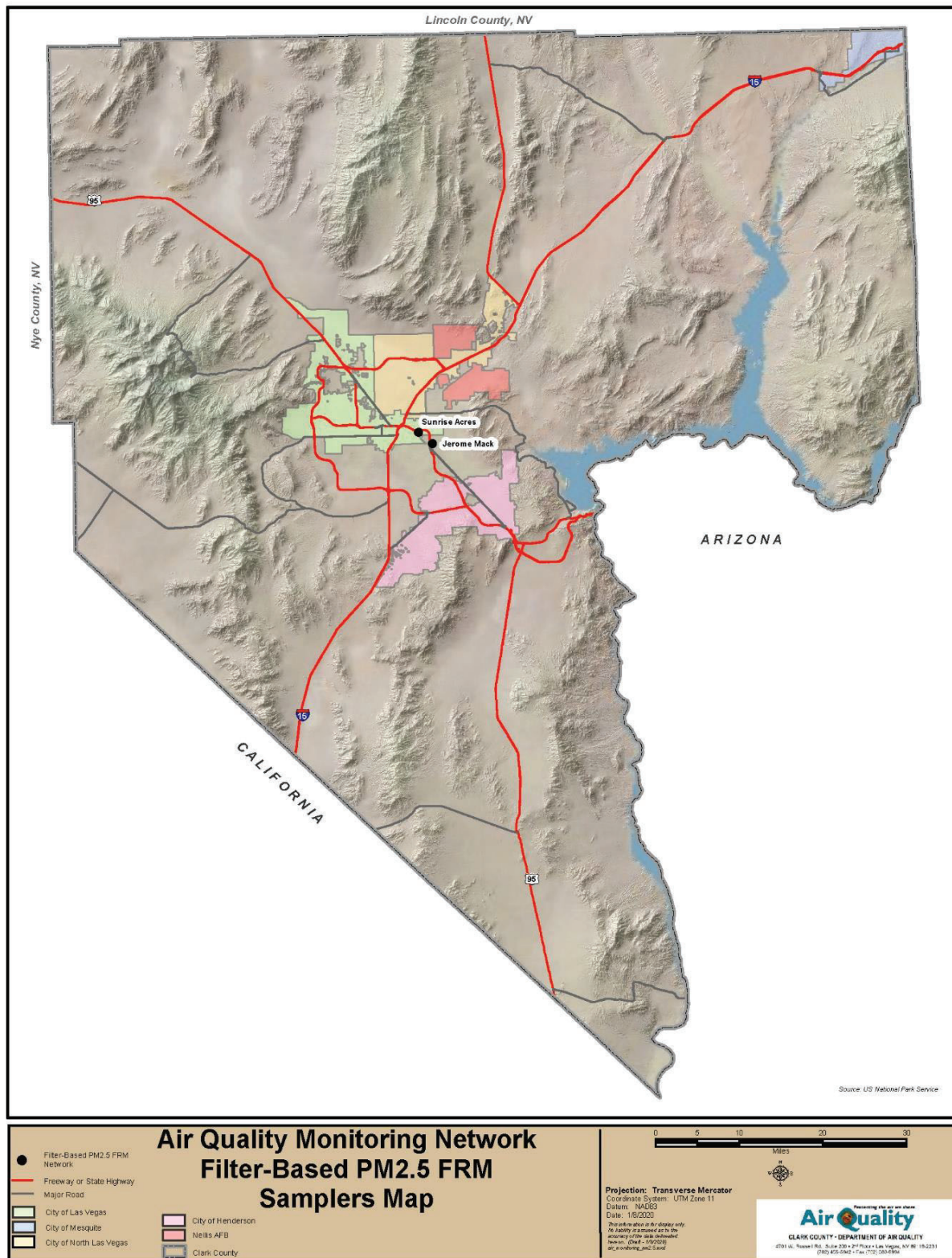


Figure 22: Filter-Based PM2.5 FRM Samplers.

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. 2020 NPAP and TTP Evaluations

Monitoring Station	Pollutant	Evaluation Date
Palo Verde	O ₃	1/23/2020
Jerome Mack	O ₃ , CO, SO ₂	9/16/2020

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. 2020 PEP Audit Activity

Sampler Location	Pollutant	Audit Date
Jean	PM _{2.5} FEM	1/23/2020
Sunrise Acres	PM _{2.5} FEM	1/23/2020
Green Valley	PM _{2.5} FEM	9/16/2020
Paul Meyer	PM _{2.5} FEM	9/16/2020
Rancho & Teddy	PM _{2.5} FEM	9/16/2020

7.0 NETWORK MODIFICATIONS

7.1 Completed Changes

DAQ has made the following recent network changes:

Table 14. Summary of Recent Network Modifications

Action	Date	Explanation
Began monitoring PM _{2.5} at Walter Johnson and Palo Verde as SPM	January 1, 2020	These measurements provide real-time PM _{2.5} data to the public and help provide greater spatial coverage.
Deployed criteria pollutant monitoring at Mountain's Edge site	October 1, 2020	EPA approved the new Mountain's Edge Park 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.
Ran Trace CO SPMs at Joe Neal, Green Valley, and Spring Mountain Youth Camp	April – September, 2020	Monitoring was in support of DES Planning initiatives. This initiative assessed inverse CO-O ₃ correlation related to stratospheric O ₃ intrusions.
O ₃ SPMs	April and May, 2020	Monitoring was in support of DES Planning initiatives. This initiative supported the assessment of stratospheric O ₃ intrusions.
Changed the Sunrise Acres PM _{2.5} FRM from 1 in 6 to 1 in 3 day sampling.	February 1, 2021	Helped with PM _{2.5} network bias assessments and data completeness.

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.

New monitoring site approval information is as follows:

- EPA approved the Mountains Edge site through the 2017 annual network plan approval process.
- EPA approved the Liberty High School site through the 2017 annual network plan approval process.
- EPA approved the Mesquite site relocation to Virgin Valley High School on March 22, 2017.
- EPA approved the Boulder City site relocation to Garrett Junior High School on April 5, 2017.
- EPA approved the Walnut Community Center site on August 7, 2017.
- EPA approved the Apex site relocation (to a nearby location in the Apex Valley) on August 7, 2017.

With the exception of Walnut Recreation Center, DES will start all PM_{2.5} monitors as SPM, and DAQ may not operate the SPMs in full compliance with Appendix A and E requirements during this trial period.

DAQ is working to start up new monitoring sites (see Table 15) by close of 2021; however, a 2022 startup may be needed due to circumstances beyond DAQ control.

Table 15. Upcoming Site and Equipment Changes

Site/Equipment Change	Date of Proposed Change	Explanation
Current PM _{2.5} monitoring at Walter Johnson and Palo Verde are SPM. DES proposed conversion to SLAMS.	July 1, 2020	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.	April 2021	Monitoring anticipated in support DES Planning initiatives. This initiative will support the assessment of stratospheric O ₃ intrusions.
Redeploy Trace CO SPMs at Joe Neal and Green Valley.	April 2021	Deployment will support DAQ Planning initiative related to inverse CO-O ₃ correlation measurements.
Change Jerome Mack PM _{2.5} collocated sampling from 1 in 6 to 1 in 3 day sampling.	April 2021	Will help with PM _{2.5} network bias assessments and data completeness.
Mesquite site relocation. O ₃ and PM ₁₀ monitoring to start as SLAMS, and PM _{2.5} as SPM.	2021	EPA approved the Mesquite site relocation on March 22, 2017. The new Mesquite site location will be at Virgin Valley High School. DAQ plans to restart O ₃ and PM ₁₀ monitoring as SLAMS, and PM _{2.5} as SPM. The existing Mesquite site has been closed.
Boulder City site relocation and PM _{2.5} to start as SPM	2021	EPA approved the Boulder City site relocation on April 5, 2017. The new Boulder City site location will be at Garrett Junior High School. DAQ plans to start up PM _{2.5} monitoring as SPM.
Deploy SLAMS criteria pollutant monitoring at Walnut Community Center	2021	EPA approved the new Walnut Community Center site on August 7, 2017. DAQ plans to measure CO, O ₃ , NO ₂ , PM ₁₀ , and PM _{2.5} as SLAMS. This site will be a replacement for JD Smith.
Deploy SLAMS and SPM criteria pollutant monitoring at Liberty High School	2021	EPA approved the new Liberty High School site on October 30, 2017, as part of the 2017 Annual Network Plan. DAQ plans to measure O ₃ , and PM ₁₀ as SLAMS, and start PM _{2.5} as SPM.
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 may delay site start-up until 2022. O ₃ SLAMS monitoring is planned for this site.



Figure 23: Spring Mountain Youth Camp (SPM Site).

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.) (2021)
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
Instrument manufacturer and model	TAPI 400 series	TAPI 300 series
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	04/1/2021 (anticipated)	4/1/2019
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)	8.8	4.1
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)	NA	NA
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 Mesquite



Figure 24: Virgin Valley High School.

The Virgin Valley site is approximately 75 miles north of Las Vegas and will monitor O₃, PM₁₀ and PM_{2.5} as SPM. The site sits along a transport and exit corridor connecting jurisdictional boundaries, and will serve as an indicator of population exposure to pollutants. Meteorological measurements at the Mesquite site will 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

Local Site Name (AQS ID)	Virgin Valley High School (32-003-0024)
Traffic count (AADT, year)	Valley View Dr.: < 2,000 (est.); Hillside Dr.: 6,100; Interstate 15: 28,800 (2019)
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	2021	2021	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	N	N
Is it suitable for comparison against the annual PM _{2.5} ? (Y/N)	NA	N	NA

Pollutant, POC	PM ₁₀ , 1	PM _{2.5} (continuous), 3	O ₃ , 1
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	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	NA

7.2.2 Monitoring Site Relocation in Boulder City (Garrett Junior High School)



Figure 25: Boulder City (Garrett Junior High).

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: 50 (anticipated); Avenue G: 200 (anticipated)
Traffic counts (AADT, year)	Adams Blvd: 4,700; Avenue G: 1,800: (2019)
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	2021	2021	2021
Current sampling frequency	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	5.0 (anticipated)	5.0 (anticipated)	4.0 (anticipated)
Distance from supporting structure (m)	2.1 (anticipated)	2.1 (anticipated)	1.2 (anticipated)
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 (anticipated)	50 (anticipated)	50 (anticipated)
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	10 (est.)
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)	NA	NA	NA
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	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	NA

7.2.3 Criteria Pollutant Monitoring at Walnut Community Center (New Site)



Figure 26: Walnut Community Center.

The Walnut Community Center site will be a replacement for the JD Smith site, which was shut down on December 31, 2017.

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. 20 (est.), W. Walnut Rd. 120, E. Cheyenne Ave. 360
Traffic count (AADT, year)	Cecile Ave. 1,000 (est.), W. Walnut Rd.: 4,400, E. Cheyenne Ave. 20,200 (2019)
Ground cover	Concrete, grass
Representative statistical area name	Las Vegas-Paradise, NV MSA

Pollutant, POC	O ₃ , 1	CO, 1	NO ₂ , 1	PM ₁₀	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	2021	2021	2021	2021	2021
Current sampling frequency	NA	NA	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round	Year-round	Year-round
Probe height (m)	4 (anticipated)	4 (anticipated)	4 (anticipated)	5 (anticipated)	5 (anticipated)
Distance from supporting structure (m)	1.2 (anticipated)	1.2 (anticipated)	1.2 (anticipated)	2.2 (anticipated)	2.2 (anticipated)
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)	12 (anticipated)	12 (anticipated)	12 (anticipated)	12 (anticipated)	12 (anticipated)
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
Residence time for reactive gases (s)	10 (est.)	10 (est.)	10 (est.)	NA	NA
Will there be changes within the next 18 months? (Y/N)	N	N	N	N	N

Pollutant, POC	O ₃ , 1	CO, 1	NO ₂ , 1	PM ₁₀	PM _{2.5}
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	NA	NA	NA	NA	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	NA	NA	NA

7.2.4 Criteria Pollutant Monitoring in Southeast Las Vegas (New Site)



Figure 27: Liberty High School.

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: 20 (est.); Chaperral Rd: 25 (est.); Bermuda Rd: 575
Traffic count (AADT, year)	Liberty Heights Ave: 1,000 (est.); Chaperral Rd: 1,000 (est.); Bermuda Rd: 9,300 (2018)
Ground cover	Asphalt, gravel, and grass
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	EQA-0992-087
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	2021	2021	2021
Current sampling frequency	NA	NA	NA
Calculated sampling frequency	Continuous	Continuous	Continuous
Sampling season	Year-round	Year-round	Year-round
Probe height (m)	5.0 (anticipated)	5.0 (anticipated)	4.0 (anticipated)
Distance from supporting structure (m)	2.2 (anticipated)	2.2 (anticipated)	1.2 (anticipated)
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)	12 (est.)	12 (est.)	12 (est.)
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	10 (est.)
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)	NA	Y	NA
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	NA
Last two semiannual flow rate audits for PM monitors	NA	NA	NA

7.2.5 Monitoring Site Relocation in the Apex Valley

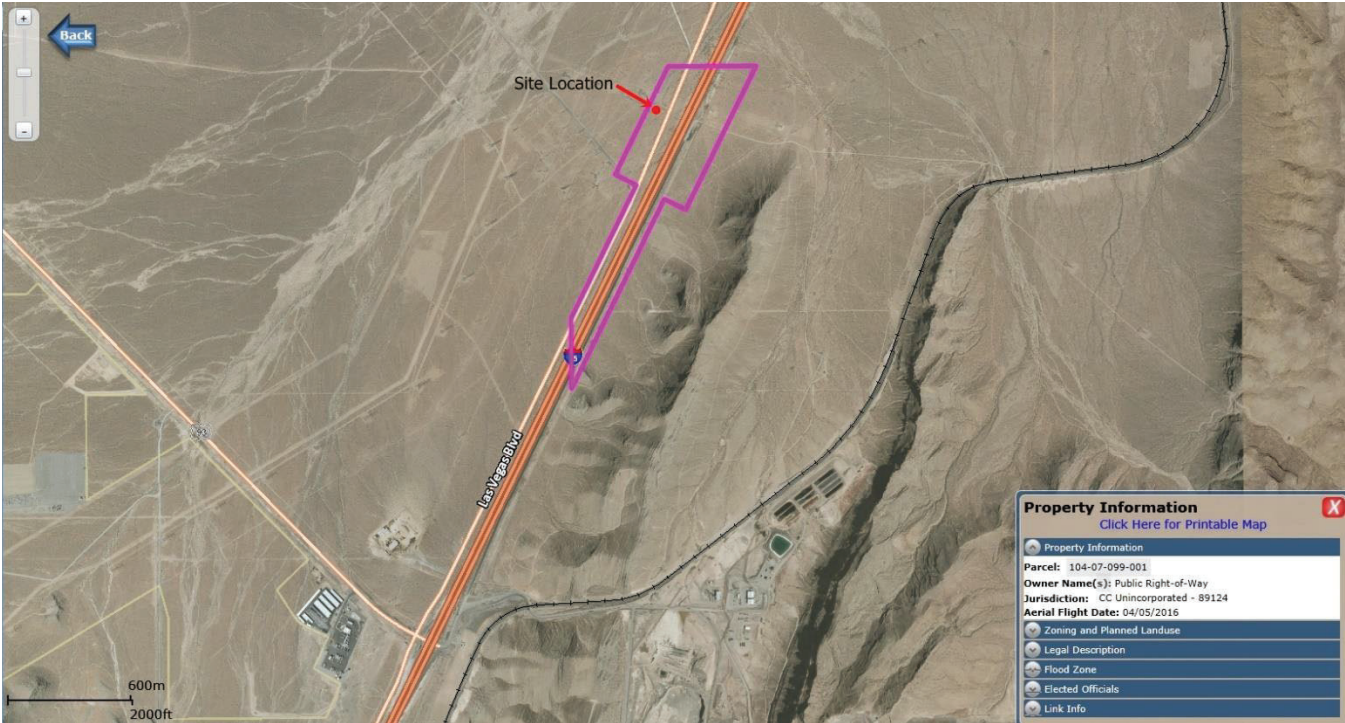


Figure 28: Apex (new site).

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: 26,900
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
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)	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	NA
Last two semiannual flow rate audits for PM monitors	NA

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

This plan was made available between April 6 and May 6, 2021, 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 and noticed in the Las Vegas Review Journal. **DAQ 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 January 28, 2021. EPA approved this waiver on March 29, 2021.

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. A majority of this effort will be focused on the O₃ season, and related studies are being projected over the next several years. None of the upper-elevation O₃ 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 is conducting 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 will be measuring VOC and trace gasses from a mobile lab for three weeks at a fixed location using a wide array of specialized measuring equipment, followed by one week of mobile measurements. DAQ is exploring the feasibility of additional measurements at a fixed location in early August to help quantify late summer biogenic VOC concentrations. Upon completion of these measurements, laboratory analysis, and modeling, data assessments will be completed with the findings incorporated into a final report.

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.