

# Annual Monitoring Network Plan



**June 2022**

Clark County Department of Environment and Sustainability

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

## **Executive Summary**

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

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## ACRONYMS AND ABBREVIATIONS

|                   |  |
|-------------------|--|
| AADT              | annual average daily traffic                                 |
| AQS               | Air Quality System   |
| CAA               | Clean Air Act  |
| CBSA              | Core-Based Statistical Area                                  |
| CFR               | Code of Federal Regulations                                  |
| CO                | carbon monoxide  |
| DAQ               | Division of Air Quality                                      |
| DES               | Department of Environment and Sustainability                 |
| EE                | Exceptional Event  |
| EPA               | U.S. Environmental Protection Agency                         |
| FEM               | federal equivalent method                                    |
| FRM               | federal reference method                                     |
| MSA               | Metropolitan Statistical Area                                |
| NAAQS             | National Ambient Air Quality Standards                       |
| NCore             | National Core Multi-Pollutant Monitoring Network             |
| NDOT              | Nevada Department of Transportation                          |
| NEI               | National Emissions Inventory                                 |
| NO <sub>x</sub>   | oxides of nitrogen   |
| NOAA              | National Oceanic and Atmospheric Administration              |
| NPAP              | National Performance Audit Program                           |
| O <sub>3</sub>    | ozone  |
| PAMS              | Photochemical Assessment Monitoring Stations                 |
| Pb                | lead   |
| PEP               | Performance Evaluation Program                               |
| PM                | particulate matter   |
| PM <sub>2.5</sub> | particulate matter 2.5 micrometers in diameter or smaller    |
| PM <sub>10</sub>  | 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 <sub>2</sub>   | sulfur dioxide   |
| SPM               | Special Purpose Monitor                                      |
| TTP               | through-the-probe  |
| VOC               | Volatile Organic Compounds                                   |

## SCIENTIFIC UNITS

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

## 1.0 INTRODUCTION

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

During 2021, the following conditions existed:

1. DAQ operated monitoring instruments to measure ambient concentrations of pollutants using continuous and filter-based methods, including continuous and filter-based particulate matter 2.5 micrometers in diameter or smaller (PM<sub>2.5</sub>), continuous particulate matter 10 micrometers in diameter or smaller (PM<sub>10</sub>), continuous particulate matter between 10 and 2.5 micrometers in diameter (PM Coarse), ozone (O<sub>3</sub>), carbon monoxide (CO), oxides of nitrogen (NO, NO<sub>2</sub>, and NO<sub>y</sub>), and sulfur dioxide (SO<sub>2</sub>).
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 O<sub>3</sub>, PM<sub>2.5</sub>/PM<sub>10</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, 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 PM<sub>10</sub>, CO, and O<sub>3</sub>. To address CO, DAQ submitted a CO State Implementation Plan (SIP) in 2000 that described the control measures and technologies required to bring the Las Vegas Valley into compliance with the CO NAAQS. The CO SIP was approved by EPA, effective October 21, 2004 (69 FR 56351). A Federal Register notice denoting EPA's determination of attainment of the CO NAAQS within the valley was issued in June 2005 (70 FR 31353). In 2008, DAQ submitted a CO Request for Re-designation and Maintenance Plan, which was approved by EPA, effective September 27, 2010 (75 FR 59090). A Second 10-Year CO Limited Maintenance Plan was submitted in June 2019 and was approved by EPA in October 2021, with an effective date of November 22, 2021 (86 FR 58579).

The Las Vegas Valley (HA 212) attained the PM<sub>10</sub> standard by December 31, 2006, and EPA issued a “Finding of Attainment” in August 2010 (75 FR 45485). In 2012, DAQ submitted a Request for Re-designation and Maintenance Plan for PM<sub>10</sub>, which EPA approved in October 2014, with an effective date of November 5, 2014 (79 FR 60078).

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

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

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

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

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

## 2.0 MINIMUM MONITORING REQUIREMENTS

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

**Table 1. Flow Rates for PM Monitoring Instruments**

| Instrument                   | Flow Rates<br>(liters per minute)                    |
|------------------------------|--|
| Met One Super SASS           | 6.7  |
| URG                          | 22   |
| MetOne PM <sub>2.5</sub> FRM | 16.67  |
| Teledyne T640X               | 16.67 for PM <sub>10</sub> ; 5 for PM <sub>2.5</sub> |

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 O<sub>3</sub>

**Table 2. Minimum Monitoring Requirements for O<sub>3</sub>**

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

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

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

<sup>2</sup> AQS (site) Identification.

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

<sup>4</sup> Design Value with EPA concurrence on proposed 2020 and 2021 EEs

<sup>5</sup> Design Value with EPA concurrence on proposed 2020 EEs but no 2021 EEs

<sup>6</sup> Design Value with EPA concurrence on non-challenging 2020 EEs but no 2021 EEs

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

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

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

## 2.2 PM<sub>2.5</sub>

**Table 3. Minimum Monitoring Requirements for PM<sub>2.5</sub> (FRM<sup>2</sup> – Filter Based)**

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

<sup>1</sup> µg/m<sup>3</sup> = micrograms per cubic meter.

<sup>2</sup> FRM stands for federal reference method.

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

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

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

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

**Table 4. Minimum Monitoring Requirements for PM<sub>2.5</sub> (FEM<sup>2</sup> – Continuous)**

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

<sup>1</sup> µg/m<sup>3</sup> = micrograms per cubic meter.

<sup>2</sup> FEM stands for federal equivalent method.

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

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

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

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

## 2.3 PM<sub>10</sub>

**Table 5. Minimum Monitoring Requirements for PM<sub>10</sub>**

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

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

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



## 2.4 NO<sub>2</sub>

**Table 6. Minimum Monitoring Requirements for NO<sub>2</sub>**

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

<sup>1</sup> This number represents the highest AADT count of any roadway segment in Clark County as measured by NDOT (counting station 0030074) on Interstate-15, 0.5 miles north of the Spring Mountain Interchange (Exit 39). This traffic counter is approximately 0.5 miles south of the Rancho & Teddy near-road monitoring site along the Interstate-15 corridor, both the monitoring site and traffic counting station have similar traffic patterns, and it is presumed that high traffic count locations are indicative of maximum hourly NO<sub>2</sub> concentrations. Due to potential inconsistencies with the 2020 AADT count related to COVID-19, the 2021 AADT estimate was obtained from NDOT through direct correspondence.

<sup>2</sup> Two near-road NO<sub>2</sub> monitors are required in any CBSA with one or more roadway segments having an AADT of 250,000 or more and population of 1,000,000 or more (40 CFR 58, App. D, Sec. 4.3.2(a)).

<sup>3</sup> This number includes Regional Administrator (RA) 40, PAMS true NO<sub>2</sub>, 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 NO<sub>2</sub> concentrations representing the neighborhood or larger spatial scales. Sunrise Acres meets this requirement, and this site also has the designated RA40 monitor for NO<sub>2</sub>.

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

## 2.5 SO<sub>2</sub>

**Table 7. Minimum Monitoring Requirements for SO<sub>2</sub>**

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

<sup>1</sup> Used for Population Weighted Emissions Index (PWEI) calculation.

<sup>2</sup> Stationary source SO<sub>2</sub> emissions are based on 2019 data. All other categories are based on the 2017 National Emissions Inventory (NEI).

<sup>3</sup> Calculated by multiplying CBSA population by total SO<sub>2</sub> and dividing product by one million.

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

Monitors required for SIP or maintenance plan: NA.

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

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

## 2.6 CO

**Table 8. Minimum Monitoring Requirements for CO**

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

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

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

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

## 2.7 Pb

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

## 2.8 Near-Road NO<sub>2</sub>, PM<sub>2.5</sub>, and CO Monitors

**Table 9. Minimum Monitoring Requirements for Near-Road NO<sub>2</sub>, PM<sub>2.5</sub>, and CO**

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

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

<sup>1</sup> This number represents the highest AADT (annual average daily traffic) count of any roadway segment in Clark County as measured by NDOT (counting station 0030074) on Interstate-15, 0.5 miles north of the Spring Mountain Interchange (Exit 39). This traffic counter is approximately 0.5 miles south of the Rancho & Teddy near-road monitoring site along the Interstate-15 corridor, both the monitoring site and traffic counting station have similar traffic patterns, and it is presumed that high traffic count locations are indicative of maximum hourly NO<sub>2</sub> concentrations. Due to inconsistencies with the 2020 AADT count due to COVID-19, the 2021 AADT estimate was obtained from NDOT through direct correspondence.

## 3.0 COLLOCATED MONITORS AS OF 2021

**Table 10. Filter-Based PM<sub>2.5</sub> 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<sub>2.5</sub> FEM Network**

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

<sup>1</sup>PM<sub>2.5</sub> SPMs are included in the count.

<sup>2</sup>Meets 40 CFR 58 App. A, Sec. 3.2.3 requirements

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

DAQ has no manual PM<sub>10</sub> samplers in its network. Clark County has only continuous PM<sub>10</sub> monitors in its network, and there are no CFR requirements for collocation of continuous PM<sub>10</sub> monitors.

## 4.0 2021 SITE TABLES



**Figure 1: Boulder City.**

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

| Local Site Name (AQS ID)              | Boulder City (32-003-0601)                           |                    |
|---------------------------------------|--|--------------------|
| GPS Coordinates (latitude, longitude) | +35.978149°, -114.846313°                            |                    |
| Street Address                        | 1005 Industrial Rd., Boulder City, NV 89005          |                    |
| Distance to roadways (m)              | Industrial Rd: 58; U.S. Highway 93: 96               |                    |
| Traffic counts (AADT, year)           | Industrial Rd: 2,250; U.S. Highway 93: 12,000 (2020) |                    |
| Ground cover                          | Paved, native desert                                 |                    |
| Representative statistical area name  | Las Vegas-Paradise, NV MSA                           |                    |
| Pollutant, POC                        | PM <sub>10</sub> , 1                                 | O <sub>3</sub> , 1 |
| Parameter code                        | 81102  | 44201              |

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

<sup>1</sup>Site shutdown in March 2021.





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

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

At the request of NDOT, DAQ deployed CO, PM<sub>10</sub> and PM<sub>2.5</sub> SPM monitors in addition to existing near-road NO<sub>2</sub> and meteorological monitors. Data from these monitors will be used for an Environmental Impact Statement related to the expansion of the US-95.

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

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

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

| Pollutant, POC   | NO <sub>2</sub> , 1                    | CO, 1            | PM <sub>10</sub> , 1 | PM <sub>2.5</sub> (continuous), 3 |
|--|--|------------------|----------------------|-----------------------------------|
| Parameter code   | 42602                                  | 42101            | 81102                | 88101                             |
| Basic monitoring objective(s)                                    | NAAQS comparison                       | Research support | Research support     | Research support                  |
| Site type(s)   | Source oriented; Highest concentration | Source oriented  | Source oriented      | Source oriented                   |
| Network affiliation  | Near Road                              | NA               | NA                   | NA                                |
| Monitor type(s)  | SLAMS                                  | SPM              | SPM                  | SPM                               |
| Primary, QA Collocated, or Other                                 | Primary                                | Primary          | Primary              | Primary                           |
| Instrument manufacturer and model                                | TAPI 500 series                        | TAPI 300 series  | Teledyne T640X       | Teledyne T640X                    |
| Method code  | EQNA-0514-212                          | RFCA-1093-093    | EQPM-0516-239        | EQPM-0516-238                     |
| FRM/FEM/ARM/other  | FEM                                    | other            | FEM                  | FEM                               |
| Collecting agency  | DAQ                                    | DAQ              | DAQ                  | DAQ                               |
| Analytical lab   | NA                                     | NA               | NA                   | NA                                |
| Reporting agency   | DAQ                                    | DAQ              | DAQ                  | DAQ                               |
| Spatial scale  | Microscale                             | Microscale       | Microscale           | Microscale                        |
| Monitoring start date  | 07/01/2016                             | 08/01/2021       | 09/01/2021           | 08/01/2021                        |
| Current sampling frequency                                       | Continuous                             | Continuous       | Continuous           | Continuous                        |
| Calculated sampling frequency                                    | Continuous                             | Continuous       | Continuous           | Continuous                        |
| Sampling season  | Year-round                             | Year-round       | Year-round           | Year-round                        |
| Probe height (m)   | 4.9                                    | 4.9              | 4.9                  | 4.9                               |
| Distance from supporting structure (m)                           | 2.2                                    | 2.2              | 2.1                  | 2.1                               |
| Distance from obstructions on roof – horizontal distance (m)     | NA                                     | NA               | NA                   | NA                                |
| Distance from obstructions on roof – vertical height (m)         | NA                                     | NA               | NA                   | NA                                |
| Distance from obstructions not on roof – horizontal distance (m) | NA                                     | NA               | NA                   | NA                                |
| Distance from obstructions not on roof – vertical height (m)     | NA                                     | NA               | NA                   | NA                                |
| Does obstruction(s) not on roof impede flow                      | No                                     | No               | No                   | No                                |
| Obstruction height above probe (m)                               | NA                                     | NA               | NA                   | NA                                |
| Distance from trees (m)  | 31.7                                   | 31.7             | 31.7                 | 31.7                              |
| Distance to furnace or incinerator flue (m)                      | NA                                     | NA               | NA                   | NA                                |

| Pollutant, POC   | NO <sub>2</sub> , 1 | CO, 1      | PM <sub>10</sub> , 1    | PM <sub>2.5</sub> (continuous), 3 |
|--|---------------------|------------|-------------------------|-----------------------------------|
| Distance between monitors fulfilling QA collocation requirements (m)       | NA                  | NA         | NA                      | NA                                |
| Distance to nearest PM instrument (m)                                      | NA                  | NA         | NA                      | NA                                |
| Unrestricted airflow (degrees)   | 360                 | 360        | 360                     | 360                               |
| Probe material for reactive gases  | Teflon              | Teflon     | NA                      | NA                                |
| Residence time for reactive gases (s)                                      | 7.3                 | 3.7        | NA                      | NA                                |
| Will there be changes within the next 18 months? (Y/N)                     | N                   | N          | N                       | N                                 |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N) | N                   | N          | N                       | N                                 |
| Frequency of flow rate verification for manual PM samplers                 | NA                  | NA         | NA                      | NA                                |
| Frequency of flow rate verification for automated PM analyzers             | NA                  | NA         | Monthly                 | Monthly                           |
| Frequency of one-point QC check for gaseous instruments                    | Daily               | Daily      | NA                      | NA                                |
| Last annual performance evaluation for gaseous parameters                  | 9/1/2021            | 12/14/2021 | NA                      | NA                                |
| Last two semiannual flow rate audits for PM monitors                       | NA                  | NA         | 11/19/2021 <sup>1</sup> | 11/19/2021 <sup>2</sup>           |

<sup>1</sup> Monitoring began 9/1/2021

<sup>2</sup> Monitoring began 8/1/2021





**Figure 3: Garrett Junior High.**

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

| Local Site Name (AQ5 ID)              | Garrett Junior High (32-003-0602)          |
|---------------------------------------|--|
| GPS Coordinates (latitude, longitude) | +35.969848°, -114.835007°                  |
| Street Address                        | 1200 Ave G , Boulder City, NV              |
| Distance to roadways (m)              | Adams Blvd: 133 Avenue G: 305              |
| Traffic counts (AADT, year)           | Adams Blvd: 4,250; Avenue G: 1,550: (2020) |
| Ground cover                          | Grass, unpaved, paved                      |
| Representative statistical area name  | Las Vegas-Paradise, NV MSA                 |

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



**Figure 4: Green Valley.**

The Green Valley site in Henderson was established to monitor dust emissions from a gravel processing plant, and it continues to monitor PM<sub>10</sub> and PM<sub>2.5</sub>. O<sub>3</sub> monitoring was established in 2015. Meteorological measurements at the Green Valley site include wind speed, wind direction, and ambient temperature.

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

| Pollutant, POC | PM <sub>10</sub> , 1 | PM <sub>2.5</sub> (continuous), 3 | O <sub>3</sub> , 1 | CO, 1 |
|----------------|----------------------|-----------------------------------|--------------------|-------|
| Parameter code | 81102                | 88101                             | 44201              | 42101 |

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

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

<sup>1</sup>No audit conducted on special study SPM.





**Figure 5: Indian Springs.**

The O<sub>3</sub> monitor at Indian Springs is helpful in identifying high O<sub>3</sub> 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-O<sub>3</sub> triangulation between Joe Neal and the Las Vegas Paiute Tribe (when active), which appears to be the highest O<sub>3</sub> location within Clark County. DAQ will continue to work with EPA in evaluating high O<sub>3</sub> locations within its jurisdiction.

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

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



**Figure 6: Jean.**

The Jean site is approximately 30 miles south of Las Vegas. This site was originally set up as an upwind background site, and it still serves this purpose for PM. Its primary objective for O<sub>3</sub> monitoring is measuring transport from Southern California. Meteorological measurements at the Jean site include wind speed, wind direction, and ambient temperature.

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



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



**Figure 7: Jerome Mack.**

The Jerome Mack site in east Las Vegas is the Clark County NCore and PAMS site. Its primary objective is to monitor trace-level gaseous pollutants, O<sub>3</sub> and O<sub>3</sub> precursors, PM parameters (including PM<sub>10</sub>, PM<sub>2.5</sub>, 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<sub>2.5</sub> QA collocated FRM sampler for the PM<sub>2.5</sub> FRM network. The SASS (parameter code 88502) and URG (parameter code 88355) are non-regulatory speciation samplers and are operated as non-FRM/FEM.

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

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

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

| Pollutant, POC                    | PM <sub>10</sub> , 3 | PM <sub>2.5</sub> continuous, 3 | PM <sub>10-2.5</sub> continuous, 3 | PM <sub>2.5</sub> Primary (FRM), 1 | PM <sub>2.5</sub> Collocated (FRM), 2 | Speciation SASS, 5               | Speciation URG, 5                | O <sub>3</sub> , 1  | NO, 1               | NO <sub>2</sub> , 1  | NO <sub>x</sub> , 1 | Trace CO, 1                        | Trace SO <sub>2</sub> , 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 <sup>nd</sup> 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                                | 1:3                                   | 1:3                              | 1:3                              | Continuous          | Continuous          | Continuous   | Continuous          | Continuous                         | Continuous                |
| Calculated sampling frequency     | Continuous           | Continuous                      | Continuous                         | 1:3                                | 1:3                                   | 1:3                              | 1:3                              | Continuous          | Continuous          | Continuous   | Continuous          | Continuous                         | Continuous                |
| Sampling season                   | Year-round           | Year-round                      | Year-round                         | Year-round                         | Year-round                            | Year-round                       | Year-round                       | Year-round          | Year-round          | Year-round   | Year-round          | Year-round                         | Year-round                |
| Probe height (m)                  | 5.2                  | 5.2                             | 5.2                                | 3.1                                | 3.1                                   | 3.0                              | 3.3                              | 3.4                 | 7.0                 | 3.4  | 7.0                 | 3.4                                | 3.4                       |

| Pollutant, POC   | PM <sub>10</sub> , 3 | PM <sub>2.5</sub> continuous, 3 | PM <sub>10-2.5</sub> continuous, 3 | PM <sub>2.5</sub> Primary (FRM), 1 | PM <sub>2.5</sub> Collocated (FRM), 2 | Speciation SASS, 5 | Speciation URG, 5 | O <sub>3</sub> , 1 | NO, 1  | NO <sub>2</sub> , 1 | NO <sub>y</sub> , 1 | Trace CO, 1 | Trace SO <sub>2</sub> , 1 |
|--|----------------------|---------------------------------|------------------------------------|------------------------------------|---------------------------------------|--------------------|-------------------|--------------------|--------|---------------------|---------------------|-------------|---------------------------|
| Distance from supporting structure (m)                                     | 2.0                  | 2.0                             | 2.0                                | 2.9                                | 2.9                                   | 2.9                | 3.1               | 1.1                | 7.0    | 1.1                 | 7.0                 | 1.1         | 1.1                       |
| Distance from obstructions on roof – horizontal distance (m)               | NA                   | NA                              | NA                                 | NA                                 | NA                                    | NA                 | NA                | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance from obstructions on roof – vertical height (m)                   | NA                   | NA                              | NA                                 | NA                                 | NA                                    | NA                 | NA                | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance from obstructions not on roof – horizontal distance (m)           | NA                   | NA                              | NA                                 | 5.4                                | 3.0                                   | 7.2                | 5.3               | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance from obstructions not on roof – vertical obstruction height (m)   | NA                   | NA                              | NA                                 | 3.1                                | 3.1                                   | 3.0                | 3.3               | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Obstruction height above probe (m)   | NA                   | NA                              | NA                                 | 0.2                                | 0.2                                   | 0.3                | 0.4               | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance from trees (m)  | 16.1                 | 16.1                            | 16.1                               | 22.0                               | 18.3                                  | 20.3               | 19.4              | 15.5               | 14.5   | 15.5                | 14.5                | 15.5        | 15.5                      |
| Distance to furnace or incinerator flue (m)                                | NA                   | NA                              | NA                                 | NA                                 | NA                                    | NA                 | NA                | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance between monitors fulfilling QA collocation requirements (m)       | NA                   | NA                              | NA                                 | 3.6                                | 3.6                                   | NA                 | NA                | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Distance to nearest PM instrument (m)                                      | 8.4                  | 8.4                             | 8.4                                | 3.6                                | 3.6                                   | 2.8                | 2.2               | NA                 | NA     | NA                  | NA                  | NA          | NA                        |
| Unrestricted airflow (degrees)   | 360                  | 360                             | 360                                | 360                                | 360                                   | 360                | 360               | 360                | 360    | 360                 | 360                 | 360         | 360                       |
| Probe material for reactive gases  | NA                   | NA                              | NA                                 | NA                                 | NA                                    | NA                 | NA                | Teflon             | Teflon | Teflon              | Teflon              | Teflon      | Teflon                    |
| Residence time for reactive gases (s)                                      | NA                   | NA                              | NA                                 | NA                                 | NA                                    | NA                 | NA                | 8.5                | 9.8    | 7.4                 | 9.8                 | 4.3         | 10.2                      |
| Will there be changes within the next 18 months? (Y/N)                     | N                    | N                               | N                                  | N                                  | N                                     | N                  | N                 | N                  | N      | N                   | N                   | N           | N                         |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (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 <sub>10</sub> , 3                                | PM <sub>2.5</sub><br>continuous, 3                  | PM <sub>10-2.5</sub><br>continuous,<br>3            | PM <sub>2.5</sub><br>Primary<br>(FRM), 1            | PM <sub>2.5</sub><br>Collocated<br>(FRM), 2         | Speciation<br>SASS, 5                               | Speciation<br>URG, 5                                 | O <sub>3</sub> , 1 | NO, 1     | NO <sub>2</sub> , 1 | NO <sub>x</sub> , 1 | Trace<br>CO, 1 | Trace<br>SO <sub>2</sub> , 1 |
|---|---|---|---|---|---|---|--|--------------------|-----------|---------------------|---------------------|----------------|------------------------------|
| Frequency of one-point QC check for gaseous instruments   | NA  | NA  | NA  | NA  | NA  | NA  | NA   | Daily              | Daily     | Daily               | Daily               | Daily          | Daily                        |
| Last annual performance evaluation for gaseous parameters | NA  | NA  | NA  | NA  | NA  | NA  | NA   | 10/4/2021          | 9/27/2021 | 10/4/2021           | 9/27/2021           | 9/28/2021      | 10/5/2021                    |
| Last two semiannual flow rate audits for PM monitors      | 3/16/2021,<br>6/16/2021,<br>9/22/2021,<br>12/7/2021 | 3/16/2021,<br>6/16/2021,<br>9/22/2021,<br>12/7/2021 | 3/16/2021,<br>6/16/2021,<br>9/22/2021,<br>12/7/2021 | 3/18/2021,<br>6/16/2021,<br>9/23/2021,<br>12/7/2021 | 3/18/2021,<br>6/16/2021,<br>9/23/2021,<br>12/7/2021 | 3/16/2021,<br>6/16/2021,<br>9/23/2021,<br>12/7/2021 | 3/16/2021,<br>6/16/2021,<br>9/23/2021,<br>12/13/2021 | NA                 | NA        | NA                  | NA                  | NA             | NA                           |



**Figure 8: Joe Neal.**

The primary objectives of the Joe Neal site, located in northwest Las Vegas, are to monitor O<sub>3</sub> and NO<sub>2</sub> in an area of high O<sub>3</sub> concentrations, and to support DAQ modeling efforts. Due to topography at this location, the summertime loft brings higher O<sub>3</sub> and precursor levels toward this site from the east end of the Las Vegas Valley. Although Joe Neal tends to measure the highest O<sub>3</sub> concentrations within the network, DAQ will continue working with EPA to evaluate if there are higher O<sub>3</sub> locations within Clark County. Meteorological measurements at the Joe Neal site include wind speed, wind direction, and ambient temperature.

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

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



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

<sup>1</sup>No audit conducted on special study SPM.



**Figure 9: Liberty High School.**

The Liberty High School site was established to fill a spatial gap in the southeast Las Vegas Valley. The site measures O<sub>3</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> (SPM). Meteorological measurements at the Liberty High School site include wind speed, wind direction, and ambient temperature.

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

| Pollutant, POC                    | PM <sub>10</sub> , 1 | PM <sub>2.5</sub>                                       | O <sub>3</sub> , 1  |
|-----------------------------------|----------------------|---|---------------------|
| Parameter code                    | 81102                | 88101   | 44201               |
| Basic monitoring objective(s)     | NAAQS comparison     | Provide air pollution data to public in a timely manner | NAAQS comparison    |
| Site type(s)                      | Population exposure  | Population exposure                                     | Population exposure |
| Monitor type(s)                   | SLAMS                | SPM   | SLAMS               |
| Instrument manufacturer and model | Teledyne T640X       | Teledyne T640X  | API 400 series      |
| Method code                       | EQPM-0516-239        | EQPM-0516-238   | EQA-0992-087        |

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



**Figure 10: Mountains Edge Park.**

The Mountains Edge site was established to fill a spatial gap in the southwest Las Vegas Valley. The site measures O<sub>3</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> (SPM). Meteorological measurements at the Mountains Edge site include wind speed, wind direction, and ambient temperature.

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

| Pollutant, POC | PM <sub>10</sub> , 1 | PM <sub>2.5</sub> | O <sub>3</sub> , 1 |
|----------------|----------------------|-------------------|--------------------|
| Parameter code | 81102                | 88101             | 44201              |

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

| Pollutant, POC                                       | PM <sub>10</sub> , 1                          | PM <sub>2.5</sub>                             | O <sub>3</sub> , 1 |
|--|---|---|--------------------|
| Last two semiannual flow rate audits for PM monitors | 2/24/2021, 4/28/2021,<br>8/12/2021, 12/2/2021 | 2/24/2021, 4/28/2021,<br>8/12/2021, 12/2/2021 | NA                 |





**Figure 11: Palo Verde.**

The primary objective of the Palo Verde site in west Las Vegas is to monitor O<sub>3</sub>, but it also monitors PM<sub>10</sub> and PM<sub>2.5</sub> with a primary and collocated monitor. Due to topography at this location, the summertime loft brings higher O<sub>3</sub> 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 <sub>10</sub> , 1 | PM <sub>2.5</sub> , 3 | PM <sub>2.5</sub> , 4 | O <sub>3</sub> , 1  |
|-------------------------------|----------------------|-----------------------|-----------------------|---------------------|
| Parameter code                | 81102                | 88101                 | 88101                 | 44201               |
| Basic monitoring objective(s) | NAAQS comparison     | NAAQS comparison      | NAAQS comparison      | NAAQS comparison    |
| Site type(s)                  | Population exposure  | Population exposure   | Population exposure   | Population exposure |



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

| Pollutant, POC                                       | PM <sub>10</sub> , 1                       | PM <sub>2.5</sub> , 3                      | PM <sub>2.5</sub> , 4  | O <sub>3</sub> , 1 |
|--|--|--|------------------------|--------------------|
| Last two semiannual flow rate audits for PM monitors | 2/17/2021, 4/27/2021, 8/12/2021, 11/3/2021 | 2/17/2021, 4/27/2021, 8/12/2021, 11/3/2021 | 11/3/2021 <sup>1</sup> | NA                 |

<sup>1</sup> Colocation began 10/1/2021



**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.: 3,000 (est.); South Tenaya Way: 3,400 (2020) |
| 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 <sub>10</sub> , 1                        | PM <sub>2.5</sub> , 3                       | O <sub>3</sub> , 1 |
|--|---|---|--------------------|
| FRM/FEM/ARM/other  | FEM   | FEM   | FEM                |
| Collecting agency  | DAQ   | DAQ   | DAQ                |
| Analytical lab   | NA  | NA  | NA                 |
| Reporting agency   | DAQ   | DAQ   | DAQ                |
| Spatial scale  | Neighborhood                                | Neighborhood                                | Neighborhood       |
| Monitoring start date  | 09/12/2017                                  | 06/15/2017                                  | 07/01/1998         |
| Current sampling frequency   | Continuous                                  | Continuous                                  | Continuous         |
| Calculated sampling frequency  | Continuous                                  | Continuous                                  | Continuous         |
| Sampling season  | Year-round                                  | Year-round                                  | Year-round         |
| Probe height (m)   | 4.6   | 4.6   | 4.3                |
| Distance from supporting structure (m)                                     | 1.9   | 1.9   | 1.6                |
| Distance from obstructions on roof – horizontal distance (m)               | NA  | NA  | NA                 |
| Distance from obstructions on roof – vertical height (m)                   | NA  | NA  | NA                 |
| Distance from obstructions not on roof – horizontal distance (m)           | NA  | NA  | NA                 |
| Distance from obstructions not on roof – vertical height (m)               | NA  | NA  | NA                 |
| Distance from trees (m)  | 10.8  | 10.8  | 11.9               |
| D1.5 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 <sub>2.5</sub> ? (Y/N) | N   | Y   | N                  |
| Frequency of flow rate verification for manual PM samplers                 | NA  | NA  | NA                 |
| Frequency of flow rate verification for automated PM analyzers             | Monthly                                     | Monthly                                     | NA                 |
| Frequency of one-point QC check for gaseous instruments                    | NA  | NA  | Daily              |
| Last annual performance evaluation for gaseous parameters                  | NA  | NA  | 3/15/2021          |
| Last two semiannual flow rate audits for PM monitors                       | 2/22/2021, 4/14/2021, 8/12/2021, 11/19/2021 | 2/22/2021, 4/14/2021, 8/12/2021, 11/19/2021 | NA                 |



**Figure 13: Sunrise Acres.**

Monitoring at the Sunrise Acres site near the center of the Las Vegas Valley began as part of a CO study in the 1990s. The primary objective of the Sunrise Acres site is to monitor CO, NO<sub>2</sub>, and PM. DAQ is conducting area-wide NO<sub>2</sub> monitoring, which meets RA 40 requirements outlined in 40 CFR 58, App. D, Sec. 4.3.4 at this site. The site monitors PM<sub>10</sub>, and it monitors PM<sub>2.5</sub> using both filter-based and continuous methodologies. The PM<sub>2.5</sub> FEM is the primary monitor at this site, and it is collocated with a PM<sub>2.5</sub> FRM. Meteorological measurements at the Sunrise Acres site include wind speed, wind direction, and ambient temperature.

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

| Pollutant, POC   | PM <sub>10</sub> , 1 | CO, 1                 | PM <sub>2.5</sub> Collocated FRM, 1 | PM <sub>2.5</sub> Primary FEM (continuous), 3 | NO <sub>2</sub> , 1                        |
|--|----------------------|-----------------------|-------------------------------------|---|--|
| Parameter code   | 81102                | 42101                 | 88101                               | 88101   | 42602                                      |
| Basic monitoring objective(s)                                    | NAAQS comparison     | NAAQS comparison      | NAAQS comparison                    | NAAQS comparison                              | NAAQS comparison                           |
| Site type(s)   | Population exposure  | Highest concentration | Highest concentration               | Highest concentration                         | Population exposure; highest concentration |
| Network affiliation  | NA                   | NA                    | NA                                  | NA  | NA   |
| Monitor type(s)  | SLAMS                | SLAMS                 | SLAMS                               | SLAMS   | SLAMS                                      |
| Primary, QA Collocated, or Other                                 | Primary              | Primary               | QA Collocated                       | Primary                                       | Primary                                    |
| Instrument manufacturer and model                                | Teledyne T640X       | API 300 series        | Met One E-SEQ-FRM                   | Teledyne T640X                                | TAPI 500 series                            |
| Method code  | EQPM-0516-239        | RFCA-1093-093         | RFPS-0717-245                       | EQPM-0516-238                                 | EQNA-0514-212                              |
| FRM/FEM/ARM/other  | FEM                  | FRM                   | FRM                                 | FEM   | FEM  |
| Collecting agency  | DAQ                  | DAQ                   | DAQ                                 | DAQ   | DAQ  |
| Analytical lab   | NA                   | NA                    | Weigh                               | NA  | NA   |
| Reporting agency   | DAQ                  | DAQ                   | DAQ                                 | DAQ   | DAQ  |
| Spatial scale  | Neighborhood         | Neighborhood          | Neighborhood                        | Neighborhood                                  | Neighborhood                               |
| Monitoring start date  | 09/25/2017           | 10/01/1996            | 01/01/2019                          | 09/25/2017                                    | 01/01/2013                                 |
| Current sampling frequency                                       | Continuous           | Continuous            | 1:3                                 | Continuous                                    | Continuous                                 |
| Calculated sampling frequency                                    | Continuous           | Continuous            | 1:3                                 | Continuous                                    | Continuous                                 |
| Sampling season  | Year-round           | Year-round            | Year-round                          | Year-round                                    | Year-round                                 |
| Probe height (m)   | 4.7                  | 3.6                   | 3.0                                 | 4.7   | 3.6  |
| Distance from supporting structure (m)                           | 2.2                  | 1.0                   | 2.1                                 | 2.2   | 1.0  |
| Distance from obstructions on roof – horizontal distance (m)     | NA                   | NA                    | NA                                  | NA  | NA   |
| Distance from obstructions on roof – vertical height (m)         | NA                   | NA                    | NA                                  | NA  | NA   |
| Distance from obstructions not on roof – horizontal distance (m) | NA                   | NA                    | 2.1                                 | NA  | NA   |
| Distance from obstructions not on roof – vertical height (m)     | NA                   | NA                    | 0.5 <sup>1</sup>                    | NA  | NA   |
| Distance from trees (m)  | NA                   | NA                    | NA                                  | NA  | NA   |

| <b>Pollutant, POC</b>  | <b>PM<sub>10</sub>, 1</b>                 | <b>CO, 1</b> | <b>PM<sub>2.5</sub> Collocated FRM, 1</b>                               | <b>PM<sub>2.5</sub> Primary FEM (continuous), 3</b>                     | <b>NO<sub>2</sub>, 1</b> |
|--|---|--------------|---|---|--------------------------|
| Distance to furnace or incinerator flue (m)                                | NA  | NA           | NA  | NA  | NA                       |
| Distance between monitors fulfilling QA collocation requirements (m)       | NA  | NA           | Distance between PM <sub>2.5</sub> FRM and PM <sub>2.5</sub> FEM is 3.8 | Distance between PM <sub>2.5</sub> FRM and PM <sub>2.5</sub> FEM is 3.8 | NA                       |
| Distance to nearest PM instrument (m)                                      | 3.8                                       | NA           | 3.8   | 3.8   | NA                       |
| Unrestricted airflow (degrees)   | 360                                       | 360          | 360   | 360   | 360                      |
| Probe material for reactive gases  | NA  | Teflon       | NA  | NA  | Teflon                   |
| Residence time for reactive gases (s)                                      | NA  | 2.9          | NA  | NA  | 5.8                      |
| Will there be changes within the next 18 months? (Y/N)                     | N   | N            | N   | N   | N                        |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N) | N   | N            | Y   | Y   | N                        |
| Frequency of flow rate verification for manual PM samplers                 | NA  | NA           | Monthly   | NA  | NA                       |
| Frequency of flow rate verification for automated PM analyzers             | Monthly                                   | NA           | NA  | Monthly   | NA                       |
| Frequency of one-point QC check for gaseous instruments                    | NA  | Daily        | NA  | NA  | Daily                    |
| Last annual performance evaluation for gaseous parameters                  | NA  | 9/22/2021    | NA  | NA  | 9/22/2021                |
| Last two semiannual flow rate audits for PM monitors                       | 1/4/2021, 5/11/2021, 8/16/2021, 12/6/2021 | NA           | 2/23/2021, 5/11/2021, 8/16/2021, 12/8/2021                              | 1/4/2021, 5/11/2021, 8/16/2021, 12/6/2021                               | NA                       |

<sup>1</sup> Inlet above obstruction.





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

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

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

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

| Pollutant, POC  | NO <sub>2</sub> , 1 | CO, 1    | PM <sub>2.5</sub> , 1                      |
|---|---------------------|----------|--|
| Frequency of one-point QC check for gaseous instruments   | Daily               | Daily    | NA   |
| Last annual performance evaluation for gaseous parameters | 12/15/21            | 12/15/21 | NA   |
| Last two semiannual flow rate audits for PM monitors      | NA                  | NA       | 2/24/2021, 4/14/2021, 9/23/2021, 12/7/2021 |





**Figure 15: Virgin Valley High School.**

The Virgin Valley site is approximately 80 miles north of Las Vegas and monitors O<sub>3</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> (as SPM). The site sits along a transport and exit corridor connecting jurisdictional boundaries, and serves as an indicator of population exposure to pollutants. Meteorological measurements at this site include wind speed, wind direction, and ambient temperature.

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

| Pollutant, POC   | PM <sub>10</sub> , 1 | PM <sub>2.5</sub> (continuous), 3 | O <sub>3</sub> , 1                      |
|--|----------------------|-----------------------------------|---|
| Parameter code   | 81102                | 88101                             | 44201                                   |
| Basic monitoring objective(s)  | NAAQS comparison     | NAAQS comparison                  | NAAQS comparison                        |
| Site type(s)   | Population exposure  | Population exposure               | Population exposure, regional transport |
| Monitor type(s)  | SLAMS                | SPM                               | SLAMS                                   |
| Instrument manufacturer and model  | Teledyne T640X       | Teledyne T640X                    | API 400 series                          |
| Method code  | EQPM-0516-239        | EQPM-0516-238                     | EQOA-0992-087                           |
| FRM/FEM/ARM/other  | FEM                  | FEM                               | FEM                                     |
| Collecting agency  | DAQ                  | DAQ                               | DAQ                                     |
| Analytical lab   | NA                   | NA                                | NA                                      |
| Reporting agency   | DAQ                  | DAQ                               | DAQ                                     |
| Spatial scale  | Neighborhood         | Neighborhood                      | Neighborhood                            |
| Monitoring start date  | 1/1/2021             | 1/1/2021                          | 1/1/2021                                |
| Current sampling frequency   | NA                   | NA                                | NA                                      |
| Calculated sampling frequency  | Continuous           | Continuous                        | Continuous                              |
| Sampling season  | Year-round           | Year-round                        | Year-round                              |
| Probe height (m)   | 4.9                  | 4.9                               | 3.6                                     |
| Distance from supporting structure (m)                                     | 2.4                  | 2.4                               | 1.2                                     |
| Distance from obstructions on roof – horizontal distance (m)               | NA                   | NA                                | NA                                      |
| Distance from obstructions on roof – vertical height (m)                   | NA                   | NA                                | NA                                      |
| Distance from obstructions not on roof – horizontal distance (m)           | NA                   | NA                                | NA                                      |
| Distance from obstructions not on roof – vertical height (m)               | NA                   | NA                                | NA                                      |
| Distance from trees (m)  | 30.5                 | 30.5                              | 30.5                                    |
| Distance to furnace or incinerator flue (m)                                | NA                   | NA                                | NA                                      |
| Distance between collocated monitors (m)                                   | NA                   | NA                                | NA                                      |
| Unrestricted airflow (degrees)   | 360                  | 360                               | 360                                     |
| Probe material for reactive gases  | NA                   | NA                                | Teflon                                  |
| Residence time for reactive gases (s)                                      | NA                   | NA                                | 5.5                                     |
| Will there be changes within the next 18 months? (Y/N)                     | N                    | Y, change to SLAMS                | N                                       |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N) | N                    | N                                 | N                                       |
| Frequency of flow rate verification for manual PM samplers                 | NA                   | NA                                | NA                                      |
| Frequency of flow rate verification for automated PM analyzers             | Monthly              | Monthly                           | NA                                      |
| Frequency of one-point QC check for gaseous instruments                    | NA                   | NA                                | Daily                                   |

| Pollutant, POC  | PM <sub>10</sub> , 1                           | PM <sub>2.5</sub> (continuous), 3              | O <sub>3</sub> , 1 |
|---|--|--|--------------------|
| Last annual performance evaluation for gaseous parameters | NA   | NA   | 2/2/2021           |
| Last two semiannual flow rate audits for PM monitors      | 2/11/2021; 4/13/2021;<br>8/30/2021; 10/27/2021 | 2/11/2021; 4/13/2021;<br>8/30/2021; 10/27/2021 | NA                 |



**Figure 16: Walnut Community Center.**

The Walnut Community Center site began operation in June, 2021. This site was a replacement for the JD Smith site, which was shut down in December, 2017 due to poor siting. This site measures O<sub>3</sub>, CO, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. All criteria pollutant measurements are SLAMS. Meteorological measurements at the Walnut site include wind speed, wind direction, and ambient temperature.

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



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

| <b>Pollutant, POC</b>  | <b>O<sub>3</sub>, 1</b> | <b>CO, 1</b>        | <b>NO<sub>2</sub>, 1</b> | <b>PM<sub>10</sub></b> | <b>PM<sub>2.5</sub></b> |
|--|-------------------------|---------------------|--------------------------|------------------------|-------------------------|
| Parameter code   | 44201                   | 42101               | 42602                    | 81102                  | 88101                   |
| Basic monitoring objective(s)                                    | NAAQS comparison        | NAAQS comparison    | NAAQS comparison         | NAAQS comparison       | NAAQS comparison        |
| Site type(s)   | Population exposure     | Population exposure | Population exposure      | Population exposure    | Population exposure     |
| Monitor type(s)  | SLAMS                   | SLAMS               | SLAMS                    | SLAMS                  | SLAMS                   |
| Instrument manufacturer and model                                | TAPI 400 series         | TAPI 300 series     | TAPI 500 series          | Teledyne T640X         | Teledyne T640X          |
| Method code  | EQOA-0992-087           | RFCA-1093-093       | EQNA-0514-212            | EQPM-0516-239          | EQPM-0516-238           |
| FRM/FEM/ARM/other  | FEM                     | FRM                 | FEM                      | FEM                    | FEM                     |
| Collecting agency  | DES                     | DES                 | DES                      | DES                    | DES                     |
| Analytical lab   | NA                      | NA                  | NA                       | NA                     | NA                      |
| Reporting agency   | DES                     | DES                 | DES                      | DES                    | DES                     |
| Spatial scale  | Neighborhood            | Neighborhood        | Neighborhood             | Neighborhood           | Neighborhood            |
| Monitoring start date  | 6/1/2021                | 6/1/2021            | 6/1/2021                 | 6/1/2021               | 6/1/2021                |
| Current sampling frequency                                       | Continuous              | Continuous          | Continuous               | Continuous             | Continuous              |
| Calculated sampling frequency                                    | Continuous              | Continuous          | Continuous               | Continuous             | Continuous              |
| Sampling season  | Year-round              | Year-round          | Year-round               | Year-round             | Year-round              |
| Probe height (m)   | 4.5                     | 4.5                 | 4.5                      | 4.9                    | 4.9                     |
| Distance from supporting structure (m)                           | 1.8                     | 1.8                 | 1.8                      | 2.2                    | 2.2                     |
| Distance from obstructions on roof – horizontal distance (m)     | NA                      | NA                  | NA                       | NA                     | NA                      |
| Distance from obstructions on roof – vertical height (m)         | NA                      | NA                  | NA                       | NA                     | NA                      |
| Distance from obstructions not on roof – horizontal distance (m) | NA                      | NA                  | NA                       | NA                     | NA                      |
| Distance from obstructions not on roof – vertical height (m)     | NA                      | NA                  | NA                       | NA                     | NA                      |
| Distance from trees (m)  | 11                      | 11                  | 11                       | 10.5                   | 10.5                    |
| Distance to furnace or incinerator flue (m)                      | NA                      | NA                  | NA                       | NA                     | NA                      |
| Distance between collocated monitors (m)                         | NA                      | NA                  | NA                       | NA                     | NA                      |
| Unrestricted airflow (degrees)                                   | 360                     | 360                 | 360                      | 360                    | 360                     |
| Probe material for reactive gases                                | Teflon                  | Teflon              | Teflon                   | NA                     | NA                      |

| Pollutant, POC   | O <sub>3</sub> , 1 | CO, 1     | NO <sub>2</sub> , 1 | PM <sub>10</sub>                     | PM <sub>2.5</sub>                    |
|--|--------------------|-----------|---------------------|--------------------------------------|--------------------------------------|
| Residence time for reactive gases (s)                                      | 6.4                | 3.0       | 5.2                 | NA                                   | NA                                   |
| Will there be changes within the next 18 months? (Y/N)                     | N                  | N         | N                   | N                                    | N                                    |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N) | NA                 | NA        | NA                  | NA                                   | Y                                    |
| Frequency of flow rate verification for manual PM samplers                 | NA                 | NA        | NA                  | NA                                   | NA                                   |
| Frequency of flow rate verification for automated PM analyzers             | NA                 | NA        | NA                  | Monthly                              | Monthly                              |
| Frequency of one-point QC check for gaseous instruments                    | Daily              | Daily     | Daily               | NA                                   | NA                                   |
| Last annual performance evaluation for gaseous parameters                  | 6/3/2021           | 6/16/2021 | 6/14/2021           | NA                                   | NA                                   |
| Last two semiannual flow rate audits for PM monitors                       | NA                 | NA        | NA                  | 6/3/2021,<br>9/15/2021,<br>12/7/2021 | 6/3/2021,<br>9/15/2021,<br>12/7/2021 |



**Figure 17: Walter Johnson.**

The primary objective of the Walter Johnson site, located on the west side of Las Vegas, is to monitor  $O_3$ ,  $PM_{10}$  and  $PM_{2.5}$ . 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: 28,600 (2020) |
| Ground cover                          | Concrete/asphalt, grass   |
| Representative statistical area name  | Las Vegas-Paradise, NV MSA  |

| Pollutant, POC   | O <sub>3</sub> , 1  | PM <sub>10</sub> , 1                            | PM <sub>2.5</sub> , 3                           |
|--|---------------------|---|---|
| Parameter code   | 44201               | 81102   | 88101   |
| Basic monitoring objective(s)  | NAAQS comparison    | NAAQS comparison                                | NAAQS comparison                                |
| Site type(s)   | Population exposure | Population exposure                             | Population exposure                             |
| Network affiliation  | NA                  | NA  | NA  |
| Monitor type(s)  | SLAMS               | SLAMS   | SLAMS   |
| Primary, QA Collocated, or Other   | Primary             | Primary   | Primary   |
| Instrument manufacturer and model  | API 400 series      | Teledyne T640X                                  | Teledyne T640X                                  |
| Method code  | EQOA-0992-087       | EQPM-0516-239                                   | EQPM-0516-238                                   |
| FRM/FEM/ARM/other  | FEM                 | FEM   | FEM   |
| Collecting agency  | DAQ                 | DAQ   | DAQ   |
| Analytical lab   | NA                  | NA  | NA  |
| Reporting agency   | DAQ                 | DAQ   | DAQ   |
| Spatial scale  | Neighborhood        | Neighborhood                                    | Neighborhood                                    |
| Monitoring start date  | 08/01/1998          | 09/12/2017                                      | 1/1/2020  |
| Current sampling frequency   | Continuous          | Continuous                                      | Continuous                                      |
| Calculated sampling frequency  | Continuous          | Continuous                                      | Continuous                                      |
| Sampling season  | Year-round          | Year-round                                      | Year-round                                      |
| Probe height (m)   | 4.3                 | 5.0   | 5.0   |
| Distance from supporting structure (m)                                     | 1.5                 | 2.2   | 2.2   |
| Distance from obstructions on roof – horizontal distance (m)               | NA                  | NA  | NA  |
| Distance from obstructions on roof – vertical height (m)                   | NA                  | NA  | NA  |
| Distance from obstructions not on roof – horizontal distance (m)           | NA                  | NA  | NA  |
| Distance from obstructions not on roof – vertical height (m)               | NA                  | NA  | NA  |
| Distance from trees (m)  | 17.8                | 16.6  | 16.6  |
| Distance to furnace or incinerator flue (m)                                | NA                  | NA  | NA  |
| Distance between monitors fulfilling QA collocation requirements (m)       | NA                  | NA  | NA  |
| Distance to nearest PM instrument (m)                                      | NA                  | NA  | NA  |
| Unrestricted airflow (degrees)   | 360                 | 360   | 360   |
| Probe material for reactive gases  | Teflon              | NA  | NA  |
| Residence time for reactive gases (s)                                      | 6.6                 | NA  | NA  |
| Will there be changes within the next 18 months? (Y/N)                     | N                   | N   | N   |
| Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N) | N                   | N   | N   |
| Frequency of flow rate verification for manual PM samplers                 | NA                  | NA  | NA  |
| Frequency of flow rate verification for automated PM analyzers             | NA                  | Monthly   | Monthly   |
| Frequency of one-point QC check for gaseous instruments                    | Daily               | NA  | NA  |
| Last annual performance evaluation for gaseous parameters                  | 3/16/2020           | NA  | NA  |
| Last two semiannual flow rate audits for PM monitors                       | NA                  | 2/23/2021, 4/28/2021,<br>8/12/ 2021, 11/19/2021 | 2/23/2021, 4/28/2021,<br>8/12/ 2021, 11/19/2021 |

## 5.0 MAPS OF CRITERIA POLLUTANT MONITORING STATIONS IN 2021

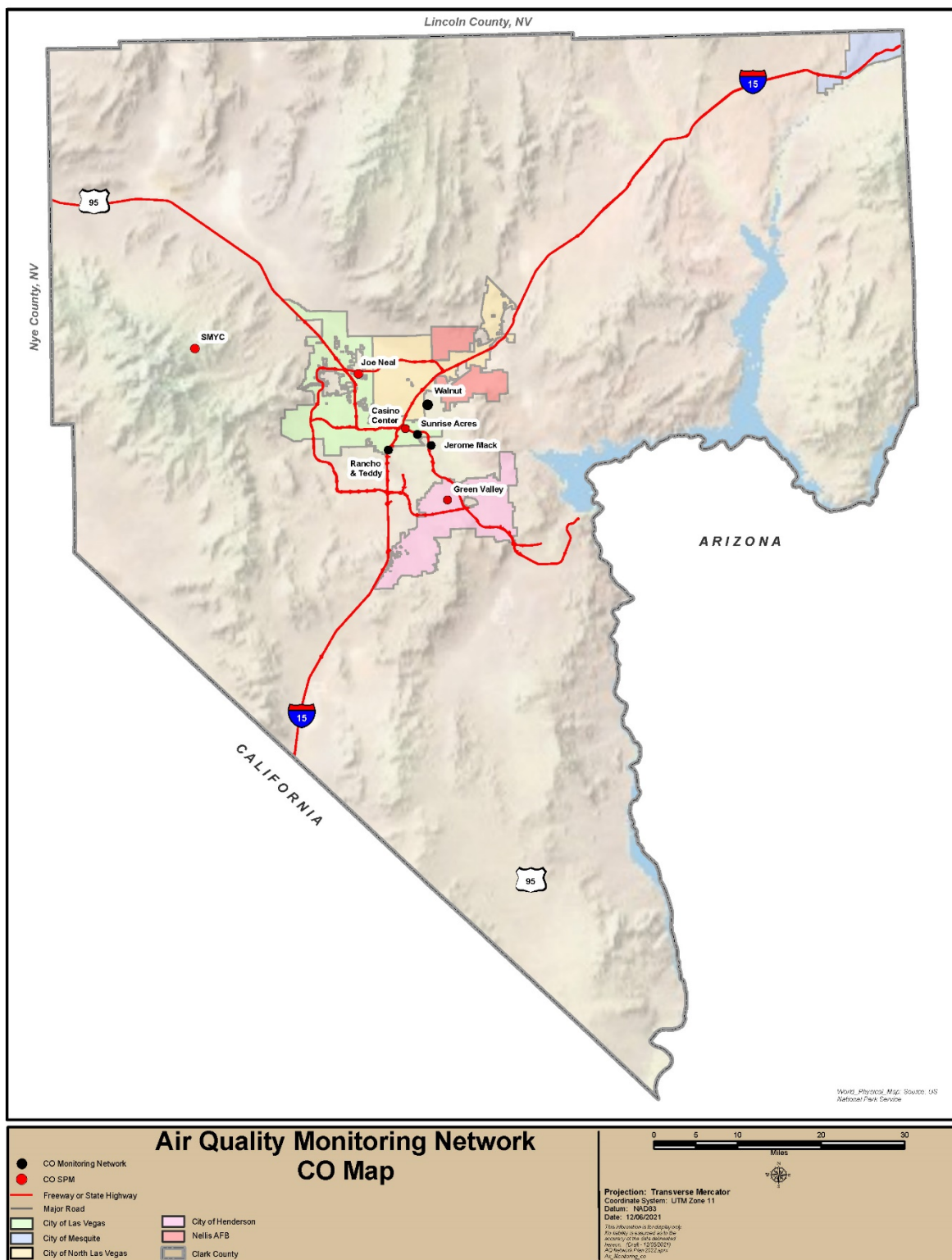


Figure 18: CO Monitors

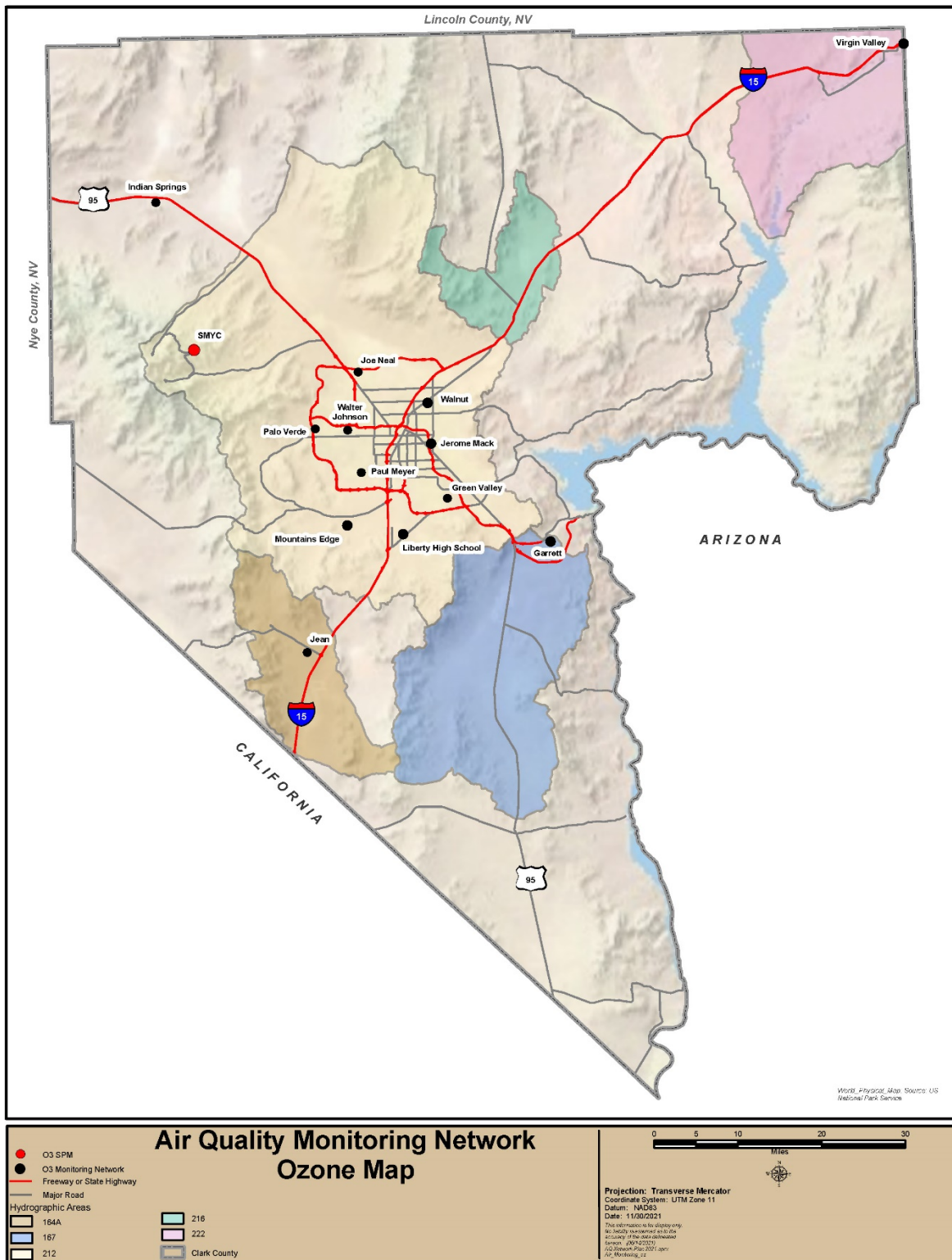
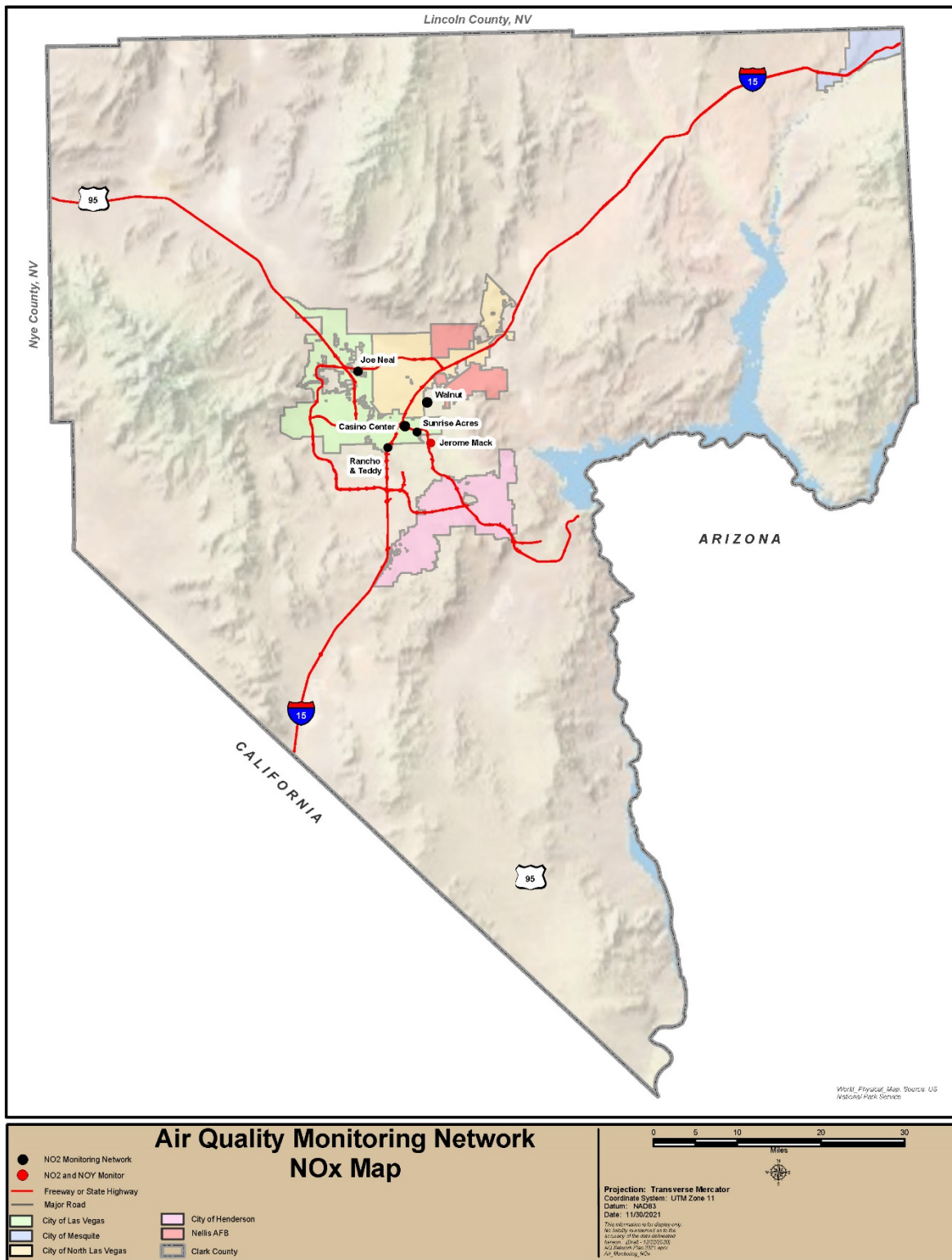


Figure 19: O<sub>3</sub> Monitors.





**Figure 20: NO<sub>x</sub> Monitors.**



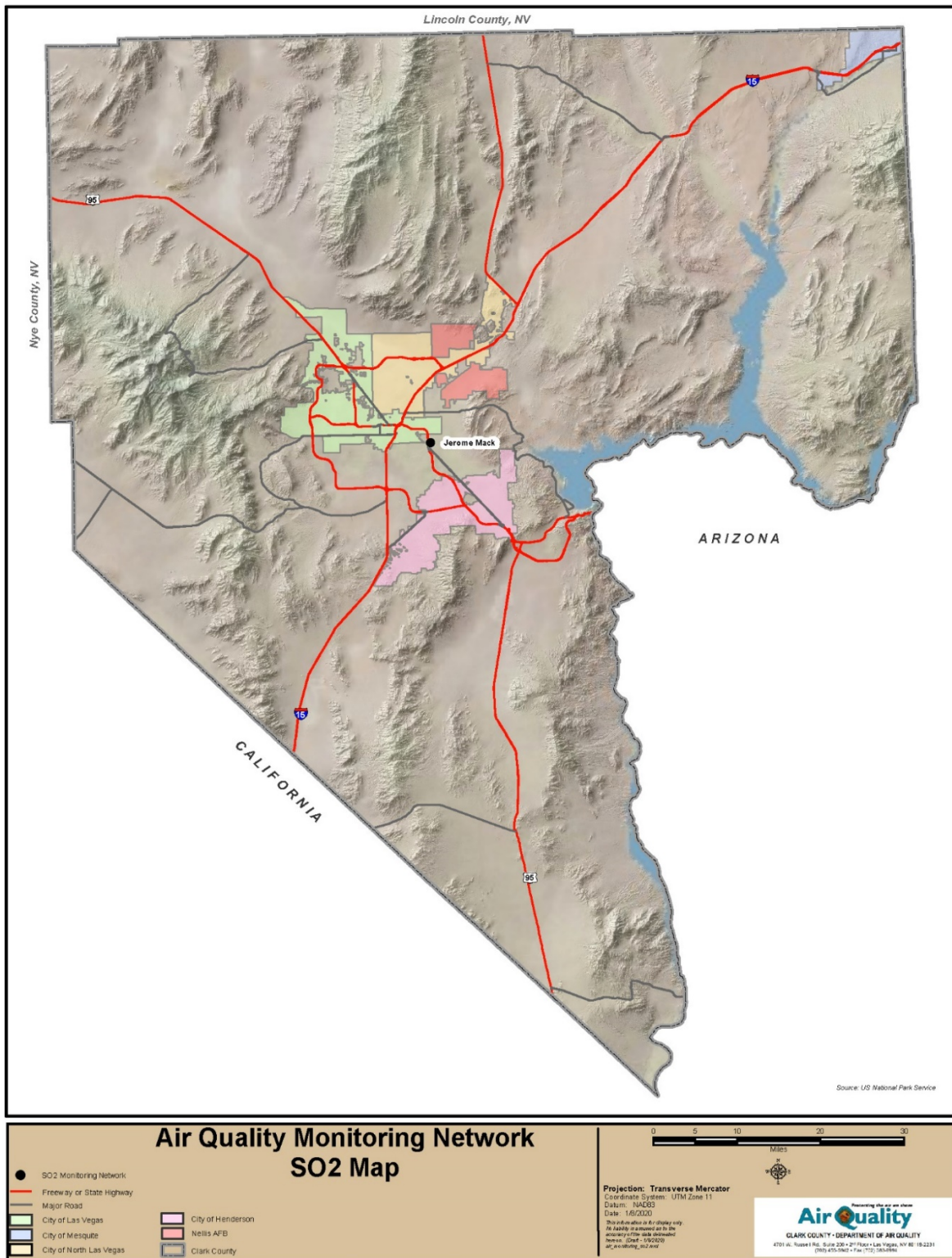
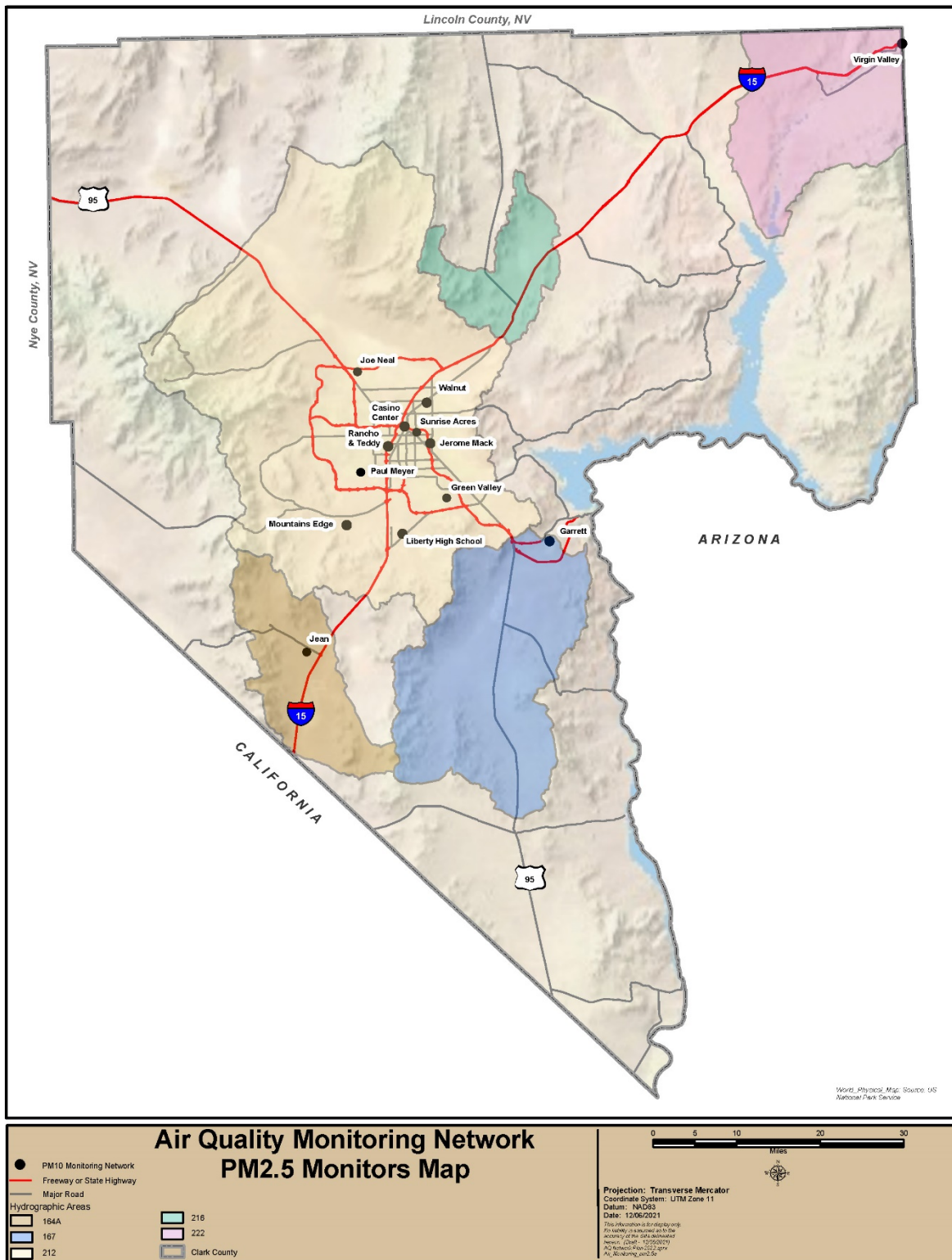


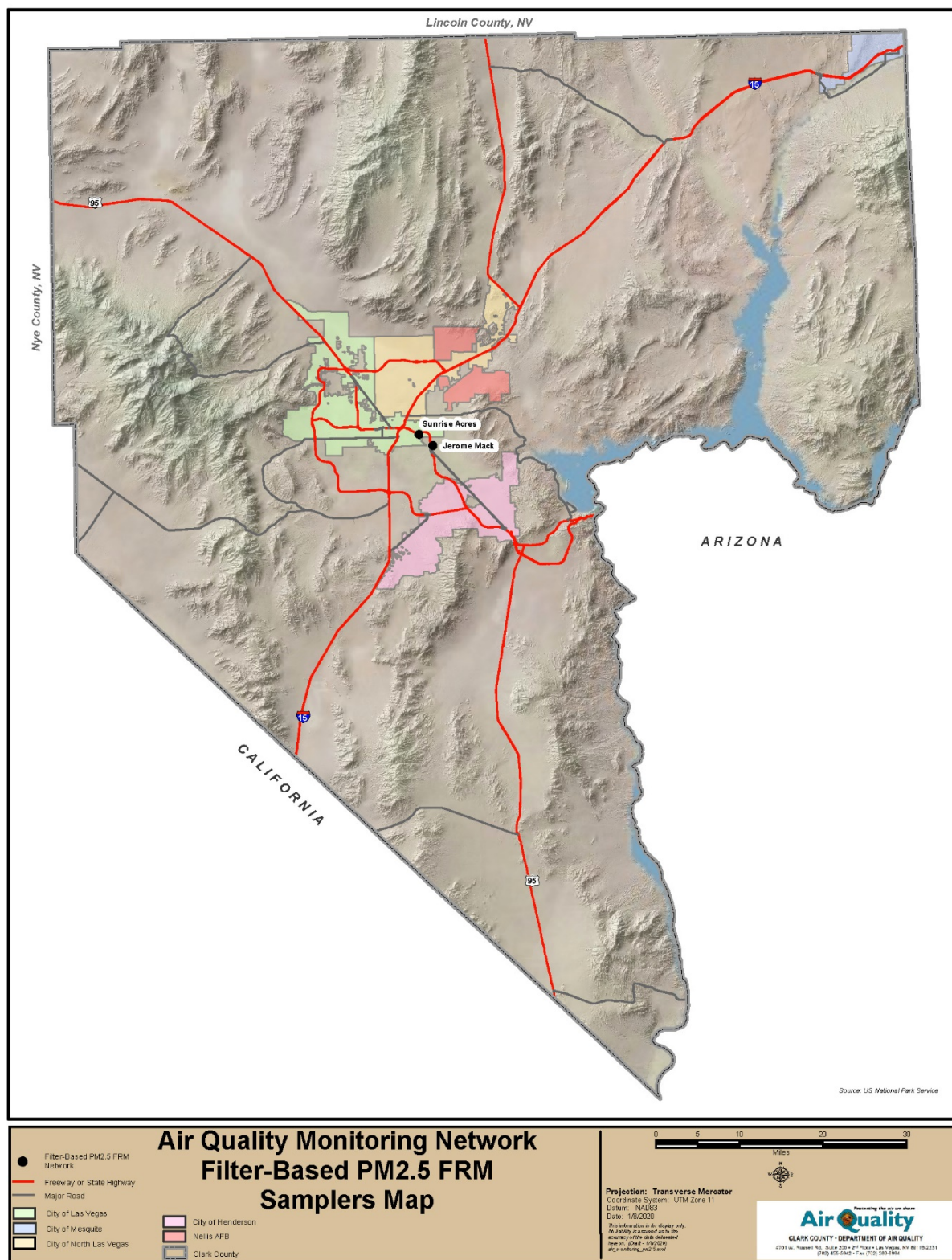
Figure 21: SO<sub>2</sub> Monitor.





**Figure 23: Continuous PM<sub>2.5</sub> Monitors.**





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

## 6.0 NATIONAL PERFORMANCE AUDIT PROGRAM AND PERFORMANCE EVALUATION PROGRAM

Each year, EPA Region 9 performs National Performance Audit Program (NPAP) Through-the-Probe (TTP) performance evaluations in accordance with 40 CFR Part 58 Appendix A, which focus on gaseous criteria pollutants. EPA has not audited the direct NO<sub>2</sub> FEM instruments, and the TTP audits are carried out through a contractor.

**Table 12. 2021 NPAP and TTP Evaluations**

| Monitoring Station | Pollutant      | Evaluation Date |
|--------------------|----------------|-----------------|
| Paul Meyer         | O <sub>3</sub> | 10/20/2021      |
| Joe Neal           | O <sub>3</sub> | 10/20/2021      |

Each year, the PM<sub>2.5</sub> FRM sampling network undergoes Performance Evaluation Program (PEP) audits. PEP audit results (in µg/m<sup>3</sup>) are generated by an independent lab and then submitted to the AQS database through an EPA contractor.

**Table 13. 2021 PEP Audit Activity**

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

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

## 7.0 NETWORK MODIFICATIONS

### 7.1 Completed Changes

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

With the exception of Walnut Recreation Center, DAQ started all PM<sub>2.5</sub> monitors as SPM.

DAQ has made the following recent network changes:

**Table 14. Summary of Recent Network Modifications**

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

## 7.2 Upcoming Changes and Request for Approval

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

**Table 15. Upcoming Site and Equipment Changes**

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





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

DES routinely deploys O<sub>3</sub> monitoring at Spring Mountain Youth Camp (SMYC) to assist with the identification of stratospheric intrusions, pollutant mixing heights, and to assist with model validation. DES has recently introduced trace CO monitoring at SMYC, which provides an inverse O<sub>3</sub> correlation during stratospheric O<sub>3</sub> intrusion events. Measurements at this site are for special studies and strictly non-regulatory.

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

| <b>Pollutant, POC</b>             | <b>O<sub>3</sub>, 1</b> | <b>Trace CO, 1</b>   |
|-----------------------------------|-------------------------|----------------------|
| Parameter code                    | 44201                   | 42101                |
| Basic monitoring objective(s)     | Research support        | Research support     |
| Site type(s)                      | Regional transport      | Regional transport   |
| Monitor type(s)                   | SPM (non-regulatory)    | SPM (non-regulatory) |
| Instrument manufacturer and model | TAPI 400 series         | TAPI 300 series      |

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

<sup>1</sup>Open fetch, but air flow is limited by obstructions.

<sup>2</sup> Anticipate O<sub>3</sub> monitor deployment.

<sup>3</sup> Anticipate CO monitor deployment.

### 7.2.1 Monitoring Site Relocation in the Apex Valley



**Figure 26: Apex (new site).**

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

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

| Pollutant, POC                    | O <sub>3</sub> , 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 <sub>3</sub> , 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 <sub>2.5</sub> ? (Y/N) | N                  |
| Frequency of flow rate verification for manual PM samplers                 | NA                 |
| Frequency of flow rate verification for automated PM analyzers             | NA                 |
| Frequency of one-point QC check for gaseous instruments                    | Daily              |
| Last annual performance evaluation for gaseous parameters                  | NA                 |
| Last two semiannual flow rate audits for PM monitors                       | NA                 |

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

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

The annual network plan outlines all notices of proposed changes, in compliance with 40 CFR 58.10. In the event that DAQ needs to change the location of a PM<sub>2.5</sub> 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<sub>2.5</sub> 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 O<sub>3</sub> Monitoring Waiver**

Due to the 2015 revised O<sub>3</sub> NAAQS, EPA has revoked all previous seasonal O<sub>3</sub> waivers. If agencies desire an O<sub>3</sub> waiver approval, they must reevaluate O<sub>3</sub> data and resubmit waiver requests. Based on this direction, DAQ submitted an O<sub>3</sub> waiver request for the Apex and Indian Springs sites on February 7, 2022. EPA approved this waiver on March 24, 2022.

### **7.5 Near-Road Monitoring**

The Rancho & Teddy site (Near-Road Site 1) was approved by EPA as part of the 2014 Annual Network Plan response, and DAQ began operations in August 2015. The Casino Center (Near-Road Site 2) was approved by EPA as part of the 2014 Annual Network Plan response, and operations commenced in July 2016. 40 CFR Part 58 requires one CO monitor and one PM<sub>2.5</sub> monitor to be placed at a near-road NO<sub>2</sub> monitoring site. DAQ deployed both of these monitors at the Rancho & Teddy site (Near-Road Site 1) beginning January 2017, as required.

### **7.6 Special Purpose Studies**

DAQ plans to contribute to the goals of the Clean Air Act and the evolving science of air quality. DAQ's objectives include research of pollutants and precursor transport, identification of stratospheric intrusions and mixing heights, pollution impacts, and model validation. Many of these efforts will be focused on the O<sub>3</sub> season, and related studies are being projected over the next several years. DAQ will continue to deploy trace CO monitors, which provide an inverse O<sub>3</sub>-CO correlation during O<sub>3</sub> intrusions and direct correlation during smoke events, and these initiatives contribute to DAQ modeling efforts. None of the upper-elevation O<sub>3</sub> or CO research monitors that are a part of these studies will be a part of the SLAMS or regulatory monitoring network.

DAQ will continue filter-based chemical speciation sampling during special events, such as New Year's Eve and Fourth of July, when PM<sub>2.5</sub> 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 O<sub>3</sub> exceptional event demonstration packages when smoke from wildfires may be a significant factor.

DAQ conducted a summertime O<sub>3</sub> study in 2021 to address questions related to the formation of high O<sub>3</sub> concentrations. The study seeks to define oxides of nitrogen (NO<sub>x</sub>) and Volatile Organic Compounds (VOC) limiting ratios for local O<sub>3</sub> formation, both spatially and temporally during the O<sub>3</sub> season (typically May through August). DAQ will assess if these ratios change throughout the O<sub>3</sub> season. DAQ is working with the National Oceanic and Atmospheric Administration (NOAA) to perform this work. NOAA measured VOC, NO<sub>x</sub> and trace gasses for three weeks at a fixed location using a wide array of specialized measuring equipment, followed by one week of mobile measurements. Upon completion of laboratory analysis and modeling, data assessments will be completed with the findings incorporated into a final report.

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

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

## **7.7 Future Needs**

As part of the revised O<sub>3</sub> rule, EPA is requiring PAMS measurements to be collocated with existing NCore sites in areas with population of one million or more, irrespective of O<sub>3</sub> 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 NO<sub>2</sub>. 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.