APPENDIX A

PM_{10} Second Maintenance Plan
Technical Support Document

Las Vegas Valley Maintenance Area
Clark County, Nevada

Clark County Department of Environment and Sustainability
Division of Air Quality

8/5/2025

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

Acronyms

ADT	average daily traffic
BLM	Bureau of Land Management
CRC	Coordinated Research Council
DCP	Clark County Department of Comprehensive Planning
EIIP	Emissions Inventory Improvement Program
EMP	Emissions Modeling Platform
EPA	U.S. Environmental Protection Agency
ERC	Emission Reduction Credit
GILIS	Geographic Integrated Land-use Information System
HA	hydrographic area
HPMS	Highway Performance Monitoring System
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NEI	National Emissions Inventory
RTC	Regional Transportation Commission of Southern Nevada
SCC	Source Classification Code
SIP	state implementation plan
UNLV	University of Nevada, Las Vegas
VMT	vehicle miles traveled

Abbreviations

PM_{10}	particulate matter less than 10 microns
Psi	pounds per square inch
tpd	tons per day
tpy	tons per year

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This technical support document, developed by the Clark County Department of Environment and Sustainability, Division of Air Quality (DAQ), describes the development of PM_{10} emissions inventory projections for the second maintenance plan for the 1987 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS). The maintenance area is comprised of Hydrographic Area (HA) 212 (Las Vegas Valley) in Clark County, Nevada. The estimated emission inventories represent a design day for 2019, 2026, and 2035, projected from the 2017 National Emissions Inventory (NEI). The projected emissions inventories include six primary sectors: on-road mobile, non-road mobile, point sources, nonpoint sources, fugitive dust, and banked Emission Reduction Credits. Chapters 4–9 detail the methodology and results for each of these sectors.

Although DAQ used 2019 emissions activity data for some subcategories, it mainly used the 2017 NEI to develop the 2019 base year PM_{10} inventory and projected activity data to develop the 2026 and 2035 future year inventories, following the EPA guidance document "Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations" (EPA 2017). The primary data sources for the 2019 base year and future year inventories were local specific activity data for 2019, the 2017 NEI, EPA's 2016v3 Emissions Modeling Platform data (2016v3 EMP) (EPA 2023), and MOVES4 modeling. For subcategories where the 2017 NEI was used to establish the base year, EMP growth factors were used to estimate emissions for the 2019 base year.

DAQ developed emissions inventories for the entire HA 212 area. For the inventory domain in the first maintenance plan, DAQ used the Bureau of Land Management (BLM) disposal area boundaries instead of the HA 212 boundary. Although DAQ had good cause to use the BLM disposal area previously, it used the HA 212 boundary for this maintenance plan. Using this boundary aligns with assessments DAQ performed for other NAAQS and the domain DAQ uses to track motor vehicle emissions budgets (MVEBs). Moreover, the HA 212 boundary aligns with the previous nonattainment area boundary and encompasses all of the maintenance area.

1.2 INVENTORY ORGANIZATION

The organization of the emissions inventory generally follows that of the 2017 NEI and the first maintenance plan. Emissions are separated first by category (i.e., point sources, nonpoint sources, on-road, non-road, and emission reduction credits), then by subcategory, then by sector.

1.2.1 Overlapping Categories/Sectors

Some emissions sources are distinctly classified under one category, while others may overlap across multiple categories or sectors. When there may be ambiguity in the applicable category or sector, DAQ follows the approach used in the 2017 NEI. For sources with overlapping categories or sectors, DAQ adjusted emissions estimates consistent with the approach used in the 2017 NEI. The corresponding sections of this report provide additional details.

1.2.1.1 Fuel Combustion

Emissions related to fuel combustion are reported in both the point source and nonpoint source categories. Non-point source emissions exclude fuel-related emissions from point sources.

1.2.1.2 Mining and Quarry Operations

Emissions related to the mining and quarry operations sector can be classified as point sources or nonpoint sources. The first maintenance plan classified these emissions in the nonpoint source category. However, because this sector represents a discrete set of facilities that are required to report annual emissions, DAQ now includes these emissions in the point-source category.

1.2.1.3 Railway Operations

Emissions related to railway operations were classified in multiple categories consistent with the NEI (Table 1).

Table 1-1. Classification of Railway Operations Emissions

Type of Activity	Category	Subcategory/Sector
Railyard operations	Point source	Other point sources
Passenger and freight locomotive emissions	Non-point source	Locomotive
Railway maintenance	Non-road	Railroad

1.3 DOCUMENT ORGANIZATION

DAQ used population projections in estimating future emissions for certain subcategories. Section 2 explains the population projection methodology used, including calculations and detailed tables describing population estimates for HA 212.

Section 3 provides a summary of the 2019, 2026, and 2035 emissions inventories.

Section 4 provides the point source emissions inventory, which includes all major stationary sources within HA 212 with a potential to emit (PTE) greater than 25 tons per year of PM_{10}.

Section 5 provides a summary of the overall approach used to generate estimates of PM_{10} emissions from nonpoint sources, which is broadly divided into fugitive dust and non-fugitive dust (i.e., other nonpoint sources) subcategories.

Section 6 describes the development of the emissions inventory for the fugitive dust subcategory. This includes sources that primarily emit fugitive dust from construction, wind erosion, and paved and unpaved roads.

Section 7 describes the development of the emissions inventory for all other nonpoint sources, including a combination of combustion-related emissions and/or fugitive dust. Sectors included in this subcategory include industrial fuel combustion, commercial cooking, residential wood combustion, and structure and vehicle fires.

Section 8 describes the development of the emissions inventory for on-road sources, which includes emissions resulting from exhaust, brake wear, and tire wear for mobile sources such as cars and trucks.

Section 9 describes the development of the emissions inventory for non-road sources, including all mobile sources that are not operated on-highway, such as construction equipment, lawn and garden equipment, recreational vehicles, agricultural equipment, railway maintenance equipment, and other industrial/commercial machinery.

Section 10 addresses Emission Reduction Credits.

Section 11 includes tables summarizing emissions projection factors, growth factors, and temporal adjustments used in the emissions calculations for specific source categories.

Section 12 lists all references used in this report.

1.4 GENERAL CALCULATION METHODOLOGY

1.4.1 Design Day Emissions Calculation

Design day emissions estimates for the base year (2019) for all subcategories begin with an annual estimate, which is scaled down to the design day using temporal adjustment factors for each source type to account for typical variability in monthly and weekly emissions (Equation 1-1).

Equation 1-1. Calculation of Design Day Emissions Using Temporal Adjustment Factors

$$E_{design\ day} = E_{annual} x \frac{K_{monthly}}{4} x\ K_{weekly}$$

where:

$E_{design\ day}$	=	Design day emissions, in tons per day (tpd)
E_{annual}	=	Annual emissions, in tons per year (tpy)
$K_{monthly}$	=	Monthly temporal adjustment factor (0–1)
K_{weekly}	=	Weekly temporal adjustment factor (0–1).

As noted earlier, the annual estimate (E_{annual}) for most nonpoint subcategories is based on the 2017 NEI. Design day emissions for the base year are calculated by using the 2017 NEI estimate and an emissions growth factor for the period 2017–2019, which was derived from the 2016v3 EMP (Equation 1-2).

Equation 1-2. Calculation of Base Year Design Day Emissions

$$EM_{base\ year} = EM_{2017NEI} + (EM_{2017NEI}\ x\ GAF_{2023}\ x\ 2\ years)$$

where:

$EM_{base\ year}$	=	SCC-specific design day emissions for base year 2019 (tpd)

$EM_{2017NEI}$ = SCC-specific design day emissions for 2017 (tpd)
GAF_{2023} = SCC-specific growth adjustment factor for the period 2017–2019 (% / yr) (see Section 1.4.2).

1.4.1.1 Temporal Adjustment Factors

Monthly and weekly temporal adjustment factors were obtained from the 2016v3 EMP based on Source Classification Code (SCC). In general, each SCC has a set of factors for specific counties and states, along with a national adjustment factor that reflects the unique variability characteristics of each dataset. DAQ prioritized county-specific temporal adjustment factors in calculating design day emissions because these were considered the most representative for the inventory. Where county-level adjustment factors were not available, DAQ applied state (if available) or national adjustment factors.

For subcategories where SCC-based temporal adjustments were not available, DAQ assumed that emissions were uniformly distributed throughout the year (Equation 1-3).

Equation 1-3. Calculation of Design Day Emissions (No Temporal Adjustments)

$$E_{design\ day} = \frac{E_{annual}}{365}$$

where:
$E_{design\ day}$ = Design day emissions (tpd).

1.4.2 Projected Emissions

Once the design day emissions are calculated for the baseline year, projected emissions for 2026 and 2035 are then determined using various methods.

For most nonpoint source subcategories, DAQ estimated emissions for 2026 and 2035 using the design day emission estimate for the base year (2019) and growth adjustment factors (GAFs) derived from the 2016v3 EMP. GAFs were determined for the period 2016–2023 (GAF_{2023}) and for the period 2023–2026 (GAF_{2026}), as Equation 1-4 and Equation 1-5 show.

Equation 1-4. Calculation of 2023 Growth Adjustment Factor

$$GAF_{2023} = \frac{\frac{EM_{2023} - EM_{2016}}{EM_{2016}}}{7\ years}$$

where:
GAF_{2023} = SCC-specific growth adjustment factor for the period 2016–2023 (% / yr)
EM_{2023} = SCC-specific annual emissions from 2016v3 EMP for 2023 (tpy)
EM_{2016} = SCC-specific annual emissions from 2016v3 EMP for 2016 (tpy).

Equation 1-5. Calculation of 2026 Growth Adjustment Factor

$$GAF_{2026} = \frac{\frac{EM_{2026} - EM_{2023}}{EM_{2023}}}{3\ years}$$

where:

GAF_{2026} = SCC-specific growth adjustment factor for the period 2023-2026 (% / yr)

EM_{2026} = SCC-specific annual emissions from 2016v3 EMP for 2026 (tpy)

EM_{2023} = SCC-specific annual emissions from 2016v3 EMP for 2023 (tpy).

Projected emissions for 2026 were determined by first calculating projected emissions for 2023 using the base year estimate and for GAF_{2023} as shown in Equation 1-6. The 2023 emissions estimate and GAF_{2026} were then used to calculate emissions for 2026 (Equation 1-7).[1]

Equation 1-6. Calculation of Projected 2023 Design Day Emissions

$$EM_{2023} = EM_{2019} + (EM_{2019}\ x\ GAF_{2023}\ x\ 4\ years)$$

where:

EM_{2023} = SCC-specific design day emissions for 2023 (tpd)

EM_{2019} = SCC-specific design day base year emissions (tpd)

GAF_{2023} = SCC-specific growth adjustment factor for the period 2016–2023 (% / yr).

Equation 1-7. Calculation of Projected 2026 Design Day Emissions

$$EM_{2026} = EM_{2023} + (EM_{2023}\ x\ GAF_{2026}\ x\ 3\ years)$$

where:

EM_{2026} = SCC-specific design day emissions for 2026 (tpd)

EM_{2023} = SCC-specific design day emissions for 2023 (tpd)

GAF_{2026} = SCC-specific growth adjustment factor for the period 2023–2026 (% / yr).

Projected emissions for 2035 were determined by applying GAF_{2026} to the emissions estimate for 2026 (Equation 1-8).

Equation 1-8. Calculation of Projected 2035 Design Day Emissions

$$EM_{2035} = EM_{2026} + (EM_{2026}\ x\ GAF_{2026}\ x\ 9\ years)$$

[1] DAQ did not directly utilize the 2016v3 EMP 2026 emissions estimate for the projected 2026 estimate in this inventory because the 2016v3 EMP was not updated with 2017 NEI data for all SCCs. Many of the base year estimates in the 2016v3 EMP utilize 2016 data. Using the 2017 NEI as a starting point for base year emissions and then projecting forward to 2019 and 2026 was considered more accurate because all SCCs reflect 2017 data. Thus, annual emissions calculated from the 2026 estimates in this inventory for some SCCs may not exactly match those in the 2016v3 EMP.

where:

EM_{2035}	=	SCC-specific design day emissions for 2035 (tpd)
EM_{2026}	=	SCC-specific design day emissions for 2026 (tpd)
GAF_{2026}	=	SCC-specific growth adjustment factor for the period 2023–2026 (% / yr).

For vacant land wind erosion emissions, projected emissions growth for 2026 and 2035 was based on estimates of vacant land consumption rate and population growth (Section 6.3). For structure and vehicle fires, estimates for 2026 and 2035 were based on projected population growth (Section 7.5).

For point source emissions, projected emissions for 2026 and 2035 for electric generating units (EGUs) were based on annual growth factors developed using EPA's Integrated Planning Model (IPM) estimates for 2023, 2025, and 2030 (Section 4.1.1). For airports, projected emissions for commercial airports were based on a Clark County Department of Aviation study (Section 4.1.2.1); projected emissions for federal airports were based on a study conducted for the U.S. Air Force (USAF) and growth rates from the first maintenance plan (Section 4.1.2.2). Projected emissions for all other point sources were calculated based on growth factors derived from U.S. Energy Information Administration industrial sector growth data based on applicable North American Industrial Classification System (NAICS) codes (Section 4.1.3).

2.0 POPULATION PROJECTIONS

2.1 METHODOLOGY

DAQ used growth factors from EPA's 2016v3 EMP to estimate future-year emissions for most sectors. However, historical population data and population projections from the University of Nevada, Las Vegas (UNLV) Center for Business and Economic Research for 2010–2035 (UNLV 2022) were also used to estimate future-year emissions or activity throughput in Clark County when applicable, as summarized in Table 2-1.

Table 2-1. Estimated Clark County Population (2010–2035)

Year	Population
2010	1,951,269[1]
2011	1,966,630[2]
2012	2,008,654[2]
2013	2,062,253[2]
2014	2,102,238[2]
2015	2,147,641[2]
2016	2,205,207[2]
2017	2,248,616[2]
2018	2,284,616[2]
2019	2,325,798[2]
2020	2,376,683[2]
2021	2,333,092[2]
2022	2,375,000
2023	2,427,000
2024	2,485,000
2025	2,540,000
2026	2,593,000
2027	2,644,000
2028	2,694,000
2029	2,733,000
2030	2,773,000
2031	2,810,000
2032	2,845,000
2033	2,879,000
2034	2,910,000
2035	2,940,000

[1] Data obtained from U.S. Census Bureau.
[2] Consensus population estimate.
All other values represent projected populations.

When the 2016v3 EMP did not have growth adjustment factors available for an SCC code, DAQ used projected population growth estimates for 2026 and 2035 compared to the baseline year, 2019 (Table 2-2). The data show an estimated population growth of 11% for the period 2019–2026 and 26% for the period 2019–2035.

Table 2-2. Clark County Population Growth vs. Base Year

Year	Population	Population Change	% Change
2019	2,325,798	--	--
2026	2,593,000	267,202	11%
2035	2,940,000	614,202	26%

Inventory estimates for many subcategories and sectors are based on the 2017 NEI, which provides resolution at the county level. DAQ downscaled these estimates based on a ratio of HA 212 population to Clark County population (Table 2-3) (DCP 2024). DAQ applied population growth rates for Clark County when necessary. This is a reasonable assumption, since most of HA 212's population resides within Clark County.

Table 2-3. Clark County Population Data for HA 212 Communities (2019)

HA 212 Communities	Population
Las Vegas Valley Urban Area	2,251,832
Blue Diamond	573
Lower Kyle Canyon Road	225
Mt. Charleston	709
Red Rock	125
HA-212 Total	**2,253,464**
Clark County Total	**2,325,798**
% HA-212 within Clark County	**96.9%**

3.0 INVENTORY SUMMARY

Table 3-1 summarizes HA 212 design day emissions for the base year (2019), the interim year (2026), and the future year (2035). The data show that nonpoint sources account for most of the emissions estimated during the second maintenance period, mostly fugitive dust caused by wind erosion on vacant lands. Construction emissions also contribute significantly to overall emissions, but these also come mostly from wind erosion (Section 6.3). DAQ expects emissions to decline over the second maintenance period due to reduced wind erosion as development driven by population growth consumes vacant land. These findings are consistent with the first maintenance plan, although the magnitude of emissions and the decline in land are lower in this inventory, primarily due to lower design day wind speeds, a reduction in available vacant land, and more conservative estimates for the types of vacant land within HA 212.

Table 3-1. HA 212 Design Day Emissions (tpd)

Category/Subcategory/Sector	2019	2026	2035
POINT EMISSIONS			
Emissions generating units	0.206	0.288	2.17
Airports	0.455	0.545	0.586
Non-emissions generating units	2.97	3.31	4.04
Subtotal:	**3.63**	**4.14**	**6.80**
NONPOINT EMISSIONS			
Fugitive Dust:	818	798	778
• Construction	221	237	261
• Wind erosion from vacant lands	556	519	468
• Paved roads	38.2	39.6	46.0
• Unpaved roads	2.61	2.61	2.61
• Agricultural operations	0.235	0.23	0.23
Other Nonpoint Sources:	4.3	4.8	5.2
• Fuel combustion	0.714	0.727	0.754
• Commercial cooking	2.92	3.31	3.73
• Residential wood combustion	0.469	0.486	0.495
• Structure fires	0.032	0.035	0.045
• Vehicle fires	0.027	0.031	0.039
• Locomotives	0.041	0.033	0.026
• Miscellaneous non-industrial not elsewhere classified	0.12	0.131	0.148
Subtotal:	**822**	**803**	**783**
On-road Emissions Subtotal:	2.97	3.01	3.15
Nonroad Emissions Subtotal:	3.25	2.22	1.73
Emission Reduction Credits Subtotal:	0.31	0.31	0.31
TOTAL:	**833**	**813**	**795**

4.0 POINT SOURCE EMISSIONS

4.1 METHODOLOGY

Point sources are large, stationary sources of emissions. The point source emissions inventory includes all stationary sources within Clark County with a PM_{10} PTE greater than 25 tpy. Point sources include airports, EGUs, gypsum manufacturing, sand and gravel mining, solid waste collection, landfills, and petroleum terminals.

The 2019 base year emissions estimates for most point source subcategories utilize the same methodology. Emissions estimates are based on annual emissions inventory reports each facility submits to DAQ; these reports include facility emissions based on direct on-site measurements or on calculations using EPA emissions factors and activities data. DAQ used different methodologies for EGUs and for non-EGU subcategories. This section presents detailed descriptions of the methodology applied for each subcategory to project future emissions.

4.1.1 Electric Generating Units

EGUs are fossil-fuel fired sources that provide electric power to the grid. Four power plants are located in HA 212, each of which contains one or more natural gas-fired auxiliary boilers, combustion turbines, and/or combined cycle units of varying capacity (Table 4-1).

Table 4-1. EGUs Located in HA 212

Facility	Location	Primary Equipment
Clark Generating Station	Whitney	One 60-MW CT Four 85-MW CCUs Twelve 59.5-MW CTs[1]
Las Vegas Generating Station	North Las Vegas	Five 44-MW CCUs
Saguaro Power Company	Henderson	Two 35-MW CCUs One 218-MMBtu/hr auxiliary boiler One 86-MMBtu/hr auxiliary boiler
Sun Peak Generating Station	Las Vegas	Three 84.5-MW CTs

Note: CCU = combined cycle unit; CT = combustion turbine; CU = combustion unit; MMBtu = million British thermal units; MW = megawatt.
[1] These units are configured with two CTs serving a single generator with a capacity of 59.5 MW.

DAQ evaluated two methods for projecting EGU emissions. The first was IPM (EPA 2021b), which analyzes the projected impact of environmental policies on the electric power sector. IPM is a complex, deterministic model that utilizes numerous input parameters representing distinct aspects of the power industry (e.g., fuel market characteristics, existing and planned generation resources, emission control technologies, power system operation) to estimate the cost and emissions impacts associated with various regulatory policies affecting the industry. DAQ utilized the Summer 2021 Reference Case for this analysis, which EPA used in the evaluation of the recently finalized Good Neighbor Plan for the 2015 ozone NAAQS. The IPM dataset included projected power plant emissions for 2023, 2025, and 2030.

DAQ also evaluated projected emissions using the Eastern Regional Technical Advisory Committee (ERTAC) EGU Projection Tool, developed by the Mid-Atlantic Regional Air Management

Association to improve emissions inventories and inform air quality impact assessments for member states. The tool uses hourly emissions data, estimated electricity demand growth, new unit and unit retirement dates, and pollution control device information to estimate projected emissions. DAQ utilized the most recent version of the tool (CONUS 16.0) for which a complete dataset is available (2018), which included a base year of 2016 and projected years of 2020, 2023, and 2028.

Table 4-2 shows a comparison of the design day emissions of each model using the DAQ 2019 inventory for the baseline emissions estimate.[2,3]

Table 4-2. Comparison of EGU Emissions (IPM vs. ERTAC)

Model	Design Day Emissions (tpd)		
	2019	2026	2035
IPM v6 ('Summer 2021 Reference Case')	0.21	0.29	2.17
ERTAC EGU Projection Tool (CONUS 16.1)	0.09	0.09	0.11

Table 4-3 shows a comparison of the associated growth rates for the initial and later years of the second maintenance period, and across the entire period. While both models predict low overall emissions and a small change in emissions, there are significant differences in emissions growth rates throughout the second maintenance period. The ERTAC model predicts relatively steady growth (~1%); the IPM predicts an annual growth rate of ~6% from 2019–2026, then a rise to 73% from 2026–2035, giving an overall increase of ~60% across the maintenance period. DAQ attributes these differences to regulatory effects that are not accounted for in the ERTAC model,[4] temporal adjustment methodologies, and differences between the EGU inventories used in each model.[5] While ERTAC suggested lower emissions growth rates over the second maintenance period, DAQ decided to use the IPM results because they provided a more complete inventory and a more conservative estimate of emissions over the maintenance period.

Table 4-3. Comparison of EGU Emissions Projection Rates (IPM vs. ERTAC)

Model	Emissions Growth (%/yr)		
	2019-2026	2026-2035	2019-2035
IPM v6 ('Summer 2021 Reference Case')	5.7%	73%	60%
ERTAC EGU Projection Tool (CONUS 16.1)	0.9%	1.4%	1.3%

[2] IPM did not provide a baseline emission estimate. DAQ estimated emissions for 2019 based on the ERTAC baseline year (2016) and projected growth rates, which were significantly (70%) lower than DAQ inventory estimates (21 tpy vs. 70 tpy). Factors contributing to this difference include the fact that the ERTAC estimate for the Clark Generating Station was significantly lower than DAQ estimates (11 tpy vs. 62 tpy) and did not include estimates from the Saguaro Generating Station.

[3] Predicted emissions for each model were also normalized using 2019 baseline emissions.

[4] The IPM case used for this analysis was developed in 2021 and included the effects of the proposed Good Neighbor Plan. The ERTAC EGU Projection Tool (CONUS 16.1) was developed in 2018 and does not account for these effects.

[5] The ERTAC model showed significant differences with baseline inventory estimates for the Clark Generating Station and did not include the Saguaro Power Company facility.

Table 4-4 provides estimated base-year and projected-years design day emissions for EGU facilities located in HA 212. There remains some uncertainty in these estimates, since they do not include the impact of recently finalized greenhouse gas regulations for new combustion turbines (89 FR 39798) or forthcoming emissions guidelines for existing turbines. However, EGU emissions are a small contributor to the overall emissions inventory, so such uncertainty may not have a substantial impact on overall emissions estimates.

Table 4-4. HA 212 Point Source Emissions (EGU)

Facility Name	Facility ID	2019	2026	2035
Clark Generating Station	7	0.12	0.20	1.15
Las Vegas Generating Station	329	0.00	0.00	0.96
Saguaro Power Company	393	0.08	0.06	0.06
Sun Peak Generating Station	423	0.01	0.02	0.00
	Total (tpd)	**0.21**	**0.29**	**2.17**

4.1.2 Airports

4.1.2.1 Commercial Aviation

The Clark County Department of Aviation (DOA) oversees the operation of three commercial airports in HA 212:

- Harry Reid (formerly McCarran) International Airport
- North Las Vegas Airport
- Henderson Executive Airport.

DOA also operates an airport in Jean and Perkins Field in Overton, both located outside HA 212. In addition, DOA would operate the proposed Southern Nevada Regional Heliport in Sloan, a new facility in the planning phase that would off-load helicopter traffic from Harry Reid International. To be consistent with the current ozone maintenance plan (DAQ 2021), DAQ assumed all helicopter traffic from Harry Reid International would transfer to Sloan beginning in 2033.

DOA provided 2017 actual and projected design day emissions for 2023 and 2032 for aircraft engines, auxiliary power units, and ground support equipment for each airport. These were developed using the Federal Aviation Administration's Aviation Environmental Design Tool (ver. 3b), based on anticipated growth in passenger traffic and using the tool's default meteorology settings. The design day chosen was an average weekday in July, the peak month for aircraft operations. Because an updated DOA study was not available when this inventory was prepared, DAQ based emissions estimates for the baseline year (2019) and projected years (2026 and 2035) on growth factors developed using DOA emissions data for 2017, 2023, and 2032.

DOA did not provide projections for Sloan Regional Heliport. DAQ assumes emissions will be based on transferring all helicopter traffic from Harry Reid International beginning in 2033, with the same annual emissions growth rate as the annual emissions growth rate from 2023 to 2032 for helicopter operations at Harry Reid.

Table 4-5 provides the estimated design day emissions at DOA facilities for the base year and projected years.

Table 4-5. HA 212 Commercial Airport Design Day Emissions (tpd)

Facility Name	2019	2026	2035
McCarran International Airport	0.35	0.38	0.38
North Las Vegas Airport	0.03	0.03	0.03
Henderson Executive Airport	0.02	0.02	0.02
Southern Nevada (Sloan) Regional Heliport (proposed)			0.03
Total	**0.39**	**0.42**	**0.46**

4.1.2.2 Federal Aviation

The only federal aviation facility in HA 212 is Nellis Air Force Base (NAFB). Emissions from the Contracted Close Air Support (CCAS) training project at NAFB were included in its inventory. This project involves flight and ground support operations at the North Las Vegas Airport and Jean Sport Aviation Center, as well as aircraft training exercises in “special use airspace” outside Clark County. CCAS is a contracted project with operations planned from January 2022 through December 2031. Although the contract expires before the end of the current maintenance period, DAQ conservatively assumed the project would continue at least through 2035. PM_{10} PTE of 21.9 tpy (USAF 2022)[6] is below the minimum threshold for inclusion in the point source inventory, but the project was included for consistency with the ozone maintenance SIP.

Baseline (2019) emissions for NAFB were obtained from the annual emissions inventory reports it submitted. Projected emissions were determined using growth factors and temporal adjustment factors derived from the NAICS code for the facility (928110, “National Security”) using data from the 2016v3 EMP.

CCAS project emissions were based on USAF estimates for the 2022–2031 operating period in the environmental assessment (USAF 2022). There are no baseline emissions for this project, since it began after the baseline period. Estimated emissions for 2026 reflect the USAF estimate. DAQ assumed 2035 emissions were the same as the USAF estimate for 2031.

Table 4-6 provides the estimated design day emissions for the base year and projected years.

Table 4-6. Federal Airport Design Day Emissions (tpd)

Facility Name	2019	2026	2035
Nellis Air Force Base (NAFB)	0.06	0.06	0.06
NAFB Contracted Close Air Support (CCAS) Project	0.00	0.06	0.06
Total	**0.06**	**0.12**	**0.12**

[6] Estimated emissions are based on Project Alternative 1 for operations within HA 212: North Las Vegas and Jean Airport operations and R-4806 airspace operations. Estimates for R-4806 operations include Lincoln, Nye, and Clark counties, which may slightly overstate emissions.

4.1.2.3 Airports Summary

Table 4-7 provides the estimated design day emissions for the base year and projected years for all airports in HA 212.

Table 4-7. Total Airport Design Day Emissions (tpd)

Airport Type	2019	2026	2035
Commercial	0.39	0.42	0.46
Federal	0.06	0.12	0.12
Total	**0.46**	**0.55**	**0.59**

4.1.3 Other Point Sources

DAQ grouped all point sources that were within HA 212, but not in the EGU or airport subcategories, into the "other point source" subcategory. This covered 141 facilities[7] within HA 212 that report data to DAQ and had combined emissions exceeding the PM_{10} PTE threshold of 25 tpy, including:

- Gypsum product manufacturing;
- Lime manufacturing;
- Construction sand and gravel mining;
- Nonferrous metal (except aluminum) smelting and refining;
- Other basic inorganic chemical manufacturing;
- Ready-mix concrete manufacturing;
- Asphalt paving mixture and block manufacturing;
- Casino-hotels;
- Solid waste landfill;
- Manufacturing plastic plumbing fixtures; and
- Nonmetallic mineral mining.

Baseline (2019) emissions were obtained from the annual emissions inventory reports submitted by each facility within HA 212. Projected emissions were determined using growth and temporal adjustment factors derived from EPA's 2016v3EMP based on NAICS codes. Table 4-8 provides a summary of the baseline (2019) and projected design day emissions for 2026 and 2035 for each industry.

[7] Union Pacific's Las Vegas Intermodal Terminal is classified as a railyard, although emissions are negligible and do not meet the point source reporting threshold.

Table 4-8. Design Day Emissions (Other Point Sources–By Industry) (tpd)

NAICS	Description	Facilities	2019	2026	2035
212321	Construction Sand and Gravel Mining	20	1.06	1.21	1.41
327320	Ready-Mix Concrete Manufacturing	18	0.28	0.31	0.37
721120	Casino Hotels	47	0.40	0.45	0.60
324121	Asphalt Paving Mixture and Block Manufacturing	6	0.26	0.31	0.42
212390	Other Nonmetallic Mineral Mining and Quarrying	1	0.24	0.27	0.32
331410	Nonferrous Metal (except Aluminum) Smelting and Refining	1	0.20	0.19	0.20
562111	Solid Waste Collection	2	0.07	0.07	0.10
327420	Gypsum Product Manufacturing	1	0.05	0.05	0.07
812331	Linen Supply	7	0.03	0.04	0.05
622110	General Medical and Surgical Hospitals	15	0.11	0.13	0.17
327410	Lime Manufacturing	1	0.04	0.05	0.05
325180	Other Basic Inorganic Chemical Manufacturing	3	0.08	0.09	0.09
326191	Plastics Plumbing Fixture Manufacturing	1	0.02	0.03	0.03
812320	Drycleaning and Laundry Services (except Coin-Operated)	5	0.03	0.03	0.04
812332	Industrial Launderers	5	0.06	0.07	0.09
518210	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	4	0.00	0.00	0.00
327331	Concrete Block and Brick Manufacturing	4	0.02	0.02	0.03
Total		**141**	**2.97**	**3.31**	**4.04**

4.2 EMISSIONS SUMMARY

Table 4-9 provides the 2019, 2026, and 2035 design day emissions calculations for point sources within HA 212. Figure 4-1 provides a graphical breakdown of emissions by subcategory and year. Unless otherwise indicated, all emissions are in tons per day. The data show a slight increase in total emissions from 2019 to 2026, followed by a slight increase from 2026 to 2035.

Table 4-9. HA 212 Point Source Emissions (tpd)

Sector	2019	2026	2035
Electric Generating Units	0.21	0.29	2.17
Airports	0.46	0.55	0.59
Other Point Sources	2.97	3.31	4.04
Total	**3.63**	**4.15**	**6.80**

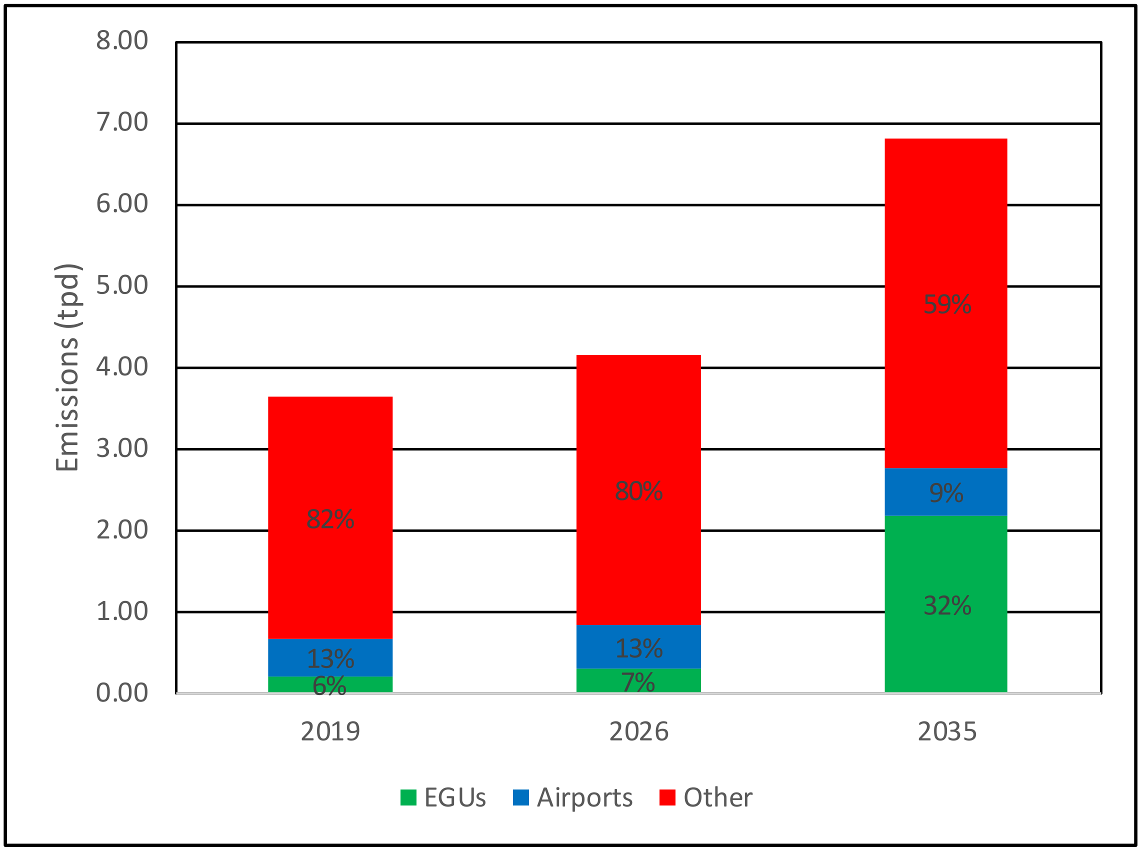

Figure 4-1. HA 212 Point Source Emissions.

5.0 NONPOINT SOURCE EMISSIONS OVERVIEW

5.1 SOURCE CATEGORIES

Nonpoint sources collectively represent individual points or specific mobile sources that have not been otherwise inventoried. Nonpoint sources are typically either too numerous, too small, or too difficult to inventory using the methodologies for point or mobile sources. Nonpoint sources of PM_{10} fall into two subcategories:

- **Fugitive Dust:** Sectors whose primary emissions source is fugitive dust, such as construction activities, wind erosion from vacant land, paved and unpaved roads, and agricultural operations.
- **Other Nonpoint Sources:** Sectors with emissions from industrial fossil fuel combustion, commercial cooking, residential wood combustion, structure and vehicle fires, locomotives, and other such sources. The current emissions inventory includes this subcategory, as did the first maintenance plan, which showed fugitive emissions as the largest contributor to the overall inventory.

The first maintenance plan developed emissions estimates for various industrial sectors based on SCCs in the 2008 NEI. It also included fugitive emissions from wind erosion, which were not in the 2008 NEI but were a significant contributor to the emissions inventory. The plan omitted the following source categories because they were insignificant emissions sources:

- Anthracite coal combustion;
- Animal husbandry and fertilizer application;
- Agricultural tilling and grain elevator operations;
- Human and animal cremation;
- Cotton ginning operation;
- Dental preparation;
- Drum/barrel reclamation;
- General laboratory activities;
- Hospital sterilization; and
- Fluorescent lamp breakage/recycling.

The second maintenance plan uses the 2017 NEI to establish emissions inventory source categories. Table 5-1 provides a summary of source categories excluded from the current inventory and the reason for their exclusion.

Table 5-1. SCC Categories in 2017 NEI Excluded from Nonpoint Source Category

SCC	Description	Sector	Reason Excluded
2102001000	Industrial; Anthracite Coal; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Coal	2017 NEI shows negligible emissions
2102005000	Industrial; Residual Oil; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Oil	
2102011000	Industrial; Kerosene; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Oil	
2103001000	Commercial/Institutional; Anthracite Coal; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Coal	
2103002000	Commercial/Institutional; Bituminous/Subbituminous Coal; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Coal	
2103005000	Commercial/Institutional; Residual Oil; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Oil	
2104002000	Bituminous/Subbituminous Coal; Total: All Combustor Types	Fuel Comb - Residential - Other	
2104011000	Kerosene; Total: All Heater Types	Fuel Comb - Residential - Oil	
2805001020	Agriculture - Crops & Livestock Dust		
2805001040	Agriculture - Crops & Livestock Dust		
2805001030	Agriculture - Crops & Livestock Dust		
2805001050	Agriculture - Crops & Livestock Dust		
2610000400	Waste Disposal, Treatment, and Recovery; Open Burning; All Categories; Yard Waste - Brush Species Unspecified		
2610000100	Waste Disposal, Treatment, and Recovery; Open Burning; All Categories; Yard Waste - Leaf Species Unspecified		
2810060100	Miscellaneous Area Sources; Other Combustion; Cremation; Humans		
2810060200	Miscellaneous Area Sources; Other Combustion; Cremation; Animals		
2805001020	Agriculture Production–Livestock; Broilers; Dust Kicked-up by Feet		
2805001030	Agriculture Production–Livestock; Layers; Dust Kicked-up by Feet		
2805001040	Agriculture Production–Livestock; Swine; Dust Kicked-up by Hooves		
2805001050	Agriculture Production–Livestock; Turkeys; Dust Kicked-up by Feet		
2801500170	Grassland fires; prescribed		
2810001001	Forest Wildfires; Smoldering; Residual smoldering only (includes grassland wildfires)		Negligible emissions reported for design day[1]
2810001002	Forest Wildfires; Flaming (includes grassland wildfires)		
2811015001	Prescribed Forest Burning; Smoldering; Residual smoldering only		Zero emissions reported for design day[2]
2811015002	Prescribed Forest Burning; Flaming		
2610030000	Waste Disposal, Treatment, and Recovery; Open Burning; Residential		Prohibited in Clark County
2305070000	Mineral Processing: Concrete/Gypsum		

SCC	Description	Sector	Reason Excluded
2305080000	Mineral Processing: Stone		Emissions included in point source category
2306010000	Asphalt mix plant and pavement roofing materials		
232500000	Industrial processes		

[1] Data obtained from the InFORM wildland fire database shows two small wildfires (<0.25 acres) that were extinguished on the design day. Emissions are considered negligible.
[2] Data obtained from InFORM wildland fire database show no prescribed wildfires on the design day.

While most of the source sectors in the current inventory remain the same as in the previous inventory, changes in NEI reporting procedures eliminated or regrouped certain subcategories and created new subcategories. The "Sand and Gravel," "Mineral Processing (concrete, gypsum)," "Mineral Processing (stone)," and "Asphalt" categories in the first maintenance plan are now in the "Point Source Emissions" category rather than a nonpoint category. The current inventory includes emissions from agricultural operations, which were not part of the first maintenance plan; those emissions were deemed insignificant because agricultural operations within Clark County were limited. However, that determination was based on a more limited scope of applicable SCCs compared with the 2017 NEI. Since the 2017 NEI shows non-trivial agricultural emissions, the current inventory now includes this subcategory.

The first maintenance plan had a subcategory for open burning, comprising emissions related to uncontrolled, open-air burning of various yard wastes and miscellaneous open fires. The inventory in the second maintenance plan eliminates this category because the 2017 NEI showed zero emissions related to open burning of yard waste. Open burning of household waste emissions were also eliminated, since Clark County prohibits the burning of household trash, garbage, construction debris, asphalt, paper, plastic, rubber, oils, or any material that will generate noxious fumes as a product of combustion. The current inventory includes a new subcategory from the 2017 NEI, "Miscellaneous Non-Industrial Not Elsewhere Classified (NEC)," which includes emissions from residential grilling and human/animal cremation.

5.2 GENERAL METHODOLOGY

The following sections contain separate discussions of the methodologies used to establish baseline and projected emissions for the second maintenance plan. The methods used to calculate nonpoint source sector emissions for the first maintenance plan were primarily based on Emission Inventory Improvement Program (EIIP) guidance (EPA 1997). They relied on a combination of county-provided activity and throughput data, AP-42 emissions factors, and county-sponsored research studies. DAQ retained the calculation methodology for certain subcategories in the current inventory, including "Wind Erosion from Vacant Lands" and "Construction," because these subcategories relied on research studies to improve overall accuracy and their emissions were key components of the overall inventory. Emissions from all other subcategories were based on EPA-developed estimates from the 2017 NEI. This approach reflects updates to calculation methodologies that were not reflected in the EIIP guidance.

6.0 FUGITIVE NONPOINT SOURCE EMISSIONS

6.1 DESCRIPTION

This section provides design day and projected emissions for the following nonpoint sources of PM_{10}: construction, wind erosion from vacant lands, paved and unpaved roads, and agricultural operations.

6.2 CONSTRUCTION

Construction-related emissions include fugitive dust from residential, nonresidential, and road construction projects. This includes dust from actual construction activities (e.g., site preparation, demolition, basement/foundation installation, building erection), hauling equipment and materials on-site and off-site (i.e., track-out emissions), and wind erosion. (Wind erosion emissions are fugitive emissions that originate from vacant land before construction activity starts.[8])

6.2.1 Methodology

PM_{10} emissions from actual construction activities for residential, nonresidential, and road construction activities within HA 212 were calculated based on Equation 6-1 (DAQ 2012). DAQ applied a bottom-up approach to estimate residential construction emissions, consistent with the approach used in the first maintenance plan but different from the method used to estimate emissions for the 2017 NEI. The NEI used regional data, while the bottom-up approach uses local activity data from the DAQ dust control permit database to quantify the total area disturbed by construction activities. Estimating emissions this way tailored the results more closely to local conditions. DAQ assumed the acreage associated with dust control permits issued during 2019 represented the acreage on which actual construction took place that year.

Equation 6-1. General Construction Emissions Calculation

$$E = (C)(D)(EF)(CE)$$

where:

E	=	Emissions (tpy)
C	=	Construction area (acres)
D	=	Duration of construction (month/year)
EF	=	Emission factor (ton/acre/month)
CE	=	Overall control efficiency.

The following sections detail the assumptions on construction area and duration, emissions factors, and overall control efficiency used in the emissions calculation for each construction sector.

[8] These type of emissions and calculation procedures are the same as those used for the "Wind Erosion from Vacant Land" subcategory.

6.2.1.1 Construction Area

Construction area values for HA 212 were based on data acquired from the DAQ dust control permit database. It was assumed that the acreage associated with dust control permits issued during 2019 reasonably represented the construction area during that year.

6.2.1.2 Duration of Construction Activity

DAQ does not track the actual duration of individual construction projects. It based estimates of the average construction duration in each construction category on the empirical observations of DAQ compliance inspectors, which range from 1–12 months per year. The construction duration assumptions are consistent with those used in the first maintenance plan.

6.2.1.3 Emissions Factors

The two emissions factors DAQ used to estimate emissions based on construction type were consistent with those used in the first maintenance plan. The first was for residential, commercial/industrial, public-park, school, and other projects (0.265 ton/acre/month), and was based on the average of two factors (0.11 ton/acre/month and 0.42 ton/acre/month). The second (0.42 ton/acre/month) was applied to estimates for airports, flood detention basins, roadways (collector size and larger), and underground utility projects.

These emission factors were based on a study conducted by the Midwest Research Institute (MRI 1996). The 0.11 ton/acre/month value used to generate the 0.265 ton/acre/month emissions factor represents the geometric mean of uncontrolled emissions tested at seven construction sites in Las Vegas and in Coachella Valley, South Coast, and San Joaquin Valley, California. MRI developed the 0.42 ton/acre/month factor on construction sites where there were “active large-scale earth-moving operations,” which represented “worst-case conditions” (MRI 1996).

6.2.1.4 Overall Control Efficiency

Overall control efficiency has the most significant effect on calculated emissions. It is based on the implementation and effectiveness of emissions controls, the effectiveness of any applicable regulations (“rule effectiveness”), and the degree to which the regulations affect emissions sources (“rule penetration”). It is calculated as the product of expected control efficiency, rule effectiveness, and rule penetration (DAQ 2012). Overall control efficiencies were derived for each construction sector based on the assumptions used in Equation 6-2.

Equation 6-2. Overall Control Efficiency Calculation

$$CE_{overall} = (CE_{expected})(RE)(RP)$$

where:

$CE_{overall}$ = Overall control efficiency (%)
$CE_{expected}$ = Expected control efficiency (%)
RE = Rule effectiveness (%)
RP = Rule penetration (%).

Efficiency of the Control(s) Expected to be Used. The PM_{10} SIP provides the rationale for assigning a control efficiency of 87% for this evaluation (DAQ 2001). Several studies were conducted to determine the effectiveness of watering as a control at construction sites. Although EPA found that using water provided 50% control efficiency (EPA 1988a), the report did not consider wind speed, soil types, or construction activities. To account for wind speed effects, DAQ relied on an EPA equation to predict control efficiencies based on wind speed (EPA 1988b). For Las Vegas Valley meteorological conditions, this equation predicted a control efficiency of 83%. Fitz (2000) tested the equation's predictions and demonstrated a reduction of 90% at a wind speed of 13 meters per second, although he may have achieved a higher control rate than predicted because water was applied at a rate of 1.4 gal/hr/yd^2. Because an independent study verified the equation and EPA did not provide details on variables, the 83% emissions reduction rate was determined to be the best estimate for construction activities.

None of the studies above included tackifiers or surfactants. Wind tunnel studies conducted by UNLV showed that dust suppressants can have at least 91% control effectiveness on vacant disturbed land, and DAQ applied this rate to soil not actively disturbed on construction sites (DAQ 2001). Averaging the 91% reduction rate for undisturbed soils at construction sites and the 83% reduction rate for construction activities provided an emission reduction rate of 87% for overall construction activities, assuming 50% of a construction site is always disturbed.

The best management practices for construction adopted by Clark County, which include tackifier and surfactant use, effective water application, and overall strengthening of dust control requirements, may produce an even higher rate of emission reductions.

Rule Penetration. EPA defines this as "the percentage of a nonpoint source category covered by an applicable regulation" (73 FR 76555). Section 94 of the Air Quality Regulations, which regulates construction activities, requires dust control permits for construction sites 0.25 acres or larger. DAQ reviewed the total number of permits requiring dust control for the baseline year to determine the appropriate rule penetration factor for each construction sector (i.e., residential, nonresidential, and road), as shown in
Table 6-1.

Table 6-1. Rule Penetration Factors Based on Construction Sector

Construction Subcategory	Total Number of Permits	Number of Permits Requiring Dust Control (>0.25 acres)	Average Rule Penetration (%)
Residential	908	864	95%
Non-residential	1196	995	83%
Road	9	9	100%

Rule Effectiveness. EPA defines this as "a rating of how well a regulatory program achieves all possible emissions reductions." This rating reflects the assumption that controls typically are not 100% effective because of equipment downtime, upsets, decreases in control efficiencies, and other deficiencies in emissions estimates. Rule effectiveness adjusts the control efficiency from ideal conditions to what occurs in practice (73 FR 76555).

EPA's initial rule effectiveness policy required a 20% default reduction in projected emissions reductions unless the state or local agency could demonstrate a higher percentage was appropriate (52 FR 45044 & 45060). EPA revised this policy in 2005 following a workgroup process initiated in 2004 (EPA 2017).

The new policy recommends using a rule effectiveness adjustment that falls within one of five different ranges for point sources and one of three different ranges for nonpoint sources, depending on a variety of factors. The low end of this range requires at least a 30% adjustment to emissions projections; the high end requires no adjustment, since it assumes 100% rule effectiveness.

Factors considered in selecting a range, then a specific value from within that range, include the agency's experience enforcing the rule, the degree of monitoring and reporting required, the frequency of inspections for the category, etc. DAQ's fugitive dust regulatory programs are among the most stringent in the country. In a recent enforcement performance review, EPA's Region 9 found that DAQ outperformed other jurisdictions on the audit more than 80% of the time on specific measures (EPA 2021c). Based on this review, DAQ expects to claim a high rate of rule effectiveness. Nevertheless, to assure conservatism in the emissions inventory approach, DAQ elected to apply EPA's past policy of assuming 80% rule effectiveness.

Table 6-2 provides a breakdown of the overall control efficiencies for each construction sector.

Table 6-2. Overall Control Efficiencies

Parameter	Expected Control Efficiency (%)	Rule Effectiveness (%)	Rule Penetration (%)	Overall Control Efficiency (%)
Residential	87%	80%	95%	66%
Non-residential	87%	80%	83%	58%
Road	87%	80%	100%	70%

6.2.1.5 Growth and Temporal Adjustment Factors

Emissions growth factors used to estimate future year emissions came from EPA's 2016v3 EMP, based on SCC for each construction type (Table 6-3). These growth factors were applied to all emissions components discussed here (actual construction, track-out, and wind erosion).

Temporal adjustment factors used to estimate design day baseline and future year emissions were also obtained from EPA's 2016v3 EMP, based on SCC code for each construction type. These temporal adjustments were only applied in the estimates of actual construction and track-out.

Table 6-3. SCCs for Construction Types

SCC	Description
2311010000	Construction–Residential; Dust–Construction Dust
2311020000	Construction–Non-Residential; Dust–Construction Dust
2311030000	Construction–Road; Dust–Construction Dust

6.2.2 Direct Construction Activities

Direct construction activities include all emissions related to active construction of a facility or road except those caused by vehicle track-out or wind erosion.

6.2.2.1 Residential

The residential construction sector includes emissions from construction of single and multi-unit buildings (e.g., apartments or duplexes). Table 6-4 summarizes the parameters used to estimate residential construction emissions.

Table 6-4. Data Used to Estimate Residential Construction Emissions (2019)

Construction Type	Area (acres)	Duration (mo/yr)	EF (ton/acre/mo)	Overall Efficiency
Residential	8,076	6	0.265	66%

6.2.2.2 Nonresidential

The nonresidential construction sector includes emissions from construction projects at airports, commercial/industrial facilities, flood detention facilities, public parks, schools, underground utilities, and miscellaneous construction projects. Table 6-5 shows the parameters used to estimate nonresidential construction emissions.

Table 6-5. Data Used to Estimate Nonresidential Construction Emissions (2019)

Construction Type	Area (acres)	Duration (months/year)	EF (ton/acre/month)	Overall Control Efficiency (%)
Airport Projects	205.6	12	0.42	58%
Commercial Construction	3,728	3	0.265	58%
Demo-Structure	171	3	0.42	58%
Flood Detention Basins	530.1	12	0.42	58%
Miscellaneous	1,768	6	0.265	58%
Public Parks	3.8	6	0.265	58%
Public Schools etc	1.5	12	0.265	58%
Staging/Stockpiling	210.1	3	0.265	58%
Underground Utilities	2,634	1	0.42	58%
Total	**9,253**			

6.2.2.3 Road

The road construction sector includes the maintenance and construction of new highways and roads within HA 212. DAQ obtained road construction areas from the DAQ permit database for highway construction and public works project types within HA 212 that included road maintenance or construction. Table 6-6 shows the parameters used to estimate these emissions. Wind erosion from vacant land (discussed in Section 6.2.3) includes track-out emissions.

Table 6-6. Data Used to Estimate Road Construction Emissions (2019)

Construction Type	Area (acres)	Duration (months/year)	EF (ton/acre/month)	Overall Efficiency (%)
Road	199.6	12	0.42	70%

6.2.2.4 Summary

Table 6-7 provides a summary of the estimated 2019 baseline and predicted emissions related to direct construction activities for residential, nonresidential, and road construction projected within HA 212. These estimates reflect growth and temporal adjustment factors obtained from EPA's 2016v3 EMP.

Table 6-7. HA 212 Nonpoint Source Emissions (Construction: Direct Construction Activities) (tpd)

Construction Type	SCC	2019	2026	2035
Residential	2311010000	15.0	16.1	17.8
Non-Residential	2311020000	14.4	15.5	17.0
Road	2311030000	1.1	1.1	1.3
Total		**30.4**	**32.7**	**36.0**

6.2.3 Track-out

Track-out emissions are generated when vehicles traveling on paved roads kick up dried soil left behind by vehicles leaving construction sites. Consistent with the first maintenance plan, DAQ assumed that all construction sites averaged 3 access points per 30 acres of construction area except for airport, flood detention, and residential projects, which DAQ assumed averaged 1 access point per 30 acres of construction area. Previous studies showed that limited track-out occurs at underground utility construction areas, since these sites are far removed from paved roads or the vehicles at the sites remain on paved surfaces (DAQ 2001). Table 6-8 shows the number of access points by construction type.

Table 6-8. Number of Access Points

Construction Type	Access Points/Acre	Number of Access/Points
Airport Projects	0.03	7
Commercial Construction	0.10	373
Demo-Structure	0.03	6
Flood Detention Basins	0.03	16
Highway Construction	0.10	11
Miscellaneous	0.10	177
Public Parks	0.10	1
Public Schools etc	0.10	1
Public Works	0.10	10
Residential Homes	0.03	243
Staging/Stockpiling	0.03	7
Underground Utilities	0.00	0

These estimates assume that the average track-out length is 150 feet, access points to paved roads are all located on collector roads, and the average daily traffic (ADT) count on urban collector roads is representative of HA 212. ADT is calculated using the annual vehicle miles traveled (VMT) of major and minor urban collector roads (~1,680,000,000 miles per year) and the combined length of these roads (~589 miles) based on 2019 data from the Nevada Department of Transportation (NDOT 2020).[9] This yields an average ADT count for 2019 of ~7,820 vehicles per day. DAQ used the 2019 ADT and projected population data (Section 2.0) to estimate ADT for 2026 and 2035 (Table 6-9).

Table 6-9. Collector Road ADT Counts

	2019	2026	2035
Population	2,325,798	2,593,000	2,940,000
ADT (vehicles/day)	7,822	8,720	9,887

The average silt loading of urban collector roads in HA 212 (0.49 g/m^2) was based on sampling results (DAQ 2001) and adjusted using a scaling factor to represent the amount of silt loading at various track-out sites compared to baseline levels (D&M 2000b). The adjusted silt loading value was then incorporated into the AP-42 equation for estimating paved road dust emissions factors (Equation 6-3) to obtain a VMT-based emissions factor of 1.22 g/VMT.

Equation 6-3. EPA AP-42 Paved Road Dust Emission Factor Calculation

$$EF = (k)(SL)^{0.91}(W)^{1.02}$$

where:

EF = Emissions factor (g/VMT)

k = EPA default particle size multiplier for PM_{10} (1.00 g/VMT)

[9] NDOT data for Functional Classes 5 (Major Collector–Urban) and 6 (Minor Collector–Urban).

SL = Road surface silt loading (0.49 g/m^2)
W = Average weight of vehicles traveling the road (2.29 tons).

Finally, track-out emissions were calculated for each construction sector using Equation 6-4 (DAQ 2012).

Equation 6-4. Track-Out Emissions Calculation

$$\boldsymbol{E = (A)(C)(ADT)(L)(EF)(D)(C_1)}$$

where:

E = Emissions (tons/year)
A = Access points (number of points/acre)
C = Construction area (acres)
ADT = Average ADT count of urban collector roads (vehicles/day)
L = Length of track-out (ft)
EF = Emission factor (g/VMT) (see Equation 6-3)
D = Duration of construction (month/year)
C_1 = Conversion factor, (30.5 days/month)/(5,280 ft/mile)/(453.6 g/lb)/2,000 lb/ton).

Table 6-10 provides a summary of the estimated baseline and predicted track-out emissions associated with residential, nonresidential, and road construction projects within HA-12. These estimates reflect growth and temporal adjustment factors from EPA's 2016v3 EMP.

Table 6-10. HA 212 Nonpoint Source Emissions (Construction: track-out) (tpd)

Construction Type	2019	2026	2035
Airport Projects	0.00	0.00	0.00
Commercial Construction	0.03	0.04	0.04
Demo-Structure	0.00	0.00	0.00
Flood Detention Basins	0.01	0.01	0.01
Highway Construction	0.00	0.00	0.00
Miscellaneous	0.03	0.04	0.04
Public Parks	0.00	0.00	0.00
Public Schools etc	0.00	0.00	0.00
Public Works	0.00	0.00	0.00
Residential Homes	0.05	0.05	0.05
Staging/Stockpiling	0.00	0.00	0.00
Underground Utilities			
Total	**0.13**	**0.14**	**0.16**

6.2.4 Wind Erosion

The effects of wind erosion due to soil disturbance were included in the construction-related emissions estimates for all construction types. Since most construction projects only last a few months of the year, wind erosion estimates were adjusted based on the duration of construction. To adjust emissions, DAQ first calculated an effective construction area for each construction type (Equation 6-5) (DAQ 2012), then assumed all construction projects would implement some form of fugitive emissions control (depending on construction type) to comply with a set control efficiency.

Equation 6-5. Effective Construction Area Calculation

$$C_{eff} = (C)(D)(C_2)$$

where:

C_{eff}	=	Effective construction area (acres)
C	=	Construction area (acres)
D	=	Duration of construction (month/year)
C_2	=	Conversion factor, (year/12 months).

To calculate wind erosion emissions, the contributions from disturbed stable (land with controlled emissions) and disturbed unstable lands (land with uncontrolled emissions) must be determined. The effective construction areas for each construction type were partitioned into controlled and uncontrolled lands based on the overall control efficiency for each construction type according to Equation 6-5 and Equation 6-6 (DAQ 2012).

Equation 6-6. Effective Construction Area with Controlled Emissions

$$C_{controlled_i} = (C_{eff_i})(\eta_i)$$

where:

$C_{controlled(i)}$	=	Effective construction area of land type “i” with controlled emissions (acres)
$C_{eff(i)}$	=	Total effective construction area of land type “i” (acres)
η_i	=	Overall control efficiency of land type “i”

Equation 6-7. Effective Construction Area with Uncontrolled Emissions

$$C_{uncontrolled_i} = C_{eff_i} - C_{uncontrolled_i}$$

where:

$C_{controlled(i)}$	=	Effective construction area of land type “i” with uncontrolled emissions (acres)
$C_{eff(i)}$	=	Total effective construction area of land type “i” (acres)
$C_{controlled(i)}$	=	Effective construction area of land type “i” with uncontrolled emissions (acres)

Table 6-11 provides a summary of the resulting controlled and uncontrolled effective construction areas for each construction type.

Table 6-11. Effective Construction Areas

Construction Type	Construction Duration (months)	Overall Control Efficiency (%)	Effective Construction Area (acres)		
			Total	Uncontrolled	Controlled
Airport Projects	12	58%	205.6	86.6	119.0
Commercial Construction	3	58%	932.0	392.4	539.7
Demo-Structure	3	58%	42.8	18.0	24.8
Flood Detention Basins	12	58%	530.1	223.2	306.9
Highway Construction	12	70%	101.0	30.7	70.3
Miscellaneous	6	58%	884.2	372.2	512.0
Public Parks	6	58%	1.9	0.8	1.1
Public Schools etc	12	58%	1.5	0.6	0.9
Public Works	12	70%	98.6	30.0	68.6
Residential Homes	6	66%	4,038.2	1,363.8	2,674.4
Staging/Stockpiling	3	58%	52.5	22.1	30.4
Underground Utilities	1	58%	219.5	92.4	127.1
Total			**7,108**	**2,633**	**4,475**

Estimated wind erosion emissions were calculated for the controlled and uncontrolled construction areas based on emissions factors for disturbed vacant land developed by UNLV through wind-tunnel testing (DAQ 2007). "Disturbed vacant land" refers to native desert disturbed by removing natural crusts and vegetation, typically through anthropogenic activities such as construction (EQM 2006). It can be categorized as "disturbed/stable" if the soil has naturally stabilized or is protected against wind erosion by artificial means. Conversely, "disturbed/unstable" vacant land refers to vacant land that is unprotected against wind erosion. To estimate controlled wind erosion emissions, DAQ applied the emission factor developed for "disturbed/stable" vacant land for controlled wind erosion and the emissions factor for "disturbed/unstable" vacant land for uncontrolled wind erosion.

Both emission factors depend on design-day wind speed distribution data. For consistency with the first maintenance plan, DAQ utilized meteorological data from Harry Reid International for the design day to estimate baseline and projected emissions (MRCC 2024). It was assumed that disturbed/unstable lands had infinite reservoirs of particulate matter (DAQ 2007). The design day factor represents a composite of all emissions associated with each wind speed range, as Table 6-12 shows (i.e., 0.05278 ton/acre). For disturbed/stable lands, DAQ assumed that only a one-hour reservoir of particulate matter is emitted at the highest wind speed (DAQ 2007). The design day factor represents the calculated emission factor based on the highest wind speed range achieved for that day, as

Table 6-13 shows (0.01140 ton/acre).

Table 6-12. PM_{10} Disturbed/Unstable Vacant Land Emission Factor

Wind Speed (mph)	EF (ton/acre/hr)	# Hours on Design Day	EF (ton/acre)
10-14.9	0.001450	2	0.00290
15-19.9	0.001440	0	0.00000
20-24.9	0.002220	3	0.00666
25-29.9	0.006610	2	0.01322
30-34.9	0.030000	1	0.03000
34-39.9	0.016700	0	0.00000
40-44.9	0.036800	0	0.00000
45-49.9	0.027100		
50-54.9	0.028600		
Composite Emissions Factor			**0.05278**

Table 6-13. PM_{10} Disturbed/Stable Vacant Land Emission Factor

Wind Speed (mph)	EF (ton/acre/day)	#Days in Range	EF (ton/acre)
10-14.9	0.001410	1	0.00141
15-19.9	0.001770	0	0.00000
20-24.9	0.001590	1	0.00159
25-29.9	0.003740	1	0.00374
30-34.9	0.011400	1	0.01140
34-39.9	0.007870	0	0.00000
40-44.9	0.013500	0	0.00000
45-49.9	0.008600	0	0.00000
50-54.9			
Emissions Factor			**0.01140**

Baseline design-day wind erosion emissions were calculated using Equation 6-8, based on the effective construction area for each construction type and the disturbed land emission factors, and assuming construction occurs uniformly over the entire year. Projected emissions were based on SCC growth factors for each construction type from the 2016v3 EMP.

Equation 6-8. Calculation of Construction-Related Wind Erosion

$$E_i = (C_{eff(cont)})_i(EF_{ds}) \quad + (C_{eff(uncont)})_i(EF_{du})$$

where:

E_i	=	Wind erosion emissions for construction type "i" (tpd)
$C_{eff(cont)i}$	=	Effective controlled construction area for construction type "i" (acres)
EF_{ds}	=	Disturbed/stable vacant land emissions factor (0.01140 ton/acre)
$C_{eff(uncont)i}$	=	Effective uncontrolled construction area for construction type "i" (acres)
EF_{du}	=	Disturbed/unstable vacant land emissions factor (0.05278 ton/acre)

Table 6-14 summarizes the baseline and projected wind erosion emissions for each construction type in HA 212. The resulting wind erosion emissions estimates are likely conservative for the following reasons: (1) the methodology assigns a controlled emission rate to areas where the ground can be covered by asphalt, concrete, vegetation, and other substances; (2) uniform controls were applied for all construction categories; and (3) meteorological data were not fully incorporated.

Table 6-14. HA 212 Design Day Emissions (Construction: Wind Erosion) (tpd)

Construction Type	2019	2026	2035
Airport Projects	5.9	6.4	7.0
Commercial Construction	26.9	28.9	31.8
Demo-Structure	1.2	1.3	1.5
Flood Detention Basins	15.3	16.4	18.1
Highway Construction	2.4	2.6	2.9
Miscellaneous	25.5	27.4	30.2
Public Parks	0.1	0.1	0.1
Public Schools etc	0.0	0.0	0.1
Public Works	2.4	2.5	2.8
Residential Homes	102.5	110.3	121.4
Staging/Stockpiling	1.5	1.6	1.8
Underground Utilities	6.3	6.8	7.5
Total	**190.0**	**204.5**	**225.1**

6.2.5 Rail-Related Construction

The Brightline West project is a new electric high-speed rail service connecting Las Vegas to Los Angeles (Section 7.6.1). Emissions are expected due to the construction of new tracks, stations, bridges, and maintenance facilities. Construction began in 2024, with expected completion in 2027 and initial operations beginning in 2028. The project will be located within Clark County, Nevada, and the Mojave Desert Air Quality Management District in California.

Emissions estimates are based on the project’s latest environmental impact statement with implementation of DAQ fugitive dust control measures. Emissions related to wind erosion and track-out were excluded. Table 6-15 provides a summary of the annual emissions associated with each construction type. The results show that most emissions will come from at-grade construction of new track, and overall emissions for the project are trivial.

Table 6-15. Brightline West Project Estimated Annual Construction Emissions (tpy)

Construction Type	2024	2025	2026	2027
At-Grade Construction	14.5	14.9	14.9	14.6
Elevated Structure Construction	0.1	0.3	0.3	0.1
Tunneling Construction	0.0	0.0	0.0	0.0
Total	**14.6**	**15.2**	**15.2**	**14.7**

Table 6-16**Error! Not a valid bookmark self-reference.** provides a summary of design day emissions for HA 212. While the rail project should be completed during the second maintenance period, only the third year (2026) includes project emissions in the inventory. Construction is projected to occur uniformly throughout each year, requiring no temporal adjustments.

Table 6-16. HA 212 Design Day Emissions (Construction: Rail-Related) (tpd)

Project	2019	2026	2035
Brightline West Rail Service	0.00	0.04	0.00

6.2.6 Construction Summary

Table 6-17 summarizes the baseline and projected emissions for all construction-related activities within HA 212. "Direct Construction" includes rail-related construction.

Table 6-17. HA 212 Nonpoint Source Emissions (Construction) (tpd)

Construction Activity	2019	2026	2035
Direct Construction			
Residential	15.0	16.1	17.8
Non-Residential	14.4	15.5	17.0
Rail-Related	0.00	0.04	0.00
Road	1.1	1.1	1.3
Track-out	0.1	0.1	0.2
Wind Erosion	190.0	204.5	225.1
Total	**220.5**	**237.5**	**261.3**

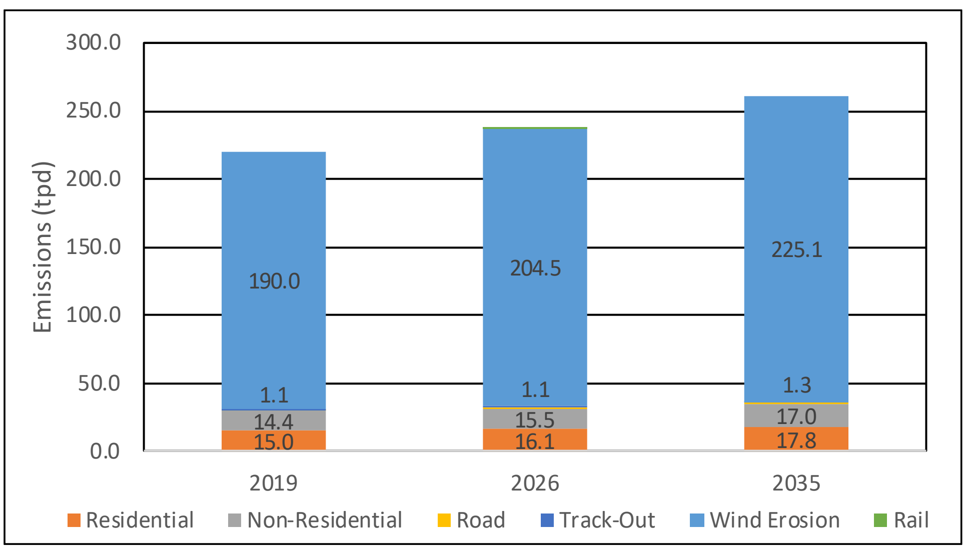

Figure 6-1. HA 212 Nonpoint Source Emissions (Construction).

6.3 WIND EROSION FROM VACANT LANDS

6.3.1 Vacant Land Area

The most accurate source of information on the estimated acreage of undeveloped/vacant land and developed land in HA 212 is the Clark County Division of Comprehensive Planning (DCP) Geographically Integrated Land Use Information System (GILIS). GILIS contains the Clark County Assessor's parcel database, along with other information compiled by DCP. Each parcel has a land use code that describes the land's primary use. Land use codes follow the format "XX.XXX," where the first digit represents one of ten major categories (Table 6-18) and subsequent digits further refine the land use description.

DAQ assumed that all vacant land is identified as Category 1, "Vacant", and that all other categories contain developed land or negligible amounts of vacant land. Category 0, "Land Use Code Pending," represents developed land parcels for to which DCP has not yet assigned a land use code. Table 6-19 breaks down vacant land use codes.

Table 6-18. GILIS Land Use Codes

Category	Description	Classification
0	Land Use Pending	Developed
1	Vacant	Undeveloped/Vacant
2	Single Family Residential	Developed
3	Multi-Residential	Developed
4	Commercial	Developed
5	Industrial	Developed
6	Rural	Developed
7	Communication, Transportation, and Utilities	Developed
8	Mines	Developed
9	Special Purpose or Use Properties	Developed

Table 6-19. Category 1 Series–Vacant Land Use Codes

Category	Description
10.000	Vacant–Unknown/Other
11.000	Vacant–Splinter & Other Unbuildable
12.000	Vacant–Single Family Residential
12.000.C	Vacant–Single Family Residential. Condo Ownership
13.000	Vacant–Multi-Residential
14.000	Vacant–Commercial
14.000.C	Vacant–Commercial. Condo Ownership
15.000	Vacant–Industrial
15.000.C	Vacant–Industrial. Condo Ownership
16.000	Vacant–Mixed Zoning
19.000	Vacant–Public Use Lands

DAQ queried the GILIS database for all land use codes within HA 212 for the baseline year 2019. Table 6-20 lists total acres by land use, including estimates for total developed land and vacant land. DAQ separately estimated public rights-of-way, which are considered nonparceled, developed land but not included in the GILIS database. Public right-of-way acreage comprises 20% of parceled, developed land (DAQ 2012).

Table 6-20. Breakdown of Vacant and Developed Land (HA 212)

Category	Primary Use Description	Use Code	Classification	Total Area (acres)
0	Unassigned	All	Developed	71
1	Vacant	All	Vacant	714,825
2	Single Family Residential	All	Developed	108,106
3	Multi-Family Residential	All	Developed	10,099
4	Commercial	All	Developed	51,913
5	Industrial	All	Developed	10,263
6	Rural	All	Developed	255
7	Communication, Transportation, and Utilities	All	Developed	14,562
8	Mines	All	Developed	193
9	Special Purpose or Use Properties	All	Developed	7,147
Subtotal (Vacant Land)				**714,825**
Subtotal (Developed Land)				**202,608**
Non-parcelled Developed Land (i.e. public right-of-ways)				**40,522**
Total				**957,955**

6.3.2 Vacant Land Surface Conditions

Wind erosion emissions depend on soil surface conditions and wind speed. While the GILIS parcel data can quantify the amount of vacant land within HA 212, it provides no information on surface conditions. However, a previous study conducted in support of the first maintenance plan provided surface condition data (EQM 2006).[10] The study used remote sensing imagery analysis to classify developed and undeveloped (vacant) land areas within HA 212 based on unique multiband spectral signatures created for each land type: native desert, disturbed/stabilized, wash-drainage, concrete, urban, vegetation, and barren/shadow area. DAQ classified any land area that did not fall into one of these classifications as disturbed/unstable vacant land. Table 6-21 summarizes the EQM 2006 study results.

[10] Differences in the vacant land area used in the EQM study and that used in the first and second maintenance plans are due to differences in the methodology used to establish land areas.

Table 6-21. HA 212 Surface Conditions (2006)

Classification	% Total Area
Native Desert	48%
Disturbed Stabilized	3%
Disturbed Unstable Vacant Land	1%
Wash - Drainage	9%
Concrete	1%
Urban	5%
Vegetation	1%
Barren/Shadow	33%
Total	**100%**

A distribution for vacant land that included “native desert,” “disturbed/stabilized,” and “disturbed/unstable” was created from study results. Consistent with the assumptions used in the first maintenance plan, DAQ assumed that native desert area includes wash-drainage areas and excluded all other classifications (e.g., concrete, urban, vegetation, barren/shadow) as being developed or non-erodible.[11] Table 6-22 summarizes the resulting distribution.

Table 6-22. Vacant Land Type Distribution (2006)

Classification	% Total Area
Native Desert Land (w/wash-drainage only)	93%
Disturbed Stable Vacant Land (adjusted)	5%
Disturbed Unstable Vacant Land (adjusted)	2%
Total	**100%**

The distribution of vacant land types may vary over time as construction or other anthropogenic activities disturb desert soil. Similarly, unstable soil may become more stable due to natural events, such as soil compaction or new plant growth, or through artificial means, such as barrier installation, plantings, and activity restrictions. To account for potential shifts in distribution, DAQ categorized as disturbed/stable vacant land all lands the 2006 study identified as disturbed/unstable vacant land. DAQ also assumed the percentage of native desert land will remain the same, i.e., there would be no new formation of disturbed/stable or disturbed/unstable land and no restoration of disturbed/stable land to native desert.

Table 6-23 shows a comparison of the original (EQM 2006) distribution to the distribution used in the current inventory for 2019, 2026, and 2035.

[11] The “barren/shadow” classification comprised areas in shadow during image development. These consist primarily of nonerodible mountainous areas on the periphery of HA-212. A more detailed image analysis by DAQ (2007) showed that this signature is also present within the BLM area, but DAQ concluded that 99% of this area consisted of developed urban areas and only 1% was erodible native desert.

Table 6-23. Comparison of 2006 and 2019-2035 Vacant Land Distribution

Classification	2006	2019-2023
Native Desert Land (w/wash-drainage only)	93%	93%
Disturbed Stable Vacant Land (adjusted)	5%	7%
Disturbed Unstable Vacant Land (adjusted)	2%	0%

Vacant land erosion emissions are affected by the amount and surface conditions of vacant land. While wind erosion emissions decrease over time as vacant land is consumed, these effects may be offset by changes in soil stability, which may increase or decrease over time. DAQ's assumption that all disturbed vacant land is stable for the 2019–2035 period results in lower overall emissions when compared with an assumption that some disturbed vacant land is unstable because the disturbed/stable emissions factor is significantly lower than the disturbed/unstable vacant land emissions factor. The fact that emissions are lower has a conservative effect on predicted emissions when using the roll-back method compared with alternative assumptions, since the lower emissions for this subcategory reduce its effect on the entire inventory.[12]

6.3.3 Emissions Factors

Emissions factors for all vacant land types—native desert, disturbed/stable, and disturbed/unstable—were developed by UNLV through wind-tunnel testing (DAQ 2007). Emissions factors for the disturbed/stable and disturbed/unstable land types, as discussed in Section 6.2.4, were used to estimate wind erosion emissions on disturbed vacant land. The native desert emissions factor was developed during the same UNLV study. It is also dependent on design-day wind speed distribution data. For consistency with the first maintenance plan and construction emissions calculations, DAQ utilized meteorological data from Harry Reid International for the design day for estimating the baseline and projected emissions.

Table 6-24 shows the wind speed data used in calculating the native desert emissions factor and the resulting composite emissions factor. The wind-tunnel test results indicate these native-land crustal surfaces emit only negligible amounts when wind speeds are less than 25 miles per hour. Table 6-24 shows the sustained wind and spike emissions factors developed for wind speeds exceeding that threshold. Table 6-25 summarizes the composite design-day emissions factors for all vacant land types.

[12] The data show that this is the largest contributor in the current inventory and that vacant land emissions decline over the maintenance period due to consumption of vacant land. By biasing emissions low in the base year, the effect of this decline in future years is reduced.

Table 6-24. PM_{10} Native Desert Emission Factor

Wind Speed (mph)	# Days in Range	Sustained Winds EF (ton/acre/hour)	Spike EF (ton/acre/hour)	Composite EF (ton/acre)
10-14.9	271			
15-19.9	163			
20-24.9	86			
25-29.9	24	0.00257	0.000361	0.070344
30-34.9	7	0.00316	0.000468	0.025396
34-39.9	1	0.00299	0.000815	0.003805
40-44.9	0			
45-49.9				
50-54.9				
Emissions Factor (Annual)				**0.099545**
Emissions Factor (Design Day)				**0.0002720**

Table 6-25. Design Day Wind Erosion Emission Factors for Vacant Land

Category	EF (ton/acre)
Native Desert	0.0002720
Disturbed Stabilized Vacant Land	0.01140
Disturbed Unstable Vacant Land	0.05278

6.3.4 Vacant Land Consumption

Wind erosion on vacant land will decrease over time as land is consumed by construction due to population increases; emissions projections thus required estimates for the vacant land types for 2026 and 2035. DAQ examined historical vacant land usage data provided by the Clark County Desert Conservation Program (CCDCP 2022) to determine the 12-year average vacant land consumption rate for 2010–2022[13] (2,634 acres/yr). DAQ also utilized historical population growth rate data for 2010–2022 (35,061 persons/yr) and projected population growth rate data for 2023–2035 (42,750 persons/year) to calculate a population growth adjustment factor of 1.22 (UNLV 2022). This was used to calculate a population-adjusted projected vacant land consumption rate of 3,212 acres/yr, as shown in Equation 6-9 (DAQ 2012).

Equation 6-9. Projected Vacant Land Consumption Rate, 2023–2035

$$R_{2023-2035} = \left(\frac{P_{2023-2035}}{P_{2010-2022}}\right) x R_{2010-2022}$$

where:

$R_{2023-2035}$ = Projected HA 212 vacant land consumption rate adjusted for population growth, 2023–2035 (3,212 acres/yr)

$P_{2023-2035}$ = HA 212 projected population growth rate, 2023–2035 (42,750 persons/yr)

[13] 2010 was selected as the starting point for this evaluation because it corresponded to a national census year. 2022 was selected as the ending point for this evaluation because it was the latest available information.

$P_{2010-2022}$ = HA 212 actual population growth rate, 2010–2022 (35,061 persons/yr)
$R_{2010-2022}$ = HA 212 actual vacant land consumption rate, 2010–2022 (2,634 acres/yr).

DAQ used the projected vacant land consumption rate to estimate the total area of vacant land for 2026 and 2035, and used the distribution of vacant land types to estimate the projected amount of native desert, disturbed/stable, and disturbed/unstable vacant lands for 2026 and 2035, as summarized in Table 6-26 (DAQ 2012).[14]

Table 6-26. Vacant Land Areas by Type (acres)

Vacant Land Type	2019	2026	2035
Native Desert	665,237	644,939	618,039
Disturbed/Stable	49,589	48,076	46,071
Disturbed/Unstable	0	0	0
Total	**714,825**	**693,015**	**664,110**

6.3.5 Emissions Summary

The wind erosion emissions factors were applied to the baseline and projected land areas to estimate total emissions from wind erosion. Because these are a significant source of construction-related emissions, so were already accounted for in those estimates (Section 6.2.3), vacant land emissions were adjusted by the amount of wind erosion emissions resulting from construction activities. Table 6-27 provides a summary of wind erosion emissions expected from vacant land.

Table 6-27. HA 212 Nonpoint Source Emissions (Fugitive Nonpoint Sources: Wind Erosion on Vacant Lands) (tpd)

Vacant Land Type	2019	2026	2035
Native Desert	180.9	175.4	168.1
Disturbed/Stable	565.3	548.1	525.2
Disturbed/Unstable	0.0	0.0	0.0
Subtotal	**746.2**	**723.5**	**693.3**
Adjustment for Construction-Related Wind Erosion	190.0	204.5	225.1
Total	**556.3**	**518.9**	**468.2**

6.4 PAVED ROADS

Baseline and projected emissions for this sector are based on the air quality conformity analysis in the Regional Transportation Plan (RTP) of the Regional Transportation Commission of Southern Nevada (RTC). RTC estimated fugitive emissions from vehicles driving over paved roads (SCC 2294000000) using emissions factors DAQ derived for the first maintenance plan (Table 6-28) and estimates of annual average weekday VMT generated by its Travel Demand Model.

[14] DAQ conservatively assumed zero disturbed/unstable vacant land to minimize vacant land erosion emissions, which has the overall effect of biasing predicted 2035 PM_{10} concentrations high using the roll-back method compared to the predicted concentration if the disturbed/unstable land type was included in the emissions estimate.

Table 6-28. Average Paved Road Emission Factors by Road Type

Road Type	Emission Factor (g/VMT)
Major Arterial	0.761
Minor Arterial	1.220
Collector	1.225
Local	3.671
Freeway	0.066

However, these VMT estimates do not include the base year (2019) or the projection years (2026 and 2035). The VMT estimate for 2019 was derived based on the ratio of VMT reported by NDOT for 2019 and 2022 in nonlocal, urban areas of Clark County, which is assumed to be more representative of HA 212. The VMT estimates for 2026 and 2035 were calculated based on linear interpolation using RTC's reported values for 2025, 2030, and 2040 (Table 6-29).[15] Table 6-30 shows paved road emissions by road type, including applicable emissions factors.

[15] *Estimating 2019 VMT for PM_{10} Boundary*, technical memo from Greg Gaides and Sathya Thyagaraj (Parsons Corporation) to Hui Shen (RTC), 12/5/2024.

Table 6-29. Average Weekday VMT by Road Type

Road Type	Average Weekday VMT		
	2019	2026	2035
Rural-Freeway	297,286	341,301	456,726
Rural-Expressway/Beltway	81,263	98,841	135,021
Rural-Super Arterial	141,052	135,897	145,527
Rural-Major Arterial	24,470	46,560	71,691
Rural-Minor Arterial	6,088	6,307	7,450
Rural-Collector	235,534	254,217	508,606
Rural-Local	295,346	525,669	846,997
Rural-Ramp	0	5,568	9,507
Rural-System To System Ramp	34,581	27,095	35,919
Rural-Unknown	807	876	1,188
Rural-Centroid Connector	96,019	158,316	332,648
Rural-Externals	0	0	0
Urban-Freeway	7,734,454	7,807,305	8,101,172
Urban-Expressway/Beltway	4,826,958	4,945,089	5,277,579
Urban-Super Arterial	5,327,618	5,421,404	6,012,919
Urban-Major Arterial	11,870,817	12,200,036	14,080,680
Urban-Minor Arterial	0	0	0
Urban-Collector	4,590,745	4,744,089	5,534,669
Urban-Local	1,721,330	1,712,776	1,986,618
Urban-Ramp	891,535	991,784	1,201,721
Urban-System To System Ramp	1,494,986	1,517,935	1,672,712
Urban-Unknown	17,976	19,668	24,223
Urban-Centroid Connector	2,274,727	2,298,881	2,462,282
Urban-Externals	0	0	0
Public Transit Bus	59,452	59,921	72,766
Intra-zonal	68,133	71,585	94,481
Total	**42,091,177**	**43,391,120**	**49,073,101**

Table 6-30. Average Weekday Emissions Road Type (tpd)

Road Type	Emission Factor (g/VMT)	Emissions (tpd)		
		2019	2026	2035
Rural-Freeway	0.066	0.02	0.02	0.03
Rural-Expressway/Beltway	0.066	0.01	0.01	0.01
Rural-Super Arterial	0.761	0.12	0.11	0.12
Rural-Major Arterial	0.761	0.02	0.04	0.06
Rural-Minor Arterial	1.225	0.01	0.01	0.01
Rural-Collector	1.225	0.32	0.34	0.69
Rural-Local	1.225	0.40	0.71	1.14
Rural-Ramp	1.225	0.00	0.01	0.01
Rural-System To System Ramp	1.225	0.05	0.04	0.05
Rural-Unknown	1.225	0.00	0.00	0.00
Rural-Centroid Connector	3.671	0.39	0.64	1.35
Rural-Externals	1.225	0.00	0.00	0.00
Urban-Freeway	0.066	0.56	0.57	0.59
Urban-Expressway/Beltway	0.066	0.35	0.36	0.38
Urban-Super Arterial	0.761	4.47	4.55	5.04
Urban-Major Arterial	0.761	9.96	10.23	11.81
Urban-Minor Arterial	1.225	0.00	0.00	0.00
Urban-Collector	1.225	6.20	6.41	7.47
Urban-Local	1.225	2.32	2.31	2.68
Urban-Ramp	1.225	1.20	1.34	1.62
Urban-System To System Ramp	1.225	2.02	2.05	2.26
Urban-Unknown	1.225	0.02	0.03	0.03
Urban-Centroid Connector	3.671	9.20	9.30	9.96
Urban-Externals	1.225	0.00	0.00	0.00
Public Transit Bus	3.671	0.24	0.24	0.29
Intra-zonal	3.671	0.28	0.29	0.38

Table 6-31 provides a summary of total PM_{10} emissions for HA 212 from paved road fugitive dust emissions.

Table 6-31. Nonpoint Source Design Day Emissions (Paved Road) (tpd)

SCC	Description	2019	2026	2035
2294000000	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives	38.2	39.6	46.0

6.5 UNPAVED ROADS

Baseline emissions for this sector were obtained from the 2017 NEI for all of Clark County using EPA-developed emissions estimates. They include total fugitive dust emissions from vehicles driving over all unpaved roads (SCC 2296000000). Emissions were adjusted for HA 212 based on the percentage of total length of unpaved roads within HA 212 compared to total unpaved roads within Clark County (16.3%).[16] Growth and temporal adjustment factors from the 2016v3 EMP were used to estimate design day and future-year emissions. Table 6-32 provides a summary of baseline and predicted emissions for 2026 and 2035.

Table 6-32. HA 212 Nonpoint Source Emissions (Unpaved Roads) (tpd)

SCC	Description	2019	2026	2035
2296000000	Mobile Sources; Unpaved Roads; All Unpaved Roads; Total: Fugitives	2.6	2.6	2.6

6.6 AGRICULTURAL OPERATIONS

Emissions from agricultural operations include fugitive dust related to livestock, crop tilling, and field burning. Livestock fugitive dust is kicked up by the hooves or feet of dairy and beef cattle, poultry, and swine during normal activities (grazing, roaming, milking). Design day and future-year emissions were estimated using growth and temporal adjustment factors from the 2016v3 EMP. Table 6-33 shows design-day and projected emissions for HA 212 according to SCC.

Table 6-33. HA 212 Nonpoint Source Emissions (Agricultural Operations) (tpd)

SCC	Description	2019	2026	2035
2801000003	Agriculture Production – Crops; Agriculture – Crops; Tilling	0.13	0.13	0.13
2805001000	Agriculture Production – Livestock; Beef Cattle Finishing Operations on Feedlots; Dust Kicked-up by Hooves	0.10	0.10	0.10
2801500171	Miscellaneous Area Sources;Agriculture Production - Crops - as nonpoint;Agricultural Field Burning - whole field set on fire;Fallow	0.00	0.00	0.00
2805001020	Agriculture Production – Livestock; Broilers; Dust Kicked-up by Feet	0.00	0.00	0.00
2805001040	Agriculture Production – Livestock; Swine; Dust Kicked-up by Hooves	0.00	0.00	0.00
2805001010	Agriculture Production – Livestock; Daily Cattle; Dust Kicked-up by Hooves	0.00	0.00	0.00
2805001030	Agriculture Production – Livestock; Layers; Dust Kicked-up by Feet	0.00	0.00	0.00
2805001050	Agriculture Production – Livestock; Turkeys; Dust Kicked-up by Feet	0.00	0.00	0.00
TOTAL		**0.23**	**0.23**	**0.23**

6.7 SUMMARY

Table 6-34 breaks down fugitive nonpoint source emissions sources. Figure 6-2 is a graphical representation of the data.

[16] Data obtained from www.OpenStreetMap.org by Clark County (email from V. Rajagopalan (DAQ) to R. Barton (RTP), 10/23/2024).

Table 6-34. HA 212 Nonpoint Source Emissions (tpd) (Fugitive Sources)

Sector	2019	2026	2035
Construction	221	237	261
Wind Erosion from Vacant Land	556	519	468
Paved Roads	38.2	39.6	46.0
Unpaved Roads	2.6	2.6	2.6
Agricultural Operations	0.2	0.2	0.2
Total	**818**	**799**	**778**

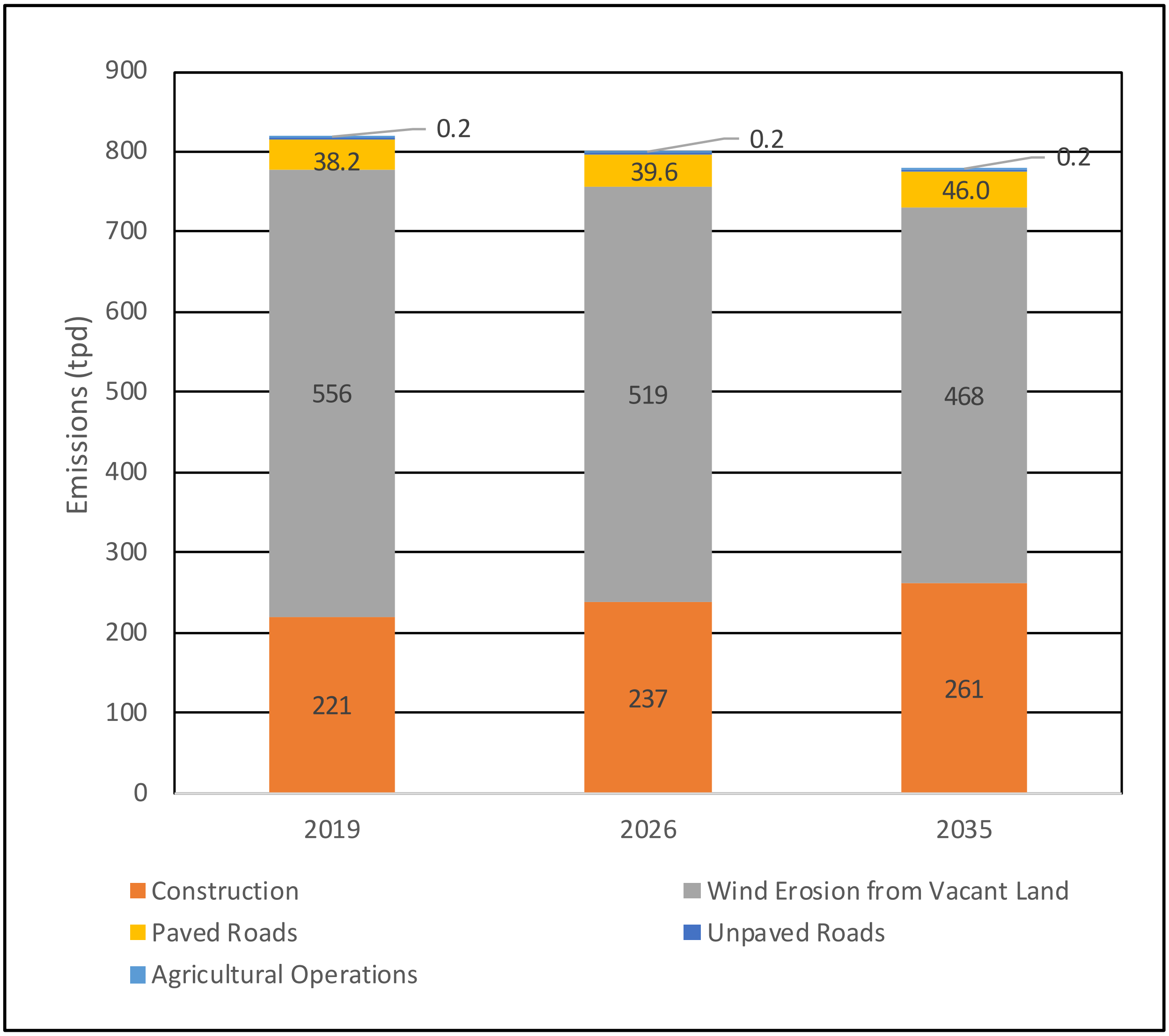

Figure 6-2. HA 212 Nonpoint Source Emissions (Fugitive Sources).

7.0 OTHER NONPOINT SOURCE EMISSIONS

7.1 DESCRIPTION

This section provides design day and projected emissions for the following nonpoint sources of PM_{10}: fuel combustion, commercial cooking, residential wood combustion, structure and vehicle fires, and miscellaneous sources not otherwise classified.

7.2 FUEL COMBUSTION

The fuel combustion sector includes combustion-related emissions from boilers, engines, and other sources not reported as point sources. In HA 212, it encompasses 18 SCCs, each of which has a unique end-use sector (residential, commercial, or industrial) and fuel type (coal, distillate oil, residual oil, natural gas, liquefied petroleum gas, and kerosene). Emissions from residential wood combustion are not part of this sector but are discussed in Section 7.4.

Emissions estimates were based on the 2017 NEI, which uses total fuel consumption data for each state from the U.S. Energy Information Administration. EPA adjusted total fuel consumption for fuel usage by mobile sources and point sources, and prorated to the county level based on employment data for each end-use sector. DAQ projected emissions using growth factors and temporal adjustment factors from the 2016v3 EMP.

Table 7-1 provides estimated design day emissions for the base year and projected years for fuel combustion.

Table 7-1. HA 212 Nonpoint Source Emissions (Fuel Combustion) (tpd)

SCC	SCC Description (Level 3)	SCC Description (Level 3)	2019	2026	2035
2102001000	Industrial; Anthracite Coal; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Coal	0.00	0.00	0.00
2102002000	Industrial; Bituminous/Subbituminous Coal; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Coal	0.26	0.24	0.24
2102004001	Industrial; Distillate Oil; All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Oil	0.01	0.02	0.02
2102004002	Industrial; Distillate Oil; All IC Engine Types	Fuel Comb - Industrial Boilers, ICEs - Oil	0.18	0.21	0.22
2102005000	Industrial; Residual Oil; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Oil	0.00	0.00	0.00
2102006000	Industrial; Natural Gas; Total: Boilers and IC Engines	Fuel Comb - Industrial Boilers, ICEs - Natural Gas	0.01	0.01	0.01
2102007000	Industrial; Liquified Petroleum Gas (LPG); Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Other	0.00	0.00	0.00
2102011000	Industrial; Kerosene; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Oil	0.00	0.00	0.00
2103001000	Commercial/Institutional; Anthracite Coal; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Coal	0.00	0.00	0.00
2103002000	Commercial/Institutional; Bituminous/Subbituminous Coal; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Coal	0.00	0.00	0.00
2103004001	Commercial/Institutional; Distillate Oil; Boilers	Fuel Comb - Comm/Institutional - Oil	0.00	0.00	0.00
2103004002	Commercial/Institutional; Distillate Oil; IC Engines	Fuel Comb - Comm/Institutional - Oil	0.00	0.00	0.00
2103005000	Commercial/Institutional; Residual Oil; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Oil	0.00	0.00	0.00
2103006000	Commercial/Institutional; Natural Gas; Total: Boilers and IC Engines	Fuel Comb - Comm/Institutional - Natural Gas	0.02	0.02	0.02
2103007000	Commercial/Institutional; Liquified Petroleum Gas (LPG); Total: All Combustor Types	Fuel Comb - Comm/Institutional - Other	0.00	0.00	0.00
2103011000	Commercial/Institutional; Kerosene; Total: All Combustor Types	Fuel Comb - Comm/Institutional - Oil	0.00	0.00	0.00
2104002000	Bituminous/Subbituminous Coal; Total: All Combustor Types	Fuel Comb - Residential - Other	0.00	0.00	0.00
2104004000	Distillate Oil; Total: All Combustor Types	Fuel Comb - Residential - Oil	0.00	0.00	0.00
2104006000	Natural Gas; Total: All Combustor Types	Fuel Comb - Residential - Natural Gas	0.02	0.02	0.02
2104007000	Liquified Petroleum Gas (LPG); Total: All Combustor Types	Fuel Comb - Residential - Other	0.00	0.00	0.00
2104011000	Kerosene; Total: All Heater Types	Fuel Comb - Residential - Oil	0.00	0.00	0.00
2103008000	Commercial/Institutional; Wood; Total: All Boiler Types	Fuel Comb - Comm/Institutional - Biomass	0.16	0.16	0.16
2102008000	Industrial; Wood; Total: All Boiler Types	Fuel Comb - Industrial Boilers, ICEs - Biomass	0.06	0.06	0.07
TOTAL			**0.71**	**0.73**	**0.75**

7.3 COMMERCIAL COOKING

Commercial cooking emissions result from cooking meat (e.g., steak, hamburgers, poultry, pork, and seafood) and fried foods (e.g., french fries, onion rings, etc.) using common charbroiling and frying methods. Estimates for this sector are based on the following commercial restaurant types: ethnic food, fast food, family, seafood, and steak and barbecue. Emissions from fuel combustion during the cooking process are accounted for separately in the "Fuel Combustion" sector.

Emissions estimates are based on the 2017 NEI. To produce the NEI values, EPA estimated the amount of meat and french fries cooked, within each county using different appliances based on the number of each restaurant type and assumptions regarding the percentage of restaurants with each cooking appliance, the number of each appliance at each restaurant, and the amount of meat and french fries cooked using each appliance. An emissions factor was then applied to the total amount of cooked meat and french fries for each appliance type. DAQ projected emissions using growth factors and temporal adjustment factors from the 2016v3 EMP.

Table 7-2 provides the estimated design day emissions for the base year and projected years for each type of cooking appliance and method, according to its SCC.

Table 7-2. HA 212 Nonpoint Source Emissions (Commercial Cooking) (tpd)

SCC	SCC Description (Level 3)	SCC Description (Level 3)	2019	2026	2035
2302002100	Commercial Cooking – Charbroiling	Conveyorized Charbroiling	0.29	0.33	0.37
2302002200	Commercial Cooking – Charbroiling	Under-fired Charbroiling	2.06	2.33	2.63
2302003100	Commercial Cooking – Frying	Flat Griddle Frying	0.54	0.61	0.69
2302003200	Commercial Cooking – Frying	Clamshell Griddle Frying	0.04	0.04	0.04
TOTAL			**2.92**	**3.31**	**3.73**

7.4 RESIDENTIAL WOOD COMBUSTION

Residential wood combustion includes such appliances as fireplaces, fireplace inserts, wood stoves, indoor furnaces, hydronic heaters, and other wood-burning devices. Equipment includes EPA-certified types (equipment produced after 1998 and meeting EPA emissions standards) and non-EPA certified types. EPA-certified equipment is categorized based on whether it is equipped with a catalytic combustor.

Emissions estimates are based on the 2017 NEI. To produce the NEI values, EPA first estimated the amount of wood burned in each county based on a national survey that identified the percentage of homes using various types of wood-burning devices and the typical amount of wood burned in each device. EPA determined the estimated number of homes within each county to calculate the amount of wood burned in each device type at the county level, then applied an emissions factor for each device type to estimate county-level emissions. DAQ downscaled these county-level emissions to estimate HA 212 emissions using a population adjustment factor (0.97), then projected emissions using growth factors and temporal adjustment factors from the 2016v3 EMP.

Table 7-3 provides the estimated design day emissions for the base year and projected years for each type of wood burning device, according to its SCC.

Table 7-3. HA 212 Nonpoint Source Emissions (Residential Wood Combustion) (tpd)

SCC	Description	2019	2026	2035
2104008100	Wood; Fireplace: general	0.00	0.00	0.00
2104008210	Wood; Woodstove: fireplace inserts; non-EPA certified	0.00	0.00	0.00
2104008220	Wood; Woodstove: fireplace inserts; EPA certified; non-catalytic	0.00	0.00	0.00
2104008230	Wood; Woodstove: fireplace inserts; EPA certified; catalytic	0.00	0.00	0.00
2104008310	Wood; Woodstove: freestanding, non-EPA certified	0.00	0.00	0.00
2104008320	Wood; Woodstove: freestanding, EPA certified, non-catalytic	0.00	0.00	0.00
2104008330	Wood; Woodstove: freestanding, EPA certified, catalytic	0.00	0.00	0.00
2104008400	Wood; Woodstove: pellet-fired, general (freestanding or FP insert)	0.00	0.00	0.00
2104008510	Wood; Furnace: Indoor, cordwood-fired, non-EPA certified	0.00	0.00	0.00
2104008530	Wood; Furnace: Indoor, pellet-fired, general	0.00	0.00	0.00
2104008610	Wood; Hydronic heater: outdoor	0.11	0.11	0.11
2104008620	Wood; Hydronic heater: indoor	0.07	0.07	0.07
2104008630	Wood; Hydronic heater: pellet-fired	0.00	0.00	0.00
2104008700	Wood; Outdoor wood burning device, Not elsewhere classified (fire-pits, chimeneas, etc)	0.29	0.30	0.31
2104009000	Firelog; Total: All Combustor Types	0.00	0.00	0.00
TOTAL		**0.47**	**0.49**	**0.50**

7.5 STRUCTURE AND VEHICLE FIRES

Structure fires affect buildings, mobile homes, open platforms, bridges, roof assemblies over open storage or process areas, tents, air-supported structures, and grandstands. The category also covers confined building fires, which are typically small fires within a building inside equipment or objects, such as pots, fireplaces, or noncombustible containers.

Vehicle fires affect any motorized passenger vehicle besides a motor home (pickup trucks, sport utility vehicles, buses), road freight or transport vehicles, railcars, water vehicles (boats, barges, hovercraft, and all other vehicles designed for navigation on water), and aircraft.

Structure and vehicle fires are minor sources of emissions, but DAQ included them in the current inventory for consistency with the first maintenance plan. Since the 2017 NEI did not include these sources, DAQ used the calculation methodology from the first maintenance plan to estimate emissions using an estimated number of fire incidents, an assumption of the amount of material burned, and an emissions factor for each fire type.

Table 7-4 lists the number of structural and vehicle fires reported by the fire departments of Clark County, the City of Las Vegas, the City of Henderson, the City of North Las Vegas, and Boulder City in 2019 (NFIRS 2024). These departments track fire information for private dwellings, apartments, hotels, other residential structures, public assembly buildings (churches, clubs), schools and colleges, health care and penal institutions, stores and offices, industry utilities, labs, storage units, other structures, and various types of vehicles.

Table 7-4. Types and Annual Numbers of Fires in Clark County

Fire Department	Number of Fires	
	Structural	Vehicle
Boulder City FD	5	3
City of Las Vegas Fire & Rescue	644	283
Clark County Fire Protection District	749	265
Henderson Fire Department	136	85
North Las Vegas Fire Department	234	125
Total	**1,768**	**761**

DAQ assumed the average vehicle contains approximately 0.25 tons of combustible material, and the estimated emissions factor is 100 lb/ton of combustible material (EIIP 2000). For structure fires, DAQ assumed the average amount of material burned is 1.15 tons and the estimated emissions factor is 10.8 lb/ton (EIIP 2001). Projected emissions were calculated using growth factors and temporal adjustment factors from the 2016v3 EMP.

Table 7-5 provides the estimated design day emissions for the base year and projected years for structure and vehicle fires located in HA 212.

Table 7-5. HA 212 Nonpoint Source Emissions (Structure and Vehicle Fires) (tpd)

SCC	Description	2019	2026	2035
2810030000	Miscellaneous Area Sources/ Other Combustion/ Structure Fires/ Unspecified	0.03	0.04	0.04
2810050000	Miscellaneous Area Sources/ Other Combustion/ Motor Vehicle Fires/ Unspecified	0.03	0.03	0.04
Total		**0.06**	**0.07**	**0.08**

7.6 LOCOMOTIVES

Locomotive emissions include emissions resulting from diesel-electric passenger and freight locomotive traffic within HA 212.[17] Diesel-electric locomotives use a 2-stroke or 4-stroke diesel engine and an alternator to produce electricity, which then powers drive motors. Locomotive emissions are reported by railroad service type: Class I freight (carriers with annual revenue exceeding $500M), Class II/III freight (carriers with annual revenue less than $500M), passenger, and commuter. Union Pacific is the primary freight carrier providing service to the Las Vegas area. There are currently no passenger[18] or diesel-powered commuter[19] routes through Clark County, although construction of a high-speed rail service between Los Angeles and Las Vegas is planned during the second maintenance period (Section 7.6.1).

Emissions estimates are based on the 2017 NEI, which relies on county-level emissions estimates provided by ERTAC.[20] DAQ then downscaled the estimate from Clark County to estimate to HA 212 emissions based on population. Projected emissions are calculated using growth factors and temporal adjustment factors from the 2016v3 EMP. Table 7-6 provides estimated design day emissions for the base year and projected years for each locomotive operation according to SCC.

Table 7-6. Nonpoint Source Design Day Emissions (Locomotives) (tpd)

SCC	Description	2019	2026	2035
2285002006	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class I Operations	0.04	0.03	0.03
2285002007	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class II / III Operations	0.00	0.00	0.00
2285002008	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Passenger Trains (Amtrak)	0	0	0
2285002009	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Commuter Lines	0	0	0
TOTAL		**0.04**	**0.03**	**0.03**

7.6.1 Additional Rail Traffic

The Brightline West rail project is a new electric high-speed rail service connecting Las Vegas to Los Angeles. The project, originally known as DesertXpress, started development in 2005 and has since passed through several developers and investors. Although additional locomotive emissions are unlikely during normal operations, increased emissions could result from construction

[17] As discussed earlier, railyard emissions (if any) are included within the point source category and railway maintenance operations are included in the non-road category.
[18] Amtrak's 'Desert Wind' service was discontinued in 1997. The company is considering service to Las Vegas as part of a 15-year expansion plan but there is no definitive timetable for this project.
[19] The Las Vegas Monorail provides limited local rail service along Las Vegas Boulevard ("the Strip) using electric trains.
[20] ERTAC used confidential line-haul activity data in the analysis so details on methodology are not readily available.

of new track, stations, and maintenance facilities. These were included in the "Nonpoint Source: Construction" sector (Section 6.2.5).

7.7 MISCELLANEOUS NON-INDUSTRIAL NOT ELSEWHERE CLASSIFIED

This subcategory in 2017 NEI captures all nonpoint sources that are not otherwise included in major SCC sectors. Sectors for which there is data for Clark County include residential grilling, human cremation, and animal cremation. The only sector in Clark County with nontrivial emissions is "Residential Grilling." Residential barbecue grilling emissions come from the burning of charcoal, the use of lighter fluid, and emissions from cooked meat. Combustion emissions from propane and natural gas-fired grills are not included.

Emissions estimates are based on the 2017 NEI. EPA estimated the total amount of meat cooked within each county based on grill type (charcoal and gas/electric), then applied a single emissions factor (lb/ton-meat) to estimate emissions. EPA applies a different methodology for estimating the total amount of meat cooked for each grill type:

- For charcoal grills, the estimate is based on the amount of charcoal sold nationally, which is downscaled to the county level based on the number of residential homes within each county and assumptions regarding the amount of meat cooked per pound of charcoal.
- For gas and electric grills, the estimate is based on the amount of meat cooked using charcoal grills, an assumed percentage of gas/electric grills used in comparison to charcoal grills, and the estimated annual use for each grill type.

DAQ downscaled the 2017 NEI county-level estimates to HA 212 using a population adjustment factor. Projected emissions were calculated using growth factors and temporal adjustment factors from the 2016v3 EMP.

Table 7-7 provides the estimated design day emissions for the base year and projected years, according to SCC.

Table 7-7. Nonpoint Source Design Day Emissions (Miscellaneous Non-Industrial NEC) (tpd)

SCC	Description	2019	2026	2035
2810025000	Miscellaneous Area Sources; Other Combustion; Charcoal Grilling - Residential; Total	0.11	0.13	0.14
2810060200	Miscellaneous Area Sources; Other Combustion; Cremation; Animals	0.00	0.00	0.00
2810060100	Miscellaneous Area Sources; Other Combustion; Cremation; Humans	0.00	0.01	0.01
TOTAL		**0.12**	**0.13**	**0.15**

7.8 EMISSIONS SUMMARY

Table 7-8 and Figure 7-1 provide the estimated design day emissions for the base year and future years for the "Other Nonpoint Source" subcategory. Table 7-9 and Figure 7-2 provide the estimated design day emissions for the base year and future years for the entire "Nonpoint Source" category.

Table 7-8. HA 212 Nonpoint Source Emissions (Other Nonpoint Sources) (tpd)

Sector	2019	2026	2035
Fuel Combustion	0.71	0.73	0.75
Commercial Cooking	2.92	3.31	3.73
Residential Wood Combustion	0.47	0.49	0.50
Structure Fires	0.03	0.04	0.04
Vehicle Fires	0.03	0.03	0.04
Locomotive	0.04	0.03	0.03
Miscellaneous Non-Industrial NEC	0.12	0.13	0.15
Total	**4.32**	**4.75**	**5.24**

Table 7-9. HA 212 Nonpoint Source Emissions (All Sectors) (tpd)

Sector	2019	2026	2035
Construction	221	237	261
Wind Erosion from Vacant Lands	556	519	468
Paved Roads	38.16	39.61	46.01
Unpaved Roads	2.61	2.61	2.61
Agricultural Operations	0.23	0.23	0.23
Fuel Combustion	0.71	0.73	0.75
Commercial Cooking	2.92	3.31	3.73
Residential Wood Combustion	0.47	0.49	0.50
Structure Fires	0.03	0.04	0.04
Vehicle Fires	0.03	0.03	0.04
Locomotive	0.04	0.03	0.03
Miscellaneous Non-Industrial NEC	0.12	0.13	0.15
Total	**822**	**804**	**784**

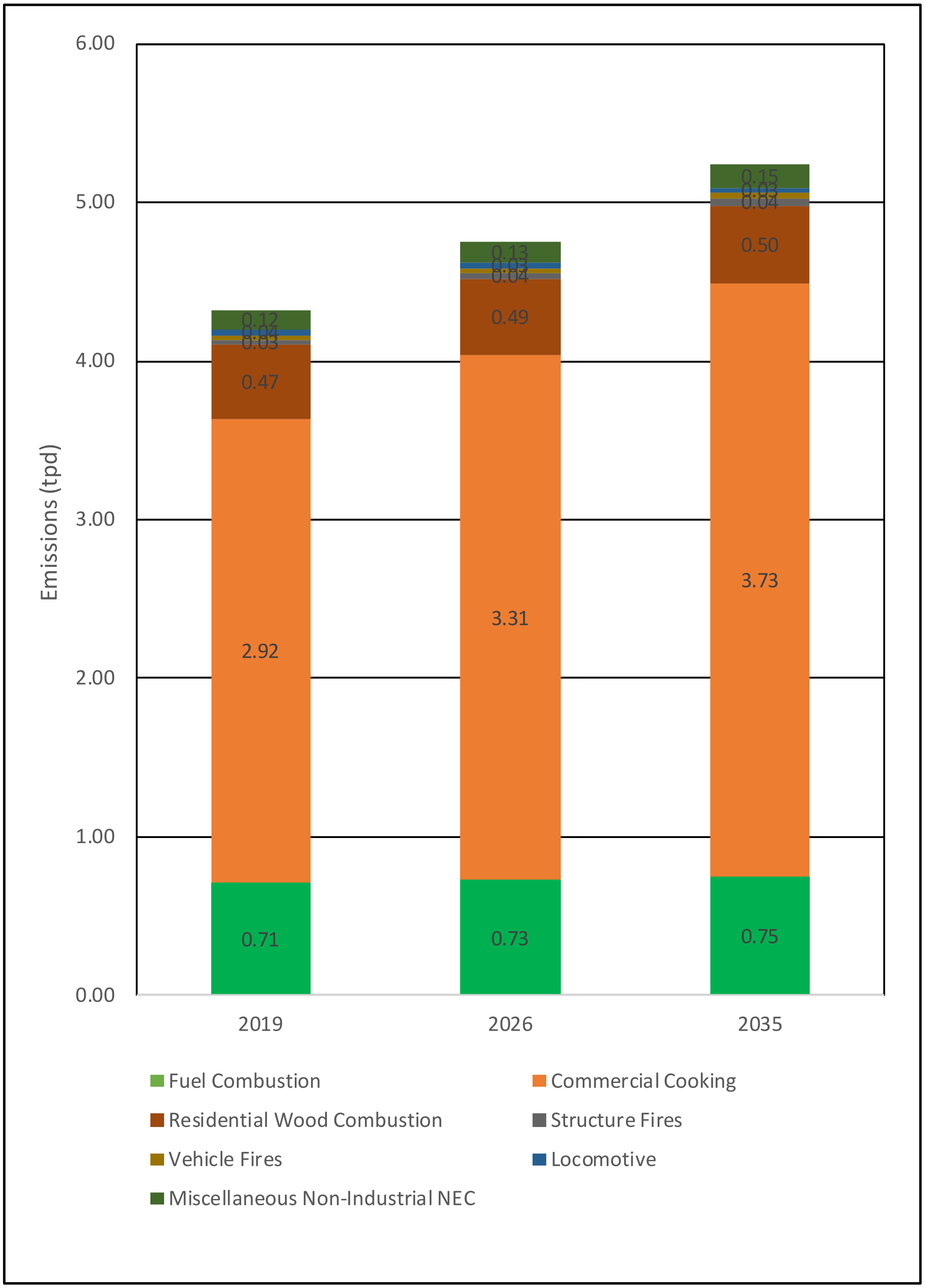

Figure 7-1. HA 212 Nonpoint Source Emissions (Other Nonpoint Sources).

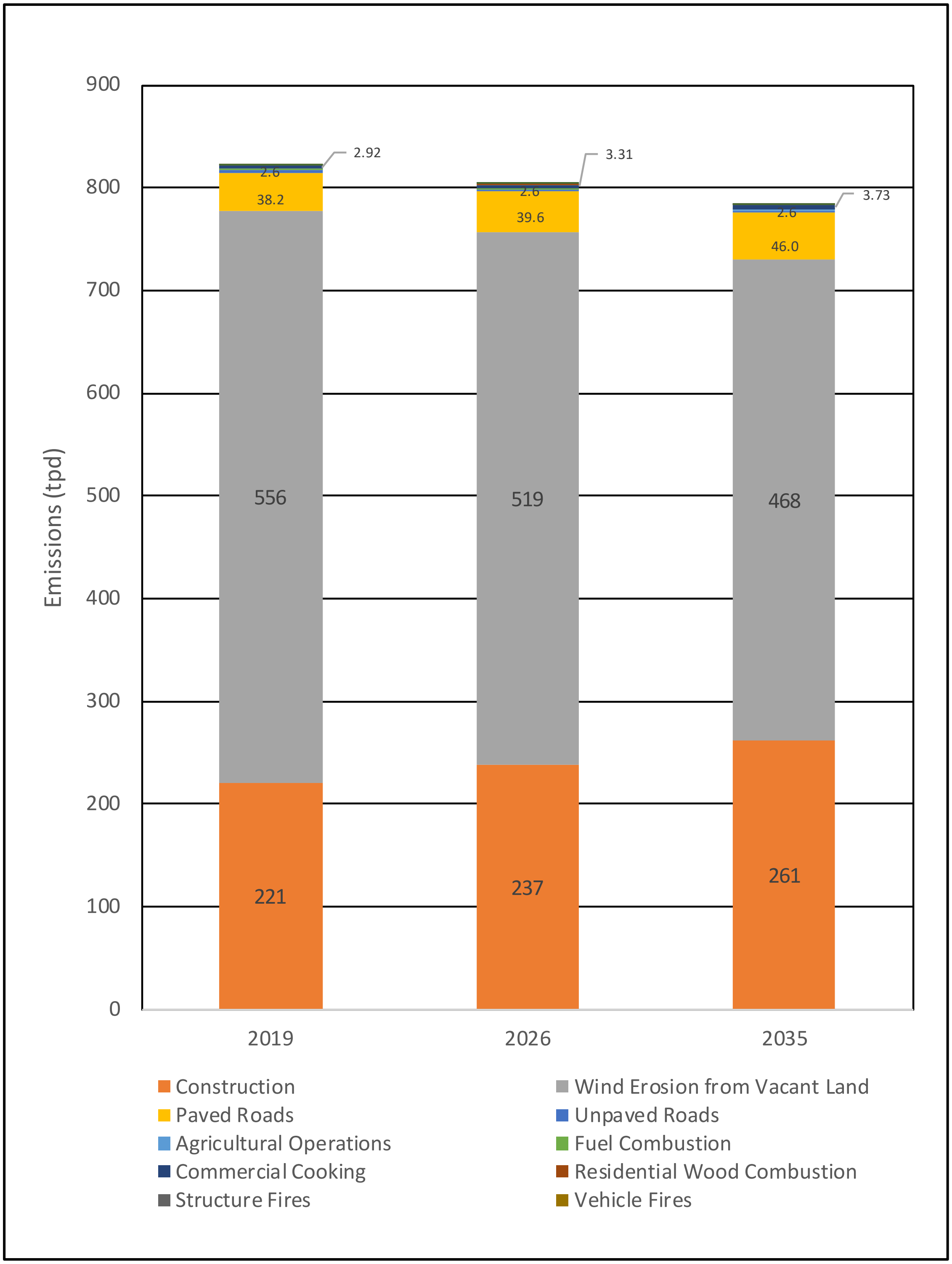

Figure 7-2. HA 212 Nonpoint Source Emissions (All Sectors).

8.0 ON-ROAD MOBILE SOURCE EMISSIONS

8.1 DESCRIPTION

On-road mobile sources are highway mobile sources that include automobiles, buses, and trucks traveling on local roads and national highways. Emissions sources include exhaust, brake wear, and tire wear. This includes emissions generated from parking areas and while vehicles are moving. Fugitive emissions resulting from reentrained dust on paved and unpaved roads were included in the "Fugitive Nonpoint Source Emissions" category (Sections 6.4 and 6.5).

8.2 METHODOLOGY

On-road model source emissions were estimated using MOVES4.0, the latest release of EPA's MOVES model.[21] The model includes emissions estimates from 13 source types (Table 8-1) and four roadway types (Table 8 2). DAQ developed updated county-specific MOVES input databases for the 2017 base year, 2019 design day year, and future years of 2026 and 2035. Once the databases were generated, sub-county input databases for HA 212 were also developed based on actual activity data or spatial surrogates. DAQ then ran MOVES4 with the databases for HA 212 to generate PM10 inventories for the on-road source category.

Table 8-1. MOVES Source Use Type

Source Type ID	MOVES Source Type Name
11	Motorcycle
21	Passenger Car
31	Passenger Truck
32	Light Commercial Truck
41	Other Buses
42	Transit Bus
43	School Bus
51	Refuse Truck
52	Single Unit Short-haul Truck
53	Single Unit Long-haul Truck
54	Motor Home
61	Combination Short-haul Truck
62	Combination Long-haul Truck

[21] The MOVES4 model can be operated in "inventory" or "emission rate" mode. For the purpose of this inventory, DAQ operated the model in "inventory" mode.

Table 8-2. Map of HPMS Road Types to MOVES Road Type

HPMS Road Type	MOVES Road Type
11: Rural Principal Arterial–Interstate	2: Rural Restricted Access
13: Rural Principal Arterial - Other	3: Rural Unrestricted Access
15: Rural Minor Arterial	
17: Rural Major Collector	
19: Rural Minor Collector	
21: Rural Local System	
23: Urban Principal Arterial–Interstate	4: Urban Restricted Access
25: Urban Principal Arterial–Other Freeways	
27: Urban Principal Arterial–Other	5: Urban Unrestricted Access
29: Urban Minor Arterial	
31: Urban Collector	
33: Urban Local System	

Note: HPMS = Highway Performance Monitoring System (Federal Highway Administration).

The following subsections discuss the key MOVES inputs, including vehicle fleet activity data such as VMT, vehicle population by vehicle source type or class, fleet age distribution, fuel parameters, and inspection and maintenance (I/M) programs.

8.2.1 Vehicle Classification Study

Because vehicle classification is a critical component for developing an on-road emissions inventory, DAQ completed a vehicle classification study in June 2018. The study used 2014–2016 traffic count data collected by NDOT and included an on-road license plate survey at select roadway locations. The collected license plate numbers were matched to vehicle identification numbers and then decoded to obtain vehicle attributes that allowed DAQ's contractor to classify cars versus light-duty trucks. The primary products of the vehicle classification study were VMT mix and temporal profiles, which were incorporated into the MOVES input databases. The MOVES temporal profiles included monthly, weekly, and hourly traffic profiles.

8.2.1.1 Mix Profiles

Figure 8-1 shows the VMT mix profiles from the study by MOVES road type. Rural Restricted Access (Road Type 2) has the highest amount of heavy-duty VMT (24%), which decreases from left to right in the figure: Road Type 2 to Rural Unrestricted Access (Road Type 3) to Urban Restricted Access (Road Type 4) to Urban Unrestricted (Road Type 5).

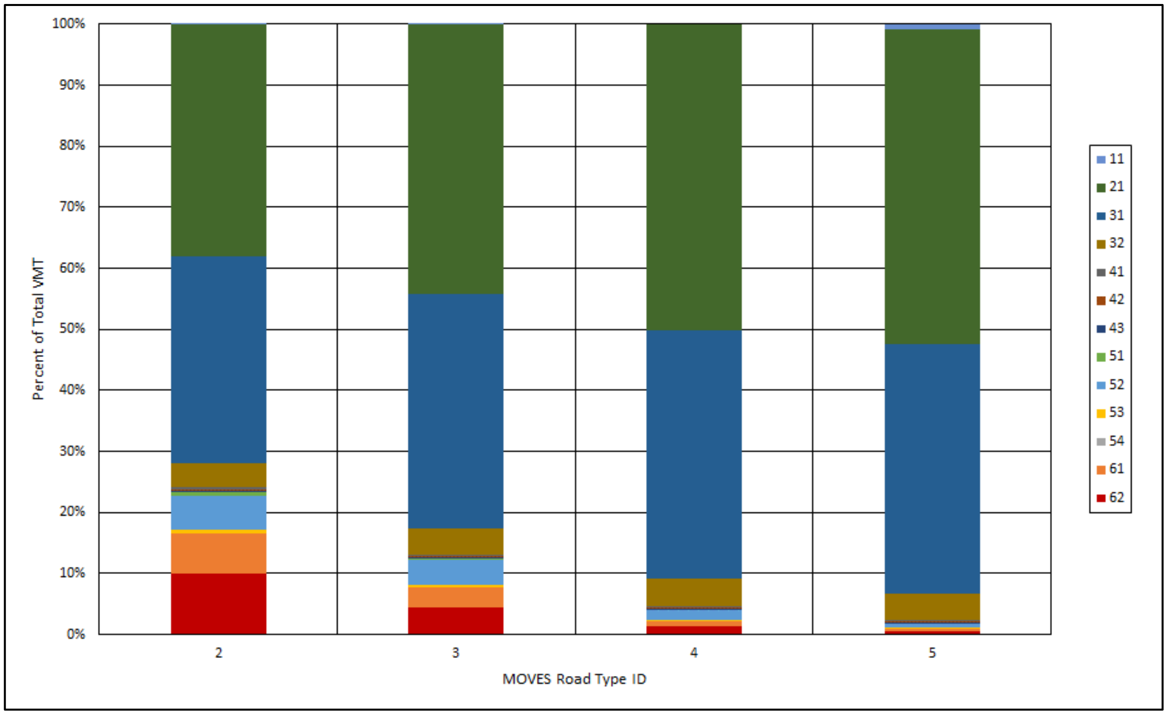

Figure 8-1. Summary of the VMT Mix on Each MOVES Road Type.

8.2.1.2 Monthly Traffic Profiles

The MOVES model distributes annual VMT to monthly totals using the month VMT fractions shown in Figure 8-2. Clark County's monthly variation does not indicate a strong influence of season on VMT. The monthly variation is based on the NDOT traffic counts during 2014–2016 using continuous traffic counters.

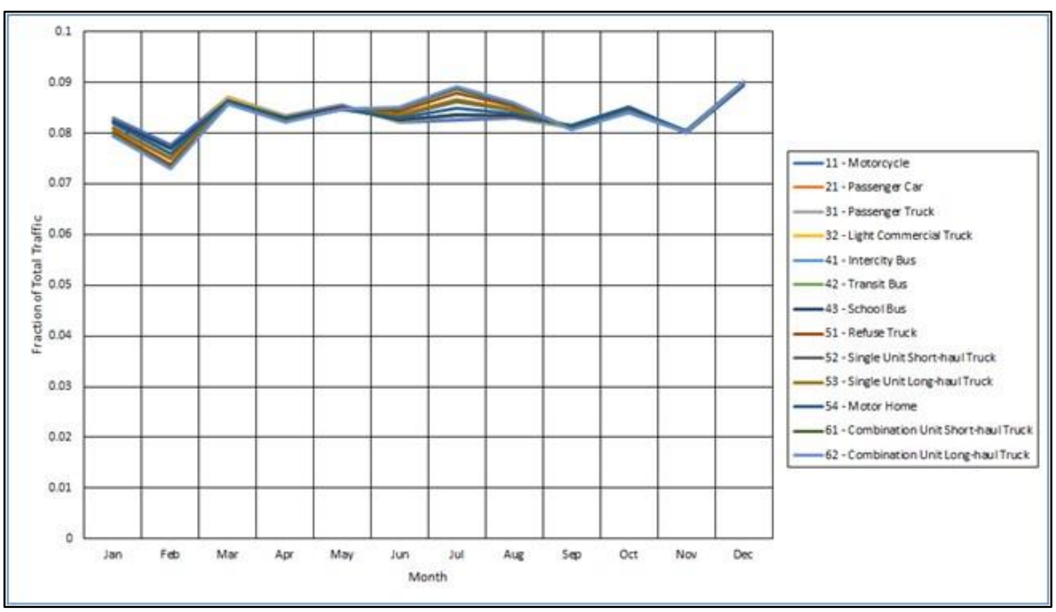

Figure 8-2. MOVES Month VMT Fractions for Clark County.

8.2.1.3 Weekly Traffic Profiles

The day-of-week profiles in MOVES apportion weekly VMT to two periods of the week: "weekday" (Monday–Friday) and "weekend" (Saturday–Sunday). Figure 8-3 shows a sample of the profiles for passenger cars. The ratio of weekday to weekend VMT grows from left to right, moving from Rural (Road Types 2 & 3) to Urban (Road Types 4 & 5). This pattern of higher weekday VMT on urban roads and unrestricted roads was generally true for all source types.

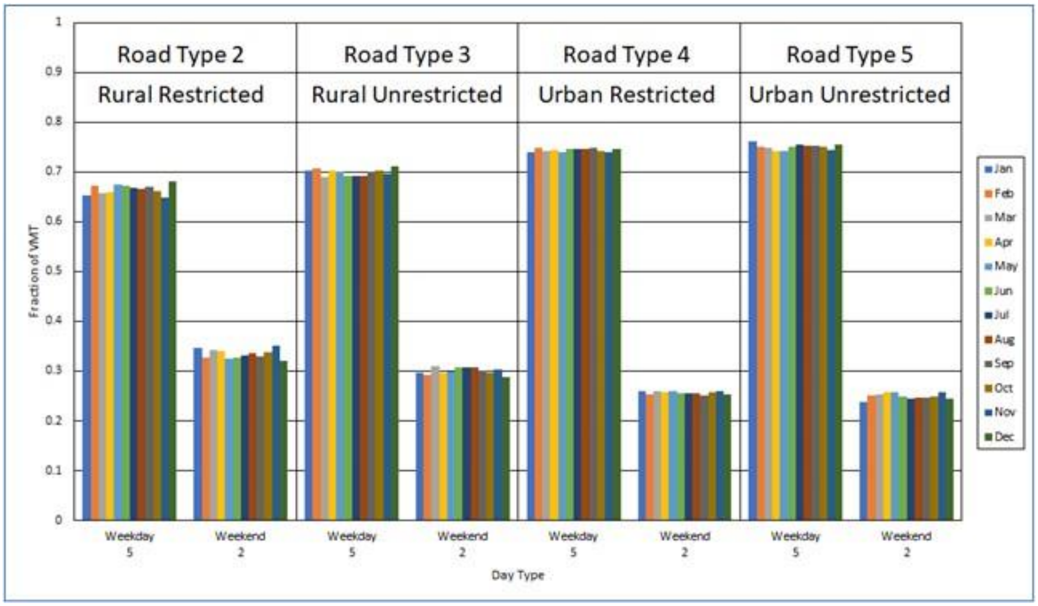

Figure 8-3. Sample MOVES Day VMT Fractions (Passenger Cars).

8.2.1.4 Hourly Traffic Profiles

Figure 8-4 shows sample MOVES hour VMT fractions for passenger cars traveling on weekdays (solid line series) and weekends (broken line series) in Clark County for each of the four MOVES road types. On weekdays, the two Urban Road Types—4 (grey) and 5 (yellow)—have prominent morning peaks in the VMT fractions. Weekend profiles on all road types reach their high point at midday (from about noon to 4 p.m.).

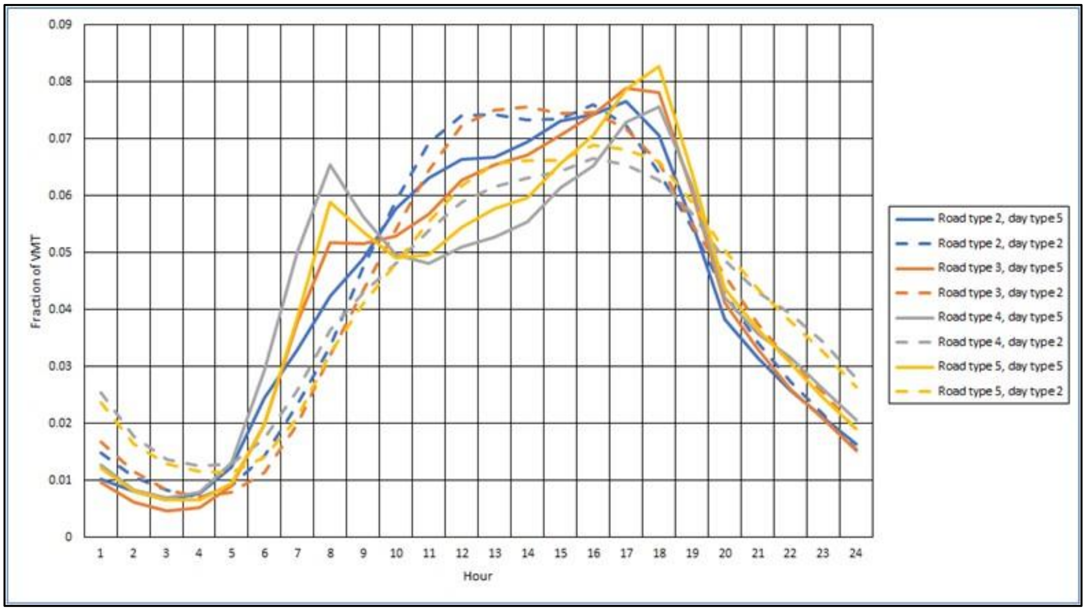

Figure 8-4. Sample MOVES Hourly VMT Fractions (Passenger Cars).

8.2.1.5 Other MOVES Inputs

VMT data for the design day are derived from NDOT's 2019 annual Highway Performance Monitoring System (HPMS) reports. NDOT also provided DAQ with VMT data for the HA 212 sub-county area.

The MOVES model requires annual or daily VMT by vehicle type. Using the VMT mix information developed from the Clark County Vehicle Classification Study, DAQ generated annual VMTs for each vehicle source type for HA 212. Table 8-3 shows Clark County 2017 and 2019 annual VMTs by function class within HA 212 from NDOT.

For urban road types, VMTs for 2026 and 2035 were projected from 2017 using growth factors from the forecasts of RTC's Travel Demand Model. For rural road types, a linear regression projection from historical NDOT HPMS reports was used to project VMT. Table 8-4 lists annual VMT by source type for the three modeling years (2019, 2026, and 2035).

Table 8-3. Clark County 2017 and 2019 Annual VMT by Functional Class within HA 212

Function Class	2017 AVMT	2019 AVMT
Rural Interstate	37,956,020	37,500,115
Rural Other Principal Arterial	71,177,655	68,622,553
Rural Minor Arterial	0	0
Rural Major Collector	45,745,974	39,202,758
Rural Minor Collector	1,218,372	979,450
Rural Local	8,512,560	8,834,213
Urban Interstate	3,158,264,116	3,312,302,893
Urban Other Freeways and Expressways	1,509,145,790	1,587,526,074
Urban Other Principal Arterial	2,045,321,410	2,118,282,259
Urban Minor Arterial	3,937,878,139	4,155,483,477

Function Class	2017 AVMT	2019 AVMT
Urban Collector	1,617,429,935	1,677,418,975
Urban Local	4,118,471,242	4,334,457,631
Total	16,551,121,213	17,340,610,399

Table 8-4. Clark County Annual VMT by Vehicle Type within HA 212

Source Type ID	Source Type Name	2019	2026	2035
11	Motorcycle	97,649,562	110,688,308	121,928,605
21	Passenger Car	8,797,393,656	9,972,073,598	10,984,728,659
31	Passenger Truck	7,076,541,240	8,021,442,807	8,836,013,074
32	Light Commercial Truck	757,293,117	858,411,365	945,582,263
41	Other Buses	44,272,579	49,716,622	49,375,226
42	Transit Bus	29,940,342	33,802,966	42,033,125
43	School Bus	25,650,000	29,677,620	33,283,931
51	Refuse Truck	12,607,006	14,290,368	15,741,542
52	Single Unit Short-haul Truck	212,142,495	240,469,014	264,888,425
53	Single Unit Long-haul Truck	10,559,077	11,968,988	13,184,427
54	Motor Home	1,718,526	1,947,994	2,145,811
61	Combination Short-haul Truck	146,985,768	166,612,175	183,531,491
62	Combination Long-haul Truck	127,857,031	144,929,257	159,646,692
	Total:	**17,340,610,399**	**19,656,031,082**	**21,652,083,271**

DAQ derived the vehicle type population data for the entire county primarily from the Nevada Department of Motor Vehicles (DMV) registration database. Adjustments were made for transit buses based on data obtained from the RTC, and for school bus populations based on reports from the online magazine *SchoolBus*. Vehicle population estimates for combination short-haul and long-haul trucks were based on a database recently developed for the Clark County moderate ozone SIP inventory. The vehicle populations by source type for future years were projected from 2017 using surrogates such as human population for the light-duty vehicles and VMTs for heavy-duty trucks. For the HA 212 sub-county area, vehicle population by source type was adjusted from the county level using human population as a surrogate. Based on census data for human population distribution, DAQ assumed that the source type population within HA 212 is about 96.9 % of the total source type population of Clark County. Table 8-5 lists the source type populations used in the model for the years of 2019, 2026 and 2035.

Table 8-5. Clark County Vehicle Population within HA 212

Source Type ID	Source Type Name	2019	2026	2035
11	Motorcycle	42,591	49,282	55,269
21	Passenger Car	716,576	829,147	922,607
31	Passenger Truck	558,468	646,201	720,215
32	Light Commercial Truck	59,764	69,153	89,306
41	Other Buses	374	433	486
42	Transit Bus	856	856	1,046
43	School Bus	1,860	2,270	2,545
51	Refuse Truck	638	726	802
52	Single Unit Short-haul Truck	16,558	18,828	20,795

Source Type ID	Source Type Name	2019	2026	2035
53	Single Unit Long-haul Truck	1,172	1333	1,472
54	Motor Home	920	1046	1,155
61	Combination Short-haul Truck	4,556	5,181	5,722
62	Combination Long-haul Truck	7,326	8,331	9,201
	Total:	**1,411,634**	**1,632,786**	**1,830,619**

MOVES also requires input from hoteling activity, which refers to hours that drivers of diesel long-haul combination trucks spend idling their engines during mandatory rest periods. MOVES accounts for idling and auxiliary power unit use as separate emission processes, in addition to truck operation on roadways. Since no local specific hoteling hours are available, hoteling hours were based on MOVES4 defaults.

Ambient temperature and humidity data were based on meteorological data collected at Harry Reid International in 2019. Table 8-6 presents the hourly temperature and humidity data used in the MOVES database for the design day.

Table 8-6. Average Hourly Design Day Temperature and Humidity at Harry Reid International Airport

Hour	Temperature (F)	Humidity (%)
1	61.0	17.4
2	59.9	18.4
3	59.0	18.5
4	58.1	19.3
5	57.3	19.8
6	56.7	20.4
7	59.3	19.0
8	63.0	16.4
9	66.6	13.4
10	69.1	12.0
11	71.4	11.1
12	73.7	10.3
13	75.3	9.7
14	76.7	9.4
15	77.1	9.1
16	77.0	9.1
17	75.1	10.0
18	72.8	11.0
19	70.6	12.2
20	67.7	13.7
21	66.0	13.8
22	64.2	14.5
23	62.7	15.4
24	61.7	16.0

The Nevada DMV provided vehicle registration data for Clark County by model year and vehicle type, which DAQ used to generate vehicle population and vehicle age distribution inputs. The age distributions for 2017 were based on vehicle registration data from DMV for light-duty vehicle types; age distributions for heavy-duty vehicle types were exported from the 2017 NEI database. However, DAQ found a better source of data for age distribution: a national project conducted by the Coordinated Research Council (CRC). The project performed VIN decoding of 2017 county-specific registration data from IHS Markit (now part of S&P Global). EPA has used the age distributions from this VIN-decoding project in the 2016v2 EMP and for 2017 NEI development, along with purchasing county-specific data from IHS Markit for the entire U.S. However, DAQ decided the age distributions in the 2017 NEI were more robust; therefore, the NEI data was used in Clark County's on-road inventory.

EPA provided an age distribution projection tool in the 2017 NEI modeling platform that included a new method to ensure the dip in light-duty vehicle sales during the 2008–09 recession is reflected for the same vehicle-model years at a future time. In other words, the tool adjusts the age distributions of light-duty source types from the base year to future years. DAQ used this new age-distribution projection tool to adjust light-duty source types from the base year of 2017 to the 2019 design day year and the future years of 2026 and 2035. The future-year age distributions for heavy-duty source types were kept the same as those in the base year of 2017, consistent with the assumption used in the 2016v2 EMP.

CRC sponsored several projects aimed at improving the on-road portion of the NEI. Vehicle speed distribution is a crucial component for on-road emission inventories. In the Clark County 2017 MOVES database, the average vehicle speed distributions from 16 MOVES speed bins for each vehicle type are based on the CRC-sponsored project A-100, which used StreetLight Vehicle Telematics Data. DAQ used the same speed distributions for the future years (2026 and 2035), consistent with the assumption used in the 2016v2 EMP.

DAQ also used fuel parameters from the MOVES4 default database. Both gasoline and diesel sulfur levels are required to meet EPA requirements for low sulfur content as part of the Tier 2 standard (before 2017) or the Tier 3 standard (after 2017). Nevada caps the fuel Reid vapor pressure in Clark County at 9.0 pounds per square inch (psi), with a 1.0-psi waiver for ethanol-blended fuels.

Information regarding vehicle I/M programs is another important input for the MOVES model. In the Las Vegas Valley, the state I/M program requires an annual two-speed idle test for 1995 and older vehicles, and on-board diagnostics checks (exhaust and evaporative) for 1996 and newer vehicles. In the past, the I/M program exempted a new vehicle from emissions testing for the first two years; during the 2021 legislative session, AB 349 changed the I/M grace period from two years to three years. DAQ incorporated this information into MOVES modeling, using a two-year grace period for 2019 and a three-year grace period for 2026 and 2035.

8.3 EMISSIONS ESTIMATES

Table 8-7 shows the PM_{10} emissions estimates for the design day emissions for the base year and future years (2026 and 2035).

Table 8-7. Clark County On-road Vehicle PM10 Emissions (tpd) within HA 212

Emissions Type	2019	2026	2035
Exhaust	0.691	0.442	0.327
Brakewear	1.744	1.968	2.163
Tirewear	0.536	0.604	0.664
Total:	**2.971**	**3.014**	**3.154**

9.0 ON-ROAD MOBILE EMISSIONS

9.1 DESCRIPTION

This category includes all mobile sources not operated on highways, such as lawn and garden equipment, construction equipment, and portable industrial, commercial, and agricultural engines that either move under their own power or are movable from site to site.

9.2 METHODOLOGY

Estimated design day and projected emissions were determined using the MOVES4-Nonroad module, the latest release of EPA's MOVES model. MOVES4-Nonroad estimates combustion-related engine emissions based on engine type (compression or spark), fuel type, and size in the following 12 economic sectors:

- Airport service (e.g., terminal tractors) (excludes aircraft)
- Agricultural equipment (e.g., tractors, combines, balers)
- Construction equipment (e.g., graders, backhoes)
- Industrial equipment (e.g., forklifts, sweepers)
- Commercial equipment (e.g., forklifts, sweepers)
- Recreational vehicles (e.g., all-terrain vehicles, off-road motorcycles)
- Residential and commercial lawn & garden equipment (e.g., leaf blowers, snow blowers)
- Logging operations (e.g., shredders, large chain saws)
- Recreational marine vessels (e.g., power boats)
- Oil field operations
- Railroad support operations (excludes locomotives)[22]
- Underground mining.

DAQ eliminated certain sectors from the inventory because other inventory categories accounted for the emissions or source level activity within HA 212 was zero or trivial, as Table 9-1 shows.

Table 9-1. Nonroad Sectors Excluded from Inventory

Sector	Reason
Airport service	Emissions included in Point Source category
Recreational marine vessels	Zero or trivial activity within HA 212 (pleasure craft usage at Lake Mead and Lake Las Vegas occurs outside HA 212)
Logging operations	Zero or trivial activity within HA 212
Oil field operations	Zero or trivial activity within HA 212

[22] Railroad support operations include combustion-related emissions resulting from various maintenance activities, such as replacing worn-out parts, greasing points, cleaning, repacking ballast, concrete repair, rail plate reinforcing, anchor straightening, and other general upkeep activities.

MOVES4-Nonroad incorporates the effects of promulgated federal regulations, including Tier 4 emissions standards for non-road compression-ignition engines and low-sulfur nonroad diesel fuel. It also accounts for fleet turnover effects (e.g., old engines are replaced by new ones subject to stricter controls, engine type EFs decrease over time) and increases in emissions due to population growth. Equation 9-1 (DAQ 2012) shows the general equation used for estimating emissions in the model.

Equation 9-1. MOVES4-Nonroad Emissions Calculation

$$E = (N)(P)(LF)(A)(EF)$$

where:

N	=	Engine population
P	=	Average engine power (hp)
LF	=	load factor (fraction of available power)
A	=	activity (hrs/yr)
EF	=	Emission factor (g/hp-hr)

MOVES4-Nonroad uses default estimates, variables, and factors in its calculations that users can change if more appropriate local-area data are available. DAQ used model default values for most parameters except ambient temperature and fuel specification, summarized in Table 9-2. To calculate sulfur-level parameters, inputs of 30 parts per million for gasoline and 15 for diesel were used for all modeling years.

Table 9-2. Input Parameters for MOVES4-Nonroad Modeling

Parameter	2018	2026	2035
Fuel RVP for gas (psi)	9.18	9.74	9.74
Oxygen weight	2.47%	3.5%	3.5%
Gas sulfur	0.0030%	0.0030%	0.0030%
Diesel sulfur	0.0015%	0.0015%	0.0015%
Marine diesel sulfur	0.0015%	0.0015%	0.0015%
CNG/LPG sulfur	0.0030%	0.0030%	0.0030%
Minimum temperature (ºF)	63	63	63
Maximum temperature (ºF)	80.1	80.1	80.1
Average temperature (ºF)	72.2	72.2	72.2
Regional altitude	LOW	LOW	LOW
Market share of ethanol blends	70.5%	100%	100%
Volume of ethanol	10%	10%	10%

Note: RVP=Reid vapor pressure; CNG=compressed natural gas; LPG=liquified petroleum gas.

MOVES4-Nonroad calculates daily emissions for weekdays and weekends by month and year. DAQ assumed a weekday modeling scenario because the design day falls on a Tuesday. Because model output is provided on a county basis, DAQ estimated emissions for HA 212 based on the percentage of HA 212 population included within Clark County. Table 9-3 provides a summary of estimated emissions for the 2019 baseline year, the 2026 midpoint year, and the 2035 horizon year. Figure 9-1 is a graphical representation of Table 9-3.

Table 9-3. Nonroad PM10 Emissions Estimates (tpd)

Equipment Type	2019	2026	2035
Recreational vehicles	0.03	0.03	0.03
Construction equipment	2.22	1.18	0.63
Industrial equipment	0.02	0.02	0.02
Lawn/Garden equipment	0.90	0.93	0.99
Agricultural equipment	0.00	0.00	0.00
Commercial equipment	0.08	0.06	0.06
Railroad support operations	0.00	0.00	0.00
Total	**3.25**	**2.22**	**1.73**

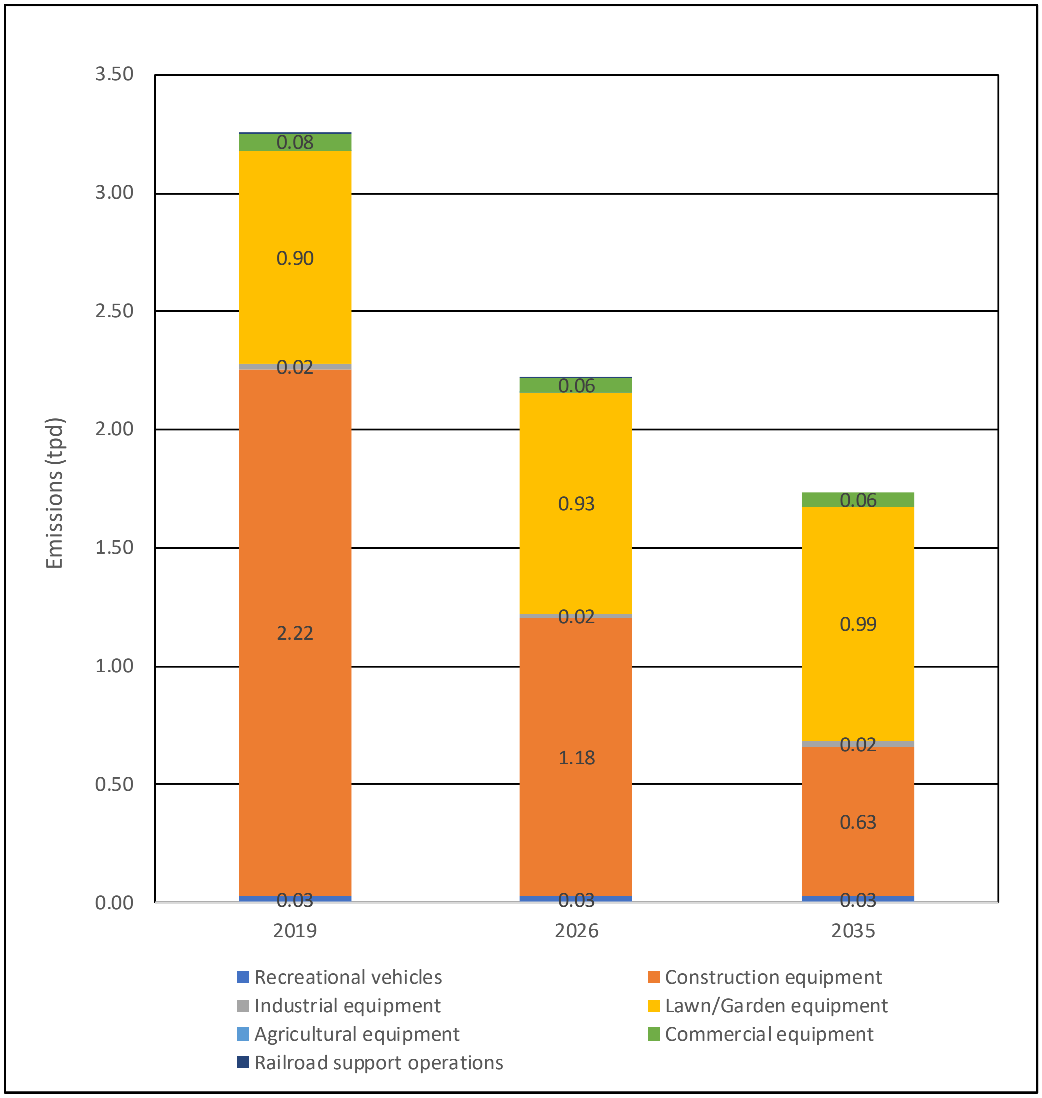

Figure 9-1. HA 212 Nonroad Emissions.

10.0 EMISSION REDUCTION CREDITS

DAQ may grant Emission Reduction Credits (ERCs), upon request and under strict guidelines, to a source that voluntarily reduces emissions beyond required levels of control. ERCs may be sold, leased, banked for future use, or traded, in accordance with applicable regulations. However, once used to offset emissions, the credits are permanently retired.

ERCs are intended to provide an incentive for sources to reduce emissions, promoting a market-based approach to regulating air pollution. Both the Nevada Division of Environmental Protection (NDEP) and DAQ have authority to bank ERCs in Clark County. NDEP has jurisdiction over permitting, compliance, and ERC banking for specific steam-generating EGUs within Clark County, but all other units in the county are under DAQ's jurisdiction.

NDEP reported no banked ERCs for Clark County sources under its jurisdiction. Table 10-1 lists the amount of PM_{10} ERCs currently banked for Clark County sources under DAQ's jurisdiction.

Table 10-1. PM_{10} ERCs Banked in Clark County

Banking Authority	Component	tpy	tpd
Clark County	ERC Balance for PM_{10} in HA 212	112.87	0.31

There are no pending ERC applications at either DAQ or NDEP as of 2024. For the emissions analysis, DAQ included all banked PM_{10} ERCs in the 2026 and 2035 inventory years.

11.0 SUPPORTING CALCULATIONS

The tables in this section provide supporting calculations for the source categories listed in Table 11-1.

Table 11-1. Supporting Calculations

Point Sources	
All supporting calculations for the 'EGUs' and 'Airports' subcategories can be found in Sections 4.1.1 and 4.1.2, respectively.	
Nonpoint Sources	
Fugitive Dust	Paved Road
	Unpaved Roads
	Agricultural Operations
Other Nonpoint Sources	Fuel Combustion
	Commercial Cooking
	Residential Wood Combustion
	Structural Fires
	Vehicle Fires
	Locomotive
	Miscellaneous Non-Industrial NEC

Note: All supporting calculations for the 'Construction' and 'Wind Erosion from Vacant Lands' subcategories can be found in Sections 6.2 and 6.3, respectively.

Table 11-2. Point Source: Non-EGUs

Point Sources: Non-EGUs													
				Temporal Adjustments		2016v3 Growth Rate (%)		Annual Emissions (tpy)			Design Day Emissions (tpd)		
NAICS	Description	Number of Facilities	2019 DAQ Emissions (tpy)	Monthly	Weekly	2019>>2026	2026>>2035	2019	2026	2035	2019	2026	2035
212321	Construction Sand and Gravel Mining	20	357.13	0.08	0.14	13.4%	2.8%	357.13	405.16	416.48	1.06	1.21	1.41
327320	Ready-Mix Concrete Manufacturing	18	81.48	0.08	0.17	9.1%	9.3%	81.48	88.87	97.10	0.28	0.31	0.37
721120	Casino Hotels	47	129.66	0.09	0.14	13.3%	17.6%	129.66	146.88	172.75	0.40	0.45	0.60
324121	Asphalt Paving Mixture and Block Manufacturing	6	88.84	0.08	0.14	16.5%	17.3%	88.84	103.52	121.38	0.26	0.31	0.42
212390	Other Nonmetallic Mineral Mining and Quarrying	1	81.08	0.08	0.14	13.4%	2.8%	81.08	91.98	94.55	0.24	0.27	0.32
331410	Nonferrous Metal (except Aluminum) Smelting and Refining	1	66.57	0.08	0.14	-4.8%	8.6%	66.57	63.41	68.86	0.20	0.19	0.20
562111	Solid Waste Collection	2	22.38	0.08	0.14	13.3%	17.6%	22.38	25.35	29.82	0.07	0.07	0.10
327420	Gypsum Product Manufacturing	1	16.62	0.08	0.14	10.0%	12.2%	16.62	18.28	20.51	0.05	0.05	0.07
812331	Linen Supply	7	8.25	0.08	0.20	13.3%	17.6%	8.25	9.35	10.99	0.03	0.04	0.05
622110	General Medical and Surgical Hospitals	15	37.89	0.08	0.14	13.3%	17.6%	37.89	42.92	50.48	0.11	0.13	0.17
327410	Lime Manufacturing	1	14.13	0.08	0.14	9.1%	9.3%	14.13	15.41	16.84	0.04	0.05	0.05
325180	Other Basic Inorganic Chemical Manufacturing	3	27.54	0.08	0.14	2.9%	4.8%	27.54	28.33	29.70	0.08	0.09	0.09
326191	Plastics Plumbing Fixture Manufacturing	1	7.65	0.08	0.14	12.7%	17.9%	7.65	8.62	10.16	0.02	0.03	0.03
812320	Drycleaning and Laundry Services (except Coin-Operated)	5	6.99	0.08	0.20	13.3%	17.6%	6.99	7.92	9.31	0.03	0.03	0.04
812332	Industrial Launderers	5	14.63	0.08	0.20	13.3%	17.6%	14.63	16.57	19.49	0.06	0.07	0.09
518210	Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	4	0.60	0.08	0.20	13.3%	17.6%	0.60	0.68	0.80	0.00	0.00	0.00
327331	Concrete Block and Brick Manufacturing	4	6.62	0.08	0.14	9.7%	11.3%	6.62	7.26	8.08	0.02	0.02	0.03

Table 11-3. Fugitive Dust: Paved/Unpaved Roads

Fugitive Dust: Paved/Unpaved Roads														
			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2294000000	Dust - Paved Road Dust	2,814.30	0.08	0.12	1.7%	2.0%	2,727	2,820	3,191	3,560	6.85	7.08	8.01	8.94
2296000000	Dust - Unpaved Road Dust	6,369.87	0.08	0.12	0.0%	0.0%	1,038	1,038	1,038	1,038	2.61	2.61	2.61	2.61

Table 11-4. Fugitive Dust: Agricultural Operations

Fugitive Dust: Agricultural Operations

			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2801000003	Agriculture - Crops & Livestock Dust	39.03	0.08	0.17	0.0%	0.0%	39.03	39.03	39.03	39.03	0.13	0.13	0.13	0.13
2805001000	Agriculture - Crops & Livestock Dust	47.05	0.06	0.14	0.0%	0.0%	45.59	45.59	45.59	45.59	0.10	0.10	0.10	0.10
2801500171	Fires - Agricultural Field Burning	0.56	0.08	0.14	0.0%	0.0%	0.54	0.54	0.54	0.54	0.00	0.00	0.00	0.00
2805001020	Agriculture - Crops & Livestock Dust	0.00	0.07	0.14	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2805001040	Agriculture - Crops & Livestock Dust	0.04	0.07	0.14	0.0%	0.0%	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00
2805001030	Agriculture - Crops & Livestock Dust	0.04	0.07	0.14	0.0%	0.0%	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00
2805001010	Agriculture - Crops & Livestock Dust	0.55	0.07	0.14	0.0%	0.0%	0.53	0.53	0.53	0.53	0.00	0.00	0.00	0.00
2805001050	Agriculture - Crops & Livestock Dust	0.00	0.07	0.14	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 11-5. Other Non-Point Sources: Fuel Combustion

Other Non-Point Sources: Fuel Combustion

			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2102001000	Fuel Comb - Industrial Boilers, ICEs - Coal	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2102002000	Fuel Comb - Industrial Boilers, ICEs - Coal	90.76	0.08	0.15	-2.2%	0.5%	87.94	84.06	77.49	79.88	0.27	0.26	0.24	0.24
2102004001	Fuel Comb - Industrial Boilers, ICEs - Oil	4.54	0.08	0.15	3.3%	0.7%	4.40	4.69	5.37	5.59	0.01	0.01	0.02	0.02
2102004002	Fuel Comb - Industrial Boilers, ICEs - Oil	57.27	0.08	0.15	3.3%	0.7%	55.49	59.13	67.75	70.43	0.17	0.18	0.21	0.22
2102005000	Fuel Comb - Industrial Boilers, ICEs - Oil	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2102006000	Fuel Comb - Industrial Boilers, ICEs - Natur	1.86	0.08	0.15	3.3%	0.8%	1.80	1.92	2.21	2.31	0.01	0.01	0.01	0.01
2102007000	Fuel Comb - Industrial Boilers, ICEs - Other	0.08	0.08	0.15	-13.3%	23.7%	0.08	0.06	0.03	0.05	0.00	0.00	0.00	0.00
2102011000	Fuel Comb - Industrial Boilers, ICEs - Oil	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103001000	Fuel Comb - Comm/Institutional - Coal	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103002000	Fuel Comb - Comm/Institutional - Coal	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103004001	Fuel Comb - Comm/Institutional - Oil	0.05	0.08	0.15	0.0%	0.0%	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00
2103004002	Fuel Comb - Comm/Institutional - Oil	0.05	0.08	0.15	0.0%	0.0%	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00
2103005000	Fuel Comb - Comm/Institutional - Oil	0.00	0.08	0.15	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103006000	Fuel Comb - Comm/Institutional - Natural (	6.23	0.08	0.15	0.3%	2.2%	6.03	6.07	6.55	7.35	0.02	0.02	0.02	0.02
2103007000	Fuel Comb - Comm/Institutional - Other	0.16	0.08	0.15	0.0%	0.0%	0.16	0.16	0.16	0.16	0.00	0.00	0.00	0.00
2103011000	Fuel Comb - Comm/Institutional - Oil	0.04	0.08	0.15	0.0%	0.0%	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00
2104002000	Fuel Comb - Residential - Other	0.00	0.06	0.14	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2104004000	Fuel Comb - Residential - Oil	0.17	0.06	0.14	0.0%	0.0%	0.17	0.17	0.17	0.17	0.00	0.00	0.00	0.00
2104006000	Fuel Comb - Residential - Natural Gas	7.54	0.06	0.14	0.0%	0.0%	7.31	7.31	7.31	7.31	0.02	0.02	0.02	0.02
2104007000	Fuel Comb - Residential - Other	0.15	0.06	0.14	0.0%	0.0%	0.15	0.15	0.15	0.15	0.00	0.00	0.00	0.00
2104011000	Fuel Comb - Residential - Oil	0.00	0.08	0.14	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2103008000	Fuel Comb - Comm/Institutional - Biomass	54.23	0.08	0.15	0.0%	0.0%	52.54	52.54	52.54	52.54	0.16	0.16	0.16	0.16
2102008000	Fuel Comb - Industrial Boilers, ICEs - Bioma	19.55	0.08	0.15	-0.6%	2.3%	18.94	18.71	19.48	21.96	0.06	0.06	0.06	0.07

Table 11-6. Other Non-Point Sources: Commercial Cooking

Other Non-Point Sources: Commercial Cooking														
			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2302002100	Commercial Cooking	97.43	0.08	0.14	1.6%	2.3%	94.40	97.34	110.27	124.40	0.28	0.29	0.33	0.37
2302002200	Commercial Cooking	692.65	0.08	0.14	1.6%	2.3%	671.11	691.99	783.95	884.36	2.00	2.06	2.33	2.63
2302003100	Commercial Cooking	180.33	0.08	0.14	1.6%	2.3%	174.72	180.15	204.10	230.24	0.52	0.54	0.61	0.69
2302003200	Commercial Cooking	11.83	0.08	0.14	1.6%	2.3%	11.46	11.82	13.39	15.11	0.03	0.04	0.04	0.04

Table 11-7. Other Non-Point Sources: Residential Wood Combustion

Other Non-Point Sources: Residential Wood Combustion														
			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2104008100	Fuel Comb - Residential - Wood	132.21	0.00	0.14	1.0%	1.0%	128.10	130.73	139.92	147.79	0.00	0.00	0.00	0.00
2104008210	Fuel Comb - Residential - Wood	26.62	0.00	0.14	-2.0%	-1.6%	25.79	24.77	21.65	19.51	0.00	0.00	0.00	0.00
2104008220	Fuel Comb - Residential - Wood	10.08	0.00	0.14	0.6%	0.3%	9.76	9.88	10.20	10.40	0.00	0.00	0.00	0.00
2104008230	Fuel Comb - Residential - Wood	7.64	0.00	0.14	0.9%	0.5%	7.40	7.53	7.90	8.14	0.00	0.00	0.00	0.00
2104008310	Fuel Comb - Residential - Wood	72.80	0.00	0.14	-1.8%	-1.5%	70.54	67.98	60.11	54.56	0.00	0.00	0.00	0.00
2104008320	Fuel Comb - Residential - Wood	27.56	0.00	0.14	0.6%	0.3%	26.71	27.02	27.91	28.43	0.00	0.00	0.00	0.00
2104008330	Fuel Comb - Residential - Wood	20.89	0.00	0.14	0.9%	0.5%	20.24	20.59	21.62	22.27	0.00	0.00	0.00	0.00
2104008400	Fuel Comb - Residential - Wood	1.55	0.00	0.14	4.3%	2.0%	1.50	1.63	2.00	2.23	0.00	0.00	0.00	0.00
2104008510	Fuel Comb - Residential - Wood	12.21	0.00	0.14	-9.0%	-17.9%	11.83	9.70	2.52	-3.34	0.00	0.00	0.00	0.00
2104008530	Fuel Comb - Residential - Wood	1.35	0.00	0.14	4.3%	2.0%	1.31	1.42	1.75	1.95	0.00	0.00	0.00	0.00
2104008610	Fuel Comb - Residential - Wood	27.55	0.12	0.14	0.0%	-0.2%	26.69	26.70	26.58	26.34	0.11	0.11	0.11	0.11
2104008620	Fuel Comb - Residential - Wood	17.60	0.12	0.14	0.0%	-0.2%	17.05	17.06	16.98	16.83	0.07	0.07	0.07	0.07
2104008630	Fuel Comb - Residential - Wood	0.04	0.12	0.14	0.0%	-0.2%	0.04	0.04	0.04	0.03	0.00	0.00	0.00	0.00
2104008700	Fuel Comb - Residential - Wood	159.33	0.11	0.07	1.0%	0.6%	154.38	157.55	167.05	173.37	0.28	0.29	0.30	0.31
2104009000	Fuel Comb - Residential - Wood	48.74	0.00	0.14	1.0%	0.6%	47.22	48.19	51.10	53.03	0.00	0.00	0.00	0.00

Table 11-8. Other Non-Point Sources: Structure Fires

Other Non-Point Sources: Structure Fires												
			Temporal Adjustments		Populaton Growth (%)		Annual Emissions (tpy)			Design Day Emissions (tpd)		
SCC	Fire District	Number of Fires	Monthly	Weekly	2019>>2026	2026>>2035	2019 (Baseline)	2026	2035	2019 (Baseline)	2026	2035
2810030000	Boulder City FD	5	0.08	0.14	11.5%	13.4%	0.03	0.03	0.04	0.00	0.00	0.00
2810030000	City of Las Vegas Fire & Rescue	644	0.08	0.14	11.5%	13.4%	3.87	4.32	4.90	0.01	0.01	0.02
2810030000	Clark County Fire Protection District	749	0.08	0.14	11.5%	13.4%	4.51	5.02	5.70	0.01	0.01	0.02
2810030000	Henderson Fire Department	136	0.08	0.14	11.5%	13.4%	0.82	0.91	1.03	0.00	0.00	0.00
2810030000	North Las Vegas Fire Department	234	0.08	0.14	11.5%	13.4%	1.41	1.57	1.78	0.00	0.00	0.01

Table 11-9. Other Non-Point Sources: Vehicle Fires

Other Non-Point Sources: Vehicle Fires												
			Temporal Adjustments		Populaton Growth (%)		Annual Emissions (tpy)			Design Day Emissions (tpd)		
SCC	Fire District	Number of Fires	Monthly	Weekly	2019>>2026	2026>>2035	2019 (Baseline)	2026	2035	2019 (Baseline)	2026	2035
2810050000	Boulder City FD	3	0.08	0.14	11.5%	13.4%	0.04	0.04	0.05	0.00	0.00	0.00
2810050000	City of Las Vegas Fire & Rescue	283	0.08	0.14	11.5%	13.4%	3.43	3.82	4.33	0.01	0.01	0.01
2810050000	Clark County Fire Protection District	265	0.08	0.14	11.5%	13.4%	3.21	3.58	4.06	0.01	0.01	0.01
2810050000	Henderson Fire Department	85	0.08	0.14	11.5%	13.4%	1.03	1.15	1.30	0.00	0.00	0.00
2810050000	North Las Vegas Fire Department	125	0.08	0.14	11.5%	13.4%	1.51	1.69	1.91	0.00	0.01	0.01

Table 11-10. Other Non-Point Sources: Locomotive

Other Non-Point Sources: Locomotive														
			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2285002006	Mobile - Locomotives	14.29	0.09	0.14	-3.4%	-3.3%	13.85	12.90	10.34	8.07	0.043	0.040	0.032	0.025

Table 11-11. Other Non-Point Sources: Miscellaneous Non-Industrial NEC

Other Non-Point Sources: Miscellaneous Non-Industrial NEC														
			Temporal Adjustments		2016v3 Growth Factors (%/yr)		Annual Emissions (tpy)				Design Day Emissions (tpd)			
SCC	Sector	2017 NEI Emissions (tpy)	Monthly	Weekly	GAF (2023)	GAF (2026)	2017 (Downscaled)	2019 (Baseline)	2026	2035	2017 (Downscaled)	2019 (Baseline)	2026	2035
2810025000	Miscellaneous Non-Industrial NEC	94.59	0.07	0.07	1.6%	2.3%	91.65	94.50	107.06	120.77	0.11	0.11	0.13	0.14
2810060200	Miscellaneous Non-Industrial NEC	0.00	0.08	0.14	0.0%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2810060100	Miscellaneous Non-Industrial NEC	1.66	0.08	0.14	1.6%	2.3%	1.60	1.65	1.87	2.11	0.00	0.00	0.01	0.01

12.0 REFERENCES

43 U.S.C. 932. Mining Act of 1866 (repealed 1976).

43 U.S.C. 1761. Federal Land Policy and Management Act of 1976.

40 CFR 51. "Requirements for Preparation, Adoption, and Submittal of Implementation Plans.

73 FR 76555. "Air Emissions Reporting Requirements."

CCDCP 2022. Clark County vacant land usage data for 2003–2022 by year and HA 212 community, Clark County Desert Conservation Program, 2022.

CDM 2020. *Airport Design Day Inventory Calculations*, CDM Smith, 2020.

DAQ 2001. *PM_{10} State Implementation Plan for Clark County*. Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2003. *Construction Activities Dust Control Handbook*. Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2006. "Average Vehicle Fleet Weight in Clark County." Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2007. *PM_{10} State Implementation Plan Milestone Achievement Report*. Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2010. "Review of National Fugitive Construction Activities Emissions Inventories Based on Pechan Methodology." Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2012. *PM_{10} Redesignation Request and Maintenance Plan*. Las Vegas, Nevada: Clark County Department of Air Quality.

DAQ 2021. *Second Maintenance Plan for the 1997 8-hour Ozone NAAQS, Clark County, Nevada,* Clark County Department of Environment and Sustainability, December 2021.

DAQ 2023. HA-212 vacant land usage data by year and region (2003–2022), Clark County Division of Air Quality, 2023.

DAQ 2024. DAQ *dust permit database (query of 2019 air emissions sources within HA-212)*, Clark County Division of Air Quality, 2024.

DAQ 2024. Air permitting emissions inventory database (query of 2019 air emissions sources within HA-212 with PM_{10} emissions > 0 tpy), Clark County Division of Air Quality, 2024.

DAQ 2024. *Clark County Division of Comprehensive Planning Geographic Information Land Use Information System (GILIS) (query of 2019 land use codes/acreage within HA-212),* Data provided by Clark County Division of Air Quality, 2024.

DCP 2024. Estimates of inventory by communities obtained from Clark County Department of Comprehensive Planning (DCP), 2024.

D&M 2000a. *PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley*, Dames & Moore/Clark County Department of Air Quality, 2000.

D&M 2000b. *Silt Loading Measurements for Clark County Paved Roads*, Dames & Moore, Clark County Department of Air Quality, 2000.

DOA 2023. *Presentation: Clark County Department of Aviation Airport System Strategic Update, Executive Summary,* Clark County Department of Aviation, December 2023.

DRI 1997. *Fugitive Dust and Other Source Contributions to PM_{10} in Nevada's Las Vegas Valley*. DRI Document No. 4039.2F1. Las Vegas, Nevada: Desert Research Institute.

EC/R 2002. *Development of Emissions Inventory Methods for Wildland Fire*, Battye, William and Battye Rebecca, EC/R Incorporated, February 2002.

EIA 2019. *EIA-923 Monthly Generation and Fuel Consumption Time Series File, 2019 Final Revision*, U.S. Department of Energy, The Energy Information Administration (EIA), 2019.

EIIP 2000. *Area Source Category Method Abstract–Vehicle Fires,* US EPA EIIP, May 2000.

EIIP 2001. *Volume III, Chapter 18, Structure Fires,* US EPA EIIP, January 2001.

EPA 1988a. *Control of Open Fugitive Dust Sources*. EPA-450/3-88-008. Washington, D.C.: U.S. Environmental Protection Agency.

EPA 1988b. *Gap Filling PM_{10} Emission Factors for Selected Open Area Dust Sources*. EPA450/4-88-003. Washington, D.C.: U.S. Environmental Protection Agency.

EPA 1991. *Procedures for Preparing Emissions Projections*. EPA-450/4-91-019. Washington, D.C.: U.S. Environmental Protection Agency.

EPA 1996. AP-42 Section 13.1, *Wildfires and Prescribed Burning,* US EPA, October 1996.
EPA 1997. *Emission Inventory Improvement Program Technical Report Series*. 10 vols. EPA 454/R-97-004. Washington, D.C.: U.S. Environmental Protection Agency.

EPA 2010. *Nonroad Engine Population Estimates*, Assessment and Standards Division, Office of Transportation and Air Quality, US EPA, July 2010.

EPA 2017. *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations,* EPA-454/B-17-002, US EPA, May 2017.

EPA 2021a. *2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document, EPA-454/R-21-001,* US EPA, February 2021.

EPA 2021b. *Integrated Planning Model (IPM), Version 6, Summer 2021 Reference Case*, US EPA, 2021. (https://www.epa.gov/power-sector-modeling/documentation-epas-power-sector-modeling-platform-v6-summer-2021-reference)

EPA 2021c. *State Review Framework Clark County Department of Environment and Sustainability Clean Air Act Implementation in Calendar Year 2019*, U.S. EPA, Region 9, January 7, 2021.

EPA 2023. *Air Emissions Modeling Platform (2016v3) - Technical Support Document and Supporting Data Files,* US EPA, 2023.

EPA 2023. "Guidance on the Preparation of State Implementation Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter," Draft Guidance, Office of Air Quality Planning and Standards, Air Quality Policy Division dated March 17, 2023.

EPA 2023. *Overview of EPA's Motor Vehicle Emission Simulator (MOVES4)*, Assessment and Standards Division, Office of Transportation and Air Quality, US EPA, August 2023.

EPA 2024. Source Classification Codes (SCC) online database (https://sor-scc-api.epa.gov/sccwebservices/sccsearch/), US EPA, 2024.

EQM 2006. *An Inventory of Vacant Land Soil Stability and Unpaved Private Roads in the Las Vegas Valley Using Remote Sensing Imagery*. Las Vegas, Nevada: Clark County Department of Air Quality.

ERTAC 2013. *Energy Generating Unit (EGU) Projection Tool, Continental Unit States (CONUS) Version 16.0*, Eastern Regional Technical Advisory Committee (ERTAC), 2013.

Fitz 2000. "Evaluation of Watering to Control Dust in High Winds." *Journal of the Air & Waste Management Association* 50 (April 2000): 570-577, Fitz, D., and K. Bumiller, 2000.

FRA 2011. *DesertXpress Final Environmental Impact Statement (FEIS), Appendix F-L, Regional Emission Calculation Worksheets*, Federal Railroad Administration, March 2011.

FRA 2023. *Brightline West Victor Valley, CA to Las Vegas, NV High-Speed Rail Project Reevaluation*, Federal Railroad Administration, September 2023.

MRCC 2024. *Midwestern Regional Climate Center (MRCC) cli-MATE Online Database (query of hourly design day wind speed data for McCarran International Airport*), (https://mrcc.purdue.edu/CLIMATE/), Midwestern Regional Climate Center, 2024.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1), Final Report*. Diamond Bar, California: South Coast Air Quality Management District.

MRI 2006. *An Inventory of Vacant Land Soil Stability and Unpaved Private Roads in the Las Vegas Valley Using Remote Sensing Imagery,* Environmental Quality Management, Inc. and Midwest Research Institute, December 2006.

NCDC 2009. "Climate Data Online: Summaries and Analysis: U.S. Local Climatological Data: McCarran International Airport" [accessed 2/2/12]. http://gis.ncdc.noaa.gov/map/lcd/

NDOT 2020. *Annual Vehicle Miles of Travel, 2019 Highway Performance Monitoring System*, Nevada Department of Transportation, August 2020.

NFIRS 2024. *NFIRS 5.0 National Reporting System*, *Summary By Incident Type (1/1/2019-12/31/2019),* NFIRS online database, April 2024.

OMB 2007. *North American Industry Classification System*. Washington, D.C.: Economic Classification Policy Committee, Office of Management and Budget.

Regional Transportation Commission of Southern Nevada. [1] *Let's Go 2050: The RTC Regional Transportation Plan Update, Appendix E–Air Quality Conformity Analysis*. Las Vegas, NV

UNLV 2022. *2022-2026 Population Forecasts–Long Term Projections for Clark County Nevada,* Center for Business and Economic Research, University of Nevada, Las Vegas, June 2022.

USAF 2022. *Final Environmental Assessment, Contracted Close Air Support, Nellis Air Force Base, Nevada,* United States Air Force, April 2022.

USCB 2024, *United States Census Bureau - Online Census Database* (query for 2010 population of Clark County, NV) (https://data.census.gov/), US Census Bureau. 2024.

USDA 2017. *Census of Agricultural–County Profile, Clark County Nevada*, United States Department of Agriculture, 2017.