North Hollywood to Pasadena Bus Rapid Transit (BRT) Corridor Planning and Environmental Study

GREENHOUSE GAS EMISSIONS TECHNICAL REPORT

Prepared For:

Metro

TABLE OF CONTENTS

LIST OF FIGURES iii
LIST OF TABLES iv
ACRONYMS AND ABBREVIATIONS v

1. INTRODUCTION 1

2. PROJECT DESCRIPTION 2

3. REGULATORY FRAMEWORK 10
3.1 Federal Regulations 10
3.2 State Regulations 12
3.3 Local Regulations 15

4. EXISTING SETTING 25

5. SIGNIFICANCE THRESHOLDS AND METHODOLOGY 30

6. IMPACT ANALYSIS 34

7. CUMULATIVE ANALYSIS 34

8. REFERENCES 47

9. LIST OF PREPARERS 52

LIST OF FIGURES

Figure 1 – Proposed Project with Route Options 3

Figure 2a – Cumulative Impact Study Area 39

Figure 2b – Cumulative Impact Study Area 40

Figure 2c – Cumulative Impact Study Area 41

LIST OF TABLES

Table 1 – Route Segments 5
Table 2 – Proposed/Optional Stations 8
Table 3 – City of Burbank GGRP Action Areas and Measures 20
Table 4 – City of Glendale Greener Glendale Plan GHG Policies 21
Table 5 – City of Pasadena CAP Reduction Strategies and Measures 22
Table 6 – GHG Emissions in California 26
Table 7 – GHG Emissions from On-Road Emissions in the SCAG Region 27
Table 8 – GHG Emissions for the SCAG Region from Three Primary Sectors 27
Table 9 – GHG Emissions from Metro Operations in 2019 28
Table 10 – Carbon Intensity Factors 32
Table 11 – Regional Vehicle Miles Traveled 33
Table 12 – Annual GHG Emissions (2042) 35
Table 13 – Related Projects 42

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
BRT	Bus Rapid Transit
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
Cal EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFCs	Chlorofluorocarbons
CH_4	Methane
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
GGRP	Greenhouse Gas Reduction Plan
GHG	Greenhouse gas
HCFCs	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
LADWP	Los Angeles Water and Power
LRT	Light Rail Transit
Metro	Los Angeles County Metropolitan Transportation Authority
$MMTCO_2e$	Million Metric Tons of Carbon Dioxide Equivalent
mpg	Miles per Hour
$MTCO_2e$	Metric Tons of Carbon Dioxide Equivalent

N_2O	Nitrous Oxide
NHTSA	National Highway Traffic Safety Administration
OPR	Office of Planning and Research
PFCs	Perfluorocarbons
PRC	Public Resources Code
RHNA	Regional Housing Needs Assessment
ROW	Right-of-Way
RTP	Regional Transportation Plan
SAFE	Safe Affordable Fuel-Efficient
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SF6	Sulfur Hexafluoride
SFV	San Fernando Valley
TSP	Transit Signal Priority
USC	United States Code
USEPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
ZEB	Zero Emission Bus
ZEV	Zero Emission Vehicle

1. Introduction

The Los Angeles County Metropolitan Transportation Authority (Metro) is proposing the North Hollywood to Pasadena Bus Rapid Transit (BRT) Corridor Project (Proposed Project or Project) which would provide a BRT service connecting several cities and communities between the San Fernando and San Gabriel Valleys. Specifically, the Proposed Project would consist of a BRT service that runs from the North Hollywood Metro B/G Line (Red/Orange) station in the City of Los Angeles through the Cities of Burbank, Glendale, the community of Eagle Rock in the City of Los Angeles, and Pasadena, ending at Pasadena City College. The Proposed Project with route options would operate along a combination of local roadways and freeway sections with various configurations of mixed-flow and dedicated bus lanes depending on location. A Draft Environmental Impact Report (EIR) is being prepared for the following purposes:

- To satisfy the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code (PRC) Section 21000, et seq.) and the CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Section 15000, et seq.).
- To inform public agency decision-makers and the public of the significant environmental effects of the Proposed Project, as well as possible ways to minimize those significant effects, and reasonable alternatives to the Proposed Project that would avoid or minimize those significant effects.
- To enable Metro to consider environmental consequences when deciding whether to approve the Proposed Project.

This Greenhouse Gas Emissions Technical Report is comprised of the following sections:

1. Introduction
2. Project Description
3. Regulatory Framework
4. Existing Setting
5. Significance Thresholds and Methodology
6. Impact Analysis
7. Cumulative Analysis
8. References
9. List of Preparers

2. Project Description

This section is an abbreviated version of the Project Description contained in the Draft EIR. This abbreviated version provides information pertinent to the Technical Reports. Please reference the Project Description chapter in the Draft EIR for additional details about the Proposed Project location and surrounding uses, project history, project components, and construction methods. The Draft EIR also includes a more comprehensive narrative description providing additional detail on the project routing, station locations, and proposed roadway configurations. Unless otherwise noted, the project description is valid for the Proposed Project and all route variations, treatments, and configurations.

2.1 PROJECT ROUTE DESCRIPTION

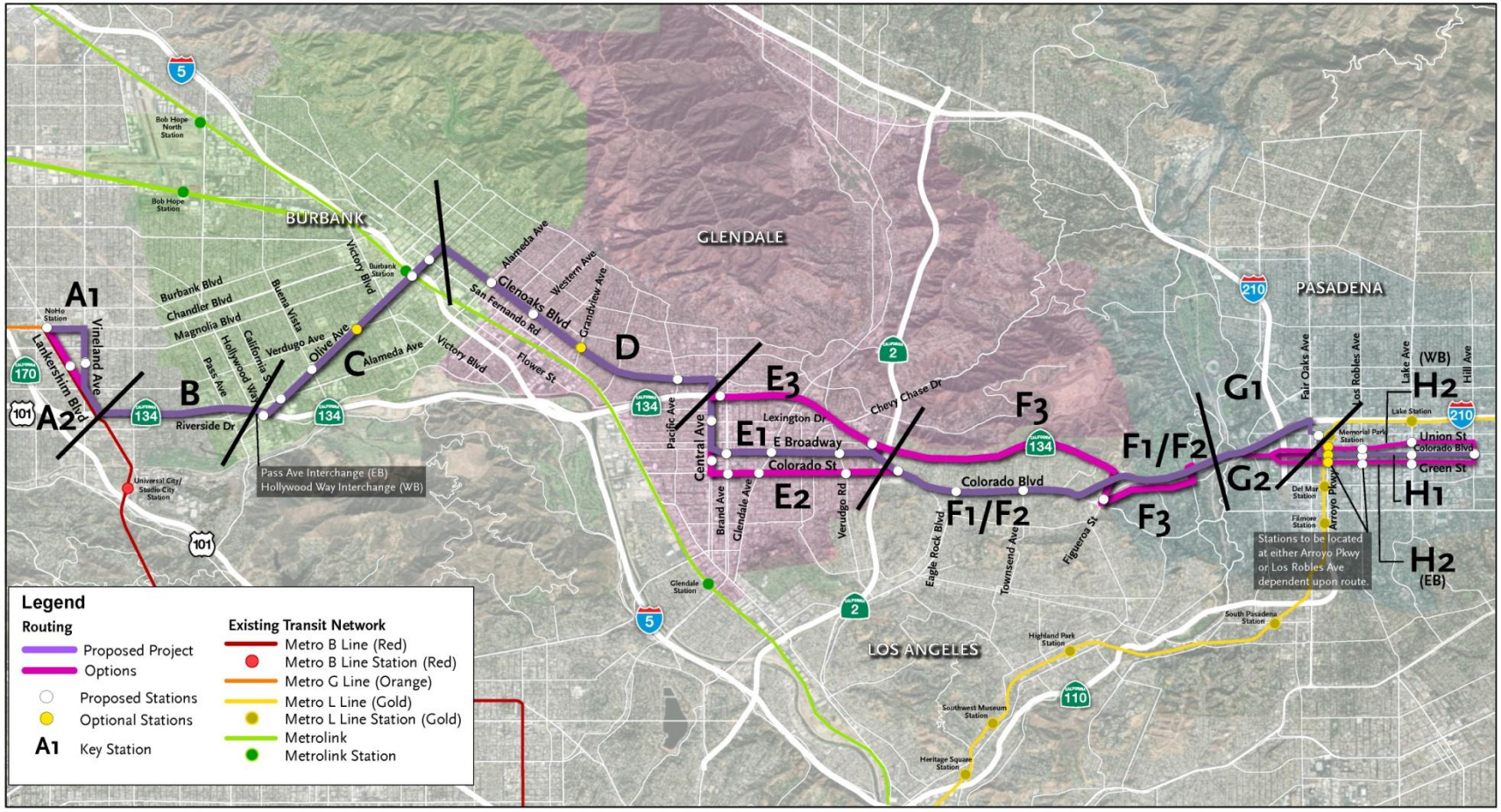
Metro is proposing the BRT service to connect several cities and communities between the San Fernando and San Gabriel Valleys. The Proposed Project extends approximately 18 miles from the North Hollywood Metro B/G Line (Red/Orange) Station on the west to Pasadena City College on the east. The BRT corridor generally parallels the Ventura Freeway (State Route 134) between the San Fernando and San Gabriel Valleys and traverses the communities of North Hollywood and Eagle Rock in the City of Los Angeles as well as the Cities of Burbank, Glendale, and Pasadena. Potential connections with existing high-capacity transit services include the Metro B Line (Red) and G Line (Orange) in North Hollywood, the Metrolink Antelope Valley and Ventura Lines in Burbank, and the Metro L Line (Gold) in Pasadena. The Study Area includes several dense residential areas as well as many cultural, entertainment, shopping and employment centers, including the North Hollywood Arts District, Burbank Media District, Downtown Burbank, Downtown Glendale, Eagle Rock, Old Pasadena and Pasadena City College (see Figure 1).

2.2 BRT ELEMENTS

BRT is intended to move large numbers of people quickly and efficiently to their destinations. BRT may be used to implement rapid transit service in heavily traveled corridors while also offering many of the same amenities as light rail but on rubber tires and at a lower cost. The Project would provide enhanced transit service and improve regional connectivity and mobility by implementing several key BRT elements. Primary components of the BRT are further addressed below and include:

- Dedicated bus lanes on city streets
- Transit signal priority (TSP)
- Enhanced stations with all-door boarding

Figure 1 – Proposed Project with Route Options



2.3 DEDICATED BUS LANES

The Proposed Project would generally include dedicated bus lanes where there is adequate existing street width, while operating in mixed traffic within the City of Pasadena. BRT service would operate in various configurations depending upon the characteristics of the roadways as shown below:

- **Center-Running Bus Lanes**: Typically includes two lanes (one for each direction of travel) located in the center of the roadway. Stations are usually provided on islands at intersections and are accessible from the crosswalk.
- **Median-Running Bus Lanes**: Typically includes two lanes (one for each direction of travel) located in the inside lane adjacent to a raised median in the center of the roadway. Stations are usually provided on islands at intersections and are accessible from the crosswalk.
- **Side-Running Bus Lanes**: Buses operate in the right-most travel lane separated from the curb by bicycle lanes, parking lanes, or both. Stations are typically provided along curb extensions where the sidewalk is widened to meet the bus lane. At intersections, right-turn bays may be provided to allow buses to operate without interference from turning vehicles and pedestrians.
- **Curb-Running Operations**: Buses operate in the right-most travel lane immediately adjacent to the curb. Stations are located along the sidewalk which may be widened to accommodate pedestrian movement along the block. Right-turning traffic merges with the bus lane approaching intersections and buses may be delayed due to interaction with right-turning vehicles and pedestrians.
- **Mixed-Flow Operations**: Where provision of dedicated bus lanes is impractical, the BRT service operates in lanes shared with other roadway vehicles, although potentially with transit signal priority. For example, where the service transitions from a center-running to side-running configuration, buses would operate in mixed-flow. Buses would also operate in mixed-flow along freeway facilities.

Table 1 provides the bus lane configurations for each route segment of the Proposed Project.

Table 1 – Route Segments

Key	Segment	From	To	Bus Lane Configuration
A1 (Proposed Project)	**Lankershim Blvd.**	**No. Chandler Blvd.**	**Chandler Blvd.**	**Mixed-Flow**
	Chandler Blvd.	**Lankershim Blvd.**	**Vineland Ave.**	**Side-Running**
	Vineland Ave.	**Chandler Blvd.**	**Lankershim Blvd.**	**Center-Running**
	Lankershim Blvd.	**Vineland Ave.**	**SR-134 Interchange**	**Center-Running** **Mixed-Flow[1]**
A2 (Route Option)	Lankershim Blvd.	No. Chandler Blvd.	SR-134 Interchange	Side-Running Curb-Running[2]
B (Proposed Project)	**SR-134 Freeway**	**Lankershim Blvd.**	**Pass Ave. (EB)** **Hollywood Wy. (WB)**	**Mixed-Flow**
C (Proposed Project)	**Pass Ave. – Riverside Dr. (EB)** **Hollywood Wy. – Alameda Ave. (WB)**	**SR-134 Freeway**	**Olive Ave.**	**Mixed-Flow[3]**
	Olive Ave.	**Hollywood Wy. (EB)** **Riverside Dr. (WB)**	**Glenoaks Blvd.**	**Curb-Running**
D (Proposed Project)	**Glenoaks Blvd.**	**Olive Ave.**	**Central Ave.**	**Curb-Running** **Median-Running[4]**
E1 (Proposed Project)	**Central Ave.**	**Glenoaks Blvd.**	**Broadway**	**Mixed Flow** **Side-Running[5]**
	Broadway	**Central Ave.**	**Colorado Blvd.**	**Side-Running**
E2 (Route Option)	Central Ave.	Glenoaks Blvd.	Colorado St.	Side-Running
	Colorado St. – Colorado Blvd.	Central Ave.	Broadway	Side-Running
E3 (Route Option)	Central Ave.	Glenoaks Blvd.	Goode Ave. (WB) Sanchez Dr. (EB)	Mixed-Flow
	Goode Ave. (WB) Sanchez Dr. (EB)	Central Ave.	Brand Blvd.	Mixed-Flow
	SR-134[6]	Brand Blvd.	Harvey Dr.	Mixed-Flow
F1 (Route Option)	Colorado Blvd.	Broadway	Linda Rosa Ave. (SR-134 Interchange)	**Side-Running**
				Side-Running Center Running[7]

Key	Segment	From	To	Bus Lane Configuration
F2 (Proposed Project)	**Colorado Blvd.**	**Broadway**	**Linda Rosa Ave. (SR-134 Interchange)**	**Side-Running**
F3 (Route Option)	SR-134	Harvey Dr.	Figueroa St.	Mixed-Flow
	Figueroa St.	SR-134	Colorado Blvd.	**Mixed-Flow**
	Colorado Blvd.	Figueroa St.	SR-134 via N. San Rafael Ave. Interchange	**Mixed-Flow**
G1 (Proposed Project)	**SR-134**	**Colorado Blvd.**	**Fair Oaks Ave. Interchange**	**Mixed-Flow**
	Fair Oaks Ave.	**SR-134**	**Walnut St.**	**Mixed-Flow**
	Walnut St.	**Fair Oaks Ave.**	**Raymond Ave.**	**Mixed-Flow**
	Raymond Ave.	**Walnut St.**	**Colorado Blvd. or Union St./Green St.**	**Mixed-Flow**
G2 (Route Option)	SR-134	Colorado Blvd.	Colorado Blvd. Interchange	Mixed-Flow
	Colorado Blvd. or Union St./Green St.	Colorado Blvd. Interchange	Raymond Ave.	Mixed-Flow
H1 (Proposed Project)	**Colorado Blvd.**	**Raymond Ave.**	**Hill Ave.**	**Mixed-Flow**
H2 (Route Option)	Union St. (WB) Green St. (EB)	Raymond Ave.	Hill Ave.	Mixed-Flow

Notes:
[1]South of Kling St.
[2]South of Huston St.
[3]Eastbound curb-running bus lane on Riverside Dr. east of Kenwood Ave.
[4]East of Providencia Ave.
[5]South of Sanchez Dr.
[6]Route continues via Broadway to Colorado/Broadway intersection (Proposed Project F2 or Route Option F1) or via SR-134 (Route Option F3)
[7]Transition between Ellenwood Dr. and El Rio Ave.

2.4 TRANSIT SIGNAL PRIORITY

TSP expedites buses through signalized intersections and improves transit travel times. Transit priority is available areawide within the City of Los Angeles and is expected to be available in all jurisdictions served by the time the Proposed Project is in service. Basic functions are described below:

- **Early Green**: When a bus is approaching a red signal, conflicting phases may be terminated early to obtain the green indication for the bus.
- **Extended Green**: When a bus is approaching the end of a green signal cycle, the green may be extended to allow bus passage before the green phase terminates.
- **Transit Phase**: A dedicated bus-only phase is activated before or after the green for parallel traffic to allow the bus to proceed through the intersection. For example, a queue jump may be implemented in which the bus departs from a dedicated bus lane or a station ahead of other traffic, so the bus can weave across lanes or make a turn.

2.5 ENHANCED STATIONS

It is anticipated that the stations servicing the Proposed Project may include the following elements:

- Canopy and wind screen
- Seating (benches)
- Illumination, security video and/or emergency call button
- Real-time bus arrival information
- Bike racks
- Monument sign and map displays

Metro is considering near-level boarding which may be achieved by a combination of a raised curb along the boarding zone and/or ramps to facilitate loading and unloading. It is anticipated that BRT buses will support all door boarding with on-board fare collection transponders in lieu of deployment of ticket vending machines at most stations.

The Proposed Project includes 21 proposed stations and two “optional” stations, and additional optional stations have been identified along the Route Options, as indicated in Table 2. Of the 21 proposed stations, four would be in the center of the street or adjacent to the median, and the remaining 17 stations would be situated on curbs on the outside of the street.

Table 2 – Proposed/Optional Stations

Jurisdiction	Proposed Project	Route Option
North Hollywood (City of Los Angeles)	North Hollywood Transit Center (Metro B/G Lines (Red/Orange) Station)	
	Vineland Ave./Hesby St.	Lankershim Blvd./Hesby St.
City of Burbank	Olive Ave./Riverside Dr.	
	Olive Ave./Alameda Ave.	
	Olive Ave./Buena Vista St.	
	Olive Ave./Verdugo Ave. (optional station)	
	Olive Ave./Front St. (on bridge at Burbank-Downtown Metrolink Station)	
	Olive Ave./San Fernando Blvd.	
City of Glendale	Glenoaks Blvd./Alameda Ave.	
	Glenoaks Blvd./Western Ave.	
	Glenoaks Blvd./Grandview Ave. (optional station)	
	Central Ave./Lexington Dr.	Goode Ave. (WB) & Sanchez Dr. (EB) west of Brand Blvd.
		Central Ave./Americana Way
	Broadway/Brand Blvd.	Colorado St./Brand Blvd.
	Broadway/Glendale Ave.	Colorado St./Glendale Ave.
	Broadway/Verdugo Rd.	Colorado St./Verdugo Rd.
		SR 134 EB off-ramp/WB on-ramp west of Harvey Dr.
	Colorado Blvd./Eagle Rock Plaza	
Eagle Rock (City of Los Angeles)	Colorado Blvd./Eagle Rock Blvd.	
	Colorado Blvd./Townsend Ave.	Colorado Blvd./Figueroa St.
	Raymond Ave./Holly St.[1] (near Metro L Line (Gold) Station)	
City of Pasadena	Colorado Blvd./Arroyo Pkwy.[2]	Union St./Arroyo Pkwy. (WB)[2] Green St./Arroyo Pkwy. (EB)[2]
	Colorado Blvd./Los Robles Ave.[1]	Union St./Los Robles Ave. (WB)[1] Green St./Los Robles Ave. (EB)[1]
	Colorado Blvd./Lake Ave.	Union St./Lake Ave. (WB) Green St./Lake Ave. (EB)
	Pasadena City College (Colorado Blvd./Hill Ave.)	Pasadena City College (Hill Ave./Colorado Blvd.)

[1]With Fair Oaks Ave. interchange routing

[2]With Colorado Blvd. interchange routing

2.6 DESCRIPTION OF CONSTRUCTION

Construction of the Proposed Project will likely include a combination of the following elements dependent upon the chosen BRT configuration for the segment: restriping, curb-and-gutter/sidewalk reconstruction, right-of-way (ROW) clearing, pavement improvements, station/loading platform construction, landscaping, and lighting and traffic signal modifications. Generally, construction of dedicated bus lanes consists of pavement improvements including restriping, whereas ground-disturbing activities occur with station construction and other support structures. Existing utilities will be protected or relocated. Due to the shallow profile of construction, substantial utility conflicts are not anticipated, and relocation efforts should be brief. Construction equipment anticipated to be used for the Proposed Project consists of asphalt milling machines, asphalt paving machines, large and small excavators/backhoes, loaders, bulldozers, dump trucks, compactors/rollers, and concrete trucks. Additional smaller equipment may also be used such as walk-behind compactors, compact excavators and tractors, and small hydraulic equipment.

The construction of the Proposed Project is expected to last approximately 24 to 30 months. Construction activities will shift along the corridor so that overall construction activities should be of relatively short duration within each segment. Most construction activities would occur during daytime hours. For specialized construction tasks, it may be necessary to work during nighttime hours to minimize traffic disruptions. Traffic control and pedestrian control during construction would follow local jurisdiction guidelines and the Work Area Traffic Control Handbook. Typical roadway construction traffic control methods will be followed including the use of signage and barricades.

It is anticipated that publicly owned ROW or land in proximity to the Proposed Project's alignment will be available for staging areas. Because the Proposed Project is anticipated to be constructed in a linear segment-by-segment method, there will not be a need for large construction staging areas in proximity to the alignment.

2.7 DESCRIPTION OF OPERATIONS

The Proposed Project will provide BRT service from 4:00 a.m. to 1:00 a.m. or 21 hours per day Sunday through Thursday, and longer service hours (4:00 a.m. to 3:00 a.m.) will be provided on Fridays and Saturdays. The proposed service span is consistent with the Metro B Line (Red). The BRT will operate with 10-minute frequency throughout the day on weekdays tapering to 15 to 20 minutes frequency during the evenings, and with 15-minute frequency during the day on weekends tapering to 30 minutes in the evenings. The BRT service will be provided on 40-foot zero-emission electric buses with the capacity to serve up to 75 passengers, including 35-50 seated passengers and 30-40 standees, and a maximum of 16 buses are anticipated to be in service along the route during peak operations. The buses will be stored at an existing Metro facility.

3. Regulatory Framework

3.1 FEDERAL REGULATIONS

3.1.1 Clean Air Act

Congress passed the first major Clean Air Act (CAA) in 1970 (42 United States Code [USC] Sections 7401 et seq.). The CAA gives the U.S. Environmental Protection Agency (USEPA) broad responsibility for regulating motor vehicle emissions from many sources of air pollution from mobile to stationary sources. Pursuant to the CAA, the USEPA is authorized to regulate air emissions from mobile sources like heavy-duty trucks, agricultural and construction equipment, locomotives, lawn and garden equipment, and marine engines; and stationary sources such as power plants, industrial plants, and other facilities. The CAA establishes federal air quality standards, known as the National Ambient Air Quality Standards, for the six most common air pollutants and specifies future dates for achieving compliance.

The *U.S. Supreme Court ruled in Massachusetts v. Environmental Protection Agency*, 127 S.Ct. 1438 (2007), that greenhouse gases (GHG) that contribute to global climate change are pollutants under the federal CAA, which the USEPA must regulate if it determines they pose an endangerment to public health or welfare. The U.S. Supreme Court did not mandate that the USEPA enact regulations to reduce global warming emissions. Instead, the Court found that the USEPA could avoid taking action if it found that global warming emissions do not contribute to climate change or if it offered a "reasonable explanation" for not determining that such emissions contribute to climate change.

3.1.2 U.S. Environmental Protection Agency Endangerment Findings

On April 17, 2009, the USEPA issued a proposed finding that GHG emissions contribute to air pollution that may endanger public health or welfare. The USEPA stated that high atmospheric levels of GHG emissions, "are the unambiguous result of human emissions and are very likely the cause of the observed increase in average temperatures and other climatic changes." USEPA further found that, "atmospheric concentrations of greenhouse gases endanger public health and welfare within the meaning of Section 202 of the Clean Air Act." The findings were signed by the USEPA Administrator on December 7, 2009.[1] While these findings alone do not impose any requirements on industry or other entities, this action is a prerequisite to regulatory actions by the USEPA, including, but not limited to, GHG emissions standards for light-duty vehicles.

[1] USEPA, *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, Final Rule*.

3.1.3 Heavy-Duty Vehicle Program

In May 2010, President Barack Obama issued a Presidential Memorandum Regarding Fuel Efficiency Standards requesting that USEPA and the National Highway Traffic Safety Administration (NHTSA) take coordinated steps to produce a new generation of clean vehicles. In response, USEPA and NHTSA adopted regulations governing Medium- and Heavy-Duty Greenhouse Gas Emissions and Fuel Efficiency (Title 40, Code of Federal Regulations, Chapter I) on September 15, 2011 (most recently amended on August 16, 2013) to establish the first fuel efficiency requirements for medium- and heavy-duty vehicles beginning with the model year 2014 through model year 2018. On February 18, 2014, the President directed USEPA and NHTSA to set the next round of fuel efficiency standards for medium- and heavy-duty vehicles (beyond model year 2018) that will build on the existing standards to further reduce fuel consumption through the application of advanced cost-effective technologies and continue to improve the efficiency of moving goods across the United States. In October 2016, USEPA and NHTSA adopted Phase 2 GHG and fuel efficiency standards for medium- and heavy-duty engines and vehicles.

3.1.4 Corporate Average Fuel Economy Standards

In 2010, President Obama issued a memorandum directing the USEPA and other federal agencies to establish standards regarding fuel efficiency and GHG emissions reduction, clean fuels, and advanced vehicle infrastructure. In response to this directive, the USEPA and NHTSA proposed stringent, coordinated federal GHG emissions and fuel economy standards for model years 2017–2025 light-duty vehicles. The proposed standards are projected to achieve 163 grams/mile of carbon dioxide (CO_2) in model year 2025, on an average industry fleet-wide basis, which is equivalent to 54.5 miles per gallon (mpg) if the standards were achieved solely through fuel efficiency. The final rule was adopted in 2012 for model years 2017–2021. On August 2, 2018, NHTSA announced plans to revise adopted standards for model years 2022–2025 in a future rulemaking.

In addition to the regulations applicable to cars and light-duty trucks described above, in 2011 the USEPA and the NHTSA announced fuel economy and GHG standards for medium- and heavy-duty trucks for model years 2014–2018. The standards for CO_2 emissions and fuel consumption are tailored to three main vehicle categories: combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. According to the USEPA, this regulatory program would reduce GHG emissions and fuel consumption for the affected vehicles by 6 to 23 percent over the 2010 baselines.

Building on the success of the first phase of standards, in August 2016, the USEPA and the NHTSA finalized Phase 2 standards for medium and heavy-duty vehicles through model year 2027 that will improve fuel efficiency and cut carbon pollution. The Phase 2 standards were to lower CO_2 emissions by approximately 1.1 billion metric tons and save vehicle owners fuel costs

of about $170 billion.[2] On October 17, 2017, USEPA announced it would revisit these standards.

3.1.5 Safe Affordable Fuel-Efficient Vehicles

On September 19, 2019, the U.S. Department of Transportation's NHTSA and USEPA issued a final action entitled the "One National Program Rules" to enable the federal government to provide nationwide uniform fuel economy and GHG emission standards for automobile and light duty trucks. This action finalizes the Safe Affordable Fuel Efficient (SAFE) Vehicles Rule and clarifies that federal law preempts state and local tailpipe GHG emissions standards as well as zero emission vehicle (ZEV) mandates. The SAFE Vehicle Rule also withdraws the CAA waiver granted to the State of California that allowed the state to enforce its own Low Emission Vehicle program.[3] On March 31, 2020, Part II of the SAFE Vehicles was issued and sets carbon dioxide emissions and CAFE standards for passenger vehicles and light duty trucks, covering model years 2021-2026.[4]

3.2 STATE REGULATIONS

With the passage of several pieces of legislation, including Senate and Assembly Bills and Executive Orders, California launched an innovative and pro-active approach to dealing with GHG emissions and climate change. A summary of key legislation is provided below.

3.2.1 Executive Order S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger issued Executive Order (EO) S-3-05 that set the following GHG emission reduction goals: reduce GHG emissions to 2000 levels by 2010; reduce GHG emissions to 1990 levels by 2020; and reduce GHG emissions to 80 percent below 1990 levels by 2050. EO S-3-05 also calls for the Secretary of California Environmental Protection Agency (Cal EPA) to be responsible for coordination of state agencies and progress reporting.

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[2] USEPA, *EPA and NHTSA Adopt Standards to Reduce GHG and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond*, August 2016.

[3] U.S. Department of Transportation and EPA. 2019. *One National Program Rule on Federal Preemption of State Fuel Economy Standards*, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-one-national-program-federal-preemption-state#:~:text=In%20this%20action%20NHTSA%20is,and%20local%20programs%20are%20preempted.

[4] U.S. Department of Transportation. 2020. *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks*, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/final_safe_preamble_web_version_200330.pdf.

3.2.2 Executive Order S-1-07

On January 18, 2007, Governor Arnold Schwarzenegger issued EO S-1-07 that mandated the following: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 and; (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels by established in California.

3.2.3 Executive Order B-30-15

On April 29, 2015, Governor Jerry Brown issued EO B-30-15. Therein, the governor directed the following:

- Established a new interim statewide reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 (subsequently codified in Senate Bill (SB) 32).
- Ordered all state agencies with jurisdiction over sources of GHG emissions to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 reduction targets.
- Directed California Air Resources Board (CARB) to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of CO_2 equivalent.

3.2.4 Assembly Bill 32, the Global Warming Solutions Act of 2006

On September 27, 2006, Governor Arnold Schwarzenegger signed into law the Warming Solutions Act of 2006 (Assembly Bill [AB] 32). AB 32 represents the first enforceable statewide program to limit GHG emissions from all major sectors with penalties for noncompliance. AB 32 requires the State of California to reduce its emissions to 1990 levels by 2020. The Act establishes key deadlines for certain actions the state must take in order to achieve the reduction target. AB 32 also required the CARB to develop a Scoping Plan to detail California's approach to reduce GHG emissions in order to meet this goal. AB 32 codified EO S-3-05 into law.

3.2.5 Assembly Bill 1439 (Pavley Regulations)

In September 2002, AB 1493 (Chapter 200, Statutes of 2002) (referred to as Pavley I) was enacted, requiring the development and adoption of regulations to achieve "the maximum feasible reduction of greenhouse gases" emitted by noncommercial passenger vehicles, light-duty trucks, and other vehicles used primarily for personal transportation in the state by January 1, 2005. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" will cover 2017 to 2025 (13 California Code Regulations Section 1900 *et seq.*). Fleet average emission standards were to reach a 22 percent reduction by 2012 and 30 percent by 2016.

3.2.6 Senate Bill 97

In October 2007, Governor Arnold Schwarzenegger signed SB 97, which amended CEQA to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. SB 97 directs the Governor's Office of Planning and Research (OPR) to prepare CEQA guidelines for the mitigation and effects of GHG emissions.

3.2.7 Senate Bill 375, Sustainable Communities and Climate Protection Act of 2008

SB 375 was adopted in 2008 and seeks to coordinate land use planning, house planning, regional transportation planning, and GHG reductions. By coordinating these efforts, vehicle congestion and travel can be reduced resulting in a corresponding reduction in emissions. SB 375 directed CARB to set regional targets to reduce emissions; regional transportation plans are required to identify how they will meet these targets.

SB 375 has three major components:

- Using the regional transportation planning process to achieve reductions in emissions consistent with AB 32's goals.
- Offering CEQA incentives to encourage projects that are consistent with a regional plan that achieves emissions reductions.
- Coordinating the Regional Housing Needs Assessment (RHNA) process with the regional transportation process while maintaining local authority over land use decisions.

3.2.8 Chapter 585, 2009 California Transportation Plan

This bill requires the long-range transportation plan to help meet California's climate change goals under AB 32.

3.2.9 Senate Bill 32

On September 8, 2016, Governor Jerry Brown signed into law SB 32, which adds Section 38566 to the Health and Safety Code and requires a commitment to reducing statewide GHG emissions by 2020 to 1990 levels and by 2030 to 40 percent less than 1990 levels. SB 32 codified EO B-30-15 into law.

3.2.11 Climate Change Scoping Plan

CARB is responsible for implementing the State's goals outlined in AB 32 and SB 32. In December 2008, CARB adopted the *Climate Change Scoping Plan* indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions. CARB's initial Scoping Plans contains the main strategies California would implement to reduce the projected 2020 Business-as-Usual emissions to 1990 levels, as required by AB 32. In November 2017, CARB adopted the most recent scoping plan, California's 2017 Climate Change Scoping Plan, which outlines the proposed framework of

action for achieving SB 32 2030 GHG target: a 40 percent reduction in GHG emissions by 2030 relative to 1990 levels. The 2030 target is intended to ensure that California remains on track to achieve the goal set forth by EO S-3-05 to reduce statewide GHG emissions by 2050 to 80 percent below 1990 levels.

3.2.12 California Cap-and-Trade Program

Authorized by the California Global Warming Solutions Act of 2006 (AB 32), the Cap-and-Trade Program is a core strategy that California is using to meet its statewide GHG reduction targets for 2020 and 2030, and ultimately achieve an 80 percent reduction from 1990 levels by 2050. Under the Cap-and-Trade Program, an overall limit is established for GHG emissions from capped sectors (e.g., electricity generation, petroleum refining, cement production, and large industrial facilities that emit more than 25,000 metric tons CO_2e per year) and declines over time, and facilities subject to the cap-and-trade permits to emit GHGs. The statewide cap for GHG emissions from the capped sectors commenced in 2013 and declines over time, achieving GHG emission reductions throughout the program's duration (see generally 17 California Code of Regulations Sections 95811, 95812). On July 17, 2017, the California Legislature passed AB 398, extending the Cap-and-Trade Program through 2030.

The Cap-and-Trade regulation provides a firm cap, helping to ensure that the 2020 and 2030 statewide emission limits will not be exceeded. An inherent feature of the Cap-and-Trade Program is that it does not direct GHG emissions reductions in any discrete location or by any particular source. Rather, GHG emissions reductions are ensured on a state-wide basis.

3.3 LOCAL REGULATIONS

3.3.1 South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) adopted a "Policy on Global Warming and Stratospheric Ozone Depletion" on April 6, 1990. The policy commits the SCAQMD to consider global impacts in rulemaking and in drafting revisions to the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- Phase out the use and corresponding emissions of chlorofluorocarbons, methyl chloroform (1,1,1-trichloroethane [TCA]), carbon tetrachloride, and halons by December 1995;
- Phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons by the year 2000;
- Develop recycling regulations for hydrochlorofluorocarbons (e.g., SCAQMD Rules 1411 and 1415);
- Develop an emissions inventory and control strategy for methyl bromide; and
- Support the adoption of a California GHG emission reduction goal.

3.3.2 Southern California Association of Governments

To implement SB 375 and reduce GHG emissions by correlating land use and transportation planning, the Southern California Association of Governments (SCAG) adopted the 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), on May 7, 2020, for federal conformity purposes. The RTP/SCS presents the latest transportation vision for Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial Counties through 2045 and provides a long-term investment framework for addressing the region's transportation and growth challenges. These framework policies, which guided development of the RTP/SCS's goals for land use, include the following:

- Encourage regional economic prosperity and global competitiveness;
- Improve mobility, accessibility, reliability, and travel safety for people and goods;
- Enhance the preservation, security, and resilience of the regional transportation system;
- Increase person and goods movement and travel choices within the transportation system;
- Reduce greenhouse gas emissions and improve air quality;
- Support healthy and equitable communities;
- Adapt to a changing climate and support an integrated regional development pattern and transportation network;
- Leverage new transportation technologies and data-driven solutions that result in more efficient travel;
- Encourage development of diverse housing types in areas that are supported by multiple transportation options; and
- Promote conservation of natural and agricultural lands and restoration of habitats.

SCAG's RTP/SCS recognizes that transportation investments and future land use patterns are inextricably linked, and continued recognition of this relationship will help the region make choices that sustain existing resources and expand efficiency, mobility, and accessibility for people across the region. The RTP/SCS draws a closer connection between where people live and work, and it offers a blueprint for how Southern California can grow more sustainably. The RTP/SCS also includes strategies focused on compact infill development and economic growth by building the infrastructure the region needs to promote the smooth flow of goods and easier access to jobs, services, educational facilities, healthcare, and more.

The RTP/SCS states that the SCAG region is home to about 18.8 million people in 2016 and currently includes approximately 6.0 million homes and 8.4 million jobs. By 2045, the integrated growth forecast projects that these figures will increase to 22.5 million people, 7.6 million homes, and 10.0 million jobs. The RTP/SCS encourages development in priority growth areas which include job centers, transit priority areas, high quality transit areas, neighborhood mobility areas, livable corridors, and spheres of influence. SCAG's recommended growth strategies will help these areas accommodate 64 percent of forecasted household growth and 74 percent of forecasted employment growth from 2016 to 2045.

The RTP/SCS is expected to reduce per capita transportation emissions by 8 percent by 2020 and 19 percent by 2035. This level of reduction would meet the region's GHG targets set by CARB of 8 percent per capita by 2020 and 19 percent per capita by 2035. Although there are no per capita GHG emission reduction targets for passenger vehicles set by CARB for the Plan's horizon year (2045), the projects and policies proposed by SCAG will reduce GHG emissions through transit improvements, traffic congestion management, emerging technology, and active transportation. The Plan is expected to meet more aggressive GHG emissions reductions by 2045.

3.3.3 Los Angeles County Metropolitan Transportation Authority

Approved by the Metro Board of Directors on September 24, 2020, the Moving Beyond Sustainability Plan establishes agency-wide sustainability goals, targets, and strategies for the next ten years. The Plan includes energy, water, emissions and pollution control, materials and construction/operations, climate adaptation and resiliency, livable neighborhoods, equity, and economic and workforce development goals. Metro has also prepared the Climate Action and Adaptation Plan 2019 that commits the agency to reducing greenhouse gas emissions by 79 percent relative to 2017 levels by 2030 and 100 percent by 2050. The Climate Action and Adaptation Plan identified a goal of reducing Metro's GHG emissions per boarding by 5 percent from 2010 to 2020. The 2019 Climate Action and Adaptation Plan updated the agency's commitment to reducing operational greenhouse gas emissions by 79 percent relative to 2017 levels by 2030 and 100 percent by 2050. Operational emissions are broken down into three sources, or scopes. Scope 1 emissions include direct GHG emissions from equipment and facilities owned and/or operated by Metro. Scope 2 includes indirect GHG emissions from electricity purchases. Scope 3 includes all other Metro activities from sources owned or controlled by another company or entity, including: business travel, embodied emission in material goods purchased and service contracted by Metro, emissions from landfilled solid waste, and emissions from Metro employee commute patterns. The Plan includes thirteen mitigation measures to reduce GHG emissions, most of which are aimed at reducing Scope 1 and Scope 2 emissions.

Metro adopted a Green Construction Policy in August 2011 and is committed to using more sustainable construction equipment and vehicles as well as implementing best practices, to reduce harmful diesel emissions from all Metro construction projects performed on Metro properties and in Metro ROWs. The Green Construction Policy encourages the use of construction equipment with technologies such as hybrid drives and specific fuel economy standards, both of which are methods to reduce GHG emissions during the construction period. From January 2015 onwards, the Green Construction Policy has required all off-road, diesel-powered construction equipment greater than 50 horsepower shall meet Tier 4 off-road emission standards at a minimum.

3.3.4 City of Los Angeles

Green LA Action Plan/Climate LA Plan

The City of Los Angeles began addressing the issue of global climate change by publishing Green LA, An Action Plan to Lead the Nation in Fighting Global Warming (LA Green Plan) in 2007. This document outlines the goals and actions the City has established to reduce the generation and emission of GHG emissions from both public and private activities. According to the LA Green Plan, the City is committed to the goal of reducing emissions of CO_2 to 35 percent below 1990 levels by year 2030. To achieve this, the City has implemented the following:

- Increase the generation of renewable energy;
- Improve energy conservation and efficiency; and
- Change transportation and land use patterns to reduce dependence on automobiles.[5]

To facilitate implementation of the LA Green Plan, the City has a Climate LA Plan that lays out departmental programs to implement the Action Plan's initiatives. The City also adopted the Los Angeles Green Building Code, as discussed below. In addition, Los Angeles Department of Water and Power (LADWP) will continue to implement programs to emphasize water conservation and will also pursue securing alternative supplies, including recycled water and storm water capture. Furthermore, the City implemented the Recovering Energy, Natural Resources and Economic Benefit from Waste for Los Angeles plan (RENEW LA plan) to meet solid waste reduction goals by expanding recycling to multi-family dwellings, commercial establishments, and restaurants. Under the RENEW LA plan, the City is also developing facilities that will convert solid waste to energy without incineration.[6] These measures would serve to reduce overall emissions from the City.

Mobility Plan 2035

In February 2015, the City of Los Angeles released the City's Mobility Plan 2035 as an addition to the Air Quality Element of the General Plan. The Plan identifies goals, objectives, policies, and action items (programs and projects) that serve as guiding tools for making sound transportation decisions as the City evolves. The key policies of the Mobility Plan 2035 include:

- Consider the strong link between land use and transportation;
- Embed equity into the transportation policy framework and into project implementation;
- Target greenhouse gas reductions through a more sustainable transportation system;
- Promote "first mile-last mile" connections;
- Improve interdepartmental and interagency communications and coordination with respect to street design and maintenance;

[5] City of Los Angeles, *Green LA: An Action Plan to Lead the Nation in Fighting Global Warming*, May 2007.
[6] City of Los Angeles, *Recovering Energy Natural Resources and Economic Benefit from Waste for Los Angeles*, June 2011.

- Identify potential funding options for regular street maintenance as well as infrastructure designs;
- Increase the use of technology (applications, real time transportation information) and wayfinding to expand awareness and access to parking options and a host of multi-modal options (car share, bicycle share, car/van pool, bus and rail transit, shuttles, walking, bicycling, driving);
- Expand the role of the streets as a public place; and
- Increase the role of low-tech "green street" solutions to treat and infiltrate stormwater.

The Sustainable City pLAn

In April 2015, Mayor Eric Garcetti released the City of Los Angeles' Sustainable City pLAn as a roadmap to achieve short-term (2017) and longer term (by 2025 and 2035) targets in 14 categories that will advance the City's commitment to a cleaner environment, stronger economy, and equity. The Green New Deal, released in 2019, provided an update to the Sustainable City pLAn.

Green New Deal

In April 2019, Mayor Eric Garcetti announced Los Angeles' Green New Deal to set goals for the city's sustainable future. Los Angeles' Green New Deal commits to uphold the Paris Climate Agreement, deliver environmental justice through an inclusive green economy, plans to ensure every City resident has the ability to join the green economy, and sets a determination to lead by example within City government. The goals and targets of the Green New Deal include:

- Building a zero-carbon electricity grid – reaching an accelerated goal of 80 percent renewable energy supply by 2036 as Los Angeles leads California toward 100 percent renewable by 2045.
- Creating a Jobs Cabinet to bring city, labor, education, and business leaders together to support the effort to create 300,000 green jobs by 2035 and 400,000 by 2050.
- Mandating that all new municipally owned building and major renovations be all-electric, effective immediately, and that every building in Los Angeles – from skyscrapers to single-family homes – become emissions free by 2050.
- Achieving a zero-waste future by phasing out Styrofoam by 2021, ending the use of plastic straws and single-use takeout containers by 2028, and no longer sending any trash to landfills by 2050.
- Recycling 100 percent of wastewater by 2035; sourcing 70 percent of our water locally – a significant increase from our existing pathway; and nearly tripling the maximum amount of stormwater captured.
- Planting and maintaining at least 90,000 trees – which will provide 61 million square feet of shade – citywide by 2021 and increasing tree canopy in low-income, severely heat impacted areas by at least 50 percent by 2028.

The Green New Deal aims to reach a 50 percent reduction in GHG emissions by 2025 and reach net neutrality by 2050. The Green New Deal builds upon the City's Sustainable City pLAn, in which the City met or exceeded 90 percent of the pLAn's long-term goals on time or early,

resulting in a reduction of GHG emissions by 11 percent in a single year and creating more than 35,000 green jobs.

3.3.5 City of Burbank

Greenhouse Gas Reduction Plan

In February 2013, the City of Burbank adopted the Greenhouse Gas Reduction Plan (GGRP) which is designed to implement the City's General Plan, Burbank 2035, and comply with recent revisions to CEQA Guidelines. The GGRP aims to reduce GHG emissions from the following sources: buildings and energy, transportation, water, and waste. The GGRP aims to reduce 2010 jurisdictional emissions levels by 15 percent by 2020 and 30 percent by 2035. The action areas and measures in the GGRP are included in **Table 3**.

Table 3 – City of Burbank GGRP Action Areas and Measures

Action Areas/ Measures	Action Area/Measure Description
BUILDING AND ENERGY	
Action Area E-1	Energy Efficiency
E-1.1	Energy Efficiency in New Construction
E-1.2	Energy Efficiency Retrofits
E-1.3	ENERGY STAR Appliances
E-1.4	Smart Grid Integration
E-1.5	Cool Roofs
E-1.6	BWP Energy Conservation Programs
E-1.7	Building Shade Trees
Action Area E-2	Renewable Energy
E-2.1	Renewable Energy Requirements
E-2.2	Solar Photovoltaic Systems
E-2.3	Solar Water Heater Systems
Action Area E-3	Street and Area Lighting
E-3.1	Light-Emitting Diode Street Lights
TRANSPORTATION	
Action Area T-1	Pedestrian and Bicycle Improvements
T-1.1	Pedestrian Enhancements
T-1.2	Safe Routes to School
T-1.3	Bicycle Education Program
T-1.4	Bicycle Infrastructure Expansion
T-1.5	Bicycle Accommodation Ordinance
Action Area T-2	Transportation Demand Management
T-2.1	Transportation Management Organization Expansion
Action Area T-3	Intelligent Transportation System
T-3.1	Traffic Signal Coordination

Action Areas/ Measures	Action Area/Measure Description
WATER CONSERVATION	
Action Area W-1	Water Efficiency
W-1.1	Water Conservation Programs
W-1.2	Recycled Water Use Master Plan
W-1.3	Stormwater Management Plan
WASTE REDUCTION	
Action Area SW-1	Organic Waste Diversion
SW-1.1	Food Scrap and Compostable Paper Diversion Ordinance
SW-1.2	Yard Waste Diversion Ordinance
SW-1.3	Lumber Diversion Ordinance
SW-1.4	Reusable Bags
SW-1.5	Recycling Ordinance
Action Area SW-2	Landfill Methane Recovery
SW-2.1	Enhanced Methane Recovery
MUNICIPAL	
CG-1	City Government Action
CG-1.1	Sustainability Coordinator
CG-1.2	Sustainability Element

SOURCE: City of Burbank, Burbank 2035 GGRP, 2013.

3.3.6 City of Glendale

Greener Glendale Plan

In 2010, the City of Glendale adopted a resolution to address sustainability and climate change. As a result, the City prepared a sustainability plan to address how the City can reduce GHG emissions, entitled the Greener Glendale Plan. The Greener Glendale Plan includes many objectives and strategies aimed at reducing GHG emissions. The relevant mobility objectives and policies from the Greener Glendale Plan are included in **Table 4**.

Table 4 – City of Glendale Greener Glendale Plan GHG Policies

Objectives/Policy	Objectives/Policy Description
Objective T1	Facilitate the Provision of Alternative Transportation Infrastructure
Policy T1-A	Incentivize community provision and funding of public transit and bicycle, pedestrian, and multi-modal infrastructure, such as in renovations and new development projects.
Policy T1-B	Adopt a comprehensive parking policy to encourage the use of carpooling and alternative modes of transportation.
Policy T1-C	Provide safe bicycle travel ways and places to secure bicycles at destination points.
Policy T1-D	Explore opportunities to reduce vehicle travel lanes/widths in order to provide space for other modes of transportation.

Objectives/Policy	Objectives/Policy Description
Policy T1-E	Ensure bicycle travel ways are continuous and not interrupted by freeway and off ramps.
Policy T1-F	Incorporate "Complete Streets" into the General Plan.
Policy T1-G	Connect Glendale to the regional light rail network and high speed rail should it be developed.
Objective T2	Promote and Encourage the use of Alternative Forms of Transportation
Policy T2-A	Encourage businesses, schools, hospitals, etc. to provide telecommuting options and incentives for utilizing alternative transportation, and to promote the use of car-share, bicycles, and public transit to their employees/students.
Policy T2-B	Celebrate the bus infrastructure so riders feel proud to ride.
Policy T2-C	Develop a comprehensive education and outreach campaign encouraging citizens to use alternative forms of transportation, such as walking, bicycling, and public transit.
Policy T2-D	Continue to improve existing "Parking Cash Out" programs so they are effective in encouraging the use of alternative forms of transportation.

SOURCE: City of Glendale, Greener Glendale Plan: Community Activities, 2012.

3.3.7 City of Pasadena

Climate Action Plan

In 2018, the City of Pasadena prepared a climate action plan (CAP) with the goal to reduce community-wide GHG emissions 27 percent below 2009 levels by 2020, 49 percent below 2009 levels by 2030, 59 percent below 2009 levels by 2035, and 83 percent below 2009 levels by 2050. In order to achieve these reduction goals, the City of Pasadena identified five climate strategies and associated measures outlined in **Table 5**.

Table 5 – City of Pasadena CAP Reduction Strategies and Measures

Strategies/Measures	Strategy/Measure Description
Strategy 1	Sustainable Mobility and Land Use
Measure T-1	Walking and Bicycling
T-1.1	Continue to expand Pasadena's bicycle and pedestrian network
T-1.2	Continue to improve bicycle and pedestrian safety
T-1.3	Continue to encourage bicycle and pedestrian travel
Measure T-2	Public Transit
T-2.1	Continue to enhance safe, reliable, and seamless transit services
Measure T-3	Transportation Demand Management
T-3.1	Decrease annual commuter miles traveled by single-occupancy vehicles
T-3.2	Improve the existing transportation system to smooth traffic flow, reduce idling, minimize bottlenecks, and encourage efficient driving techniques
Measure T-4	Alternative Fuel Vehicles
T-4.1	Expand the availability and use of alternative fuel vehicles and fueling

Strategies/Measures	Strategy/Measure Description
	infrastructure
Measure T-5	Transit-Oriented Development
T-5.1	Facilitate high-density, mixed-use, transit-oriented and infill development
Measure T-6	Construction Vehicles
T-6.1	Reduce GHG emissions from heavy-duty construction equipment and vehicles
Measure T-7	Lawn and Garden Equipment
T-7.1	Reduce GHG emissions from lawn and garden equipment
Strategy 2	Energy Efficiency and Conservation
Measure E-1	Building Performance Standards for New Construction
E-1.1	Increase energy efficiency requirements of new buildings to perform better than 2016 Title 24 Standards
E-1.2	Encourage the use of energy conservation devices and passive design concepts that make use of the natural climate to increase energy efficiency
Measure E-2	Energy Retrofits of Existing Buildings
E-2.1	Facilitate energy efficient upgrades in existing homes and businesses
Measure E-3	Municipal Operations
E-3.1	Increase municipal energy conservation efforts
Measure E-4	Residential and Commercial Carbon-Neutral Energy
E-4.1	Increase city-wide use of carbon-neutral energy by encouraging and/or supporting carbon-neutral technologies
Measure E-5	City Energy Portfolio
E-5.1	Continue to expand the City's renewable and/or carbon-neutral energy portfolio
Strategy 3	Water Conservation
Measure WC-1	Potable Water
WC-1.1	Reduce potable water usage throughout Pasadena
Measure WC-2	Non-Potable (Recycled) Water
WC-2.1	Increase access to and use of non-potable water
Measure WC-3	Storm Water
WC-3.1	Improve storm water systems to slow, sink, and treat run-off, recharge groundwater, and improve water quality
Strategy 4	Solid Water Reduction
Measure WR-1	Solid Waste
WR-1.1	Continue to reduce solid waste and landfill GHG emissions
Measure WR-2	Reuse and Recycling
WR-2.1	Establish a "Preferred Procurement Plan" for sustainable, strategic sourcing for all City departments and facilities

Strategies/Measures	Strategy/Measure Description
WR-2.2	Create an internal program for all City departments to recirculate unwanted goods
Measure WR-3	Composting and Food Recycling
WR-3.1	Implement a city-wide composting program to limit the amount of organic material entering landfills
WR-3.2	Implement 3-bin compost systems, in addition to recycling and landfill bins, at public parks to compost all trimmings and waste on-site to divert organic materials from the landfill and increase locally available compost
Measure WR-4	Waste Collection System
WR-4.1	Reduce the GHG impacts of the waste collection system
Strategy 5	Urban Greening
Measure UG-1	Greenspace
UG-1.1	Continue to preserve, enhance, and acquire additional greenspace throughout Pasadena to improve carbon sequestration, reduce the urban heat-island effect, and increase opportunities for active recreation
Measure UG-2	Urban Forest
UG-2.1	Continue to protect existing trees and plant new ones to improve and ensure viability of Pasadena's urban forest

SOURCE: City of Pasadena, CAP, 2018.

4. Existing Setting

4.1 GREENHOUSE GASES

Greenhouse gases (GHG) include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. Presented below is a description of each GHG and their known sources.

- **Carbon Dioxide (CO_2)**. Enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, respiration, and as a result of other chemical reactions. Carbon dioxide can also be removed from the atmosphere when it is absorbed by plants in the carbon cycle.
- **Methane (CH_4)**. Emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock, agricultural practices, and by the decay of organic waste in municipal solid waste landfills.
- **Nitrous Oxide (N_2O)**. Emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated Gases**. Synthetic, strong GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but due to their potency, are known as High Global Warming Potential gases. These include:
    - ***Chlorofluorocarbons (CFCs)***. GHGs covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulations, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are being replaced by other compounds that are GHGs covered under the Kyoto Protocol.
    - ***Perfluorocarbons (PFCs)***. Group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF4] and perfluoroethane [C2F4]) were introduced as alternatives, along with hydrofluorocarbons (HFCs), to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratosphere ozone layer, but they have a high global warming potential.
    - ***Sulfur Hexafluoride (SF6)***. Colorless gas soluble in alcohol and ether, slightly soluble in water. SF6 is a strong GHG used primarily in electrical transmissions and distribution systems as a dielectric.
    - ***Hydrochlorofluorocarbons (HCFCs)***. HCFCs contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent than CFCs. They have been introduced as temporary replacements for CFCs and are also GHGs.
    - ***Hydrofluorocarbons (HFCs)***. HFCs contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products.

4.2 STATE GREENHOUSE GAS EMISSIONS

In 2017, California emitted 424 million metric tons of CO_2e ($MMTCO_2e$) GHG emissions. The primary contributors to GHG emissions in California are transportation, electric power production from both in-state and out-of-state sources, industry, agriculture and forestry, and other sources, which include commercial and residential activities. **Table 6** provides a summary of GHG emissions reported in California in 2000 and 2017 separated by categories defined by the United National Intergovernmental Panel on Climate Change (IPCC).

Table 6 – GHG Emissions in California

Source Category	2000 ($MMTCO_2e$)	Percent of Total	2017 ($MMTCO_2e$)	Percent of Total
ENERGY	**413.8**	**87.84%**	**348.9**	**82.27%**
Energy Industries	159.12	38.45%	109.66	31.43%
Manufacturing Industries & Construction	22.75	5.50%	19.88	5.70%
Transport	179.13	43.29%	168.93	48.42%
Other Sectors (Residential/Commercial/Institutional)	44.67	10.80%	41.24	11.82%
Fugitive Emissions from Solid Fuels	0.04	0.01%	0.02	0.01%
Fugitive Emissions from Oil & Natural Gas	6.89	1.67%	8.2	2.35%
Fugitive Emissions from Geothermal Energy Production	1.13	0.27%	0.93	0.27%
Pollution Control Devices	0.11	0.03%	0.05	0.01%
INDUSTRIAL PROCESSES & PRODUCT USE	**19.6**	**4.16%**	**33.6**	**7.92%**
Mineral Industry	5.6	28.57%	4.93	14.67%
Chemical Industry	0.06	0.31%	0	0.00%
Non-Energy Products from Fuels & Solvent Use	3.3	16.84%	1.88	5.60%
Electronics Industry	0.2	1.02%	0.17	0.51%
Substitutes for Ozone Depleting Substances	5.57	28.42%	19.64	58.45%
Other Product Manufacture and Use	1.52	7.76%	1.18	3.51%
Other	3.31	16.89%	5.81	17.29%
AGRICULTURE, FORESTRY, & OTHER LAND USE	**28.4**	**6.03%**	**30.7**	**7.24%**
Livestock	19.12	67.32%	22.68	73.88%
Aggregate Sources & Non-CO_2 Sources on Land	9.27	32.64%	8.07	26.29%
WASTE	**9.3**	**1.97%**	**10.8**	**2.55%**
Solid Waste Disposal and Biological Treatment	7.22	77.63%	8.54	79.07%
Biological Treatment of Solid Waste	0.13	1.40%	0.35	3.24%
Wastewater Treatment & Discharge	1.93	20.75%	1.94	17.96%
EMISSIONS SUMMARY				
Gross California Emissions	471.1		424.1	

SOURCE: CARB. California Greenhouse Gas 2000-2017, 2019.

According to CARB, the potential impact in California due to global climate change will affect the health of Californians. Climate change may result in: loss in snow pack; sea level rise; more extreme heat days per year; more high ozone days; more large forest fires; more drought years; increased erosion of California's coastlines and sea water intrusion into the Sacramento and San Joaquin Delta and associated levee systems; and increased pest infestation.

4.3 REGIONAL GREENHOUSE GAS EMISSIONS

SCAG provides estimates of the regional GHG emissions through implementation of the RTP/SCS. The RTP/SCS has a horizon year of 2045. **Table 7** demonstrates that from 2019 to 2045, the regional on-road emissions are anticipated to decrease by 17.4 percent from 77.4 $MMTCO_2e$ to 64.0 $MMTCO_2e$ by 2045.

Table 7 – GHG Emissions from On-Road Emissions in the SCAG Region

On-Road Vehicles	2019 (MMT/year)			2045 (MMT/year)		
	CO_2	CH_4	NO_2	CO_2	CH_4	NO_2
Light and Medium Duty Vehicles	59.43	0.002	0.0009	38.08	0.001	0.0002
Heavy Duty Vehicles	15.46	0.000	0.002	24.16	0.001	0.0009
Buses	1.50	0.001	0.0002	1.38	0.0003	0.00004
On-Road Vehicles (Subtotal) in CO_2	76.4	0.004	0.003	63.6	0.002	0.001
On-Road Vehicles (Subtotal) in CO_2e	76.4	0.078	0.9	63.6	0.04	0.4
Total GHG Emissions from On-Road Vehicles in CO_2e	77.4			64.0		

SOURCE: SCAG, RTP/SCS *Final PEIR and SCAG Modeling*, 2019.

In addition, SCAG provides the total regional GHG emissions from the three primary sources of GHG emissions within the region: transportation, building energy, and water related energy. **Table 8** shows that GHG emissions across the region are anticipated to decrease by approximately 15.9 percent from 2019 to 2045.

Table 8 – GHG Emissions for the SCAG Region from Three Primary Sectors

Area	2019 (MMTCO2e/ year)	2030 (MMTCO2e/ year)	2035 (MMTCO2e/ year)	2045 (MMTCO2e/ year)	2019 vs 2045
Transportation	77.4	61.3	60.0	64.0	-17.3%
Building Energy	35.8	34.6	35.5	31.3	-12.6%
Water-related energy	3.1	2.8	2.8	2.5	-19.4%
Total	116.3	98.7	98.3	97.8	-15.9%

SOURCE: SCAG, *RTP/SCS Final PEIR and SCAG Modeling*, 2020.

4.4 METRO GREENHOUSE GAS EMISSIONS

Metro provides annual estimates of the net GHG emissions. As illustrated in **Table 9**, Metro system operations produced a net displacement in GHG emissions of 591,123 $MTCO_2e$ across all modes of transit provided in 2019. The reduction in GHG emissions is associated with the shift from CNG to a renewable natural gas bus fleet. Additionally, the use of diesel fuel in Metro buses was entirely phased out in 2019.

Table 9 – GHG Emissions from Metro Operations in 2019

Category	2019
Greenhouse Gas Emissions (pounds CO_2e per Vehicle Revenue Mile)	5.78
Greenhouse Gas Displacement (Metric Tons CO_2e)	-918,076
Net Greenhouse Gas Emissions (Metric Tons CO_2e)	-591,123

SOURCE: Metro, *Performance Metrics Summary*. 2020.

4.5 CITY OF LOS ANGELES

According to the City of Los Angeles' GreenLA Plan, the City emitted approximately 51.6 $MMTCO_2e$ in 2004 with the goal of reducing emissions to 35.2 $MMTCO_2e$ by 2030. The transportation and municipal operations sector accounted for approximately 50 percent and 33 percent, respectively, of the City's total GHG emissions.

4.6 CITY OF BURBANK

According to the City of Burbank's GGRP, the City generated an estimated 2.0 $MMTCO_2e$ in 2010. The transportation sector represented the largest GHG contributor across city-wide emissions, accounting for approximately 61 percent of total GHG emissions. The energy sector contributed approximately 36 percent of total GHG emissions. Solid waste, wastewater, and water compromised the remaining 3 percent. The GGRP determined that in order to meet state reduction goals, the City would need to reduce emissions to 1.4 $MMTCO_2e$/year by 2020 (15 percent below 2010 jurisdictional emissions levels). Additionally, the City would need to reduce emissions to 1.2 $MMTCO_2e$/year by 2035 (30 percent below 2010 jurisdictional levels).

4.7 CITY OF GLENDALE

According to the Greener Glendale Plan, in 2009, the City of Glendale emitted a total of 1.6 $MMTCO_2e$. The transportation and energy (commercial and residential) sectors represent the largest contributors of GHG emissions, representing approximately 48 percent and 46 percent of the total emissions, respectively. Waste generation, landfill, and water transport represent the remainder of the GHG emissions in 2009.

4.8 CITY OF PASADENA

According to the City of Pasadena's CAP, the City generated an estimated 1.9 $MMTCO_2e$ in 2013. The transportation and energy sectors represent the largest contributors of GHG emissions, approximately 52 percent and 43 percent of the total emissions, respectively. GHG emissions from waste and water represent the remaining emissions. As stated above, the City of Pasadena's CAP includes the following emissions goals: 27 percent below 2009 levels by 2020, 49 percent below 2009 levels by 2030, 59 percent below 2009 levels by 2035, and 83 percent below 2009 levels by 2050. These goals are in line with the state-wide targets established by AB 32, SB 32, and EO S-3-05.

5. Significance Thresholds and Methodology

5.1 SIGNIFICANCE THRESHOLDS

In accordance with Appendix G of the State CEQA Guidelines, the Proposed Project would have a significant impact related to greenhouse gas emissions if it would:

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; and/or
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG.

The State CEQA Guidelines include Section 15064.4, which states that, when making a determination with respect to the significance of a project's GHG emissions, a lead agency shall have discretion to determine whether to: (1) Use a model or methodology to quantify GHG emissions resulting from a project, and which model or methodology to use; and/or (2) Rely on a qualitative analysis or performance-based standards. Section 15064.4 also states that a lead agency should consider the following factors when assessing the significance of the impact of GHG emissions on the environment: (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting; (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and (3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

Although SCAQMD has a regulatory role in the South Coast Air Basin, it has not adopted or proposed any quantitative thresholds that would be applicable to the Proposed Project's BRT corridor. Neither CARB, OPR, SCAQMD, nor Metro have officially promulgated specific thresholds for analyzing GHG emissions under CEQA. CARB and OPR acknowledge that transforming public transit systems and reducing VMT is an effective climate adaptation strategy. As a transit project, the Proposed Project is assessed using a net-zero GHG emissions threshold. In addition, the analysis assesses consistency with statewide, regional, and local plans adopted for the purpose of reducing and/or mitigating GHG emissions

5.2 METHODOLOGY

CARB recommends considering indirect emissions to provide a more complete picture of the GHG emissions footprint of a project. Annually reported indirect energy usage aids the conservation awareness of a facility and provides information to CARB to be considered for future strategies. For example, CARB has proposed requiring the calculation of direct and indirect GHG emissions as part of the AB 32 reporting requirements. Additionally, OPR has

noted that lead agencies "should make a good-faith effort, based on available information, to calculate, model, or estimate… GHG emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities." Therefore, direct and indirect emissions have been calculated for the Proposed Project.

A fundamental difficulty in the analysis of GHG emissions is the global nature of the existing and cumulative future conditions. Changes in GHG emissions can be difficult to attribute to a particular planning program or project because the planning effort or project may cause a shift in the locale for some type of GHG emissions, rather than causing "new" GHG emissions. As a result, there is an inability to conclude whether a project's GHG emissions represent a net global increase, reduction, or no change in GHG emissions that would exist if the project were not implemented. The analysis of the Proposed Project GHG emissions is particularly conservative in that it assumes all of the GHG emissions are new additions to the atmosphere.

The California Emissions Estimator Model® (CalEEMod) is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operations from a variety of land use projects. CalEEMod was developed in collaboration with the air districts of California, who provided data (e.g., emission factors, trip lengths, meteorology, source inventory) to account for local requirements and conditions. The model is considered by SCAQMD to be an accurate and comprehensive tool for quantifying air quality and GHG impacts from land use projects throughout California.

The Proposed Project would generate construction-related and operational emissions. GHG emissions emitted during project construction are temporary, while operational emissions would be generated continually throughout the life of the Proposed Project. The methodology used to evaluate construction and operational effects is described below.

5.2.1 Evaluation of Construction-Period Impacts

Project construction would be a source of GHG emissions. Such emissions would result from activities that could include but not be limited to demolition, roadway striping, and station construction. These activities could involve the use of heavy-duty construction equipment (e.g., dozers) and smaller equipment (e.g., rollers, forklifts, concrete saws, paving equipment) in order to construct BRT stations over a period of up to 30-months. GHG emissions would also be produced from heavy-duty haul trucks removing debris during the demolition phase, as well as vendor and contractor trucks and worker passenger car trips. Construction emissions were modeled in CalEEMod and worker trip emissions were adjusted consistent with CARB's Off-Model Adjustment Factors to account for the SAFE Vehicles Rule. Consistent with SCAQMD-recommended methodology, total construction-period emissions are amortized over a 30-year period, then added to the design-year GHG emissions total to arrive at the annual tons per year estimate that accounts for construction and operations emissions.

5.2.2 Evaluation of Operations-Period Impacts

Long-term changes in GHG emissions would result from operating more Metro transit service, the mode shift of travelers from vehicles to Metro transit services, as well as indirect GHG emissions from charging the bus fleet.

Metro may rely on CNG-powered buses when the Proposed Project first opens. If required, the use of CNG-powered buses during operation would be a temporary condition and any additional impacts posed by CNG-powered buses would be short-term and negligible. Because Metro is expected to operate Zero Emission Buses (ZEBs) along the route in the long-term, mobile-source emissions from ZEBs were calculated by applying the LADWP carbon intensity factors from LADWP's Power Strategic Long-Term Resource Plan to the annual estimate of electrical demand (see **Table 10**).

Table 10 – Carbon Intensity Factors

Pollutant	LADWP Carbon Intensity (lb/MWh)	Global Warming Potential
CO_2	834	1
CH_4	0.029	25
N_2O	0.00617	298
Aggregate lb CO_2e/MWh	**836.6**	-

SOURCE: LADWP. *Power Strategic Long-Term Resource Plan*, 2017.

Total electrical demand was established by determining the average per-mile electrical use per bus and applying that consumption rate to the annual VMT. Consistent with Metro's Climate Action and Adaptation Plan 2019, it was assumed that ZEBs have a fuel economy of 2.2 kWh/mile.

The fleet will also generate emissions from "deadhead" travel as buses travel to and from one or more of the following Metro Divisions for service, fueling, and storage: El Monte, Sun Valley, and Cypress Park. Buses would travel from the route to the Metro Division when the line closes and would travel from the Metro Division to the route when the line opens. In order to perform the most conservative analysis, it was assumed that the El Monte Metro Division—the farthest Metro Division from the route—would provide overnight storage and charge the buses. Any other overnight facility would be closer to the Project corridor, resulting in less emissions from "deadhead" miles. Since the Proposed Project route runs 18 miles from North Hollywood to Pasadena, the buses may be traveling to the Metro Division from any point along the corridor. Buses located in North Hollywood would travel further to reach El Monte Metro Division than buses located in Pasadena.

To account for these differences, emissions for "deadhead" travel were calculated assuming that each of the buses would travel the average distance from the route to the division on a daily basis. The average distance from the route to the Metro Division was measured at three stations along the route, including: (1) West Glenoaks Boulevard and North Pacific Avenue in

Glendale; (2) Chandler Boulevard and Lankershim Boulevard in North Hollywood; and (3) South Hill Street and East Colorado Boulevard in Pasadena. The average distance from the Proposed Project route to the Metro El Monte Division is approximately 18.3 miles. Therefore, each bus was assumed to travel 36.6 "deadhead" miles daily. All charging is expected to be centralized at a Metro Division, any impacts to the Metro Division or enhancements to support the Proposed Project would be minor.

Because BRT service would shift mode share from auto use to public transit, GHG emissions related to changes in local vehicle miles traveled (VMT) and roadway network travel speeds were calculated using traffic data (VMT aggregated for speed) derived from a travel demand model that applies project effects and EMFAC2017 emissions factors to determine running GHG emissions. In order to account for the SAFE Vehicles Rule Part I, CARB has issued Off-Model Adjustment factors for CO_2 emissions from light duty automobiles and trucks which will be applied to the EMFAC2017 results. The CO_2 adjustment factor for 2042 is 1.1207.

Regional VMT associated with the Proposed Project (2042) and 2042 Baseline conditions are shown in **Table 11**. The change in total daily VMT from No Project to Proposed Project is an approximately 0.017 percent decrease. Transportation modeling was also completed for the Route Options. The regional VMT for implementing the design options differed marginally from the Proposed Project by approximately 0.003 percent. Therefore, it is reasonable to only quantify GHG emissions associated with the Proposed Project.

Table 11 – Regional Vehicle Miles Traveled

Scenario	Daily VMT	Annual VMT	Percent Decrease
Existing (2017)	428,792,499	148,791,691,153	-
Existing + Project	428,721,905	148,766,500,989	0.017%
2042 Baseline	511,871,989	177,619,580,183	-
2042 Baseline + Project	511,785,330	177,589,509,510	0.017%

6. Impact Analysis

The following section includes the impact analysis, mitigation measures (if necessary), and significance after mitigation measures (if applicable). The potential for the Proposed Project to result in an impact to greenhouse gas emissions is independent of the specific alignment and Project components. The following impact conclusions are valid for the Proposed Project and all route variations, treatments, and configurations.

Impact a) Would the Proposed Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction

No Impact. Construction under the Proposed Project would involve sidewalk modifications as well as the installation of up to 43 station platforms along the route. Emissions sources include but are not limited to equipment, truck trips for debris disposal and material delivery, and worker commute trips. Consistent with Metro's Green Construction Policy, construction activities would require Tier 4-certified construction equipment. Construction activities would result in approximately 910 $MTCO_2e$ emissions over the course of the overall construction period, and an annual average of 364 MT CO_2e/year.

As opposed to electric bus charging networks that are distributed along local streets, all charging is expected to be centralized at a Metro Division or possibly at Pasadena City College. Coaches would likely be serviced at one maintenance division, likely the El Monte Metro Division. In the short-term, coaches may be CNG-fueled and use existing fueling facilities. As Metro's fleet is expected to use electricity by 2030, the BRT coaches would utilize charging facilities already planned for this and other maintenance and storage facilities. Any upgrades needed to substations, transformers, conduits, and charging facilities would be programmed into Metro's capital improvement plans for the entire bus fleet and developed over time.

Consistent with SCAQMD-recommended methodology, construction-period emissions were amortized over a 30-year period, resulting in an annual equivalent of approximately 30.3 $MTCO_2e$/year. The SCAQMD recommends that construction emissions be assessed together with operational emissions rather than as an independent emissions process. As shown below, the reduction in operational emissions would offset annual construction emissions. Therefore, the Proposed Project would not result in a significant impact related to construction activities.

Operations

No Impact. Operation of the Proposed Project would result in GHG emissions from charging the bus fleet and the use of Metro fleet service motor vehicles along the corridor. The Proposed Project would employ a fleet of approximately twenty ZEBs. While the fleet would not generate GHG emissions directly through the operation of ZEBs, battery charging would generate indirect emissions related to electricity consumption. This electrical demand would indirectly generate

GHG emissions at off-site power plants. Under the Proposed Project, the ZEBs are expected to travel 1,348,500 annual revenue miles in 2042. Implementation of Metro's NextGen service and implementation of the Proposed Project would reduce service from existing bus lines that overlap with the proposed BRT route. Metro Line 180 connects Hollywood with Pasadena and will be restructured to reduce service along the route by approximately 303,124 annual revenue miles. Metro anticipates having a 100 percent electric fleet by 2042, which is accounted for in the emissions analysis. GHG emissions generated from the bus operations along the BRT alignment as well as the GHG emissions no longer being emitted from Metro Line 180's service reduction are provided in **Table 12**.

The implementation of BRT service in this corridor would also reduce GHG emissions emitted by vehicles traveling within the study area, as mode share shifts away from auto use to public transit. Specifically, the BRT service would reduce 30,070,673 VMT annually as compared to baseline conditions (without BRT service). As summarized in **Table 12**, the Proposed Project would result in an annual net decrease of approximately 8,061 $MTCO_2e$ compared with future (2042) baseline conditions, a decrease of 0.015 percent of GHG emissions.

Table 12 – Annual GHG Emissions (2042)

Emissions Source	CO_2e (metric tons)
2042 BASELINE EMISSIONS	
Regional Traffic Emissions	54,268,110
2042 BASELINE EMISSIONS	
Construction Activities (annual amortized)	30
ZEB Operations (Revenue Service)	1,126
ZEB Operation (Deadhead to/from Metro Division)	223
Displaced Metro Line 180 Operations	-253
Regional Traffic Emissions	54,258,923
Total Proposed Project-Related Emissions	54,260,049
Net Project Emissions	
Net GHG Emissions	*-8,061*
Change Compared to 2042 Baseline	-0.015%

SOURCE: Impact Sciences (2020), **Appendix A**. Based on 77,652,996 annual person trips within the Study Area, with 16,149 more transit trips than the No Project Alternative. CO_2e emissions from ZEB service represent power plant-related emissions associated with generating electricity to fuel the emissions-free coaches.

It is expected that Metro will operate a 100 percent ZEB fleet in 2042. Buses associated with the Proposed Project may operate on compressed natural gas until electric buses are available to operate the service. As shown in **Table 12**, the regional decrease in VMT associated with the Proposed Project results in a large reduction in GHG emissions. The operation of CNG buses instead of electric buses would not offset the reduction to the extent that it would cause a net annual increase in emissions. As noted in **Table 11**, the existing daily VMT in the Project area is

approximately 148,791,691,153 and will be reduced by 0.017 percent to 148,766,500,989 daily VMT in the opening year. This is a daily VMT reduction of 25,190,164. Therefore, due to the reduction in daily VMT, GHG emissions will be reduced and will offset any emissions generated from the operation of CNG buses.

When compared to existing (2017) conditions, the Proposed Project would also reduce overall emissions in the study area. As shown in **Table 11**, BRT services would reduce 25,190,164 VMT annually when compared to 2017 base year conditions. This would also result in reductions in GHG emissions from the vehicle fleet in the study area. There would be some GHG emissions from the initial use of CNG buses at the start of service in 2022. Specifically, the operation of 20 CNG buses would emit 3,068 lbs/day of CO_2e. When considering overall fleet emissions reductions associated with mode shift from passenger vehicles to public transit, initial BRT service would result in _a reduction of approximately 9,418 lbs/day of CO_2e.

Including the amortized construction emissions, total GHG emissions resulting from the implementation of the Proposed Project in 2042 would be 0.015 percent lower than under the 2042 Baseline Conditions. This represents a benefit to regional GHG emissions and there is no potential for the Proposed Project to result in an impact. Therefore, the Proposed Project would not result in a significant impact related to operational activities.

Impact b) Would the Proposed Project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Construction and Operations

No Impact. A significant GHG impact may occur if the Proposed Project would conflict with applicable GHG reduction plans, policies or regulations. As such, SB 375, SB 32, SCAG's RTP/SCS, and CARB's 2017 Scoping Plan represent climate change-related plans that can be the basis of such an evaluation. The Proposed Project would travel through Los Angeles, Burbank, Glendale, and Pasadena and would also be evaluated for consistency with any city's adopted greenhouse gas reduction plan.

SCAG's RTP/SCS identifies improved accessibility and mobility as one of its goals. Proposed Project would introduce BRT service to the corridor capable of increasing transit capacity, which would support the SCS's goal of improved accessibility and mobility. As such, it would not conflict with the goals of SB 375 and the SCAG RTP/SCS in that it would provide new transit service that contributes to a larger transit network that ultimately reduces transportation-related GHG emissions.

CARB's 2017 Scoping Plan provides a blueprint for the state to reduce GHG emissions in order to meet the reduction goals set under SB 32. The 2017 Scoping Plan includes goals to reduce GHG emissions across all sectors, including transportation emissions. The Scoping Plan's GHG reductions from the transportation sector will come from a number of strategies, including the use of new technologies, low carbon fuels, and reducing VMT. The Proposed Project will encourage the use of transit and reduce VMT as compared to the future (2042) baseline

scenario. Furthermore, the Proposed Project will operate 20 electric, zero-emission buses, further reducing GHG emissions from transit operations. As a result, the Proposed Project would not conflict with CARB's 2017 Scoping Plan.

The Metro Climate Action and Adaptation Plan 2019 identified the goal of achieving zero emissions by 2050. The Proposed Project will utilize a fleet of 20 zero-emissions electric buses, which will emit significantly less emissions as compared to compressed natural gas-powered buses. Therefore, the Proposed Project will not interfere with the Metro Climate Action and Adaptation Plan 2019. The Proposed Project will also comply with the Metro Green Construction Policy.

The City of Los Angeles' Green New Deal outlines targets to reduce GHG emissions including from transportation and public transit emissions. These goals include increasing the percentage of all trips made by walking, biking, micro-mobility/matched rides, or transit to at least 35 percent by 2025, 50 percent by 2035, and maintain at least 50 percent by 2050, and reducing VMT per capita by at least 13 percent by 2025, 39 percent by 2035, and 45 percent by 2050. The City of Burbank GGRP sets the goal of reducing GHG emissions to 30 percent below 2010 jurisdictional levels by 2035. The Greener Glendale Plan is an adopted resolution with strategies aimed at reducing GHG emissions, including policies to increase public transit. The City of Pasadena's CAP aims to reduce community-wide GHG emissions to 27 percent below 2009 levels by 2020, 49 percent below 2009 levels by 2030, 59 percent below 2009 levels by 2035, and 83 percent below 2009 levels by 2050. Operation of the Proposed Project would result in new transit trips, thereby contributing to reductions in VMT per capita and increases in the percentage of trips made by transit. Because of the mode-shift from cars to more efficient public transit vehicles, the Proposed Project would not conflict with any of the cities' greenhouse gas reduction plans.

Overall, the Proposed Project does not conflict with AB 32, SB 32, or SB 375 or Metro or City goals to reduce GHG emissions by providing transportation infrastructure necessary to enable mode-shifts and encourage transit use within the community. Therefore, the Proposed Project be consistent with applicable plans, policies, and regulation adopted to reduce GHG emissions and would not result in a significant impact related to operational activities.

7. Cumulative Analysis

CEQA Guidelines Section 15355 defines cumulative impacts as two or more individual actions that, when considered together, are considerable or will compound other environmental impacts. CEQA Guidelines Section 15130(a) requires that an Environmental Impact Report (EIR) discuss the cumulative impacts of a project when the project's incremental effect is "cumulatively considerable." As set forth in CEQA Guidelines Section 15065(a)(3), "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Thus, the cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions to more accurately gauge the effects of multiple projects.

In accordance with CEQA Guidelines Section 15130(a)(3), a project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. In addition, the lead agency is required to identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable.

CEQA Guidelines Section 15130(b) further provides that the discussion of cumulative impacts reflects "the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone." Rather, the discussion is to "be guided by the standards of practicality and reasonableness and should focus on the cumulative impact to which the identified other projects contribute." CEQA Guidelines Sections 15130(b)(1)(A) and (B) include two methodologies for assessing cumulative impacts. One method is a list of past, present, and probable future projects producing related or cumulative impacts. The other method is a summary of projections contained in an adopted local, regional, or statewide plan, or related planning document that describes or evaluates conditions contributing to the cumulative effect. Such plans may include a general plan, regional transportation plan, or plans for reducing GHG emissions. The cumulative effect on GHG emissions in the Project Area is best addressed through consideration of adopted local, regional, or statewide plan, or related planning documents.

Related Projects that are considered in the cumulative impact analysis are those projects that may occur in the Project Site's vicinity within the same timeframe as the Proposed Project. In this context, "Related Projects" includes past, present, and reasonably probable future projects. Related Projects associated with this growth and located within half a mile of the Project Site are depicted graphically in **Figures 2a** through **2c** and listed in **Table 13**. Related projects of particular relevance to the Proposed Project are discussed below.

Figure 2a – Cumulative Impact Study Area

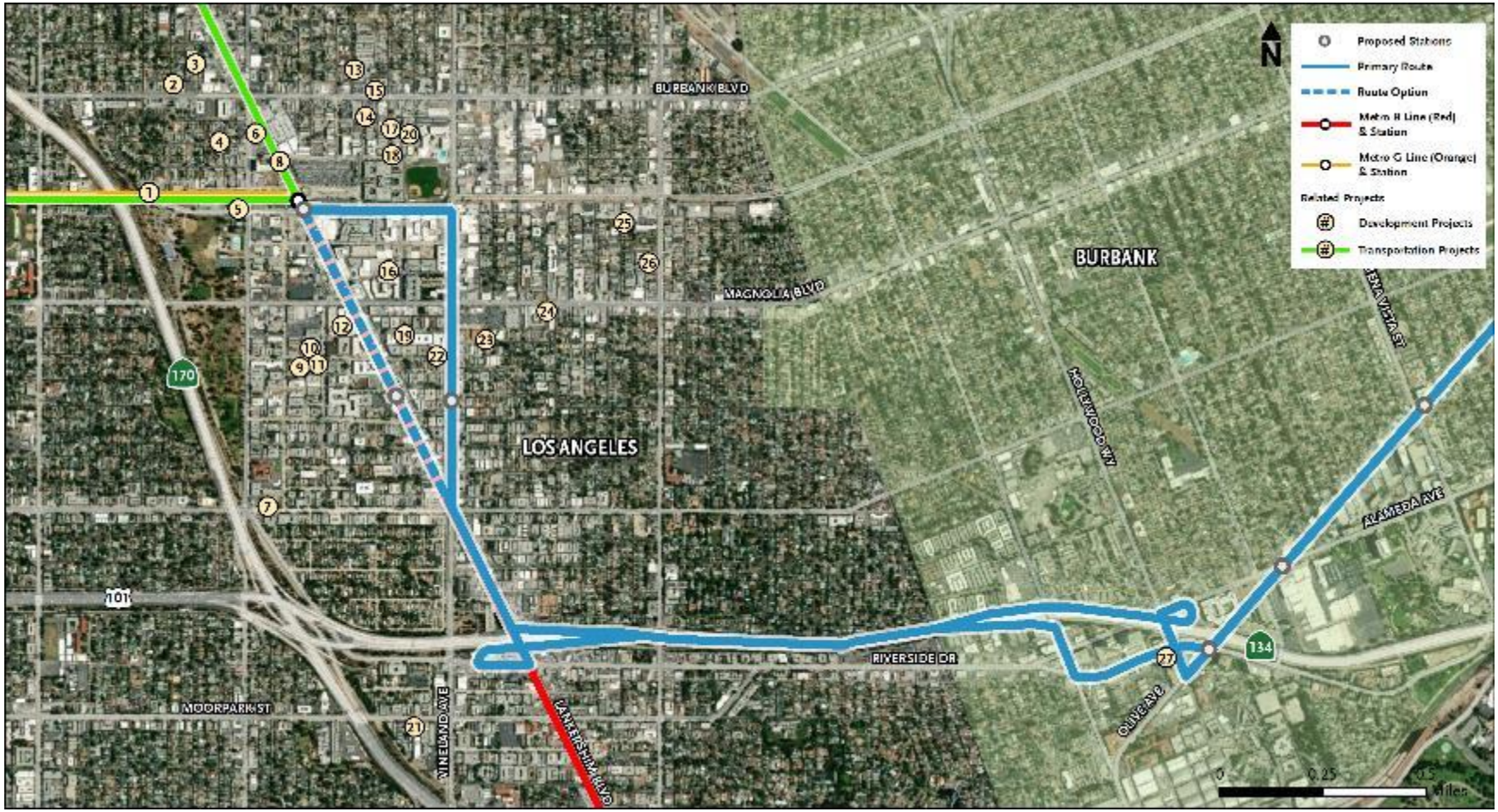
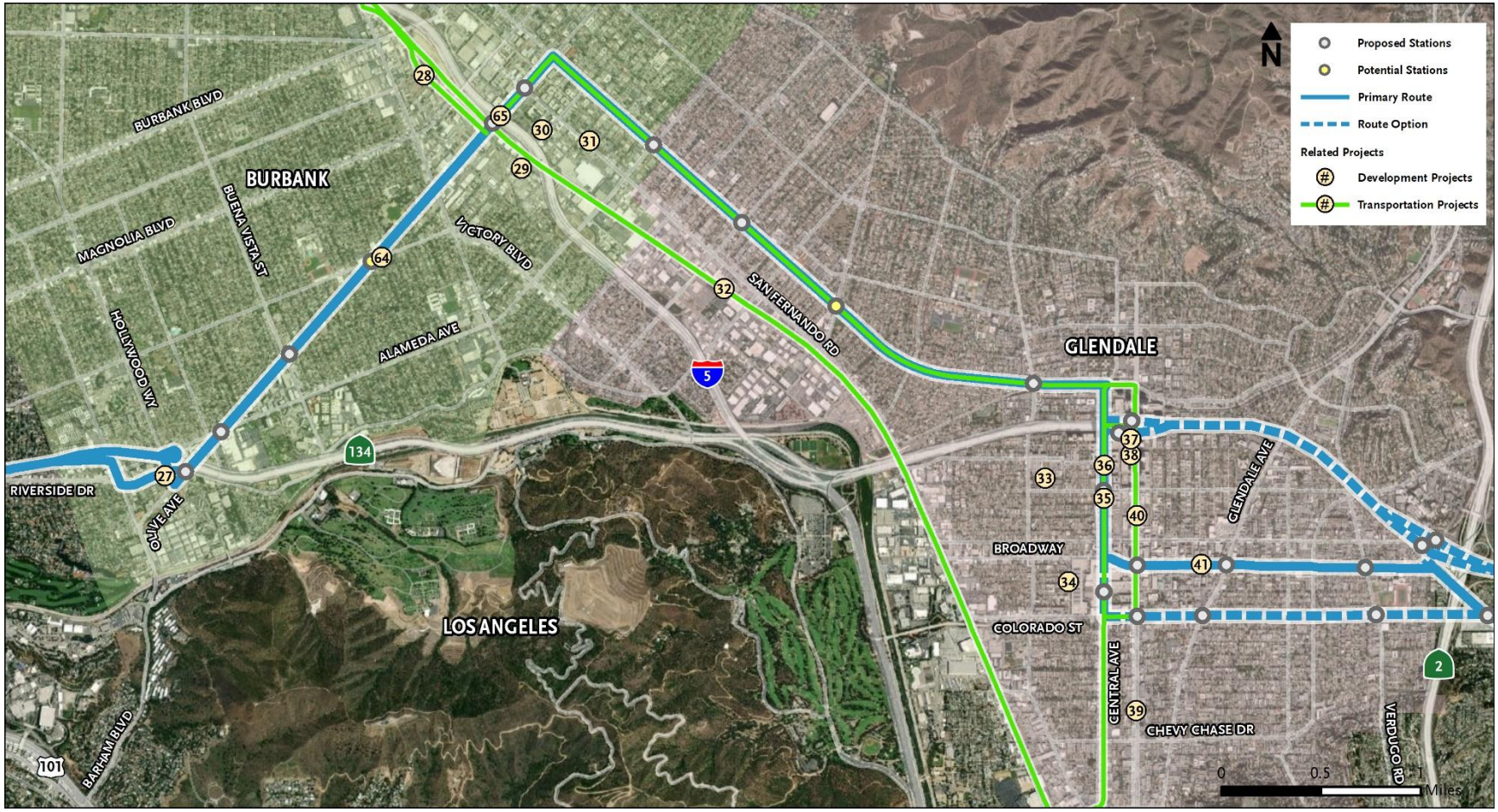


Figure 2b – Cumulative Impact Study Area



Metro

Figure 2c – Cumulative Impact Study Area

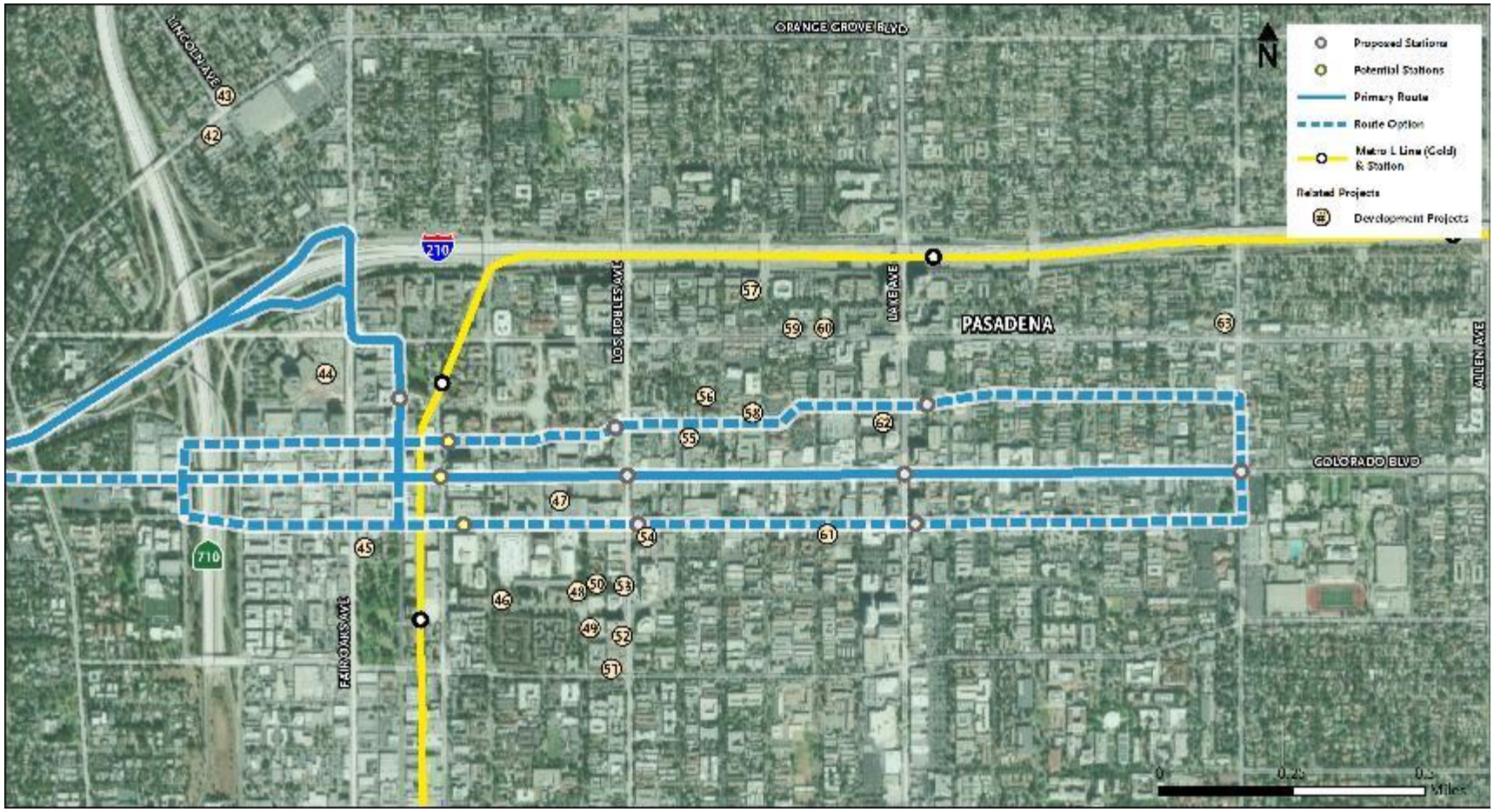


Table 13 – Related Projects

Map ID	Project Name	Location	Description	Status
REGIONAL				
N/A	NextGen Bus Plan	Los Angeles County	The NextGen Bus Plan will revise the existing Metro bus network to improve ridership and make bus use more attractive to current and future riders. The Plan will adjust bus routes and schedules based upon existing origin/destination ridership data with a phased approach to future infrastructure investments in transit convenience, safety, and rider experience.	Implementation early 2021
N/A	East San Fernando Valley LRT Project	San Fernando Valley	New 9-mile LRT line that will extend north from the Van Nuys Metro G Line (Orange) station to the Sylmar/San Fernando Metrolink Station.	Planning
8	North San Fernando Valley BRT Project	San Fernando Valley	New 18-mile BRT line from North Hollywood B/G Line Station (Red/Orange) to Chatsworth.	Planning
32	Los Angeles – Glendale-Burbank Feasibility Study	Amtrak corridor from Los Angeles Union Station to Bob-Hope Airport	Metro is studying a 13-mile transit corridor between Los Angeles Union Station and the Hollywood Burbank Airport. A range of options are under study including both light rail and enhanced commuter rail.	Planning and feasibility
BURBANK				
27	Mixed-Use Development	3700 Riverside Dr.	49-unit residential condominium and 2,000 sq. ft. of retail	Active Project Submission
28	San Fernando Bikeway	San Fernando Blvd. Corridor	Three-mile Class I bike path along San Fernando Blvd. near the Downtown Metrolink Station in the City of Burbank. This project will complete a 12-mile long regional bike path extending from Sylmar to the Downtown Burbank Metrolink Station along the San Fernando Blvd. rail corridor	Planning
29	Commercial Development	411 Flower St.	Commercial building (size unknown)	Active Project Submission
30	Mixed-Use Development	103 Verdugo Ave.	Two mixed-use buildings (size unknown)	Active Project Submission
31	Mixed-Use Development	624 San Fernando Blvd.	42-unit, 4-story mixed-use building with 14,800 sq. ft. of ground-floor commercial	Active Project Submission

Map ID	Project Name	Location	Description	Status
64	Olive Ave./Sparks St./Verdugo Ave. Intersection Improvements	Olive Ave./Sparks St./Verdugo Ave.	Various intersection improvements.	Planning
65	Olive Ave. Overpass Rehabilitation	Olive Ave. over Interstate 5	Improvements to operational efficiency, pedestrian safety, and bicycle connections.	Planning
GLENDALE				
33	Multi-Family Development	452 Milford St.	15-unit building	Active Project Submission
34	Multi-Family Development	401 Hawthorne St.	23-unit building	Active Project Submission
35	Commercial Development	340 Central Ave.	14,229 sq. ft. office	Active Project Submission
36	Multi-Family Development	520 Central Ave.	98-unit building	Active Project Submission
37	Commercial Development	611 Brand Blvd.	Hotel (857 hotel rooms and 7,500 sq. ft. of restaurant/retail)	Active Project Submission
38	Multi-Family Development	601 Brand Blvd.	604 units in 3 buildings	Active Project Submission
39	Commercial Development	901 Brand Blvd.	34,228 sq. ft. parking structure for car dealership	Active Project Submission
40	Glendale Streetcar	Downtown Glendale	Streetcar connecting the Larry Zarian Transportation Center with Downtown Glendale	Planning and feasibility
41	Commercial Development	517 Broadway	Medical/office/retail building (size unknown)	Active Project Submission
LOS ANGELES				
N/A	Orange Line Transit Neighborhood Plan	North Hollywood, Van Nuys, and Sepulveda BRT Stations	Develop regulatory tools and strategies for the areas around three Orange Line stations to encourage transit ridership, enhance the urban environment, and focus new growth and housing in proximity to transit and corridors	Undergoing Environmental Review
N/A	Take Back The Boulevard Initiative	Colorado Blvd.	The mission of the Take Back the Boulevard initiative is to serve as a catalyst for the community-drive revitalization of Colorado Boulevard in Eagle Rock. The Take Back the Boulevard initiative seeks to utilize broad community feedback and involvement to make this central corridor through Eagle Rock a safe, sustainable, and vibrant street in order to stimulate economic growth, increase public safety, and enhance community pride and wellness.	Active Initiative
1	Multi-Family Development	11525 Chandler Blvd.	60-unit building	Active Building Permit

Map ID	Project Name	Location	Description	Status
2	Multi-Family Development	5610 Camellia Ave.	62-unit building	Active Building Permit
3	Multi-Family Development	5645 Farmdale Ave.	44-unit building	Active Building Permit
4	Multi-Family Development	11433 Albers St.	59-unit building	Active Building Permit
5	Mixed-Use Development	11405 Chandler Blvd.	Mixed-use building with residential and commercial components (size unknown)	Active Building Permit
6	Mixed-Use Development	5530 Lankershim Blvd.	15-acre joint development at the North Hollywood Metro Station. Includes 1,275-1,625 residential units (275-425 affordable units), 125,000-150,000 sq. ft. of retail, and 300,000-400,000 sq. ft. of office space	Active Project Submission
7	Mixed-Use Development	11311 Camarillo St.	Mixed-use building (size unknown)	Active Building Permit
9	Multi-Family Development	11262 Otsego St.	49-unit building	Active Building Permit
10	Multi-Family Development	11241 Otsego St.	42-unit building	Active Building Permit
11	Multi-Family Development	11246 Otsego St.	70-unit building	Active Building Permit
12	Mixed-Use Development	5101 Lankershim Blvd.	297 units in a mixed-use housing complex	Active Building Permit
13	Multi-Family Development	5630 Fair Ave.	15-unit building	Active Building Permit
14	Multi-Family Development	5550 Bonner Ave.	48-unit building	Active Building Permit
15	Commercial Development	11135 Burbank Blvd.	4-story hotel with 70 guestrooms	Active Building Permit
16	Commercial Development	11115 McCormick St.	Apartment/Office building (size unknown)	Active Building Permit
17	Multi-Family Development	5536 Fulcher Ave.	36-unit building	Active Building Permit
18	Multi-Family Development	11111 Cumpston St.	41-unit building	Active Building Permit
19	Multi-Family Development	11050 Hartsook St.	48-unit building	Active Building Permit
20	Multi-Family Development	5525 Case Ave.	98-unit building	Active Building Permit
21	Multi-Family Development	11036 Moorpark St.	96-unit building	Active Building Permit
22	Multi-Family Development	11011 Otsego St.	144-unit building	Active Building Permit
23	Multi-Family Development	10925 Hartsook St.	42-unit building	Active Building Permit
24	Multi-Family Development	10812 Magnolia Blvd.	31-unit building	Active Building Permit
25	Multi-Family Development	5338 Cartwright Ave.	21-unit building	Active Building Permit
26	Multi-Family Development	5252 Willow Crest Ave.	25-unit building	Active Building Permit

Map ID	Project Name	Location	Description	Status
PASADENA				
42	Mixed-Use Development	690 Orange Grove Blvd.	48-unit building with commercial space	Active Project Submission
43	Multi-Family Development	745 Orange Grove Blvd.	35-unit building	Active Project Submission
44	Mixed-Use Development	100 Walnut St.	Mixed-use planned development: office building, 93-unit apartment building, and a 139-unit building	Active Building Permit
45	Multi-Family Development	86 Fair Oaks Ave.	87-unit building with commercial space	Active Project Submission
46	Commercial Development	190 Marengo Ave.	7-story hotel with 200 guestrooms	Active Project Submission
47	Multi-Family Development	39 Los Robles Ave.	Residential units above commercial space (size unknown)	Active Building Permit
48	Mixed-Use Development	178 Euclid Ave.	42-unit building with 940 sq. ft. of office space	Active Building Permit
49	Multi-Family Development	380 Cordova St.	48-unit building	Active Building Permit
50	Mixed-Use Development	170 Euclid Ave.	42-unit building with 10,000 sq. ft. of commercial space	Active Project Submission
51	Multi-Family Development	399 Del Mar Blvd.	55-unit building	Active Building Permit
52	Multi-Family Development	253 Los Robles Ave.	92-unit building	Active Project Submission
53	Mixed-Use Development	171 Los Robles Ave.	8-unit building	Active Project Submission
54	Commercial Development	98 Los Robles Ave.	School of medicine building	Active Building Permit
55	Multi-Family Development	530 Union St.	55-unit building with retail space	Active Building Permit
56	Multi-Family Development	119 Madison Ave.	81-unit building	Active Building Permit
57	Multi-Family Development	289 El Molino Ave.	105-unit building	Active Building Permit
58	Multi-Family Development	99 El Molino Ave.	40-unit building	Active Building Permit
59	Commercial Development	711 Walnut St.	Mixed-use building with condominiums, commercial space, food facility, parking structure (size unknown)	Active Building Permit
60	Commercial Development	737 Walnut St.	42-unit building with commercial space	Active Project Submission
61	Mixed-Use Development	740 Green St.	273-unit building	Active Project Submission
62	Mixed-Use Development	83 Lake Ave.	54-unit building with office space	Active Project Submission
63	Multi-Family Development	231 Hill Ave.	59-unit building	Active Project Submission

SOURCE: Terry A. Hayes Associates Inc., 2020.

North San Fernando Valley (SFV) Bus Rapid Transit (BRT) Project. The North SFV BRT Project is a proposed new 18-mile BRT line that is intended to serve the portions of the San Fernando Valley that are north of the Metro G Line (Orange) service area. The project would provide a new, high-quality bus service between the communities of Chatsworth to the west and North Hollywood to the east. The project would enhance existing bus service and increase transit system connectivity.

Joint Development - North Hollywood Station Project. The Joint Development - North Hollywood Station project would construct facilities at the North Hollywood B/G Line (Red/Orange) Station that would be shared by the Proposed Project. The project has been identified in the Measure M Expenditure Plan, with a projected opening date between Fiscal Year 2023-25 and $180 million of funding.

NextGen Bus Plan. In January 2018, Metro began the NextGen Bus Plan aimed at reimagining the bus network to be more relevant, reflective of, and attractive to the diverse customer needs within Los Angeles County. The NextGen Bus Plan will realign Metro's bus network based upon data of existing ridership and adjust bus service routes and schedules to improve the overall network. The Proposed Project would be included in the Plan and replace some select bus services in the region. The NextGen Bus Plan is anticipated to begin implementation in the beginning of 2021.

East SFV Light Rail Transit (LRT) Project. The East SFV LRT Project will be a 9-mile LRT line that will extend north from the Van Nuys Metro G Line (Orange) station to the Sylmar/San Fernando Metrolink Station. Light rail trains will operate in the median of Van Nuys Boulevard for 6.7 miles to San Fernando Road. From San Fernando Road, the trains will transition onto the existing railroad right-of-way that's adjacent to San Fernando Road, which it will share with Metrolink for 2.5 miles to the Sylmar/San Fernando Metrolink Station. The project includes 14 at-grade stations. The Draft EIR/Environmental Impact Statement (EIR/EIS) was published in August 2017 and the Final EIR/EIS is currently being prepared by Metro.

Regarding the potential for Proposed Project to contribute to a cumulative impact, the Project would reduce VMT and associated transportation GHG emissions in the Project Area. Passenger vehicle trips would be replaced with zero-emissions, electric buses. As discussed above, the Proposed Project and design options would be consistent with the goals and policies of applicable GHG reduction plans in the Plan Area including SCAG's RTP/SCS, CARB's 2017 Scoping Plan, Metro Climate Action and Adaptation Plan 2019, Los Angeles Green New Deal, City of Burbank GGRP, Greener Glendale Plan, and the City of Pasadena CAP. Each of these plans is, in and of itself, a GHG reduction plan aimed to reduce cumulative GHG emissions at the local level and beyond. Additionally, it is important to note that GHG impacts are generally cumulative in nature, and unlike the localized air quality impacts, they have broader (i.e., statewide, national, and global) implications. *See Center for Biology Diversity v. Dept. of Fish & Wildlife*, 62 Cal.4th 204, 220 (2015) (characterizing the state's GHG emissions as a "cumulative problem."). There is no potential for the Proposed Project to contribute to a cumulative impact, and impacts related to GHG emissions would not be cumulatively considerable.

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9. List of Preparers

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Appendices to the Greenhouse Gas Emissions Technical Report

NoHo to Pasadena BRT Route

Los Angeles-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	23.00	1000sqft	0.53	23,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	12			**Operational Year**	2024
Utility Company	Los Angeles Department of Water & Power				
CO2 Intensity (lb/MWhr)	834	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

NoHo to Pasadena BRT Route - Los Angeles-South Coast County, Annual

Project Characteristics - CO_2 Intensity Factor consistent with LADWP's 2017 Power Strategic Long-Term Resource Plan, p. C-15.

Land Use -

Construction Phase - Schedule reflect 30-month construction duration.

Off-road Equipment - Construction equipment to be used during the curb/pavement demo phase.

Off-road Equipment - Construction equipment to be used during Site Preparation phase.

Off-road Equipment - Construction equipment to be used during Station Construction.

Off-road Equipment - Construction equipment to be used during paving phase.

Off-road Equipment - Construction equipment to be used during roadway striping phase.

Grading -

Demolition -

Trips and VMT - Assume 5 vendor trips per day during Site Prep, Station Construction, Paing, and Roadway Striping. Assume 30 worker trips per day.

Construction Off-road Equipment Mitigation - Tier 4 construction equipment will be used consistent with Metro's Green Construction Policy.

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tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
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tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
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tblConstructionPhase	PhaseEndDate	1/21/2022	5/28/2022
tblConstructionPhase	PhaseEndDate	6/22/2022	4/27/2024

NoHo to Pasadena BRT Route - Los Angeles-South Coast County, Annual

tblConstructionPhase	PhaseEndDate	1/24/2022	8/6/2022
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tblConstructionPhase	PhaseStartDate	1/27/2022	8/8/2022
tblConstructionPhase	PhaseStartDate	6/16/2022	12/11/2023
tblConstructionPhase	PhaseStartDate	1/22/2022	5/30/2022
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Paving Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType	Forklifts	Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
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tblOffRoadEquipment	PhaseName		Paving
tblOffRoadEquipment	PhaseName		Roadway Striping
tblProjectCharacteristics	CO2IntensityFactor	1227.89	834
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tblTripsAndVMT	WorkerTripNumber	15.00	30.00

tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	23.00	30.00
tblTripsAndVMT	WorkerTripNumber	2.00	30.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1828	1.7955	2.1400	3.8700e-003	0.0856	0.0771	0.1627	0.0177	0.0724	0.0901	0.0000	340.9431	340.9431	0.0769	0.0000	342.8661
2023	0.1548	1.6881	2.7051	4.4200e-003	0.0562	0.0623	0.1184	0.0150	0.0573	0.0723	0.0000	391.2278	391.2278	0.1086	0.0000	393.9434
2024	0.0827	0.6649	1.0296	1.8200e-003	0.0292	0.0307	0.0599	7.8100e-003	0.0286	0.0364	0.0000	159.8774	159.8774	0.0378	0.0000	160.8224
Maximum	**0.1828**	**1.7955**	**2.7051**	**4.4200e-003**	**0.0856**	**0.0771**	**0.1627**	**0.0177**	**0.0724**	**0.0901**	**0.0000**	**391.2278**	**391.2278**	**0.1086**	**0.0000**	**393.9434**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0875	1.3664	2.4182	3.8700e-003	0.0856	0.0111	0.0968	0.0177	0.0111	0.0288	0.0000	340.9428	340.9428	0.0769	0.0000	342.8657
2023	0.1034	1.7815	3.0007	4.4200e-003	0.0562	0.0195	0.0757	0.0150	0.0195	0.0345	0.0000	391.2274	391.2274	0.1086	0.0000	393.9430
2024	0.0357	0.6480	1.1389	1.8200e-003	0.0292	2.5200e-003	0.0317	7.8100e-003	2.5100e-003	0.0103	0.0000	159.8773	159.8773	0.0378	0.0000	160.8222
Maximum	**0.1034**	**1.7815**	**3.0007**	**4.4200e-003**	**0.0856**	**0.0195**	**0.0968**	**0.0177**	**0.0195**	**0.0345**	**0.0000**	**391.2274**	**391.2274**	**0.1086**	**0.0000**	**393.9430**

NoHo to Pasadena BRT Route - Los Angeles-South Coast County, Annual

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**46.08**	**8.50**	**-11.63**	**0.00**	**0.00**	**80.50**	**40.14**	**0.00**	**79.10**	**62.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-10-2022**	**4-9-2022**	0.4520	0.2954
2	**4-10-2022**	**7-9-2022**	0.5215	0.2874
3	**7-10-2022**	**10-9-2022**	0.5326	0.4195
4	**10-10-2022**	**1-9-2023**	0.4998	0.4862
5	**1-10-2023**	**4-9-2023**	0.4567	0.4710
6	**4-10-2023**	**7-9-2023**	0.4611	0.4755
7	**7-10-2023**	**10-9-2023**	0.4662	0.4808
8	**10-10-2023**	**1-9-2024**	0.4539	0.4485
9	**1-10-2024**	**4-9-2024**	0.4196	0.3915
10	**4-10-2024**	**7-9-2024**	0.2787	0.2463
		Highest	0.5326	0.4862

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.8300e-003	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.8300e-003**	**0.0000**	**2.9000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.0000**	**6.1000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.8300e-003	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.8300e-003**	**0.0000**	**2.9000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.0000**	**6.1000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

NoHo to Pasadena BRT Route - Los Angeles-South Coast County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Curb/Pavement Demolition	Demolition	1/10/2022	5/28/2022	6	120	
2	Site Preparation	Site Preparation	5/30/2022	8/6/2022	6	60	
3	Station Construction	Building Construction	8/8/2022	12/9/2023	6	420	
4	Paving	Paving	12/11/2023	4/27/2024	6	120	
5	Roadway Striping	Architectural Coating	4/29/2024	7/6/2024	6	60	

Acres of Grading (Site Preparation Phase): 60

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.53

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 1,380 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Roadway Striping	Air Compressors	2	6.00	78	0.48
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Curb/Pavement Demolition	Concrete/Industrial Saws	2	8.00	81	0.73
Station Construction	Skid Steer Loaders	2	8.00	65	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Graders	2	8.00	187	0.41
Paving	Pavers	2	7.00	130	0.42
Paving	Rollers	2	7.00	80	0.38
Curb/Pavement Demolition	Rubber Tired Dozers	2	1.00	247	0.40
Roadway Striping	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Station Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Curb/Pavement Demolition	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Station Construction	Rough Terrain Forklifts	4	8.00	100	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Curb/Pavement Demolition	6	30.00	0.00	5.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	4	30.00	5.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Station Construction	9	30.00	5.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	9	30.00	5.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Roadway Striping	4	30.00	5.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

3.2 Curb/Pavement Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.3000e-004	0.0000	5.3000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0703	0.6189	0.6949	1.1600e-003		0.0324	0.0324		0.0312	0.0312	0.0000	100.3680	100.3680	0.0151	0.0000	100.7459
Total	**0.0703**	**0.6189**	**0.6949**	**1.1600e-003**	**5.3000e-004**	**0.0324**	**0.0329**	**8.0000e-005**	**0.0312**	**0.0313**	**0.0000**	**100.3680**	**100.3680**	**0.0151**	**0.0000**	**100.7459**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.4000e-004	1.6000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1883	0.1883	1.0000e-005	0.0000	0.1886
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.2600e-003	5.4500e-003	0.0627	1.9000e-004	0.0197	1.6000e-004	0.0199	5.2400e-003	1.5000e-004	5.3800e-003	0.0000	17.1748	17.1748	4.7000e-004	0.0000	17.1866
Total	**7.2800e-003**	**6.0900e-003**	**0.0629**	**1.9000e-004**	**0.0198**	**1.6000e-004**	**0.0199**	**5.2500e-003**	**1.5000e-004**	**5.3900e-003**	**0.0000**	**17.3631**	**17.3631**	**4.8000e-004**	**0.0000**	**17.3752**

3.2 Curb/Pavement Demolition - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.3000e-004	0.0000	5.3000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0221	0.4234	0.7418	1.1600e-003		1.6700e-003	1.6700e-003		1.6700e-003	1.6700e-003	0.0000	100.3679	100.3679	0.0151	0.0000	100.7457
Total	**0.0221**	**0.4234**	**0.7418**	**1.1600e-003**	**5.3000e-004**	**1.6700e-003**	**2.2000e-003**	**8.0000e-005**	**1.6700e-003**	**1.7500e-003**	**0.0000**	**100.3679**	**100.3679**	**0.0151**	**0.0000**	**100.7457**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.4000e-004	1.6000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1883	0.1883	1.0000e-005	0.0000	0.1886
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.2600e-003	5.4500e-003	0.0627	1.9000e-004	0.0197	1.6000e-004	0.0199	5.2400e-003	1.5000e-004	5.3800e-003	0.0000	17.1748	17.1748	4.7000e-004	0.0000	17.1866
Total	**7.2800e-003**	**6.0900e-003**	**0.0629**	**1.9000e-004**	**0.0198**	**1.6000e-004**	**0.0199**	**5.2500e-003**	**1.5000e-004**	**5.3900e-003**	**0.0000**	**17.3631**	**17.3631**	**4.8000e-004**	**0.0000**	**17.3752**

3.3 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0318	0.0000	0.0318	3.4400e-003	0.0000	3.4400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0348	0.4160	0.2376	5.8000e-004		0.0154	0.0154		0.0142	0.0142	0.0000	51.3023	51.3023	0.0166	0.0000	51.7171
Total	**0.0348**	**0.4160**	**0.2376**	**5.8000e-004**	**0.0318**	**0.0154**	**0.0473**	**3.4400e-003**	**0.0142**	**0.0176**	**0.0000**	**51.3023**	**51.3023**	**0.0166**	**0.0000**	**51.7171**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0141	3.8000e-003	4.0000e-005	9.4000e-004	3.0000e-005	9.7000e-004	2.7000e-004	3.0000e-005	3.0000e-004	0.0000	3.6650	3.6650	2.2000e-004	0.0000	3.6705
Worker	3.6300e-003	2.7200e-003	0.0314	9.0000e-005	9.8600e-003	8.0000e-005	9.9400e-003	2.6200e-003	7.0000e-005	2.6900e-003	0.0000	8.5874	8.5874	2.4000e-004	0.0000	8.5933
Total	**4.0700e-003**	**0.0168**	**0.0352**	**1.3000e-004**	**0.0108**	**1.1000e-004**	**0.0109**	**2.8900e-003**	**1.0000e-004**	**2.9900e-003**	**0.0000**	**12.2524**	**12.2524**	**4.6000e-004**	**0.0000**	**12.2638**

3.3 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0318	0.0000	0.0318	3.4400e-003	0.0000	3.4400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0107	0.1859	0.3515	5.8000e-004		9.5000e-004	9.5000e-004		9.5000e-004	9.5000e-004	0.0000	51.3022	51.3022	0.0166	0.0000	51.7170
Total	**0.0107**	**0.1859**	**0.3515**	**5.8000e-004**	**0.0318**	**9.5000e-004**	**0.0328**	**3.4400e-003**	**9.5000e-004**	**4.3900e-003**	**0.0000**	**51.3022**	**51.3022**	**0.0166**	**0.0000**	**51.7170**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0141	3.8000e-003	4.0000e-005	9.4000e-004	3.0000e-005	9.7000e-004	2.7000e-004	3.0000e-005	3.0000e-004	0.0000	3.6650	3.6650	2.2000e-004	0.0000	3.6705
Worker	3.6300e-003	2.7200e-003	0.0314	9.0000e-005	9.8600e-003	8.0000e-005	9.9400e-003	2.6200e-003	7.0000e-005	2.6900e-003	0.0000	8.5874	8.5874	2.4000e-004	0.0000	8.5933
Total	**4.0700e-003**	**0.0168**	**0.0352**	**1.3000e-004**	**0.0108**	**1.1000e-004**	**0.0109**	**2.8900e-003**	**1.0000e-004**	**2.9900e-003**	**0.0000**	**12.2524**	**12.2524**	**4.6000e-004**	**0.0000**	**12.2638**

3.4 Station Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0578	0.7026	1.0356	1.5300e-003		0.0288	0.0288		0.0265	0.0265	0.0000	133.9274	133.9274	0.0433	0.0000	135.0103
Total	**0.0578**	**0.7026**	**1.0356**	**1.5300e-003**		**0.0288**	**0.0288**		**0.0265**	**0.0265**	**0.0000**	**133.9274**	**133.9274**	**0.0433**	**0.0000**	**135.0103**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.2000e-004	0.0295	7.9700e-003	8.0000e-005	1.9800e-003	6.0000e-005	2.0400e-003	5.7000e-004	5.0000e-005	6.3000e-004	0.0000	7.6964	7.6964	4.6000e-004	0.0000	7.7079
Worker	7.6300e-003	5.7200e-003	0.0659	2.0000e-004	0.0207	1.7000e-004	0.0209	5.5000e-003	1.5000e-004	5.6500e-003	0.0000	18.0335	18.0335	5.0000e-004	0.0000	18.0459
Total	**8.5500e-003**	**0.0353**	**0.0738**	**2.8000e-004**	**0.0227**	**2.3000e-004**	**0.0229**	**6.0700e-003**	**2.0000e-004**	**6.2800e-003**	**0.0000**	**25.7300**	**25.7300**	**9.6000e-004**	**0.0000**	**25.7539**

3.4 Station Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0348	0.6989	1.1531	1.5300e-003		8.0300e-003	8.0300e-003		8.0300e-003	8.0300e-003	0.0000	133.9273	133.9273	0.0433	0.0000	135.0101
Total	**0.0348**	**0.6989**	**1.1531**	**1.5300e-003**		**8.0300e-003**	**8.0300e-003**		**8.0300e-003**	**8.0300e-003**	**0.0000**	**133.9273**	**133.9273**	**0.0433**	**0.0000**	**135.0101**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.2000e-004	0.0295	7.9700e-003	8.0000e-005	1.9800e-003	6.0000e-005	2.0400e-003	5.7000e-004	5.0000e-005	6.3000e-004	0.0000	7.6964	7.6964	4.6000e-004	0.0000	7.7079
Worker	7.6300e-003	5.7200e-003	0.0659	2.0000e-004	0.0207	1.7000e-004	0.0209	5.5000e-003	1.5000e-004	5.6500e-003	0.0000	18.0335	18.0335	5.0000e-004	0.0000	18.0459
Total	**8.5500e-003**	**0.0353**	**0.0738**	**2.8000e-004**	**0.0227**	**2.3000e-004**	**0.0229**	**6.0700e-003**	**2.0000e-004**	**6.2800e-003**	**0.0000**	**25.7300**	**25.7300**	**9.6000e-004**	**0.0000**	**25.7539**

3.4 Station Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1261	1.5316	2.4133	3.5600e-003		0.0574	0.0574		0.0528	0.0528	0.0000	312.6388	312.6388	0.1011	0.0000	315.1667
Total	**0.1261**	**1.5316**	**2.4133**	**3.5600e-003**		**0.0574**	**0.0574**		**0.0528**	**0.0528**	**0.0000**	**312.6388**	**312.6388**	**0.1011**	**0.0000**	**315.1667**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5900e-003	0.0521	0.0167	1.8000e-004	4.6300e-003	6.0000e-005	4.6900e-003	1.3400e-003	6.0000e-005	1.3900e-003	0.0000	17.3962	17.3962	9.5000e-004	0.0000	17.4199
Worker	0.0167	0.0121	0.1413	4.5000e-004	0.0483	3.7000e-004	0.0487	0.0128	3.5000e-004	0.0132	0.0000	40.5385	40.5385	1.0400e-003	0.0000	40.5646
Total	**0.0183**	**0.0641**	**0.1580**	**6.3000e-004**	**0.0530**	**4.3000e-004**	**0.0534**	**0.0142**	**4.1000e-004**	**0.0146**	**0.0000**	**57.9346**	**57.9346**	**1.9900e-003**	**0.0000**	**57.9844**

3.4 Station Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0812	1.6307	2.6906	3.5600e-003		0.0187	0.0187		0.0187	0.0187	0.0000	312.6384	312.6384	0.1011	0.0000	315.1663
Total	**0.0812**	**1.6307**	**2.6906**	**3.5600e-003**		**0.0187**	**0.0187**		**0.0187**	**0.0187**	**0.0000**	**312.6384**	**312.6384**	**0.1011**	**0.0000**	**315.1663**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5900e-003	0.0521	0.0167	1.8000e-004	4.6300e-003	6.0000e-005	4.6900e-003	1.3400e-003	6.0000e-005	1.3900e-003	0.0000	17.3962	17.3962	9.5000e-004	0.0000	17.4199
Worker	0.0167	0.0121	0.1413	4.5000e-004	0.0483	3.7000e-004	0.0487	0.0128	3.5000e-004	0.0132	0.0000	40.5385	40.5385	1.0400e-003	0.0000	40.5646
Total	**0.0183**	**0.0641**	**0.1580**	**6.3000e-004**	**0.0530**	**4.3000e-004**	**0.0534**	**0.0142**	**4.1000e-004**	**0.0146**	**0.0000**	**57.9346**	**57.9346**	**1.9900e-003**	**0.0000**	**57.9844**

3.5 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.2700e-003	0.0884	0.1241	2.0000e-004		4.3700e-003	4.3700e-003		4.0300e-003	4.0300e-003	0.0000	17.1073	17.1073	5.4000e-003	0.0000	17.2423
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.2700e-003**	**0.0884**	**0.1241**	**2.0000e-004**		**4.3700e-003**	**4.3700e-003**		**4.0300e-003**	**4.0300e-003**	**0.0000**	**17.1073**	**17.1073**	**5.4000e-003**	**0.0000**	**17.2423**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e-004	3.1900e-003	1.0200e-003	1.0000e-005	2.8000e-004	0.0000	2.9000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	1.0651	1.0651	6.0000e-005	0.0000	1.0665
Worker	1.0200e-003	7.4000e-004	8.6500e-003	3.0000e-005	2.9600e-003	2.0000e-005	2.9800e-003	7.9000e-004	2.0000e-005	8.1000e-004	0.0000	2.4820	2.4820	6.0000e-005	0.0000	2.4835
Total	**1.1200e-003**	**3.9300e-003**	**9.6700e-003**	**4.0000e-005**	**3.2400e-003**	**2.0000e-005**	**3.2700e-003**	**8.7000e-004**	**2.0000e-005**	**9.0000e-004**	**0.0000**	**3.5470**	**3.5470**	**1.2000e-004**	**0.0000**	**3.5501**

3.5 Paving - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.7300e-003	0.0827	0.1424	2.0000e-004		3.1000e-004	3.1000e-004		3.1000e-004	3.1000e-004	0.0000	17.1073	17.1073	5.4000e-003	0.0000	17.2422
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.7300e-003**	**0.0827**	**0.1424**	**2.0000e-004**		**3.1000e-004**	**3.1000e-004**		**3.1000e-004**	**3.1000e-004**	**0.0000**	**17.1073**	**17.1073**	**5.4000e-003**	**0.0000**	**17.2422**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.0000e-004	3.1900e-003	1.0200e-003	1.0000e-005	2.8000e-004	0.0000	2.9000e-004	8.0000e-005	0.0000	9.0000e-005	0.0000	1.0651	1.0651	6.0000e-005	0.0000	1.0665
Worker	1.0200e-003	7.4000e-004	8.6500e-003	3.0000e-005	2.9600e-003	2.0000e-005	2.9800e-003	7.9000e-004	2.0000e-005	8.1000e-004	0.0000	2.4820	2.4820	6.0000e-005	0.0000	2.4835
Total	**1.1200e-003**	**3.9300e-003**	**9.6700e-003**	**4.0000e-005**	**3.2400e-003**	**2.0000e-005**	**3.2700e-003**	**8.7000e-004**	**2.0000e-005**	**9.0000e-004**	**0.0000**	**3.5470**	**3.5470**	**1.2000e-004**	**0.0000**	**3.5501**

3.5 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0505	0.4702	0.7055	1.1200e-003		0.0228	0.0228		0.0211	0.0211	0.0000	96.9400	96.9400	0.0306	0.0000	97.7046
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0505**	**0.4702**	**0.7055**	**1.1200e-003**		**0.0228**	**0.0228**		**0.0211**	**0.0211**	**0.0000**	**96.9400**	**96.9400**	**0.0306**	**0.0000**	**97.7046**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.4000e-004	0.0180	5.6100e-003	6.0000e-005	1.6100e-003	2.0000e-005	1.6300e-003	4.6000e-004	2.0000e-005	4.8000e-004	0.0000	6.0114	6.0114	3.2000e-004	0.0000	6.0195
Worker	5.5000e-003	3.8200e-003	0.0457	1.5000e-004	0.0168	1.3000e-004	0.0169	4.4500e-003	1.2000e-004	4.5700e-003	0.0000	13.6283	13.6283	3.3000e-004	0.0000	13.6366
Total	**6.0400e-003**	**0.0218**	**0.0513**	**2.1000e-004**	**0.0184**	**1.5000e-004**	**0.0185**	**4.9100e-003**	**1.4000e-004**	**5.0500e-003**	**0.0000**	**19.6396**	**19.6396**	**6.5000e-004**	**0.0000**	**19.6560**

3.5 Paving - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0155	0.4685	0.8071	1.1200e-003		1.7400e-003	1.7400e-003		1.7400e-003	1.7400e-003	0.0000	96.9399	96.9399	0.0306	0.0000	97.7045
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0155**	**0.4685**	**0.8071**	**1.1200e-003**		**1.7400e-003**	**1.7400e-003**		**1.7400e-003**	**1.7400e-003**	**0.0000**	**96.9399**	**96.9399**	**0.0306**	**0.0000**	**97.7045**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.4000e-004	0.0180	5.6100e-003	6.0000e-005	1.6100e-003	2.0000e-005	1.6300e-003	4.6000e-004	2.0000e-005	4.8000e-004	0.0000	6.0114	6.0114	3.2000e-004	0.0000	6.0195
Worker	5.5000e-003	3.8200e-003	0.0457	1.5000e-004	0.0168	1.3000e-004	0.0169	4.4500e-003	1.2000e-004	4.5700e-003	0.0000	13.6283	13.6283	3.3000e-004	0.0000	13.6366
Total	**6.0400e-003**	**0.0218**	**0.0513**	**2.1000e-004**	**0.0184**	**1.5000e-004**	**0.0185**	**4.9100e-003**	**1.4000e-004**	**5.0500e-003**	**0.0000**	**19.6396**	**19.6396**	**6.5000e-004**	**0.0000**	**19.6560**

3.6 Roadway Striping - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	3.2000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0195	0.1600	0.2427	3.7000e-004		7.6400e-003	7.6400e-003		7.3200e-003	7.3200e-003	0.0000	31.7450	31.7450	6.1700e-003	0.0000	31.8994
Total	**0.0227**	**0.1600**	**0.2427**	**3.7000e-004**		**7.6400e-003**	**7.6400e-003**		**7.3200e-003**	**7.3200e-003**	**0.0000**	**31.7450**	**31.7450**	**6.1700e-003**	**0.0000**	**31.8994**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.2000e-004	0.0106	3.3000e-003	4.0000e-005	9.4000e-004	1.0000e-005	9.6000e-004	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	3.5361	3.5361	1.9000e-004	0.0000	3.5409
Worker	3.2300e-003	2.2500e-003	0.0269	9.0000e-005	9.8600e-003	8.0000e-005	9.9400e-003	2.6200e-003	7.0000e-005	2.6900e-003	0.0000	8.0166	8.0166	2.0000e-004	0.0000	8.0215
Total	**3.5500e-003**	**0.0128**	**0.0302**	**1.3000e-004**	**0.0108**	**9.0000e-005**	**0.0109**	**2.8900e-003**	**8.0000e-005**	**2.9700e-003**	**0.0000**	**11.5527**	**11.5527**	**3.9000e-004**	**0.0000**	**11.5624**

3.6 Roadway Striping - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	3.2000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.4500e-003	0.1449	0.2505	3.7000e-004		5.4000e-004	5.4000e-004		5.4000e-004	5.4000e-004	0.0000	31.7450	31.7450	6.1700e-003	0.0000	31.8994
Total	**0.0107**	**0.1449**	**0.2505**	**3.7000e-004**		**5.4000e-004**	**5.4000e-004**		**5.4000e-004**	**5.4000e-004**	**0.0000**	**31.7450**	**31.7450**	**6.1700e-003**	**0.0000**	**31.8994**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.2000e-004	0.0106	3.3000e-003	4.0000e-005	9.4000e-004	1.0000e-005	9.6000e-004	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	3.5361	3.5361	1.9000e-004	0.0000	3.5409
Worker	3.2300e-003	2.2500e-003	0.0269	9.0000e-005	9.8600e-003	8.0000e-005	9.9400e-003	2.6200e-003	7.0000e-005	2.6900e-003	0.0000	8.0166	8.0166	2.0000e-004	0.0000	8.0215
Total	**3.5500e-003**	**0.0128**	**0.0302**	**1.3000e-004**	**0.0108**	**9.0000e-005**	**0.0109**	**2.8900e-003**	**8.0000e-005**	**2.9700e-003**	**0.0000**	**11.5527**	**11.5527**	**3.9000e-004**	**0.0000**	**11.5624**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.545348	0.044620	0.206559	0.118451	0.015002	0.006253	0.020617	0.031756	0.002560	0.002071	0.005217	0.000696	0.000850

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.8300e-003	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004
Unmitigated	1.8300e-003	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.2000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.4900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004
Total	**1.8400e-003**	**0.0000**	**2.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.0000**	**6.1000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.2000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.4900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	2.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	5.7000e-004	5.7000e-004	0.0000	0.0000	6.1000e-004
Total	**1.8400e-003**	**0.0000**	**2.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**5.7000e-004**	**5.7000e-004**	**0.0000**	**0.0000**	**6.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod GHG Adjustments for Worker Trips

Year	Annual CO2 Emissions	Worker Trip GHG Emissions				Annual CO2 Emissions with Adjusted Worker Trip Emissions	Annual CH4 Emissions	Annual N2O Emissions	Annual CO2e Emissions with Adjusted CO2 Emissions
		Phase	Off-Site Emissions	CARB CO2 EMFAC Adjustment*	Adjusted Emissions				
2022	340.9428	Curb/Pavement Demolition	17.1748	-	-	347.9545	0.0769	0.00	348.03
		Site Preparation	8.5874	-	-				
		Station Construction	18.0335	-	-				
		Total Worker Trip GHG Emissions	*43.7957*	1.1601	50.8074				
2023	391.2274	Station Construction	40.5385	-	-	398.1150	0.1086	0.00	398.22
		Paving	2.482	-	-				
		Total Worker Trip GHG Emissions	*43.0205*	1.1601	49.9081				
2024	159.8773	Paving	13.6283	-	-	163.3426	0.0376	0.00	163.38
		Roadway Striping	8.0166	-	-				
		Total Worker Trip GHG Emissions	*21.6449*	1.1601	25.1102				
								Total Construction GHG Emissions	**909.64**
								Average Construction GHG Emissions per Year	***363.85***

CARB. *EMFAC Off-Model Adjustment Factors for Carbon Dioxide Emissions to Account for the SAFE Vehicle Rule Part One and the Final SAFE Rule* . 2020.
Available: https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_draft.pdf

* CalEEMod estimates vehicle emissions with EMFAC2014. Therefore, calculation utilizes CARB's EMFAC2014 CO2 adjustment factor.

Emissions from Buses Traveling Route

Annual Revenue Miles (NoHo to Pasadena)	kWh/mile	MWh/year	LADWP CO2 Intensity Factor (lb/Mwh)	LADWP CH4 Intensity Factor (lb/Mwh)	CH4 Intensity Factor Adjusted for GWP*	LADWP N2O Intensity Factor (lb/Mwh)	N2O Intensity Factor Adjusted for GWP*	CO2e lb/year	CO2e MT/year
1,348,500	2.2	2966.7	834.00	0.029	0.725	0.00617	1.83866	2,481,833.41	1,125.73

*GWP for CH4 and N20 is 25 and 298, respectively.

Emissions from Buses Displaced by Proposed Project

Annual Revenue Miles Displaced	kWh/mile	MWh/year	LADWP CO2 Intensity Factor (lb/Mwh)	LADWP CH4 Intensity Factor (lb/Mwh)	CH4 Intensity Factor Adjusted for GWP*	LADWP N2O Intensity Factor (lb/Mwh)	N2O Intensity Factor Adjusted for GWP*	CO2e lb/year	CO2e MT/year
303,124	2.2	666.8728	834.00	0.029	0.725	0.00617	1.83866	557881.5503	253.05

*GWP for CH4 and N20 is 25 and 298, respectively.

Emissions from Deadhead Miles to Metro Division

Annual Miles to and from Sun Valley*	kWh/mile	MWh/year	LADWP CO2 Intensity Factor (lb/Mwh)	LADWP CH4 Intensity Factor (lb/Mwh)	CH4 Intensity Factor Adjusted for GWP**	LADWP N2O Intensity Factor (lb/Mwh)	N2O Intensity Factor Adjusted for GWP**	CO2e lb/year	CO2e MT/year
267,180	2.2	587.796	834.00	0.029	0.725	0.00617	1.83866	491728.7731	223.04

*Proposed Project route is approximately 18.3 miles from El Monte Metro Division. Assumed 20 buses would make one round trip (36.6 miles) per day.

**GWP for CH4 and N20 is 25 and 298, respectively.

EMFAC2017 Output File

EMFAC2017 (v1.0.2) Emission Rates
Region Type: County
Region: LOS ANGELES
Calendar Year: 2042
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN. Note 'day' in the unit is operation day.

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	CH4_RUNEX	N2O_RUNEX	CO2_RUNEX
LOS ANGELES	2042	HHDT	Aggregated	Aggregated	GAS	71.33508363	8344.197657	0.07650057	0.126509546	1571.10357
LOS ANGELES	2042	HHDT	Aggregated	Aggregated	DSL	68063.92488	9463165.656	0.000877445	0.157612436	1002.71247
LOS ANGELES	2042	HHDT	Aggregated	Aggregated	NG	4957.168892	202107.4699	4.08526533	0.537832041	2638.28689
LOS ANGELES	2042	LDA	Aggregated	Aggregated	GAS	4675886.67	150153468.3	0.000789472	0.002970876	205.320261
LOS ANGELES	2042	LDA	Aggregated	Aggregated	DSL	57307.75307	1862958.863	0.000313428	0.026145751	166.336304
LOS ANGELES	2042	LDA	Aggregated	Aggregated	ELEC	298426.4196	9937034.706	0	0	0
LOS ANGELES	2042	LDT1	Aggregated	Aggregated	GAS	671612.7371	20605872.47	0.000930556	0.003208609	239.548781
LOS ANGELES	2042	LDT1	Aggregated	Aggregated	DSL	98.31465116	2951.669772	0.001145905	0.051508806	327.69319
LOS ANGELES	2042	LDT1	Aggregated	Aggregated	ELEC	24908.77245	802934.1238	0	0	0
LOS ANGELES	2042	LDT2	Aggregated	Aggregated	GAS	1810757.611	57135293.22	0.001150796	0.003076646	236.463269
LOS ANGELES	2042	LDT2	Aggregated	Aggregated	DSL	18384.19062	587143.5351	0.001032587	0.03483293	221.603158
LOS ANGELES	2042	LDT2	Aggregated	Aggregated	ELEC	80889.17343	1839449.308	0	0	0
LOS ANGELES	2042	LHDT1	Aggregated	Aggregated	GAS	119145.3618	3800528.51	0.001151055	0.004139401	664.803805
LOS ANGELES	2042	LHDT1	Aggregated	Aggregated	DSL	137871.2156	4349497.767	0.001987246	0.060082051	382.235201
LOS ANGELES	2042	LHDT2	Aggregated	Aggregated	GAS	21738.58839	666424.3365	0.001134021	0.004544295	763.627389
LOS ANGELES	2042	LHDT2	Aggregated	Aggregated	DSL	55982.92897	1701695.679	0.002043768	0.066516972	423.173442
LOS ANGELES	2042	MCY	Aggregated	Aggregated	GAS	284728.18	1513179.356	0.375921442	0.065087766	224.858641
LOS ANGELES	2042	MDV	Aggregated	Aggregated	GAS	1160610.266	34443965.57	0.001301902	0.003294795	288.795444
LOS ANGELES	2042	MDV	Aggregated	Aggregated	DSL	40995.61993	1234344.188	0.000359855	0.045052683	286.620068
LOS ANGELES	2042	MDV	Aggregated	Aggregated	ELEC	58874.38233	1336730.161	0	0	0
LOS ANGELES	2042	MH	Aggregated	Aggregated	GAS	23125.93383	208057.5868	0.003486931	0.013357247	1357.56538
LOS ANGELES	2042	MH	Aggregated	Aggregated	DSL	10970.30549	89698.85041	0.002200651	0.12611455	802.326482
LOS ANGELES	2042	MHDT	Aggregated	Aggregated	GAS	18448.79708	898534.4529	0.002750102	0.008518243	1343.71796
LOS ANGELES	2042	MHDT	Aggregated	Aggregated	DSL	99288.89957	5606716.099	0.000346806	0.115834182	736.923945
LOS ANGELES	2042	OBUS	Aggregated	Aggregated	GAS	4260.430109	145827.1207	0.003636923	0.012400435	1357.00353
LOS ANGELES	2042	OBUS	Aggregated	Aggregated	DSL	4917.386705	329753.278	0.00050588	0.145166965	923.535792
LOS ANGELES	2042	SBUS	Aggregated	Aggregated	GAS	2972.754928	103179.9337	0.002676124	0.010879227	709.031235
LOS ANGELES	2042	SBUS	Aggregated	Aggregated	DSL	4512.91183	143460.7535	0.000672887	0.144267489	917.813427
LOS ANGELES	2042	UBUS	Aggregated	Aggregated	GAS	519.3343148	37544.13632	0.005940007	0.020742907	1568.18271
LOS ANGELES	2042	UBUS	Aggregated	Aggregated	DSL	0	0	0	0	0
LOS ANGELES	2042	UBUS	Aggregated	Aggregated	NG	4727.548781	501938.3386	6.322584336	0.406813642	1995.58787

Average CO2e Emissions (grams/mile)

Calendar Year	Vehicle Category	Fuel	Population	VMT	Proportion of VMT	CO2 (g/mile)	CO2 (g/mile) as a proportion of VMT	CH4 (g/mile)	CH4 (g/mile) as a proportion of VMT	N2O (g/mile)	N2O (g/mile) as a proportion of VMT
2042	HHDT	GAS	71.33508363	8344.197657	2.69418E-05	1571.103567	0.04232838	0.07650057	2.06106E-06	0.126509546	3.4084E-06
2042	HHDT	DSL	68063.92488	9463165.656	0.030554747	1002.712468	30.63762569	0.000877445	2.68101E-05	0.157612436	0.004815808
2042	HHDT	NG	4957.168892	202107.4699	0.000652566	2638.286886	1.721656999	4.08526533	0.002665906	0.537832041	0.000350971
2042	LDA	GAS	4675886.67	150153468.3	0.484816751	205.320261	99.54270177	0.000789472	0.000382749	0.002970876	0.00144033
2042	LDA	DSL	57307.75307	1862958.863	0.006015137	166.3363042	1.000535636	0.000313428	1.88531E-06	0.026145751	0.00015727
2042	LDA	ELEC	298426.4196	9937034.706	0.032084779	0	0	0	0	0	0
2042	LDT1	GAS	671612.7371	20605872.47	0.06653241	239.5487815	15.93775777	0.000930556	6.19121E-05	0.003208609	0.000213476
2042	LDT1	DSL	98.31465116	2951.669772	9.53038E-06	327.6931901	0.003123039	0.001145905	1.09209E-08	0.051508806	4.90898E-07
2042	LDT1	ELEC	24908.77245	802934.1238	0.00259252	0	0	0	0	0	0
2042	LDT2	GAS	1810757.611	57135293.22	0.184478904	236.4632689	43.62248459	0.001150796	0.000212298	0.003076646	0.000567576
2042	LDT2	DSL	18384.19062	587143.5351	0.001895774	221.6031576	0.420109474	0.001032587	1.95755E-06	0.03483293	6.60354E-05
2042	LDT2	ELEC	80889.17343	1839449.308	0.005939229	0	0	0	0	0	0
2042	LHDT1	GAS	119145.3618	3800528.51	0.012271178	664.8038047	8.157925583	0.001151055	1.41248E-05	0.004139401	5.07953E-05
2042	LHDT1	DSL	137871.2156	4349497.767	0.014043694	382.2352009	5.367994228	0.001987246	2.79083E-05	0.060082051	0.000843774
2042	LHDT2	GAS	21738.58839	666424.3365	0.002151756	763.6273892	1.643140096	0.001134021	2.44014E-06	0.004544295	9.77821E-06
2042	LHDT2	DSL	55982.92897	1701695.679	0.005494449	423.1734416	2.325104882	0.002043768	1.12294E-05	0.066516972	0.000365474
2042	MCY	GAS	284728.18	1513179.356	0.004885766	224.8586409	1.098606685	0.375921442	0.001836664	0.065087766	0.000318004
2042	MDV	GAS	1160610.266	34443965.57	0.111212959	288.7954439	32.11779577	0.001301902	0.000144788	0.003294795	0.000366424
2042	MDV	DSL	40995.61993	1234344.188	0.003985461	286.6200684	1.142313002	0.000359855	1.43419E-06	0.045052683	0.000179556
2042	MDV	ELEC	58874.38233	1336730.161	0.004316045	0	0	0	0	0	0
2042	MH	GAS	23125.93383	208057.5868	0.000671778	1357.565378	0.911982613	0.003486931	2.34244E-06	0.013357247	8.97311E-06
2042	MH	DSL	10970.30549	89698.85041	0.00028962	802.3264823	0.232370104	0.002200651	6.37353E-07	0.12611455	3.65253E-05
2042	MHDT	GAS	18448.79708	898534.4529	0.002901195	1343.717957	3.898388376	0.002750102	7.97858E-06	0.008518243	2.47131E-05
2042	MHDT	DSL	99288.89957	5606716.099	0.018103011	736.9239452	13.34054225	0.000346806	6.27823E-06	0.115834182	0.002096947
2042	OBUS	GAS	4260.430109	145827.1207	0.000470848	1357.003533	0.638942133	0.003636923	1.71244E-06	0.012400435	5.83872E-06
2042	OBUS	DSL	4917.386705	329753.278	0.00106471	923.5357919	0.983297876	0.00050588	5.38615E-07	0.145166965	0.000154561
2042	SBUS	GAS	2972.754928	103179.9337	0.000333148	709.0312346	0.236212491	0.002676124	8.91546E-07	0.010879227	3.6244E-06
2042	SBUS	DSL	4512.91183	143460.7535	0.000463207	917.8134268	0.425137841	0.000672887	3.11686E-07	0.144267489	6.68257E-05
2042	UBUS	GAS	519.3343148	37544.13632	0.000121223	1568.182709	0.190099523	0.005940007	7.20064E-07	0.020742907	2.51451E-06
2042	UBUS	DSL	0	0	0	0	0	0	0	0	0
2042	UBUS	NG	4727.548781	501938.3386	0.001620663	1995.587869	3.234174677	6.322584336	0.010246776	0.406813642	0.000659308
			Total VMT	309711799.618		**AVERAGE CO2 (g/mile)**	268.8723515	**AVERAGE CH4 (g/mile)**	0.015662367	**AVERAGE N2O (g/mile)**	0.012809003
						EMFAC2017 Adjustment for 2042 (g/mile)*	1.1207	**Adjusted for GWP****	25	**Adjusted for GWP****	298
						Adjusted Average CO2 Adjusted (g/mile)	*301.33*	**Adjusted Average CH4 (g/mile)**	*0.39*	**Adjusted Average N2O (g/mile)**	*3.82*
										Adjusted CO2e (g/mile)***	***305.53***

* CARB. EMFAC Off-Model Adjustment Factors for Carbon Dioxide Emissions to Account for the SAFE Vehicle Rule Part One and the Final SAFE Rule. 2020. Available: https://ww3.arb.ca.gov/msei/emfac_off_model_co2_adjustment_factors_06262020-final.pdf

** Global Warming Potential (GWP) for CH4 and N2O is 25 and 298, respectively.

*** Adjusted Average CO2e = Ajusted Average CO2 + Adjusted Average CH4 + Adjusted Average N2O

VMT GHG Emissions

Scenario	Total Daily VMT	Annual VMT	Average CO2e (g/mile)	Average CO2e (MT/mile)	CO2e (MT/year)
Baseline (2042)	511,871,989	177,619,580,183	305.53	0.00030553	54,268,110.33
Proposed Project	511,785,330	177,589,509,510	305.53	0.00030553	54,258,922.84

EMFAC2017 (v1.0.2) Emission Rates
Region Type: County
Region: LOS ANGELES
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN. Note 'day' in the unit is operation d

Region	Calendar Y	Vehicle Ca	Model Yea	Speed	Fuel	Population	VMT	CO2_RUNI	CH4_RUNI	N2O_RUNEX
LOS ANGEI	2022	HHDT	Aggregate	Aggregate	GAS	55.46637507	5860.691124	2083.65	0.104616	0.150366
LOS ANGEI	2022	HHDT	Aggregate	Aggregate	DSL	58358.51972	7034024.324	1447.534	0.003555	0.227532
LOS ANGEI	2022	HHDT	Aggregate	Aggregate	NG	2627.443069	106986.7103	3410.179	5.117678	0.695187
LOS ANGEI	2022	LDA	Aggregate	Aggregate	GAS	4040504.833	154312636.5	277.0764	0.003116	0.004668
LOS ANGEI	2022	LDA	Aggregate	Aggregate	DSL	35580.70761	1405948.594	215.1656	0.00099	0.033821
LOS ANGEI	2022	LDA	Aggregate	Aggregate	ELEC	79346.01523	3237232.352	0	0	0
LOS ANGEI	2022	LDT1	Aggregate	Aggregate	GAS	466456.294	17402686.02	321.2744	0.007854	0.008944
LOS ANGEI	2022	LDT1	Aggregate	Aggregate	DSL	276.3592923	6755.981354	466.5442	0.008956	0.073334
LOS ANGEI	2022	LDT1	Aggregate	Aggregate	ELEC	3550.873409	146697.1661	0	0	0
LOS ANGEI	2022	LDT2	Aggregate	Aggregate	GAS	1395327.914	52851239.49	344.8095	0.005064	0.00708
LOS ANGEI	2022	LDT2	Aggregate	Aggregate	DSL	9029.025545	384253.17	292.5279	0.001073	0.045981
LOS ANGEI	2022	LDT2	Aggregate	Aggregate	ELEC	14572.87567	476540.0157	0	0	0
LOS ANGEI	2022	LHDT1	Aggregate	Aggregate	GAS	107665.0189	3912114.95	811.5794	0.007628	0.012581
LOS ANGEI	2022	LHDT1	Aggregate	Aggregate	DSL	66438.77298	2829556.448	465.2207	0.003092	0.073126
LOS ANGEI	2022	LHDT2	Aggregate	Aggregate	GAS	18107.10123	636816.2065	931.0345	0.005579	0.013411
LOS ANGEI	2022	LHDT2	Aggregate	Aggregate	DSL	26821.57306	1100164.26	514.72	0.003031	0.080907
LOS ANGEI	2022	MCY	Aggregate	Aggregate	GAS	181916.5067	1290803.93	223.4509	0.380714	0.065537
LOS ANGEI	2022	MDV	Aggregate	Aggregate	GAS	941584.3061	33063464.21	423.4377	0.006765	0.008951
LOS ANGEI	2022	MDV	Aggregate	Aggregate	DSL	19913.35499	791156.8054	378.6489	0.000735	0.059518
LOS ANGEI	2022	MDV	Aggregate	Aggregate	ELEC	7529.633431	254507.8273	0	0	0
LOS ANGEI	2022	MH	Aggregate	Aggregate	GAS	19672.43712	198291.6854	1674.31	0.012445	0.022042
LOS ANGEI	2022	MH	Aggregate	Aggregate	DSL	6142.766028	64185.85871	966.4587	0.003172	0.151914
LOS ANGEI	2022	MHDT	Aggregate	Aggregate	GAS	14669.99802	811414.7327	1678.263	0.013633	0.023298
LOS ANGEI	2022	MHDT	Aggregate	Aggregate	DSL	66663.52346	4256908.395	953.6375	0.002874	0.149899
LOS ANGEI	2022	OBUS	Aggregate	Aggregate	GAS	4028.136326	167752.5949	1697.449	0.012936	0.023595
LOS ANGEI	2022	OBUS	Aggregate	Aggregate	DSL	3117.01323	239545.8927	1178.92	0.002871	0.18531
LOS ANGEI	2022	SBUS	Aggregate	Aggregate	GAS	1393.897962	56948.09952	866.2283	0.010678	0.02324
LOS ANGEI	2022	SBUS	Aggregate	Aggregate	DSL	3866.897734	122197.4183	1223.125	0.005372	0.192258
LOS ANGEI	2022	UBUS	Aggregate	Aggregate	GAS	463.7251984	33581.36145	2028.437	0.005946	0.02444
LOS ANGEI	2022	UBUS	Aggregate	Aggregate	DSL	37.1389	5105.145298	1609.322	0.12548	0.252963
LOS ANGEI	2022	UBUS	Aggregate	Aggregate	ELEC	14	1217.553685	0	0	0
LOS ANGEI	2022	UBUS	Aggregate	Aggregate	NG	4177.418205	442636.1645	1995.644	6.321092	0.406825

2022 Emissions from CNG Buses Traveling Route

Annual Revenue Miles (NoHo to Pasadena)	EMFAC2017 CO2 (g/mile)	EMFAC2017 CH4 (g/mile)	CH4 Intensity Factor Adjusted for GWP*	EMFAC2017 CH4 (g/mile)	N2O Intensity Factor Adjusted for GWP*	CO2e grams/year	CO2e MT/year
1,348,500	1,995.64	6.320	158.000	0.40700	121.28600	3,067,737,711.00	3,067.74

* GWP for CH4 and NO2 is 25 and 298, respectively.

2022 Average CO2e Emissions (grams/mile)

Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Proportion of VMT	CO2 (g/mile)	CO2 (g/mile) as a proportion of VMT	CH4 (g/mile)	CH4 (g/mile) as a proportion of VMT	N2O (g/mile)	N2O (g/mile) as a proportion of VMT
2022	HHDT	Aggregate	Aggregate	GAS	55.466375	5860.6911	2.037E-05	2083.650372	0.042453	0.104615931	2.13E-06	0.150366088	3.06E-06
2022	HHDT	Aggregate	Aggregate	DSL	58358.52	7034024.3	0.0244536	1447.533568	35.39738	0.003555174	8.69E-05	0.227532119	0.005564
2022	HHDT	Aggregate	Aggregate	NG	2627.4431	106986.71	0.0003719	3410.179455	1.268369	5.117677797	0.001903	0.695187391	0.000259
2022	LDA	Aggregate	Aggregate	GAS	4040504.8	154312637	0.5364634	277.0763818	148.6413	0.003115905	0.001672	0.004667654	0.002504
2022	LDA	Aggregate	Aggregate	DSL	35580.708	1405948.6	0.0048877	215.1656295	1.051674	0.000990097	4.84E-06	0.033821041	0.000165
2022	LDA	Aggregate	Aggregate	ELEC	79346.015	3237232.4	0.0112541	0	0	0	0	0	0
2022	LDT1	Aggregate	Aggregate	GAS	466456.29	17402686	0.0604999	321.2743755	19.43708	0.00785429	0.000475	0.008943923	0.000541
2022	LDT1	Aggregate	Aggregate	DSL	276.35929	6755.9814	2.349E-05	466.5441636	0.010958	0.008955531	2.1E-07	0.073334246	1.72E-06
2022	LDT1	Aggregate	Aggregate	ELEC	3550.8734	146697.17	0.00051	0	0	0	0	0	0
2022	LDT2	Aggregate	Aggregate	GAS	1395327.9	52851239	0.1837358	344.8094676	63.35385	0.005064174	0.00093	0.00707987	0.001301
2022	LDT2	Aggregate	Aggregate	DSL	9029.0255	384253.17	0.0013358	292.5279299	0.390772	0.001073464	1.43E-06	0.045981317	6.14E-05
2022	LDT2	Aggregate	Aggregate	ELEC	14572.876	476540.02	0.0016567	0	0	0	0	0	0
2022	LHDT1	Aggregate	Aggregate	GAS	107665.02	3912115	0.0136004	811.5793812	11.03777	0.007628405	0.000104	0.012581329	0.000171
2022	LHDT1	Aggregate	Aggregate	DSL	66438.773	2829556.4	0.0098369	465.2206871	4.576316	0.003092148	3.04E-05	0.073126213	0.000719
2022	LHDT2	Aggregate	Aggregate	GAS	18107.101	636816.21	0.0022139	931.0345486	2.061192	0.0055793	1.24E-05	0.013410897	2.97E-05
2022	LHDT2	Aggregate	Aggregate	DSL	26821.573	1100164.3	0.0038247	514.7199842	1.968644	0.003031259	1.16E-05	0.080906814	0.000309
2022	MCY	Aggregate	Aggregate	GAS	181916.51	1290803.9	0.0044874	223.4508661	1.002723	0.380713945	0.001708	0.065536564	0.000294
2022	MDV	Aggregate	Aggregate	GAS	941584.31	33063464	0.1149442	423.437712	48.6717	0.006765418	0.000778	0.008950844	0.001029
2022	MDV	Aggregate	Aggregate	DSL	19913.355	791156.81	0.0027504	378.6489396	1.041449	0.000734861	2.02E-06	0.05951834	0.000164
2022	MDV	Aggregate	Aggregate	ELEC	7529.6334	254507.83	0.0008848	0	0	0	0	0	0
2022	MH	Aggregate	Aggregate	GAS	19672.437	198291.69	0.0006894	1674.309881	1.154194	0.012444905	8.58E-06	0.022042427	1.52E-05
2022	MH	Aggregate	Aggregate	DSL	6142.766	64185.859	0.0002231	966.4587239	0.215656	0.003171744	7.08E-07	0.151913853	3.39E-05
2022	MHDT	Aggregate	Aggregate	GAS	14669.998	811414.73	0.0028209	1678.263352	4.734146	0.013633426	3.85E-05	0.023298183	6.57E-05
2022	MHDT	Aggregate	Aggregate	DSL	66663.523	4256908.4	0.014799	953.6375096	14.1129	0.002874229	4.25E-05	0.149898536	0.002218
2022	OBUS	Aggregate	Aggregate	GAS	4028.1363	167752.59	0.0005832	1697.449314	0.98993	0.012936233	7.54E-06	0.023595418	1.38E-05
2022	OBUS	Aggregate	Aggregate	DSL	3117.0132	239545.89	0.0008328	1178.91994	0.981774	0.002870955	2.39E-06	0.185309797	0.000154
2022	SBUS	Aggregate	Aggregate	GAS	1393.898	56948.1	0.000198	866.2282657	0.171495	0.010677983	2.11E-06	0.023240408	4.6E-06
2022	SBUS	Aggregate	Aggregate	DSL	3866.8977	122197.42	0.0004248	1223.124843	0.519603	0.005371697	2.28E-06	0.192258192	8.17E-05
2022	UBUS	Aggregate	Aggregate	GAS	463.7252	33581.361	0.0001167	2028.436838	0.236809	0.005946069	6.94E-07	0.024440284	2.85E-06
2022	UBUS	Aggregate	Aggregate	DSL	37.1389	5105.1453	1.775E-05	1609.321718	0.028562	0.125479786	2.23E-06	0.252962963	4.49E-06
2022	UBUS	Aggregate	Aggregate	NG	4177.4182	442636.16	0.0015388	1995.64376	3.07092	6.321092318	0.009727	0.406825035	0.000626
					TOTAL	287648013		**AVERAGE CO2 (g/mile)**	366.1697	**AVERAGE CH4 (g/mile)**	0.017557	**AVERAGE N2O (g/mil**	0.016337
								EMFAC2017 Adjustment for 2022 (g/mile)*	1.0065	**Adjusted for GWP****	25	**Adjusted for GWP****	298
								Adjusted Average CO2 Adjusted (g/mile)	*368.55*	**Adjusted Average CH4 (g/mile)**	*0.44*	**Adjusted Average N2O (g/mile)**	*4.87*
													373.86

* CARB. EMFAC Off-Model Adjustment Factors for Carbon Dioxide Emissions to Account for the SAFE Vehicle Rule Part One and the Final SAFE Rule. 2020. Available: https://ww3.arb.ca.gov/msei/emfac_off_model_co2_adjustment_factors_06262020-final.pdf

** Global Warming Potential (GWP) for CH4 and N2O is 25 and 298, respectively.

*** Adjusted Average CO2e = Ajusted Average CO2 + Adjusted Average CH4 + Adjusted Average N2O

VMT GHG Emissions

Scenario	Total Daily VMT	Annual VMT	Average CO2e (g/mile)	Average CO2e (MT/mile)	CO2e (MT/year)
Existing (2017)	428,792,499	148,791,691,153	373.86	0.000373857	55,626,836.71
Existing + Project	428,721,905	148,766,500,989	373.86	0.000373857	55,617,419.19
				NET CO2e (MT/year)	***-9,417.52***