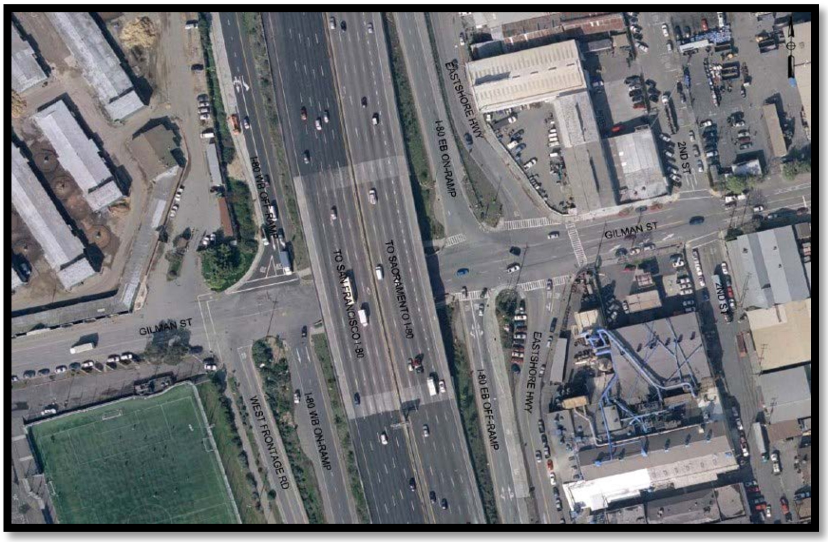
AIR QUALITY REPORT

I-80/Gilman Street Interchange Improvement Project

Alameda County, CA



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Prepared for

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AIR QUALITY REPORT

ALAMEDA COUNTY, CALIFORNIA

CALIFORNIA DEPARTMENT OF TRANSPORTATION DISTRICT 04

E.A. 04-0A7700

EFIS 0400020155

Project ID 0400020155

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Acronyms and Abbreviations

Term	**Definition**
AADT	Average Annual Daily Traffic
AB	Assembly Bill
AQMP	Air Quality Management Plan
ARB	Air Resources Board
BAAQMD	Bay Area Air Quality Management District
Bay Trail	San Francisco Bay Trail
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Fuel Economy
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
County	Alameda County
EDs	Environmental Documents
EO	Executive Order
FCAA	Federal Clean Air Act
FHWA	Federal Highway Administration
ft	Feet
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GHG	Greenhouse Gas
GWP	Global Warming Potential
H_2S	Hydrogen Sulfide

Term	Definition
HEI	Health Effects Institute
I-80	Interstate 80
IPCC	International Panel on Climate Change
IRIS	Integrated Risk Information System
lbs	Pounds
LOS	Level of Service
$MMTCO_2e$	Million Metric Tons of Carbon Dioxide Equivalent
MPO	Metropolitan Planning Organization
MSAT	Mobile Source Air Toxics
MTC	Metropolitan Transportation Commission
$MTCO_2e$	Metric Tons of Carbon Dioxide Equivalent
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO_2	Nitrogen Dioxide
NOA	Naturally Occurring Asbestos
NO_x	Nitrogen Oxide
O_3	Ozone
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns in Diameter
POAQC	Project of Air Quality Concern
ppm	Parts per Million
Protocol	Transportation Project-Level Carbon Monoxide Protocol
ROGs	Reactive Organic Gases
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy

Term	Definition
SB	Senate Bill
SCS	Sustainable Communities Strategies
Sec/Veh	Seconds per Vehicle
SFBAAB	San Francisco Bay Area Air Basin
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxide
TACs	Toxic Air Contaminants
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
U.S. EPA	United States Environmental Protection Agency
UPPR	Union Pacific Railroad
USC	United States Code
USDOT	United States Department of Transportation
UV	Ultraviolet
VMT	Vehicle Miles Traveled
VOCs	Volatile Organic Compounds
VRP	Visibility-Reducing Particles

1. Proposed Project Description

1.1 Introduction

The California Department of Transportation (Caltrans) proposes to reconfigure the Interstate 80 (I-80)/Gilman Street interchange. The Project is located in Alameda County at the Interstate 80 (I-80)/Gilman Street interchange in the cities of Berkeley and Albany (Post Miles [PM] 6.38 to 6.95). The purpose of the project is to simplify and improve navigation, mobility, and traffic operations; reduce congestion, vehicle queues, and conflicts; improve local and regional bicycle connections and pedestrian facilities; and improve safety at the I-80/Gilman Street interchange. Current conditions, along with an overall increase in vehicle traffic, have created poor, confusing, and unsafe operations in the interchange area for vehicles, pedestrians, and bicyclists. . Caltrans is the lead agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The Alameda County Transportation Commission is the Implementing Agency, and is working cooperatively with the Cities of Berkeley and Albany to deliver the project.

The purpose of this Air Quality Report is to inform the NEPA and CEQA decisions with background information and project-specific analysis related to the project. The analysis includes assessments related to carbon monoxide (CO), nitrogen dioxide (NO_2), nitrogen oxides (NO_X), volatile organic compound (VOC), reactive organic gas (ROG), ozone (O_3), sulfur dioxide (SO_2), sulfur oxide (SO_X), lead (Pb), particles of 10 micrometers or smaller (PM_{10}), and particles of 2.5 micrometers or smaller ($PM_{2.5}$), and mobile source air toxics (MSAT). The analysis is based on guidance and information provided by Caltrans, the Federal Highway Administration (FHWA), the U.S. Environmental Protection Agency (U.S. EPA), the California Air Resources Board (ARB), and the Bay Area Air Quality Management District (BAAQMD).

1.2 Location and Background

The project is located in Alameda County at the I-80/Gilman Street interchange in the City of Berkeley (Post Miles 6.38 to 6.95). The I-80/Gilman Street interchange is a four-lane arterial roadway (Gilman Street), with two lanes in the east/west direction that are intersected with four I-80 on- and off-ramps, West Frontage Road, and the Eastshore Highway. Figure 1-1 shows the project location.

This project is included in the Metropolitan Transportation Commission (MTC) Year 2017 cost-constrained Transportation Improvement Program (TIP). It is also included in the MTC Year 2017 Regional Transportation Plan (RTP), which is known as the Plan Bay Area 2040. The primary funding sources of the project are state funds and Measure BB, the 2014 voter-approved extension of the transportation sales tax. The local air district is the BAAQMD.

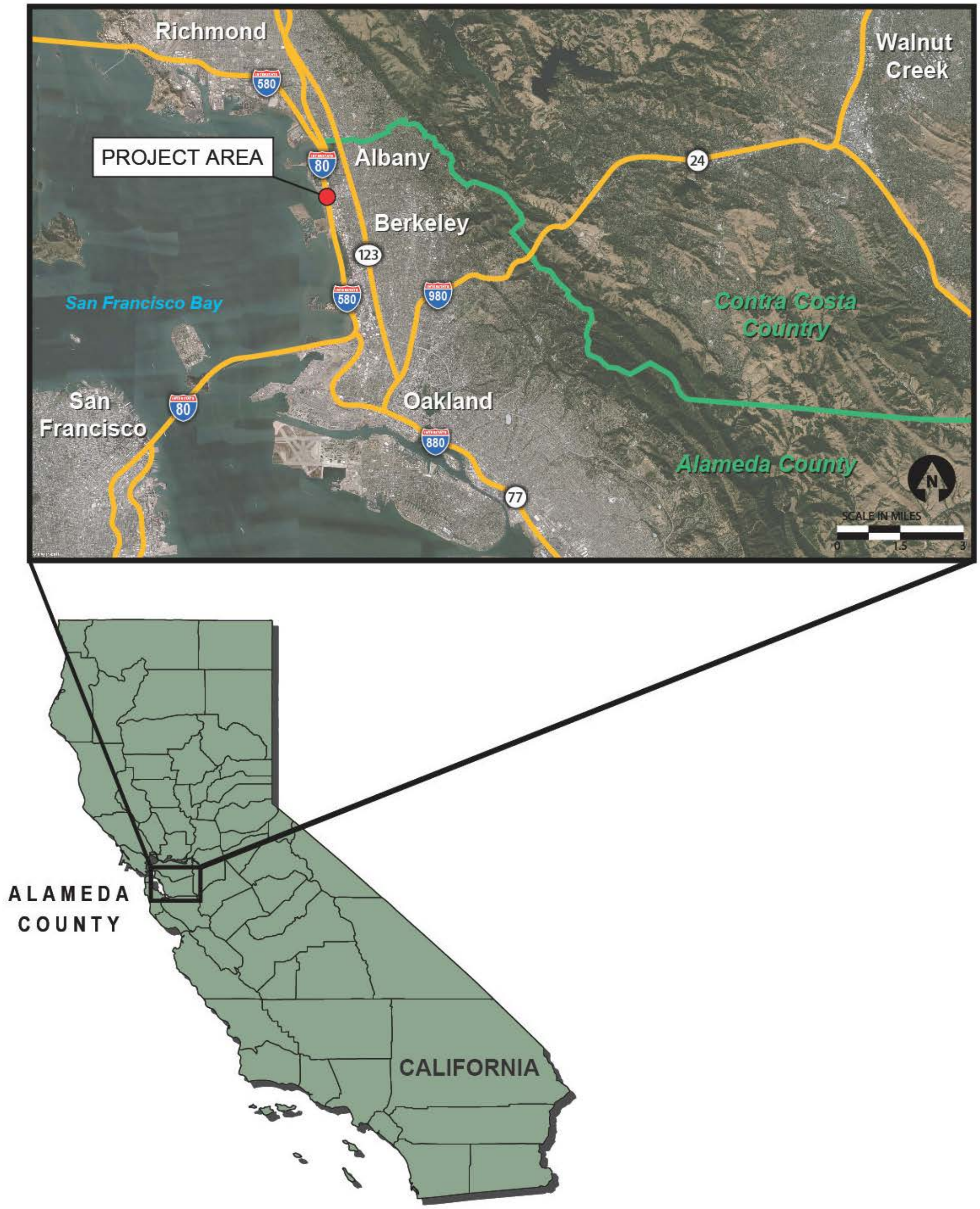

Figure 1-1. Map of the Project Location

1.3 Purpose and Need

The purpose of the project is to simplify and improve navigation, mobility and traffic operations, reduce congestion, vehicle queues and conflicts, improve local and regional bicycle connections and pedestrian facilities, and improve safety at the I-80/Gilman Street interchange. Current conditions, along with an overall increase in vehicle traffic, have created poor, confusing, and unsafe operations in the interchange area for vehicles, pedestrians, and bicyclists.

1.4 Baseline and Forecasted Conditions for the No Build and Roundabout Alternatives

The proposed alternatives include the No Build Alternative and the Roundabout Alternative. These alternatives are each discussed below. In summary, emission estimations based are on information contained in the Traffic Operations Analysis Report (TJKM, 2017). In order to determine study intersection performance, Synchro models were developed based on the geometry obtained from the aerial photos and field observation. Signal timing cards received from the City of Berkeley were used to code the signal timing for signalized intersection within study area. The AM and PM peak hour level of service (LOS) for each study intersection was determined using Synchro and the procedures from the Highway Capacity Manual Operational Methodology. The future I-80 off-ramp demands at the Gilman Street interchange were constrained by maintaining the ratio of the off-ramp forecast demands to mainline forecast demands in relation to the existing volume.

Likewise, the future I-80 on-ramp demands at Gilman Street interchange were constrained based on the westbound Gilman Street constrained demands. The westbound demands along Gilman Street were constrained due to the fact that Gilman Street has one lane in either direction and a capacity of 1,100 vehicles per hour per lane was used to constrain the demands on Gilman Street taking into account signalized intersections between San Pablo Avenue and 4th Street. Based on the constraint applied on Gilman Street the demands on the on-ramps from both eastbound and westbound I-80 and frontage road were proportionally constrained during the peak hour. It should be noted that under 2020 conditions, the demands on Gilman Street are almost the same as Baseline/existing conditions; therefore, no constraint was applied to the 2020 demands along Gilman Street. Intersection demands and I-80 ramp demands at Gilman Street interchange were balanced throughout the study area and utilized for future traffic operational analysis.

Under the Baseline/existing conditions, the network peak hours during the AM and PM peak periods are 8:00-9:00 a.m. and 5:00-6:00 p.m., respectively. Similarly, it is projected that the highest demands occur during 8:00-9:00 a.m. and 5:00-6:00 p.m. based on the review of future (2020 and 2040) conditions. In order to ensure that the queues from downstream intersections do not extend into the off-ramp intersections and block freeway off-ramps, study intersections are evaluated between 8:00-9:00 a.m. and 5:00-6:00 p.m. as peak hours.

Traffic conditions are shown below and summarized in Appendix A.

1.4.1 Existing Roadways and Traffic Conditions

Under CEQA, the baseline for environmental impact analysis consists of the existing conditions (referred to in this document as Baseline) at the time of the Notice of Preparation. The Baseline year has been established as 2016. Emission estimations based on information contained in the Traffic Operations Analysis Report (TJKM, 2017). The traffic analysis completed for the project is based on delay instead of vehicle miles traveled (VMT) due to the project being a roundabout. Therefore, Table 1-1 shows intersection delay and level of service. Table 1-2 shows existing vehicle average annual daily traffic (AADT) in the intersection area, including truck AADT and percentage.

Table 1-1. Summary of Baseline Traffic Conditions

ID	Intersection	2016 (Baseline)			
		AM Peak		PM Peak Hour	
		Delay (sec/veh)[1]	LOS[2]	Delay (sec/veh)[1]	LOS[2]
1	Gilman St. at Frontage Rd.	>50.0	F	>50.0	F
2	Gilman St. at WB I-80 Ramps	>50.0	F	>50.0	F
3	Gilman St. at EB I-80 Ramps	18.9	C	>50.0	F
4	Gilman St. at Eastshore Hwy.	>50.0	F	>50.0	F
5	Gilman St. at 2nd St.	26.8	D	41.1	E
6	Gilman St. at 4th St.	74.2	F	>50.0	F
7	Gilman St. at 6th St.	15.3	B	23.7	C
8	Gilman St. at 8th St.	8.3	A	7.6	A
9	Gilman St. at 9th St.	8.8	A	9.8	A
10	Gilman St. at 10th St.	27.7	D	49.8	E
11	Gilman St. at San Pablo Ave.	31.6	D	35.6	D
12	Eastshore Hwy. at Harrison St.	12.3	B	8.2	A
13	2nd St. at Harrison St.	6.9	A	6.8	A

1 Delay in seconds per vehicle

2 LOS - Level of Service

Source: TJKM, 2017

Table 1-2. Truck Percentages and Volumes on I-80 and Gilman Street

Route	County	Post Mile	Leg	Description	Vehicle AADT	Truck AADT	% Truck
I-80	Alameda	3.786	A	Emeryville, Powell Rd.	277,000	13,267	4.79
I-80	Alameda	4.582	B	Berkeley, Jct. Rte. 13 East	277,000	13,325	4.81
I-80	Alameda	4.582	A	Berkeley, Jct. Rte. 13 East	269,000	12,831	4.77
I-80	Alameda	6.62	B	Berkeley, Gilman St.	267,000	N/A	N/A
I-80	Alameda	6.62	A	Berkeley, Gilman St.	274,000	N/A	N/A
Gilman St.	Alameda	-	-	Gilman St., East of I-80	17,121	N/A	8
Gilman St.	Alameda	-	-	Gilman St., West of 6th St.	17,121	N/A	5

Source: TJKM, 2017

Figure 1-2. Map of the Project and Nearby Roadways

1.4.2 No Build Alternative

The No Build (No Action) Alternative consists of those transportation projects that are already planned for construction by or before 2020. Consequently, the No Build Alternative represents future travel conditions in the I-80/Gilman Street Interchange Improvement Project study area without the I-80/Gilman Street Interchange Improvement Project and is the baseline against which the other I-80/Gilman Street Interchange Improvement Project alternatives will be assessed to meet NEPA requirements. The traffic analysis completed for the project is based on delay instead of VMT due to the project being a roundabout. Therefore, Table 1-3 shows intersection delay and LOS.

Table 1-3. Summary of Future No Build Alternative Traffic Conditions

ID	Intersection	2020 (Opening Year)				2040 (Horizon Year)			
		AM Peak		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)[1]	LOS[2]	Delay (sec/veh)[1]	LOS	Delay (sec/veh)[1]	LOS[2]	Delay (sec/veh)[1]	LOS[2]
1	Gilman St. at Frontage Rd.	>50.0	F	>50.0	F	>50.0	F	>50.0	F
2	Gilman St. at WB I-80 Ramps	>50.0	F	F	F	>50.0	F	>50.0	F
3	Gilman St. at EB I-80 Ramps	27.3	D	>50.0	F	24.7	C	27.6	C
4	Gilman St. at Eastshore Hwy.	>50.0	F	F	F	>50.0	F	>50.0	F
5	Gilman St. at 2nd St.	32.2	D	>50.0	F	38.0	E	>50.0	F
6	Gilman St. at 4th St.	7.8	A	9.7	A	7.9	A	8.3	A
7	Gilman St. at 6th St.	15.6	B	25.5	C	14.5	B	32.5	C
8	Gilman St. at 8th St.	9.1	A	8.2	A	28.1	C	14.3	B
9	Gilman St. at 9th St.	9.0	A	10.5	B	9.9	A	13.0	B
10	Gilman St. at 10th St.	27.7	D	>50.0	F	>50.0	F	>50.0	F
11	Gilman St. at San Pablo Ave.	41.2	D	42.6	D	>50.0	F	>50.0	F
12	Eastshore Hwy. at Harrison St.	12.2	B	8.4	A	12.3	B	9.7	A
13	2nd St. at Harrison St.	6.9	A	7.0	A	7.0	A	6.9	A

1 Delay in seconds per vehicle

2 LOS - Level of Service

Source: TJKM, 2017

1.4.3 Project Build Alternative

The Roundabout Alternative includes the reconfiguration of I-80 ramps and intersections at Gilman Street. The existing nonsignalized intersection configuration with stop-controlled ramp termini would be replaced with two hybrid single-lane roundabouts with multilane portions on Gilman Street at the I-80 ramp terminals. The I-80 ramps and frontage road intersections at each ramp intersection would be combined to form a single roundabout intersection on each side of I-80. Gilman Street would be reconstructed on the west from the parking lots at Tom Bates Regional Sports Complex along Gilman Street to the eastern side of the 4th Street intersection. Work would also include reconstruction of

West Frontage Road and Eastshore Highway within the project limits. In addition, the northern and southern legs of the eastern roundabout will be reduced from two lanes to one lane entering the roundabout. The southbound and northbound movements onto Eastshore Highway would instead be made via 2nd Street to Page Street or 2nd Street to Harrison Street.

Improvements associated with installation of the roundabouts would extend approximately 280 feet south on West Frontage Road from the Gilman Street interchange and approximately 250 feet north and 1,010 feet south on Eastshore Highway from the Gilman Street interchange. Work associated with reconfiguration of the eastbound I 80 off-ramp and on-ramp would extend approximately 820 feet south and 280 feet north of the interchange. Work associated with reconfiguration of the westbound I-80 off-ramp and on-ramp would extend approximately 370 feet north and 230 feet south of the interchange. There are no proposed improvements to the freeway mainline. A metering light would be installed on West Frontage Road to regulate the volume of northbound traffic that enters the western roundabout.

The western roundabout intersection would consist of four approaching legs: eastbound and westbound Gilman Street, West Frontage Road, and I-80 westbound off-ramp. The eastern roundabout intersection would include five approaching legs: I-80 eastbound off-ramp, northbound and southbound Eastshore Highway, and eastbound and westbound Gilman Street. A left-turn pocket would be provided on Gilman Street for vehicles traveling eastbound turning onto northbound 2nd Street. Left turns will be restricted from westbound Gilman Street turning onto southbound 2nd Street.

Improvements on 2nd Street north of Gilman Street include reduced crossing distances, new striping, signing, new pavement, additional landscaping, and new light poles. South of Gilman Street, improvements on 2nd Street include a bulb-out on the southeast corner of the intersection and converting the road to one-lane southbound, while the other lane would be used as a designated parking/loading zone for businesses.

All modified roadways including ramps, frontage roads, and arterials would be improved. Improvements would include mill and overlay of pavement, striping, relocation of drainage inlets, lighting, and signage.

Several operational improvements would be incorporated in to the project. A metering signal would be installed on the northbound leg of the western roundabout to limit the volume of traffic that is bypassing the freeway using West Frontage Road. A queue cutting signal will be placed on the eastbound leg of the Union Pacific Railroad (UPRR) crossing at 3rd Street to prevent traffic from extending across the UPRR tracks.

Pedestrian and Bicycle Facilities

A shared-use Class I path consisting of 10-foot-wide travel way with a 2-foot-wide shoulder for pedestrians and bicyclists would be constructed on the south side of Gilman Street from 2nd Street to the eastern roundabout. The shared-use path would extend south along Eastshore Highway, where it would then connect to a proposed bicycle/pedestrian overcrossing. The overcrossing would be constructed over I-80, merging into the existing San Francisco Bay Trail (Bay Trail) that runs parallel to

West Frontage Road. The at-grade shared-use path would continue on the south side of Gilman Street under I-80 and terminate at the Bay Trail on the west side of the interchange.

The structure would be located south of Gilman Street and have a minimum of three spans with a maximum span length of approximately 230 feet over I-80. The foundations for the pedestrian bridge would be located on 2-foot diameter Cast-In-Drilled-Hole piles 120 feet below the existing ground surface. There would be two staircases incorporated into the overcrossing, one on each side of I-80. They would be approximately 45 feet long with a height of 25 feet to connect to the overcrossing. There would also be retaining walls on the east and west side of the overcrossing; they would be approximately 6 feet tall at the highest point and taper down to zero. The maximum depth of the retaining wall piles is expected to be 50 feet below the ground surface.

Improvements would be made along 4th Street to Harrison Street to 5th Street to provide bicycle connectivity between the Codornices Creek Path and the two-way cycle track on Gilman Street. These improvements would consist of painted shared-lane markings, also known as sharrows, on the pavement throughout this corridor. Bicycle signage and pedestrian scale lighting would be constructed as part of the improvements.

Approximately 125 feet of new curb, gutter, and sidewalk beginning at the corner of Harrison Street and 4th Street and ending half-way down the block towards 5th Street would be constructed. Parallel parking would be added along this new section of curb and sidewalk. The bus stop located at the corner of 4th Street and Gilman Street would be removed.

The Build Alternative includes a two-way cycle track on the south side of Gilman Street between the eastern I-80/Gilman Street ramps and 4th Street. The two-way cycle track is separated from vehicle traffic with a minimum 3-foot-wide striped buffer and a parking lane in some locations. The addition of the two-way cycle track would require installation of a traffic signal at the intersection of 4th Street and Gilman Street. The northern curb line on Gilman Street would also be shifted 2 to 5 feet north. Along Eastshore Highway, the sidewalk, curb, and gutter would be replaced between Page Street and Gilman Street.

West of the I-80/Gilman Street interchange, the existing Bay Trail would be extended approximately 660 feet west along the south side of Gilman Street from its current terminus at the intersection of West Frontage Road and Gilman Street to just beyond Berkeley city limits. The proposed Bay Trail extension would be 10 feet wide, unstriped, with 2-foot-wide unpaved shoulders on either side of the trail.

Additional pedestrian and bicycle improvements include upgrading the 3rd Street/UPRR crossing at Gilman Street to accommodate the cycle track. Improvements would include relocating the gate, flashing beacons, addition of a bicycle signal, installation of medians, and improved striping and signage. All improvements will be approved by the UPRR and the California Public Utilities Commission.

Utilities, Landscaping, and Drainage

Existing PG&E overhead electric lines along Gilman Street, West Frontage Road, and Eastshore Highway would be relocated as part of the Roundabout Alternative. Some of these overhead lines may be placed underground. Minor drainage modifications would also be required to conform to the new roundabout alignment and drainage improvements associated with the two-way cycle track along Gilman Street would also be required. Utility relocations and new drainage systems may require trenching to a depth of approximately six feet.

A separation device would be installed underground along Gilman Street to separate trash, mercury, and polychlorinated biphenyls. A tidal flap gate would be installed at the existing headwall of the 60-inch reinforced concrete pipe at the west end terminus of Gilman Street. Replacement of the existing headwall and associated rip rap may include in-water work. Work below the ordinary mean high water mark may be required. Dewatering or a coffer dam may also be required.

New light pole foundations and ramp metering poles would be two feet in diameter and would range from five to 13 feet deep near the roundabout. An existing East Bay Municipal Utility District recycled water transmission line would be relocated and extended as part of the project. Approximately 1,100 feet of a new 12-inch recycled water transmission pipeline within Eastshore Highway from Page Street to Gilman Street and approximately 1,050 feet of pipeline within Gilman Street from 2nd Street to the Buchanan Street extension are part of the Roundabout Alternative. The maximum excavations for the pipe trench would be approximately 24 inches wide by 60 inches deep. Approximately 1,100 feet of an existing 10-inch recycled water pipeline located within Caltrans right-of-way along the eastbound Gilman Street off-ramp shoulder would be abandoned in place or removed. A new City of Berkeley sewer line would be installed underneath Gilman Street beginning at a point east of the Interchange and ending on the west side I-80 at the approximate entrance to the Tom Bates Sports Complex parking lots.

Existing vegetation is sparse in the project footprint and consists of ornamental plantings or ruderal vegetation. The Roundabout Alternative would remove existing landscaping and trees on the sidewalk along Eastshore Highway from Page Street to Gilman Street. In addition, trees and/or shrubs would be removed at the I-80 off-ramps, westbound I-80 on-ramp, and along the Bay Trail. Opportunities for new landscaping or artwork would be available in the center of each roundabout. Opportunities for tree replacements on site would be available.

Golden Gate Fields Access

The existing driveway entrance to Golden Gate Fields is located immediately adjacent to the westbound I-80 off-ramp at the end of the curb return on Gilman Street. Construction of the roundabout would expand the ramp intersection to the north and would require relocation of the Golden Gate Fields entrance and exit gate to their stables. The Build Alternative would relocate the entrance and exit gate to the Gilman Street Extension. The existing gate would be connected to Golden Gate Fields Access Road allowing for the existing security shed to remain in place. The intersection of Gilman Street Extension with Golden Gate Fields Access Road would be improved and Gilman Street would be widened to the south to provide space for two – two lane roads separated by a median. The Golden Gate Fields north east parking lot would be re-sized and re-striped to allow room for the Gilman Street Extension/Golden Gate Fields Access Road intersection. The existing security shed leading to the northeast and northwest parking lots would be moved north and reconstructed with new gates. The Golden Gate Fields north west parking lot would be restriped to maximize the parking spaces. Both parking lots would be repaved, restriped, and lighting and landscaping elements would be added. Golden Gate Fields internal access road and the Gilman Street Extension would be repaved and restriped between Gilman Street and the northeast and northwest parking lots. Fifteen new parallel parking spaces would be striped along the Gilman Street access road. There would be no net loss of parking for Golden Gate Fields.

Traffic Conditions

The traffic analysis completed for the project is based on delay instead of VMT due to the project being a roundabout. The roundabout would have a negligible effect on local and regional VMT. Therefore, Table 1-4 shows intersection delay and LOS, which was used to estimate emissions.

Table 1-4. Summary of Future Roundabout Alternative Traffic Conditions

ID	Intersection	2020 (Opening Year)				2040 (Horizon Year)			
		AM Peak		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)[1]	LOS[2]	Delay (sec/veh)[1]	LOS	Delay (sec/veh)[1]	LOS[2]	Delay (sec/veh)[1]	LOS[2]
1	Gilman St. at Frontage Rd.	27.9	C	43.2	D	123.2	F	59.9	E
2	Gilman St. at WB I-80 Ramps	>50.0	F	F	F	>50.0	F	>50.0	F
3	Gilman St. at EB I-80 Ramps	10.9	B	17.1	B	9.6	A	17.3	B
4	Gilman St. at Eastshore Hwy.	>50.0	F	F	F	>50.0	F	>50.0	F
5	Gilman St. at 2nd St.	32.2	D	>50.0	F	38.0	E	>50.0	F
6	Gilman St. at 4th St.	7.8	A	9.7	A	7.9	A	8.3	A
7	Gilman St. at 6th St.	15.6	B	25.5	C	14.5	B	32.5	C
8	Gilman St. at 8th St.	9.1	A	8.2	A	28.1	C	14.3	B
9	Gilman St. at 9th St.	9.0	A	10.5	B	9.9	A	13.0	B
10	Gilman St. at 10th St.	27.7	D	>50.0	F	>50.0	F	>50.0	F
11	Gilman St. at San Pablo Ave.	41.2	D	42.6	D	>50.0	F	>50.0	F
12	Eastshore Hwy. at Harrison St.	12.2	B	8.4	A	12.3	B	9.7	A
13	2nd St. at Harrison St.	6.9	A	7.0	A	7.0	A	6.9	A

1 Delay in seconds per vehicle

2 LOS - Level of Service

Source: TJKM, 2017

1.4.4 Comparison of Existing/Baseline and Build Alternative

Under CEQA, Existing Conditions (CEQA Baseline) are compared to future Build scenarios. The difference between the Baseline/Existing Condition, No Build and Roundabout Alternatives may help inform significance determinations for the environmental document. The purpose of the project is to simplify and improve navigation, mobility and traffic operations, reduce congestion, vehicle queues and conflicts, improve local and regional bicycle connections and pedestrian facilities, and improve safety at the I-80/Gilman Street interchange. As shown in Tables 1-1 through 1-4 of traffic data, these improvements would reduce vehicle delay and improve LOS values. This would reduce vehicle idling time and associated emissions. Table 1-5 summarizes design features and operational impacts on traffic conditions near the project.

Table 1-5. Summary of Long-Term Operational Impacts on Traffic Conditions of Baseline/Existing, No Build, and Roundabout Alternatives

Scenario/Analysis Year	Location	Design Features and Operational Impacts on Traffic Conditions
Baseline (Existing) 2016	Gilman St.	High congestion and vehicles queues, as shown in Table 1-1.
No Build Alternative (2020 and 2040)	Gilman St.	Increased congestion from the Baseline due to traffic volume growth and no project improvements, as shown in Table 1-3.
Roundabout Alternative (2020 and 2040)	Gilman St.	Roundabout reduces congestion and vehicle idling times, as shown in Table 1-4.

Source: TJKM, 2017

1.5 Construction Activities and Schedule

Construction work for the Roundabout Alternative would be done primarily during daylight hours from 7:00 a.m. to 6:00 p.m.; however, there may be some work during night-time hours to avoid temporary roadway closures for tasks that could interfere with traffic or create safety hazards. Work hours along the internal access road in Golden Gate Field property will be limited to after 10:00 a.m. to 5:00 p.m. and night work would be restricted within or adjacent to Golden Gate Fields property. Examples of work activities include striping operations, traffic control setup, installation of storm drain crossings, and asphalt pavement mill and overlay. Temporary lane, ramp closures, and detours would occur. It is anticipated that temporary closure of existing bicycle or pedestrian facilities would occur at times and may require temporary rerouting of transit service due to intersection work. A Transportation Management Plan would be developed and implemented as part of the project construction planning phase.

The anticipated construction staging areas available include areas within the existing roadway right-of-way construction limits. An additional staging area may be required west of the project on Gilman Street in one or two parking lots owned by East Bay Regional Parks District. Staging areas are shown on Figure 1-2, above.

It is anticipated that construction would begin in Winter 2020 and occur for two years. Activities would broadly include land clearing, site preparation, drainage/utility/sub-grade activities, and paving. Detailed pashing schedules are not known at this time in the project planning process. The following equipment is anticipated to be used during construction: auger drill rig, backhoe, compactor, concrete pump, crane, dozer, excavator, front end loader, grader, heavy duty dump trucks, jackhammer, vibratory roller, and pavement breaker.

The construction period is planned to last approximately two years. No construction activities are anticipated to last more than five years at any individual site. Emissions from construction-related activities are thus considered temporary as defined in 40 Code of Federal Regulations (CFR) 93.123(c)(5); and are not required to be included in PM hot-spot analyses to meet conformity requirements.

2. Regulatory Setting

Many statutes, regulations, plans, and policies have been adopted at the federal, state, and local levels to address air quality issues related to transportation and other sources. The project is subject to air quality regulations at each of these levels. This section introduces the pollutants governed by these regulations and describes the regulation and policies that are relevant to the project.

2.1 Pollutant-Specific Overview

Air pollutants are governed by multiple federal and state standards to regulate and mitigate health impacts. At the federal level, there are six criteria pollutants for which National Ambient Air Quality Standards (NAAQS) have been established: CO, Pb, NO_2, O_3, PM ($PM_{2.5}$ and PM_{10}), and SO_2. The U.S. EPA has also identified nine priority mobile source air toxics: 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter (https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/). In California, sulfates, visibility reducing particles, hydrogen sulfide, and vinyl chloride are also regulated.

2.1.1 Criteria Pollutants

The Clean Air Act requires the U.S. EPA to set National Ambient Air Quality Standards (NAAQS) for six criteria air contaminants: ozone, particulate matter, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide. It also permits states to adopt additional or more protective air quality standards if needed. California has set standards for certain pollutants. Table 2-1 documents the current air quality standards while Table 2-2 summarizes the sources and health effects of the six criteria pollutants and pollutants regulated in the state of California.

Table 2-1. Table of State and Federal Ambient Air Quality Standards. Accessed April 9, 2018, www.arb.ca.gov/research/aaqs/aaqs2.pdf.

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 $\mu g/m^3$)		0.070 ppm (137 $\mu g/m^3$)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	12.0 $\mu g/m^3$	15 $\mu g/m^3$	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 $\mu g/m^3$)	Gas Phase Chemiluminescence	100 ppb (188 $\mu g/m^3$)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 $\mu g/m^3$)		0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 $\mu g/m^3$)	Ultraviolet Fluorescence	75 ppb (196 $\mu g/m^3$)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 $\mu g/m^3$)	
	24 Hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 $\mu g/m^3$ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 $\mu g/m^3$		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

See footnotes on next page ...

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1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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Table 2-2. State and Federal Criteria Air Pollutant Effects and Sources

Pollutant	Principal Health and Atmospheric Effects	Typical Sources
Ozone (O_3)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from reactive organic gases/volatile organic compounds (ROG or VOC) and nitrogen oxides (NOx) in the presence of sunlight and heat. Common precursor emitters include motor vehicles and other internal combustion engines, solvent evaporation, boilers, furnaces, and industrial processes.
Respirable Particulate Matter (PM_{10})	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many toxic and other aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke & vehicle exhaust; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources.
Fine Particulate Matter ($PM_{2.5}$)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many toxic and other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical and photochemical reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG.
Carbon Monoxide (CO)	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone. Colorless, odorless.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.
Nitrogen Dioxide (NO_2)	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain & nitrate contamination of stormwater. Part of the “NOx” group of ozone precursors.	Motor vehicles and other mobile or portable engines, especially diesel; refineries; industrial operations.
Sulfur Dioxide (SO_2)	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.
Lead (Pb)	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also, a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from older gasoline use may exist in soils along major roads.
Visibility-Reducing Particles (VRP)	Reduces visibility. Produces haze. NOTE: not directly related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other “Class I” areas. However, some issues and measurement methods are similar.	See particulate matter above. May be related more to aerosols than to solid particles.

Pollutant	Principal Health and Atmospheric Effects	Typical Sources
Sulfate	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.
Hydrogen Sulfide (H_2S)	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea. Strong odor.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.
Vinyl Chloride	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes.

2.1.2 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. EPA regulate 188 air toxics, also known as hazardous air pollutants. The U.S. EPA has assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of U.S. EPA's Integrated Risk Information System (IRIS) (https://www.epa.gov/iris). In addition, the U.S. EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-hazard contributors from the 2011 National Air Toxics Assessment (NATA) (https://www.epa.gov/national-air-toxics-assessment). These are *1,3-butadiene*, *acetaldehyde*, *acrolein*, *benzene*, *diesel particulate matter (diesel PM)*, *ethylbenzene*, *formaldehyde*, *naphthalene*, and *polycyclic organic matter*. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future U.S. EPA rules.

The 2007 U.S. EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using U.S. EPA's MOVES2014a model, even if vehicle activity (vehicle-miles traveled, VMT) increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emission rate for the priority MSATs is projected for the same time period, as shown in Figure 2-1.

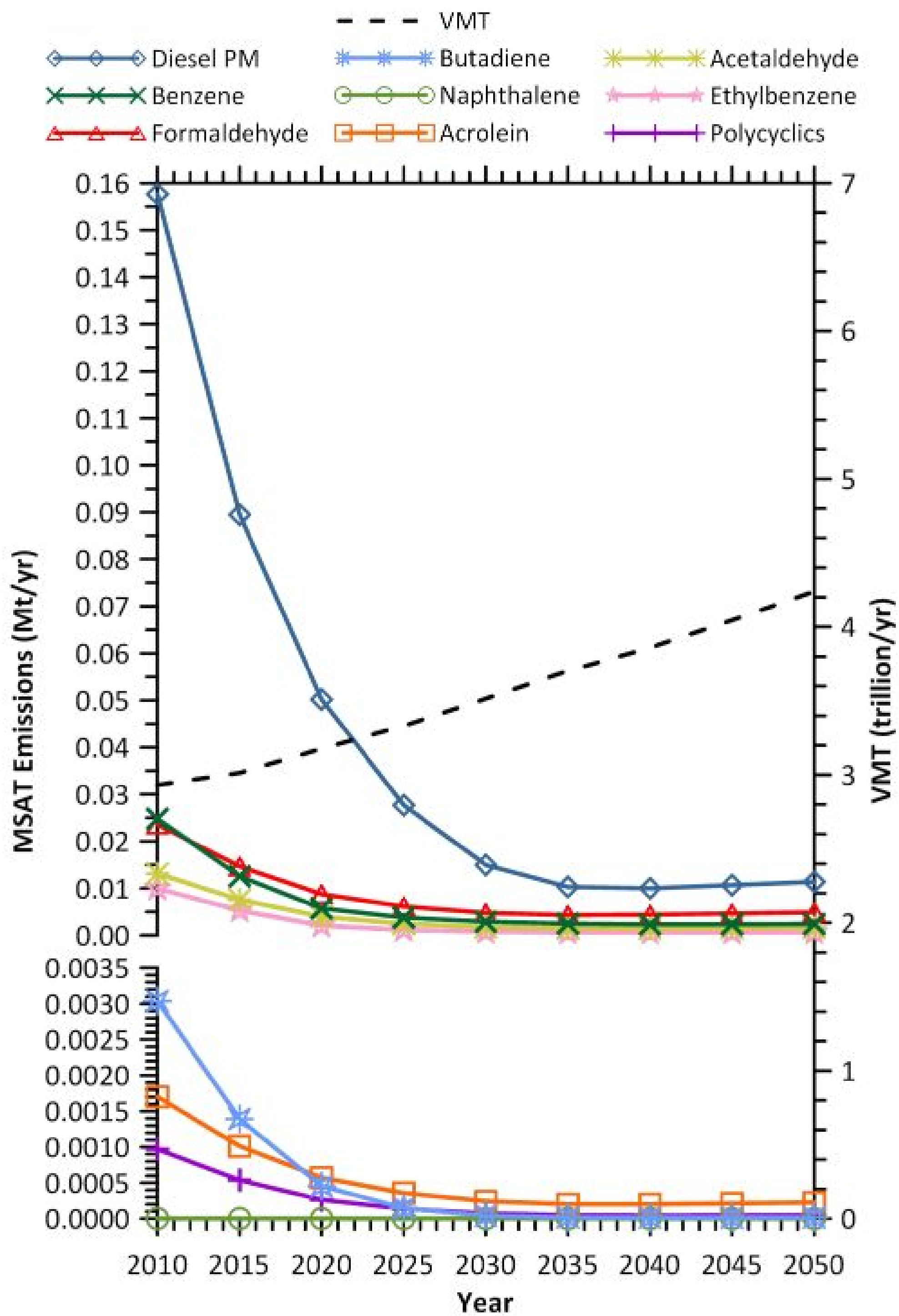

Figure 2-1. Projected National MSAT Trends, 2010-2050 (Source: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/)

2.1.3 Greenhouse Gases

The term greenhouse gas (GHG) is used to describe atmospheric gases that absorb solar radiation and subsequently emit radiation in the thermal infrared region of the energy spectrum, trapping heat in the Earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and water vapor, among others. A growing body of research attributes long-term changes in temperature, precipitation, and other elements of Earth's climate to large increases in GHG emissions since the mid-nineteenth century, particularly from human activity related to fossil fuel combustion. Anthropogenic GHG emissions of particular interest include CO_2, CH_4, N_2O, and fluorinated gases.

GHGs differ in how much heat each traps in the atmosphere (global warming potential, or GWP). CO_2 is the most important GHG, so amounts of other gases are expressed relative to CO_2, using a metric called "carbon dioxide equivalent" (CO_2e). The global warming potential of CO_2 is assigned a value of 1, and the warming potential of other gases is assessed as multiples of CO_2. For example, the 2007 International Panel on Climate Change *Fourth Assessment Report* calculates the GWP of CH_4 as 25 and the GWP of N_2O as 298, over a 100-year time horizon.[1] Generally, estimates of all GHGs are summed to obtain total emissions for a project or given time period, usually expressed in metric tons ($MTCO_2e$), or million metric tons ($MMTCO_2e$).[2]

As evidence has mounted for the relationship of climate changes to rising GHGs, federal and state governments have established numerous policies and goals targeted to improving energy efficiency and fuel economy, and reducing GHG emissions. Nationally, electricity generation is the largest source of GHG emissions, followed by transportation. In California, however, transportation is the largest contributor to GHGs.

At the federal level, the National Environmental Policy Act (NEPA) (42 United States Code [USC] Part 4332) requires federal agencies to assess the environmental effects of their proposed actions prior to making a decision on the action or project.

To date, no national standards have been established for nationwide mobile-source GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level. However, the U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) issued the first corporate fuel economy (CAFE) standards in 2010, requiring cars and light-duty vehicles to achieve certain fuel economy targets by 2016, with the intention of gradually increasing the targets and the range of vehicles to which they would apply.

California has enacted aggressive GHG reduction targets, starting with Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 is California's signature climate change legislation. It set the goal of reducing statewide GHG emissions to 1990 levels by 2020, and required the ARB to develop a Scoping Plan that describes the approach California will take to achieve that

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[1] See Table 2.14 in IPCC Fourth Assessment Report: Climate Change 2007 (AR4): The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf.

[2] See http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/CEQA-Guidance-Tools.

goal and to update it every 5 years. In 2015, Governor Jerry Brown enhanced the overall adaptation planning effort with Executive Order (EO) B-30-15, establishing an interim GHG reduction goal of 40 percent below 1990 levels by 2030, and requiring state agencies to factor climate change into all planning and investment decisions.

Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act of 2008, furthered state climate action goals by mandating coordinated transportation and land use planning through preparation of sustainable communities strategies (SCS). The ARB sets GHG emissions reduction targets for passenger vehicles for each region. Each regional metropolitan planning organization must include in its regional transportation plan an SCS proposing actions toward achieving the regional emissions reduction targets.[3]

With these and other State Senate and Assembly bills and executive orders, California advances an innovative and proactive approach to dealing with GHG emissions and climate change.

2.1.4 Asbestos

Asbestos is a term used for several types of naturally occurring fibrous minerals that are a human health hazard when airborne. The most common type of asbestos is chrysotile, but other types such as tremolite and actinolite are also found in California. Asbestos is classified as a known human carcinogen by state, federal, and international agencies and was identified as a toxic air contaminant by the ARB in 1986. All types of asbestos are hazardous and may cause lung disease and cancer.

Asbestos can be released from serpentine and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. These rocks have been commonly used for unpaved gravel roads, landscaping, fill projects, and other improvement projects in some localities. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads, during grading for development projects, and at quarry operations. All of these activities may have the effect of releasing potentially harmful asbestos into the air. Natural weathering and erosion processes can act on asbestos-bearing rock and make it easier for asbestos fibers to become airborne if such rock is disturbed.

Serpentine may contain chrysotile asbestos, especially near fault zones. Ultramafic rock, a rock closely related to serpentinite, may also contain asbestos minerals. Asbestos can also be associated with other rock types in California, though much less frequently than serpentinite and/or ultramafic rock. Serpentinite and/or ultramafic rock are known to be present in 44 of California's 58 counties. These rocks are particularly abundant in counties of the Sierra Nevada foothills, the Klamath Mountains, and Coast Ranges. The California Department of Conservation, Division of Mines and Geology has developed a map showing the general location of ultramafic rock in the state (www.conservation.ca.gov/cgs/minerals/hazardous_minerals/asbestos/Pages/index.aspx).

[3] https://www.arb.ca.gov/cc/sb375/sb375.htm

2.2 Regulations

2.2.1 Federal and California Clean Air Act

The Federal Clean Air Act (FCAA), as amended, is the primary federal law that governs air quality while the California Clean Air Act (CCAA) is its companion state law. These laws and related regulations by the U.S. EPA and the ARB set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and state ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), and sulfur dioxide (SO_2). In addition, national and state standards exist for lead (Pb), and state standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and state standards are set at levels that protect public health with a margin of safety, and are subject to periodic review and revision. Both state and federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics in their general definition.

2.2.2 Transportation Conformity

The conformity requirement is based on Federal Clean Air Act Section 176(c), which prohibits the U.S. Department of Transportation (USDOT) and other federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to State Implementation Plan (SIP) for attaining the NAAQS. "Transportation Conformity" applies to highway and transit projects and takes place on two levels: the regional—or, planning and programming level—and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. The U.S. EPA regulations at 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for NAAQS and do not apply at all for state standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and in some areas (although not in California), sulfur dioxide (SO_2). California has attainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for lead (Pb); however, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on emission analysis of Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years (for the RTP), and 4 years (for the FTIP). RTP and FTIP conformity uses travel demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), FHWA, and Federal Transit Administration (FTA), make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept, scope, and "open-to-traffic" schedule of a proposed transportation project are the same as described in the RTP and the TIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and TIP and the project has a design concept and scope[4] that has not changed significantly from those in the RTP and TIP. If the design concept and scope have changed substantially from that used in the RTP Conformity analysis, RTP and TIP amendments may be needed. Project-level conformity also needs to demonstrate that project analyses have used the latest planning assumptions and U.S. EPA-approved emissions models; the project complies with any control measures in the SIP in PM areas. Furthermore, additional analyses (known as hot-spot analyses) may be required for projects located in CO and PM nonattainment or maintenance areas to examine localized air quality impacts.

2.2.3 National Environmental Policy Act (NEPA)

NEPA requires that policies and regulations administered by the federal government are consistent with its environmental protection goals. NEPA also requires that federal agencies use an interdisciplinary approach to planning and decision-making for any actions that could impact the environment. It requires environmental review of federal actions including the creation of Environmental Documents (EDs) that describe the environmental effects of a proposed project and its alternatives (including a section on air quality impacts).

2.2.4 California Environmental Quality Act (CEQA)

CEQA is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA documents address CCAA requirements for transportation projects. While state standards are often more strict than federal standards, the state has no conformity process.

[4] "Design concept" means the type of facility that is proposed, such as a freeway or arterial highway. "Design scope" refers to those aspects of the project that would clearly affect capacity and thus any regional emissions analysis, such as the number of lanes and the length of the project.

2.2.5 Local

The U.S. EPA has delegated responsibility to air districts to establish local rules to protect air quality. Caltrans' Standard Specification 14-9.02 (Caltrans, 2015) requires compliance with all applicable air quality laws and regulations including local and air district ordinances and rules. BAAQMD has jurisdiction over an approximately 5,600-square-mile area of the SFBAAB, including all of Santa Clara County. It prepares plans to attain and maintain air quality conditions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. BAAQMD prepared the 2010 Clean Air Plan to address nonattainment of the O_3 NAAQS in the SFBAAB. The 2010 Clean Air Plan also addresses control strategies related to PM_{10} and $PM_{2.5}$.

3. Affected Environment

The topography of a region can substantially impact air flow and resulting pollutant concentrations. California is divided into 15 air basins with similar topography and meteorology to better manage air quality throughout the state. Each air basin has a local air district that is responsible for identifying and implementing air quality strategies to comply with ambient air quality standards.

The I-80/Gilman Street Interchange Improvement Project site is located in the Cities of Berkeley and Albany in Alameda County, an area within the SFBAAB, which includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Napa Counties and portions of Solano and Sonoma Counties. Air quality regulation in the SFBAAB is administered by BAAQMD. Current and forecasted population for Alameda County is 1,647,704 (2017), 1672,886 (2020), and 1,838,543 (2040). The County's economy is largely driven by the Port of Oakland, manufacturing, health care, and the University of California at Berkeley.

3.1 Climate, Meteorology, and Topography

Meteorology (weather) and terrain can influence air quality. Certain weather parameters are highly correlated to air quality, including temperature, the amount of sunlight, and the type of winds at the surface and above the surface. Winds can transport ozone and ozone precursors from one region to another, contributing to air quality problems downwind of source regions. Furthermore, mountains can act as a barrier that prevents ozone from dispersing.

Air quality in the region is affected by natural factors, such as proximity to the San Francisco Bay and ocean, topography, meteorology, and existing air pollution sources. The San Francisco Bay Area is characterized by a Mediterranean-type climate, with warm, dry summers and cool, wet winters. The terrain of the area influences both the climate and air pollution potential. This climatological subregion stretches from Richmond to San Leandro. The western boundary is defined by the Bay and its eastern boundary by the Oakland-Berkeley Hills. The Oakland-Berkeley Hills have a ridge line height of approximately 1,500 feet, a significant barrier to air flow. The most densely populated area of the subregion lies in a strip of land between the Bay and the lower hills. In this area, marine air traveling through the Golden Gate, as well as across San Francisco and through the San Bruno Gap, is a dominant weather factor.

The Oakland-Berkeley Hills cause the westerly flow of air to split off to the north and south of Oakland, which causes diminished wind speeds. The prevailing winds for most of this subregion are from the west. At the northern end, near Richmond, prevailing winds are from the south-southwest. Temperatures in this subregion have a narrow range due to the proximity of the moderating marine air. Maximum temperatures during summer average in the mid-70's, with minimums in the mid-50's. Winter highs are in the mid- to high-50's, with lows in the low- to mid-40's.

The Berkeley climatological station, maintained by the National Weather Service Cooperative Observer Program, is located near the project site and is representative of meteorological conditions near the project. The average January temperature is 49.3 degrees Fahrenheit and the average July temperature is 62.0 degrees Fahrenheit. Annual average rainfall is 23.41 inches, mainly falling during the winter months. Figure 3-1 shows a wind rose illustrating the predominant wind patterns near the project.

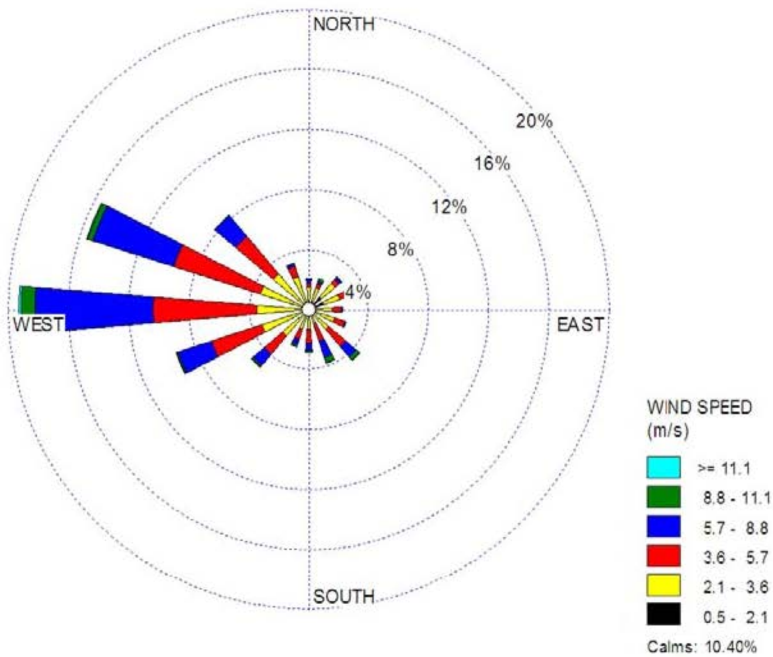

Figure 3-1. Predominant Wind Patterns Near the Project

3.2 Existing Air Quality

This section summarizes existing air quality conditions near the proposed project area. It includes attainment statuses for criteria pollutants, describes local ambient concentrations of criteria pollutants for the past five years, and discusses MSAT and GHG emissions. The closest air quality monitoring station to the project site is the Berkeley-Aquatic Park Monitoring Station located at 1 Bolivar Drive in the City of Berkeley. As shown in Figure 3-2, the monitoring station is approximately 0.9 miles south of the project site. This monitoring station did not exist before 2016. Prior to 2016, the monitoring station nearest was located at 1100 21st Street in the City of Oakland, approximately 4.5 miles south of the project area. Data from this station was used for years 2013 to 2015, and the station is also depicted on Figure 3-2.

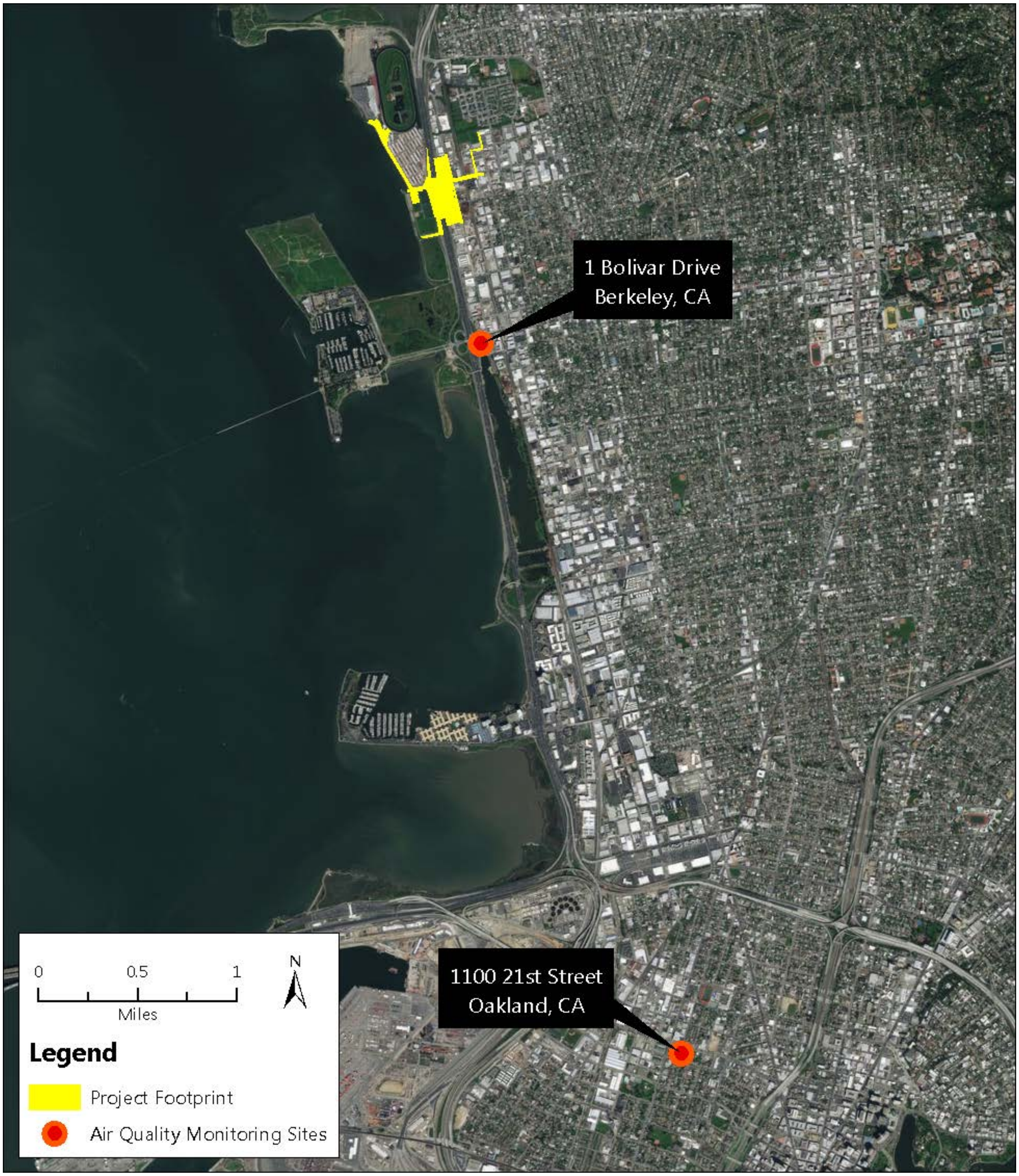

Figure 3-2. Map of Air Quality Monitoring Station Nearest to the Project

3.2.1 Criteria Pollutants and Attainment Status

Table 3-1 lists the state and federal attainment status for all regulated pollutants. For federal standards, Alameda County is designated as marginal nonattainment for the 2008 8-hour O_3 standard, moderate nonattainment for the 2006 $PM_{2.5}$ 24-hour standard, and moderate maintenance for CO standards. Alameda County has been designated as attainment or attainment/unclassified for all other NAAQS. The SFBAAB has been designated by the ARB has nonattainment for the O_3, PM_{10}, and $PM_{2.5}$ standards and attainment or attainment/unclassified for all other state standards.

Table 3-1. State and Federal Attainment Status

Pollutant	State Attainment Status	Federal Attainment Status
Ozone (O_3)	Nonattainment	Nonattainment (Marginal – 8 hour)
Respirable Particulate Matter (PM_{10})	Nonattainment	Attainment – Maintenance
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment (Moderate – 24 hour)
Carbon Monoxide (CO)	Attainment	Attainment – Maintenance (Moderate)
Nitrogen Dioxide (NO_2)	Attainment	Attainment – Unclassified
Sulfur Dioxide (SO_2)	Attainment	Attainment – Unclassified
Lead (Pb)	Attainment	Attainment – Unclassified
Visibility-Reducing Particles	Attainment	N/A
Sulfates	Attainment	N/A
Hydrogen Sulfide	Attainment	N/A
Vinyl Chloride	Attainment	N/A

Source: U.S. EPA, 2018 and ARB, 2018

Table 3-2a lists air quality trends in data collected at the Berkeley-Aquatic Park Monitoring Station for the past two years (2016 and 2017). This monitoring station did not exist before 2016. Prior to 2016, the monitoring station nearest was located at 1100 21st Street in the City of Oakland, approximately 4.5 miles south of the project area. Data from this station was used for years 2013 to 2015 and is shown in Table 3-2b. PM_{10} concentrations were not monitored in Alameda County between 2013 and 2017. Ambient data from another County would not be an accurate representation of air quality in the project area. In the project area, the federal 24-hour $PM_{2.5}$ standard was exceeded between zero and seven times annually between 2013 and 2017 and the federal NO_2 standard was exceed one time in 2017. Table 3-3 shows the status of U.S. EPA-approved SIPs that are relevant to Alameda County.

Table 3-2a. Air Quality Concentrations for the Past Two Years Measured at the Berkeley-Aquatic Park Monitoring Station

Pollutant	Standard	2016	2017
Ozone			
Max 1-hr concentration		0.052	0.058
No. days exceeded: State	0.09 ppm	0	0
Max 8-hr concentration		0.041	0.049
No. days exceeded: State Federal	0.070 ppm 0.070 ppm	0 0	0 0
Carbon Monoxide			
Max 1-hr concentration		1.6	2.2
No. days exceeded: State Federal	20 ppm 35 ppm	0 0	0 0
Max 8-hr concentration		1.4	1.7
No. days exceeded: State Federal	9.0 ppm 9 ppm	0 0	0 0
$PM_{2.5}$			
Max 24-hr concentration		17.3	52
No. days exceeded: Federal	35 $\mu g/m^3$	0	7
Max annual concentration		7.1	9.1
No. days exceeded: State Federal	12 $\mu g/m^3$ 12.0 $\mu g/m^3$	0 0	0 0
Nitrogen Dioxide			
Max 1-hr concentration		.05	0.123
No. days exceeded: State Federal	0.18 ppm 100 ppb	0 0	0 1
Max annual concentration		0.015	0.016
No. days exceeded: State Federal	0.030 ppm 53 ppb	0 0	0 0

Source: ARB, 2018

Table 3-2b. Air Quality Concentrations for Years 2013 to 2015 Measured at the 1100 21st Street Monitoring Station

Pollutant	Standard	2013	2014	2015
Ozone				
Max 1-hr concentration		0.071	0.072	0.091
No. days exceeded: State	0.09 ppm	0	0	0
Max 8-hr concentration		0.059	0.059	0.064
No. days exceeded: State Federal	0.070 ppm 0.070 ppm	0 0	0 0	0 0
Carbon Monoxide				
Max 1-hr concentration		3.8	3	4.7
No. days exceeded: State Federal	20 ppm 35 ppm	0 0	0 0	0 0
Max 8-hr concentration		3.2	2.6	2.6
No. days exceeded: State Federal	9.0 ppm 9 ppm	0 0	0 0	0 0
$PM_{2.5}$				
Max 24-hr concentration		42.7	38.8	38.7
No. days exceeded: Federal	35 µg/m^3	2	2	3
Max annual concentration		12.8	9.5	10.2
No. days exceeded: State Federal	12 µg/m^3 12.0 µg/m^3	0 0	0 0	0 0
Nitrogen Dioxide				
Max 1-hr concentration		.064	.056	0.057
No. days exceeded: State Federal	0.18 ppm 100 ppb	0 0	0 0	0 0
Max annual concentration		.017	.014	0.014
No. days exceeded: State Federal	0.030 ppm 53 ppb	0 0	0 0	0 0

Source: ARB, 2018

Table 3-3. Status of SIPs Relevant to the Project Area

Name/Description	Status
Carbon Monoxide	Maintenance: Meets NAAQS – SIP Requirements Approved
Ozone (8-Hour)	Nonattainment (Marginal): Meets NAAQS
$PM_{2.5}$	Nonattainment (Moderate): Meets NAAQS

Source: U.S. EPA, 2018

3.2.2 Mobile Source Air Toxics

Sources of MSAT emissions in the project area include the I-80, UPPR tracks, and the Berkeley Marina. No MSAT monitoring sites were identified in Alameda County and existing concentrations are not available in the project area.

3.2.3 Greenhouse Gas and Climate Change

CO_2, as part of the carbon cycle, is an important compound for plant and animal life, but also accounted for 84% of California's total GHG emissions in 2015. Transportation, primarily on-road travel, is the single largest source of CO_2 emissions in the state.

The proposed project is located in the cities of Berkeley and Albany in Alameda County and is included in the 2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The RTP/SCS, also known as 2040 Plan Bay Area, included an estimate of existing transportation related emissions within the MTC region. Existing emissions were assessed for a 2015 baseline year and were determined to be between 23,427,000 and 24,563,000 $MMTCO_2e$. Emission sources included passenger vehicles, trucks, buses, and other vehicles.

The City of Berkeley adopted a Climate Action Plan June 2, 2009. The target for the year 2020 is to reduce GHG emissions 33% (below 2000 levels). The baseline year was established as 2005 and emissions were estimated to be 575,889 metric tons of CO_2e. The transportation sector with vehicles traveling within city limits represented 47% of emissions.

The City of Albany adopted a Climate Action Plan in April 2010. The Climate Action Plan is comprised of polices and measures that enable the City to meet its target for GHG emission reductions. Albany's Climate Action Plan establishes a goal of reducing GHG emissions by 25% by the year 2020. The General Plan includes additional reduction goals of 60% by 2035 and net zero emissions by 2050. The baseline (year 2004) emissions were established at 69,830 metric tons of CO_2e. The baseline emissions do not include state highway traffic, which would be responsible for 79% of the GHG inventory's total transportation emissions. The City stated that it has no control over the vehicles passing through Albany on state highways and their associated GHG emissions. Transportation emissions in the Climate Action Plan comprise only local roadway emissions, which can be directly influenced by City policy and action.

3.3 Sensitive Receptors

Sensitive receptors include residential areas, schools, hospitals, other health care facilities, child/day care facilities, parks, and playgrounds. On the basis of research showing that the zone of greatest concern near roadways is within 500 feet (or 150 meters), sensitive receptors within 500 feet (or 150 meters) have been identified and are documented in Table 3-4. Figure 3-3 shows the locations of sensitive receptors relative to the project site. In addition, the local community has identified the horse population at Golden Gate Fields as sensitive to air pollution.

Table 3-4. Sensitive Receptors Located Within 500 Feet of the Project Site

Receptor	Description	Distance Between Receptor and Nearest Project Area (Feet)
Tom Bates Regional Sports Complex	Athletic Fields	5
Harrison Park (Gabe Catalfo Fields)	Athletic Fields	5
Berkeley Skate Park	Recreational Use	5
Harrison House Shelter	Mental health, housing, employment, education, drug/alcohol recovery services for homeless individuals and families.	5
Golden Gate Fields	Temporary Residences Above Stables	75
University Village	UC Berkeley Married Student Housing	175

Source: Terry A. Hayes Associates Inc., 2018

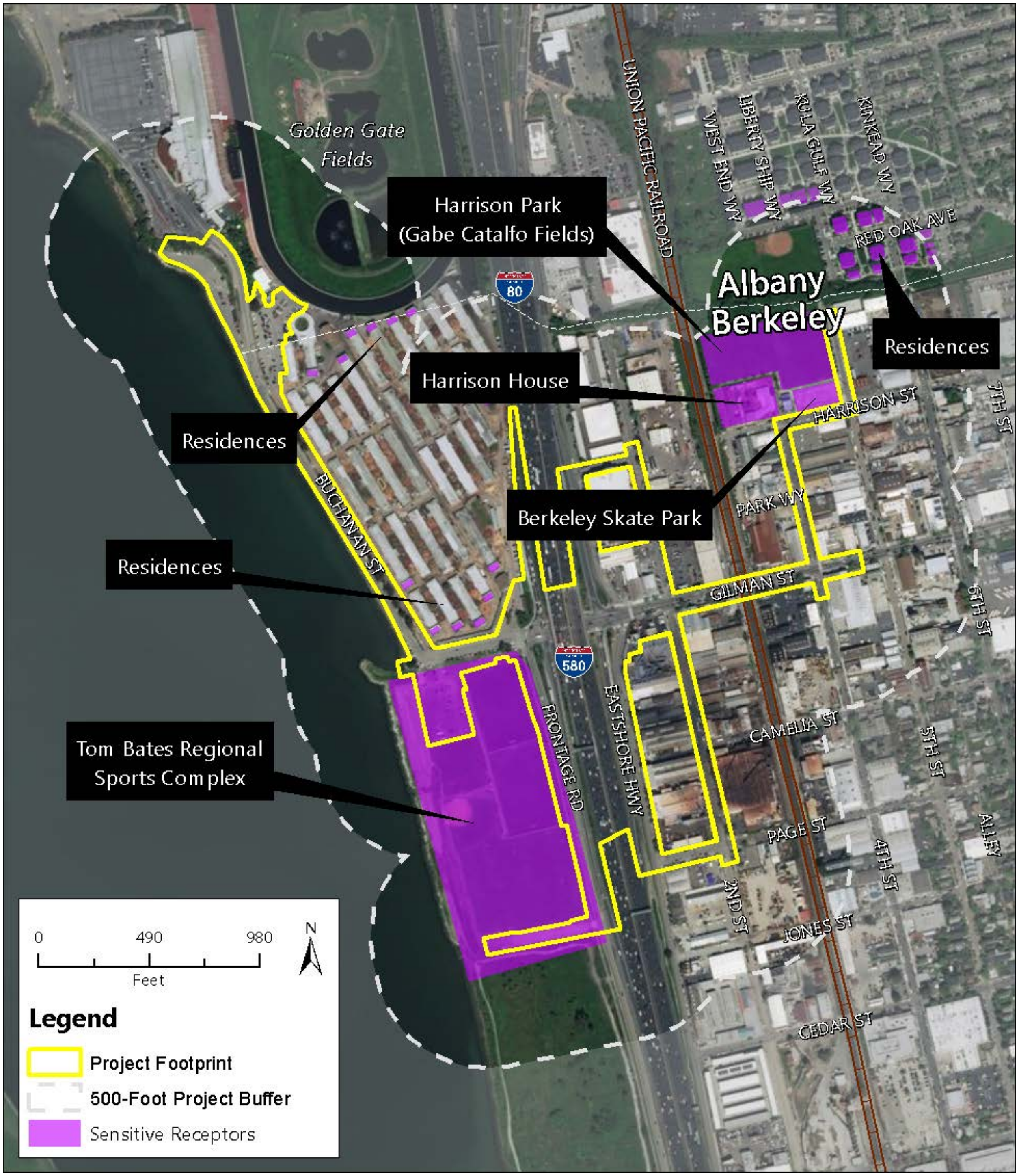

Figure 3-3. Sensitive Receptors Located Near the Proposed Project

3.4 Conformity Status

3.4.1 Regional Conformity

This project is exempt from regional (40 CFR 93.127) conformity requirements. The exemption is defined as changes in vertical and horizontal alignment that do not affect regional emissions. Separate listing of the project in the Regional Transportation Plan and Transportation Improvement Program, and their regional conformity analyses, is not necessary. The project will not interfere with timely implementation of Transportation Control Measures (TCMs) identified in the applicable SIP and regional conformity analysis. Therefore, the appendix files do not include the RTP and TIP listings for the project and the FHWA conformity determination.

3.4.2 Project-Level Conformity

The project is located in Alameda County and is in an attainment – maintenance (moderate) area for CO and, attainment – maintenance for PM_{10}, and nonattainment (moderate – 24 hour) for $PM_{2.5}$. Thus project-level hot-spot analyses for CO, PM_{10}, and $PM_{2.5}$ are required under 40 CFR 93.109. The project is not designated as a TCM and would not interfere with any TCMs.

3.4.3 Interagency Consultation

The project was presented to the MTC Air Quality Conformity Task Force on September 28, 2017 (see Appendix E for supporting documentation). Participating agencies included U.S. EPA, FHWA, Federal Transit Administration, Caltrans, ARB, and the BAAQMD. The Roundabout Alternative was not considered a Project of Air Quality Concern because it was determined not to meet the criteria as defined in U.S. EPA Transportation Conformity Guidance. Various project components have changed since Interagency Consultation, including modifications to pedestrian and bicycle facilities, utilities work, rail track grade crossing, and access to Golden Gate Fields. Important to the context for project-level Transportation Conformity, the project modifications have not resulted in a new traffic study and there has been no change to anticipated truck volumes. As a result, it is not necessary to revisit the Interagency Consultation process.

3.5 NEPA Analysis/Requirement

NEPA applies to all projects that receive federal funding or involve a federal action. NEPA requires that all reasonable alternatives for the project are rigorously explored and objectively evaluated. For NEPA, this study addresses federal criteria pollutants (O_3, $PM_{2.5}$, PM_{10}, CO, NO_2, SO_2, and lead), MSATs, and asbestos. For NEPA analyses, the analysis compares emissions from the future year Build scenario to those from the future year No Build scenario.

3.6 CEQA Analysis/Requirement

CEQA applies to most California transportation projects (certain projects are statutorily exempt). CEQA requires that a range of reasonable alternatives to the project that would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project are explored. For CEQA, this study addresses pollutants for which California has established air quality standards (O_3, PM_{10}, $PM_{2.5}$, carbon monoxide, NO_2, SO_2, lead, visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride), as well as GHGs, MSATs, and asbestos. For CEQA analyses, the analysis compares emissions from the future year Build scenarios to emissions from the Baseline (existing conditions).

4. Environmental Consequences

This section describes the methods, impact criteria, and results of air quality analyses of the proposed project. Analyses in this report were conducted using methodology and assumptions that are consistent with the requirements of NEPA, CEQA, the CCAAs of 1990, and the CCAA of 1988. The analyses also use guidelines and procedures provided in applicable air quality analysis protocols, such as the Transportation Project-Level Carbon Monoxide Protocol (CO Protocol) (Garza et al., 1997), Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM_{10} and $PM_{2.5}$ Nonattainment and Maintenance Areas (U.S. EPA, 2015), and the FHWA Updated Interim Guidance on Air Toxics Analysis in NEPA Documents (FHWA, 2016).

4.1 Impact Criteria

Project-related emissions will have an adverse environmental impact if they result in pollutant emissions levels that either create or worsen a violation of an ambient air quality standard (identified in Table 3-1, above, or contribute to an existing air quality violation.

4.2 Short-Term Effects (Construction Emissions)

4.2.1 Construction Equipment, Traffic Congestion, and Fugitive Dust

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. During construction, short-term degradation of air quality is expected from the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Emissions from construction equipment powered by gasoline and diesel engines are also anticipated and would include CO, NO_x, VOCs, directly emitted PM_{10} and $PM_{2.5}$, and toxic air contaminants (TACs) such as diesel exhaust particulate matter. Construction activities are expected to increase traffic congestion in the area, resulting in increases in emissions from traffic during the delays. These emissions would be temporary and limited to the immediate area surrounding the construction site.

Under the transportation conformity regulations (40 CFR 93.123(c)(5)), construction-related activities that cause temporary increases in emissions are not required in a hot-spot analysis. These temporary increases in emissions are those that occur only during the construction phase and last five years or less at any individual site. They typically fall into two main categories:

- *Fugitive Dust*: A major emission from construction due to ground disturbance. All air districts and the California Health and Safety Code (Sections 41700-41701) prohibit "visible emissions" exceeding three minutes in one hour – this applies not only to dust but also to engine exhaust. In general, this is interpreted as visible emissions crossing the right-of-way line.

Sources of fugitive dust include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site may deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions may vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

- *Construction equipment emissions*: Diesel exhaust particulate matter is a California-identified toxic air contaminant, and localized issues may exist if diesel-powered construction equipment is operated near sensitive receptors.

The construction period for the proposed project spans two years. In addition, transportation project construction emissions have not been identified as a significant contributor to nonattainment conditions. Therefore, an analysis of construction emissions is not needed for conformity purposes.

However, construction emissions have been estimated in accordance with CEQA requirements and for disclosure in the NEPA document. Construction emissions were estimated using the latest Sacramento Metropolitan Air Quality Management District's Road Construction Model (http://www.airquality.org/ceqa/, Version 8.1.0). While the model was developed for Sacramento conditions in terms of fleet emission factors, silt loading, and other model assumptions, it is considered adequate for estimating road construction emissions by the San Joaquin Valley Air Pollution Control District (under its Indirect Source regulations) and the BAAQMD (in its CEQA guidance) and is used for that purpose in this analysis.

Construction emissions were estimated for the Roundabout Alternative using detailed equipment inventories and construction scheduling information provided by the engineering team combined with emissions factors from the EMFAC2014 and OFFROAD models. Construction-related emissions for the Roundabout Alternative are presented in Table 4-1. The results of the construction emission calculations are included in Appendix B. The emissions presented are based on the best information available at the time of calculations. The emissions represent the peak daily construction emissions that would be generated the Roundabout Alternative.

Table 4-1. Construction Emissions

Activity	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)	CO (lbs/day)	NO_x (lbs/day)	VOC (lbs/day)	CO_2 (tons/phase)
Land Clearing/Grubbing	16.28	4.32	22.35	24.06	2.63	121.54
Grading/Excavation	16.84	4.70	27.00	37.93	3.52	757.93
Drainage/Utilities	16.30	4.20	21.81	21.65	2.28	641.95
Paving	0.73	0.58	13.16	12.13	1.14	157.65
Maximum daily Maximum Phase for CO_2	16.84	4.70	27.00	37.93	3.52	757.93
Project Total (Tons)	3.74	1.02	5.98	7.12	0.70	1,679.07

Source: Terry A. Hayes Associates Inc., 2018

Implementation of the following measures, some of which may also be required for other purposes such as storm water pollution control, would reduce air quality impacts resulting from construction activities. Please note that although these measures are anticipated to reduce construction-related emissions, these reductions cannot be quantified at this time. The following measures would reduce pollutant exposure to horses in addition to further reducing human exposure beyond that achieved by the standard Caltrans measures.

- The construction contractor must comply with the Caltrans' Standard Specifications in Section 14-9 (2015).
  - Section 14-9-02 specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.
- Water or a dust palliative will be applied to the site and equipment as often as necessary to control fugitive dust emissions.
- Soil binder will be spread on any unpaved roads used for construction purposes, and on all project construction parking areas.
- Trucks will be washed as they leave the right-of-way as necessary to control fugitive dust emissions.
- Construction equipment and vehicles will be properly tuned and maintained. All construction equipment will use low sulfur fuel as required by CA Code of Regulations Title 17, Section 93114.
- A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely re-vegetation of disturbed slopes as needed to minimize construction impacts to existing communities.
- Equipment and materials storage sites will be located as far away from residential and park uses as practicable. Construction areas will be kept clean and orderly.

- Environmentally sensitive areas will be established near sensitive air receptors. Within these areas, construction activities involving the extended idling of diesel equipment or vehicles will be prohibited, to the extent feasible.
- Track-out reduction measures, such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic, will be used.
- All transported loads of soils and wet materials will be covered before transport, or adequate freeboard (space from the top of the material to the top of the truck) will be provided to minimize emission of dust during transportation.
- Dust and mud that are deposited on paved, public roads due to construction activity and traffic will be promptly and regularly removed to reduce PM emissions.
- To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.
- Mulch will be installed or vegetation planted as soon as practical after grading to reduce windblown PM in the area.

4.2.2 Asbestos

Naturally Occurring Asbestos

Naturally occurring asbestos (NOA) can be released from serpentinite and ultramafic rocks when the rock is broken or crushed. The State Department of Conservation, in conjunction with the United States Geological Survey, has prepared a map and spreadsheet inventory of asbestos areas and areas known to contain serpentinite and ultraformic rocks. The locations of the identified deposits were examined and it was determined that the project is not in an area containing NOA. Standard dust control measures such as watering would effectively control unanticipated NOA exposure.

Structural Asbestos

Demolition of activities would be subject to BAAQMD Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing). BAAQMD Regulation 11, Rule 2 is intended to limit asbestos emissions and the associated disturbance of asbestos-containing waste material generated or handled during these activities. As described in the BAAQMD May 2017 CEQA Guidelines, "The rule addresses the national emissions standards for asbestos along with some additional requirements. The rule requires the Lead Agency and its contractors to notify BAAQMD of any regulated renovation or demolition activity. This notification includes a description of structures and methods utilized to determine whether asbestos-containing materials are potentially present. All asbestos-containing material found on the site must be removed prior to demolition or renovation activity in accordance with BAAQMD Regulation 11, Rule 2, including specific requirements for surveying, notification, removal, and disposal of material containing asbestos. Therefore, projects that comply with Regulation 11, Rule 2 would ensure that asbestos-containing materials would be disposed of appropriately and safely."

4.2.3 Lead

Lead is normally not an air quality issue for transportation projects unless the project involves disturbance of soils containing high levels of aerially deposited lead or painting or modification of structures with lead-based coatings. No industrial sources of lead emissions have been identified near the project site. Regardless, soils will be tested for the presence of hazardous materials such as lead. If lead is present, the project would be required to develop a Lead Compliance Plan to minimize exposure per BAAQMD rules and regulations.

4.3 Long-Term Effects (Operational Emissions)

Operational emissions take into account long-term changes in emissions due to the project (excluding the construction phase). The operational emissions analysis compares forecasted emissions for Existing/Baseline conditions, No Build, and Roundabout Alternatives.

Regional operational emissions associated with project implementation were calculated using CT-EMFAC2014. EMFAC2014 is the most recent on-road emissions modeling tool in California that has been approved for use by the U.S. EPA. EMFAC2014 contains a comprehensive emissions inventory of motor vehicles that provides estimated emission rates for air pollutants. The emission rates provided by EMFAC2014 in grams per mile were used in conjunction with AM and PM traffic volumes and intersection delay data to calculate changes in peak-hour emissions.

The air quality analysis relied upon traffic data presented in Tables 1-1 through 1-4, above, to prepare peak-hour emissions estimates. The Roundabout Alternative would not generate new vehicle trips and would have the greatest effect on congestion and delay during the AM and PM peak hours. The traffic study only includes peak hour volumes and delay. It is presumed that the study area operates in acceptable traffic conditions during non-peak hours and changes in pollutant emissions related to improved traffic flow would be minimal. Therefore, the sum of changes in total AM and PM peak hour delay were used to characterize daily emissions resulting from implementation of the Roundabout Alternative relative to the No Build Alternative in 2020 and 2040. This methodology represents a reasonable assessment of how exhaust emissions would change in the intersection area with the Roundabout Alternative.

Table 4-2 shows emissions in the existing condition and 2020 and 2040 for the No Build and Roundabout Alternatives. Emissions decrease in 2020 and 2040 compared to the existing condition primarily due to fleet turnover and improvements in exhaust controls. When compared to the No Build Alternative, the Roundabout Alternative would result in slight reductions in daily criteria pollutant emissions due to improved traffic flow. The results of the construction emission calculations are included in Appendix D.

Table 4-2. Summary of Comparative Emissions Analysis

Scenario/ Analysis Year	VOC (pounds/day)	NOx (surrogate for NO_2) (pounds /day)	CO pounds/day	PM10 (pounds/day)	$PM_{2.5}$ (pounds/day)
Baseline/Existing Conditions (2016)	1.43	4.06	1.87	0.02	0.02
No Build Alternative (2020)	1.17	3.07	1.58	0.02	0.02
Roundabout Alternative (2020)	0.34	0.90	0.46	0.10	0.10
No Build Alternative (2040)	0.54	1.44	0.80	0.01	0.01
Roundabout Alternative (2040)	0.38	1.00	0.55	0.01	0.01
Year 2020 Net Change from No Build Alternative	-0.83	-2.17	-1.12	-0.02	-0.01
Year 2020 Net Change from Existing Condition	-1.09	-3.16	-1.41	-0.02	-0.02
Year 2040 Net Change from No Build Alternative	-0.16	-0.44	-0.24	0.00	0.00
Year 2040 Net Change from Existing Condition	-1.05	-3.06	-1.32	-0.02	-0.02

Source: Terry A. Hayes Associates Inc., 2018

4.3.1 CO Analysis

The CO Protocol was developed for project-level conformity (hot-spot) analysis and was approved for use by the U.S. EPA in 1997. It provides qualitative and quantitative screening procedures, as well as quantitative (modeling) analysis methods to assess project-level CO impacts. The qualitative screening step is designed to avoid the use of detailed modeling for projects that clearly cannot cause a violation, or worsen an existing violation, of the CO standards. Although the protocol was designed to address federal standards, it has been recommended for use by several air pollution control districts in their CEQA analysis guidance documents and is also be valid for California standards because the key criterion (8-hour concentration) is similar: 9 ppm for the federal standard and 9.0 ppm for the state standard.

Sections 3 and 4 of the CO Protocol describe the methodology for determining whether a CO hot-spot analysis is required. The Protocol provides two conformity requirement decision flowcharts that are designed to assist project sponsors in evaluating the requirements that apply to their project. The flowchart of the CO Protocol applies to new projects and was used here. Below is a step-by-step explanation of the flowchart, which is also included in Appendix C. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the project. The step-by-step process shows that a quantitative analysis is not necessary for the Roundabout Alternative because it would not worsen air quality.

Section 3 – Requirements for New Projects

3.1.1 – Is the project exempt from all emissions analyses? No. Roundabouts are not included in the list of expect projects per 40 CFR 93.127.

3.1.2 – Is the project exempt from regional emissions analysis? Yes. The project is exempt from regional (40 CFR 93.127) conformity requirements. The exemption is defined as changes in vertical and horizontal alignment that do not affect regional emissions. Proceed to Section 3.1.9

3.1.9 – Examine local impacts and proceed to Section 4.

Section 4 – Local CO Analysis

4.1.1 – Is the project in a CO nonattainment area? No. Alameda County is located in a federal attainment/maintenance area as of April 30, 1998.

4.1.2 – Was the area redesignated as "attainment" after the 1990 Clean Air Act? Yes. See previous response.

4.1.3 – Has "continued attainment" been verified with the local Air District, if appropriate? Yes. As shown in Table 3-2, above, monitored CO concentrations in the project area were below the NAAQS for the latest three-year period (2014 to 2017). Proceed to Level 7.

4.7.1 – Does the project worsen air quality? No. Section 4.7.1 provides criteria that can be satisfied to demonstrate that the project would not worsen air quality. In accordance with the CO Protocol, the Roundabout Alternative would not worsen air quality based on the following evaluation:

a) The project may worsen air quality if it increases the percentage of vehicles operating in cold start mode by 2 percent or more in the affected area.

   The ARB has defined cold starts in the EMFAC2014 Volume II - Handbook for Project-Level Analysis (April 30, 2014). Cold starts are defined as starts after the vehicle engine has been shut-off for more than 720 minutes (12 hours). It can reasonably be assumed that cold starts are by vast majority generated when residents leave their homes in the morning or employees leave work in the evening. The Roundabout Alternative has no nexus to the number of cold starts operating along Gilman Street and the surrounding surface streets as no vehicle trips would be generated.

   The Traffic Operations Analysis Report does not identify project-specific cold starts, which are not usually included or relevant for intersection improvement projects. The CO Protocol identifies typical ranges for the percent of vehicles operating in cold mode in Table B.6 of Section B.3.2. For local/collector streets, the range is 5 to 15% during the AM peak hours and 15 to 25% during the PM peak hours. It is anticipated that cold starts in the project area would be within the suggested range of values in the CO Protocol. The precise number for the project area is of no consequence to the CO hot-spot analysis for this particular project.

The Roundabout Alternative has no effect on vehicles operating in cold start mode within the proposed roundabouts or along adjacent surface streets.

The cold start percentage would be identical in the No Build and Roundabout Alternative conditions. Based on the typical ranges in the CO Protocol, the cold start percent for the No Build Alternative would be approximately 10% during the AM peak hour and approximately 20% during the PM peak hour. The cold start percent for the Roundabout Alternative would also be approximately 10% during the AM peak hour and approximately 20% during the PM pea hour. Therefore, there is no potential for the Roundabout Alternative to increase the percentage of vehicles operating in cold start mode.

b) The project may worsen air quality if it significantly increases travel volumes by 5% or more or reduces average vehicle speeds in the affected area.

The Traffic Operations Analysis Report included a detailed analysis of peak hour traffic volumes. The analysis determined that there would be no change in 2020 or 2040 peak hour volumes between the No Build and Roundabout Alternative. According to the Traffic Operations Analysis Report, the future I-80 off-ramp demands—in both 2020 and 2040—at the Gilman Street interchange would be constrained by maintaining the ratio of the off-ramp forecast demands to mainline forecast demands in relation to the existing volume. Likewise, the future I-80 on-ramp demands at Gilman Street interchange would be constrained based on the westbound Gilman Street constrained demands.

The westbound demands along Gilman Street would be constrained due to the fact that Gilman Street has one lane in either direction and a capacity of 1,100 vehicles per hour per lane was used to constrain the demands on Gilman Street taking into account signalized intersections between San Pablo Avenue and 4th Street. Based on the constraint applied on Gilman Street the demands on the onramps from both eastbound and westbound I-80 and frontage road would be proportionally constrained during the peak hour.

Traffic volumes at intersections analyzed in the Traffic Operations Analysis Report are shown in Table 4-3 for the AM peak hour and in Table 4-4 for the PM Peak Hour. No Build and Roundabout Alternative intersection volumes would be identical the 2020 (Opening Year) and 2040 (Horizon Year). Therefore, there is no potential for the Roundabout Alternative to increase intersection volumes by 5% or more.

Table 4-3. Intersection Volumes – AM Peak Hour

Intersection	2020 (Opening Year)		2040 (Horizon Year)	
	No Build Alternative	Roundabout Alternative	No Build Alternative	Roundabout Alternative
Gilman St. at Frontage Rd.	1,332	1,332	1,791	1,791
Gilman St. at WB I-80 Ramps	2,282	2,282	2,803	2,803
Gilman St. at EB I-80 Ramps	2,275	2,275	2,271	2,271
Gilman St. at Eastshore Hwy.	2,417	2,417	2,432	2,432
Gilman St. at 2nd St.	1,621	1,621	1,621	1,621
Gilman St. at 4th St.	1,615	1,615	1,597	1,597
Gilman St. at 6th St.	1,784	1,784	1,802	1,802
Gilman St. at 8th St.	1,366	1,366	1,937	1,937
Gilman St. at 9th St.	1,263	1,263	1,617	1,617
Gilman St. at 10th St.	1,195	1,195	1,511	1,511
Gilman St. at San Pablo Ave.	2,660	2,660	3,293	3,293
Eastshore Hwy. at Harrison St.	585	585	616	616
2nd St. at Harrison St.	126	126	139	139

Source: TJKM, 2017

Table 4-4. Intersection Volumes – PM Peak Hour

Intersection	2020 (Opening Year)		2040 (Horizon Year)	
	No Build Alternative	Roundabout Alternative	No Build Alternative	Roundabout Alternative
Gilman St. at Frontage Rd.	1,285	1,285	1,615	1,615
Gilman St. at WB I-80 Ramps	1,961	1,961	2,028	2,028
Gilman St. at EB I-80 Ramps	2,471	2,471	2,585	2,585
Gilman St. at Eastshore Hwy.	2,172	2,172	2,505	2,505
Gilman St. at 2nd St.	1,779	1,779	2,107	2,107
Gilman St. at 4th St.	1,843	1,843	2,103	2,103
Gilman St. at 6th St.	2,065	2,065	2,526	2,526
Gilman St. at 8th St.	1,551	1,551	2,103	2,103
Gilman St. at 9th St.	1,522	1,522	1,966	1,966
Gilman St. at 10th St.	1,457	1,457	2,003	2,003
Gilman St. at San Pablo Ave.	3,483	3,483	4,565	4,565
Eastshore Hwy. at Harrison St.	392	392	513	513
2nd St. at Harrison St.	118	118	100	100

Source: TJKM, 2017

c) The project may worsen air quality if the project worsens traffic flow, causing a reduction in average speed or an increase in average delay at an intersection.

The Traffic Operations Analysis Report included a detailed intersection delay analysis related to traffic flow. Table 5-3 shows the 2020 (Opening Year) LOS and delay for the No Build and Roundabout Alternatives and Table 5-4 shows the 2040 (Horizon Year) LOS and delay for the No Build and Roundabout Alternatives. Every intersection would operate at the same or better LOS in both years under the Roundabout Alternative relative to the No Build Alternative. There is no potential for the Roundabout Alternative to worsen traffic flow, which would be reflected by a reduction in average speed or an increase in average delay at an intersection.

The Roundabout Alternative would not be expected to cause or contribute to any new localized violations of the federal 1-hour or 8-hour CO ambient standards The Roundabout Alternative would not worsen air quality, and no further analysis is needed in accordance with Level 7 in Figure 3 of the CO Protocol.

4.3.2 PM Analysis

Emissions Analysis

PM emissions were estimated for Existing Conditions along with the No Build and Roundabout Alternative for the opening year 2020 and horizon year 2040. Table 4-2 shows that the project would result in marginal reductions in PM emissions. Slight reductions would occur when comparing the Roundabout Alternative to Existing Conditions and the No Build Alternative.

Hot-Spot Analysis

In November 2015, the U.S. EPA released an updated version of Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas (Guidance) for quantifying the local air quality impacts of transportation projects and comparing them to the PM NAAQS (75 FR 79370). The U.S. EPA originally released the quantitative guidance in December 2010, and released a revised version in November 2013 to reflect the approval of EMFAC 2011 and U.S. EPA's 2012 PM NAAQS final rule. The November 2015 version reflects MOVES2014 and its subsequent minor revisions such as MOVES2014a, to revise design value calculations to be more consistent with other U.S. EPA programs, and to reflect guidance implementation and experience in the field. Note that EMFAC, not MOVES, should be used for project hot-spot analysis in California. The Guidance requires a hot-spot analysis to be completed for a project of air quality concern (POAQC). The final rule in 40 CFR 93.123(b)(1) defines a POAQC as:

(i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

(ii) Projects affecting intersections that are at Level-of-Service (LOS) D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

(iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and

(v) Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

U.S. EPA guidance for PM hot-spot analysis and interagency consultation were used to determine whether the project is a POAQC. The Roundabout Alternative has undergone PM2.5 Interagency Consultation regarding POAQC determination. Interagency Consultation participants concurred that the project is not a POAQC on September 28, 2017 (see Appendix E for supporting documentation). The Roundabout Alternative is not considered a POAQC because it does not meet the definition as defined in U.S. EPA's Transportation Conformity Guidance. Therefore, PM hot-spot analysis is not required.

4.3.3 NO_2 Analysis

The U.S. EPA modified the NO_2 NAAQS to include a 1-hr standard of 100 ppb in 2010. Currently there is no federal project-level nitrogen dioxide (NO_2) analysis requirement. However, NO_2 is among the near-road pollutants of concern and project analysts will be expected to explain how transportation projects affect near-road NO_2.

Regionally, the project is in an NO_2 maintenance area and included in the conforming RTP and TIP. For project-level analysis, NO_2 assessment protocol is not available. Neither EMFAC nor CT-EMFAC provides NO_2 emissions estimates. Instead, those models provide NO_x (combination of NO and NO_2) emissions estimates. Near-road NO_2 concentrations will likely be dominated by overall NO_x emissions. As long as ozone is present at relatively low (background) concentrations, most of the directly emitted NO will convert to NO_2 within a few seconds. Therefore, NO_x emissions overall can serve as a useful analysis surrogate for NO_2. The Caltrans Near-Road Nitrogen Dioxide Assessment report can be used as a reference (Caltrans, 2012).

Table 4-2, above, shows NO_X emissions for existing, No Build Alternative, and Roundabout Alternative conditions. Emissions decrease in 2020 and 2040 compared to the existing condition primarily due to fleet turnover and improvements in exhaust controls. When compared to the No Build Alternative, the Roundabout Alternative would result in slight reductions in daily criteria pollutant emissions due to improved traffic flow.

4.3.4 Mobile Source Air Toxics Analysis

FHWA guidance defines MSATs as in the 2007 U.S. EPA regulations; however, in addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxic Assessment (NATA) (https://www.epa.gov/national-air-toxics-assessment). These are *1,3-butadiene,acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.* While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The project is not categorically excluded by 23 CFR 771.117(c), CAA pursuant to 40 CRF 93.126, and therefore a discussion of MSAT emissions is warranted. FHWA released updated guidance in October 2016 (FHWA, 2016) for determining when and how to address MSAT impacts in the NEPA process for transportation projects. FHWA identified three levels of analysis:

- No analysis for exempt projects or projects with no potential for meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; and
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Projects with no impacts generally include those that a) qualify as a categorical exclusion under 23 CFR 771.117, b) qualify as exempt under the FCAA conformity rule under 40 CFR 93.126, and c) are not exempt, but have no meaningful impacts on traffic volumes or vehicle mix.

Projects that have low potential MSAT effects are those that serve to improve highway, transit, or freight operations or movement without adding substantial new capacity or creating a facility that is likely to substantially increase emissions. The large majority of projects fall into this category.

Projects with high potential MSAT effects include those that:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of Diesel Particulate Matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000, or greater, by the design year; and
- Are proposed to be located in proximity to populated areas or, in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals).

The FHWA guidance does not recommend MSAT analyses for projects with no or negligible traffic impacts. The Traffic Operations Analysis Report (TJKM, 2017) determined that the Roundabout Alternative would result in 2020 and 2040 benefits at the following intersections: Gilman Street/Frontage Road, Gilman Street/Westbound I-80 Ramps, Gilman Street/Eastbound I-80 Ramps, and Gilman Street/Eastshore Highway. The traffic study also concluded that the queue lengths would be reduced significantly on the I-80 eastbound off-ramp and on I-80 westbound off-ramp to Gilman Street under both 2020 and 2040 conditions. Furthermore, Table 4-2, above, demonstrate that the

Roundabout Alternative would reduce emissions of criteria pollutants and ozone precursors in the interchange area.

The purpose of this project is to simplify and improve navigation, mobility and traffic operations, reduce congestion, vehicle queues and conflicts, improve local and regional bicycle connections and pedestrian facilities, and improve safety at the I-80/Gilman Street interchange. This would be accomplished by configuring the existing non-signalized intersection configuration with stop-controlled ramp terminuses with two hybrid single-lane roundabouts with multilane portions on Gilman Street at the I-80 ramp terminals. I-80 ramps and frontage road intersections at each ramp intersection would be combined to form one single roundabout intersection. This project has been determined to generate minimal air quality impacts for FCCA criteria pollutants and has not been linked with any special MSAT concerns. As such, this project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause an increase in MSAT impacts of the Roundabout and No Build Alternatives, based on VMT, vehicle mix, and speed.

Moreover, U.S. EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades due to stricter engine and fuel regulations issued by U.S. EPA. Based on regulations now in effect, an analysis of national trends with U.S. EPA's MOVES2014 model forecasts a combined reduction of over 90 percent in the total annual emissions rate for the priority MSAT from 2010 to 2050 while VMT are projected to increase by over 45 percent. This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.

Council on Environmental Quality (CEQ) Provisions Covering Incomplete or Unavailable Information (40 CFR 1502.22)

Sec. 1502.22 Incomplete or Unavailable Information

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

- If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
- If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
- A statement that such information is incomplete or unavailable;
    - A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
    - A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and

  - The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

- The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

U.S. EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the FCCA and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. U.S. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix C of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The U.S. EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal)."

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the U.S. EPA as provided by the FCCA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires U.S. EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than one in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than one in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld U.S. EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

4.3.5 Greenhouse Gas Emissions Analysis

Project-related CO_2 emissions were estimated using CT EMFAC. Annual emissions were calculated by simply multiplying AM and PM peak period emissions within the interchange area by 347 days in a year. It is presumed that the interchange area operates in acceptable traffic conditions during non-peak hours, weekends, and holidays. Changes in pollutant emissions related to improved traffic flow during these time periods and days would be minimal. Therefore, assessing project-related changes in emissions as a function in changes to peak hour traffic movements is a reasonable methodology for this project.

Table 4-5 shows CO_2 emissions in the Existing Condition and 2020 and 2040 for the No Build and Roundabout Alternatives. The Roundabout Alternative would result in a negligible change to local and regional VMT. Therefore, VMT was not estimated for the alternatives and is not shown in the table. The Roundabout Alternative would result in less CO_2 emissions due to improved traffic flow and reduced delay when compared to the No Build Alternative in 2020 and 2040. The No Build Alternative in 2020 and 2040 would also result in less CO_2 emissions than Existing Conditions, primarily due to improvements in engine exhaust controls. CH_4 and N_20 would represent a negligible amount of CO_2e emissions (less than 1%).

Table 4-5. Modeled Annual CO_2 Emissions, by Alternative

Alternative	CO_2 Emissions (Metric Tons/Year)
Existing/Baseline (2016)	219
Open to Traffic (2020)	
No Build Alternative	218
Roundabout Alternative	64
20-Year Horizon/Design-Year (2040)	
No Build Alternative	155
Roundabout Alternative	107

CO_2 = carbon dioxide
Source: EMFAC2014

While EMFAC has a rigorous scientific foundation and has been vetted through multiple stakeholder reviews, its emission rates are based on tailpipe emission test data and have limitations. The EMFAC-based CO_2 emissions estimates are used for comparison of alternatives. However, the model does not account for factors such as the vehicle operation mode (e.g., rate of acceleration) and the vehicles' aerodynamics, which would influence CO_2 emissions. ARB's GHG Inventory follows the IPCC guideline by assuming complete fuel combustion, while still using EMFAC data to calculate CH_4 and N_2O emissions.

4.4 Cumulative/Regional/Indirect Effects

The cumulative impact analysis is conducted based on a summary of projections of future development and impacts contained in an adopted general planning or related planning document, or in a prior environmental document that has been certified. The project is included in the MTC Year 2017 RTP, which is known as Plan Bay Area 2040. The associated Air Quality Conformity Analysis verifies that the Amended Plan Bay Area 2040 and the Amended 2017 Transportation Improvement Plan conform with the latest U.S. EPA transportation conformity regulations and the Bay Area Conformity SIP. Therefore, there is no potential for the project to interfere with air quality plans that are designed to reduce cumulative air quality impacts in the project area.

In addition, O_3, secondary PM_{10}, and secondary $PM_{2.5}$ are normally regional issues because they are formed by photochemical and chemical reactions over time in the atmosphere. Formation of ozone and secondary PM are a function of VOC and NO_x emissions. As shown in Table 4-2, above, the Roundabout Alternative would result in less VOC and NO_X emissions than either the Existing condition or No Build Alternative.

5. Minimization Measures

The following subsections discuss short-term (construction) and long-term (operational) measures to reduce emissions.

5.1 Short-Term (Construction)

Caltrans standard measures are included in the Project Description and in Section 4.2.1 of this Air Quality Report. These measures are designed to protect sensitive receptors located near construction activity, including the residential population at Golden Gate Fields.

The local community has identified the horse population at Golden Gate Fields as sensitive to air pollution. The following measures would reduce pollutant exposure to horses in addition to further reducing human exposure beyond that achieved by the Caltrans standard measures.

- Construction equipment servicing, and storage would not be allowed on Gilman Road adjacent to Golden Gate Fields.
- Exposed soil would be watered as necessary to prohibit visible emissions at Golden Gate Fields.
- A publicly visible sign would be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person would be required to respond and take corrective action within 48 hours. The BAAQMD phone number would also be visible to ensure compliance with applicable regulations.

5.2 Long-Term (Operational)

The Roundabout Alternative itself is a GHG reduction measure related to operational efficiency as roundabouts reduce idling (and associated fuel use) and queuing, which has been shown to reduce GHG emissions. The measures below would address water efficiency, energy efficiency, material use/choice, carbon sequestration, heat island reduction, operational efficiency, fuel consumption, and construction methods and are included to reduce the GHG emissions and potential climate change impacts.

- Landscaping reduces surface warming and, through photosynthesis, decreases CO_2. The project would include plantings in the center islands of the roundabouts and medians to the extent feasible. Low plantings would be included along the sides of the San Francisco Bay Trail and between the new retaining walls. These plantings will help offset any potential CO_2 emissions increase through carbon sequestration and reducing the heat island effect.
- The project would incorporate the use of energy-efficient lighting, such as light-emitting diode (LED) traffic signals. LED bulbs cost $60 to $70 each but last five to six years, compared

to the one-year average lifespan of the incandescent bulbs previously used. The LED bulbs themselves consume 10% of the electricity of traditional lights, which will also help reduce the project's CO_2 emissions through energy efficiency.

- A plan would be developed to efficiently use water for adequate dust control during construction.
- The contractor would use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials, and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products utilized should be certified through a sustainable forestry program.
- Fuel consumption would be minimized by encouraging and providing carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes. Additionally, fuel efficiency from construction equipment would be improved by minimizing idling time and maintaining construction equipment in proper working condition.

6. Conclusions

The purpose of this AQR is to inform the NEPA and CEQA decisions with background information and project-specific analysis related to the project. The findings are as follows:

- **Transportation Conformity** – This project is exempt from regional (40 CFR 93.127) conformity requirements. The exemption is defined as changes in vertical and horizontal alignment that do not affect regional emissions.

  Alameda County is subject to Project-Level Transportation Conformity Assessments for CO and PM. A CO analysis was completed using the CO Protocol and it was determined that the Roundabout Alternative would not create a CO hot-spot. The project has undergone Interagency Consultation regarding the POAQC determination. Interagency Consultation participants concurred that the project is not a POAQC on September 28, 2017. Therefore, PM hot-spot analysis is not required.

  The construction period is planned to last approximately two years. No construction activities are anticipated to last more than five years at any individual site. Emissions from construction-related activities are thus considered temporary as defined in 40 CFR 93.123(c)(5); and are not required to be included in PM hot-spot analyses to meet conformity requirements.

- **Construction Emissions** – Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. During construction, short-term degradation of air quality is expected from the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Implementation of the following avoidance, minimization, and/or mitigation measures would minimize construction emissions
  - The construction contractor must comply with the Caltrans' Standard Specifications in Section 14-9 (2015).
    - Section 14-9-02 specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.

    Water or a dust palliative will be applied to the site and equipment as often as necessary to control fugitive dust emissions.

    Soil binder will be spread on any unpaved roads used for construction purposes, and on all project construction parking areas.

    Trucks will be washed as they leave the right-of-way as necessary to control fugitive dust emissions.

Construction equipment and vehicles will be properly tuned and maintained. All construction equipment will use low sulfur fuel as required by CA Code of Regulations Title 17, Section 93114.

A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely re-vegetation of disturbed slopes as needed to minimize construction impacts to existing communities.

Equipment and materials storage sites will be located as far away from residential and park uses as practicable. Construction areas will be kept clean and orderly.

Environmentally sensitive areas will be established near sensitive air receptors. Within these areas, construction activities involving the extended idling of diesel equipment or vehicles will be prohibited, to the extent feasible.

Track-out reduction measures, such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic, will be used.

All transported loads of soils and wet materials will be covered before transport, or adequate freeboard (space from the top of the material to the top of the truck) will be provided to minimize emission of dust during transportation.

Dust and mud that are deposited on paved, public roads due to construction activity and traffic will be promptly and regularly removed to reduce PM emissions.

To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.

Mulch will be installed or vegetation planted as soon as practical after grading to reduce windblown PM in the area.

Construction equipment servicing, and storage would not be allowed on Gilman Road adjacent to Golden Gate Fields.

Exposed soil would be watered as necessary to prohibit visible emissions at Golden Gate Fields.

A publicly visible sign would be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person would be required to respond and take corrective action within 48 hours. The BAAQMD phone number would also be visible to ensure compliance with applicable regulations.

- **Operational Emissions** - The Roundabout Alternative would result in fewer emissions in 2020 and 2040 compared to the No Build Alternative and existing conditions. Emissions decrease in 2020 and 2040 compared to the existing condition primarily due to fleet turnover and improvements in exhaust controls. When compared to the No Build Alternative, the Roundabout Alternative would result in slight reductions in daily criteria pollutant emissions due to improved traffic flow.

- **PM Analysis** - PM emissions were estimated for Existing Conditions along with the No Build and Roundabout Alternative for the opening year 2020 and horizon year 2040. Table 4-2 shows that the project would result in marginal reductions in PM emissions. Slight reductions would occur when comparing the Roundabout Alternatives to Existing conditions and the No Build Alternative.

- **NO_2 Analysis** - For project-level analysis, an NO_2 assessment protocol is not available and emissions are best assessed as NO_X. Emissions decrease in 2020 and 2040 compared to the existing condition primarily due to fleet turnover and improvements in exhaust controls. When compared to the No Build Alternative, the Roundabout Alternative would result in slight reductions in daily criteria pollutant emissions due to improved traffic flow.

- **MSAT Analysis** – Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA, 2016) recommends a range of options deemed appropriate for addressing and documenting the MSAT issue in NEPA documents. The guidance states that FHWA does not recommended MSAT analyses for projects with no or negligible traffic impacts. The Traffic Operations Analysis Report (TJKM, 2017) determined that the Roundabout Alternative would result in 2020 and 2040 benefits at the following intersections: Gilman Street/Frontage Road, Gilman Street/Westbound I-80 Ramps, Gilman Street/Eastbound I-80 Ramps, and Gilman Street/Eastshore Highway. The traffic study also concluded that the queue lengths would be reduced significantly on the I-80 eastbound off-ramp and on I-80 westbound off-ramp to Gilman Street under both 2020 and 2040 conditions. The Roundabout Alternative would not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause an increase in MSAT impacts of the Roundabout and No Build Alternatives, based on VMT, vehicle mix, and speed.

- **GHG Emissions** - The Roundabout Alternative would result in less CO_2 emissions due to improved traffic flow when compare to the No Build Alternative and existing conditions. The No Build Alternative in 2020 and 2040 would also result in less CO_2 emissions than existing conditions, primarily due to improvements in engine exhaust controls. The measures below would address water efficiency, energy efficiency, material use/choice, carbon sequestration, heat island reduction, operational efficiency, fuel consumption, and construction methods and are included to reduce the GHG emissions and potential climate change impacts.

  Landscaping reduces surface warming and, through photosynthesis, decreases CO_2. The project would include plantings in the center islands of the roundabouts and medians to the extent feasible. Low plantings would be included along the sides of the San Francisco Bay Trail and between the new retaining walls. These plantings will help offset any potential CO_2 emissions increase through carbon sequestration and reducing the heat island effect.

  The project would incorporate the use of energy-efficient lighting, such as light-emitting diode (LED) traffic signals. LED bulbs cost $60 to $70 each but last five to six years, compared to the one-year average lifespan of the incandescent bulbs previously used. The LED bulbs themselves consume 10% of the electricity of traditional lights, which will also help reduce the project's CO_2 emissions through energy efficiency.

A plan would be developed to efficiently use water for adequate dust control during construction.

The contractor would use locally sourced or recycled materials for construction materials (goal of at least 20% based on costs for building materials, and based on volume for roadway, parking lot, sidewalk and curb materials). Wood products utilized should be certified through a sustainable forestry program.

Fuel consumption would be minimized by encouraging and providing carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes. Additionally, fuel efficiency from construction equipment would be improved by minimizing idling time and maintaining construction equipment in proper working condition.

- **Cumulative/Regional/Indirect Effects** - The project is included in the MTC Year 2017 RTP, which is known as Plan Bay Area 2040. The associated Air Quality Conformity Analysis verifies that the Amended Plan Bay Area 2040 and the Amended 2017 Transportation Improvement Plan conform with the latest U.S. EPA transportation conformity regulations and the Bay Area Conformity SIP. Therefore, there is no potential for the project to interfere with air quality plans that are designed to reduce cumulative air quality impacts in the project area.

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8. Appendices

Appendix A Summary of Forecast Travel Activities

Appendix B Construction Emissions Calculation

Appendix C CO Flow Chart

Appendix D Summary Tables for Estimated Regional Emissions of GHG, PM, and Other Pollutants

Appendix E Interagency Consultation Documentation