Section 5.4 Air Quality and Climate Change

This section describes the potential air quality and climate change impacts associated with the proposed changes to the approved project. This section supplements Section 4.3 of the 2005 Final EIR, Section 5.2 of the 2007 Final SEIR, and Section 3.2 of the 2014 Subsequent IS/MND. This analysis is based on and supported by new information and updated data from the California Air Resources Board (CARB), the U.S. Environmental Protection Agency, and the operational assumptions from VTA.

Environmental Setting

The following discussion describes the changes to the existing regional and local air quality and climate change conditions since the preparation of the air quality and climate change analysis in the 2005 Final EIR, 2007 Final SEIR, and 2014 Subsequent IS/MND. The basic environmental setting of the project area, in terms of climate and topography, existing pollutant concentrations in the Capitol Expressway corridor, and sensitive receptors, is unchanged from the 2005 Final EIR. Regional attainment status in the project area has changed, as discussed below.

Table 5.4-1 provides the most recent available data (2015–2017 time period). The nearest air quality monitoring station to the project corridor is the San Jose-Knox Avenue Station. However, this station does not measure all pollutants, and supplemental data from the next closest station, San Jose-Jackson Street station, are included for ozone and particulate matter less than or equal to 10 microns (PM10). As indicated in Table 5.4-1, the San Jose-Knox Avenue and San Jose-Jackson Street stations experienced violations of 8-hour ozone, PM10, and particulate matter less than or equal to 2.5 microns (PM2.5) standards between 2015 and 2017.

Table 5.4-1 Ambient Criteria Air Pollutant Monitoring Data (2015-2017)

Pollutant Standards	2015	2016	2017
Ozone (O_3) (San Jose – Jackson Street)			
Maximum 1-hour concentration (ppm)	0.094	0.087	0.121
Maximum 8-hour concentration (ppm)	0.081	0.066	0.098
Number of days standard exceeded[1]			
CAAQS 1-hour (>0.09 ppm)	0	0	3
CAAQS 8-hour (>0.070 ppm)	2	0	4
NAAQS 8-hour 2008 Standard (>0.075 ppm)	2	0	3
NAAQS 8-hour 2015 Standard (>0.070 ppm)	2	0	4
Carbon Monoxide (CO) (San Jose – Knox Avenue)			
Maximum 8-hour concentration (ppm)	2.0	1.4	2.6
Maximum 1-hour concentration (ppm)	2.7	1.9	1.8

Pollutant Standards	**2015**	**2016**	**2017**
Number of days standard exceeded:[1]			
NAAQS 8-hour (≥9 ppm)	0	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0
Nitrogen Dioxide (NO_2) (San Jose – Knox Avenue)			
State maximum 1-hour concentration (ppb)	61	52	76
State second-highest 1-hour concentration (ppb)	58	51	71
Annual average concentration (ppb)	17	15	17
Number of days standard exceeded:			
CAAQS 1-hour (180 ppb)	0	0	0
Particulate Matter (PM10)[2] (San Jose – Jackson Street)			
National[3] maximum 24-hour concentration (g/m^3)	58.8	40.0	69.4
National[3] second-highest 24-hour concentration (g/m^3)	47.2	35.2	67.3
State[4] maximum 24-hour concentration (g/m^3)	58.0	41.0	69.8
State[4] second-highest 24-hour concentration (g/m^3)	49.3	37.5	67.6
National annual average concentration (g/m^3)	21.3	17.5	20.7
State annual average concentration (g/m^3)[5]	21.9	18.3	21.3
Number of days standard exceeded:[1]			
NAAQS 24-hour (>150 g/m^3)[6]	0	0	0
CAAQS 24-hour (>50 g/m^3)[6]	1	0	6
Particulate Matter (PM2.5) (San Jose – Knox Avenue)			
National[3] maximum 24-hour concentration (g/m^3)	46.9	26.5	48.4
National[3] second-highest 24-hour concentration (g/m^3)	31.6	24.4	47.4
State[4] maximum 24-hour concentration (g/m^3)	46.9	26.5	48.4
State[4] second-highest 24-hour concentration (g/m^3)	31.6	24.4	47.4
National annual average concentration (g/m^3)	8.4	9.1	10.7
State annual average concentration (g/m^3)[5]	8.4	9.1	10.8
Number of days standard exceeded:[1,6]			
NAAQS 24-hour (>35 g/m^3)	1	0	8

Notes:
ppm = parts per million
NAAQS = National Ambient Air Quality Standards
CAAQS = California Ambient Air Quality Standards
g/m^3 = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter
- = data not available

Pollutant Standards	2015	2016	2017

[1] An exceedance is not necessarily a violation.
[2] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.
[3] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, state statistics are based on California approved samplers.
[4] Measurements usually are collected every 6 days.
[5] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[6] Mathematical estimate of how many days' concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Source: California Air Resources Board 2018a; U.S. Environmental Protection Agency 2018a.

Local monitoring data (Table 5.4-1) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). The most recent attainment status for Santa Clara County, which is current as of 2018, is shown in Table 5.4-2 for each applicable pollutant.

Table 5.4-2 Federal and State Attainment Status for Santa Clara County (2018)

Criteria Pollutant	Federal Designation	State Designation
O_3 (8-hour)	Marginal Nonattainment	Nonattainment
CO	Maintenance	Attainment
PM10	Attainment	Nonattainment
PM2.5	Nonattainment	Nonattainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
Sulfates	(No Federal Standard)	Attainment
Hydrogen Sulfide	(No Federal Standard)	Unclassified
Visibility Reducing Particles	(No Federal Standard)	Unclassified

Notes:
O_3 = ozone
CO = carbon monoxide
PM10 = particulate matter less than or equal to 10 microns
PM2.5 = particulate matter less than or equal to 2.5 microns
NO_2 = nitrogen dioxide
SO_2 = sulfur dioxide

Source: California Air Resources Board 2017; U.S. Environmental Protection Agency 2018b.

As discussed in Chapter 2, *Changes to the Approved Project, Changes in Circumstances, and Introduction of New Information*, Senate Bill 350 was signed by Governor Brown in October 2015 and its key provisions establish benchmarks for renewable energy that electric utilities must meet. In addition, SB 32 requires CARB to ensure that statewide greenhouse gas (GHG) emissions are reduced to at least 40% below 1990 levels by 2030. Pursuant to SB 32, CARB updated the prior AB 32 Scoping Plan to address

implementation of GHG reduction strategies to meet the 2030 reduction target. The Final Plan was approved in December 2017. Furthermore, on April 19, 2017, the BAAQMD Board of Directors adopted an update to the 2010 Clean Air Plan, the *2017 Clean Air Plan*.

Environmental Impacts and Mitigation

The impact discussion in this section primarily focuses on the proposed changes to the approved project that could result in new or more significant air quality impacts compared to the impacts previously identified and analyzed for the approved project.

IMPACTS ON AIR QUALITY EMISSIONS DURING OPERATION

Many of the proposed changes to the approved project (including the revision to Capitol Expressway roadway lane configurations; modifications to the Eastridge Station platforms and tracks; reduction in parking spaces at the Eastridge Park-and-Ride lot; minor shift in the location and straightening of the Story Station pedestrian overcrossing and access; modification to Story Station pedestrian access; relocation of a construction staging area; and relocation of PG&E electrical transmission facilities) would not result in any exceedances of the federal or state ambient air quality standards related to the generation of emissions of reactive organic gases, oxides of nitrogen, and particulate matter from the light rail or on-road vehicles during operation. Thus, these proposed changes to the approved project would not result in changes to the conclusions of the air quality impacts previously identified and analyzed for the approved project.

For this analysis, long-term air quality impacts are those associated with motor vehicles operating on the roadway network, predominantly those operating in the project area on Capitol Expressway and the cross streets along the project corridor. One of the proposed changes to the approved project (the extension of the aerial guideway to grade-separate the Ocala Avenue and Cunningham Avenue intersections) could result in changes to air quality during operation. The rate of emissions of reactive organic gases (ROG), nitrogen dioxide (NO_X), carbon monoxide (CO), PM10, PM2.5, and GHGs from motor vehicles could be increased or decreased based on changes to vehicle miles traveled (VMT) and vehicle speeds that would result from the proposed changes to the approved project. Criteria pollutant emissions associated with the proposed changes to the approved project were quantified using emission factors from the CARB's EMFAC2017 emission factor database and VMT data prepared for the proposed changes by VTA (Santa Clara Valley Transportation Authority 2018). Changes in VMT at the regional level (i.e., the nine-county Bay Area region) that would result from implementation of the proposed changes to the approved project were modeled for an existing conditions scenario in 2017, a project scenario relative to a no project scenario in 2023, and a project scenario relative to a no project scenario in 2043. Emission factors from EMFAC2017 were selected for each analysis year and for the MTC region[1] for an accurate representation of the profile of vehicles that would be affected by the proposed changes to the approved project (i.e., the

[1] MTC refers to the Metropolitan Transportation Commission, which is the regional transportation planning agency for the nine-county Bay Area region.

percentage of vehicles in the MTC region that are light duty, heavy duty, etc.). The VMT data and emission factor assumptions used for the analysis are included in Attachment F.

Under the existing plus project scenario, the proposed changes to the approved project would result in fewer VMT and better intersection performance as compared to the approved project (Black pers. comm.). The proposed changes include an aerial guideway rather than the at-grade alignment included in the approved project. Thus, light rail vehicles could travel at increased speeds as a result of the proposed changes. The aerial guideway would remove the possibility of traffic signal delay that could occur for the approved project's at-grade alignment, and speeds for light rail vehicles could be increased. The increased speeds would likely result in better system performance and could result in increased ridership, which would lead to lower VMT than with the approved project. Emissions associated with the existing plus project scenario for the proposed changes to the approved project are shown in Table 5.4-3.

Table 5.4-3 Operational Criteria Pollutant Emissions Increases (Existing [2017] Year, Year 2023, and Year 2043)

Daily/Annual Emissions	ROG	NO_X	CO	PM10	PM2.5
Project Scenario Relative to Existing Conditions in 2017					
Maximum Daily Emissions (lbs/day)	-0.1	-0.6	-2.1	-0.01	-0.01
Annual Emissions (tons/year) [1]	-0.02	-0.11	0.37	> -0.01	> -0.01
Project Scenario Relative to No Project in 2023					
Maximum Daily Emissions (lbs/day)	1.9	12.5	52.3	0.18	0.16
Annual Emissions (tons/year) [1]	0.3	2.2	9.1	0.03	0.03
Project Scenario Relative to No Project in 2043					
Maximum Daily Emissions (lbs/day)	-11.0	-87.6	-311.3	-1.0	-1.0
Annual Emissions (tons/year) [1]	-1.9	-15.2	-54.0	-0.2	-0.2
BAAQMD Daily Thresholds[2] (lbs/day)	**54**	**54**	***CAAQS***	**82**	**54**
BAAQMD Annual Thresholds[2] (tons/year)	**10**	**10**	***CAAQS***	**15**	**10**

Notes:

CAAQS = violation of a CAAQS (see impact Carbon Monoxide Hot Spot discussion)

[1] Daily emissions were converted into annual emissions by multiplying by a standard factor of 347 days per year, to account for reduced volumes on weekends.

[2] Bay Area Air Quality Management District 2017a.

Sources: Vehicle miles traveled data from VTA (2018). Emission factors from EMFAC2017 (California Air Resources Board 2018b) are included in Attachment F.

Existing (2017) Conditions. As shown in Table 5.4-3, criteria pollutant emissions during operation of the proposed changes to the approved project would decrease emissions relative to existing conditions, resulting in a net benefit to regional air quality. With net negative reductions relative to the existing conditions, emissions would not increase as a result of the proposed changes, and there would be no exceedances of the BAAQMD's thresholds of significance for any pollutant. For carbon monoxide (CO), there is no mass emissions threshold, and localized CO concentrations are evaluated with respect to the

CAAQS. Localized CO concentrations are evaluated in a separate impact discussion below.

2023 Conditions. The proposed changes to the approved project would result in a slight increase in net VMT relative to the no project conditions in 2023. Although light rail ridership would likely increase for the reasons discussed above, there could be an offset effect from drivers seeking alternative routes, resulting in slightly greater travel distances. This effect is anticipated to be minor but would result in increases of criteria pollutant emissions, as shown in Table 5.4-3. The increases in emissions for all pollutants would be below the BAAQMD's thresholds of significance by a substantial margin. The largest increase in a pollutant relative to no project conditions in 2023 would occur for NO_X, but emissions would be approximately 12.5 pounds per day, which is approximately 41.5 pounds per day less than the BAAMQD's NO_X threshold of 54 pounds per day.

2043 Conditions. The effect of alternative travel routes that would cause VMT and emissions increases in 2023 would be relatively minor; VMT reductions would be experienced by 2043 from increasing light rail ridership, decreasing on-road vehicle travel, and a cleaner, lower-emitting region-wide vehicle fleet in 2043. As shown in Table 5.4-3, criteria pollutant emissions from implementation of the proposed changes to the approved project would decrease emissions of all pollutants relative to no project conditions in 2043, resulting in a net benefit to air quality.

The 2005 Final EIR determined that the approved project would result in decreases to regional criteria pollutants (i.e., a net benefit to air quality) because there would be a decrease in single-occupant vehicle use. The 2014 Subsequent IS/MND determined that the No Ocala Station option could increase VMT slightly (i.e., by less than 0.1%) relative to the Light Rail Alternative with the median Ocala Station, but this minor increase would not be expected to result in exceedances of the federal or state ambient air quality standards. The analysis for the proposed changes to the approved project has determined that, while criteria pollutant emissions would slightly increase in one of the analysis years (2023), the increase would be below the BAAQMD thresholds and there would be a net benefit to air quality in the existing conditions scenario and a long-term, on-going benefit to air quality by 2043 for the proposed changes to the approved project. Thus, the proposed changes to the approved project would not result in any criteria pollutant emissions exceedances nor would the proposed changes result in any exceedances of the federal or state ambient air quality standards beyond the impacts previously identified and analyzed for the approved project.

Impact: The following impact from the 2005 Final EIR would still apply to the proposed changes to the approved project: AQ-6 (Potential Net Increase in Emissions of Reactive Organic Gases, Oxides of Nitrogen, and PM10).

Mitigation: None required. This impact is "Less than Significant."

Less-than-significant impact. No mitigation required.

IMPACTS ON CARBON MONOXIDE HOT SPOTS

With respect to localized CO impacts at intersections along the Capitol Expressway corridor, the proposed changes to the approved project would result in improved intersection performance compared to the approved project. CO dispersion modeling was conducted in the 2005 Final EIR for the existing year (2001), 2010, and 2025, and no exceedances of the CAAQS were identified. Dispersion modeling was not conducted in the 2007 Final SEIR or the 2014 Subsequent IS/MND. Because the proposed changes to the approved project would result in changes to intersection volumes at four intersections relative to the approved project and no project conditions in 2017, 2023, and 2043, which are years not previously analyzed with respect to CO hot spots, the potential for the proposed changes to the approved project to affect CO hot spots is evaluated in this analysis. Intersection volumes at all four intersections are well below the screening volumes established by the BAAQMD to determine whether a project could result in exceedances of the CAAQS (i.e., generate CO hot spots).[2] However, because two intersections, Capitol Expressway/Capitol Avenue and Capitol Expressway/Story Road, are considered to be Congestion Management Program intersections, further scrutiny is warranted at these intersections. As concluded in Section 5.1, *Transportation*, the proposed changes to the approved project would result in a significant impact with respect to level of service and delay at the Capitol Expressway/Story Road intersection for the existing plus project scenario, 2023 plus project scenario, and 2043 plus project scenario. No significant level of service or delay impacts are identified at the Capitol Expressway/Capitol Avenue intersection in Section 5.1, *Transportation*.

Because the Capitol Expressway/Story Road intersection is considered a Congestion Management Program intersection and would have a significant impact, the BAAQMD screening methodology for CO hot spots is not used. As such, CO dispersion modeling at this intersection was conducted for the proposed changes to the approved project in the existing (2017), 2023, and 2043 scenarios using peak hour traffic volumes from the August 23, 2018 *Eastridge to BART Regional Connector: Capitol Expressway Light Rail Project Supplemental Transportation Analysis* prepared by Hexagon Transportation Consultants, Inc. The Capitol Expressway/Story Road intersection analysis is a worst-case analysis because it has the highest volumes among the four intersections that would be modified by the proposed changes to the approved project. In addition, the higher of

[2] Heavy traffic congestion can contribute to high levels of CO, and individuals exposed to such hot spots may have a greater likelihood of developing adverse health effects. BAAQMD has adopted screening criteria that provide a conservative indication of whether project-generated traffic would cause a potential CO hot spot. The BAAQMD's CO screening criteria require that (1) the project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; (2) the project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway); and (3) the project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.

the AM or PM peak hour volumes for each year were used for the dispersion modeling to further represent a worst-case analysis.

The results of the CO hot spot analysis for the Capitol Expressway/Story Road intersection are provided in Table 5.4-4. As shown in Table 5.4-4, the proposed changes to the approved project would result in lower CO concentrations for all years at the Capitol Expressway/Story Road intersection than the concentrations modeled in the 2005 Final EIR for the intersection. In addition, there would be no exceedances of the CAAQS at the worst-case intersection of Capitol Expressway/Story Road intersection, and the proposed changes to the approved project would not result in any CO hot spots at any of the intersections modified by the proposed changes. Thus, the proposed changes to the approved project would not result in CO hot spot impacts beyond the impacts previously identified and analyzed for the approved project.

Table 5.4-4 CO Modeling Concentration Results at Capitol Expressway and Story Road (Existing [2016] Year, Year 2023, and Year 2043)

	Worst Case Concentrations (parts per million)	
	Capitol Expressway and Story Road	
Year	**1-hr CO[1]**	**8-hr CO[2]**
Existing (2016[3]) + Project	4.9	3.4
With Project (2023)	5.0	3.5
With Project (2043)	3.7	2.6
CAAQS Threshold[4]	20.0	9.0
NAAQS Threshold	35.0	9.0

Notes:

[1] Average 1-hour background concentration between 2015 and 2017 was 2.6 ppm at the Knox Avenue Station in San Jose (U.S. Environmental Protection Agency 2018).

[2] Average 8-hour background concentration between 2015 and 2017 was 1.8 ppm at the Knox Avenue Station in San Jose (U.S. Environmental Protection Agency 2018).

[3] At the Capitol Expressway & Story Road intersection, 2016 volumes were used instead of 2017 volumes, because minor construction activities were occurring in 2017. Thus, the existing year at this intersection is 2016.

[4] The BAAQMD's threshold of significance for CO impacts is the CAAQS.

Sources: Hourly Roadway segment volumes are included in Attachment F; emission factors from EMFAC2017 (California Air Resources Board 2018b) are included in Attachment F; and dispersion modeling conducted with CALRoads View (Lakes Environmental 2016).

Impact: The following impact from the 2005 Final EIR would still apply to the proposed changes to the approved project: AQ-5 (Violation of State Carbon Monoxide Standards as Determined by Modeling of Carbon Monoxide Emissions).

Mitigation: None required. This impact is "Less than Significant."

Less-than-significant impact. No mitigation required.

CONSISTENCY WITH THE APPLICABLE AIR QUALITY PLAN

Impacts of the approved project related to consistency with the applicable air quality plan were not previously analyzed in the 2005 Final EIR, the 2007 Final SEIR, or the 2014 Subsequent IS/MND. The most recent air quality plan applicable to the proposed changes to the approved project is the BAAQMD's *2017 Clean Air Plan*, which provides an integrated strategy to control ozone, PM, TACs, and GHG emissions (Bay Area Air Quality Management District 2017b). The primary goals of the *2017 Clean Air Plan* are to attain air quality standards, reduce population exposure and protect public health in the Bay Area, and reduce GHG emissions and protect the climate.

A project is generally considered to be inconsistent with an air quality plan if the project would result in population and/or employment growth that exceeds the estimates used to develop the plan. The proposed changes to the approved project are not considered a land use development project and would not directly result in any population or employment increases in the region.

Furthermore, because the proposed changes to the approved project would increase the efficiency of light rail by changing the at-grade alignment of the approved project to an elevated guideway, the proposed changes to the approved project would be consistent with the overall goals of the *2017 Clean Air Plan*. Specifically, the proposed changes to the approved project would be consistent with Transportation Control Measure TR-4 of the *2017 Clean Air Plan*, Local and Regional Rail Service. As previously discussed, the proposed changes to the approved project would likely result in increased light rail ridership relative to the approved project due to the improvements in vehicle speed. Thus, the proposed changes to the approved project would complement, not conflict with, the BAAQMD's *2017 Clean Air Plan* and this impact would be less than significant.

IMPACTS ON SUBSTANTIAL POLLUTANT CONCENTRATIONS

The potential pollutant concentration impacts of the approved project were not previously analyzed in the 2005 Final EIR, the 2007 Final SEIR, or the 2014 Subsequent IS/MND. Based on the results of the daily traffic volume analysis, the operational phase of the proposed changes to the approved project would not result in any major sources of toxic air contaminants that could adversely affect sensitive receptors (e.g., a gas station, or a project that would add a substantial amount of diesel truck or bus traffic). The proposed changes to the approved project would involve light rail vehicles traveling on the proposed aerial guideway and changes to on-road vehicle volumes on Capitol Expressway and the cross streets. The light rail vehicles would be electrically powered and would not directly generate any exhaust emissions. Because the vast majority of onroad vehicles are gasoline-powered, on-road vehicles are not considered to be appreciable sources of diesel particulate matter. Other toxic air contaminants (e.g., benzene and 1,3-Butadiene) are present in gasoline exhaust emissions and can pose health risks to sensitive receptors.

Table 5.4-5 shows the changes in on-road vehicle traffic volumes that are expected on roadways in the immediate vicinity of the Capitol Expressway corridor as a result of the

proposed changes to the project. On nearly all roadways in the vicinity of the corridor, the proposed changes to the approved project would result in a net decrease in traffic volumes in the existing year (2017), 2023, and 2043. On these roadways, the proposed changes to the approved project would result in decreases in pollutant concentrations that are currently affecting sensitive receptors because there would likely be higher light rail ridership and fewer on-road vehicles. Thus, on nearly all roadways, the proposed changes to the approved project would not contribute to existing pollutant concentrations and would not worsen exposure of sensitive receptors to those pollutants concentrations. However, in 2043 on Ocala Avenue, vehicle volumes would increase by approximately 5,109 vehicles per day west of Capitol Expressway and by approximately 1,574 vehicles east of Capitol Avenue. The presence of approximately 5,109 vehicles per day alone would not generate substantial toxic air contaminant emissions and thus would not lead to significant health impacts that exceed the BAAQMD's health risk thresholds. As such, the incremental effect of the proposed changes to the approved project on Ocala Avenue would not lead to substantial pollutant concentrations and this impact would be less than significant.

Table 5.4-5 Daily[1] Traffic Volume Changes Relative to No Project Conditions (Existing [2017] Year, Year 2023, and Year 2043)[2]

Roadway	2017 + Project	2023 + Project	2043 + Project
Capitol Avenue Segments			
North of Capitol Avenue[3]	-669	-703	-747
Between Capitol Expressway and Story Road[3]	-733	-873	-975
Between Story Road and Ocala Avenue	-1,023	-1,012	-1,321
Between Ocala Avenue and Cunningham Avenue	-1,702	-1,710	-854
South of Cunningham Avenue	-1,676	-1,731	-3,274
Cross Street Segments			
Excalibur - West of Capitol Expressway[3]	-54	-61	-63
Capitol Avenue - East of Capitol Expressway[3]	-393	-568	-628
Story Road - West of Capitol Expressway[3]	-580	-300	-1,193
Story Road - East of Capitol Expressway[3]	-855	-315	-668
Ocala Avenue - West of Capitol Expressway	-581	-87	**5,109**
Ocala Avenue - East of Capitol Expressway	-993	-478	**1,574**
Cunningham Avenue - West of Capitol Expressway	-43	-49	-97
Cunningham Avenue - East of Capitol Expressway	-108	-155	-271

Notes:

[1] AM & PM peak-hour intersection volumes were provided by Hexagon Transportation Consultants, Inc. (hourly volumes provided in Attachment F). Hourly volumes were converted into daily volumes by multiplying the PM peak-hour volumes by 10, based on consultation with Hexagon Transportation Consultants, Inc.

[2] Volume increases are shown in **bold** font.

[3] On these roadway segments, 2016 data were used, because minor construction activities were occurring in 2017.

Source: Tse, pers. comm.

IMPACTS ON GHG EMISSIONS

In addition to emissions changes from on-road vehicles, the proposed changes to the approved project would result in the use of electricity and natural gas during its operational phase. Electricity would be used to provide power to the light rail vehicles and lighting, while natural gas would be used to heat the facility where light rail vehicles are maintained.

The GHG emissions associated with consumption of electricity and natural gas were quantified in the 2014 Subsequent IS/MND, which concluded that the net effect of the approved project would be a benefit with respect to climate change in 2035, because the reduction in single-occupancy vehicle-related GHG emissions would be greater than any increases in energy consumption-related GHG emissions. The 2014 Subsequent IS/MND also concluded that for the No Ocala Station option in analysis year 2018, there would be a net increase in GHG emissions, but by 2035 the net effect would be negative GHG emissions. The largest increase in electricity- and natural gas-related emissions from the approved project relative to no-build conditions was 2,029 metric tons of CO2e per year.[3]

The proposed aerial guideway would allow the light rail vehicles to avoid traffic signal delay that would occur at intersections for an at-grade alignment. Thus, the proposed changes would eliminate the need for additional energy required for light vehicle acceleration at intersections and would operate more efficiently and with lower energy consumption. Although the acceleration effect is anticipated to be minor, the proposed changes to the approved project would likely result in lower energy consumption and lower GHG emissions than the approved project.

Changes in criteria pollutant emissions from on-road vehicles from construction of the proposed changes to the approved project were quantified using VMT data and the EMFAC2017 database of emission factors. Annual changes in GHG emissions from on-road vehicles shown in Table 5.4-6 were quantified using the same method,[4] and the results follow the same trend as the criteria pollutant emissions (net decrease in GHG emissions from the proposed changes to the approved project in 2017, net increase in 2023, and net decrease in 2043). Table 5.4-6 also shows the total GHG emissions including electricity and natural gas-related emissions.

[3] From Table 3.2-2 in the 2014 Subsequent IS/MND, 1,888 metric tons of electricity-related emissions plus 141 metric tons of natural gas-related emissions equals 2,029 metric tons.

[4] Emissions of CH_4 were quantified using emission factors from a separate module of EMFAC2017, for Santa Clara County only. Due to model-processing time, running the separate CH_4 module for the whole nine-county region was not feasible.

Table 5.4-6 Summary of Operational GHG Emissions (Existing [2017] Year, Year 2023, and Year 2043)

	On-Road Emissions				Total with Energy Emissions[1]
Year	**CO_2**	**CH_4**	**N_2O**	**CO_2e**	**CO_2e**
Existing Plus Project Scenario (2017)					
Annual Emissions (metric tons/year) [2]	-96	> -0.01	-0.01	-97	1,932
Project Scenario Relative to No Project in 2023					
Annual Emissions (metric tons/year) [2]	3,680	0.1	0.2	3,733	5,762
Project Scenario Relative to No Project in 2043					
Annual Emissions (metric tons/year) [2]	-26,568	-0.3	-1.3	-26,964	-24,935

Notes:

[1] From Table 3.2-2 in the 2014 Subsequent IS/MND, 1,888 metric tons of electricity-related emissions plus 141 metric tons of natural gas-related emissions equals 2,029 metric tons CO2e. This amount of emissions is the highest value for any of the alternatives for the approved project. As discussed above, the elevated guideway (i.e. a proposed change to the approved project) would likely result in less energy consumption than the approved project's partial-elevated alternatives. Thus, these energy-related GHG emissions represent a worst-case estimate.

[2] Daily GHG emissions were converted into annual emissions by multiplying by a standard factor of 347 days per year, to account for reduced volumes on weekends.

CO_2 = carbon dioxide
CH_4 = methane
N_2O = nitrous oxide
CO_2e = carbon dioxide equivalent

Sources: Vehicle miles traveled data: Hexagon 2018. Emission factors from EMFAC2017 (California Air Resources Board 2018b) are included in Attachment F.

As shown in Table 5.4-6, the proposed changes to the approved project would result in an initial decrease in traffic-related GHG emissions, but with the addition of the energy consumption emissions (as a worst-case scenario, energy-related GHG emissions are assumed to be equal to the 2014 Subsequent IS/MND energy-related GHG emissions: 2,029 metric tons of CO2e per year), the net effect of the proposed changes to the approved project would result in a total GHG emission increase in 2017 relative to existing conditions. GHG emissions were not quantified in the 2005 Final EIR and 2007 Final SEIR, because those documents were prepared before it had become a necessity and common practice to evaluate GHG emissions quantitatively. In the 2014 Subsequent IS/MND, GHG emissions were quantified for two alternatives, the at-grade Light Rail Alternative and the at-grade Light Rail Alternative with the No Ocala Station option. Compared to the options analyzed in the 2014 Subsequent IS/MND, in 2017, the proposed changes to the approved project would result in more GHG emissions than for the at-grade Light Rail Alternative in 2018, but less GHG emissions than the at-grade Light Rail Alternative with the No Ocala Station option in 2018.

Similarly, in 2023, VMT would increase (for the reasons discussed for criteria pollutants), and there would be an additional increase from energy-related GHG emissions. However, in 2043, VMT and GHG emissions would be net negative by a substantial amount (negative reductions greater than 24,000 metric tons), and the proposed changes to the approved project would result in a net benefit to GHG emissions. This result is consistent with both the at-grade and No Ocala Station options, but the proposed changes to the approved project would result in much larger negative reductions than the options in the 2014 Subsequent IS/MND.

Additionally, over 90% of the energy consumption-related GHG emissions are expected to result from electricity consumption. Any electricity supplied for the proposed changes to the approved project would be subject to Senate Bill (SB) 350, which requires that publicly- and investor-owned utilities procure 33% and 50% of electricity from qualified renewable energy sources by 2020 and 2030, respectively. One of the primary purposes of SB 350 is to support the state's climate change goals as codified in SB 32, which requires a statewide reduction in GHG emissions of 40% below 1990 levels by 2030. As such, the proposed changes to the approved project's energy consumption would become less carbon intensive in the future as utilities increase their renewable energy portfolios, and thus the proposed changes would be considered consistent with the state's plans and goals with respect to reducing GHG emissions (i.e., SB 32). Similarly, the net increase in GHG emissions in 2017 and 2023 would be reduced in future years by the Low Carbon Fuel Standard and other state regulations that have been adopted to support the goals of SB 32.

Overall, the proposed changes to the approved project would result in a net benefit to GHG emissions by 2043, because of the net decreases from reduced single-occupancy vehicle trips, and would result in a substantially greater net reduction in GHG emissions than identified in the 2014 Subsequent MND for the approved project in 2035. A net benefit to GHG emissions would support and be directly consistent with the state's overarching GHG emissions reduction goal to reduce emissions by 80% below 1990 levels by 2050. Thus, the proposed changes to the approved project would not result in new significant impacts or a substantial increase in the severity of previously identified significant impacts related to air quality and climate change.

IMPACTS ON AIR QUALITY EMISSIONS DURING CONSTRUCTION

The impact discussion below focuses on the proposed changes to the approved project in conjunction with the components of the approved project, because air quality and GHG impacts are inherently cumulative. The effects of air quality and GHG emissions do not occur in isolation from individual project components; as such, a comprehensive analysis of all activity that would occur is appropriate.

With respect to construction of the proposed changes to the approved project, the replacement of the at-grade track alignment with an aerial guideway between south of Story Road and north of Tully Road would include concrete columns supported on pile foundations. It is anticipated that construction of the aerial guideway sections between Capitol Avenue and Tully Road would require a traditional percussive or impact hammer

to drive the foundation piles at each column location to support a cast-in-place pilecap. It is anticipated that about 6 to 12 piles would be driven per day for 3 to 6 days at each column site. The approximately 76 column sites would be spaced approximately 130 to 150 feet apart. The piles would require subsurface ground disturbance with a depth of up to approximately 100 feet. This depth is similar to the anticipated ground disturbance previously analyzed for the approved project. Overall, construction of the approved project with the proposed changes to the approved project would last for approximately five years. In addition, revisions to the Capitol Expressway roadway configuration could result in construction impacts.

Emissions of Criteria Pollutants and Greenhouse Gases (GHGs). For construction emissions, the 2005 Final EIR and the 2007 Final SEIR relied on BAAQMD's 1999 CEQA Thresholds. At that time, the BAAQMD's approach to CEQA analyses of construction impacts was to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions. As a result, the 2005 Final EIR and the 2007 Final SEIR did not quantify construction emissions. Subsequently, the BAAQMD adopted thresholds of significance on June 2, 2010 that included thresholds for construction emissions. Thus, the 2014 Subsequent IS/MND estimated construction emissions for the approved project, as summarized in Table 5.4-7. The analysis of the proposed changes to the approved project includes the emissions anticipated from the construction of approximately 2.4 miles of aerial guideway included in the approved project and the proposed change to the approved project, which would replace the at-grade track alignment with approximately 1.25 miles of aerial guideway from south of Story Road to north of Tully Road (hereafter referred to as "approved project plus proposed changes to the approved project"). All other construction work on the non-guideway components of the approved project, such as roadway widening, intersection curb work, utility relocation, station construction, and paving, are also included in the analysis. In other words, the impacts summarized in this analysis are inclusive of the activities that would occur for the approved project, in addition to the activities required to construct the proposed changes to the approved project.

Table 5.4-7 Summary of Maximum Daily Construction Criteria Pollutant Emissions (Year 2019 - 2023)[1]

Maximum Daily Emissions	ROG	NO_x	CO	PM10		PM2.5	
				Dust	Exhaust	Dust	Exhaust
Approved Project (As of the 2014 Subsequent IS/MND)							
Light Rail Alternative[2]	5.6	34.1	33.3	450.0	1.8	93.6	1.4
Light Rail Alternative, No Ocala Station Option[2]	5.6	34.1	33.3	450.0	1.8	93.6	1.4
Approved Project (Including the Proposed Extension of the Aerial Guideway to Grade-Separate the Ocala Avenue and Cunningham Avenue Intersections)[3]							
Year 2019	1.6	18.5	22.2	0.3	0.6	0.1	0.5
Year 2020	2.4	27.2	32.1	1.0	0.8	0.3	0.7
Year 2021	2.3	24.5	31.7	0.8	0.7	0.2	0.7

Maximum Daily Emissions	ROG	NO_x	CO	PM10		PM2.5	
				Dust	Exhaust	Dust	Exhaust
Year 2022	2.1	21.6	31.2	1.2	0.6	0.3	0.6
Year 2023	0.4	2.1	19.3	0.3	< 0.1	0.1	< 0.1
Maximum Daily Emissions (lbs/day)	2.4	27.2	32.1	1.2	0.8	0.3	0.7
BAAQMD Daily Thresholds (lbs/day)	54	54	-	BMPs[4]	82	BMPs[4]	54
Exceed Thresholds?	No	No	No	N/A	No	N/A	No

Notes:

[1] Construction is expected to occur for approximately five years, beginning in 2019; however, it is possible that the construction period could be extended by one year, depending on whether lane closure restrictions during construction limit the amount of activity that can occur. Emissions for the five year construction period, as reflected in this table, would be a worst-case scenario, because an extended construction schedule would likely result in less daily activity. Thus, although it is possible that construction activity could occur in 2024 or 2025, daily emissions in those years would not exceed the worst-case daily emissions in this table.

[2] Maximum emissions that would occur for any individual construction phase (i.e., the drainage/utilities/sub-grade phase), as presented in Table 3.18-1 in the 2014 Subsequent IS/MND.

[3] This analysis includes the emissions anticipated from the construction of approximately 2.4 miles of aerial guideway included in the approved project and the proposed change to the approved project, which would replace the at-grade track alignment with approximately 1.25 miles of aerial guideway from south of Story Road to north of Tully Road. It also includes other, non-guideway construction work, such as roadway widening, intersection curb work, utility relocation, station construction, and paving,[4] BMPs = best management practices

Source: ICF, 2018. Construction modeling conducted with CalEEMod and project-specific construction information. See Attachment F for construction assumptions and CalEEMod outputs.

Construction of the aerial guideway would result in changes to the construction equipment and activity that were evaluated for the approved project. As such, the criteria pollutants and GHG emissions that would occur from construction of the proposed changes to the approved project were quantified and evaluated relative to the applicable thresholds adopted by BAAQMD. Construction emissions were modeled using the California Emissions Estimator Model (CalEEMod) version 2016.3.2 and detailed construction equipment and activity data provided by VTA. According to VTA, construction equipment with engine horsepower less than 175 would be equipped with engines that meet Tier 4 engine standards.[5] All other equipment with engine horsepower 175 or greater were modeled using fleet averages for each engine tier as programmed in CalEEMod. VTA construction specifications will require Tier 4 engine standards in equipment less than 175 horsepower; however, in the event that this requirement cannot be met (e.g., for feasibility or constructability reasons), construction emissions and the corresponding impacts would need to be reevaluated inclusive of the actual equipment that would be used. If emissions are higher than modeled in this SEIR-2 such that applicable thresholds may be exceeded, then remedial measures may be necessary, which could include but are not limited to the following: use of different pollution controls, scheduling of work, use of alternative fuels (biofuels, electricity, and/or purchase of air

[5] Tier 4 engine standards are the most stringent emissions standards set by the U.S. Environmental Protection Agency and must be met in new off-road equipment. Older equipment may have engines that are equal to less stringent, more emissions permissive requirements (i.e. Tier 3, Tier 2, etc.).

quality offsets). Construction phasing and activity assumptions used to evaluate emissions of construction criteria air pollutants and GHG are included in Attachment F.

Table 5.4-7 shows the maximum daily emissions of criteria pollutants from on-road vehicles (e.g., haul trucks, pick-up trucks, construction worker commute vehicles), off-road equipment (e.g., excavators, pile drivers), and fugitive dust from grading during construction of the approved project including the proposed extension of the aerial guideway to grade-separate the Ocala Avenue and Cunningham Avenue intersections as well as BAAQMD thresholds. As shown in Table 5.4-7, construction activities would not exceed BAAQMD's thresholds for any pollutants in any year. Overall, emissions of ROG, NOx, CO, and exhaust PM10 and PM2.5 as quantified in the 2014 Subsequent IS/MND are similar to the emissions estimates for the approved project plus the proposed changes to the approved project shown in Table 5.4-7. Emissions for the approved project plus the proposed changes to the approved project are lower than the emissions estimated in the 2014 Subsequent IS/MND and are below the BAAQMD threshold.[6]

The estimates of maximum daily emissions were developed using assumptions provided by VTA regarding the types of construction activities that could occur within a 'worst-case' day and the types of activities that could occur on a typical day, and the number of 'worst-case' days and typical days that would occur in one year of construction. A worst-case day involves the most emissions intensive activity, concrete pouring, occurring simultaneously with three other non-concrete pouring activities. The assumptions used to develop the worst-case day scenario are included in Attachment F.

Emissions of PM10 and PM2.5 fugitive dust are substantially lower for the approved project plus the proposed changes to the approved project than for the approved project in the 2014 Subsequent IS/MND, however, BAAQMD does not have quantitative thresholds for fugitive dust. Instead, the threshold is based on compliance with best management practices (BMPs). Unmitigated fugitive dust could adversely affect local and regional PM10 and PM2.5 levels, which would result in health impairment due to the inhalation of dust. BAAQMD considers fugitive dust emissions to be significant without implementation of BMPs. Thus, the approved project plus the proposed changes to the approved project could result in fugitive dust emissions impacts.

Table 5.4-8 shows the GHG emissions associated with construction of the approved project plus the proposed changes to the approved project. As shown in Table 5.4-8, construction emissions for the approved project were estimated to be between 4,006 and 4,146 total metric tons of CO_2 per year depending on the alternative,[7] and construction of

[6] The reason for the differences in estimated emissions in the results between the analysis performed for the SEIR-2 and the analysis performed for the 2014 Subsequent IS/MND is due to changes in the methodologies used for each analysis. The analysis in the SEIR-2 uses construction data specific to the proposed changes to the approved project, whereas the analysis in the 2014 Subsequent IS/MND used a more generalized approach and largely model-default assumptions.

[7] The model used to estimate GHG emissions in the 2014 Subsequent IS/MND, the Sacramento Metropolitan Air Quality Management District Road Construction Emissions Model (RCEM), only calculated emissions in terms of CO_2, not CO_2e. The RCEM is a spreadsheet-based model designed for road construction and linear projects and estimates criteria pollutant and GHG emissions based on a project's length and area, the type of project, and other

the approved project plus proposed changes to the approved project would emit 2,302 metric tons of CO_2e during the entire construction period. As discussed above, there are methodology differences between the previous estimate of emissions for the approved project and the current estimate for the approved project plus the proposed changes. As such, the approved project plus the proposed changes to the approved project would result in a smaller amount of GHG emissions than the previous estimate of GHG emissions for the approved project. BAAQMD's 2017 CEQA Guidelines do not identify a GHG emission threshold for construction-related emissions. However, the CEQA Guidelines do recommend implementation of BMPs to help control and reduce GHG emissions.

Table 5.4-8 Summary of Annual Construction GHG Emissions (Year 2019 – 2023)

Annual Emissions	CO_e[2]	Other[3]	CO_2e[4]
Approved Project (As of the 2014 Subsequent IS/MND)			
Light Rail Alternative[5]	4,146	-	-
Light Rail Alternative, No Ocala Station Option[5]	4,006	-	-
Approved Project (Including the Proposed Extension of the Aerial Guideway to Grade-Separate the Ocala Avenue and Cunningham Avenue Intersections)[6]			
2019	300	< 1	302
2020	565	< 1	568
2021	788	< 1	791
2022	414	< 1	416
2023	223	< 1	225
Total Combined Emissions	2,290	< 1	2,302

Notes:

[1] Construction is expected to occur for approximately five years, beginning in 2019; however, it is possible that the construction period could be extended by one year, depending on whether lane closure restrictions during construction limit the amount of activity that can occur. Emissions for the five year construction period, as reflected in this table, would be a worst-case scenario, because an extended construction schedule would likely result in less daily activity. Thus, although it is possible that construction activity could occur in 2024 or 2025, daily emissions in those years would not exceed the worst-case daily emissions in this table.

[2] Carbon dioxide

[3] Includes CH_4 and N_2O emissions.

[4] Carbon dioxide equivalent

[5] Total CO2 that would occur for the approved project, as presented in Table 3.18-1 in the 2014 Subsequent IS/MND. The model used to estimate GHG emissions in the 2014 Subsequent IS/MND only calculated emissions in terms of CO2, not CO2e.

[6] This analysis includes the emissions anticipated from the construction of approximately 2.4 miles of aerial guideway included in the approved project and the proposed change to the approved project, which would replace the at-grade track alignment with approximately 1.25 miles of aerial guideway from south of Story Road to north of Tully Road. It also includes other, non-guideway construction work, such as roadway widening, intersection curb work, utility relocation, station construction, and paving,

generalized information. The RCEM is best suited for projects when the availability of detailed construction information is limited.

Annual Emissions	CO_e[2]	Other[3]	CO_2e[4]

Sources: ICF, 2018. Construction modeling conducted with CalEEMod and project-specific construction information for the proposed changes to the approved project. See Attachment F for construction assumptions and CalEEMod outputs.

Impact: The following impact from the 2005 Final EIR would still apply to the proposed changes to the approved project: AQ (CON)-1: (Temporary Increase in Construction-Related Emissions during Grading and Construction Activities).

Mitigation: The following mitigation measures identified in the 2005 Final EIR and 2014 Subsequent IS/MND would still apply to the proposed changes to the approved project: AQ (CON)-1 (BAAQMD's BMPs to reduce particulate matter emissions from construction activities) and AQ (CON)-2 (BAAQMD's BMPs to reduce GHG emissions from construction equipment). Mitigation Measure AQ (CON)-1 has been revised to be consistent with the BMPs in the 2017 CEQA Guidelines:

Mitigation Measure AQ (CON)-1

In accordance with the BAAQMD's current CEQA guidelines (2017), the project applicant shall implement the following BAAQMD-recommended basic control measures to reduce particulate matter emissions from construction activities. Additional control measures (including watering, washing, and other control measures) as detailed in the 2017 BAAQMD CEQA guidelines (see Additional Construction Mitigation Measures), would further reduce particulate matter emissions and should be implemented when feasible.

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title

13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Mitigation Measure AQ (CON)-2

The project applicant will implement, to the extent feasible, the BAAQMD's BMPs to reduce GHG emissions from construction equipment. These BMPs are outlined in their 2010 CEQA Guidelines.

- Alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment of at least 15 percent of the fleet;
- Local building materials of at least 10 percent; and
- Recycle at least 50 percent of construction waste or demolition materials.

Inclusion of these mitigation measures would reduce this impact to "Less than Significant."

Less-than-significant impact with mitigation.

Exposure of Sensitive Receptors to Substantial Pollutant Concentrations. An evaluation of pollutant concentration exposure on sensitive receptors was not conducted in the 2005 Final EIR, 2007 Final SEIR, or the 2014 Subsequent IS/MND.

Construction of the approved project plus the proposed changes to the approved project would emit PM2.5 and diesel particulate matter (DPM), resulting in the exposure of nearby existing sensitive receptors to increased pollutant concentrations and health risks associated with DPM. As such, a health risk assessment (HRA) was conducted to evaluate the potential health effects associated with the approved project plus the proposed changes to the approved project.[8] EPA's AERMOD dispersion model was used to predict hourly PM2.5 and exhaust DPM concentrations at sensitive land uses; DPM is assumed to be PM2.5 exhaust from diesel equipment only. Estimates of project-level cancer risk, non-cancer hazard index, and annual PM2.5 concentrations were based on

[8] An HRA is an analysis in which human exposure to toxic substances is estimated and considered together with information regarding the toxic potency of the substances to provide quantitative estimates of health risks.

the annual concentrations from AERMOD, anticipated construction durations, and accepted OEHHA and BAAQMD default values (California Office of Environmental Health Hazard Assessment 2015 & Bay Area Air Quality Management District 2017). The risk calculations incorporate OEHHA's recent guidance update, which includes age-specific factors to take into account the increased sensitivity to carcinogens during early-in-life exposure.

There are many sensitive receptors located along Capitol Expressway near where construction would occur, most of which are single- or multi-family residences. The sensitive receptors that were estimated to experience the highest pollutant concentrations are the various single-family residences located near the intersection of South Capitol Avenue and Capitol Expressway (specifically the residences along Highwood Drive) and the residences near the intersection of Ocala Avenue and Capitol Expressway (specifically the residences along the western portion of Home Gate Drive). Other residential receptors that are directly adjacent to Capitol Expressway would be exposed to pollutant concentrations from construction; however, the maximum risk is expected at residences along Highwood Drive. Exposures of pollutant concentrations on other types of sensitive receptors, including recreational receptors and school receptors, were also modeled.

Table 5.4-9 shows the PM2.5 concentration, non-cancer hazard index, and increased cancer risk values modeled for construction of the approved project plus the proposed changes to the approved project. The exposure of all receptor types to pollutant concentrations during construction was assessed by modeling PM2.5 and DPM concentrations at the sensitive receptor locations based on the construction emissions generated by the approved project plus the proposed changes to the approved project (see Table 5.4-7). Construction of the approved project plus the proposed changes to the approved project would not result in PM2.5 concentrations, hazard index or increased cancer risk values in excess of BAAQMD's threshold. As such, there would be no unacceptable increase in risks or pollutant concentrations based on BAAQMD's criteria.

Table 5.4-9 PM2.5 Concentration, Non-Cancer Hazard Index, and Increased Cancer Risk from Construction

Sensitive Receptor	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)	Non-Cancer Hazard Index	Increased Cancer Risk (per million)
Residential	< 0.1	< 0.1	4.9
School	< 0.1	< 0.1	0.3
Recreational	< 0.1	< 0.1	0.1
BAAQMD Project-Level Threshold	0.3	1.0	10.0

Source: Dispersion and health risk modeling conducted with AERMOD. See Attachment F for further calculation details.

Impact: Based on the analysis above, the proposed changes to the approved project would not result in new significant impacts or a substantial increase in the severity of previously identified significant impacts related to substantial pollutant concentrations.

Mitigation: None required. This impact is "Less than Significant."

Less-than-significant construction impact. No mitigation required.

CUMULATIVE IMPACTS

This cumulative analysis examines the effects of the proposed changes to the approved project, in combination with other current projects, probable future projects, and projected future growth within the region.

Operational Criteria Pollutant Emissions. With respect to the emissions of criteria air pollutants, BAAQMD has identified project-level thresholds to evaluate criteria pollutant impacts. In developing these thresholds, BAAQMD considered levels at which project emissions would be cumulatively considerable. As noted in the district's CEQA Guidelines (Bay Air Quality Management District 2017a):

> *In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary.*

Therefore, the criteria pollutant thresholds presented in Table 5.4-3 represent the maximum emissions the proposed changes to the approved project may generate before contributing to a cumulative impact on regional air quality. Consequently, because operational emissions associated with the proposed changes to the approved project are expected to be net negative in 2017 and 2043, and below the applicable thresholds in 2023, operational emissions would not be cumulatively significant. Criteria pollutant emissions for the approved project were estimated to be below the BAAQMD's thresholds in the 2014 Subsequent IS/MND. The proposed changes to the approved project would not result in any impacts related to cumulative criteria pollutant emissions beyond the impacts previously identified and analyzed for the approved project.

CO Hot Spots. The project-level analysis above includes both project and non-project related traffic volumes and thus represents a cumulative CO hot spot analysis. The proposed changes to the approved project would result in lower CO concentrations than the approved project for all years at the Capitol Expressway and Story Road intersection. Additionally, there would be no exceedances of the CAAQS.

GHG Emissions. GHG emissions are fundamentally a cumulative impact issue because no single project would result in sufficient GHG emissions to affect global warming or climate change in isolation. As such, the project-level discussion of GHG emissions is a cumulative impact analysis, and cumulative impacts are not discussed further here.

Operational Pollutant Concentrations/Toxic Air Contaminants. The potential cumulative pollutant concentrations/toxic air contaminants impacts of the approved project were not previously analyzed in the 2005 Final EIR, the 2007 Final SEIR, or the 2014 Subsequent IS/MND. Because there are non-project-related traffic volumes on the roadways that would also contribute to pollutant concentrations, the combined effect of the 5,109 vehicle increase plus the background, non-project related traffic volumes on Ocala Avenue and Capitol Expressway are evaluated as a cumulative impact.

As discussed previously, in 2043 on Ocala Avenue, vehicle volumes would increase by approximately 5,109 vehicles per day west of Capitol Expressway and by approximately 1,574 vehicles east of Capitol Expressway. While the increase in traffic volumes associated with the proposed changes to the approved project would be comparatively small and would not result in substantial toxic air contaminant concentrations, the cumulative effect of the increases plus non-project related traffic volumes could result in health risks or PM2.5 concentrations that exceed the BAAQMD's cumulative risk thresholds.

To evaluate the health risks associated with on-road traffic, the BAAQMD recommends the use of their roadway screening calculator. The roadway screening calculator quantifies cancer risk and PM2.5 concentrations based on basic details about the roadway (including the roadway directional orientation, direction and distance of the nearest sensitive receptor to the roadway, and the average daily traffic volumes). The roadway screening calculator uses exhaust emissions factor from an older version of CARB's emission factor database, EMFAC2011, for an analysis year of 2014.

To evaluate the health risks associated with the traffic volume increases associated with the proposed changes to the approved project in 2043, a scaling factor of 0.29 is appropriate to apply to the screening calculator values to account for the substantially cleaner vehicles that will be present in 2043 relative to the calculator's baseline year of 2014.[9] The scaling factor also takes into account the increased number of vehicles that will be present in 2043. Finally, a second scaling factor of 1.3744 is appropriate to apply to the cancer risk values (not the PM2.5 concentrations) from the screening calculator to account for updates to age-specific exposure factors not included in the calculator from the California Office of Environmental Health Hazard Assessment's updated 2015 health risk assessment guidance (California Office of Environmental Health Hazard Assessment 2015).

[9] Two separate scaling factors were applied to the cancer risk values. The first scaling factor of 0.29, is a weighted-scaling factor of PM2.5 exhaust emission rates that accounts for lower-emitting vehicles in future years and increased number of vehicles in future years. The second scaling factor of 1.3744 was applied to account for updated 2015 California Office of Environmental Health Hazard Assessment guidance that was published subsequent to the BAAQMD screening calculator. Only the first scaling factor was applied to PM2.5 concentrations.

Table 5.4-10 shows the cancer risk and PM2.5 concentration values for a maximally exposed sensitive receptor located at 1756 Home Gate Drive. The residence at this address is considered maximally exposed because it would be exposed to pollutant concentrations from increased traffic on Ocala Avenue due to the proposed changes to the approved project. The residence is also exposed to traffic on Capitol Expressway. Although the proposed changes to the approved project would reduce traffic volumes on Capitol Expressway relative to no project conditions, pollutant concentrations from traffic on Capitol Expressway would contribute cumulatively to the increased concentrations on Ocala Avenue. As such, Table 5.4-10 shows the cumulative sources of roadway-related concentration that could affect the maximally exposed receptor.

As shown in the Table 5.4-10, the maximally exposed sensitive receptor would not be exposed to cancer risks or PM2.5 concentrations that exceed the cumulative thresholds set by BAAQMD. As such, the cumulative effect of the proposed changes to the approved project plus background sources would not lead to substantial pollutant concentrations and would not result in a significant cumulative impact.

Table 5.4-10 Cancer Risk and PM2.5 Concentrations from Roadway Sources with the Proposed Changes to the Approved Project

Roadway	Average Daily Traffic with Proposed Changes to Approved Project	Cancer Risk (per million)[1]	PM2.5 Concentration ($\mu g/m^3$)[1]
Ocala Avenue - East of Capitol Expressway[2]	26,063	6.89	0.1
Capitol Expressway at Ocala Avenue[3]	63,796	22.94	0.4
Combined Cumulative Exposure	**-**	**29.83**	**0.5**
BAAQMD Cumulative Threshold[4]		100	0.8

Notes:

[1] Two separate scaling factors were applied to the cancer risk values. The first scaling factor of 0.29, is a weighted-scaling factor of PM2.5 exhaust emission rates that accounts for lower-emitting vehicles in future years and increased number of vehicles in future years. The second scaling factor of 1.3744 was applied to account for updated 2015 California Office of Environmental Health Hazard Assessment guidance that was published subsequent to the BAAQMD screening calculator. Only the first scaling factor was applied to PM2.5 concentrations.

[2] This roadway was inputted into the BAAQMD screening calculator as an east-west oriented roadway, with the nearest sensitive receptor (1756 Home Gate Drive) located approximately 20 feet south of the roadway.

[3] This roadway was inputted into the BAAQMD screening calculator as north-south oriented roadway, with the nearest sensitive receptor (1756 Home Gate Drive) located approximately 20 feet east of the roadway.

[4] Bay Area Air Quality Management District 2017.

Sources:

Intersection volume data – Tse pers. comm.

Emission factors from EMFAC2017 (California Air Resources Board 2018b) are included in Attachment F.

BAAQMD Roadway Screening Calculator – Bay Area Air Quality Management District 2015.

Construction Criteria Pollutant Emissions. As discussed for cumulative operational criteria pollutant emissions, BAAQMD has identified project-level thresholds to evaluate criteria pollutant impacts that are also considered cumulative thresholds. Because construction criteria pollutant emissions associated with the proposed changes to the approved project are expected to be below the applicable thresholds in all years of construction, construction emissions would not be cumulatively significant. Criteria pollutant emissions for the approved project were estimated to be below the BAAQMD's thresholds in the 2014 Subsequent IS/MND. The proposed changes to the approved project would not result in any impacts related to cumulative criteria pollutant emissions beyond the impacts previously identified and analyzed for the approved project.

Cumulative Air Quality Impacts During Construction. A cumulative evaluation of pollutant concentration exposure on sensitive receptors was not conducted in the 2005 Final EIR, 2007 Final SEIR, or the 2014 Subsequent IS/MND.

In addition to project-level impacts, BAAQMD recommends that projects evaluate the cumulative effect of project impacts plus all background sources of emissions. BAAQMD identified separate cumulative-level risk thresholds for cumulative analyses. For a cumulative analysis of construction of the approved project plus proposed changes to the approved project, background sources of toxic air contaminants were identified using resources from BAAQMD.[10] As previously discussed, the sensitive receptors that would experience the maximum pollutant concentrations from the approved project plus the proposed changes to the approved project are located near the intersection of South Capitol Avenue and Capitol Expressway as well as the intersection of Ocala Avenue and Capitol Expressway. Residences in these locations are directly adjacent to Capitol Expressway, with the closest residential locations (which are the backyards) as close as 15 feet from the edge of Capitol Expressway. Some residences along the eastern side of Capitol Expressway are located as close as 20 feet to the roadway edge and also located as close as 20 feet to the edge of a second roadway (i.e., Ocala Avenue, Cunningham Avenue); these sensitive receptors may be exposed to elevated background concentrations of pollutants from roadway traffic. Thus, for the cumulative analysis, four residential sensitive receptors were evaluated:

- Various residences within the area near Ocala Avenue and Capitol Expressway, which would experience a contribution from the approved project plus proposed changes to the approved project and elevated background concentrations of pollutants from roadway traffic);
- Residential exposure near the corner of Story Road and Capitol Expressway (which would experience a contribution from the approved project plus proposed changes to the approved project and elevated background concentrations of pollutants from roadway traffic);

[10] The resources used from BAAQMD include the Roadway Screening Analysis Calculator (for evaluating all roadway risks and PM2.5 concentrations), and the Stationary Source Screening Analysis Tool (for evaluating all existing stationary sources of TACs the corresponding risks and PM2.5 concentrations). These tools can be found at the following link: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools.

- Residential exposure near the corner of Cunningham Avenue and Capitol Expressway (which would experience a contribution from the approved project plus proposed changes to the approved project and elevated background concentrations of pollutants from roadway traffic); and
- Residential exposure near the corner of South Capitol Avenue and Capitol Expressway, including the maximally exposed receptor location along Highwood Drive (which would experience a contribution from the approved project plus proposed changes to the approved project and elevated background concentrations of pollutants from roadway traffic).

Table 5.4-11 shows the cumulative PM2.5 concentration, non-cancer hazard index, and increased cancer risk values evaluated at the four residential sensitive receptors.

Table 5.4-11 Cumulative PM2.5 Concentration, Non-Cancer Hazard Index, and Increased Cancer Risk from Construction

Sensitive Receptor	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)	Non-Cancer Hazard Index	Increased Cancer Risk (per million)
1. Contribution from Existing Sources[1]			
Residential (Corner of Story Road and Capitol Expressway)	0.57	0.01	38.83
Residential (Corner of Ocala Avenue and Capitol Expressway)	**0.80**	< 0.01	47.67
Residential (Corner of Cunningham Avenue and Capitol Expressway)	**0.94**	< 0.01	53.63
Residential (Corner of South Capitol Avenue and Capitol Expressway	0.49	< 0.01	28.69
2. Contribution from Construction of Approved Project Plus Proposed Changes			
Residential (Corner of Story Road and Capitol Expressway)	0.02	< 0.01	4.58
Residential (Corner of Ocala Avenue and Capitol Expressway)	0.02	< 0.01	4.86
Residential (Corner of Cunningham Avenue and Capitol Expressway)	0.01	< 0.01	3.90
Residential (Corner of South Capitol Avenue and Capitol Expressway	0.02	< 0.01	4.94
3. Cumulative Totals (Sum of 1 and 2 above)			
Residential (Corner of Story Road and Capitol Expressway)	0.59	0.01	43.41
Residential (Corner of Ocala Avenue and Capitol Expressway)	**0.81**	< 0.01	52.53

Sensitive Receptor	Maximum Annual PM2.5 Concentration (µg/m^3)	Non-Cancer Hazard Index	Increased Cancer Risk (per million)
Residential (Corner of Cunningham Avenue and Capitol Expressway)	**0.95**	< 0.01	57.53
Residential (Corner of South Capitol Avenue and Capitol Expressway	0.51	< 0.01	33.63
BAAQMD Cumulative Threshold	0.8	10.0	100

Notes:

Exceedances of the thresholds shown in bold

Source: Existing contributions of toxic air contaminants include stationary sources and roadway traffic in the vicinity of the receptors. Stationary source data were obtained from the BAAQMD's stationary sources tool. Roadway risks were calculated using the BAAQMD's Roadway Screening Analysis tool (BAAQMD 2012 and 2015). Because the Roadway Screening Analysis tool uses 2014 vehicle emission factors, risk values were scaled by 65% to account for cleaner vehicles in 2020 (when construction will occur) and higher vehicle volumes in 2020. For more detail on the background risks, refer to Attachment F.

As shown in Table 5.4-11, the cumulative hazard index and increased cancer risk values at all sensitive receptors would be below the BAAQMD's threshold. However, cumulative PM2.5 concentrations would be elevated at the receptors located near the corners of Ocala Avenue and Capitol Expressway and Cunningham Avenue and Capitol Expressway due to substantial sources of pollutant concentrations that currently exist in the area where the approved project plus the proposed changes to the approved project would occur. Even without the contribution of emissions from construction, existing PM2.5 concentrations near these sensitive receptors are at or exceed the BAAQMD's threshold because Capitol Expressway and its cross streets are heavily traveled roadways, with residences located in close proximity to the roadway edge. The approved project plus the proposed changes to the approved project would cause further exceedances of existing pollutant concentrations, worsening the cumulative exposure of sensitive receptors to toxic air contaminant concentrations. Although the contribution of the approved project plus the proposed changes to the approved project to existing concentrations would not be substantial (approximately 6% at the locations where concentrations are at or exceed 0.8 µg/m^3), there would nevertheless be a worsening of an already cumulatively significant impact. The approved project plus the proposed changes to the approved project would result in temporarily worsened concentrations of pollutants; however, the proposed changes would also result in lower vehicle volumes in future years on nearby all roadways. Thus, after construction is completed, the approved project plus the proposed changes to the approved project would likely result in reduced pollutant concentrations from existing roadway traffic due to increased light rail usage. Nevertheless, the approved project plus the proposed changes to the approved project would result in a cumulatively significant contribution during the temporary construction period.

Impact: Based on the analysis above, the proposed changes to the approved project would result in new significant impacts or a substantial increase in the severity of previously identified significant cumulative impacts related to pollutant concentration exposure on sensitive receptors during construction.

Mitigation: The following mitigation measures identified in the 2005 Final EIR would still apply to the proposed changes to the approved project: AQ (CON)-1 (BAAQMD's BMPs to reduce particulate matter emissions from construction activities) and AQ (CON)-2 (BAAQMD's BMPs to reduce GHG emissions from construction equipment). Even with inclusion of these mitigation measures, this impact would be "Significant and Unavoidable." Based on the analysis above, the proposed changes to the approved project would result in new significant impacts or a substantial increase in the severity of previously identified significant cumulative impacts related to pollutant concentration exposure on sensitive receptors during construction.

Significant and unavoidable cumulative impact, even with mitigation.