Appendix O

Air Quality Technical Memorandum

Metro

TECHNICAL MEMORANDUM

Air Quality

PREPARED FOR:	Michelle Smith/Metro
COPY TO:	Caltrans
	Study Team
PREPARED BY:	CH2M HILL Team
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This technical memorandum summarizes the results of the air quality Level I and Level II screening analyses for the State Route 710 (SR-710) Study. The Level I screening analysis evaluated 42 alternatives including 1 advanced technologies, 1 spot/local improvement, 7 bus rapid transit, 8 commuter and light rail, 11 freeway, and 13 highway alternatives along with the No Build conditions. The Level II screening analysis evaluated 12 alternatives (with 3 variations) including a TSM/TDM improvement, 3 bus rapid transit, 4 light rail transit, 4 freeway, and 2 highway alternatives along with the No Build conditions.

Methodology

Level I Screening

The Level I screening analysis evaluated the potential air quality impacts by assessing the length of each alternative through sensitive receptor areas. The alternatives with the worst likely outcome were those that would pass through sensitive areas such as residential, school, medical, church, and park uses. The alternatives with the best likely outcome were those that would pass through less sensitive areas such as commercial or industrial uses.

Level II Screening

The Level II screening analysis calculated the 2035 regional vehicle emissions associated with each alternative and compared the results to the no build alternative. The emissions were calculated using the EMFAC2007 emission model and the regional vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD) for Los Angeles County, provided by CH2MHill (July 2012). This analysis focuses on long-term operational emissions of each alternative and does not consider construction emissions. In addition, no localized analysis of "hot-spots" or specific sensitive receptors was conducted.

The effect of each project alternative was evaluated by calculating the change in regional vehicle emissions within the County. The following three emission types were evaluated as part of this analysis:

Mobile Source Air Toxics. The Mobile Source Air Toxics (MSAT) evaluated in this analysis include diesel particulates, benzene, 1,3-butadiene, acetaldehyde, acrolein, and formaldehyde. MSAT was calculated using traffic data and emission rates for 2035 from the EMFAC 2007 model.

Criteria Pollutants. The criteria pollutants evaluated in this analysis include carbon monoxide (CO), reactive organic gases (ROGs), oxides of nitrogen (NO_X), sulfur oxides (SO_X), particulate matter with aerodynamic diameter

less than 10 microns (PM_{10}), and particulate matter with aerodynamic diameter less than 2.5 microns ($PM_{2.5}$).

Greenhouse Gases. The greenhouse gases (GHG) evaluated in this analysis include carbon dioxide (CO_2) and methane (CH_4).

Regional Setting

A region's topographic features can affect pollutant levels; therefore, they are used by the California Air Resources Board (ARB) to determine the boundaries of air basins. A local air district has been formed for each air basin; the district is responsible for providing air quality strategies to bring the air basin into compliance with the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS).

The project site is in Los Angeles County, an area within the South Coast Air Basin (Basin), which includes Orange County and the non-desert parts of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the Basin is administered by the South Coast Air Quality Management District (SCAQMD).

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the EPA to identify regions as "attainment," "nonattainment," or "maintenance," depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of nonattainment, such as marginal, moderate, serious, severe, and extreme, are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. Table A lists the attainment status for each of the criteria pollutants in the Basin.

Table A: Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3 (1 hour)	Nonattainment	Revoked June 2005
O_3 (8 hour)	Nonattainment	Extreme Nonattainment
PM_{10}	Nonattainment	Serious Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Attainment	Attainment/Maintenance
NO_2	Nonattainment	Unclassifiable/Attainment
Lead	Nonattainment (L.A. County only)	Nonattainment (L.A. County only)
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board (ARB), 2012 (http://www.arb.ca.gov/desig/desig.htm).

CO = carbon monoxide
EPA = United States Environmental Protection Agency
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter

Local Setting

The SCAQMD operates several air quality monitoring stations within the Basin. The air quality monitoring station closest to the project area is the Pasadena Air Monitoring Station, and its air quality trends are representative of the ambient air quality in the project area. The pollutants monitored at this station are ozone (O_3), $PM_{2.5}$, nitrogen dioxide (NO_2), and CO. The closest air quality monitoring site that monitors PM_{10} and sulfur dioxide (SO_2) is the North Main Street, Los Angeles Station, and its air quality trends are also representative of the ambient air quality in the project area. Table B summarizes the past three years of air quality monitoring at these two stations.

Table B: Local Air Quality Levels

Pollutant	Primary Standard		Year	Maximum Concentration		Number of Days State/ Federal Standard Exceeded
	California	Federal				
Carbon Monoxide (CO)	9.0 ppm for 8 hours	9 ppm for 8 hours	2009	2.2	ppm	0/0
			2010	1.9	ppm	0/0
			2011	2.1	ppm	0/0
Ozone (O_3) (1-hour)	0.09 ppm for 1 hour	N/A	2009	0.107	ppm	5/NA
			2010	0.101	ppm	1/NA
			2011	0.176	ppm	12/NA
Ozone (O_3) (8-Hour)	0.07 ppm for 8 hours	0.075 ppm for 8 hours	2009	0.114	ppm	14/10
			2010	0.081	ppm	2-Feb
			2011	0.084	ppm	2-May
Nitrogen Dioxide (NO_2)	0.18 ppm for 1 hour	0.100 ppm for 1 hour	2009	0.102	ppm	0/0
			2010	0.071	ppm	0/0
			2011	0.08	ppm	0/0
Sulfur Dioxide (SO_2)	0.25 ppm for 1 hour	0.075 ppm for 1 hour	2009	0.009	ppm	0/0
			2010	0.01	ppm	0/0
			2011	0.02	ppm	0/0
Particulate Matter (PM_{10}) (24 hour)	50 µg/m^3 for 24 hours	150 µg/m^3 for 24 hours	2009	72	µg/m^3	Apr-00
			2010	42	µg/m^3	0/0
			2011	53	µg/m^3	Jan-00
Particulate Matter (PM_{10}) (Annual)	20 µg/m^3 for Annual mean	N/A	2009	33.1	µg/m^3	1/NA
			2010	27.1	µg/m^3	1/NA
			2011	29.3	µg/m^3	1/NA
Fine Particulate Matter ($PM_{2.5}$) (24 hour)	N/A	35 µg/m^3 for 24 hours	2009	43.8	µg/m^3	NA/1
			2010	35.2	µg/m^3	NA/0
			2011	51.9	µg/m^3	NA/3
Fine Particulate Matter ($PM_{2.5}$) (Annual)	12 µg/m^3 for Annual mean	15 µg/m^3 for Annual mean	2009	14.4	µg/m^3	Jan-00
			2010	12.6	µg/m^3	Jan-00
			2011	13.3	µg/m^3	Jan-00

Source: California Air Resources Board, ADAM Air Quality Data Statistics, www.arb.ca.gov/adam/welcome.html.

Resources in Study Area

Sensitive populations are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered to be sensitive receptors for air pollution include residences, schools, playgrounds, childcare centers, athletic facilities, hospitals, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The study area for this screening analysis is Los Angeles County.

Summary of Potential Effects to Resources

Level I Screening

No Build. The No Build Alternative would not change the number or type of vehicles operating within the project area. Therefore, there would be no project impact. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

TSM/TDM. The TSM/TDM Alternative would improve multiple local arterials. Although the proposed arterials to be improved pass through sensitive land uses, the increase in traffic along any one road would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-1. The BRT-1 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-2. The BRT-2 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-3. The BRT-3 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-4. The BRT-4 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-5. The BRT-5 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-6. The BRT-6 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

BRT-7. The BRT-7 Alternative would add buses to local arterials and existing highways. Although the bus route would pass through sensitive land uses, when added to the existing traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

LRT-1. The LRT-1 Alternative would construct a new light rail transit facility. However, as the trains will be electric, there would be no increase in local air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have the best outcome.

LRT-2. The LRT-2 Alternative would construct a new light rail transit facility. However, as the trains will be electric, there would be no increase in local air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have the best outcome.

LRT-3. The LRT-3 Alternative would construct a new light rail transit facility. However, as the trains will be electric, there would be no increase in local air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have the best outcome.

LRT-4. The LRT-4 Alternative would construct a new light rail transit facility. However, as the trains will be electric, there would be no increase in local air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have the best outcome.

LRT-5. The LRT-5 Alternative would construct a new light rail transit facility. However, as the trains will be electric, there would be no increase in local air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have the best outcome.

CR-1. The Commuter Rail-1 Alternative would add additional commuter trains using existing rail facilities. Although the rail lines pass through sensitive land uses, when added to the existing rail traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

CR-2. The Commuter Rail-2 Alternative would add additional commuter trains using existing rail facilities. Although the rail lines pass through sensitive land uses, when added to the existing rail traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

CR-3. The Commuter Rail-3 Alternative would add additional commuter trains using existing rail facilities. Although the rail lines pass through sensitive land uses, when added to the existing rail traffic the effect of the buses would be minimal. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate to best outcome.

F-1. The Freeway-1 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-2. The Freeway-2 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-3. The Freeway-3 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-4. The Freeway-4 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-5. The Freeway-5 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-6. The Freeway-6 Alternative would construct a new depressed freeway between the I-710 south stub to the I-710 north stub. The construction of this alternative would be located within close proximity to sensitive land uses. Therefore, this alternative would have major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse outcome.

F-7. The Freeway-7 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-8. The Freeway-8 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-9. The Freeway-9 Alternative would construct a new freeway which is located predominantly underground. However, the construction of this alternative would include above ground sections located within close proximity to sensitive land uses. Therefore, this alternative would have moderate air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a moderate outcome.

F-10. The Freeway-10 Alternative would widen the existing I-5 freeway. The widened portion of I-5 includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

F-11. The Freeway-11 Alternative would construct a new elevated freeway between the I-710 south stub to the I-710 north stub. The construction of this alternative would be located within close proximity to sensitive land uses. Therefore, this alternative would have major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse outcome.

H-1. The Arterial Improvements-1 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-2. The Arterial Improvements-2 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-3. The Arterial Improvements-3 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-4. The Arterial Improvements-4 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-5. The Arterial Improvements-5 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-6. The Arterial Improvements-6 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-7. The Arterial Improvements-7 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-8. The Arterial Improvements-8 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-9. The Arterial Improvements-9 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-10. The Arterial Improvements-10 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-11. The Arterial Improvements-11 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-12. The Arterial Improvements-12 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

H-13. The Arterial Improvements-13 Alternative would expand an existing road into a high capacity arterial/highway. The widened arterial includes segments located within close proximity to sensitive land uses. Therefore, this alternative would have moderate to major air quality effects. Relative to the other alternatives, the future air quality conditions under this alternative would have a worse to moderate outcome.

Level II Screening

No Build

The No Build Alternative would not change the number or type of vehicles operating within the project area. Therefore, there would be no project impact. This alternative provides the basis for comparison of the various project alternatives. Please note that the emissions discussed below, and listed in Table C, do not include any reductions from the air scrubbers proposed for the tunnel alternatives.

TSM/TDM

This alternative would reduce the vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD) within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.03 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.17 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.26 percent.

BRT-1

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.27 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.37 percent.

BRT-6

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.33 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.43 percent.

BRT-6a

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.33 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 01.43 percent.

LRT-4a

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.35 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.46 percent.

LRT-4b

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.34 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.44 percent.

LRT-4d

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.33 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.44 percent.

LRT-6

This alternative would reduce the VMT, VHT, and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would reduce the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 1.29 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 1.39 percent.

F-2

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.38 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would increase the average criteria pollutant emissions within the County by 0.04 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would increase the average greenhouse gas emissions within the County by 0.08 percent.

F-5

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.31 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 0.22 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 0.14 percent.

F-6

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.28 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would not change the average criteria pollutant emissions within the County.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would increase the average greenhouse gas emissions within the County by 0.02 percent.

F-7

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.35 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would increase the average criteria pollutant emissions within the County by 0.01 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would increase the average greenhouse gas emissions within the County by 0.04 percent.

H-2

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.05 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 0.06 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 0.05 percent.

H-6

This alternative would increase the VMT and reduce the VHT and VHD within Los Angeles County. As a result, the project alternative would have the following effect on the regional pollutants:

MSAT Emissions. When compared to the No Build Alternative this alternative would increase the MSAT emissions within the County by 0.04 percent.

Criteria Pollutant Emissions. When compared to the No Build Alternative this alternative would reduce the average criteria pollutant emissions within the County by 0.06 percent.

Greenhouse Gas Emissions. When compared to the No Build Alternative this alternative would reduce the average greenhouse gas emissions within the County by 0.05 percent.

Summary of Potential Effects to Resources by Alternative

Table C summarizes the change in regional MSAT, criteria pollutant, and GHG emissions associated with each of the proposed project alternatives.

Table C: Summary of Air Quality Effects – Percent Change from No Build Alternative

Resources	No Build	TSM/TDM	BRT-1	BRT-6	BRT-6a	LRT-4a	LRT-4b	LRT-4d	LRT-6	F-2	F-5	F-6	F-7	H-2	H-6
MSAT	0.00	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	0.38	0.31	0.28	0.35	0.05	0.04
Criteria	0.00	-1.17	-1.27	-1.33	-1.33	-1.35	-1.34	-1.33	-1.29	0.04	-0.22	0.00	0.01	-0.06	-0.06
GHG	0.00	-1.26	-1.37	-1.43	-1.43	-1.46	-1.44	-1.44	-1.39	0.08	-0.14	0.02	0.04	-0.05	-0.05

MSAT – Mobile Source Air Toxics
Criteria – Criteria Pollutants
GHG – Greenhouse Gases

Alternative	Diesel PM (grams/day)	Benzene (grams/day)	1,3-Butadiene (grams/day)	Acetaldehyde (grams/day)	Acrolein (grams/day)	Formaldehyde (grams/day)
No Build	214,817	261,626	35,806	64,053	8,236	191,565
F2	215,633	262,620	35,943	64,297	8,267	192,293
F5	215,489	262,444	35,918	64,254	8,262	192,164
F6	215,409	262,347	35,905	64,230	8,258	192,093
F7	215,570	262,544	35,932	64,278	8,265	192,237
H2	214,914	261,745	35,823	64,082	8,239	191,652
H6	214,908	261,737	35,822	64,081	8,239	191,646
LRT4a	214,732	261,522	35,792	64,028	8,232	191,489
LRT6	214,735	261,527	35,793	64,029	8,233	191,493
BRT1	214,738	261,531	35,793	64,030	8,233	191,495
BRT6	214,733	261,525	35,793	64,028	8,233	191,491
TSMTDM	214,742	261,535	35,794	64,031	8,233	191,498
LRT4b	214,733	261,524	35,792	64,028	8,233	191,490
LRT4d	214,733	261,524	35,792	64,028	8,233	191,490

Alternative	Diesel PM (lb/day)	Benzene (lb/day)	1,3-Butadiene (lb/day)	Acetaldehyde (lb/day)	Acrolein (lb/day)	Formaldehyde (lb/day)	Total (lb/day)	Percentage Change From No Build
No Build	474	577	79	141	18	422	1,711	-
F2	475	579	79	142	18	424	1,717	0.38%
F5	475	579	79	142	18	424	1,716	0.31%
F6	475	578	79	142	18	423	1,716	0.28%
F7	475	579	79	142	18	424	1,717	0.35%
H2	474	577	79	141	18	423	1,712	0.05%
H6	474	577	79	141	18	423	1,712	0.04%
LRT4a	473	577	79	141	18	422	1,710	-0.04%
LRT6	473	577	79	141	18	422	1,710	-0.04%
BRT1	473	577	79	141	18	422	1,710	-0.04%
BRT6	473	577	79	141	18	422	1,710	-0.04%
TSMTDM	473	577	79	141	18	422	1,710	-0.03%
LRT4b	473	577	79	141	18	422	1,710	-0.04%
LRT4d	473	577	79	141	18	422	1,710	-0.04%

2035 LA County Emissions (lb/day)

Alternative	ROG	CO	NOx	SOx	PM10	PM2.5
No Build	16,182	422,787	102,722	2,003	21,363	13,764
F2	16,171	423,366	102,914	2,011	21,408	13,762
F5	16,124	422,566	102,746	2,010	21,376	13,726
F6	16,163	423,054	102,832	2,009	21,390	13,755
F7	16,164	423,203	102,877	2,010	21,401	13,756
H2	16,167	422,667	102,709	2,004	21,362	13,754
H6	16,167	422,663	102,707	2,004	21,361	13,754
LRT4a	15,826	417,633	101,719	2,003	21,180	13,496
LRT6	15,843	417,884	101,768	2,003	21,189	13,509
BRT1	15,848	417,956	101,782	2,003	21,191	13,513
BRT6	15,833	417,739	101,740	2,003	21,183	13,502
TSMTDM	15,876	418,356	101,860	2,003	21,205	13,534
LRT4b	15,831	417,705	101,733	2,003	21,182	13,500
LRT4d	15,832	417,730	101,738	2,003	21,183	13,501

Delay Emissions (lb/day)

Alternative	ROG	CO	NOx	SOx	PM10	PM2.5
No Build	4,534	27,928	28,297	20	121	111
F2	4,492	27,667	28,033	20	120	110
F5	4,450	27,409	27,771	20	119	109
F6	4,505	27,750	28,117	20	121	111
F7	4,497	27,701	28,067	20	120	110
H2	4,518	27,830	28,198	20	121	111
H6	4,519	27,833	28,201	20	121	111
LRT4a	4,408	27,148	27,508	20	118	108
LRT6	4,414	27,186	27,545	20	118	108
BRT1	4,415	27,196	27,556	20	118	108
BRT6	4,410	27,164	27,523	20	118	108
TSMTDM	4,425	27,255	27,615	20	119	109
LRT4b	4,409	27,159	27,518	20	118	108
LRT4d	4,410	27,162	27,522	20	118	108

Total Emissions (lb/day)

Alternative	ROG	CO	NOx	SOx	PM10	PM2.5	Total	Percentage Change From No Build
No Build	20,716	450,714	131,019	2,024	21,485	13,875	639,833	-
F2	20,663	451,032	130,947	2,031	21,528	13,873	640,074	0.04%
F5	20,574	449,975	130,517	2,029	21,495	13,835	638,426	-0.22%
F6	20,669	450,804	130,949	2,029	21,511	13,865	639,827	0.00%
F7	20,661	450,904	130,944	2,030	21,521	13,867	639,926	0.01%
H2	20,685	450,497	130,907	2,024	21,483	13,865	639,461	-0.06%
H6	20,686	450,495	130,908	2,024	21,483	13,865	639,461	-0.06%
LRT4a	20,233	444,782	129,227	2,022	21,298	13,604	631,166	-1.35%
LRT6	20,256	445,070	129,313	2,022	21,307	13,618	631,586	-1.29%
BRT1	20,263	445,152	129,338	2,022	21,309	13,621	631,706	-1.27%
BRT6	20,243	444,903	129,263	2,022	21,302	13,610	631,342	-1.33%
TSMTDM	20,300	445,611	129,475	2,022	21,324	13,642	632,375	-1.17%
LRT4b	20,240	444,864	129,251	2,022	21,300	13,608	631,286	-1.34%
LRT4d	20,242	444,892	129,260	2,022	21,301	13,610	631,327	-1.33%

Change from No Build (lb/day)

Alternative	ROG	CO	NOx	SOx	PM10	PM2.5
F2	-53	318	-72	7	44	-3
F5	-142	-739	-502	6	10	-40
F6	-47	89	-70	5	27	-10
F7	-55	189	-75	7	36	-9
H2	-30	-218	-112	1	-2	-11
H6	-30	-219	-111	1	-2	-11
LRT4a	-483	-5,933	-1,792	-1	-187	-271
LRT6	-459	-5,645	-1,706	-1	-178	-258
BRT1	-453	-5,562	-1,681	-1	-175	-254
BRT6	-473	-5,812	-1,756	-1	-183	-265
TSMTDM	-415	-5,104	-1,544	-1	-161	-233
LRT4b	-476	-5,850	-1,768	-1	-184	-267
LRT4d	-474	-5,822	-1,759	-1	-183	-266

Change from No Build (% Reduction)

Alternative	ROG	CO	NOx	SOx	PM10	PM2.5
F2	-0.26%	0.07%	-0.06%	0.37%	0.20%	-0.02%
F5	-0.68%	-0.16%	-0.38%	0.29%	0.05%	-0.29%
F6	-0.23%	0.02%	-0.05%	0.27%	0.12%	-0.07%
F7	-0.27%	0.04%	-0.06%	0.34%	0.17%	-0.06%
H2	-0.15%	-0.05%	-0.09%	0.04%	-0.01%	-0.08%
H6	-0.14%	-0.05%	-0.08%	0.04%	-0.01%	-0.08%
LRT4a	-2.33%	-1.32%	-1.37%	-0.07%	-0.87%	-1.95%
LRT6	-2.22%	-1.25%	-1.30%	-0.06%	-0.83%	-1.86%
BRT1	-2.19%	-1.23%	-1.28%	-0.06%	-0.81%	-1.83%
BRT6	-2.28%	-1.29%	-1.34%	-0.07%	-0.85%	-1.91%
TSMTDM	-2.01%	-1.13%	-1.18%	-0.06%	-0.75%	-1.68%
LRT4b	-2.30%	-1.30%	-1.35%	-0.07%	-0.86%	-1.93%
LRT4d	-2.29%	-1.29%	-1.34%	-0.07%	-0.85%	-1.92%

Alternative	CO2	CH4	CO2eq	Percentage Change From No Build
No Build	231,573,956	4,623	231,689,543	-
F2	231,757,584	4,620	231,873,094	0.08%
F5	231,248,713	4,606	231,363,876	-0.14%
F6	231,608,919	4,619	231,724,385	0.02%
F7	231,667,934	4,619	231,783,400	0.04%
H2	231,467,838	4,619	231,583,321	-0.05%
H6	231,466,777	4,619	231,582,261	-0.05%
LRT4a	228,183,850	4,529	228,297,066	-1.46%
LRT6	228,348,836	4,533	228,462,167	-1.39%
BRT1	228,396,082	4,535	228,509,446	-1.37%
BRT6	228,253,313	4,531	228,366,577	-1.43%
TSMTDM	228,659,311	4,542	228,772,859	-1.26%
LRT4b	228,231,246	4,530	228,344,495	-1.44%
LRT4d	228,247,327	4,530	228,360,587	-1.44%