Technical Appendix 4

<u>(Air Quality)</u>

to

Attachment A

5-Cities Alliance
Comment Letter

DRAFT

Technical Review of Air Quality, Greenhouse Gas, and Health Risk Assessments for:

STATE ROUTE 710 NORTH STUDY DEIR/EIS

Prepared For:

THE FIVE CITY ALLIANCE

GLENDALE, LA CANADA FLINTRIDGE,
PASADENA, SIERRA MADRE AND SOUTH PASADENA

SHUTE, MIHALY & WEINBERGER LLP
396 Hayes Street
San Francisco, CA 94102-4421

Prepared By:

DRAFT

LANDRUM & BROWN
Matthew B. Jones P.E.
19700 Fairchild, Suite 230
Irvine, CA 92612
949·349·0671

July 8, 2015
Report #554301AQ02i

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ACRONYMS

AAQS	Ambient Air Quality Standards
AQMP	Air Quality Management Plan
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2EQ	Carbon Dioxide Equivalent
DEIR	Draft Environmental Impact Report
DPM	Diesel Particulate Matter
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gasses
HDDT	Heavy Duty Diesel Truck
LST	Localized Significance Threshold
MATES IV	Multiple Air Toxics Exposure Assessment IV
MSAT	Mobile Source Air Toxic
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
N_2O	Nitrogen Dioxide
NO_X	Nitrogen Oxides
$PM_{2.5}$	Particulate Matter with a Diameter of 2.5 microns or less
PM_{10}	Particulate Matter with a Diameter of 10 microns or less
ROG	Reactive Organic Gas
ROW	Right of Way
RTP	Regional Transportation Plan
SCAB	Southern California Air Basin
SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan

1.0 Introduction

The purpose of this report is to present the findings of our review of the air quality, greenhouse gas, and health risk impact analyses presented in the SR-710 North Study DEIR/EIS. We have determined that the DEIR/EIS has significant deficiencies that should be corrected prior to taking any action on any of the Project alternatives.

Section 3.0 of this report provides an overview of the flaws in the air quality, greenhouse gas, and health risk impact analyses. The primary shortcomings of the analysis include: (1) an incorrect finding of no significant impact and inadequate mitigation for short-term construction emissions; (2) an inadequate and poorly documented analysis of particulate hotspots; (3) the use of an oversimplified methodology to calculate cancer and non-cancer health risks; (4) an incorrect significance finding for health risk impacts; and (5) an incomplete estimate of greenhouse gas (GHG) emission increases. Further, the effects of traffic modeling issues on the air quality analysis are also presented.

Section 2.0 3.0presents a more detailed accounting of the deficiencies identified in section 3.0. Because section 2.0 is more comprehensive than the points raised in section 3.0, and because certain of this more comprehensive analysis may raise slightly different issues than those raised in section 3.0, we respectfully request that Caltrans prepare responses to each of the comments raised in this entire report.

2.0 Overview Comments

The following presents an overview of our comments on the DEIR/EIS document.

2.1.1 Construction Emissions

1) The construction emissions analysis does not clearly state whether the fugitive dust calculations assumed the implementation of measures, such as regular site watering or other dust preventive measures. This assumption should be clearly stated presented.

2) The DEIR/EIS does not specify a significance threshold for construction emissions. The document should clearly specify the threshold used to determine whether or not the project's construction impacts would be significant.

3) The DEIR/EIS compares the project's operational regional emissions, Table 3.13.10 (p. 3.13-29) with the SCAQMD recommended operational regional significance thresholds. The DEIR/EIS concludes that the alternatives' operational emissions are well below these thresholds. However, the DEIR/EIS makes no mention of the equivalent SCAQMD construction regional significance thresholds in Table 3.13.4 (p. 3.13-11). Construction emission are well above the SCAQMD thresholds. Why does the document cite the SCAQMD significance thresholds when the comparison is beneficial but ignore them when they contradict the finding of no significant impact? The construction-related emissions from all alternatives exceed the thresholds for one or more pollutants by as much as 10 times. For the analysis to conclude that there will

be no significant impact it must demonstrate that construction emission will be less than the SCAQMD thresholds with implementation of the specified mitigation.

4) Although the construction of the Freeway Tunnel Alternatives would generate approximately twice the NO_X and particulate exhaust emissions as the TSM/TDM, BRT and LRT alternatives, the DEIR/EIS does not provide the most stringent measures to reduce these emissions. Avoidance, minimization and/or mitigation measure AQ-4 would be applied to construction of the Freeway Tunnel Alternatives while AQ-5 would be applied to the TSM/TDM, BRT, and LRT alternatives. Measure AQ-5 calls for compliance with the Metro Green Construction Policy which would require the use of Tier 4 rated off-road equipment and on-road haul trucks that are model year 2007 or later. Compliance with the Metro Green Construction Policy for the Freeway Tunnel Alternatives would reduce exhaust particulate and NO_X emissions by approximately 90% from the estimate presented in the DEIR/EIS. AQ-4 contains no such restrictions and AQ-2 would only require that Freeway Tunnel Alternatives to use Tier 3 or better off-road construction equipment with no restrictions on haul trucks. AQ-4 would reduce only a fraction of the NO_X emissions, those from off-road equipment but not haul trucks, by approximately 33% and would not reduce particulate emissions. The DEIR/EIS must justify the use of less stringent measures to mitigate the Freeway Tunnel alternatives' construction impacts.

5) Avoidance, minimization and/or mitigation measure AQ-4 addresses asphalt batch plant emissions. However, the DEIR/EIS's construction emissions calculations do not appear to include any fugitive asphalt emissions. Nor are these emissions discussed in the DEIR/EIS or its air quality technical appendices. The Freeway Tunnel Alternatives would likely require asphalt paving; fugitive ROG emissions from this paving must be included in the construction emissions calculations.

6) Avoidance, minimization and/or mitigation measure AQ-1 calls for compliance with SCAQMD Rule 403. Rule 403 requires all operations to implement the Best Available Control Practices which are presented in Table 6.1 of the Air Quality Assessment Report. The rule contains additional requirements for large operations which are defined as those involving 50 or more acres or with a daily throughput of 5,000 cubic yards or greater. The DEIR/EIS does not provide enough information to determine if any of the Build Alternatives would be defined as Large Operations under Rule 403. However, the DEIR/EIS should commit to incorporating the Large Operations Rule 403 requirements for the LRT and Freeway Tunnel Alternatives to provide the greatest amount of fugitive dust minimization as possible.

7) SCAQMD recommends assessing potential localized impacts from construction activities yet no such analysis was included in the DEIR/EIS. A localized impact analysis would determine whether or not construction has the potential to either create any exceedances of the ambient air quality standard (AAQS) or make worse any existing exceedances of the AAQS. SCAQMD developed its Localized Significance Threshold Methodology (LST) to make it easier for

smaller projects, less than five acres, to assess these impacts. Most of the TDM/TSM, and BRT construction activities and LRT station construction fall into this category. The LST methodology provides on-site emissions lookup tables to determine whether the emissions have the potential to create an exceedance of the AAQS or worsen an existing exceedance. Projects that include construction activities on sites larger than five acres are required to demonstrate compliance with SCAQMD standards by conducting dispersion modeling. These analyses must be undertaken in order for the DEIR/EIS to assess whether the project will result in a significant impact under CEQA checklist item III(b).

8) Section 6 of the DEIR/EIS's Air Quality Analysis Report presents two lists of measures to reduce or minimize construction related emissions. The first list is described as "regulatory measures." However, only the first two measures fit this description. The second list is described as a list of "Caltrans standard measures." All of the items from both of these lists are mitigation measures typically applied to construction projects in the South Coast Air Basin. However, only a few of these measures have been incorporated into the avoidance, minimization, and/or mitigation measures presented in Section 3.13.4 of the DEIR/EIS. All of the measures presented in Section 6 of the Air Quality Analysis Report should be required mitigation measure's for the Project's significant construction-related air quality impacts.

9) The DEIR/EIS does not quantify the estimated emission reduction potential of each mitigation measure. The DEIR/EIS must provide these estimates to determine whether these measures would effectively reduce the construction-related emissions from each project alternative to a less than significant level.

2.1.1.1 Operational Emissions

10) The DEIR/EIS, the Air Quality Analysis Report and the Health Risk Assessment show that emission concentrations in the future would be less than current pollutant concentration levels. The DEIR/EIS attributes these reduced pollutant concentrations to the project. However, this conclusion is unsupported by evidence. These considerable reductions will occur independent of the project due to turnover of older vehicles with newer vehicles that comply with increasingly stringent vehicle emission standards. While CEQA generally requires an analysis of a project's environmental impacts against a baseline of existing conditions, in this instance, such a comparison would not accurately depict the project's impact on air quality or health risk. A comparison of future conditions to existing conditions does not provide an independent measure of the Project's impacts. Instead, it demonstrates the effects of the implementation of more stringent vehicle emissions standards in combination with the project. Because this methodological approach incorrectly mixes the project's emissions together with future background emission concentrations, there is no way to isolate the emissions that would be generated by the Project. The analysis must be revised to include two future scenarios. The first scenario would identify future concentrations without the project. The second scenario would identify future concentrations with the project. The difference in emission concentrations between the two scenarios would show the effects of the Project.

11) The DEIR/EIS and Air Quality Analysis Report do not provide any details of the specific data used in the quantitative particulate hotspot dispersion modeling. The modeling input parameters, such as traffic volumes and speeds, emission factors and specific receptor locations must be identified. These modeling assumptions were provided for the health risk dispersion modeling, so we can find no logical explanation for not identifying this data for the particulate hot spot analysis.

12) The Health Risk Assessment technical document provides a reasonable amount of documentation of the input parameters used for the MSAT dispersion modeling. This data and the methodology description show that the dispersion modeling utilized average daily traffic volumes and speeds. However, this methodological approach is incorrect as it does not properly account for diurnal variations in traffic characteristics—increased emissions during peak commute hours, slightly lower emissions during midday, and considerably lower emissions overnight—and how they interact with the diurnal weather conditions that affect how pollutants are dispersed. The use of average traffic characteristics would tend to compress the modeling results. That is, if the diurnal traffic variation was properly accounted for, some receptors would have higher concentrations and others would have lower concentrations. These errors could be amplified because the project's impact is based on the difference between two modeled scenarios, i.e., conditions with and without the project. Large differences would occur if diurnal variations in emissions and dispersion under no project conditions were "out of sync"—i.e. the highest emissions occurring during periods of high dispersion (afternoons/evenings)—and were "in sync"—i.e. the highest emissions occurring during periods of low dispersion (late nights/early mornings)—under with project conditions.

    Section 5.3.2 of the EPA's "Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" describes the preferred methodology for accounting for diurnal traffic variation. EPA's methodology separates the diurnal variation into four periods, AM peak, midday average, PM Peak period, and overnight average. This method adequately captures diurnal emission variations that are lost with the use of average daily emission characteristics. The HRA modeling must be revised with this more accurate methodology to ensure that impacts are accurately assessed.

13) As discussed in Comment 11, the DEIR/EIS does not disclose the modeling input data assumptions used in the particulate hotspot analysis. However, there are indications that the hotspot analysis used the same errant modeling (i.e., the use of average daily traffic volumes and speeds) as the HRA. If this is the case, the particulate hotspot analysis must be revised so that with the more appropriate EPA methodology.

14) The dispersion modeling for the quantitative particulate hotspot and HRA also err in the use of average speeds to determine emission factors. As discussed in comments **Error! Reference source not found.** and **Error! Reference source not found.**, both models appear to have used average daily speeds to determine the emission factor. In addition, it appears that the particulate hot

spot and HRA model used average bi-directional speed. This approach is also incorrect. Speeds and emission factors are not linearly correlated. For most pollutants, emissions per mile are greatest at low and high speeds and minimal at medium speeds. For particulate matter, emissions are at a minimum between 35 and 40 mph, increasing at lower and higher speeds. PM_{10} emission factors between 0 and 5 mph are approximately 20% higher than the mid-speed minimum emission factor and approximately 7% higher between 65-70 mph. PM_{10} emission factors are approximately 40% higher between 0 and 5 mph and approximately 15% higher between 65-70 mph. Because emission factors and speed are not linearly correlated, multiplying the average traffic volume with the emission factors based on average speed does not result in the average emissions. Further, average speeds would tend towards the minimum emission factor, incorrectly minimizing emissions.

When the dispersion modeling is revised to properly account for diurnal traffic variations, emissions should be determined for each travel direction based on the speed and volume in each direction and then combined for model input.

15) In addition to the fact that the particulate hotspot analysis relied on improper methodology, the analysis has additional flaws. First, it does not identify the intended purpose of the particulate analysis, which is to determine whether a project's increase in particulate pollutants would create or make worse any exceedances of the ambient air quality standard (AAQS). Specifically, a hot spot analysis is prepared so that the agency is able to compare air quality concentrations with the proposed project (the build scenario) to air quality concentrations without the project (the no-build scenario).

Second the DEIR/EIS does not identify the threshold for determining the significance of the project's impact. A threshold of significance is generally a numeric or qualitative level at which impacts are normally less than significant. Here, the threshold of significance would be a design value that describes a future air quality concentration in the project area that can be compared to the AAQS.

Third, the analysis does not appear to have included background concentrations in the Project area. Background concentrations account for all other sources of pollution within the project area. A determination of a project's effect on particulate AAQS must necessarily take into account background particulate concentrations. The DEIR/EIS displays the results of the particulate hotspot analysis in Tables 3.13.7 through 3.13.9. These tables show PM_{10} and $PM_{2.5}$ concentrations by Project alternative for the opening year (2025) and horizon year (2035). The values depicted in these tables appear to only include pollutant concentrations from the sources, i.e., vehicles on freeways and arterial streets.

Fourth, the DEIR/EIS does not identify pollutant concentrations at each potentially affected receptor location. Tables 3.13.7 through 3.13.9 appear to show only the highest modeled concentration for each scenario at one (unspecified) receptor location. The analysis should have identified particulate concentrations on a receptor-by-receptor basis. It is necessary to calculate the design values for all receptors in the build and no-build scenarios to determine whether there would be violations of the AAQS *at each receptor location*.

Fifth, the DEIR/EIS does not even compare the particulate pollutant concentration at the one receptor location it does identify to the AAQS.

Finally, the DEIR/EIS only addresses Federal PM_{10} AAQS; it does not address the State AAQS. The analysis must address all applicable federal and state AAQS. This analysis is especially important as the state standard is more restrictive than the federal standard.

16) The DEIR/EIS does not provide an adequate analysis of the Project's cumulative air quality impacts. First, in the discussion of CEQA checklist question III(c) (Page 4-7), the DEIR/EIS concludes that the project alternatives, in combination with the other cumulative projects would not contribute to a cumulative temporary air quality impact. The DEIR/EIS errs in this conclusion. The document asserts that Mitigation Measures AQ-1 through AQ-4 would reduce the project's construction-related air quality impacts to a less than significant level. As explained earlier in this report, there is no evidence to support this conclusion. Consequently, the project's cumulative impacts would be significant. Second, also in the context of question III(c), the DEIR/EIS includes a discussion of mobile source air toxics. However, this CEQA checklist question only addresses criteria air pollutants. The DEIR/EIS concludes that "cumulative air quality impacts related to a net increase of any criteria pollutant for which the project region is in nonattainment would be less than significant with construction of the Build Alternative in combination with these projects." However, this conclusion regarding criteria pollutants is derived from a discussion of MSAT and the conclusion does not logically follow from the argument. The EIR/EIS must evaluate whether the project's increase in criteria air pollutants, together with *criteria* air emissions from other cumulative projects would result in cumulatively significant air quality impacts.

17) The response to checklist question III(d) in the DEIR/EIS (Page 4-7) states that the Health Risk Assessment shows that "the Build Alternatives would not result in a significant increase or significant cumulative increase in criteria pollutants that are in non-attainment." However, the Health Risk Assessment analyzes the impacts of air toxics and in no way addresses criteria pollutants. The conclusion does not logically follow the argument presented.

18) The response to checklist question III(d) in the DEIR/EIS (Page 4-7) states, "the Build Alternatives would reduce cancer and noncancer chronic and acute risks in the region." However, this remark is not supported and even contradicted by the DEIR/EIS's Health Risk Assessment. The Health Risk Analysis shows that the Freeway Build Alternatives will result in cancer risk increases greater than the significance threshold of 10 in a million. This is when the actual impact of the project is measured using the Health Risk Assessment's Scenario 2 which compares future conditions with and without the project. The Health Risk Assessment's Scenario 1 does not provide a measure of the build alternative impacts as it compares future conditions with the project to existing conditions without the project. Nearly all of substantial cancer risk reductions shown under Scenario 1 are due to stricter vehicle

emissions regulations including those enacted as part of the State's Diesel Risk Reduction Program. Scenario 2 compares conditions with and without the build alternatives with no other changes to the environment and therefore, accurately reflects the impact of the alternatives.

The analysis shows that a larger area will experience decreases in cancer risk than will experience increases. Yet, this is not an accurate measure of the relative overall risk. If all of the increases occur in residential areas and all of the decreases occur in non-residential areas, then the overall net effect could be negative (note this is provided as an example we are not arguing that is the case). As discussed in the HRA section of this report, a burden analysis should be performed to calculate the change in cancer cases by applying the risk to census tracts. This analysis is required to demonstrate whether the project would have a net benefit or impact in terms of cancer cases.

19) The DEIR/EIS's HRA concludes that the project will not result in any non-cancer health risk impacts based on the difference in the acute and chronic hazard indices (HIA and HIC) with and without the project. However, this is not an appropriate analysis. The hazard indices are a measure of when adverse non-cancer health effects begin to occur. An absolute hazard index of less than one indicates that there is no potential for adverse non-cancer health impacts. A hazard index greater than one indicates that there may be adverse non-cancer health effects. A hazard index of one is the threshold between when no adverse effects are anticipated and when sensitive persons would begin to have adverse health effects.

The difference between two hazard indices provides no information except whether or not the project itself would cause an adverse health impact. The analysis needs to determine if there are any areas exposed to hazard indices greater than one during the life of the Project. If there are no areas with indices greater than one then there are no impacts. If there are areas with indices greater than one then it would be appropriate to look at the project's contribution to determine significance. The analysis would need to develop a threshold of significance for the project's contribution and provide justification for this threshold in the DEIR/EIS.

20) The DEIR/EIS evaluated cancer risks using the methodology described in the 2003 Office of Environmental Health Hazard Assessment's (OEHHA) Guidance Manual for Preparation of Health Risk Assessments. In February of 2015, the OEHHA published revised Guidelines with a new methodology to calculate cancer risks that accounts for children's' increased sensitivity to toxic air pollutants. This new methodology multiplies the risk due to exposure between the start of the third trimester in the womb and the second birthday by 10 and the risk between the second birthday and the sixteenth birthday by 3. The new methodology results in considerably higher cancer risk estimates than the prior methodology. The Technical Support Document for the Guidelines that describe the new methodology was adopted by the OEHHA in 2012 after undergoing public review. The 2012 Technical Support Document incorporated a decades worth of knowledge since the methodology presented in the 2003 Guidelines used to calculate cancer risks for the DEIR/EIS. Cancer risks need

to be estimated using the revised methodology as using the outdated methodology likely results in unidentified significant impacts.

21) The greenhouse gas (GHG) emissions presented in the Air Quality Assessment Report and the DEIR only include those emitted from vehicles within the study area. GHG Emissions will also be produced through the generation of electricity used by the project. For the TDM/TSM and BRT alternatives, electrical requirements would be expected to be minimal, as would the anticipated emissions. The Freeway Tunnel Alternatives would consume electricity for tunnel lighting and the tunnel ventilation system. This could result in considerable GHG emission that should be reported in the DEIR/EIS. The LRT would consume the most electricity of the Build Alternatives and the non-inclusion of the GHG emissions associated with electricity in the reported emissions is a significant omission. We estimate that the electricity used for train propulsion only, not including lighting, ventilation, other electrical usage, would generate between approximately 23,400 and 61,700 metric tons of CO_2EQ per year. The GHG emission estimates must account for all sources of GHG emissions directly attributed to the project alternatives to provide a valid analysis and comparison of alternatives.

22) The DEIR/EIS states that the CT-EMFAC 5.0 emissions model was used to calculate vehicular CO_2 emissions (Page 4-98). CT-EMFAC is Caltrans' interpretation of CARB's EMFAC2011 emissions model that presents the EMFAC2011 data in formats that are easier to use for highway air quality analysis. Appendix E of the Air Quality Assessment includes two sets of CO_2 emissions, one that includes the effects of the Pavley I and Low Carbon Fuel Standards and one that does not.[1] The DEIR/EIS, however, only presents emissions that assume full implementation of the Pavley I and Low Carbon Fuel Standard. This is misleading for two reasons.

First, full implementation of Pavley and LCFS is speculative. The Low Carbon Fuel Standard is a mix of command and control regulation and emissions trading that uses a mix of market based mechanisms to allow providers to choose how they will reduce emissions while responding to consumer demand. This results in the actual reduction in tailpipe CO_2 emissions from implementation of the Low Carbon Fuel Standard being uncertain. This results in a speculative underestimate of the future CO_2 emissions and an over estimate of the reduction in future CO_2 emissions over existing conditions.

Second, the DEIR/EIS skews the analysis and GHG significance conclusion by excluding Appendix E data regarding emissions without implementation of Pavley and LCFS. A comparison of CO_2 emissions without the Pavley I and Low Carbon Fuel Standards shows that future emissions under the freeway tunnel alternatives are anticipated to increase by approximately 1,110 metric tons per day in 2020, 1,400 metric tons per day in 2025 and approximately 2,100 metric tons per day in 2035 over existing conditions (the differences among

[1] This is not explained anywhere in the text of the DEIR/EIS, the Air Quality Assessment, or Appendix E of the Assessment. One must review the Appendix E tables to discover the CO_2 emissions without Pavley/LCFS.

the freeway tunnel alternatives are slight).[2] These increases in GHG emissions would be significant. However, the data presented in the body of the Air Quality Assessment and DEIR/EIS includes only emissions assuming full Pavely/Low Carbon Fuel Standard implementation assumptions in EMFAC2011. Under these assumptions, the document shows decreases in CO_2 emissions of approximately 1,100 metric tons per day in 2025, approximately 1,400 metric tons per day in 2025, and approximately 1,100 metric tons per day in 2035 – regardless of whether the TSM/TDM, BRT, LRT or Freeway Tunnel alternative is selected. In other words, these decreases are not attributable to the Project. Rather, they are a function of a regulatory program, which may or may not achieve its goal, not of the Project alternatives

23) As discussed above, EMFAC2011 was used as the basis for the vehicular CO_2 emission estimates presented in the DEIR/EIS. CARB's Mobile Source Emissions Inventory On-Road Category website (http://www.arb.ca.gov/msei/categories.htm#onroad_motor_vehicles) recommends the use of the methodology specified in the Greenhouse Gas Emissions inventory (http://www.arb.ca.gov/cc/inventory/inventory.htm) to estimate on-road mobile source GHG emissions. The DEIR/EIS should discuss why it chose to use a GHG emissions calculation methodology different from what is recommended by the Stateair emissions regulating agency. Further, the use of CARB's recommended methodology would also include estimates of methane (CH_4) and nitrous oxide (N_2O) which are important GHG's emitted from combustion and global warming potentials 25 and 300 times greater than an equivalent amount of CO_2 emissions.

24) The DEIR/EIS does not specify the threshold of significance used to determine that GHG emissions will not result in a significant impact. The DEIR/EIS must provide a clear impact threshold for GHG emissions and evaluate the project alternatives based on this threshold.

25) Section 4.3 of the DEIR/EIS presents operational GHG emissions in terms of metric tons per day. This information is conventionally presented on an annual basis and confusion may result by reporting GHG emissions using an a-typical metric. Operational GHG emissions should be presented on an annual basis.

[2] The DEIR/EIS does not provide these emission totals. They are calculated by subtracting the existing CO_2 emissions from the 2035 CO_2 emissions found in the Air Quality Assessment Report Appendix E tables under the CO_2 heading (note the DEIR/EIS presents the values shown under the CO_2 (Pavely I + LCFS) heading), and converting lb/day to metric tons/day.

3.0 Detailed Accounting of the Shortcomings of the Air Quality, Greenhouse Gas and Health Risk Assessments

The following subsections discuss the primary shortcomings of the DEIR/EIS. Specifically, those issues that result in understatement of the potential air quality impacts, adequacy of mitigation, or non-identification of significant unavoidable impacts as required by CEQA.

3.1.1 Construction Air Quality Analysis is Incomplete, Finding of No Significant Impact After Mitigation Unsupported, and Mitigation Inadequate

Section 3.13.3.1 of the DEIR/EIS (pages 3.13-9 through 3.13-13) discusses construction air pollutant emissions. Common construction activities and air pollutant emissions are discussed along with short discussions of the construction activities for each alternative. Table 3.13.4 of the DEIR/EIS presents an estimate of maximum total daily construction emissions. This mirrors the analysis presented in Section 5.1 of the Air Quality Assessment Report, included as Appendix A of the DEIR/EIS. The Air Quality Assessment Report presents the detailed equipment assumptions used to generate the estimate of maximum total daily construction emissions.[3]

Section 3.13.3.1 of the DEIR/EIS does not make any statements about whether the construction emissions would adversely impact the environment. It notes that because construction is not anticipated to last for more than five years, it is exempt from the regional and project level conformity analysis of the federal clean air act. Section 3.13.4 presents five Avoidance, Minimization, and/or Mitigation Measures that are all applicable to construction.

The analysis of air quality impacts under CEQA is presented in Section 4.2.3 of the DEIR (Pages 4-5 through 4-9). The discussion for CEQA Checklist Question III(b) on Page 4-6 states that "short-term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other construction equipment." The last sentence of the paragraph concludes, "Measures AQ 1 through AQ-5 include measures to reduce construction-related air quality impacts from fugitive dust and construction equipment emissions to less than significant levels." The document does not specify the emissions thresholds used to make this determination. The project's construction-related emissions before mitigation are well above the Regional Significance Thresholds recommended by the SCAQMD. The DEIR/EIS did not calculate the emission-reduction potential of the measures.

Table 1 below presents the maximum daily construction emissions for each project alternative from Table 3.13.4 of the DEIR/EIS along with the SCAQMD's recommended regional significance thresholds for construction. Emissions greater

[3] It appears likely that the DEIR/EIS underestimated the Freeway Tunnel Alternative's increase in emissions as it did not include emissions resulting from asphalt concrete plants. Measure AQ-4 (p. 3.13-42) requires the Project to comply with Section 39-3.06 [Asphalt Concrete Plan Emissions] which implies that this source of emissions should have been included in the EIR/EIS's estimate of total daily construction emissions.

than the significance thresholds are shown in bold-italics. This table shows that reactive organic gasses (ROGs), and CO emissions are above the thresholds for the LRT and Freeway Tunnel Alternatives. NO_X and particulate emissions exceed the SCAQMD thresholds for all of the Build Alternatives. Particulate emissions are between 1.3 and 3.4 times greater than the thresholds for the TSM/TDM and BRT alternatives and between 3.8 and 9.7 times greater under the LRT and Freeway Tunnel Alternatives. NO_X emissions are shown to be 2.1 times greater than the threshold for the BRT Alternative, 9.4 times greater for the TSM/TDM Alternative, 22.4 times greater for the LRT alternative and 43.9 and 49.3 times greater for the two Freeway Tunnel Alternatives.

Table 1
Construction Emissions and SCAQMD Regional Significance Thresholds (lbs/day)

Alternative	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
TSM/TDM	49	548	***935***	***513***	***130***
BRT	12	123	***206***	***327***	***74***
LRT	***119***	***1,335***	***2,242***	***720***	***207***
Single Bore Freeway Tunnel	***214***	***2,167***	***4,337***	***1,116***	***330***
Dual Bore Freeway Tunnel	***237***	***2,284***	***4,926***	***1,460***	***411***
SCAQMD Significance Threshold (lbs/day)	**75**	**550**	**100**	**150**	**55**

The emissions presented in Table 1 (which reflect the “maximum construction emissions” included in the DEIR/EIS’s Table 3.13.4) are comprised of exhaust emissions from off-road equipment and on-road haul trucks. Particulate emissions (PM_{10} and $PM_{2.5}$) include fugitive dust emissions from material handling as well. Between 86 and 94 percent of the PM_{10} emissions and between 61 and 91 percent of the $PM_{2.5}$ emissions are due to fugitive dust. The DEIR/EIS includes a mitigation measure that requires compliance with Caltrans Standard Specifications and Best Available Control Measures from SCAQMD Rule 403 which requires, among other things, that fugitive dust emissions be controlled by regular watering (DEIR/EIS, p. 3.13-40). However, the report does not identify any reductions in particulate matter emissions for this mitigation measure or any of the other mitigation measures.

The Air Quality Assessment Report states (on page 5-2) that the construction emissions assumed Tier 2 emission standards for all diesel fueled off-road equipment. Off-road diesel engines have been subject to stricter emission standards over time, referred to as Tiers. These emission limits apply to the engine on the date it is sold and are based on the horsepower rating of the engines. Figure 1 shows how these Tiers have been implemented. For each Tier, the years that each tier was implemented are shown—compliance dates were phased based on engine power. The vertical axis of the chart shows the allowable particulate emissions under each Tier and the horizontal axis shows the allowable NO_X emissions for each Tier. Table 2 presents the approximate reduction emissions compared to Tier 2 standards.

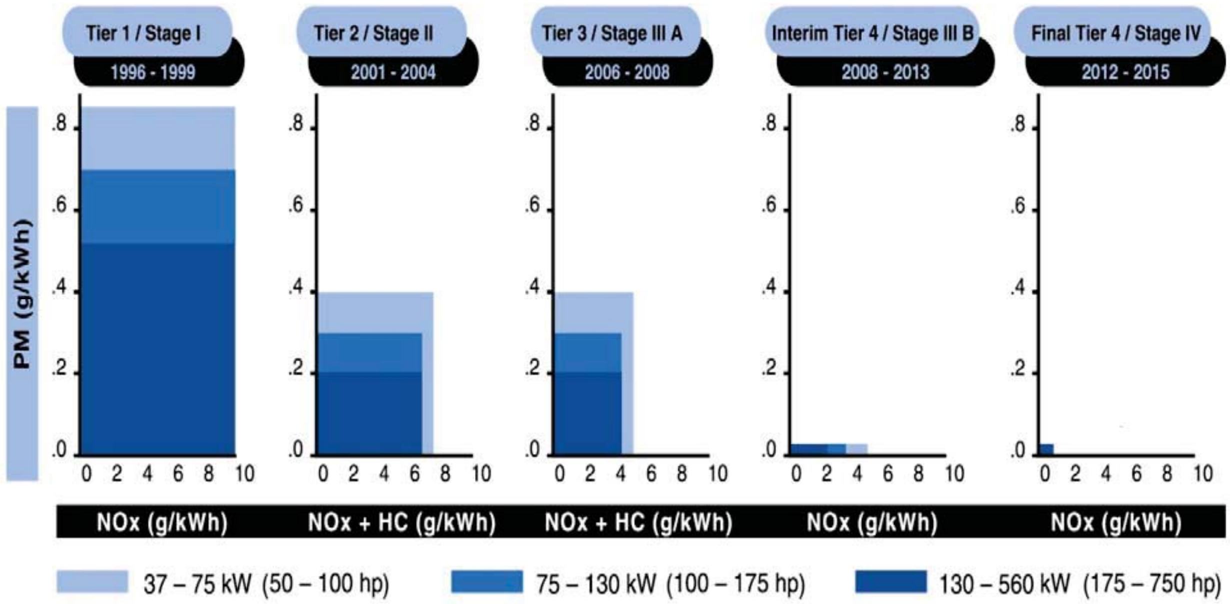

Figure 1
Off-road Equipment Emission Standard Tiers

Table 2
Approximate Emissions Reductions From Off-road Engine Tier 2 Standards

	Particulate Matter	NOx
Tier 3	0%	-33%
Tier 4 - Interim	-90%	-33%
Tier 4 - Final	-90%	-93%

To estimate emissions from on-road haul trucks, the DEIR/EIS analysis used emission factors from EMFAC2011, CARB's on-road vehicle emissions model. The emission factors represent the average emissions from all heavy trucks operating in Los Angeles County. As with off-road equipment, heavy-duty diesel trucks (HDDT) have been subject to stricter emission limits over time. The most recent regulations apply to model year 2007 and later HDDT. Model year 2007 and later trucks emit 95 percent less PM_{10} and 92 percent less $PM_{2.5}$ than the composite truck assumed for the construction emissions calculations. NO_X emissions reductions were phased in between 2007 and 2010 with all trucks with a model year of 2010 or later emitting 96 percent less NO_X than the emission calculations.

Section 3.13.4 of the DEIR/EIS (Pages 3.13-40 to 3.13-42) presents five measures geared toward mitigating the project's construction emissions. However, there are effectively only four measures because AQ-4 only applies to the Freeway Tunnel Alternatives and AQ-5 only applies to the TSM/TDM, BRT, and LRT alternatives.

Measure AQ-1 (p. 3.13-41) just calls for compliance with SCAQMD Rule 403, which calls for implementing fugitive dust measures as specified in SCAQMD Rule 403. Rule 403 requires implementation of the Best Available Control Measures presented in Table 6.1 of the DEIR/EIS's Air Quality Assessment Report. Rule 403 places additional requirements on large operations, those involving more than 50 acres or with a daily throughput of more than 5,000 cubic yards. The DEIR/EIS (p. 4-70) indicates that with the Dual Bore Freeway Tunnel Alternative there would be up to 360 daily haul trucks and the air quality calculations indicate that haul trucks have a 14 cubic yard capacity. This equates to just over 5,000 cubic yards. Therefore, it would be likely that the Dual Bore Freeway Tunnel Alternative would need to implement these additional measures. The Single Bore Freeway Tunnel and the LRT may not.

Measure AQ-2 presents general measures to reduce exhaust emissions. These include reducing trips, minimizing idling, using solar powered message signs, using power pole electricity, maintaining engines, prohibiting tampering of engines, using Tier 3 or better equipment with engine sizes greater than 75 HP, and using EPA registered particulate traps. Measure AQ-3 requires the contractor to meet EPA diesel fuel requirements, use alternative fuels where appropriate, and to identify sensitive receptors in the immediate vicinity of construction and specify means to minimize impacts to these populations.

Measure AQ-4 only applies to the Freeway Tunnel Alternative and simply requires adherence to Caltrans Standard Specifications for Construction (Section 14-9.03 and 18 [Dust Control] and Section 39-3.06 [Asphalt Concrete Plant Emissions]). The specification of asphalt concrete plant emissions is interesting because the emissions calculations do not appear to include asphalt paving fugitive ROG emissions. Section 14-9.03 requires the application of water, dust palliative or both, if ordered and for soil stockpiles to be covered with a soil stabilization material or temporary cover. Section 18 just provides specifications for the dust palliative.

Measure AQ-5 only applies to the TSM/TDM, BRT, and LRT Alternatives. This measure requires contractors to comply with the most current Metro Green Construction Policy. This policy requires all off-road diesel powered construction equipment greater than 50 HP to meet the Tier 4 emission standards. In addition, equipment without a factory equipped diesel particulate filter are to be outfitted with Best Available Control Technology (BACT) devices certified by CARB. All on-road heavy-duty diesel trucks with a GVWR of 19,500 pounds or greater shall comply with the EPA 2007 on-road emissions standards. In addition, the Metro Green Construction Policy defines fifteen Best Management Practices. Several of these Best Management Practices are included in Measure AQ-2 of the DEIR/EIS.

There is no justification given in the document for the Metro sponsored project Alternatives to implement much more extensive, and effective, pollutant emissions reduction measures than the Caltrans sponsored Freeway Tunnel Alternatives. Metro's construction policy was developed in consultation with the Ports of Los Angeles and Long Beach and the Los Angeles World Airports based on their experiences mitigating large construction projects and concludes that the additional costs for the mitigation were not significant. The effective difference in the mitigation measures is that the TSM/TDM, BRT and LRT alternatives would require the use of Tier 4 final off-road equipment and 2007 or later on-road heavy duty diesel trucks while the Freeway Tunnel Alternatives would require the use of the lesser stringent Tier 3 off-road equipment and would not place any restrictions on on-road haul trucks.

As shown in Table 2 and Figure 1 above, assuming that Metro's Green Construction Policy was used for the TSM/TDM and BRT alternatives, NO_X and particulate exhaust emissions from off-road construction equipment would be reduced by around 93 percent. Because the LRT includes considerably more hauling, there would be a slightly greater reduction in NOx emissions; hauling-related NO_X emissions would be reduced by 96 percent. Under the Freeway Tunnel Alternatives Mitigation, particulate exhaust emissions would not be reduced and NO_X emissions would be reduced by less than 33 percent. Assuming the off-road equipment and haul trucks account for the same amount of NO_X emissions, the total NO_X emissions would only be reduced by about 16 percent.

To reduce NO_X emissions to below the significance thresholds, mitigation for the TSM/TDM and BRT alternatives would need to reduce NO_X emissions by 89 and 51 percent respectively. It is possible that the Metro Green Construction Policies would achieve these reductions. The LRT alternative requires a 96 percent reduction in NO_X emissions to be less than the significance threshold. The mitigation would reduce these emissions by between 93 percent and 96 percent. The Green Construction Policies would likely not reduce emissions to less than the significance thresholds, but they would be near the threshold.

The Freeway Tunnel Alternatives would require NO_X emissions reductions of 98 percent to be reduced below the SCAQMD Significance Threshold. The DEIR/EIS's proposed mitigation measure for the Freeway Tunnel Alternatives would reduce NOx emissions by less than 33 percent. The Freeway Tunnel Alternatives should be required to implement the measures outlined in the Metro Green Construction Policy.

The Metro Green Construction Policy would reduce particulate exhaust emissions from construction of the TSM/TDM and BRT alternatives by about 90 percent. LRT reductions would be somewhat greater as haul truck PM_{10} emissions would be reduced by about 95 percent and $PM_{2.5}$ emissions would be reduced by about 92 percent. The mitigation proposed for the Freeway Tunnel Alternatives would not result in any reduction in particulate emissions.

If the fugitive dust calculations include reductions from watering, then it is not possible to reduce particulate emissions to below the SCAQMD thresholds as the fugitive dust emissions themselves exceed the standard. If watering was accounted for in the emissions calculations, then mitigated particulate emissions for the BRT alternative would likely be less than the significance thresholds. The measures would likely reduce $PM_{2.5}$ emissions to less than the threshold for the TDM/TSM alternative, but PM_{10} emissions would likely be slightly above the threshold.

Even with 90% reductions in exhaust particulate emissions, it would not be possible to reduce total particulate emissions to below the significance thresholds for the LRT and Freeway Tunnel Alternatives. Fugitive dust emissions would need to be reduced by between 78 and 90 percent. These levels of reduction are not feasible. The LRT alternative would only need a 64 percent reduction in fugitive dust to reduce $PM_{2.5}$ emissions to less than the standard. This could be achieved with three times a day watering.

SCAQMD recommends assessing potential localized impacts from construction activities, yet no such analysis was included in the DEIR/EIS. A localized impact analysis, or as its often called, a hot-spots analysis, would determine whether or not construction has the potential to either create any exceedances of the ambient air quality standards (AAQS)or make worse any existing exceedances of the AAQS.

For small projects, SCAQMD has developed their Localized Significance Threshold (LST) methodology that provides on-site emissions thresholds for projects of less than five acres in size. The TDM/TSM alternative and portions of the LRT and BRT alternatives should have been analyzed under this threshold. For those project alternatives that are larger than five acres, e.g., the Freeway Tunnel Alternatives, the DEIR/EIS should have performed dispersion modeling to determine pollutant concentrations at nearby receptors. Without this modeling, the DEIR cannot conclude that construction will not result in a significant localized air quality impact.

3.1.2 The Particulate Matter Hotspot Assessment is Not Substantiated

The particulate hotspot analysis required by the Clean Air Act (Transportation Conformity) is done in two steps. A qualitative analysis is performed to determine if a project is a project of Air Quality Concern (POAQC) in terms of particulate hotspots. If a project is determined to not be POAQC then no further analysis is required. This determination is reviewed and approved by Caltrans, FHWA, and EPA at SCAG's Transportation Conformity Working Group (TCWG). If the project is a POAQC then a quantitative analysis is performed per guidance published by EPA. The DEIR/EIS discusses how the TSM/TDM, BRT, and LRT alternatives were determined to not be projects of Air Quality Concern (POAQC). The Freeway Tunnel Alternatives were determined to be POAQC and will require quantitative particulate hotspot analysis.

The DEIR/EIS included something of a quantitative particulate hotspot analysis. However, the methodology used in this analysis is not well documented. What information that does exists indicates that the DEIR/EIS preparers did not follow EPA guidance. The DEIR/EIS does not identify the analytical steps in the analysis and does not present the results of the analysis in a meaningful way. Because of these flaws, it is not possible to determine the adequacy or accuracy of the analysis. The particulate analysis consists of a discussion of the type of emissions that were considered, a brief description of the dispersion models that were used, and an overview of the input parameters. Although the results are presented in Tables 3.13.7 through 3.13-9 of the DEIR/EIS and Tables 5.8 through 5-10 of the Air Quality Assessment Technical Report, it is not clear what the values in these tables actually represent. The Air Quality Report provides no clarification. Set forth below is a detailed description of the flawed analysis.

First, the DEIR/EIS (p. 3.13-20) presents 13 locations that were identified as areas of "air quality concern" followed by a discussion of the modeling parameters used to represent the pollution sources (p. 3.31-21). These modeling parameters include emission sources such as vehicle exhaust, vehicle fugitive emissions and tunnel ventilation towers. However, all of the data presented in the discussion of modeling parameters are general parameters for each source type. The document does not provide any specific input parameters such as specific roadways included in the model and their traffic volumes, speeds and emission factors. Nor did the DEIR/EIS identify the specific receptor locations.

The DEIR/EIS (p 3.13-22): "The forecast average daily traffic data were applied to appropriate emission factors to estimate emission for each of the segments along the proposed alignment." Because the document mentions "average" daily traffic, we are assuming the particulate hotspot modeling used the same errant methodology as the Health Risk Assessment (HRA) to calculate daily and longer average pollutant concentrations. However, the DEIR/EIS or Air Quality Assessment Report did not include enough data regarding the particulate modeling to confirm this assumption.

The HRA dispersion modeling and assumed particulate dispersion modeling methodologies errs in the use of average daily traffic characteristics in the dispersion modeling. In order to understand the effect of the use of average daily traffic characteristics on the particulate hot spot analysis, it is important to first understand details relating to dispersion modeling. Dispersion modeling uses the location and quantity of pollutant emissions from each source and hourly weather data to predict pollutant concentrations at specific receptor locations. For this project, the sources of pollution are roadway segments and the tunnel ventilation towers. In the model, roadway segments are represented as line segments and ventilation towers are represented as points. The dispersion model calculates a Dispersion Factor for each source/receptor pair for each hour of weather data. This Dispersion Factor relates the amount of pollutants emitted by the source with the concentration of pollutants at the receptor.

Pollutant concentrations at a receptor are inversely proportional to the Dispersion Factor. A large Dispersion Factor indicates that the pollutant is spread out more widely, while a low Dispersion Factor indicates the pollutant is more concentrated. In low-wind conditions, Dispersion Factors at downwind receptors near the source are low and increase for receptors further away from the source. Dispersion Factors for up-wind receptors are higher than downwind receptors. During these conditions, pollutants are not dispersed but tend to collect just downwind from the source. As wind speed increases, the Dispersion Factors for receptors near the source increase and the Factors for downwind receptors further from the source decrease. Concentrations at close receptors decrease while concentrations at more distant downwind receptors increase.

If wind blows in one direction with little side-to-side variation then receptors directly downwind will have low Dispersion Factors and the Factors will increase to each side. Most of the pollution will be directed towards receptors that are directly downwind from the source. A more variable wind will increase Dispersion Factors directly downwind and decrease those for receptors to each side compared to a constant wind. Directionally variable winds spread the downwind pollution concentrations out side to side.

The DEIR/EIS's modeling utilized five years of measured hourly weather data. That is, 43,800 hourly Dispersion Factors were calculated for each source receptor pair. That data encodes the dominant daily diurnal weather variations in Southern

California. Calm nights and mornings and increasing on-shore breezes through the day and evening that calm after sundown. However, it applies these Dispersion Factors to hourly emission factors that do not account for diurnal traffic variations. That is, the model assumes that the roadways are generating the same amount of pollution at 2:00 a.m. as they are during the morning and evening peak commute hours. In reality, the quantities of emissions during these periods are quite different. Not only are there fewer vehicles operating during the late night hours, but also speeds are increased, lowering the emissions per vehicle.

Accurate pollutant concentrations require accurate accounting of diurnal variation in emissions. The use of average daily conditions would tend to compress the range of concentrations. Areas where periods of high emission factors correspond with low Dispersion Factors would have higher concentrations with accurate diurnal modeling of traffic characteristics, rather than the average used in the DEIR/EIS. Conversely, areas where periods of low emissions correspond with high Dispersion Factors would have lower concentrations.

The project will result in changes in traffic patterns, which will result in redistributing pollutants. Using a methodology that compresses the range of concentrations results in an underestimation of the Project's effects on particulate pollutant concentrations. In addition using this errant methodology could result in compressing the differences between Project alternatives.

Section 5.3.2 of the EPA's "Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" describes the preferred methodology for accounting for diurnal traffic variation that should have been utilized. This methodology separates the diurnal variation into four periods, AM peak, midday average, PM Peak period, and overnight average. This method adequately captures diurnal emission variations that are lost with the use of average daily emission characteristics.

In addition to minimizing traffic volume variations, the methodology used for the modeling also minimizes emission factor variations. The HRA dispersion modeling, and we assume the particulate dispersion modeling, used the average daily speed to determine emission factors. Emission factors are speed dependent. For particulate matter, emissions are at a minimum between 35 and 40 mph, increasing at lower and higher speeds. PM_{10} emission factors between 0 and 5 mph are approximately 20% higher than the mid speed minimum emission factor and approximately 7% higher between 65-70 mph. PM_{10} emission factor are approximately 40% higher between 0 and 5 mph and approximately 15% higher between 65-70 mph. Because emission factors and speed are not linearly correlated multiplying the average traffic volume with the emission factor based on average speed does not result in the average emissions.

An accurate average daily emission calculation world need to use the same methodology as the regional emissions calculation, dividing the traffic volume into 5 mph speed increments and then multiplying the volume in each speed by the appropriate emission factor and then summing and averaging. The use of average speeds during the four modeling periods suggested by the EPA's methodology would acceptably correct this error. However, this would need to be done for each travel direction for each link.

The HRA modeling, and we assume the particulate hotspot modeling, used the average bi-directional speed to determine the emission factor. Because speed and emission factors are not linearly related, this results in an incorrect estimate of emissions. This is especially true for facilities with large directional splits in peak hour traffic. The average vehicle speed on a facility that is congested in one direction and free flow in the other would tend towards speeds with the lowest emissions rates while traffic was traveling at mid-range speeds that generate higher emission factors. Obviously, the emissions would be underestimated using the average rate.

The results of the particulate hotspot modeling are also poorly documented. Tables 3.13.7 through 3.13.9 purport to show the Project's highest concentrations from AERMOD. Although never stated, we assume that the analysis concludes that there will be no particulate matter hotspot impacts because the "with-project" concentrations are shown to be lower than the "no build" conditions. The CEQA Analysis (Section 4.2.3) just states that if one of the Freeway Tunnel Alternatives were selected that quantitative PM modeling would be conducted to demonstrate that the project would not delay attainment of or cause an exceedance of the $PM_{2.5}$ or PM_{10} NAAQS. It does not refer to the quantitative modeling results at all.

Assuming that the tables do depict the highest modeled concentrations, and because there is no discussion of background concentrations, we assume that these concentrations do not include background pollutant concentrations. The modeled concentrations only include emissions from those sources included in the model, freeways, arterials, and the tunnel ventilation towers. There are many other pollution sources within and outside the project area that contribute to the overall pollutant concentrations at the modeled receptors.

Comparing the modeled concentrations to measured levels appears to confirm that they do not include background concentrations. The modeled 24 hour $PM_{2.5}$ concentration shown in Table 3.13.7 is just more than one tenth of the average of the three most recent years of measured concentrations at the Main Street Los Angeles monitoring station presented in Table 3.13.2. The modeled annual $PM_{2.5}$ concentration is three and a half times lower than the measured and the 24-hour PM_{10} concentration is four times lower.

The purpose of the particulate hot spot analysis is to determine whether the project would create or worsen an exceedance of the ambient air quality standards. The first step to evaluate this impact would be to determine if there are any existing exceedances of the AAQS. This requires that the DEIR/EIS include the background concentrations for sources not included in the model. Alternatively, if the EIR/EIS seeks to demonstrate that concentrations with the project are less than no project conditions, this analysis be undertaken for ALL receptors, not just the receptors with the highest concentration under each alternative. Moreover, the DEIR/EIS errs further because it only addresses exceedances under the federal AAQS. Under CEQA, exceedances of the state AAQS must be assessed as well.

3.1.3 The Methodology Used to Determine Health Risk Impacts Minimizes Differences Between Alternatives and Underestimates Impacts

Our comments regarding the modeling methodology used for the particulate hotspot analysis above also apply to the Health Risk Assessment (HRA). In fact, they are more applicable to the HRA because the DEIR/EIS identifies the inputs for the HRA but does not do so for the particulate analysis.

Specifically, the use of average daily traffic volumes and speeds to characterize the emissions in the dispersion modeling does not provide accurate results. This flawed methodology likely understates the Project's health risks. In addition, it tends to minimize the differences between each of the Project alternatives. In order to assess the impacts of each alternative, the modeling for the HRA must use EPA methodology discussed above, i.e., AM peak period, mid-day average, PM peak period, and overnight average.

3.1.4 The Conclusion of Health Risk Impact Significance Is Incorrect

The DEIR/EIS (Section 4.2.3; p. 4-8) states that "the HRA indicated that the project would result in substantial regional benefits that reduce health risk from exposure to MSATs in the majority of the study area". Attributing these reductions to the project is erroneous and misleading. The considerable health risk reductions will occur independent of the project due to turnover of older vehicles with newer vehicles that comply with increasingly stringent vehicle emission standards. While CEQA generally requires an analysis of a project's environmental impacts against a baseline of existing conditions, in this instance, such a comparison would not accurately depict the project's impact on air quality or health risk. A comparison of future conditions to existing conditions does not provide an independent measure of the Project's impacts. Instead, it demonstrates the effects of the implementation of more stringent vehicle emissions standards in combination with the project. Because this methodological approach incorrectly mixes the project's emissions together with future background emission concentrations, there is no way to isolate the emissions that would be generated by the Project.

The DEIR/EIS's HRA Technical Report provides a more accurate indication of the Project's health risk. Comparison of opening year conditions presented in Tables 3-4 through 3-6 and Figures 3-11 through 3-19 of the HRA present accurate measures of the impacts of the project alternatives. These tables and figures show that some areas will be exposed to cancer risk increases due to the project and other will experience decreases. The tables and maps show that both residents and workers would experience cancer risks greater than 10 in a million with the Freeway Tunnel Alternatives. This is a significant increase in cancer risk. As discussed above, these results are based on a modeling methodology that would tend to minimize differences between projects. Therefore, the impacts of the project alternatives are likely more extensive than shown.

The HRA Technical Report presents the results of the analysis in terms of cancer risks. That is the risk of an individual developing cancer. A secondary measure of impacts is the cancer burden. This is a measure of the total number of persons that would be expected to contract cancer due to the Project's increased risks. This is done by multiplying the cancer risk by the number of exposed persons, typically by census tract. The average risk for each census tract is determined and then multiplied by the population. The results show risk increases in some areas and risk decreases in other areas. A burden analysis would determine whether the decreases outweighed the increases in terms of the number of persons impacted.

The HRA Technical Report discusses how a burden analysis would be performed if the project were projected to increase cancer risk by more than 10 in million. However, it did not perform this analysis because it incorrectly concluded that the project would not increase the cancer risk by more than this amount. The HRA shows locations where cancer risk would increase along with locations where they would decrease. The burden analysis would show how these increases and decreases balanced when applied to actual populations. This analysis would be required to conclude whether the project results in a net benefit or impact.

The DEIR/EIS's analysis of non-cancer health effect impacts from the project is even more problematic. Non-cancer health effects are measured by the acute hazard index (HIA), and chronic hazard index (HIC). These values are a measure of the potential for non-cancer health effects to occur. A value of less than one indicates that no adverse non-cancer health effects are expected to occur. An index of one indicates that sensitive persons will experience adverse non-cancer health effects. Indices greater than one indicate that the adverse non-cancer health effects will be more severe and pervasive but it does not show how much more severe or pervasive the adverse health effects would be. The hazard indices do not measure changes in non-cancer health effects but are a threshold at which adverse health effects begin to occur.

The HRA assesses non-cancer health effects of the project by examining the change in hazard index with the project over no project conditions. The DEIR/EIS asserts that if the project increases the index by one, then the impact is significant. However, the hazard indices do not provide any information on the impact of indices greater than one. In fact, the hazard indices do not provide any information except as a threshold for which adverse health effects would begin to occur. If the hazard index is less than one then no adverse health effects are anticipated. A hazard index of greater than one indicates that there will be adverse health impacts but does not provide a relative measure of those impacts. A change in hazard indices is meaningless unless that change is to an index of above one. If the change due to the project increases an index from below one to greater than one, the project has created an adverse health impact. If the project causes an increases at a receptor with a no project index greater than one then it makes an adverse health impact worse. The DEIR/EIS needs to present the overall hazard index for each alternative to determine the threshold of one is exceeded. If a hazard index exceeds one then the project creates or makes worse an adverse health impact. The change due to the project can then be used to characterize the project's contribution to the non-cancer health impact and determine if it is significant.

3.1.5 Greenhouse Gas Emission Calculations Do Not Include Those From Electrical Consumption

The greenhouse gas (GHG) emissions presented in the Air Quality Assessment Report and the DEIR only include those emitted from vehicles within the study area. GHG Emissions will also be produced through the generation of electricity used by the project. Emissions of criteria pollutants from electrical generation faculties are not included in those calculations because any new electrical generation emissions would come from outside the air basin and would not contribute to air quality levels within the basin. However, greenhouse gasses are a global issue and the location of the emissions is not relevant.

GHG emissions from electrical generation are dependent on the provider of the electricity. One-megawatt hour of electricity generates approximately 0.56 metric tons of CO_2EQ if purchased from Los Angeles Department of water and power. If purchased from Pasadena Department of Water and Power, one megawatt of electricity generates approximately 0.76 metric tons of CO_2EQ. One megawatt of power purchased from Southern California Edison generates approximately 0.29 metric tons of CO_2EQ. These emission factors come from SCAQMD's California Emissions Estimator Model (CalEEMod).

For the TDM/TSM and BRT alternatives, electrical requirements would be expected to be minimal, as would the anticipated emissions. The Freeway Tunnel Alternatives would consume electricity for tunnel lighting and the tunnel ventilation system. This could result in considerable GHG emission that should be reported in the DEIR/EIS. The LRT would consume the most electricity of the Build Alternatives and the non-inclusion of the GHG emissions associated with electricity in the reported emissions is a significant omission.

We were not able to find any data regarding the energy consumption of LA Metro's LRT cars. Dallas Area Rapid Transit LRT cars are similar to LA Metro's and consume an average of 288 kilowatt-hours of electricity per car per hour of operation (https://www.dart.org/newsroom/dartrailfacts.asp). Assuming just two cars per train and a 20-minute one-way travel time, the 326 daily one-way trains would generate between 65 and 170 metric tons of CO_2EQ per day. This equates to between approximately 23,400 and 61,700 metric tons of CO_2EQ per year. These are just the emissions for train propulsion and do not include electricity consumed by other components of the project such as lighting and ventilation. For the LRT Alternative, increased GHG emissions due to electrical generation are much greater than the increase due to vehicular travel. The DEIR/EIS shows that the LRT Alternative is anticipated to reduce vehicular emissions by 20 metric tons per day in the 2025 opening year and by 2.2 metric tons per day in 2035. However, the GHG emissions produced by the generation of electricity used to propel the trains will more than offset these reductions.

3.1.6 Traffic Modeling Deficiencies

Air pollutant emission predictions are based on traffic volumes and speeds. The review of the traffic study prepared for 5-Cities Alliance performed by Nelson\Nygaard Consulting Associates Inc. identified two issues that affect the DEIR/EIS's modeled traffic volumes that would also affect air pollutant impacts due to the project, spillback and induced traffic.

The Nelson/Nygaard traffic study notes that the traffic modeling did not adequately account for spillback that would occur when projected traffic volume on a road segment exceeds capacity. That is, vehicles are assumed to queue and wait their turn to pass through such bottlenecks. In reality, this large queue would not occur and travelers would adjust their behavior to avoid such bottlenecks with many finding alternative routes on arterial roadways in the project study area. This results in an under prediction of arterial road traffic volumes. If the DEIR/EIS's traffic modeling accounted for spillback, the traffic volume increases along local roadways could result in localized hot-spot impacts and cancer risk increases could be more widely dispersed, this traffic would generally travel at lower speeds on the arterial roadways and result in greater emissions.

A second important issue raised in the Nelson Nygaard report relates to induced travel. As more freeway lane miles and alternative routes are introduced, driving becomes a more convenient option. This serves to induce more vehicle trips from people who otherwise would not have traveled via car or made that trip altogether. That is, as congestion is decreased, people will decide to make trips that they would not have previously made because of congestion. The Nelson Nygaard traffic study notes that the DEIR/EIS's travel demand model cannot be trusted to accurately estimate this induced travel. Further, the Nelson/Nygaard study explains, that even if the model accurately reflected induced travel, the time period analyzed in the EIR/EIS is too short. Research shows roadway projects can result in short-term reductions in congestion due the increased capacity. However, over time, the reduced congestion induces more trips to the point where the same level of congestion as without the project is reached—but with a larger number of vehicles.

Proper accounting for spillback and induced traffic in the traffic model would increase pollutant emissions estimates in two ways. The increased traffic would increase congestion and lower speeds resulting in increased emissions per mile traveled and it would increase the vehicle miles traveled. The VMT increase would cause a proportional increase in emissions. That is, a one percent increase in VMT would result in a one percent increase in emissions. The increase due to the change in speed is more complex and not easily estimated.

The additional induced traffic would also result in increased pollutant concentrations and cancer risks with the project alternatives compared to no project conditions.