Attachment B: Supplemental Air Quality Analysis Memo

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MEMO

Date: December 17, 2021

To: Désirée Dei Rossi
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From: James Reyff
Casey Divine
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RE: Alviso Hotel, San José, CA
I&R Job #19-189

SUBJECT: Response to Comments on Air Quality Made by Lozeau Drury LLP

This memo addresses comments regarding air quality for the Alviso Hotel / The Estuary @ Terra project in San José, CA made by Lozeau Drury LLP, dated November 8, 2021. Illingworth & Rodkin, Inc. (I&R) prepared the air quality and greenhouse gas (GHG) assessment[1] for this project and was asked by the applicant to respond to the air quality comments.

Claim I: Unsubstantiated Input Parameters Used to Estimate Project Emissions

The Commenter claims that changes to default settings in the CalEEMod model and application of construction and operational inputs and control measures result in underestimation of project emissions. The Commenter identifies specific changes that they believe are unsubstantiated.

Response:

A response to each change is provided as follows:

[1] Illingworth & Rodkin, Inc, *The Estuary @ Terra Air Quality & Greenhouse Gas Assessment*, October 2, 2020.

Underestimated Land Use Size
At the time of the air quality study, the project description (7/29/2020), traffic data (July 2020), construction data (9/8/2020), and site plans (10/30/2019) provided to I&R at the time of the air quality analysis were for a 215-room hotel that was 108,702 square feet. Both construction and operational criteria pollutant emissions and health risk impacts were computed as well below their respective thresholds. The project underwent some minor changes resulting in slightly higher floor space (about a 3.5% increase). This addition of 3,761-sf of hotel use would not increase traffic and have a negligible increase in emissions or health risk impacts and would not change the conclusion or recommended mitigation measures contained in the IS/MND. Note that the Commenter does not provide any evidence to the contrary.

Unsubstantiated Changes to Individual Construction Phase Lengths
As described in the air quality assessment (Attachment 2 of Appendix A to the IS/MND), specific construction information was provided and used in the modeling rather than relying on CalEEMod model default conditions. These changes were based on the construction information sheet provided by the applicant on 9/8/2020 that include the project construction dates and duration in terms of workdays for each construction phase. The construction schedule and equipment list represent project specific information that is deemed as substantial evidence, where use of default CalEEMod inputs would be inappropriate for this project. This information is contained in Attachment 2 of Appendix A to the IS/MND and does not need to be in the body of the report, as it was accurately captured in the CalEEMod modeling.

Unsubstantiated Amount of Material Import
The IS/MND stated that "grading of the site would import approximately 1,000 cubic yards of fill". The construction information sheet provided by the applicant on 9/8/2020 (see Attachment 2 of Appendix A to the IS/MND) included 900 cubic yards of imported soil during the grading phase. These are approximate amounts, as the project is undergoing preliminary design and engineering. While the IS/MND reported an approximate amount that is close to the reported amount of imported soil, the 900 cubic yard amount calculated in CalEEMod is appropriate. The difference in emissions associated with these differences is negligible as it represents only 0.1% of all truck trips generated by construction. Therefore, the construction-related emissions to as related to project material import was not underestimated. Again, the Commenter does not demonstrate that an additional 100 cubic yard of soil import would change the results of the assessment.

Unsubstantiated Changes to Off-Road Construction Unit Amounts and Usage Hours
The modeling inputs were project-specific, based on the construction information provided. This information includes the quantity of project construction equipment needed along with the estimated number of days and average hours of operations for days that equipment is used. This information is provided in Attachment 2 of Appendix A to the IS/MND and does not need to be in the body of the report, as it was accurately captured in the CalEEMod modeling.

Underestimated Hauling Trip Number
This comment was addressed above under *Unsubstantiated Amount of Material Import*. Both 1,000 cubic yards reported in the IS/MND and 900 cubic yards reported in Attachment 2 of Appendix A of the IS/MND are preliminary estimates. The difference of 100 cubic yards is negligible as it represents only 0.1% of all truck trips generated by construction. This would have no measurable effect on the results reported in the IS/MND.

Unsubstantiated Changes to Wastewater Treatment System

Wastewater treatment systems only cause indirect emissions of greenhouse gases and do not affect criteria air pollutant emissions. Default assignments of percentage of treatment type in CalEEMod reflect statewide averages and not conditions in San José. The CalEEMod model provides three options to enter for wastewater treatment: (1) through septic systems, (2) anerobic treatment, and (3) facultative lagoons. The Septic systems and facultative lagoons are aerobic treatment techniques that typically occur in rural areas and not in San José. The project plans, obviously, do not include this treatment type. Wastewater would be treated at a municipal wastewater treatment plant. Biosolids removed from the wastewater treatment would be processed using anerobic digesters, but the treatment plant would capture these emissions. As a result, the difference in emissions from operation of the project with and without this change is minor.

Incorrect Application of Tier 3 Mitigation

The CalEEMod modeling output provided in Attachment 2 of Appendix A includes both unmitigated and mitigated emission levels (i.e., mitigated with Tier 3 equipment). Only the unmitigated emission levels from the model output were used to describe air quality impacts in the IS/MND. Mitigation for this impact was not required so levels associated with Tier 3 mitigation were not applied to the project.

Improper Application of Energy-Related Operational Mitigation Measures

Reported energy GHG emissions in the IS/MND and Appendix A to the IS/MND are based on mitigated Operational emissions generated by CalEEMod and provided in Attachment 2 to Appendix A of the IS/MND. In order to account for SJCE's 100% carbon free renewable energy for projects operational after 2021, the modification had to be applied in the mitigated energy GHG emissions section. While the emissions in CalEEMod are reported as mitigation, they are not because the modifications to the CalEEMod model, shown as mitigation, are required by the City. In addition, the application of these mitigation measures does not change the conclusion of the significance finding for greenhouse gas emissions and climate change impacts. Additionally, since completion of the IS/MND, the City has adopted a new qualified GHG Reduction Strategy for 2030 and an accompanying project compliance checklist. The project is required to comply with the strategy and checklist to demonstrate less than significant GHG impacts. As such, the project has a less than significant impact with respect to GHG emissions.

Claim II: Diesel Particulate Matter Health Risk Emissions Inadequately Evaluated.

The Commenter claims that by failing to prepare a quantified operational health risk assessment associated with diesel particulate matter health risk emissions, the IS/MND fails to evaluate the full Project health impacts.

Response:

The Commenter incorrectly asserts that diesel traffic produced by the proposed Project would cause significant health risks from traffic. In response to this claim about the project's traffic resulting in significant health risk impacts, the total project daily trips were modeled to further prove that the project's traffic does not pose a significant health risk. However, it should be noted, that per BAAQMD, roads with less than 10,000 total vehicles per day and less than 1,000 trucks per day are categorized as minor, low impact sources that do not pose a significant health impact even in combination with other nearby sources. This source can be excluded from the CEQA evaluation.[2] The project would generate approximately 1,642 daily trips, which is well below the 10,000 daily vehicles per day threshold. Most of these trips would be made by light-duty automobiles (non-diesel vehicles) and these trips would be distributed among many roadways. Therefore, the Air Quality Analysis for the IS/MND complies with the BAAQMD's guidance.

To emphasize that there is no operational health impact as a result of the project, a project-specific refined dispersion model was completed to demonstrate that the project-caused cancer risks from operational traffic are negligible. This operational health risk assessment is consistent with OEHHA guidance and the results were compared against the BAAQMD threshold to show that there would be a less-than-significant health risk (see below).

A refined assessment of operational health risks that included dispersion modeling was conducted to evaluate the project operational risks from mobile sources. The modeling of project traffic on the main roadway (N. 1st Street) where all the project traffic would egress within 1,000 feet of the project site was conducted with the AERMOD dispersion model using line-area sources to represent the roadway near the project area (see Figure 1). A conservative analysis was conducted where all project traffic emissions from on- and near-site travel were assumed to occur along N. 1st Street. This roadway is closest to the nearby sensitive receptors. The modeling used a five-year data set (2013-2017) of hourly meteorological data from the San José International Airport that was prepared for use with the AERMOD model by BAAQMD. The same model and meteorological data used for the construction health risk assessment for the IS/MND air quality analysis were used for this modeling. TAC and $PM_{2.5}$ concentrations at the same sensitive receptors and MEI locations were calculated with AERMOD. The MEI is the maximum exposed individual or sensitive receptor with highest impact from the project.

Diesel particulate matter (DPM), organic TACs, and $PM_{2.5}$ emission rates were developed for traffic on N. 1st Street using the Caltrans version of the CARB EMFAC2017 emissions model, known as CT-EMFAC2017. The CT-EMFAC2017 model provides emission factors for mobile source criteria pollutants and TACs, including DPM. Emission processes modeled include running exhaust for DPM, $PM_{2.5}$ and total organic compounds (TOG), running evaporative losses for TOG, and tire and brake wear and fugitive road dust for $PM_{2.5}$. All $PM_{2.5}$ emissions from all vehicles were used, rather than just the $PM_{2.5}$ fraction from diesel powered vehicles, because all vehicle types (i.e., gasoline and diesel powered) produce $PM_{2.5}$. Additionally, $PM_{2.5}$ emissions from vehicle tire and brake wear and from re-entrained roadway dust were included. DPM emissions are projected to decrease in the future and are reflected in the CT-EMFAC2017 emissions data. Inputs to the model include region (Santa Clara County), type of road (major/collector), truck percentage for non-state highways in Santa Clara County (3.51 percent),[3] traffic mix assigned by CT-EMFAC2017 for the county, year of analysis (2023 – project operational year), and season (annual). Travel speeds of 35 miles per hour (mph) for N. 1st Street, based on posted speed limit signs, were used for all period of the day.

Emission factors are dependent on the year, with higher rates for earlier years. Year 2023 emission

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2 Bay Area Air Quality Management District, 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards.* May. Web: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf?la=en

3 Bay Area Air Quality Management District, 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May. Web: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf?la=en

factors were conservatively assumed as being representative of future conditions over the time period that cancer risks are evaluated (28 years) from the roadway traffic, since overall vehicle emissions, and in particular diesel truck emissions will decrease in the future.

Average hourly traffic distributions for Santa Clara County roadways were developed using the EMFAC model,[4] which were then applied to the project trips to obtain estimated hourly traffic volumes and emissions for the roadway. The roadway was modeled as line-area sources. Input emissions to the model were the combination of traffic volume and emission rates.

The residential and school child sensitive receptor with the highest modeled concentration were identified as the Maximum Exposed Individuals or MEIs. For cancer risk computations, project construction would occur for two years followed by operation for a total of 30 years. To calculate the increased cancer risk from project traffic, the risks were adjusted for exposure duration to account for the MEIs being exposed to Project construction for the first 2 years of the 30-year period, as reported in the IS/MND. The exposure duration from roadway traffic was adjusted for 28 years of exposure at the residential MEI and 4 years of exposure at the school MEI (note school receptors would only be present at the school for 6 years maximum).

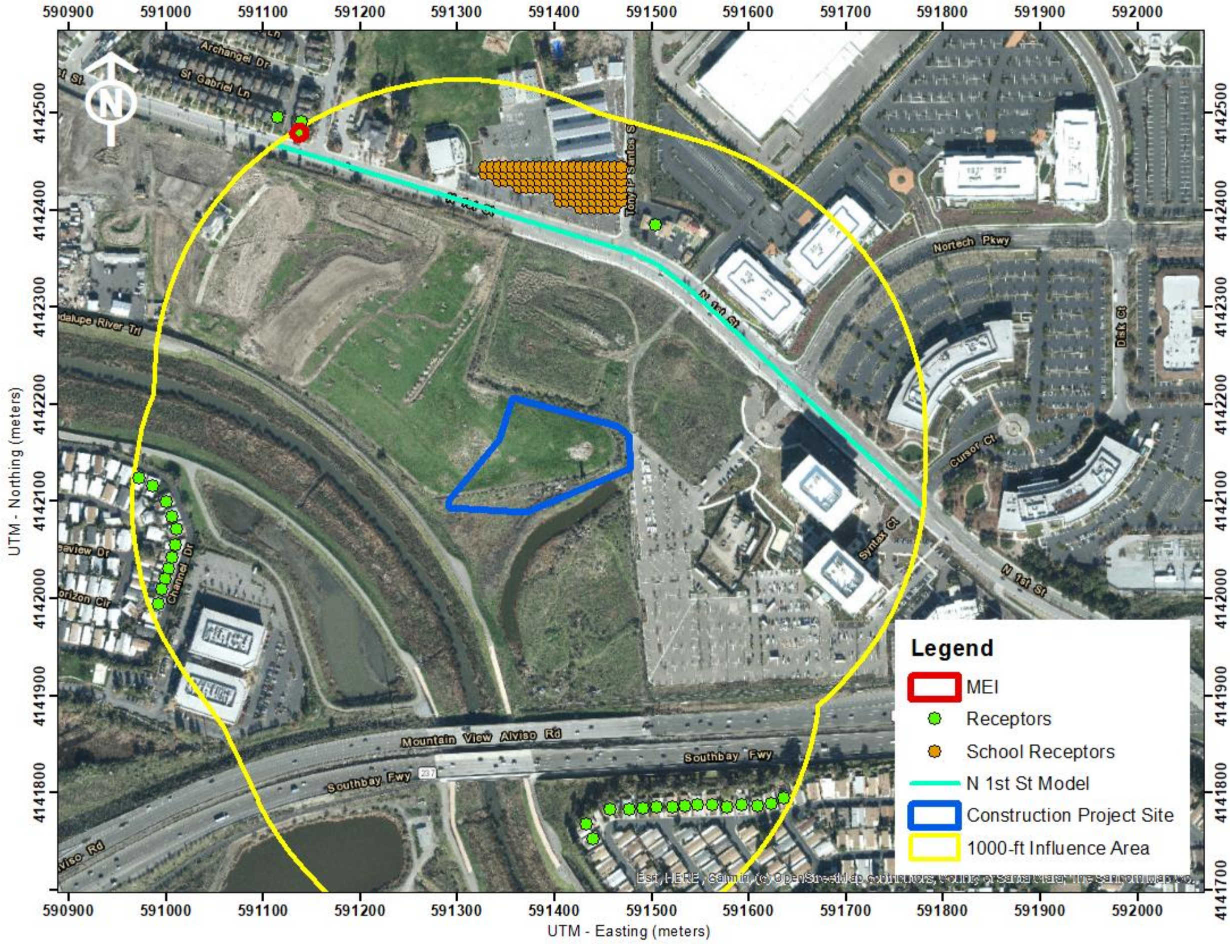
Results of this analysis are provided in Table 2. These results show the increased cancer risk to be negligible at the receptor most affected by the Project (i.e., the MEI). The project construction and operation increased cancer risks at the sensitive receptors were summed to demonstrate that the Project's increased cancer risk would not be significant with mitigation for construction. Note that the $PM_{2.5}$ concentration and hazard index value are not summed because they are based on an annual maximum level, which occurs during construction. As reported in the IS/MND, traffic generated by operation of the project would not contribute to significant health risks. Project traffic health risk modeling is provided as *Attachment 1* to this memo.

Table 2. Construction and Operation Risk Impacts at the MEI and School Receptors

Source		Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	Hazard Index
Project Construction (Years 0-2)	Unmitigated	0.3 (infant)	<0.01	<0.01
Project Traffic on N. 1st Street (Years 3-30)		0.1 (child)	0.02	<0.01
Total/Maximum Project Risks (Years 0-30)	Unmitigated	0.4	<0.03	<0.02
	BAAQMD Single-Source Threshold	***10***	***0.3***	***1.0***
Exceed Threshold?	Unmitigated	*No*	*No*	*No*
Mayne Elementary School Student Receptors				
Project Construction (Years 0-2)	Unmitigated	0.1 (child)	<0.01	<0.01
Project Traffic on N. 1st Street (Years 3-6)		<0.1 (child)	0.01	<0.01
Total/Maximum Project Risks (Years 0-6)	Unmitigated	<0.2	<0.02	<0.02
	BAAQMD Single-Source Threshold	***10***	***0.3***	***1.0***
Exceed Threshold?	Unmitigated	*No*	*No*	*No*

[4] The Burden output from EMFAC2007, a previous version of CARB's EMFAC model, was used for this since the current web-based version of EMFAC2014 does not include Burden type output with hour-by-hour traffic volume information.

Figure 1. Locations of Project Construction Site, Project Traffic Model, Off-Site Sensitive Receptors, and TAC Impacts



Claim III: Screening-Level Analysis Demonstrates Significant Impacts.

Response:

As demonstrated in response to Claim II, the health risk analysis that includes emissions and dispersion modeling using appropriate models recommended by BAAQMD show less than significant health risk impacts. The Commenter's incorrect assertion that Project risks would be significant relied on a screening level risk assessment performed by SWAPE. This screening level analysis is misleading and inaccurate.

First, SWAPE incorrectly assumes all emissions of PM_{10} exhaust from traffic is diesel particulate matter. This is not correct as most traffic associated with the Project would be powered by gasoline that does not produce diesel particulate matter. The CalEEMod modeling output provided in Attachment 2 of Appendix A of the IS/MND that the Commenter used to develop their diesel particulate matter emissions assumes that less than 5 percent of the traffic would be trucks. This incorrect assumption leads to a large error in estimating Project operational diesel particulate matter emissions.

The second error in the Commenter's analysis is that they assign all of these overestimated diesel particulate matter emissions to only the project site. This is incorrect because traffic emissions occur along the roadways where vehicles travel. According to the CalEEMod output in Attachment 2 of Appendix A of the IS/MND, travel distances are 7.30 to 9.50 miles. So, 98 percent of these emissions occur more than 1,000 feet from the project site and away from the nearby sensitive receptors.

Finally, the SWAPE analysis relied upon a screening model, AERSCREEN, to inflate these results rather than using the more accurate AERMOD model that is recommended by BAAQMD.[5] The AESCREEN model is a screening model that computes the maximum 1-hour concentration from a source and then applies a simple factor to estimate annual exposures. The model assumes that the source is continuous for every hour of the day for 365 days with adverse meteorological conditions that lead to conservatively high concentrations. AERSCREEN is a screening model that is recommended by U.S. EPA to identify the potential for impacts and not used to quantify significant impacts. If significant impacts are predicted using this model, then further analysis should be conducted. In addition, this model is inappropriate for modeling traffic sources.[6]

Claim IV: Failure to Adequately Evaluate Greenhouse Gas Impacts.

We assume this addresses GHG emissions from the hotel that the project would construct. Emissions were computed in the Air Quality Analysis. However, the analysis of project consistency with the City's 2030 Greenhouse Gas Reduction Strategy was addressed in the IS/MND and not the Air Quality Analysis.

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[5] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.

[6] According to the U.S. EPA (40 CFR Part 51, Appendix W – Guidelines on Air Quality Models), there are generally two levels of sophistication of air quality models. The first level consists of screening models that provide conservative modeled estimates of the air quality impact of a specific source or source category based on simplified assumptions of the model inputs (e.g., preset, worst-case meteorological conditions). If a screening model indicates that the increase in concentration attributable to the source could cause or exacerbate air quality conditions, then the second level of more sophisticated models should be applied unless appropriate controls or operational restrictions are implemented based on the screening modeling. AERSCREEN is a first-level screening model that is designed to provide a conservative (i.e., overestimate) of air pollutant impacts.

Attachment 1: Project Operation Dispersion Modeling Inputs and Risk Calculations

File Name:	N 1st Street Alviso Hotel - Santa Clara (SF) - 2023 - Annual.EF
CT-EMFAC2017 Version:	1.0.2.27401
Run Date:	12/15/2021 14:02
Area:	Santa Clara (SF)
Analysis Year:	2023
Season:	Annual

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Vehicle Category	VMT Fraction Across Category	Diesel VMT Fraction Within Category	Gas VMT Fraction Within Category
Truck 1	0.015	0.487	0.513
Truck 2	0.02	0.938	0.047
Non-Truck	0.965	0.014	0.958

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Road Type:	Major/Collector	
Silt Loading Factor:	CARB	0.032 g/m2
Precipitation Correction:	CARB	P = 64 days N = 365 days

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Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	<= 5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph
PM2.5	0.009229	0.005981	0.004054	0.002896	0.002194	0.001765	0.001511	0.001375
TOG	0.195764	0.127928	0.086105	0.061055	0.046181	0.036838	0.030861	0.027137
Diesel PM	0.000904	0.000732	0.000563	0.000446	0.000382	0.000353	0.00035	0.00037

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Fleet Average Running Loss Emission Factors (grams/veh-hour)

Pollutant Name	Emission Factor
TOG	1.35761

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Fleet Average Tire Wear Factors (grams/veh-mile)

Pollutant Name	Emission Factor
PM2.5	0.002108

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Fleet Average Brake Wear Factors (grams/veh-mile)

Pollutant Name	Emission Factor
PM2.5	0.016808

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Fleet Average Road Dust Factors (grams/veh-mile)

Pollutant Name	Emission Factor
PM2.5	0.014855

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Alviso Hotel / The Estuary @ Terra, San Jose - Offsite Residential Roadway Modeling
Project Operation - N. 1st Street
DPM Modeling - Roadway Links, Traffic Volumes, and DPM Emissions
Year = 2023

											Line Area					
Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Length (mi)	Link Width (m)	Link Width (ft)	Release Height (m)	Average Speed (mph)	Average Vehicles per Day	Area (sq m)	Area (sq ft)	Emission (g/s/m2)	Emission (lb/hr/ft2)	Initial Vertical height (m)	(Sigma z) Initial Vertical Dimension
DPM_1st	N. 1st Street	EB/WB	4	784.9	0.49	20.6	67.7	3.4	35	1,642	16,193	174,298	2.003E-10	1.477E-10	6.8	3.16

Emission Factors - DPM

Speed Category	1	2	3	4
Travel Speed (mph)	35			
Emissions per Vehicle (g/VMT)	0.00035			

Emisson Factors from CT-EMFAC2017

2023 Hourly Traffic Volumes and DPM Emissions - DPM_1st

Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s
1	3.91%	64	3.04E-06	9	6.50%	107	5.06E-06	17	5.58%	92	4.34E-06
2	2.59%	42	2.01E-06	10	7.36%	121	5.73E-06	18	3.28%	54	2.55E-06
3	2.88%	47	2.24E-06	11	6.33%	104	4.92E-06	19	2.36%	39	1.84E-06
4	3.34%	55	2.60E-06	12	6.84%	112	5.33E-06	20	0.92%	15	7.16E-07
5	2.19%	36	1.70E-06	13	6.15%	101	4.79E-06	21	2.99%	49	2.33E-06
6	3.39%	56	2.64E-06	14	6.15%	101	4.79E-06	22	4.14%	68	3.22E-06
7	5.98%	98	4.66E-06	15	5.23%	86	4.07E-06	23	2.47%	41	1.93E-06
8	4.66%	76	3.63E-06	16	3.91%	64	3.04E-06	24	0.86%	14	6.72E-07
								Total		1,642	

Alviso Hotel / The Estuary @ Terra, San Jose - Offsite Residential Roadway Modeling
Project Operation - N. 1st Street
PM2.5 Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2023

											Line Area					
Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Length (mi)	Link Width (m)	Link Width (ft)	Release Height (m)	Average Speed (mph)	Average Vehicles per Day	Area (sq m)	Area (sq ft)	Emission (g/s/m2)	Emission (lb/hr/ft2)	Initial Vertical height (m)	(Sigma z) Initial Vertical Dimension
PM25_1st	N. 1st Street	EB/WB	4	784.9	0.49	20.6	68	1.3	35	1,642	16,193	174,298	8.649E-10	6.377E-10	2.6	1.21

Emission Factors - PM2.5

Speed Category	1	2	3	4
Travel Speed (mph)	35			
Emissions per Vehicle (g/VMT)	0.001511			

Emisson Factors from CT-EMFAC2017

2023 Hourly Traffic Volumes and PM2.5 Emissions - PM25_1st

Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s
1	1.15%	19	3.87E-06	9	7.11%	117	2.39E-05	17	7.38%	121	2.48E-05
2	0.42%	7	1.40E-06	10	4.39%	72	1.48E-05	18	8.17%	134	2.75E-05
3	0.41%	7	1.37E-06	11	4.66%	77	1.57E-05	19	5.70%	94	1.91E-05
4	0.26%	4	8.85E-07	12	5.89%	97	1.98E-05	20	4.27%	70	1.44E-05
5	0.50%	8	1.68E-06	13	6.15%	101	2.07E-05	21	3.26%	54	1.10E-05
6	0.90%	15	3.04E-06	14	6.04%	99	2.03E-05	22	3.30%	54	1.11E-05
7	3.79%	62	1.27E-05	15	7.01%	115	2.36E-05	23	2.46%	40	8.27E-06
8	7.76%	127	2.61E-05	16	7.14%	117	2.40E-05	24	1.86%	31	6.27E-06
								Total		1,642	

Alviso Hotel / The Estuary @ Terra, San Jose - Offsite Residential Roadway Modeling
Project Operation - N. 1st Street
TOG Exhaust Modeling - Roadway Links, Traffic Volumes, and TOG Exhaust Emissions
Year = 2023

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Length (mi)	Link Width (m)	Link Width (ft)	Release Height (m)	Average Speed (mph)	Average Vehicles per Day	Line Area					
											Area (sq m)	Area (sq ft)	Emission (g/s/m2)	Emission (lb/hr/ft2)	Initial Vertical height	(Sigma z) Initial Vertical Dimension
TEXH_1st	N. 1st Street	EB/WB	4	784.9	0.49	20.6	68	1.3	35	1,642	16,193	174,298	1.766E-08	1.302E-08	2.6	1.21

Emission Factors - TOG Exhaust

Speed Category	1	2	3	4
Travel Speed (mph)	35			
Emissions per Vehicle (g/VMT)	0.03086			

Emisson Factors from CT-EMFAC2017

2023 Hourly Traffic Volumes and TOG Exhaust Emissions - TEXH_1st

Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s
1	1.15%	19	7.91E-05	9	7.11%	117	4.88E-04	17	7.38%	121	5.07E-04
2	0.42%	7	2.87E-05	10	4.39%	72	3.02E-04	18	8.17%	134	5.61E-04
3	0.41%	7	2.80E-05	11	4.66%	77	3.20E-04	19	5.70%	94	3.91E-04
4	0.26%	4	1.81E-05	12	5.89%	97	4.04E-04	20	4.27%	70	2.93E-04
5	0.50%	8	3.44E-05	13	6.15%	101	4.22E-04	21	3.26%	54	2.24E-04
6	0.90%	15	6.21E-05	14	6.04%	99	4.14E-04	22	3.30%	54	2.26E-04
7	3.79%	62	2.60E-04	15	7.01%	115	4.81E-04	23	2.46%	40	1.69E-04
8	7.76%	127	5.33E-04	16	7.14%	117	4.90E-04	24	1.86%	31	1.28E-04
								Total		1,642	

Alviso Hotel / The Estuary @ Terra, San Jose - Offsite Residential Roadway Modeling
Project Operation - N. 1st Street
TOG Evaporative Emissions Modeling - Roadway Links, Traffic Volumes, and TOG Evaporative Emissions
Year = 2023

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Length (mi)	Link Width (m)	Link Width (ft)	Release Height (m)	Average Speed (mph)	Average Vehicles per Day	Line Area: Area (sq m)	Line Area: Area (sq ft)	Line Area: Emission (g/s/m2)	Line Area: Emission (lb/hr/ft2)	Line Area: Initial Vertical height	Line Area: (Sigma z) Initial Vertical Dimension
TEVAP_1st	N. 1st Street	EB/WB	4	784.9	0.49	20.6	68	1.3	35	1,642	16,193	174,298	2.220E-08	1.637E-08	2.6	1.21

Emission Factors - PM2.5 - Evaporative TOG

Speed Category	1	2	3	4
Travel Speed (mph)	35			
Emissions per Vehicle per Hour (g/hour)	1.35761			
Emissions per Vehicle per Mile (g/VMT)	0.03879			

Emisson Factors from CT-EMFAC2017

2023 Hourly Traffic Volumes and TOG Evaporative Emissions - TEVAP_1st

Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s
1	1.15%	19	9.94E-05	9	7.11%	117	6.14E-04	17	7.38%	121	6.37E-04
2	0.42%	7	3.60E-05	10	4.39%	72	3.79E-04	18	8.17%	134	7.05E-04
3	0.41%	7	3.52E-05	11	4.66%	77	4.02E-04	19	5.70%	94	4.92E-04
4	0.26%	4	2.27E-05	12	5.89%	97	5.08E-04	20	4.27%	70	3.69E-04
5	0.50%	8	4.32E-05	13	6.15%	101	5.31E-04	21	3.26%	54	2.81E-04
6	0.90%	15	7.80E-05	14	6.04%	99	5.21E-04	22	3.30%	54	2.85E-04
7	3.79%	62	3.27E-04	15	7.01%	115	6.05E-04	23	2.46%	40	2.12E-04
8	7.76%	127	6.70E-04	16	7.14%	117	6.16E-04	24	1.86%	31	1.61E-04
								Total		1,642	

Alviso Hotel / The Estuary @ Terra, San Jose - Offsite Residential Roadway Modeling
Project Operation - N. 1st Street
Fugitive Road PM2.5 Modeling - Roadway Links, Traffic Volumes, and Fugitive Road PM2.5 Emissions
Year = 2023

											Line Area					
Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Length (mi)	Link Width (m)	Link Width (ft)	Release Height (m)	Average Speed (mph)	Average Vehicles per Day	Area (sq m)	Area (sq ft)	Emission (g/s/m2)	Emission (lb/hr/ft2)	Initial Vertical height (m)	(Sigma z) Initial Vertical Dimension
FUG_1st	N. 1st Street	EB/WB	4	784.9	0.49	20.6	68	1.3	35	1,642	16,193	174,298	1.933E-08	1.425E-08	2.6	1.21

Emission Factors - Fugitive PM2.5

Speed Category	1	2	3	4
Travel Speed (mph)	35			
Tire Wear - Emissions per Vehicle (g/VMT)	0.00211			
Brake Wear - Emissions per Vehicle (g/VMT)	0.01681			
Road Dust - Emissions per Vehicle (g/VMT)	0.01486			
Total Fugitive PM2.5 - Emissions per Vehicle (g/VMT)	0.03377			

Emisson Factors from CT-EMFAC2017

2023 Hourly Traffic Volumes and Fugitive PM2.5 Emissions - FUG_1st

Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s	Hour	% Per Hour	VPH	g/s
1	1.15%	19	8.65E-05	9	7.11%	117	5.34E-04	17	7.38%	121	5.55E-04
2	0.42%	7	3.14E-05	10	4.39%	72	3.30E-04	18	8.17%	134	6.14E-04
3	0.41%	7	3.06E-05	11	4.66%	77	3.50E-04	19	5.70%	94	4.28E-04
4	0.26%	4	1.98E-05	12	5.89%	97	4.42E-04	20	4.27%	70	3.21E-04
5	0.50%	8	3.76E-05	13	6.15%	101	4.62E-04	21	3.26%	54	2.45E-04
6	0.90%	15	6.79E-05	14	6.04%	99	4.54E-04	22	3.30%	54	2.48E-04
7	3.79%	62	2.85E-04	15	7.01%	115	5.27E-04	23	2.46%	40	1.85E-04
8	7.76%	127	5.83E-04	16	7.14%	117	5.36E-04	24	1.86%	31	1.40E-04
								Total		1,642	

Alviso Hotel / The Estuary @ Terra, San Jose, CA - N. 1st Street Traffic - TACs & PM2.5
AERMOD Risk Modeling Parameters and Maximum Concentrations - Project Traffic
at Residential MEI (1.5 m receptor heights)

Emission Year	2023
Receptor Information	Residential MEI receptor
Number of Receptors	1
Receptor Height	1.5 meters
Receptor Distances	Residential MEI receptor

Meteorological Conditions	
BAQMD San Jose Airport Met Data	2013-2017
Land Use Classification	Urban
Wind Speed	Variable
Wind Direction	Variable

Maximum Residential Cancer Risk Maximum Concentrations

Meteorological	Concentration (μg/m3)		
Data Years	DPM	Exhaust TOG	Evaporative TOG
2013-2017	0.00018	0.01767	0.02222

Maximum Residential PM2.5 Maximum Concentrations

Meteorological	PM2.5 Concentration (μg/m3)		
Data Years	Total PM2.5	Fugitive PM2.5	Vehicle PM2.5
2013-2017	0.02021	0.01934	0.00087

Alviso Hotel / The Estuary @ Terra, San Jose, CA - N. 1st Street Cancer Risk & PM2.5
Impacts at MAX Residential- 1.5 meter receptor height (1st floor)
28 Year Residential Exposure - Project Traffic

Cancer Risk Calculation Method

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00
Vehicle TOG Exhaust	6.28E-03
Vehicle TOG Evaporative	3.70E-04

Values

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 16**	**16 - 30**
Parameter				
ASF =	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Maximum - Exposure Information					Concentration (ug/m3)			Cancer Risk (per million)			
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Age Sensitivity Factor**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**DPM**	**Exhaust TOG**	**Evaporative TOG**	**TOTAL**
0	0.25	-0.25 - 0*	2021	10	0.0000	0.0000	0.0000	0.000	0.000	0.0000	0.00
1	1	0 - 1	2021	10	0.0000	0.0000	0.0000	0.000	0.000	0.0000	0.00
2	1	1 - 2	2022	10	0.0000	0.0000	0.0000	0.000	0.000	0.0000	0.00
3	1	2 - 3	2023	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
4	1	3 - 4	2024	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
5	1	4 - 5	2025	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
6	1	5 - 6	2026	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
7	1	6 - 7	2027	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
8	1	7 - 8	2028	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
9	1	8 - 9	2029	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
10	1	9 - 10	2030	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
11	1	10 - 11	2031	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
12	1	11 - 12	2032	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
13	1	12 - 13	2033	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
14	1	13 - 14	2034	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
15	1	14 - 15	2035	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
16	1	15 - 16	2036	3	0.0002	0.0177	0.0222	0.005	0.003	0.0002	0.01
17	1	16-17	2037	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
18	1	17-18	2038	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
19	1	18-19	2039	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
20	1	19-20	2040	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
21	1	20-21	2041	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
22	1	21-22	2042	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
23	1	22-23	2043	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
24	1	23-24	2044	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
25	1	24-25	2045	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
26	1	25-26	2046	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
27	1	26-27	2047	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
28	1	27-28	2048	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
29	1	28-29	2049	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
30	1	29-30	2050	1	0.0002	0.0177	0.0222	0.001	0.000	0.0000	0.00
Total Increased Cancer Risk								0.07	0.041	0.003	**0.12**

* Third trimester of pregnancy

Hazard Index	**Maximum Fugitive PM2.5**	**Total PM2.5**
0.00004	0.02	0.02

Alviso Hotel / The Estuary @ Terra, San Jose, CA - N. 1st Street Project Traffic - TACs & PM2.5
Maximum Cancer Risk and PM2.5 Concentration
AERMOD Risk Modeling Parameters and Maximum Concentrations
Impacts at Mayne Elementary School (K-5th Grades, 5 -11 years old), 4-Year Child Exposure - 1 m

Emissions Years	2023
Receptor Information	
Number of Receptors	1
Receptor Height =	1.0 meters
Receptor distances =	at MEI school site

Meteorological Conditions

BAAQMD San Jose Airport Met Data	2013-2017
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

Emission Years	Concentration (μg/m³)		
	DPM	Exhaust TOG	Evaporative TOG
2023	0.00020	0.01842	0.02316

Emission Years	PM2.5 Concentrations (μg/m³)		
	Total PM2.5	Fugitive PM2.5	Vehicle PM2.5
2023	0.0211	0.02016	0.0009

Maximum School Child PM2.5 Concentration (μg/m³)* =	0.01

* Concentration adjusted for exposure duration at school

Alviso Hotel / The Estuary @ Terra, San Jose, CA - N. 1st Street Project Traffic Cancer Risk
Maximum MEI and Child Cancer Risk
Child Exposures (1.0 meter receptor heights)
Impacts at Mayne Elementary School (K-5th Grades, 5 -11 years old), 4-Year Child Exposure - 1 meter

Cancer Risk Calculation Method

Student Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)

Inhalation Dose = C_{air} x SAF x 8hr BR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
SAF = School Adjustment Factor (unitless) for source operation and exposures different than 8 hours/day
= (24/SHR) x (7days/SDay) x (ScHR/8 hrs)
SHR = Hours of emission source operation
SDay = Modeled number of days per week of source operaion
ScHR = School operation hours while emission source in operation
8-Hr BR = Eight-hour breathing rate (L/kg body weight-per 8 hrs)
A = Inhalation absorption factor
10^{-6} = Conversion factor

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00
Vehicle TOG Exhaust	6.28E-03
Vehicle TOG Evaporative	3.70E-04

	Infant	Child
Age -->	0 - <2	2 - <16
Parameter		
ASF	10	3
8-Hr BR* =	1200	520
ScHR** =	9.00	9.00
SHR =	24	24
SDay =	7	7
A =	1	1
EF =	250	250
AT =	70	70
SAF =	1.13	1.13

* 95th percentile 8-hr breathing rates for moderate intensity activities
** ScHR based on 9 hours school day

Road Traffic Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Year	Exposure Duration (years)	Age	Maximum - Exposure Information: Age Sensitivity Factor	Annual TAC Conc (ug/m3): DPM	Annual TAC Conc (ug/m3): Exhaust TOG	Annual TAC Conc (ug/m3): Evaporative TOG	Cancer Risk (per million): DPM	Cancer Risk (per million): Exhaust TOG	Cancer Risk (per million): Evaporative TOG	Total	Hazard Index
1 - Kin	2021	1	5 - 6	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00004
2 - 1st	2022	1	6 - 7	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
3 - 2nd	2023	1	7 - 8	3	0.0002	0.0184	0.0232	0.0038	0.0020	0.0001	0.0059	
4 - 3rd	2024	1	8 - 9	3	0.0002	0.0184	0.0232	0.0038	0.0020	0.0001	0.0059	
5 - 4th	2025	1	9 - 10	3	0.0002	0.0184	0.0232	0.0038	0.0020	0.0001	0.0059	
6 - 5th	2026	1	10 - 11	3	0.0002	0.0184	0.0232	0.0038	0.0020	0.0001	0.0059	
Total Increased Cancer Risk								0.0151	0.0079	0.0006	**0.02**	