SANTANA WEST PROJECT DRAFT AIR QUALITY ASSESSMENT

San Jose, California

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Introduction

The purpose of this report is to address air quality and community risk impacts associated with the Santana West project. The Santana West project site is currently developed with three movie theaters (Century 21, 22, and 23), a restaurant, and a large surface parking lot. A public road, Olsen Drive, traverses the site, connecting Winchester Boulevard to a residential neighborhood west of the project site. The project site is adjacent to the historic Winchester Mystery House. The proposed project is a phased development that would include demolition of the two non-historic theater buildings on-site (Century 22 and 23) and construction of 969,051 square feet (sf) of office space and 29,000 square feet of retail space in six buildings, and retention of the Century 21 Theater building. Parking would be provided in above grade and below grade parking structures within the new buildings. The buildings would range in height from six to nine stories with the nine story buildings along Winchester Boulevard and in the center of the site. The six story buildings would be located near the western property line.

Air pollutant emissions associated with construction and operation of the project were modeled. In addition, the potential construction health risk impact to nearby sensitive receptors was evaluated. This analysis addresses those issues following the guidance provided by the Bay Area Air Quality Management District (BAAQMD).

Setting

The project is located in northern Santa Clara County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$).

Air Pollutants of Concern

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic Air Contaminants

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2008, CARB approved a new regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles.[1] The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or equivalent by 2023. These requirements are phased in over the compliance period and depend on the model year of the vehicle.

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California Environmental Protection Agency [EPA]) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[2] *Attachment 1* includes detailed community risk modeling methodology.

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care

[1] Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: November 21, 2014.
[2] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

facilities, elementary schools, and parks. The closest sensitive receptors to the project site are residences located adjacent to the western and southern project property boundaries. There are other residences at further distances in all directions from the project site.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1.

The BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693). The order requires the BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds (Cal. Court of Appeal, First Appellate District, Case Nos. A135335 & A136212). CBIA sought review by the California Supreme Court on three issues, including the appellate court's decision to uphold the BAAQMD's adoption of the thresholds, and the Court granted review on just one: Under what circumstances, if any, does CEQA require an analysis of how existing environmental conditions will impact future residents or users of a proposed project? In December 2015, the Supreme Court determined that an analysis of the impacts of the environment on a project – known as "CEQA-in-reverse" – is only required under two limited circumstances: (1) when a statute provides an express legislative directive to consider such impacts; and (2) when a proposed project risks exacerbating environmental hazards or conditions that already exist (Cal. Supreme Court Case No. S213478). The Supreme Court reversed the Court of Appeal's decision and remanded the matter back to the appellate court to reconsider the case in light of the Supreme Court's ruling. Accordingly, the case is currently pending back in the Court of Appeal. Because the Supreme Court's holding concerns the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment), and not the science behind the thresholds, the significance thresholds contained in the 2011 CEQA Air Quality Guidelines are applied to this project.

Table 1. Air Quality Significance Thresholds

<table>
<tr><th rowspan="2">Pollutant</th><th>Construction Thresholds</th><th colspan="2">Operational Thresholds</th></tr>
<tr><th>Average Daily Emissions (lbs./day)</th><th>Average Daily Emissions (lbs./day)</th><th>Annual Average Emissions (tons/year)</th></tr>
<tr><td colspan="4">Criteria Air Pollutants</td></tr>
<tr><td>ROG</td><td>54</td><td>54</td><td>10</td></tr>
<tr><td>NO_x</td><td>54</td><td>54</td><td>10</td></tr>
<tr><td>PM_{10}</td><td>82 (Exhaust)</td><td>82</td><td>15</td></tr>
<tr><td>$PM_{2.5}$</td><td>54 (Exhaust)</td><td>54</td><td>10</td></tr>
<tr><td>CO</td><td>Not Applicable</td><td colspan="2">9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)</td></tr>
<tr><td>Fugitive Dust</td><td>Construction Dust Ordinance or other Best Management Practices</td><td colspan="2">Not Applicable</td></tr>
<tr><td colspan="4">Health Risks and Hazards for Single Sources</td></tr>
<tr><td>Excess Cancer Risk</td><td colspan="3">>10 per one million</td></tr>
<tr><td>Hazard Index</td><td colspan="3">>1.0</td></tr>
<tr><td>Incremental annual $PM_{2.5}$</td><td colspan="3">>0.3 µg/m^3</td></tr>
<tr><td colspan="4">Health Risks and Hazards for Combined Sources (Cumulative from all sources within 1,000 foot zone of influence)</td></tr>
<tr><td>Excess Cancer Risk</td><td colspan="3">>100 per one million</td></tr>
<tr><td>Hazard Index</td><td colspan="3">>10.0</td></tr>
<tr><td>Annual Average $PM_{2.5}$</td><td colspan="3">>0.8 µg/m^3</td></tr>
<tr><td colspan="4">Greenhouse Gas Emissions</td></tr>
<tr><td>GHG Annual Emissions</td><td colspan="3">Compliance with a Qualified GHG Reduction Strategy OR
1,100 metric tons or 4.6 metric tons per capita</td></tr>
<tr><td colspan="4">Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less; and GHG = greenhouse gas.</td></tr>
</table>

Impact: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable State or federal ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less than significant with construction-period mitigation measures.***

The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NOx), PM_{10}, and $PM_{2.5}$ and apply to both construction period and operational period impacts.

The California Emissions Estimator Model (CalEEMod) Version 2013.2.2 was used to predict emissions from construction and operation of the site assuming full build out of the project. The project land use types and size, and anticipated construction schedule were input to CalEEMod.

Construction period emissions

CalEEMod provided annual emissions for construction. CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling, and vendor traffic. A construction build-out scenario, including equipment list and schedule, was provided by the project applicant. The proposed project land uses were input into CalEEMod, which included: 369,804 sf entered as “Office Park,” 29,000 sf entered as “Strip Mall,” and 630 parking spaces entered as “Enclosed Parking with Elevator” for Phase 1; 367,494 sf entered as “Office Park,” and 515 spaces entered as “Enclosed Parking with Elevator” for Phase 2; and 231,753 sf entered as “Office Park,” and 1,400 spaces entered as “Enclosed Parking with Elevator” for Phase 3.

The project would require up to 50,000 cubic yards (cy) of soil export per building, which was entered into the model. The anticipated 2,400 tons of demolition on average per building was entered into the model. In addition, 1,400 cement truck round trips during the building construction phase are anticipated and were entered per building.

The anticipated construction schedule assumes that the project would be built out over a period of approximately 6 years beginning as early as April 2017, or an estimated 1,560 construction workdays (assuming an average of 260 construction days per year). Average daily emissions were computed by dividing the total construction emissions by the number of construction days. Table 2 shows average daily construction emissions of ROG, NO_X, PM_{10} exhaust, and $PM_{2.5}$ exhaust during construction of the project. As indicated in Table 2, predicted project emissions would not exceed the BAAQMD significance thresholds. *Attachment 2* includes the CalEEMod input and output values for construction emissions.

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

Table 2. Construction Period Emissions

Scenario	ROG	NOx	PM_{10} Exhaust	$PM_{2.5}$ Exhaust
Phase 1 construction emissions (tons)	4.13 tons	6.32 tons	0.20 tons	0.18 tons
Phase 2 construction emissions (tons)	3.56 tons	4.82 tons	0.15 tons	0.14 tons
Phase 3 construction emissions (tons)	4.74 tons	4.06 tons	0.13 tons	0.12 tons
Total construction emissions (tons)	12.43 tons	15.20 tons	0.48 tons	0.44 tons
Average daily emissions (pounds)[1]	15.9 lbs.	19.5 lbs.	0.6 lbs.	0.6 lbs.
BAAQMD Thresholds (pounds per day)	*54* lbs.	*54* lbs.	*82* lbs.	*54* lbs.
Exceed Threshold?	**No**	**No**	**No**	**No**
Notes: [1]Assumes 1,560 workdays.				

Operational Period Emissions

Operational air emissions from the project would be generated primarily from autos driven by future residents and employees. Evaporative emissions from architectural coatings and maintenance products (classified as consumer products) are typical emissions from these types of uses. CalEEMod was used to predict net emissions from operation of the proposed project assuming full build-out.

Land Uses

The proposed project land uses were input to CalEEMod, which included 969,051 sf entered as "Office Park," 29,000 sf entered as "Strip Mall," and 2,545 spaces entered as "Enclosed Parking with Elevator." An Existing run was conducted to determine emissions from existing on-site uses, which included 5 screens entered as "Movie Theater," and 6,800 sf entered as "High Turnover (Sit Down Restaurant."

Model Year

Emissions associated with vehicle travel depend on the year of analysis because emission control technology requirements are phased-in over time. Therefore, the earlier the year analyzed in the model, the higher the emission rates utilized by CalEEMod. The earliest full year the buildout project could possibly be constructed and begin operating would be 2024. Emissions associated with build-out later than 2024 would be lower.

Trip Generation Rates

CalEEMod allows the user to enter specific vehicle trip generation rates, which were input to the model using the daily trip generation rate provided in the project traffic report. The trip rates accounted for the trip reductions due to the proximity to transit, retail pass-by trips, and the proposed project shuttle. The restaurant pass-by trip reduction was accounted for in the Existing model run. The default trip lengths and trip types specified by CalEEMod were used.

Consumer Products

CalEEMod computes emissions associated with consumer products[3] for all land uses, regardless of their types. This is an unrealistic default assumption because certain land uses (e.g., parking structures) are not associated with the use of consumer products. For this analysis, the parking structures are not considered sources of consumer product ROG emissions. To correct for this assumption, a separate model run for the parking structure was developed to compute the consumer product emissions that the model erroneously generates for the parking structures. These emissions were subtracted from the modeled project emissions. No other adjustments were made in CalEEMod for area sources.

Energy

The 2013 Title 24 Building Standards became effective July 1, 2014 and are predicted to use 25 percent less energy for lighting, heating, cooling, ventilation, and water heating for residential uses and 30 percent less energy for non-residential uses than the 2008 standards that CalEEMod incorporates.[4] Therefore, the CalEEMod project run was adjusted to account for the greater energy efficiency.

Other Inputs

Default model assumptions for emissions associated with solid waste generation and water/wastewater use were applied to the project.

Table 3 reports the predicted emission in terms of annual emissions in tons and average daily operational emissions, assuming 365 days of operation per year. As shown in Table 3, average daily and annual emissions of ROG, NOx, PM_{10}, or $PM_{2.5}$ emissions associated with operation would not exceed the BAAQMD significance thresholds. ~~It should be noted that existing emissions from the Pacific Hand Car Wash would be minimal and were conservatively not quantified or subtracted from project emissions to determine net operational emissions.~~

[3] Per the CalEEMod User's Guide: "Consumer products are chemically formulated products used by household and institutional consumers, including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products"

[4] California Energy Commission, 2014. *New Title 24 Standards Will Cut Residential Energy Use by 25 Percent, Save Water, and Reduce Greenhouse Gas Emissions*. July. Available online: http://www.energy.ca.gov/releases/2014_releases/2014-07-01_new_title24_standards_nr.html

Table 3. Operational Emissions

Scenario	ROG	NOx	PM_{10}	$PM_{2.5}$
Annual Project Operational emissions (tons)	12.46 tons	6.99 tons	8.02 tons	2.27 tons
Existing Operational Emissions (tons)	1.37 tons	2.67 tons	1.66 tons	0.47 tons
Adjustment for Parking Structure ROG	3.98 tons	--	--	--
Total Net Project Operational emissions (tons)	7.11 tons	4.32 tons	6.36 tons	1.80 tons
BAAQMD Thresholds (tons per year)	*10 tons*	*10 tons*	*15 tons*	*10 tons*
Exceed Threshold?	**No**	***No***	**No**	**No**
Average Daily Net Project Operational Emissions (pounds)[1]	39.0 lbs.	23.7 lbs.	34.8 lbs.	9.8 lbs.
BAAQMD Thresholds (pounds per day)	*54* lbs.	*54* lbs.	*82* lbs.	*54* lbs.
Exceed Threshold?	**No**	**No**	**No**	**No**

[1] Assumes 365-day operation.

***Mitigation Measure AQ-1:* Include basic measures to control dust and exhaust during construction.**

During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction to a less than significant level. The contractor shall implement the following best management practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Impact: Expose sensitive receptors to substantial pollutant concentrations? ***Less than significant with construction period mitigation.***

Project construction would be a temporary source of TAC emissions. Most on-site construction equipment would be diesel-powered. DPM that would be emitted from this equipment and trucks used during construction, is a TAC that can elevate cancer risk and $PM_{2.5}$ concentrations.

The closest sensitive receptors to the project site are residences located adjacent to the western and southern project property boundaries. A health risk assessment of the project construction activities was conducted that evaluated potential health effects at nearby sensitive receptors from construction emissions of DPM. A dispersion model was used to predict the off-site concentrations resulting from project construction so that lifetime cancer risks could be predicted. Figure 1 shows the project site and sensitive receptor locations (residences) used in the air quality dispersion modeling analysis where potential health impacts were evaluated.

<u>On-Site Construction TAC Emissions</u>

Construction period emissions were computed using CalEEMod along with projected construction activity, as described above. The CalEEMod model provided total annual $PM_{2.5}$ exhaust emissions (assumed to be DPM) for the off road construction equipment used for construction of the project and for the exhaust emissions from on-road vehicles (haul trucks, vendor trucks, and worker vehicles) of 0.307 tons (615 pounds) over the construction period. A trip length of one-half mile was used to represent vehicle travel while at or near the construction site. For modeling purposes, it was assumed that these emissions from on-road vehicles would occur at the construction site. Fugitive dust $PM_{2.5}$ emissions were also computed and included in this analysis. The model predicts emissions of 0.058 tons of fugitive $PM_{2.5}$. The construction schedule and equipment usage projections were provided and are included in *Attachment 2.*

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ concentrations at sensitive receptors (residences) in the vicinity of the project construction area. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[5] For each Phase of construction the AERMOD modeling utilized two area sources to represent the on-site construction emissions, one for exhaust emissions and one for fugitive dust emissions. To represent the construction equipment exhaust emissions, an emission release height of 6 meters (19.7 feet) was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive $PM_{2.5}$ emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area source. Emissions from the construction equipment and on-road vehicle travel were distributed throughout the modeled area sources. Construction emissions were modeled as occurring daily between 7 a.m. to 4 p.m., when the majority of construction activity would occur.

The modeling used a 5-year meteorological data set (2006-2010) from the San Jose Airport prepared for use with the AERMOD model by the BAAQMD. Annual DPM and $PM_{2.5}$ concentrations from construction activities during the 2017-2023 period were calculated using the model. DPM and $PM_{2.5}$ concentrations were calculated at nearby sensitive receptor locations. Receptor heights of 1.5 meters (4.9 feet) and 6.0 meters (19.7 feet) were used to represent the breathing heights of residents in nearby single family homes and for residences on the second floor level of buildings with first floor retail/commercial use.

The maximum-modeled DPM and $PM_{2.5}$ concentrations occurred in a second floor residence east of the project site on Winchester Boulevard, as shown in Figure 1 for the maximally exposed individual (MEI). Using the maximum annual modeled DPM concentrations, the maximum increased cancer risks were calculated.

Results of this assessment indicate that the maximum increased residential cancer risks would be 36.5 in one million for an infant/child exposure and 0.7 in one million for an adult exposure. The maximum residential excess cancer risk would be greater than the BAAQMD significance threshold of 10 in one million.

Predicted Annual $PM_{2.5}$ Concentration

The maximum-modeled annual $PM_{2.5}$ concentration, which is based on combined exhaust and fugitive dust emissions, was 0.2 $\mu g/m^3$, occurring at the residential MEI. Therefore, annual $PM_{2.5}$ concentration would not exceed the BAAQMD significance threshold of 0.3 $\mu g/m^3$.

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

Non-Cancer Hazards

The maximum modeled annual residential DPM concentration (i.e., from construction exhaust) was 0.194 μg/m^3. The maximum computed HI based on this DPM concentration is 0.04, which is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

Cumulative Construction Risk

Cumulative TAC impacts associated with construction of the project were assessed by predicting the combined community risk impacts from the project and nearby sources at the sensitive receptor most affected by project construction. A review of the project area identified the other sources of TAC emissions that could adversely affect the project construction MEI. These sources were characterized using screening tools provided by BAAQMD. In addition, a mixed-use development project is proposed across Winchester, the 350 Winchester Mixed-Use project, and it is assumed that construction of both projects could occur concurrently. A construction build-out scenario, including equipment list and schedule, was provided by the Winchester Mixed-Use project applicant and construction risk was modeled using the same methodology that was applied to the proposed project. The maximum cancer risk, non-cancer HI and annual $PM_{2.5}$ concentration at the proposed project construction MEI are reported in Table 4. As shown in Table 4, the predicted annual $PM_{2.5}$ concentration from construction would be above the significance threshold. However, it should be noted that the risk values from nearby TAC sources such as Winchester Boulevard are based on very conservative assumptions and that if refined dispersion modeling of the roadway was conducted, the actual risk values would be found to be substantially less.

Impact Finding

The project would have a *significant impact* with respect to community risk caused by construction activities at nearby residential receptors. Implementation of *Mitigation Measures AQ-1 and AQ-2* would reduce this impact to a level of less than significant. *Attachment 2* to this report includes the emission calculations used for the construction area source modeling and the cancer risk calculations.

Table 4. Community Risk Impacts from Cumulative Sources at Construction MEI

Source	Maximum Cancer Risk (per million)	Maximum Hazard Index	Maximum Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
Impacts to Off Site Receptors (at MEI)			
Unmitigated Project Construction (child exposure)	36.5	0.04	0.22
Unmitigated Winchester Mixed-Use construction	1.3	<0.01	0.01
Interstate 280 at 850 feet north (Highway Screening Analysis Tool)	12.0	0.01	<0.09
Winchester Boulevard at 25 feet east (Roadway Screening Analysis Calculator)	26.9	<0.03	0.66
Plant 13040 – FRIT, Santana Row at 500 feet south (Stationary Source Inquiry Form and distance multiplier)	<0.1	<0.01	<0.01
Plant G11422 – Gas Depot @ Winchester at 500 feet southeast - (Stationary Source Inquiry Form and distance multiplier)	0.6	<0.01	0.00
Plant 13698 – BelmontCorp at 325 feet north - (Stationary Source Tool and distance multiplier)	1.3	<0.01	<0.01
Unmitigated Cumulative Total	<78.7	<0.12	<1.00
BAAQMD Threshold – Cumulative Sources	***100***	***10.0***	***0.8***
Significant (unmitigated)	***No***	***No***	***Yes***
With Project Construction Mitigation			
Mitigated Project Construction (child exposure)	2.3	<0.01	0.02
Unmitigated Winchester Mixed-Use construction	1.3	<0.01	0.01
Interstate 280 at 850 feet north (Highway Screening Analysis Tool)	12.0	0.01	<0.09
Winchester Boulevard at 25 feet east (Roadway Screening Analysis Calculator)	26.9	<0.03	0.66
Plant 13040 – FRIT, Santana Row at 500 feet south (Stationary Source Inquiry Form and distance multiplier)	<0.1	<0.01	<0.01
Plant G11422 – Gas Depot @ Winchester at 500 feet southeast - (Stationary Source Inquiry Form and distance multiplier)	0.6	<0.01	0.00
Plant 13698 – BelmontCorp at 325 feet north - (Stationary Source Tool and distance multiplier)	1.3	<0.01	<0.01
Unmitigated Cumulative Total	<44.5	<0.09	<0.8
BAAQMD Threshold – Cumulative Sources	***100***	***10.0***	***0.8***
Significant (unmitigated)	***No***	***No***	***No***

Mitigation Measure AQ-2: Use of newer, retrofitted or alternatively powered construction equipment to minimize emissions. Such equipment selection would include the following:

1. All diesel-powered construction equipment larger than 50 horsepower and operating on site for more than two days continuously shall meet U.S. EPA particulate matter emissions standards for Tier 4 engines or equivalent. *Note that the construction contractor could use other measures to minimize construction period DPM emissions to*

reduce the predicted cancer risk below the thresholds. Such measures may be the use of alternative powered equipment (e.g., LPG powered forklifts), alternative fuels (e.g., biofuels), added exhaust devices, or a combination of measures, provided that these measures are approved by the lead agency.

Effectiveness of Mitigation Measure AQ-2

Implementation of Mitigation Measure AQ-1 is considered to reduce exhaust emissions by 5 percent. Implementation of Mitigation Measures AQ-2 would further reduce on-site diesel exhaust emissions. This would reduce the cancer risk proportionally, such that the mitigated risk would be less than 3.0 in one million. After implementation of this mitigation measure, the project would have a *less-than-significant* impact with respect to community risk caused by construction activities. For cumulative construction impacts, implementation of Mitigation Measures AQ-1 and AQ-2 would reduce annual $PM_{2.5}$ concentration at the project construction MEI to below 0.8 $\mu g/m^3$, as shown in Table 4, which would be below the BAAQMD significance threshold.

Figure 1. Project Construction Site, Sensitive Receptor Locations, and Location of Maximum Exposed Individual (MEI)

Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[6] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[7] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. While the OEHHA guidelines use substantially more conservative assumptions than the current Bay Area Air Quality Management District (BAAQMD) guidelines, BAAQMD has not formally adopted recommended procedures for applying the newest OEHHA guidelines. BAAQMD is in the process of developing new guidance and has developed proposed HRA Guidelines as part of the proposed amendments to Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[8] Exposure parameters from the OEHHA guidelines and newly proposed BAAQMD HRA Guidelines were used in this evaluation.

<u>Cancer Risk</u>

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95^{th} percentile breathing rates are used for the third trimester and infant exposures, and 80^{th} percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD

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[6] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[7] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[8] BAAQMD, 2016. *Workshop Report. Proposed Amendments to Air District Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants. Appendix C. Proposed Air District HRA Guidelines*. January 2016.

recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. BAAQMD recommends using these FAH factors for residential exposures.

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

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 = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

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

The health risk parameters used in this evaluation are summarized as follows:

Parameter	***Exposure Type →***	**Infant**		**Child**	**Adult**
	Age Range →	**3rd Trimester**	**0<2**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	572	261
Inhalation Absorption Factor		1	1	1	1
Averaging Time (years)		70	70	70	70
Exposure Duration (years)		0.25	2	14	14
Exposure Frequency (days/year)		350	350	350	350
Age Sensitivity Factor		10	10	3	1
Fraction of Time at Home		0.85-1.0	0.72-1.0	0.72-1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Attachment 2: CalEEMod Input and Output Worksheets, Construction Schedule, and Risk Calculations

Santana West, San Jose, CA

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Construction Area	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Phase 1	0.1258	P1_DPM	251.6	0.07659	9.65E-03	10,752	8.98E-07
2018	Phase 1	0.0021	P1_DPM	4.2	0.00127	1.60E-04	10,752	1.49E-08
2019	Phase 1	0.0084	P1_DPM	16.8	0.00512	6.45E-04	10,752	6.00E-08
	Phase 2	0.0883	P2_DPM	176.6	0.05376	6.77E-03	14,516	4.67E-07
2020	Phase 2	0.0016	P2_DPM	3.2	0.00096	1.21E-04	14,516	8.35E-09
2021	Phase 2	0.0065	P2_DPM	13.0	0.00397	5.00E-04	14,516	3.45E-08
	Phase 3	0.0679	P3_DPM	135.8	0.04134	5.21E-03	22,295	2.34E-07
2022	Phase 3	0.0020	P3_DPM	3.9	0.00120	1.51E-04	22,295	6.78E-09
2023	Phase 3	0.0047	P3_DPM	9.4	0.00285	3.59E-04	22,295	1.61E-08
Total		**0.3073**		**615**	**0.1871**	**0.0236**		

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Construction Area	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	Phase 1	P1_FUG	0.0134	26.8	0.00816	1.03E-03	10,752	9.56E-08
2018	Phase 1	P1_FUG	0.0051	10.3	0.00312	3.94E-04	10,752	3.66E-08
2019	Phase 1	P1_FUG	0.00032	0.6	0.00019	2.45E-05	10,752	2.28E-09
	Phase 2	P2_FUG	0.0131	26.2	0.00798	1.00E-03	14,516	6.92E-08
2020	Phase 2	P2_FUG	0.0045	9.1	0.00276	3.48E-04	14,516	2.39E-08
2021	Phase 2	P2_FUG	0.00028	0.6	0.00017	2.15E-05	14,516	1.48E-09
	Phase 3	P3_FUG	0.0142	28.4	0.00865	1.09E-03	22,295	4.89E-08
2022	Phase 3	P3_FUG	0.0065	13.0	0.00397	5.00E-04	22,295	2.24E-08
2023	Phase 3	P3_FUG	0.0004	0.7	0.00021	2.68E-05	22,295	1.20E-09
Total			**0.0578**	**115.7**	**0.0352**	**0.0044**		

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

DPM Construction Emissions and Modeling Emission Rates - With Mitigation

Construction Year	Construction Area	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Phase 1	0.0060	P1_DPM	11.9	0.00363	4.58E-04	10,752	4.26E-08
2018	Phase 1	0.0021	P1_DPM	4.2	0.00127	1.60E-04	10,752	1.49E-08
2019	Phase 1	0.0004	P1_DPM	0.8	0.00024	2.99E-05	10,752	2.78E-09
	Phase 2	0.0057	P2_DPM	11.3	0.00344	4.33E-04	14,516	2.99E-08
2020	Phase 2	0.0016	P2_DPM	3.2	0.00096	1.21E-04	14,516	8.35E-09
2021	Phase 2	0.0004	P2_DPM	0.7	0.00023	2.84E-05	14,516	1.96E-09
	Phase 3	0.0058	P3_DPM	11.5	0.00351	4.43E-04	22,295	1.99E-08
2022	Phase 3	0.0020	P3_DPM	3.9	0.00120	1.51E-04	22,295	6.78E-09
2023	Phase 3	0.0004	P3_DPM	0.8	0.00024	2.99E-05	22,295	1.34E-09
Total		**0.0242**		**48**	**0.0147**	**0.0019**		

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

PM2.5 Fugitive Dust Construction Emissions for Modeling - With Mitigation

Construction Year	Construction Area	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	Phase 1	P1_FUG	0.0058	11.7	0.00356	4.48E-04	10,752	4.17E-08
2018	Phase 1	P1_FUG	0.0051	10.3	0.00312	3.94E-04	10,752	3.66E-08
2019	Phase 1	P1_FUG	0.00032	0.6	0.00019	2.45E-05	10,752	2.28E-09
	Phase 2	P2_FUG	0.0055	11.0	0.00336	4.23E-04	14,516	2.92E-08
2020	Phase 2	P2_FUG	0.0045	9.1	0.00276	3.48E-04	14,516	2.39E-08
2021	Phase 2	P2_FUG	0.00028	0.6	0.00017	2.15E-05	14,516	1.48E-09
	Phase 3	P3_FUG	0.0066	13.2	0.00402	5.07E-04	22,295	2.27E-08
2022	Phase 3	P3_FUG	0.0065	13.0	0.00397	5.00E-04	22,295	2.24E-08
2023	Phase 3	P3_FUG	0.0004	0.7	0.00021	2.68E-05	22,295	1.20E-09
Total			**0.0351**	**70.2**	**0.0214**	**0.0027**		

hr/day = 9 (7am - 4pm)
days/yr = 365
hours/year = 3285

Santana West, San Jose, CA - Health Impacts Summary

Construction Health Impact Summary - Residential Receptors Without Mitigation

Construction Year	Maximum Concentrations Exhaust PM2.5/DPM ($\mu g/m^3$)	Maximum Concentrations Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million) Infant/Child	Cancer Risk (per million) Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.1938	0.0225	34.5	0.6	0.039	0.216
2018	0.0032	0.0086	0.53	0.0	0.001	0.012
2019	0.0443	0.0053	1.15	0.1	0.009	0.050
2020	0.0056	0.0016	0.14	0.0	0.001	0.007
2021	0.0088	0.0015	0.23	0.0	0.002	0.010
2022	0.0002	0.0006	0.00	0.0	0.000	0.001
2023	0.0005	0.0000	0.01	0.0	0.000	0.000
Total	-	-	**36.5**	**0.7**	-	-
Maximum Annual	0.1938	0.0225	-	-	**0.04**	**0.22**

Construction Health Impact Summary - Residential Receptors With Mitigation

Construction Year	Maximum Concentrations Exhaust PM2.5/DPM ($\mu g/m^3$)	Maximum Concentrations Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million) Infant/Child	Cancer Risk (per million) Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0092	0.0098	1.6	0.03	0.002	0.019
2018	0.0032	0.0086	0.5	0.01	0.001	0.012
2019	0.0026	0.0025	0.1	0.01	0.001	0.005
2020	0.0006	0.0016	0.0	0.00	0.000	0.002
2021	0.0007	0.0007	0.0	0.00	0.000	0.001
2022	0.0002	0.0006	0.0	0.00	0.000	0.001
2023	0.0000	0.0000	0.0	0.00	0.000	0.000
Total	-	-	**2.3**	**0.05**	-	-
Maximum Annual	0.0092	0.0098	-	-	**0.002**	**0.02**

Santana West, San Jose, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 1.5 meters

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

Values

	Infant/Child			**Adult**
Age -->	**3rd Trimester**	**0 - 2**	**2 - 16**	**16 - 30**
Parameter				
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
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

			Infant/Child - Exposure Information			**Infant/Child**	**Adult - Exposure Information**			**Adult**		
	Exposure				**Age**	**Cancer**	**Modeled**		**Age**	**Cancer**		
Exposure	**Duration**		**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**Fugitive**	**Total**
Year	**(years)**	**Age**	**Year**	**Annual**	**Factor**	**(per million)**	**Year**	**Annual**	**Factor**	**(per million)**	**PM2.5**	**PM2.5**
0	0.25	-0.25 - 0*	2017	0.1091	10	1.48	2017	0.1091	-	-	-	-
1	1	0 - 1	2017	0.1091	10	17.92	2017	0.1091	1	0.31	0.0145	0.124
2	1	1 - 2	2018	0.0018	10	0.30	2018	0.0018	1	0.01	0.0056	0.007
3	1	2 - 3	2019	0.0375	3	0.97	2019	0.0375	1	0.11	0.0054	0.043
4	1	3 - 4	2020	0.0012	3	0.03	2020	0.0012	1	0.00	0.0041	0.005
5	1	4 - 5	2021	0.0086	3	0.22	2021	0.0086	1	0.02	0.0015	0.010
6	1	5 - 6	2022	0.0002	3	0.01	2022	0.0002	1	0.00	0.0006	0.001
7	1	6 - 7	2023	0.0004	3	0.01	2023	0.0004	1	0.00	0.0003	0.001
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**20.9**				**0.5**		

* Third trimester of pregnancy

Santana West, San Jose, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 6.0 meters receptor height

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

Values

	Infant/Child			**Adult**
Age -->	**3rd Trimester**	**0 - 2**	**2 - 16**	**16 - 30**
Parameter				
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
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

			Infant/Child - Exposure Information			**Infant/Child**	**Adult - Exposure Information**			**Adult**		
	Exposure				**Age**	**Cancer**	**Modeled**		**Age**	**Cancer**		
Exposure	**Duration**		**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**Fugitive**	**Total**
Year	**(years)**	**Age**	**Year**	**Annual**	**Factor**	**(per million)**	**Year**	**Annual**	**Factor**	**(per million)**	**PM2.5**	**PM2.5**
0	0.25	-0.25 - 0*	2017	0.1938	10	2.64	2017	0.1938	-	-	-	-
1	1	0 - 1	2017	0.1938	10	31.82	2017	0.1938	1	0.56	0.0225	0.216
2	1	1 - 2	2018	0.0032	10	0.53	2018	0.0032	1	0.01	0.0086	0.012
3	1	2 - 3	2019	0.0443	3	1.15	2019	0.0443	1	0.13	0.0053	0.050
4	1	3 - 4	2020	0.0056	3	0.14	2020	0.0056	1	0.02	0.0016	0.007
5	1	4 - 5	2021	0.0088	3	0.23	2021	0.0088	1	0.03	0.0015	0.010
6	1	5 - 6	2022	0.0002	3	0.00	2022	0.0002	1	0.00	0.0006	0.001
7	1	6 - 7	2023	0.0005	3	0.01	2023	0.0005	1	0.00	0.0000	0.000
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**36.5**				**0.7**		

* Third trimester of pregnancy

Santana West, San Jose, CA - Construction Impacts - Mitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 6.0 meter Receptor Height

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

Values

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 16**	**16 - 30**
Parameter				
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
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

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
Exposure Year	**Exposure Duration (years)**	**Age**	**DPM Conc (ug/m3) Year**	**Annual**	**Age Sensitivity Factor**	**Cancer Risk (per million)**	**Modeled DPM Conc (ug/m3) Year**	**Annual**	**Age Sensitivity Factor**	**Cancer Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0092	10	0.12	2017	0.0092	-	-	-	-
1	1	0 - 1	2017	0.0092	10	1.51	2017	0.0092	1	0.03	0.0098	0.019
2	1	1 - 2	2018	0.0032	10	0.53	2018	0.0032	1	0.01	0.0086	0.012
3	1	2 - 3	2019	0.0026	3	0.07	2019	0.0026	1	0.01	0.0025	0.005
4	1	3 - 4	2020	0.0006	3	0.01	2020	0.0006	1	0.00	0.0016	0.002
5	1	4 - 5	2021	0.0007	3	0.02	2021	0.0007	1	0.00	0.0007	0.001
6	1	5 - 6	2022	0.0002	3	0.00	2022	0.0002	1	0.00	0.0006	0.001
7	1	6 - 7	2023	0.0000	3	0.00	2023	0.0000	1	0.00	0.0000	0.000
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**2.3**				**0.05**		

* Third trimester of pregnancy

350 Winchester Blvd, San Jose, CA

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Construction Area	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Site	0.0476	CON_DPM	95.2	0.02898	3.65E-03	3,626	1.01E-06
2018	Site	0.0437	CON_DPM	87.4	0.02661	3.35E-03	3,626	9.25E-07
Total		**0.0913**		**183**	**0.0556**	**0.0070**		

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Construction Area	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	Site	CON_FUG	0.0171	34.2	0.01041	1.31E-03	3,626	3.62E-07
2018	Site	CON_FUG	0.0060	12.0	0.00365	4.60E-04	3,626	1.27E-07
Total			**0.0231**	**46.2**	**0.0141**	**0.0018**		

hr/day =	9	(7am - 4pm)
days/yr =	365	
hours/year =	3285	

350 Winchester Blvd, San Jose, CA - Health Impacts
at Location of Santana West Project Construction Health Risk MEI

Construction Year	Unmitigated Emissions: Maximum Concentrations: Exhaust PM2.5/DPM ($\mu g/m^3$)	Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Infant/Child	Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0041	0.0014	0.7	0.0	0.001	0.006
2018	0.0037	0.0005	0.6	0.0	0.001	0.004
Total	-	-	**1.3**	**0.0**	-	-
Maximum Annual	0.0041	0.0014	-	-	**0.00**	**0.01**

350 Winchester Blvd, San Jose, CA - Construction Impacts - Unmitigated Emissions
Off-Site Residential Receptor Locations - 6.0 meter receptor heights
DPM Cancer Risk From Construction of 350 Winchester Blvd Project
at Location of Maximum Impact from Construction of Santana West Project

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

Values

	Infant/Child			Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 16**	**16 - 30**
Parameter				
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
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

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
	Exposure				**Age**	**Cancer**	**Modeled**		**Age**	**Cancer**		
Exposure	**Duration**		**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**DPM Conc (ug/m3)**		**Sensitivity**	**Risk**	**Fugitive**	**Total**
Year	**(years)**	**Age**	**Year**	**Annual**	**Factor**	**(per million)**	**Year**	**Annual**	**Factor**	**(per million)**	**PM2.5**	**PM2.5**
0	0.25	-0.25 - 0*	2017	0.0041	10	0.06	2017	0.0041	-	-	-	-
1	1	0 - 1	2017	0.0041	10	0.67	2017	0.0041	1	0.01	0.0014	0.006
2	1	1 - 2	2018	0.0037	10	0.61	2018	0.0037	1	0.01	0.0005	0.004
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00		
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00		
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00		
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00		
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00		
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**1.3**				**0.0**		

* Third trimester of pregnancy