APPENDIX A

CONSTRUCTION HEALTH RISK ASSESSMENT

Prepared By:

ILLINGWORTH & RODKIN, INC.

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505 LINCOLN AVENUE RESIDENTIAL PROJECT – CONSTRUCTION HEALTH RISK ASSESSMENT SAN JOSE, CALIFORNIA

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Prepared for:

Kristy Weis
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San Jose, California 95126

Prepared by:

James A. Reyff
and William Popenuck

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
1 Willowbrook Court, Suite 120
Petaluma, CA 94954
(707) 794-0400

Project 13-208

INTRODUCTION

This report provides the results of an assessment of potential health risk impacts from construction of a 190-unit residential project at 505 Lincoln Avenue in San Jose, California. The project proposes to rezone an approximately three-acre site from *IP – Industrial Park* to *PD – Planned Development* to allow for the development of up to 190 residential units. The proposed zoning would allow for buildings of up to six stories with a maximum building height of 85 feet. The conceptual site plan shows the development of a five-story (85 feet tall), 190-unit residential building. The building could be a podium structure with one level of below ground parking, parking and residential units on the first floor (the parking facilities would be located on the interior of the first floor with residential units wrapped around the exterior), and residential units on the upper four floors. A recreational courtyard with amenities, such as a pool and barbeque area, could be constructed on top of the podium (i.e., on the second floor).

Discussion of TACs

Toxic Air Contaminants (TACs) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer or serious illness) and include, but are not limited to, 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 near a highway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, state, and federal level. The identification, regulation, and monitoring of TACs is relatively new compared to that for criteria air pollutants that have established ambient air quality standards. TACs are regulated or evaluated on the basis of risk to human health rather than comparison to an ambient air quality standard or emission-based threshold.

Diesel Particulate Matter

Diesel exhaust, in the form of diesel particulate matter (DPM), is the predominant TAC in urban air with the potential to cause cancer. It is estimated to represent about two-thirds of the cancer risk from TACs (based on the statewide average). According to the California Air Resource 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. California has adopted a comprehensive diesel risk reduction program. The U.S. Environmental Protection Agency (EPA) and the CARB have adopted low-sulfur diesel fuel standards in 2006 that reduces diesel particulate matter substantially. The CARB recently adopted new regulations requiring the retrofit and/or replacement of construction equipment, on-highway diesel trucks, and diesel buses in order to lower fine particulate matter ($PM_{2.5}$) emissions and reduce statewide cancer risk from diesel exhaust.

Fine Particulate Matter ($PM_{2.5}$)

Particulate matter in excess of state and federal standards represents another challenge for the Bay Area. Elevated concentrations of $PM_{2.5}$ 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.

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 14, 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 facilities, elementary schools, and parks. For cancer risk assessments, children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Residential locations are assumed to include infants and small children. The closest sensitive receptors to the project site are existing apartments immediately west of the site. Additionally, there are residences to the south-southwest between Race and Lincoln Avenues.

TAC Thresholds of Significance

The Bay Area Air Quality Management District (BAAQMD) identified significance thresholds for exposure to TACs and $PM_{2.5}$ as part of its May 2011 *CEQA Air Quality Guidelines*[1]. This report uses the thresholds and methodologies from BAAQMD's May 2011 *CEQA Air Quality Guidelines* to determine whether there would be any project health risk impacts. This report addresses single-source (construction) impacts to nearby off-site receptors. This impact would be considered significant and mitigation would be required if:

1. An excess cancer risk level of more than 10 in 1 million, or a non-cancer (chronic or acute) hazard index greater than 1.0.
2. An incremental increase of more than 0.3 micrograms per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$.

Construction TAC Impacts

Construction activity is anticipated to include demolition of existing structures and paved areas, excavation, grading, building construction, paving and application of architectural coatings. During demolition, excavation, grading, and some building construction activities, substantial amounts of dust could be generated. Most of the dust would result during grading activities. The amount of dust generated would be highly variable and would be dependent on the size of the area disturbed at any given time, amount of activity, soil conditions, and meteorological conditions. To address fugitive dust emissions that lead to elevated PM_{10} and $PM_{2.5}$ levels near construction sites, the BAAQMD *CEQA Air Quality Guidelines* identify best control measures. If included in construction projects, these impacts will be considered less than significant.

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a TAC. BAAQMD has developed screening tables for evaluating potential impacts from toxic air contaminants emitted at construction projects.[2] The screening tables are described by BAAQMD as "environmentally conservative interim guidance" and are meant to be used to identify potentially significant impacts that should be modeled using refined techniques. These screening tables indicate that construction activities similar to this project could have significant impacts at distances beyond 100 meters or 330 feet, with the primary impact being excess cancer risk. However, these screening tables are based on older construction

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[1] BAAQMD, 2011. *BAAQMD CEQA Air Quality Guidelines*. May.
[2] BAAQMD. 2010. *Screening Tables for Air Toxics Evaluation During Construction*. May.

equipment that has higher emission rates and the load factors assumed were considerably higher than those recently recommended by the CARB. Since project construction activities would include demolition, excavation, grading, and building construction that would last longer than 6 months and would be located within 330 feet of residences, a more refined- level study of community risk assessment was conducted. Because the gross analysis indicated that impacts were possible, a refined analysis was conducted to evaluate whether impact would be significant, and if so, identify the project features or mitigation measures that would be necessary to avoid significant impacts in terms of community risk impacts to nearby sensitive receptors (e.g., adjacent residences).

On-Site Construction TAC Emissions

The refined health risk assessment focused on modeling on-site construction activity using construction fleet information included in the project design features. For these reasons, construction period emissions were modeled using the California Emissions Estimator Model, Version 2013.2.2 (CalEEMod) along with projected construction activity. The number and types of construction equipment and diesel vehicles, along with the anticipated length of their use for different phases of construction were based on site-specific construction activity schedules. Construction of the project is expected to occur for about 470 working days over about a twenty month period beginning in October 2014. The CalEEMod model provided total annual $PM_{2.5}$ exhaust emissions (assumed to be diesel particulate matter) for the off-road construction equipment and for exhaust emissions from on-road vehicles (haul trucks, vendor trucks, and worker vehicles), with total emissions of 0.0808 tons (161.6 pounds). The on-road emissions are a result of haul truck travel during demolition and grading activities, worker travel, and vendor deliveries during building construction. A trip length of 0.3 miles was used to represent vehicle travel while at or near the construction site. It was assumed that these emissions from on-road vehicles traveling at or near the site would occur at the construction site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 0.0054 tons (10.8 pounds) for the overall construction period. The CalEEMod model output with emission calculations are provided in *Attachment 1*.

Dispersion Modeling

The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM at existing sensitive receptors in the vicinity of the project site. The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for DPM exhaust emissions and one for fugitive $PM_{2.5}$ dust emissions. To represent the construction equipment exhaust emissions, an emission release height of 6 meters was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes and buoyancy of the exhaust plume. For modeling fugitive $PM_{2.5}$ emissions, a near ground level release height of 2 meters was used for the area source. Emissions from truck travel at the project site were also included in the area source for exhaust emissions. Emissions were modeled as occurring daily between 7 am - 4 pm. The model used a 5-year data set (1991 - 1995) of hourly meteorological data from the San Jose Airport available from the BAAQMD. Annual DPM concentrations from construction activities were predicted for 2014 through 2016, with the annual average concentrations based on the 5-year average concentrations from modeling 5 years of meteorological data. DPM concentrations were calculated at nearby sensitive receptors at heights of 1.5 meters (4.9 feet), 4.5 meters (14.8 feet), and 7.6 meters (24.9 feet) representative of the first three levels of the nearby residential buildings.

Cancer Risk and Hazards

The maximum-modeled DPM concentration occurred at the residence adjacent to the western boundary of the construction area at a receptor height of 4.5 meters. The location of this receptor is identified on Figure 1. Increased cancer risks were calculated using the modeled annual concentrations and BAAQMD recommended risk assessment methods for both a child exposure (3rd trimester through 2 years of age) and for an adult exposure. Since the modeling was conducted under the conservative assumption that emissions occurred 365 days per year, the default BAAQMD exposure period of 350 days per year was used.

Results of this assessment indicate that, with project construction, the incremental child cancer risk at the maximally exposed individual (MEI) would be 8.8 in one million and the adult incremental cancer risk would be 0.6 in one million. These predicted excess cancer risks are below the BAAQMD significance threshold of 10 in one million and be considered a less than significant impact.

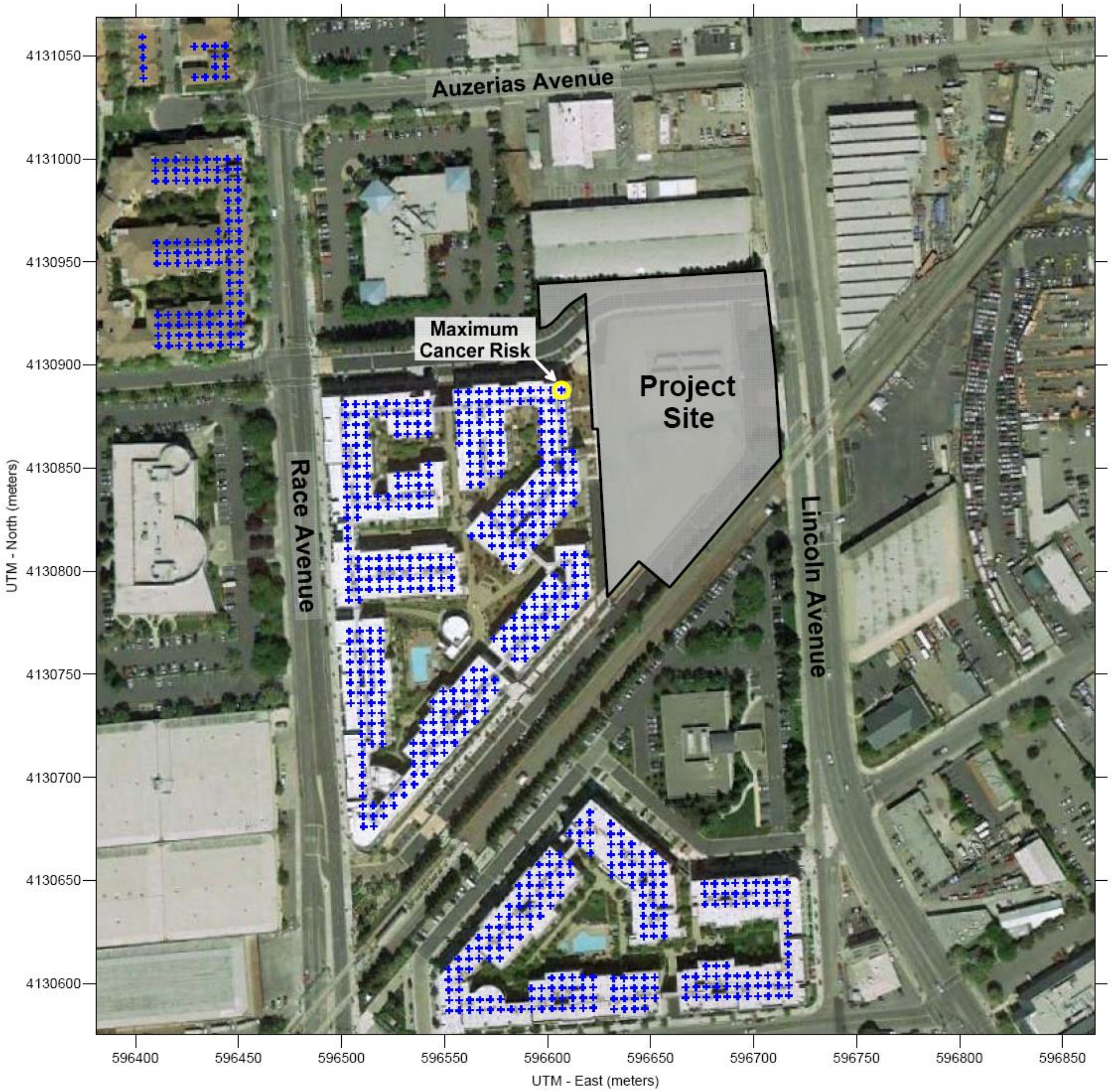
The modeled maximum annual $PM_{2.5}$ concentration was 0.07 micrograms per cubic meter ($\mu g/m^3$) occurring at the residence adjacent to the western boundary of the construction area at a height of 1.5 meters. This $PM_{2.5}$ concentration is well below the BAAQMD threshold of 0.3 $\mu g/m^3$ used to judge the significance of impacts for $PM_{2.5}$.

Potential non-cancer health effects due to chronic exposure to DPM were also evaluated. The chronic inhalation reference exposure level (REL) for DPM is 5 $\mu g/m^3$. The maximum predicted annual DPM concentration was 0.065 $\mu g/m^3$, which is much lower than the REL. The Hazard Index (HI), which is the ratio of the annual DPM concentration to the REL, is 0.013. This HI is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

The project would have *a less-than-significant* impact with respect to community risk caused by construction activities.

Attachment 1 includes the emission calculations used for the area source modeling, dispersion modeling inputs, and the cancer risk calculations.

Figure 1 – Project Construction Site and Residential Receptor Locations



ATTACHMENT 1

505 Lincoln Ave, San Jose, CA - Without Mitigation
DPM Construction Emissions and Modeling Emission Rates

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2014	Construction	0.0095	CON_DPM	19.0	0.00577	7.27E-04	10,703	6.79E-08
2015	Construction	0.0422	CON_DPM	84.4	0.02569	3.24E-03	10,703	3.02E-07
2016	Construction	0.0292	CON_DPM	58.4	0.01778	2.24E-03	10,703	2.09E-07

Notes:
Emissions assumed to be evenly distributed over each construction areas

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

505 Lincoln Ave, San Jose, CA - Without Mitigation
PM2.5 Fugitive Dust Construction Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate $g/s/m^2$
2014	Construction	CON_FUG	0.0025	4.9	0.00150	1.89E-04	10,703	1.76E-08
2015	Construction	CON_FUG	0.0019	3.7	0.00114	1.43E-04	10,703	1.34E-08
2016	Construction	CON_FUG	0.0011	2.2	0.00067	8.44E-05	10,703	7.88E-09

Notes:
Emissions assumed to be evenly distributed over each construction areas

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

505 Lincoln Ave, San Jose, CA - Construction Impacts - Unmitigated Emissions
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 4.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

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)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Values

Parameter	Child	Adult
CPF =	1.10E+00	1.10E+00
DBR =	581	302
A =	1	1
EF =	350	350
AT =	25,550	25,550

Construction Cancer Risk by Year - Maximum Impact Receptor Location

	Exposure	Child - Exposure Information			Child	Adult - Exposure Information			Adult		
	Exposure			Exposure	Cancer	Modeled		Exposure	Cancer		
	Duration	DPM Conc (ug/m3)		Adjust	Risk	DPM Conc (ug/m3)		Adjust	Risk	Fugitive	Total
Year	(years)	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	PM2.5	PM2.5
1	1	2014	0.0145	10	1.27	2014	0.0145	1	0.07	0.0041	0.019
2	1	2015	0.0645	10	5.65	2015	0.0645	1	0.29	0.0032	0.068
3	1	2016	0.0447	4.75	1.86	2016	0.0447	1	0.20	0.0019	0.047
4	1		0.0000	3	0.00		0.0000	1	0.00		
5	1		0.0000	3	0.00		0.0000	1	0.00		
6	1		0.0000	3	0.00		0.0000	1	0.00		
7	1		0.0000	3	0.00		0.0000	1	0.00		
8	1		0.0000	3	0.00		0.0000	1	0.00		
9	1		0.0000	3	0.00		0.0000	1	0.00		
10	1		0.0000	3	0.00		0.0000	1	0.00		
11	1		0.0000	3	0.00		0.0000	1	0.00		
12	1		0.0000	3	0.00		0.0000	1	0.00		
13	1		0.0000	3	0.00		0.0000	1	0.00		
14	1		0.0000	3	0.00		0.0000	1	0.00		
15	1		0.0000	3	0.00		0.0000	1	0.00		
16	1		0.0000	3	0.00		0.0000	1	0.00		
17	1		0.0000	1.5	0.00		0.0000	1	0.00		
18	1		0.0000	1	0.00		0.0000	1	0.00		
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65	1		0.0000	1	0.00		0.0000	1	0.00		
66	1		0.0000	1	0.00		0.0000	1	0.00		
67	1		0.0000	1	0.00		0.0000	1	0.00		
68	1		0.0000	1	0.00		0.0000	1	0.00		
69	1		0.0000	1	0.00		0.0000	1	0.00		
70	1		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk					**8.78**				**0.56**		