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Project No: 22-12968

Kim Voge
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Submitted via email: kvoge@townofwindsor.com

Subject: Shiloh Business Park Construction and Operational Health Risk Assessment

Dear Ms. Voge:

This memorandum assesses construction- and operational- related air emissions associated with the development of the Shiloh Business Park (project). A health risk assessment (HRA) was prepared by Rincon Consultants, Inc. (Rincon). The purpose of this HRA is to determine the potential for construction and operational activities to pose health risks to nearby sensitive receptors, specifically the Sonoma Country Day School. Construction and operational health risks associated with the project are compared to Bay Area Air Quality Management District's (BAAQMD) cancer and hazard risk thresholds.

Project Description

The project site is mostly vacant with one vacant industrial building, which was most recently occupied by JL Modular, Inc., on the western border of the site; additionally, there is an unpermitted construction yard occupied by Ghilotti Brothers, Inc., which would be cleaned up under the Project. The proposed Project would involve the construction of three industrial buildings on an existing 45.09-acre site, known as 790 Shiloh Road (APN 059-271-095). The development would consist of three buildings totaling approximately 477,093 square feet. The landscape plan for the Project has been designed to complement the abundance of trees and vegetation existing on the site with approximately 260 additional trees, drought resistant plants, and ground cover to ensure compliance with current water management practices. Landscaping would also provide screening of parking areas.

The buildings would be designed to accommodate individual tenant spaces as small as 20,000 square feet, allowing maximum flexibility to attract as many as 15 potential new businesses to the Town of Windsor. While it is impossible to determine the ultimate mix of tenant use types at this stage, it is anticipated that the types of businesses attracted will mirror historical demand in the North Bay including light manufacturing, warehouse/distribution and food manufacturing uses necessary to support the dominant industries in Sonoma County. Operation of the Project is estimated to support approximately 160 new jobs.

The primary ingress and egress to the Project would be from newly constructed Pruitt Avenue, which would extend from the existing end of Pruitt Avenue to the proposed cul-de-sac on the southwest

corner of the property (Section 1). Vehicular access has been designed to separate passenger car and truck traffic via a dedicated truck entrance directly servicing the truck courtyard separating the three buildings. The plan calls for the newly extended Pruitt Avenue to transition on-site along the re-aligned Airport Creek, exiting the site southward and running within an existing easement to Aviation Boulevard. An alternative road system is also under consideration, which would eliminate the connection to Aviation and instead improve a connection west to the intersection of Shiloh and Conde.

An important aspect of this development is balancing solar panel power generation and battery storage to enable the buildings to be "off grid". The design goal is to have each building provide enough solar power generation to maintain sufficient energy flow to its own battery to power the needs of that building. A 750kW natural gas generator would be required for each building for emergencies and to provide power during lengthy periods of inclement weather, when the solar panels could not generate enough electricity. The goal would be to minimize the number of hours the generators would run, particularly on school days when the neighboring school is in session.

Construction activities would occur over approximately 11 months. The analysis conservatively assumes a construction start date would begin in October 2023 and conclude in August 2024, although the results of the analysis apply even if construction occurs at later dates. All construction equipment would be United States Environmental Protection Agency Tier 4 rated. Soil excavated during construction, such as soil excavated from utility trenches, would be balanced onsite and no import or export would be required. Approximately 1,500 cubic yards of road material (e.g., asphalt pavement, concrete curb, etc.) would be demolished and removed. Construction hours would be 7:00 a.m. to 7:00 p.m., Monday through Fridays and 8:00 a.m. to 7:00 p.m., on Saturdays, pursuant to Windsor Municipal Code Section 7-1-190.

Methodology

The greatest potential for toxic air contaminants (TAC) emissions during construction would be diesel particulate matter (DPM) emissions associated with heavy-duty equipment exhaust during demolition, excavation, and building construction activities. In addition, incidental amounts of toxic substances such as oils, solvents, and paints would be used. These products would comply with all applicable BAAQMD rules for their manufacture and use. The greatest potential from TAC emissions during operations is diesel exhaust from trucks accessing the site. The analysis therefore focuses on health risk from receptor exposure to DPM.

Emissions Quantifications

Construction

Construction emissions were estimated using the California Emissions Estimator Model (CalEEMod), version 2022.1 using particulate matter with 10 microns in diameter or less (PM_{10}) as a surrogate as DPM is not quantified separate of PM_{10} emissions. CalEEMod uses project-specific information, including the project's land uses, square footages for different uses (e.g., mid-rise apartments, hotel, enclosed parking garage, and etc.), and location, to estimate a project's construction emissions. CalEEMod output is included in Attachment 6.

Construction emissions modeled include emissions generated by on-site construction equipment and vehicle trips associated with construction equipment, such as worker and vendor trips. Construction

activities for the proposed Project include demolition, site preparation, excavation/grading, building foundation, building construction, architectural coatings, and paving phases. Construction timing for each phase was determined by adjusting CalEEMod default phasing to accommodate the 11-month construction schedule. It was assumed that the foundation phase would require one week per building and would require extended hours (6 am to 1 am) for concrete pouring. The demolition of a 401-foot-long, 125-foot-wide and 30-foot-tall building and surrounding paved areas would occur as part of the Project. The provided construction equipment list is presented in the CalEEMod output as well as the Assumptions included as Attachment 1.

All construction equipment is assumed to operate 10 hours per day, with the exception of equipment used during the Foundation phase which would require 18 hours per day of operation. Worker, vendor, and haul trucks associated with construction activities were determined by CalEEMod. Construction equipment would be required as part of the project conditions to have EPA Tier 4 rated or Tier 4 equivalent engines.

Operation

The main source of TAC emissions during operations would be the DPM emissions from trucks accessing the Project site over the anticipated 30-year Project lifetime. The Project would result in 1,738 vehicles per day accessing the site. Of which 1,460 would be passenger vehicles, 122 are light-heavy duty trucks, and the remaining 156 are heavy-heavy duty trucks (GHD 2023). Emissions from the trucks were determined using EMFAC 2021 based on the light-heavy duty and heavy-heavy duty classes. EMFAC 2021 output is included in Attachment 1. As the exact site access is unknown, and either would access Aviation Boulevard to the south or would connect to the existing Pruitt Avenue to the north, both scenarios were modeled as accommodating 100 percent of the truck traffic. Both scenarios are included in the discussion.

The project site would include the use of three natural gas emergency back-up generators. However, as these do not result in DPM emissions and the BAAQMD does not require health risk assessments associated with the permitting of natural gas generators, these were not included in the analysis.

Air Dispersion Modeling

The analysis contained herein was conducted in accordance with BAAQMD and Office of Environmental Health Hazard Assessment (OEHHA) recommended procedures. Site-specific air dispersion modeling was conducted using the Lakes Environmental American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) View model (version 11.2.0). Dispersion modeling was used to characterize DPM emissions and ground-level concentrations associated with on-site construction activities over the approximately 11-month construction period, a 30-year operational period, and a 29-year one-month operational period. 1 gram per second (g/sec) emissions rates were used in AERMOD and project specific emissions concentrations were determined by multiplying the AERMOD generated concentrations by the anticipated project emissions modeled using CalEEMod and EMFAC 2021. DPM concentration was estimated based on the PM_{10} exhaust emissions (not including fugitive PM_{10}) provided by CalEEMod and running emissions from EMFAC 2021. In addition, $PM_{2.5}$ emissions from both engine exhaust and fugitive sources were multiplied by AERMOD average concentration output to determine ground-level concentrations at nearby receptors for comparison to BAAQMD's $PM_{2.5}$ thresholds.

The emissions sources were modeled as volume line source in AERMOD with an assumed release height of approximately 3.66 meters, corresponding to the approximate height of off-road equipment mufflers and truck exhaust stacks from which exhaust emissions would be released. AERMOD's variable emissions rate function was applied for construction activities based on construction activity to occur Monday through Saturday between 6 a.m. to 7 p.m for non-foundation work and Monday through Saturday between 6 am and 1 am for foundation work. Operational activities are anticipated to occur 24 hours a day, 7 days per week based on the trip generation study (GHD 2023).

To characterize health risk at nearby sensitive receptors, 86 receptors were placed on the Sonoma Country Day School site to determine potential risk to students and staff of the school, and 196 receptors were placed on existing residential receptors to determine risk to the offsite receptors closest to the project site. The Sonoma Country Day School is located directly south of the Project site. Residential receptors are single family and multi-family residential developments located approximately 357 meters to the east and 211 meters to the northwest of the Project site.

Receptors were determined by placing a 25-meter by 25-meter receptor grid over the Sonoma Country Day School site and a 50-meter by 50-meter receptor grid over the residential developments. These were then converted to discrete receptors. Where the discrete receptors were not adequately covered, these discrete receptor points were then adjusted to the nearest edge of the receptor.

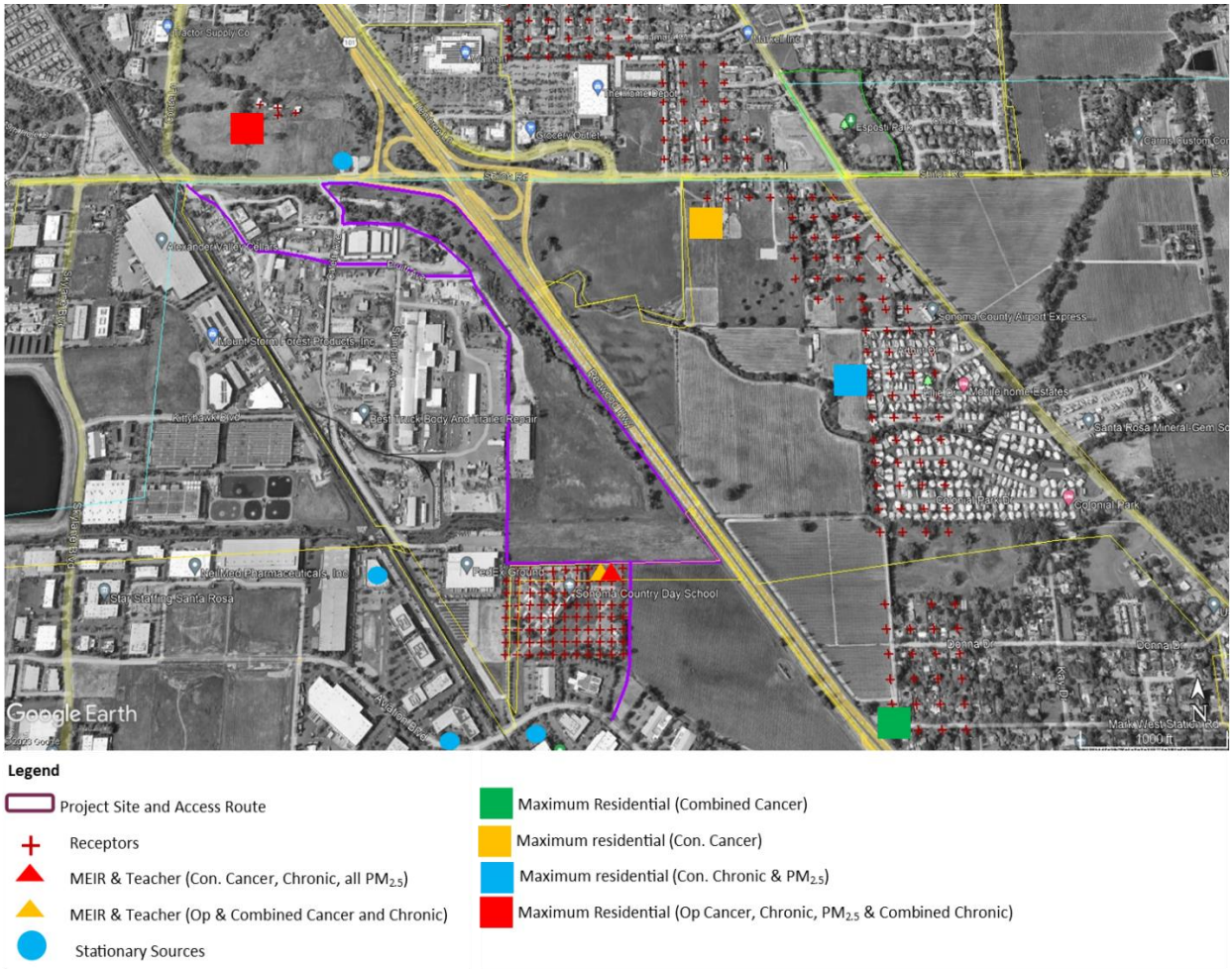
The AERMOD model requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. Specific meteorology and terrain for the site were input to the model using the nearest available meteorological data set, Sonoma County Airport (approximately 1.1 miles west of the project site), and a 30-meter Digital Elevation Model (DEM) data for the project site area. AERMOD's urban option was applied to capture the urban heat island of adjacent urban areas.

The presence of buildings and other structures disturbs downwind air flow. However, building downwash is only calculated for point sources and not appropriate to include in AERMOD for this HRA because there are no point sources in the analysis. AERMOD provides the concentration estimated by the air quality model based on an emission rate of one gram per second (BAAQMD 2020). Emissions sources (Project construction and roadways) and receptors (MEIR, cumulative analysis receptor, worker receptor, and sensitive receptors), including receptor grid areas, are shown in Figure 1.

Risk Analysis

Rincon's stand-alone proprietary spreadsheet was used to calculate the potential risk values associated with the worst-case emission concentrations at surrounding receptors following the risk quantification procedures identified in the Office of Environmental Health Hazards Assessment's *Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2015). A birth to 2-year start age was applied for the health risk as the construction activities last only 11 months. For operational risk, students were assumed to be exposed for 10 years as the Sonoma Country Day School is a TK to 8th grade facility. Teachers were assumed to be exposed for a total of 30 years. For the 29-year and 30-year operational analysis, the time typically allotted to a 3rd trimester exposure was added to the birth to 2 age bin as a conservative estimate of risk. The fraction of time at residences factor was applied for to age bins equal to or greater than 16 years.

Figure 1 Emission Sources and Receptors



Cumulative Analysis

The cumulative impact of the proposed project was further assessed by evaluating all current and proposed substantial sources of TACs within 1,000 feet of the identified construction MEIR, which is surrounded by other sensitive receptors. TAC sources identified as having the potential to result in cumulative risk include roadway sources that support more than 10,000 vehicles per day, railways, and existing stationary sources that are located within 1,000 feet of the MEIR. There are no active rail sources within 1,000 feet of the Project site, therefore, rail was excluded from this analysis. Cumulative risk impacts to the MEIR from these sources were estimated as described below following BAAQMD's *CEQA Air Quality Guidelines* (BAAQMD 2017).

Highway/Roadway TAC Impacts

Health risk at the Sonoma County Day School MEIR could be impacted by local roadways that result in more than 10,000 vehicles per day and are located within 1,000 feet of the proposed project. US 101 is located within 700 feet of the MEIR and maximum teacher/staff and residential receptors and therefore would contribute to cumulative risk. Individual arterial and collector roadways with average daily traffic of 10,000 vehicles per day or more were not specifically identified. Instead, risk from all roadways of 10,000 vehicles per day or more was estimated using the BAAQMD's Mobile Screening Map (BAAQMD 2023). A maximum potential risk from the Mobile Screening Map of 4.154 per million was estimated for cancer risk; 0.0014 was estimated for chronic risk, and 0.101 $\mu g/m^3$ was used for $PM_{2.5}$ concentration (BAAQMD 2023).

Stationary Source TAC Impacts

The BAAQMD's *Stationary Sources Screening Map* website provides screening level health risk and $PM_{2.5}$ risk values associated with permitted stationary sources within 1,000 feet of the MEIR. The MEIR is within 1,000 feet of three stationary sources: one generator and two unidentified sources. Maximum impacts and distance from the MEIR are included in Table 1.

Table 1 Cumulative Stationary Sources

Scenario	Excess Cancer Risk (per million)	Chronic Health Risk[1]	$PM_{2.5}$ $\mu g/m^3$ annual average	Distance (m)
Sonoma Country Day School Receptors				
Exchange Bank (Facility ID: 15868) 440 Aviation Boulevard	6.75	0.014	0.009	191
Airport Health Club (Facility ID: 20694) 432 Aviation Boulevard	1.03	0.007	0.568	125
Bio-Rad Laboratories (Facility ID: 24142) 487 Aviation Boulevard Suite 100	0.00	0.00	0.00	255
Maximum Residential Receptor				
Windsor Valero (Facility ID: 200007) 705 Shiloh Rd	13.376	0.058	0.00	255

Source: BAAQMD 2023

Significance Threshold

Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures. BAAQMD strongly recommends that impacted communities develop and adopt Community Risk Reduction Plan. The Town of Windsor does not currently have a qualified Community Risk Reduction Plan. In the absence of a qualified Community Risk Reduction Plan, BAAQMD has established the following thresholds of significance for local community risks and hazards associated with TACs and $PM_{2.5}$ for assessing individual project-level impacts at a local level (BAAQMD 2022):

- Not to exceed an increased cancer risk of >10 in one million
- Not to exceed increased non-cancer (i.e., Chronic or Acute) risk of >1.0 Hazard Index
- Not to exceed ambient $PM_{2.5}$ concentration increase >0.3 µg/m^3 annual average

A project would have a cumulatively considerable impact if the aggregate total of current and proposed TAC sources within a 1,000 feet radius of the project fence line in addition to the proposed Project would exceed the following thresholds of significance:

- Not to exceed an increased cancer risk of >100 in one million
- Not to exceed increased non-cancer (i.e., Chronic or Acute) risk of >10 Hazard Index
- Not to exceed ambient $PM_{2.5}$ concentration increase >0.8 µg/m^3 annual average

To provide a perspective on risk, the American Cancer Society (2018) reports that in the United States, men have about a 40 in 100 chance (0.40 probability) and women about a 38 in 100 chance (0.38) of developing cancer during a lifetime. Based on this background cancer risk level in the general population, application of a 1.0 x 10^{-5} excess risk limit means that the contribution from a toxic hazard should not cause the resultant cancer risk for the exposed population to exceed 0.40001 for men or 0.38001 for women. Neither DPM nor $PM_{2.5}$ is associated with acute health risks (OEHHA 2019); therefore, acute risk was not evaluated.

Results

Air Dispersion Modeling and Risk Analysis Results

Maximum cancer risk, chronic risk, and $PM_{2.5}$ concentrations are presented in Table 2, Table 3, and Table 4 respectively. The MEIR is the modeled receptor experiencing the highest incremental excess risk under the total exposure duration (9 years for students and 30 years for teachers/staff and residences) regardless of the access point for the site. The MEIR and maximum teacher/staff receptors were determined to be located at the northeastern edge of the Sonoma Country Day School property. The maximally exposed residential receptor is located at a residential property north of Shiloh Road and east of Conde Lane. The MEIR and maximally exposed teacher/staff and residential receptors are indicated in Figure 1, above.

The risk calculation and model outputs are available in Attachments 2, 3, 4, 5 and 7. As shown in Table 2, Table 3, and Table 4, incremental excess cancer risks, chronic risk, and $PM_{2.5}$ concentrations resulting from construction and operational activities would not exceed BAAQMD thresholds. Health risk to nearby receptors due to project construction and operations would be less than significant.

Table 2 Unmitigated Cancer Risks

Scenario	Excess Construction Cancer Risk (per million)	Excess Construction Cancer Risk (per million)	Excess Total Risk (per million)
Maximally Exposed Individual Receptor (MEIR)[1]	1.77	7.77	8.15
Maximum Exposed Teacher/Staff receptor	0.16	2.35	2.45
Maximum Exposed Residential	0.57	1.47	1.68
BAAQMD Significance Threshold	>10	>1	>0.3
Threshold Exceeded?	**No**	**No**	**No**

µg/m^3 = micrograms per cubic meter; BAAQMD = Bay Area Air Quality Management District

[1] The MEIR risk represents risk assuming the haul route passes by the Sonoma Country Day School from the site to Aviation Blvd. If the haul route is adjusted to go north from the site to Shiloh, maximum construction risk would remain the same, maximum operational risk would be reduced to 7.29 per million and Total construction plus operational risk would be reduced to 7.72 per million. The majority of the risk is associated with onsite activities and not haul route.

For Risk calculations see Attachments 2, 3, 4 and 5.

Table 3 Unmitigated Chronic Risks[1]

Scenario	Construction Chronic Health Risk[1]	Operational Chronic Health Risk[1]	Total Chronic Health Risk[1]
Maximally Exposed Individual Receptor (MEIR)	0.011	0.016	0.016
Maximum Exposed Teacher/Staff receptor	0.011	0.016	0.016
Maximum Exposed Residential	0.001	0.001	0.001
BAAQMD Significance Threshold	>1	>1	>1
Threshold Exceeded?	**No**	**No**	**No**

µg/m^3 = micrograms per cubic meter; BAAQMD = Bay Area Air Quality Management District

[1]Noncancer health impacts are determined by dividing the airborne concentration at the receptor by the appropriate Reference Exposure Level (REL) for that substance. A REL is defined as the concentration at which no adverse noncancer health effects are anticipated. Because noncancer health impacts are assessed as the ratio of airborne concentration versus the REL, the resulting hazard index is unitless.

For Risk calculations see Attachments 2, 3, 4 and 5..

Table 4 Unmitigated $PM_{2.5}$ Concentrations

Scenario	Construction $PM_{2.5}$ (µg/m^3)	Operational $PM_{2.5}$ (µg/m^3)	Toal $PM_{2.5}$ (µg/m^3)
Maximally Exposed Individual Receptor (MEIR)	0.08	0.02	0.10
Maximum Exposed Teacher/Staff receptor	0.08	0.02	0.10
Maximum Exposed Residential	0.01	<0.01	0.01
BAAQMD Significance Threshold	>3	>3	>0.3
Threshold Exceeded?	**No**	**No**	**No**

µg/m^3 = micrograms per cubic meter; BAAQMD = Bay Area Air Quality Management District

For PM2.5 concentrations see Attachments 2, 3, 4, and 5=..

Combined Sources

The MEIR is a student and teacher/staff receptor from the Sonoma Country Day School south of the project. A maximum residential receptor is located north of Shiloh Rd and east of Conde Lane, north of the Project site. Project construction- and operational-related health risk, as well as health risk from existing major roadways and highways and stationary sources within 1,000 feet of the MEIR/teacher receptors and maximum residential, are summarized in Table 5. As shown in Table 5, cumulative sources of TACs would not result in an exceedance of BAAQMD threshold. Therefore, the risk to nearby receptors due to cumulative impacts would be less than significant.

Table 5 Cumulative Health Risks Associated with Unmitigated Construction Activity

Source	Excess Cancer Risk (per million)	Chronic Health Risk[1]	$PM_{2.5}$ µg/m^3 Annual Average
Cumulatively Exposed Individual Receptor (MEIR)			
Unmitigated Project Construction & Operational Risk	8.15	0.0163	0.0969
Highway/Roadways	4.15	0.0014	0.1010
Exchange Bank (Facility ID: 15868)	0.61	0.0013	0.0008
Airport Health Club (Facility ID: 20694)	0.1648	0.0011	0.0909
Bio-Rad Laboratories (Facility ID: 24142)	0	0.0000	0.0000
Cumulative Total	13.08	0.0201	0.2896
BAAQMD Significance Threshold	>100	>10	>0.8
Threshold Exceeded?	**No**	**No**	**No**
Cumulatively Exposed Teacher/Staff Receptor			
Unmitigated Project Construction & Operational Risk	2.45	0.0163	0.0969
Highway/Roadways	4.15	0.0014	0.1010
Exchange Bank (Facility ID: 15868)	0.61	0.0013	0.0008
Airport Health Club (Facility ID: 20694)	0.16	0.0011	0.0909
Bio-Rad Laboratories (Facility ID: 24142)	0.00	0.0000	0.0000
Cumulative Total	7.37	0.0201	0.2896
BAAQMD Significance Threshold	>100	>10	>0.8
Threshold Exceeded?	**No**	**No**	**No**
Maximally Exposed Residential Receptor			
Unmitigated Project Construction & Operational Risk	1.68	0.0013	0.0083
Highway/Roadways	4.15	0.0014	0.1010
Windsor Valero (Facility ID: 200007)	2.37	0.0103	0.0000
Cumulative Total	8.21	0.01	0.11
BAAQMD Significance Threshold	>100	>10	>0.8
Threshold Exceeded?	**No**	**No**	**Yes**

[1]Noncancer health impacts are determined by dividing the airborne concentration at the receptor by the appropriate Reference Exposure Level (REL) for that substance. A REL is defined as the concentration at which no adverse noncancer health effects are anticipated. Because noncancer health impacts are assessed as the ratio of airborne concentration versus the REL, the resulting hazard index is unitless.

[2]Based on health risk raster data for Highways/Roadways provided by BAAQMD (BAAQMD 2023).

For model outputs, see Appendix B.

Conclusion

Table 2 through Table 4 demonstrate that regardless of the haul route adopted, the main source of cancer risk would come from onsite activities during both construction and operational activities. The results show that neither construction activities, operational activities, or the combined construction and operational activities will result in risk levels that exceed regulatory thresholds for students or teacher at the Sonoma Country Day School or nearby residential receptors. Table 5 demonstrates that cumulative risk when taking into account the project risk combined with existing nearby mobile and stationary sources would also be well below regulatory risk thresholds.

If you have any questions or would like to discuss, please contact Heather Dubois at hdubois@rinconconsultants.com.

Sincerely,
Rincon Consultants, Inc.



Heather Dubois
Senior Air Quality Analyst



Matt Maddox
Principal

Attachments

Attachment 1	Assumptions and Emissions Calculations
Attachment 2	Risk Summary
Attachment 3	Construction Risk Calculations
Attachment 4	29-year Operational Risk Calculations
Attachment 5	30-year Operational Risk Calculations
Attachment 6	CalEEMod Output Calculations
Attachment 7	AERMOD Output

References

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