Appendix F-3
Health Risk Assessment

HEALTH RISK ASSESSMENT REPORT

Shiloh Resort & Casino Project

Acorn Environmental / Sonoma County, CA

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1. EXECUTIVE SUMMARY

The Koi Nation of Northern California is proposing to develop the Shiloh Resort and Casino Project in unincorporated Sonoma County (the Project) which is subject to the review requirements of the National Environmental Policy Act (NEPA). The Project's operational phase has the potential to emit toxic air contaminants (TACs) due to the proposed stationary diesel-fired emergency generators and mobile emissions from additional traffic activity.

Acorn Environmental, on behalf of the NEPA Lead Agency, retained Trinity Consultants (Trinity) to perform a Health Risk Assessment (HRA) and determine the potential health risks from the operational phase of the Project. Trinity has prepared the HRA according to the Bay Area Air Quality Management District's (BAAQMD's) *Health Risk Assessment Modeling Protocol (December 2020)*. The analysis used the Hotspots Analysis and Reporting Program (HARP) Air Dispersion Risk Modeling Tool (ADMRT) with inputs from US EPA's AERMOD modeling program to perform the exposure/risk assessment. The HRA results were compared to the health risk standards established in BAAQMD's California Environmental Quality Act (CEQA) Guidelines for purposes of assessing whether the Project's health risk impacts may be considered significant.

Trinity has concluded that the Project's operational phase will not cause a significant health risk impact at the individual or cumulative Project levels. The HRA results are summarized in Table 2-1 and Table 2-2 and reproduced below.

Table 1-1. Project-Level HRA Results and Comparison to Significance Thresholds

Receptor Type	Receptor ID	X-Coordinate (m)	Y-Coordinate (m)	Maximum Acute HI	Maximum Chronic HI	Maximum Cancer Risk (per 1 million)
Acute PMI	321	519398.6	4263931.5	0.012	--	--
MEIR	555	519558.6	4264191.5	--	0.0027	9.17
MEIW	5843	518107.79	4264547.78	--	0.0032	0.75
Project-Level Maximum Impacts				**0.012**	**0.0032**	**9.17**
Project-Level Threshold of Significance				**1.0**	**1.0**	**10.0**
Exceeds Threshold?				**No**	**No**	**No**

Table 1-2. Cumulative Health Risk Impacts

Source	Maximum Cancer Risk (in 1 million)		Maximum Chronic Hazard Index	
	MEIR	MEIW	MEIR	MEIW
Stationary Sources within 1,000 ft	0	0	0	0
Roadways	4.25	27.33	0.0113	0.0759
Railways [a]	N/A	N/A	N/A	N/A
Total Cumulative Off-site Sources	4.25	27.33	0.0113	0.0759
Project Operation	9.17	0.75	0.0027	0.0032
Total Cumulative Off-site Sources + Project Operation	**13.41**	**28.08**	**0.014**	**0.079**
Cumulative Significance Threshold	**100**		**10.0**	
Exceeds Threshold?	**No**		**No**	

a. The CEQA Rail Screening Tool data set does not have data available for the MEIR and MEIW coordinates.

2. HEALTH RISK ASSESSMENT

This section presents the evaluation of potential health risks from the Project's operational TACs to local receptors. The Project has the potential to emit TACs which have cancer, chronic, and acute health impacts.

To assess the local risk and hazard impacts of the Project, an HRA was performed to determine whether the Project exceeds the BAAQMD's CEQA Thresholds of Significance as follows:

- Project-level cancer risk of 10.0 in one million
- Project-level chronic hazard index (HI) of 1.0
- Project-level acute HI of 1.0
- Cumulative-level cancer risk of 100 in one million
- Cumulative-level chronic HI of 10.0

2.1 Project Information

2.1.1 Stationary Emission Sources

The Project's casino and event center building will be supported by five identical diesel-fired Tier 4F-compliant emergency generators, with each generator's engine rated at 2,447 brake horsepower (BHP). All five will operate for routine maintenance and testing, however, only four would operate during emergency events. A sixth diesel-fired Tier 4F-compliant emergency generator will support the on-site wastewater treatment facility to the southeast and is rated at 1,367 BHP. All six engines are certified to EPA Tier 2 standards and will meet Tier 4F emission standards using add-on abatement from diesel particulate filters (DPFs) and selective catalytic reduction systems (SCRs).

2.1.2 Mobile Emission Sources (Traffic)

As discussed in Appendix I of the Shiloh Resort and Casino DEIS, the Project will generate additional vehicle trips on the roadways surrounding the Project from customers, employees, and contractors traveling to and from the Project. The emissions resulting from the Project's vehicle trips generated have been modeled for the following roadways:

- Highway 101 from Airport Boulevard to Windsor River Road/Old Redwood Highway
- Shiloh Road from Conde Lane to Faught Road
- Old Redwood Highway from Airport Boulevard to Pleasant Avenue

2.2 TAC Emission Calculations

2.2.1 Stationary Emission Sources

The diesel-fired stationary emergency generators will have the potential to emit diesel particulate matter (DPM) and ammonia. DPM is treated as a surrogate for all diesel combustion TAC emissions. The ammonia emissions are due to the ammonia slip from the use of an SCR to ensure the emergency generators meet Tier 4F standards. DPM emissions for each generator are calculated as the product of the following:

- The engine's maximum rated horsepower
- The Tier 4F particulate matter (PM) emission standard of 0.02 grams per brake horsepower-hour per EPA Off-Road Engine Tier standards
- Estimated annual average hours of emergency and non-emergency operation

Ammonia emissions for each generator are calculated as the product of the following:

- A default emission factor of 1.4 lbs of ammonia per 1,000 gallons of diesel burned for equipment abated by an SCR per South Coast Air Quality Management District's *Combustion Emission Factors* for Annual Emission Reporting
- The generator's maximum hourly fuel consumption
- Estimated annual average hours of emergency and non-emergency operation

2.2.2 Mobile Emission Sources (Traffic)

The traffic tailpipe TAC emissions are calculated to represent potential health impacts from the trips generated along the three modeled roadways. The TAC emissions from each road are calculated as the product of the following:

- Project hourly or annual trips generated
- The roadway-specific distribution of travel per Appendix I of the Shiloh Resort DEIS
- The summed product of the following vehicle category-specific information:
  - Project-specific fleet mix percentage
  - California Air Resources Board (CARB) On-Road Running Exhaust Emission Rate of PM_{10}, reactive organic gas (ROG), or ammonia per EMFAC 2021 v1.0.2 for the road-specific speed limit and representative fuel type
- For ROG-based combustion TACs from gasoline-fired vehicles, a TAC-specific weight fraction is applied to the EMFAC ROG emission factor per South Coast Air Quality Management District's *Combustion Emission Factors* for portable internal combustion engines. It is assumed all on-road engines are equipped with catalysts.
- Roadway distance

Detailed emission calculations of the Project's TAC emissions are provided in Appendix A.

2.3 Air Dispersion Model

The air quality analysis was conducted according to U.S. Environmental Protection Agency (EPA) guidelines. The AERMOD model (version 23112) was used with Trinity's BREEZE™ AERMOD Suite software to calculate ground-level concentrations with the regulatory default parameters.

2.4 Coordinate System

The location of emission sources, structures, and receptors have been represented in the Universal Transverse Mercator (UTM) coordinate system using the World Geodetic System (WGS84) projection. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km).

2.5 Terrain Elevations

The terrain elevation for each receptor, emission source, and building were determined using United States Geological Survey (USGS) 1/3 arc-second National Elevation Dataset (NED). The data, obtained from the USGS, had terrain elevations at 10-meter intervals. The terrain height for each individual modeled receptor, emission source, and building was determined by assigning the interpolated height from the digital terrain elevations surrounding each modeled receptor, emission source, or building. Buildings were assumed to have an equal elevation-dependent on a single corner of the building.

In addition, the AERMOD terrain preprocessor, AERMAP (version 18081), was used to compute the hill height scales for each receptor. AERMAP searches all NED data points for the terrain height and location that has the greatest influence on each receptor to determine the hill height scale for that receptor. AERMOD then uses the hill height scale in order to select the correct critical dividing streamline and concentration algorithm for each receptor.

2.6 Meteorological Data

Meteorological data was provided by BAAQMD for the calendar years 2013 through 2017. Surface data are from the Sonoma County Airport (Station ID 23213; elevation 34.7 meters). Upper air data are from Oakland International Airport (Station ID 23230).

2.7 Building Downwash

The emission sources at the Facility have been evaluated in terms of their proximity to nearby structures. The purpose of this evaluation is to determine if stack discharges may become caught in the turbulent wake of a building or structure. The downwash of the plume can result in elevated ground-level concentrations.

The Building Profile Input Program (BPIP) with Plume Rise Model Enhancements (PRIME) (version 04274) was used to determine the building downwash characteristics for each stack in 10-degree directional intervals. The PRIME version of BPIP features enhanced plume dispersion coefficients due to turbulent wake and reduced plume rise caused by a combination of the descending streamlines in the lee of the building and the increased entrainment in the wake.

2.8 Receptors

According to EPA regulations, "ambient air" is defined as the portion of the atmosphere external to the source. The dispersion modeling concentrations were determined for ambient air locations (i.e., receptors). The Project's fence line is the ambient air boundary for all modeling demonstrations. The following receptors are used to ensure ambient air is protected:

- Boundary receptors with 20-meter spacing;
- A variable density receptor grid with 20-meter intervals from the facility boundary centroid to 500 meters, 50-meter intervals to 1,000 meters, 100-meter intervals to 2,000 meters, 200-meter intervals to 5,000 meters, and 500-meter intervals to 10,000 meters.
- All receptors are set to a flagpole height of 1.5 meters to conservatively represent an average human's breathing height as recommended by BAAQMD's Health Risk Assessment Modeling Protocol (December 2020).

The MEIR and MEIW are selected from the receptor grid points that best align with a residence or workplace, respectively, where the highest impacts occur. Sensitive receptors, including schools, are included in the MEIR category. For acute risk, the PMI is selected as the highest risk receptor regardless of location.

2.9 Emission Sources

AERMOD represents emission units as point, volume, area, or open pit sources. The stationary emergency generators have defined exhaust stacks and are therefore modeled as point sources. The roads leading to and surrounding the Project (Old Redwood Highway, Shiloh Road, and Highway 101) are modeled as EPA line sources per BAAQMD's *CEQA Guidelines Appendix E: Recommended Methods for Screening and Modeling Local Risks and Hazards*.[1] The point source and EPA line input parameters are provided in Appendix B. An aerial view of the modeled emission sources, buildings, and receptor grid is provided in Appendix C.

2.10 Emission Rates

AERMOD estimates ambient air concentrations for each averaging period (i.e., 1-hour and period average) based on source parameters and a normalized emission rate (1 gram/second) from each source group. Each emergency generator was modeled as an individual source group. Each roadway was modeled as its own source group consisting of multiple EPA Line sources. For each EPA Line source, the emission rate was converted into g/s-m^2 by taking 1 g/s and dividing by each roadway's total area. The "Other" pollutant option was used. The calculated equivalent unit emission rates are summarized in Appendix B. The AERMOD output provides a theoretical concentration based on this normalized emission rate at each receptor location from each source. This normalized emission rate for each source was used to generate plot files that contain the contribution of each source to the total air concentration in units of micrograms per cubic meter (µg/m^3) at each receptor. The dispersion concentration plot files were scaled by the hourly and annual emissions calculated in Appendix A for input into the HARP ADMRT (version 22118).

2.11 HARP ADMRT Risk Analysis Settings

The AERMOD model output files were used as an input file to the HARP ADMRT model, which combined the source-specific concentration contributions with actual source emission rates to estimate the chemical-specific air concentrations at each receptor location. HARP ADMRT sums up the contribution from each source at a given receptor in order to estimate the total pollutant concentration for each emitted chemical. HARP ADMRT also contains updated toxicity information (cancer potency, RELs, etc.) for listed regulated substances, which are applied to estimate cancer and noncancer health hazard impacts for relevant exposure pathways and applicable target organs.

Exposure pathways are generally classified as primary pathways and secondary pathways. Inhalation is the primary exposure pathway for all modeled sources and substances. For multi-pathway substances, non-inhalation exposure pathways are also evaluated.

[1] Per BAAQMD pg. 85/122 of CEQA Air Quality Guidelines Appendix E: Recommended Methods For Screening and Modeling Local Risks and Hazards. Accessed September 2024: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?rev=b8917a27345a4a629fc18fc8650951e4&sc_lang=en

The residential scenario was evaluated using the Risk Management Policy (RMP) derived method in accordance with BAAQMD's *Health Risk Assessment Modeling Protocol (December 2020)* for a 30-year exposure duration for the following default pathways: inhalation, dermal absorption, soil ingestion (conservatively reflecting a 0.05 m/s deposition rate), and mother's milk. HARP ADMRT default parameters were used for the numerical pathway inputs.

The worker scenario was evaluated using the OEHHA Derived Method for a 25-year exposure duration for the following default pathways: inhalation, dermal absorption, and soil ingestion (conservatively reflecting a 0.05 m/s deposition rate). An 8-hour breathing rate with moderate intensity was applied to the inhalation pathway. A worker adjustment factor (WAF) of 4.20 was conservatively applied to account for the emergency generators' maintenance and testing to occur during typical business hours. HARP ADMRT default parameters were used for all other the numerical pathway inputs.

2.12 Project-Level HRA Results

The dispersion modeling results were such that the highest annual average concentrations occurred primarily to the north of the Project across from Shiloh Road, or on or along Old Redwood Highway and Highway 101. The maximum one-hour concentration occurs on Old Redwood Highway to the west of the Project. The MEIR was the same receptor for both cancer risk and chronic HI, as was for the MEIW. The potential health risk impacts for the Project-level operational phase are summarized in Table 2-1.

Table 2-1. Project-Level HRA Results and Comparison to Significance Thresholds

Receptor Type	Receptor ID	X-Coordinate (m)	Y-Coordinate (m)	Maximum Acute HI	Maximum Chronic HI	Maximum Cancer Risk (per 1 million)
Acute PMI	321	519398.6	4263931.5	0.012	--	--
MEIR	555	519558.6	4264191.5	--	0.0027	9.17
MEIW	5843	518107.79	4264547.78	--	0.0032	0.75
Project-Level Maximum Impacts				**0.012**	**0.0032**	**9.17**
Project-Level Threshold of Significance				**1.0**	**1.0**	**10.0**
Exceeds Threshold?				**No**	**No**	**No**

The Project-level health risks for the MEIR, MEIW, and acute PMI receptors are below the Project-level BAAQMD significance thresholds. Thus, the Project-level health risks are less than significant.

2.13 Cumulative HRA Results

In addition to the Project-level HRA, an assessment of the Project's impacts summed with the impacts of stationary sources within 1,000 feet of the MEIR and MEIW and existing mobile sources (roadways and railways) was conducted and compared to the BAAQMD CEQA cumulative thresholds of significance. The BAAQMD's stationary source geographic information systems (GIS) map tool indicates there are no permitted stationary sources located within 1,000 feet of the MEIR and MEIW. The cancer risk and chronic HI from roadway and railway impacts at the MEIs are determined using the raster maps available from BAAQMD's mobile source GIS map tool. Table 2-2 summarizes the impacts from cumulative sources in comparison to the BAAQMD threshold of significance for cumulative risk and hazards.

Table 2-2. Cumulative Health Risk Impacts

Source	Maximum Cancer Risk (in 1 million)		Maximum Chronic Hazard Index	
	MEIR	MEIW	MEIR	MEIW
Stationary Sources within 1,000 ft	0	0	0	0
Roadways	4.25	27.33	0.0113	0.0759
Railways [a]	N/A	N/A	N/A	N/A
Total Cumulative Off-site Sources	4.25	27.33	0.0113	0.0759
Project Operation	9.17	0.75	0.0027	0.0032
Total Cumulative Off-site Sources + Project Operation	**13.41**	**28.08**	**0.014**	**0.079**
Cumulative Significance Threshold	**100**		**10.0**	
Exceeds Threshold?	**No**		**No**	

b. The CEQA Rail Screening Tool data set does not have data available for the MEIR and MEIW coordinates.

The cumulative health risks for both the MEIR and MEIW receptors are below the cumulative-level BAAQMD significance thresholds for cancer risk and chronic HI. Thus, the cumulative health risks are less than significant.

APPENDIX A. TAC EMISSION CALCULATIONS

Table A-1: Stationary Source Input Parameters

Parameter	Emergency Generators				Notes
	GEN1-4	GEN5	GEN6	Units	
Equipment Rating	2,447	2,447	1,367	HP	1
Fuel Type	Diesel				1
Quantity	4	1	1	-	1
Annual Hours	60	12	60	hr/yr	1,2
Fuel Consumption	133.6	133.6	64.7	gal/hr	3

1. GEN1-5 equipment rating per pg. 66/624 of Shiloh EIS Appendix F. Accessed September 2024: https://www.shilohresortenvironmental.com/wp-content/uploads/2024/07/4_Koi-Nation-Shiloh-Casino-DEIS-App-F-H.pdf
GEN6 represents the generator supporting the on-site wastewater treatment facility.

2. Assumes each generator will operate for 12 hr/yr for non-emergency purposes and conservatively assumes up to 48 hrs/year for emergency purposes. GEN5 is a redundant generator that will only be used in an emergency if any of GEN1-4 fail.

3. GEN1-5 per CAT® 3516C Diesel Generator Set Specification Sheet. Accessed September 2024: https://s7d2.scene7.com/is/content/Caterpillar/CM20180713-19204-34655
GEN6 per Kohler KD900 Industrial Diesel Generator Set Specification Sheet.

Table A-2: Stationary Source TAC Emission Factors

TAC	CAS ID	Emergency Generators		Notes
		Value	Units	
DPM	9901	0.02	g/bhp-hr	1
Ammonia	7664417	1.4	lb/1,000 gal	2

1. For emergency ICE with 1,000 BHP rating or greater, BAAQMD's Best Available Control Technology (BACT). Accessed on September 2024: https://www.baaqmd.gov/~/media/files/engineering/bact-tbact-workshop/combustion/96-1-5.pdf?rev=1f89f9faaa434df5bf31ac10b5888bd2&sc_lang=en

2. Diesel emission factors from SCAQMD for stationary sources. Accessed September 2024: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/combustion-emission-factors-2021.pdf

Table A-3: Project Stationary Source TAC Emissions by Equipment Type

AERMOD Source	TAC	CAS ID	Emission Rate per Unit	
			Maximum Hourly	Annual
			(lb/hr) [1]	(lb/yr) [2]
GEN1	DPM	9901	0.108	6.474
GEN1	Ammonia	7664417	0.187	11.222
GEN2	DPM	9901	0.108	6.474
GEN2	Ammonia	7664417	0.187	11.222
GEN3	DPM	9901	0.108	6.474
GEN3	Ammonia	7664417	0.187	11.222
GEN4	DPM	9901	0.108	6.474
GEN4	Ammonia	7664417	0.187	11.222
GEN5	DPM	9901	0.108	1.295
GEN5	Ammonia	7664417	0.187	2.244
GEN6	DPM	9901	0.060	3.616
GEN6	Ammonia	7664417	0.091	5.435

1. GEN DPM Maximum Hourly Emissions (lb/hr) = [DPM Emission Factor (g/bhp-hr)] x [Engine Rating (HP)] converted to lbs
GEN Ammonia Maximum Hourly Emissions (lb/hr) = [Ammonia Emission Factor (lb/1,000 gal)] x [Hourly Fuel Consumption (gal/hr) / 1,000]

2. Maximum Annual Emissions (lb/yr) = [Hourly Emissions (lb/hr)] x [Annual Hours of Operation (hr/yr)]

Table A-4: Project Traffic Input Parameters

Trip Generations	Units	Alternative A			Notes
Saturday PM Peak Hour	trips/hour	1,340			1
Weekend Daily	trips/day	15,779			1
Weekday Daily	trips/day	11,213			1
Annual	trips/year	4,556,396			2
Road Section / **Parameter**	**Units**	**Hwy 101**	**Old Redwood Highway**	**Shiloh Road**	**Notes**
AERMOD Model ID	-	HWY101	ORWHWY	SHILOH	3
Road Section Distance	miles	3.30	2.58	1.78	4
Distribution of Travel	%	70%	20%	10%	5
Peak Hour Vehicle Trips	trips/hour	938	268	134	6
Annual Vehicle Trips	trips/year	3,189,477	911,279	455,640	6

1. Peak number of trips found on pg. 41/1175 of Koi Nation Shiloh Resort DEIS, Appendix I. Accessed online September 2024: https://www.shilohresortenvironmental.com/wp-content/uploads/2023/10/Appendix-I-Traffic-Impact-Study-v2.pdf

2. Annual trip generations are calculated as follows:

   Estimated Trips Per Year (trips/year) = [(Weekday Daily Trips) x (5 days/week) x (52 weeks/year)] + [(Weekend Daily Trips) x (2 days/week) x (52 weeks/year)]

3. Model ID represents AERMOD source group to represent each road with increased traffic impacts.

4. Represents the total distance of each road's EPA LINE model input.

5. Traffic distribution percentage assumptions found on pg. 41/180 of Koi Nation Shiloh Resort DEIS, Appendix I. Accessed online September 2024: https://www.shilohresortenvironmental.com/wp-content/uploads/2024/07/5_Koi-Nation-Shiloh-Casino-DEIS-App-I-Part-1.pdf

6. Road Section Vehicle Trips (trips/hour or trips/year) = Alternative A Total Trip Generations (trips/hour or trips/year) * Distribution of Travel (%)

Table A-5: Project Traffic Vehicle Types and EMFAC Emission Factors

Vehicle Type	EMFAC Vehicle Category [1]	Percentage of Total Trips [2]	Assumed Fuel Type [3]	Speed Class (mph) [4,5]	EMFAC Running Exhaust Emission Factors (g/mile) [6]		
					PM_{10}	ROG	NH_3
Light-Duty Auto	LDA	56.70%	Gasoline	35	1.32E-03	1.10E-02	3.43E-02
Light-Duty Truck Type 2	LDT2	16.64%	Gasoline	35	1.40E-03	1.37E-02	3.56E-02
Medium Duty Vehicles	MDV	11.69%	Gasoline	35	1.43E-03	2.02E-02	3.50E-02
Light-Duty Truck Type 1	LDT1	5.53%	Gasoline	35	2.34E-03	4.22E-02	3.71E-02
Light-Heavy Duty Truck	LHD1	3.03%	Gasoline	35	1.20E-03	3.57E-02	4.49E-02
Motorcycle	MCY	2.78%	Gasoline	35	1.91E-03	1.32E+00	8.52E-03
Medium Heavy Duty Truck	T6 Class 5	1.54%	Diesel	35	1.12E-02	2.93E-02	2.20E-01
Light-Heavy Duty Truck	LHD2	0.79%	Diesel	35	3.13E-02	1.45E-01	1.71E-01
Heavy-Heavy Duty Truck	T7 Class 8	0.66%	Diesel	35	3.98E-02	6.94E-02	2.20E-01
Motor Home	MH	0.36%	Gasoline	35	1.40E-03	6.06E-02	4.48E-02
School Bus	SBUS	0.15%	Diesel	35	1.63E-02	5.19E-02	1.43E-01
Other Bus	OBUS	0.11%	Gasoline	35	8.88E-04	6.30E-02	4.50E-02
Urban Bus	UBUS	0.03%	Gasoline	35	9.27E-04	6.92E-03	4.50E-02
Light-Duty Auto	LDA	56.70%	Gasoline	65	1.25E-03	1.03E-02	3.43E-02
Light-Duty Truck Type 2	LDT2	16.64%	Gasoline	65	1.32E-03	1.26E-02	3.56E-02
Medium Duty Vehicles	MDV	11.69%	Gasoline	65	1.34E-03	1.87E-02	3.50E-02
Light-Duty Truck Type 1	LDT1	5.53%	Gasoline	65	2.13E-03	3.76E-02	3.71E-02
Light-Heavy Duty Truck	LHD1	3.03%	Gasoline	55	1.08E-03	3.01E-02	4.49E-02
Motorcycle	MCY	2.78%	Gasoline	65	1.94E-03	1.39E+00	8.52E-03
Medium Heavy Duty Truck	T6 Class 5	1.54%	Diesel	65	1.91E-02	2.15E-02	2.20E-01
Light-Heavy Duty Truck	LHD2	0.79%	Diesel	55	2.07E-02	8.56E-02	1.71E-01
Heavy-Heavy Duty Truck	T7 Class 8	0.66%	Diesel	65	4.59E-02	4.82E-02	2.20E-01
Motor Home	MH	0.36%	Gasoline	65	1.37E-03	6.26E-02	4.48E-02
School Bus	SBUS	0.15%	Diesel	65	2.31E-02	2.98E-02	1.43E-01
Other Bus	OBUS	0.11%	Gasoline	65	8.51E-04	6.13E-02	4.50E-02
Urban Bus	UBUS	0.03%	Gasoline	65	9.30E-04	9.58E-03	4.50E-02

1. Vehicle nomenclature per EMFAC Onroad Emission Factor inventory. If there are multiples, the maximum emission factor of the highest populated vehicle class rating was chosen.

2. Table 4.4 Fleet Mix from Alternative A CalEEMod Output found on pg. 56/624 of Koi Nation Shiloh Resort DEIS Appendix F-H. Accessed online September 2024: https://www.shilohresortenvironmental.com/wp-content/uploads/2024/07/4_Koi-Nation-Shiloh-Casino-DEIS-App-F-H.pdf

3. Fuel type represents the majority of the vehicle type's population based on EMFAC Fleet Database for Sonoma County from calendar year 2022. Accessed online September 2024: https://arb.ca.gov/emfac/fleet-db/9b3e26c8b6f774fcc2766b214cd81bb1db0a60fb

4. Per City of Windsor Ordinances Title IV, Chapter 5, Article 7 "Speed Limits" of the Code of the Town of Windsor Setting Radar-Enforceable Speed Limits for Designated Town Streets (2024). Accessed September 2024: https://www.townofwindsor.ca.gov/DocumentCenter/View/29802/2024-389-Speed-Limits

5. Lowest possible speed limits for vehicles traveling across roads surrounding the project site were chosen to acquire emission factors as lower speeds present higher emission factors to conservatively represent the highest possible emissions.

6. Running exhaust emission factors from EMFAC Onroad Emission Rate for Sonoma County for calendar year 2024. Accessed online September 2024: https://arb.ca.gov/emfac/emissions-inventory/6391d1afe446b50bbaf0c8448067e55b8f5b7a5e

Table A-6: Gasoline-Fired Engine TAC Emission Factors

TAC	CAS ID	Emission Factor	
		(lb/1,000 gal) [1]	(wt% of ROG) [2]
Benzene	71432	1.5726	0.763%
1,3-Butadiene	106990	0.324	0.157%
Formaldehyde	50000	1.0131	0.492%
Nickel	7440020	0.0033	0.002%
PAHs	1151	0.0295	0.014%

1. Gasoline emission factors from SCAQMD for portable internal combustion engines and assumes catalysts are inherent to all vehicles. Accessed September 2024: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/combustion-emission-factors-2021.pdf

2. $wt\%_{ROG} = (EF_{TAC})/(EF_{Exhaust}) \times 100\%$. Emission factor for constituent and exhaust organic gases acquired from SCAQMD. Accessed September 2024: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/combustion-emission-factors-2021.pdf

$wt\%_{ROG}$ = Weight % of Reactive Organic Gas

EF_{TAC} = Emission Factor for Toxic Air Contaminant [lbs./1000 gallon]

EF_{bulk} = Emission Factor for Exhaust Organic Gases [206 lbs./1000 gallons]

Table A-7: Project Traffic TAC Emissions by Road Section

AERMOD Road Section	TAC	CAS ID	Emission Factor	Emission Rate	
				Maximum Hourly	Annual
			(lb/vehicle-mile) [1]	(lb/hr) [2]	(lb/yr) [3]
HWY101	DPM	9901	4.61E-06	1.42E-02	48.429
HWY101	Ammonia	7664417	8.76E-05	2.71E-01	921.284
HWY101	Benzene	71432	8.96E-07	2.77E-03	9.424
HWY101	1,3-Butadiene	106990	1.85E-07	5.71E-04	1.942
HWY101	Formaldehyde	50000	5.77E-07	1.79E-03	6.071
HWY101	Nickel	7440020	1.88E-09	5.82E-06	0.020
HWY101	PAHs	1151	1.68E-08	5.20E-05	0.177
ORWHWY	DPM	9901	4.58E-06	3.17E-03	10.771
ORWHWY	Ammonia	7664417	8.76E-05	6.06E-02	205.903
ORWHWY	Benzene	71432	8.97E-07	6.20E-04	2.107
ORWHWY	1,3-Butadiene	106990	1.85E-07	1.28E-04	0.434
ORWHWY	Formaldehyde	50000	5.78E-07	3.99E-04	1.357
ORWHWY	Nickel	7440020	1.88E-09	1.30E-06	0.004
ORWHWY	PAHs	1151	1.68E-08	1.16E-05	0.040
SHILOH	DPM	9901	4.58E-06	1.09E-03	3.719
SHILOH	Ammonia	7664417	8.76E-05	2.09E-02	71.094
SHILOH	Benzene	71432	8.97E-07	2.14E-04	0.728
SHILOH	1,3-Butadiene	106990	1.85E-07	4.41E-05	0.150
SHILOH	Formaldehyde	50000	5.78E-07	1.38E-04	0.469
SHILOH	Nickel	7440020	1.88E-09	4.49E-07	0.002
SHILOH	PAHs	1151	1.68E-08	4.01E-06	0.014

1. Emission Factor [lb/vehicle-mile] = [EMFAC Emission Factor [g/mile]) x (wt% of ROG) converted to lbs

2. Maximum Hourly Emissions at Road Section (lb/hr) = [Emission Factor (lb/vehicle-mile)] x [Peak Hour Vehicle Trips (trips/hr)] x [Road Section Distance (miles)]

3. Maximum Annual Emissions at Road Section (lb/yr) = [Emission Factor (lb/vehicle-mile) x [Peak Annual Vehicle Trips (trips/yr)] x [Road Section Distance (miles)]

APPENDIX B. MODELING INPUTS

Table B-1. Modeling Parameters - Point Source Inputs

Model ID	Description	X Coordinate	Y Coordinate	Elevation	Emission Rate	Stack Height	Stack Temperature	Stack Velocity	Stack Diameter	Notes
		m	m	m	(g/s)	m	K	m/s	m	
GEN1	Casino Emergency Generator 1	519635.5	4263923.6	43	1	7.6	723.15	15.24	0.1524	1,2
GEN2	Casino Emergency Generator 2	519642.6	4263920.4	42.97	1	7.6	723.15	15.24	0.1524	1,2
GEN3	Casino Emergency Generator 3	519648.8	4263917.3	42.94	1	7.6	723.15	15.24	0.1524	1,2
GEN4	Casino Emergency Generator 4	519655.7	4263914.1	43.06	1	7.6	723.15	15.24	0.1524	1,2
GEN5	Redundant Emergency Generator 5	519661.9	4263910.6	43.18	1	7.6	723.15	15.24	0.1524	1,2
GEN6	WWTP Emergency Generator	520005.22	4263938.55	45.25	1	4.2	767.04	173	0.1524	3

1. Stack temperature, flowrate, and diameter per information provided by Acorn Environmental on 2024-0826.
2. Stack heights estimated based on similar generators
3. Stack parameters provided by Acorn Environmental on 2024-0925 and the Kohler KD900 Generator specification sheets.

Table B-2. Modeling Parameters - EPA Line Inputs

Route	Description	X coord (m)	Y coord (m)	Elevation (m)	Emission Rate (g/s-m^2)	Vehicle Height (m)	Release Height (m)	End Point X coordinate (m)	End Point Y coordinate (m)	Road Width (m)	Road Length (m)	Total Area (m^2)	Init Vert dim (m)	Notes
ORWHWY1	Old Redwood Highway	520599	4262570.3	46.59	4.02E-05	2.52	2.14	520105.50	4263061.00	6	695.94	24,898.70	1.99	1,2
ORWHWY2	Old Redwood Highway	520105.9	4263059.9	42.61	4.02E-05	2.52	2.14	519991.80	4263184.00	6	168.58		1.99	1,2
ORWHWY3	Old Redwood Highway	519991.5	4263183.9	42.04	4.02E-05	2.52	2.14	519862.50	4263337.00	6	200.20		1.99	1,2
ORWHWY4	Old Redwood Highway	519862.9	4263336.1	41.37	4.02E-05	2.52	2.14	519751.60	4263452.00	6	160.69		1.99	1,2
ORWHWY5	Old Redwood Highway	519751.3	4263451.9	40.8	4.02E-05	2.52	2.14	519291.00	4264073.00	6	773.07		1.99	1,2
ORWHWY6	Old Redwood Highway	519290.7	4264071.2	42.16	4.02E-05	2.52	2.14	518977.30	4264659.00	6	666.13		1.99	1,2
ORWHWY7	Old Redwood Highway	518978.2	4264658.1	40.91	4.02E-05	2.52	2.14	518777.50	4264899.00	6	313.55		1.99	1,2
ORWHWY8	Old Redwood Highway	518778.4	4264898.3	39.75	4.02E-05	2.52	2.14	518503.10	4265189.00	6	400.37		1.99	1,2
ORWHWY9	Old Redwood Highway	518502.5	4265186.1	40.69	4.02E-05	2.52	2.14	518046.40	4265718.00	6	700.67		1.99	1,2
ORWHWY10	Old Redwood Highway	518046.1	4265717.9	40.8	4.02E-05	2.52	2.14	517995.40	4265767.00	6	70.58		1.99	1,2
SHILOH1	Shiloh Road	517657.3	4264178.1	33.35	6.46E-05	2.52	2.14	520478.00	4264168.00	5.4	2820.72	15,474.58	1.99	1,2
SHILOH2	Shiloh Road	520478.1	4264167.9	60.82	6.46E-05	2.52	2.14	520518.30	4264188.00	5.4	44.94		1.99	1,2
HWY101_1	HWY 101	516485.5	4266572	35.99	8.73E-06	2.52	2.14	516618.70	4266568.00	21.6	133.26	114,591.18	1.99	1,2
HWY101_2	HWY 101	516618.6	4266567.5	36.25	8.73E-06	2.52	2.14	516857.6	4266251	21.6	396.60		1.99	1,2
HWY101_3	HWY 101	516857.6	4266250	36.7	8.73E-06	2.52	2.14	517014	4265957	21.6	332.13		1.99	1,2
HWY101_4	HWY 101	517013.4	4265956.4	36.32	8.73E-06	2.52	2.14	519199.5	4262941	21.6	3724.47		1.99	1,2
HWY101_5	HWY 101	519199.5	4262941.3	39.13	8.73E-06	2.52	2.14	519402.7	4262733	21.6	291.00		1.99	1,2
HWY101_6	HWY 101	519402.6	4262732.8	40.67	8.73E-06	2.52	2.14	519549.5	4262677	21.6	157.14		1.99	1,2
HWY101_7	HWY 101	519549.8	4262676.5	39.48	8.73E-06	2.52	2.14	519712.3	4262672	21.6	162.56		1.99	1,2
HWY101_8	HWY 101	519712.6	4262671.5	42.82	8.73E-06	2.52	2.14	519757.1	4262637	21.6	56.31		1.99	1,2
HWY101_9	HWY 101	519756.8	4262636.9	44.93	8.73E-06	2.52	2.14	519776.2	4262589	21.6	51.68		1.99	1,2

1. Vehicle height, release height, and initial vertical dimension is a weighted average based on the fleet population and heights for non-trucks and trucks pulled from the CEQA Air Quality Guidelines Appendix E (see Table B-3): Recommended Methods for Screening and Modeling Local Risks and Hazards (Page 91). Accessed in September 2024: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?rev=b8917a27345a4a629fc18fc8650951e4&sc_lang=en

2. Total width is based on the CEQA Air Quality Guidelines (Page 85) as follows:

Route	Road Type	Road Width per Lane (m)	Number of Lanes	Total Road Width (m)
Old Redwood Highway	Arterial	3	2	6
Shiloh Road	Local	2.7	2	5.4
HWY 101	Freeway	3.6	6	21.6

Table B-3 - Model Parameters - Vehicle Dimensions

Vehicle Type	EMFAC Vehicle Category	Percentage of Total Trips [1]	Truck or Non-Trucks?	Height	Initial Vertical Dimension	Release Height	Weighted Height	Weighted Initial Vertical Dimension	Weighted Release Height	Notes
				(m)	(m)	m	(m)	(m)	(m)	
Light-Duty Auto	LDA	56.70%	Non-Truck	1.53	1.21	1.3	8.67E-01	6.86E-01	7.37E-01	1,2
Light-Duty Truck Type 2	LDT2	16.64%	Truck	4	3.16	3.4	6.65E-01	5.26E-01	5.66E-01	1,2
Medium Duty Vehicles	MDV	11.69%	Truck	4	3.16	3.4	4.68E-01	3.69E-01	3.97E-01	1,2
Light-Duty Truck Type 1	LDT1	5.53%	Truck	4	3.16	3.4	2.21E-01	1.75E-01	1.88E-01	1,2
Light-Heavy Duty Truck	LHD1	3.03%	Truck	4	3.16	3.4	1.21E-01	9.58E-02	1.03E-01	1,2
Motorcycle	MCY	2.78%	Non-Truck	1.53	1.21	1.3	4.25E-02	3.36E-02	3.61E-02	1,2
Medium Heavy Duty Truck	T6 Public Class	1.54%	Truck	4	3.16	3.4	6.16E-02	4.86E-02	5.23E-02	1,2
Light-Heavy Duty Truck	LHD2	0.79%	Truck	4	3.16	3.4	3.15E-02	2.49E-02	2.68E-02	1,2
Heavy-Heavy Duty Truck	T7 Public Class	0.66%	Truck	4	3.16	3.4	2.65E-02	2.10E-02	2.26E-02	1,2
Motor Home	MH	0.36%	Non-Truck	1.53	1.21	1.3	5.48E-03	4.33E-03	4.65E-03	1,2
School Bus	SBUS	0.15%	Non-Truck	1.53	1.21	1.3	2.31E-03	1.83E-03	1.96E-03	1,2
Other Bus	OBUS	0.11%	Non-Truck	1.53	1.21	1.3	1.66E-03	1.32E-03	1.41E-03	1,2
Urban Bus	UBUS	0.03%	Non-Truck	1.53	1.21	1.3	4.30E-04	3.40E-04	3.65E-04	1,2
						Weighted Average:	2.52	1.99	2.14	

1. Percentage of total trips per Table 4.4 Fleet Mix from Alternative A CalEEMod Output found on pg. 56/624 of Koi Nation Shiloh Resort DEIS Appendix F-H. Accessed online September 2024: https://www.shilohresortenvironmental.com/wp-content/uploads/2024/07/4_Koi-Nation-Shiloh-Casino-DEIS-App-F-H.pdf

2. Vehicle height, release height and initial vertical dimension for non-trucks and trucks pulled from the CEQA Air Quality Guidelines Appendix E: Recommended Methods for Screening and Modeling Local Risks and Hazards (Page 91 and 92). Accessed in September 2024: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?rev=b8917a27345a4a629fc18fc8650951e4&sc_lang=en

Vehicle Type	Height (m)	Initial Vertical Dimension (m)	Release Height (m)
Non-Truck	1.53	1.21	1.3
Truck	4	3.16	3.4

Table B-4. Model Parameters - Building Inputs

Model ID	Description	X Coordinate	Y Coordinate	Elevation	Height	X Length	Y Length
		m	m	m	m	(m)	(m)
B1	Main Building	519581.1	4264093.4	44.37	19.81	--	--
B2	Lobby Area	519739.1	4264024.5	44.9	19.81	--	--
B3	Parking Garage	519962.6	4263928.5	44.54	18.29	--	--
B4	Packaged Wastewater Treatment System	519998.32	4263931.98	44.97	6.00	28	34
B5	Water Treatment and Operations Building	520011.89	4263958.8	45.83	6.00	18	23
POD1	Pod for GEN1	519634.3	4263925.7	43.03	4.14	13.6	3.6
POD2	Pod for GEN2	519641.3	4263922.4	42.99	4.14	13.6	3.6
POD3	Pod for GEN3	519647.5	4263919.3	42.97	4.14	13.6	3.6
POD4	Pod for GEN4	519654.4	4263916	43.04	4.14	13.6	3.6
POD5	Pod for GEN5	519660.6	4263912.5	43.17	4.14	13.6	3.6
POD6	Pod for GEN6	520003.9	4263937.4	45.2	3.35	2.616	6.35
B7	1.0 MG Potable Water Tank	520028.56	4264003.96	46.48	9.75	11.4	11.4
B8	7.5 MG Recycled Water Tank	520013.21	4263862.95	43.94	9.75	23	23
B9	7.5 MG Recycled Water Tank	519968.82	4263831.72	43.48	9.75	23	23

APPENDIX C. FIGURES

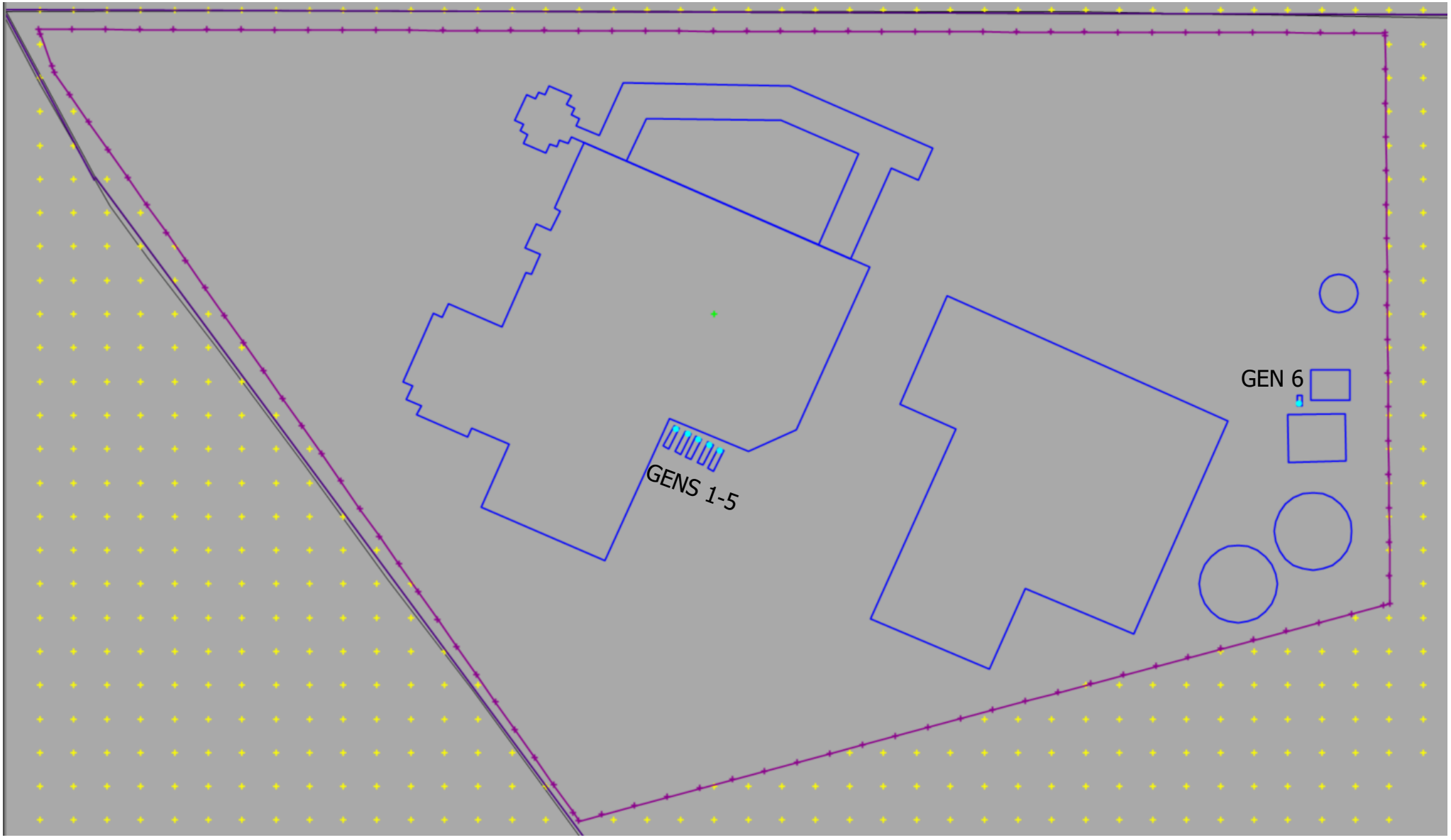

Figure C-1. AERMOD: Stationary Sources and On-site Buildings

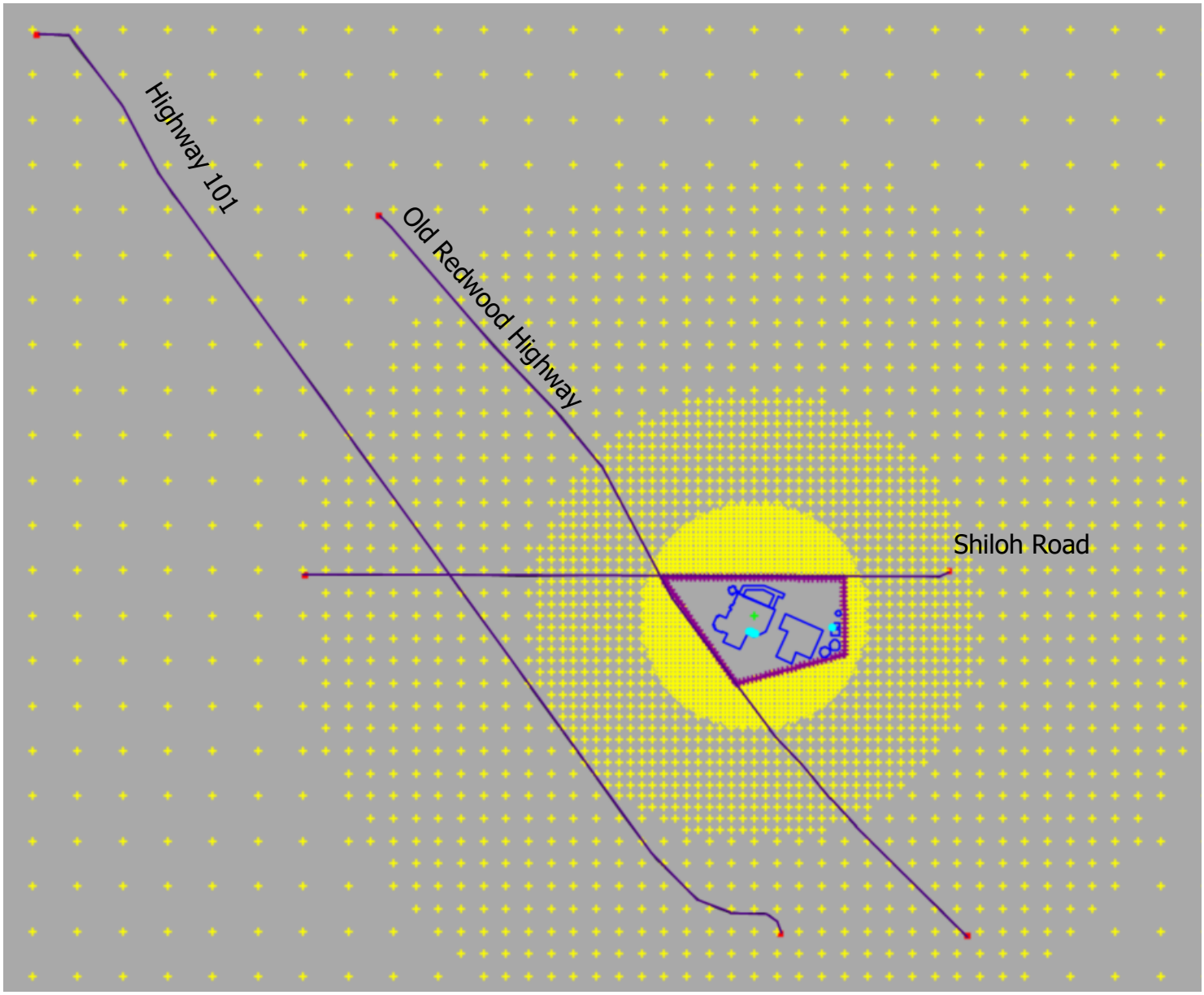

Figure C-2. AERMOD: Mobile Sources

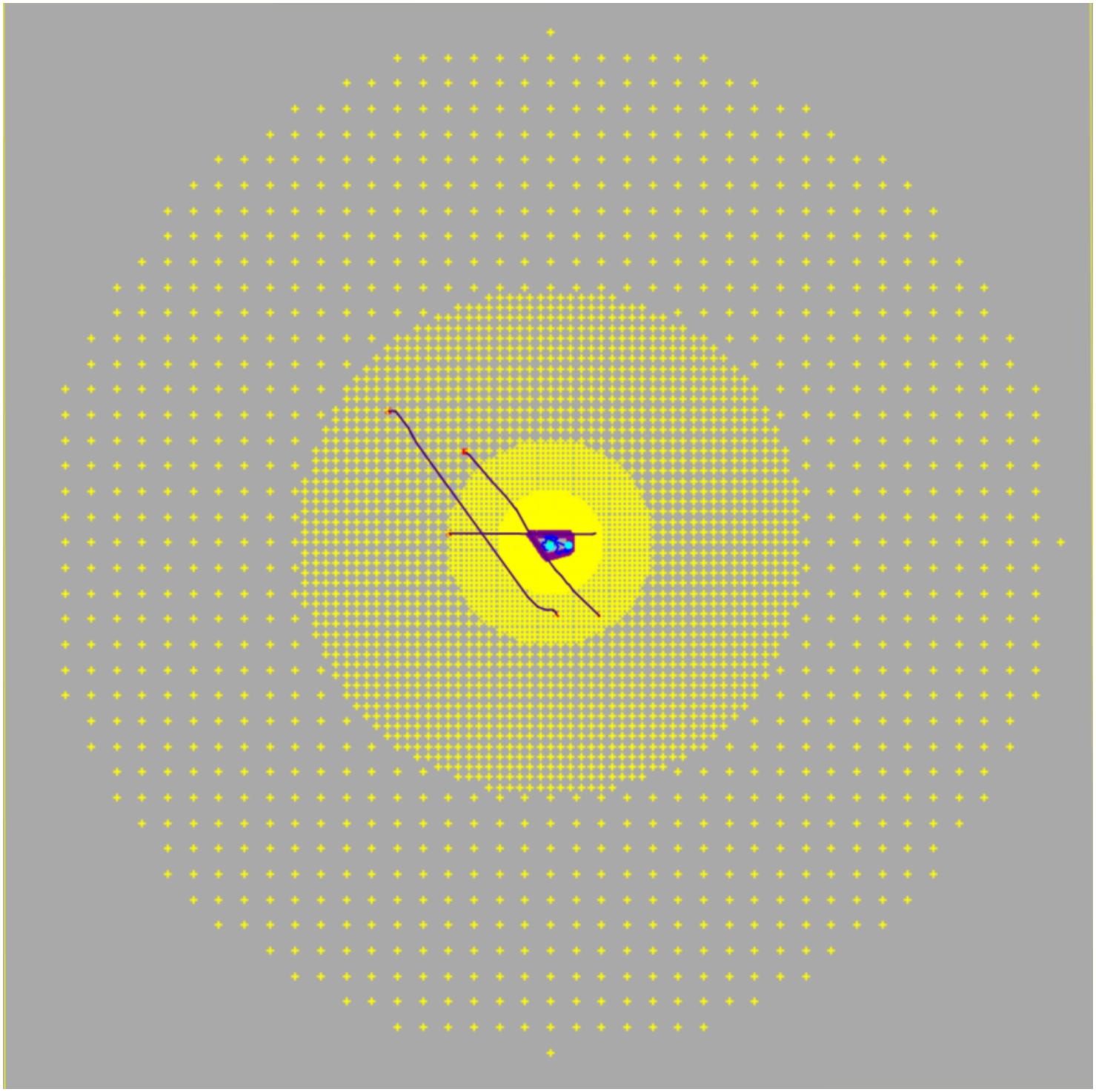

Figure C-3. AERMOD: Receptor Grid

Figure F-3.1: Maximally-Exposed Receptor Locations

Acute PMI - Acute Point of Maximum Impact
MEIR - Maximally-Exposed Individual Resident
MEIW - Maximally-Exposed Individual Worker