

**APPENDIX A:** Health Risk Assessment for the Leisure Lane-Expo Parkway Gas Station Project. ECORP Consulting, Inc., January 2023

**Health Risk Assessment  
for the  
Leisure Lane-Expo Parkway Gas Station Project**

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**Sacramento, California**

**Prepared For:**

Dokken Engineering  
110 Blue Ravine Road, Suite 200  
Folsom, CA 95630

**Prepared By:**



**ECORP Consulting, Inc.**  
ENVIRONMENTAL CONSULTANTS

55 Hanover Lane  
Chico, CA 95926

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**LIST OF ACRONYMS AND ABBREVIATIONS**

AB	Assembly Bill
ASF	Age Sensitivity Factor
ATCM	Airborne Toxics Control Measure
BR	Breathing Rate
BW	Body Weight
CAA	Clean Air Act
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
DPM	Diesel Particulate Matter
EF	Exposure Frequency
FAH	Fraction of time at home
GLC	Ground Level Concentration
HAP	Hazardous Air Pollutant
HARP2	Hot Spots Analysis & Reporting Program
HRA	Health Risk Assessment
kg	Kilogram
L	Liter
MEIR	Maximum Exposed Individual Resident
MEIW	Maximum Exposed Individual Worker
NAAQS	National Ambient Air Quality Standards
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
OEHHA	Office of Environment Health Hazard Assessment
Project	Residences at Napa Junction Project
REL	Reference Exposure Level
SB	Senate Bill
SMAQMD	Sacramento Metropolitan Air Quality Management District
SVAB	Sacramento Valley Air Basin
TAC	Toxic Air Contaminants
T-BACT	Toxics Best Available Control Technology
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

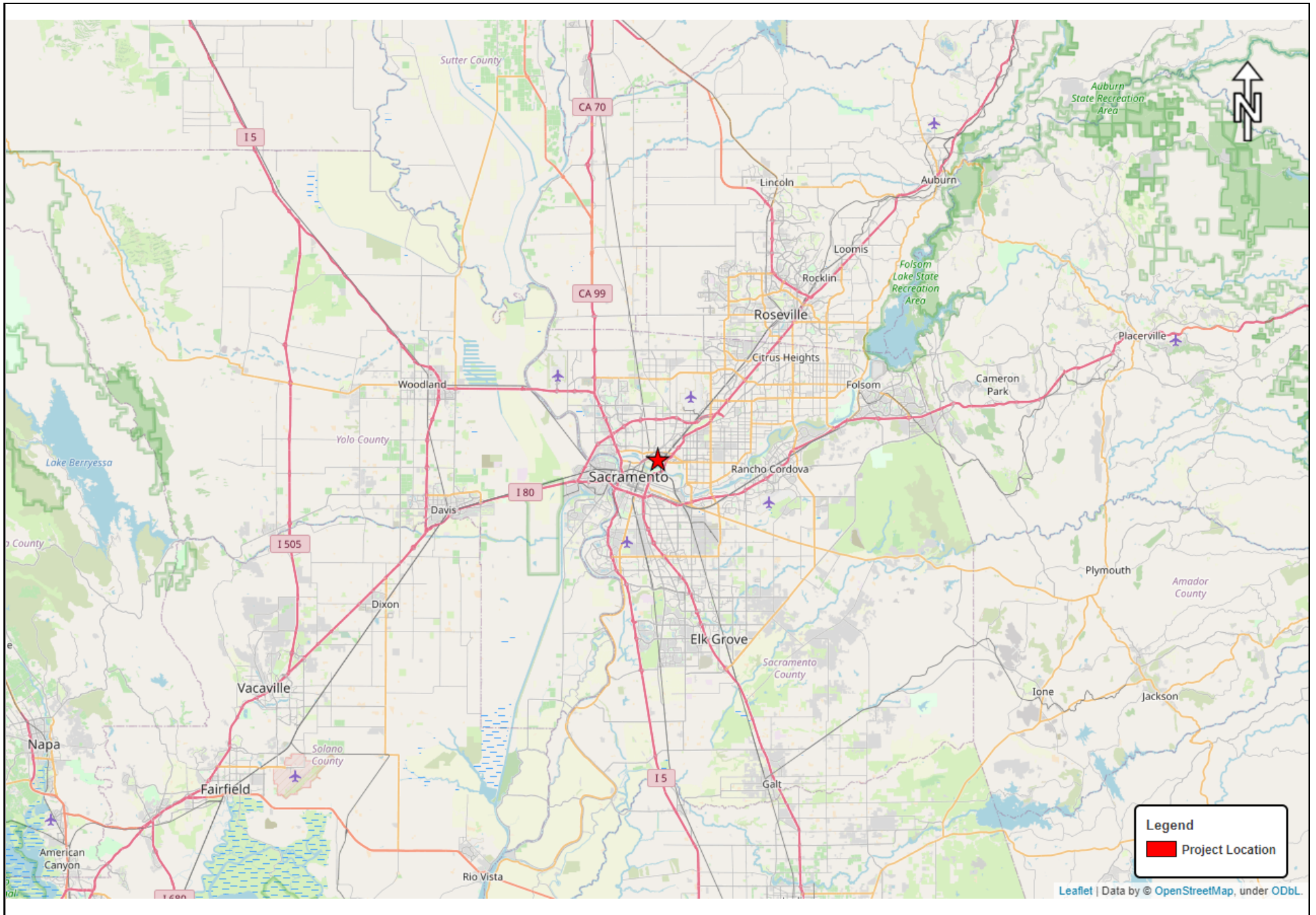
## **1.0 INTRODUCTION**

This report documents the results of a Health Risk Assessment (HRA) completed for the emissions associated with fueling operations of the Leisure Lane-Expo Parkway Gas Station Project (Project), which consist of the proposal to construct a 12-pump gas station due east of the North Sacramento Freeway (State Route 160) in the City of Sacramento, California. The purpose of this HRA is to evaluate potential health risks associated with exposure of toxic air contaminants (TACs) (or hazardous air pollutants [HAPs] in the federal parlance), including benzene, ethyl benzene, n-hexane, naphthalene, propylene (or propene), xylenes, and toluene, generated by Project fueling and fuel storage operations. This Operational HRA was prepared in accordance with the requirements and recommendations of the Office of Environmental Health Hazard Assessment (OEHHA), California Air Resources Board (CARB), California Air Pollution Control Officers Association (CAPCOA), and the Sacramento Metropolitan Air Quality Management District (SMAQMD) to determine if significant health risks are likely to occur to existing residents and workers in the vicinity of the Project Site due to Project Operations.

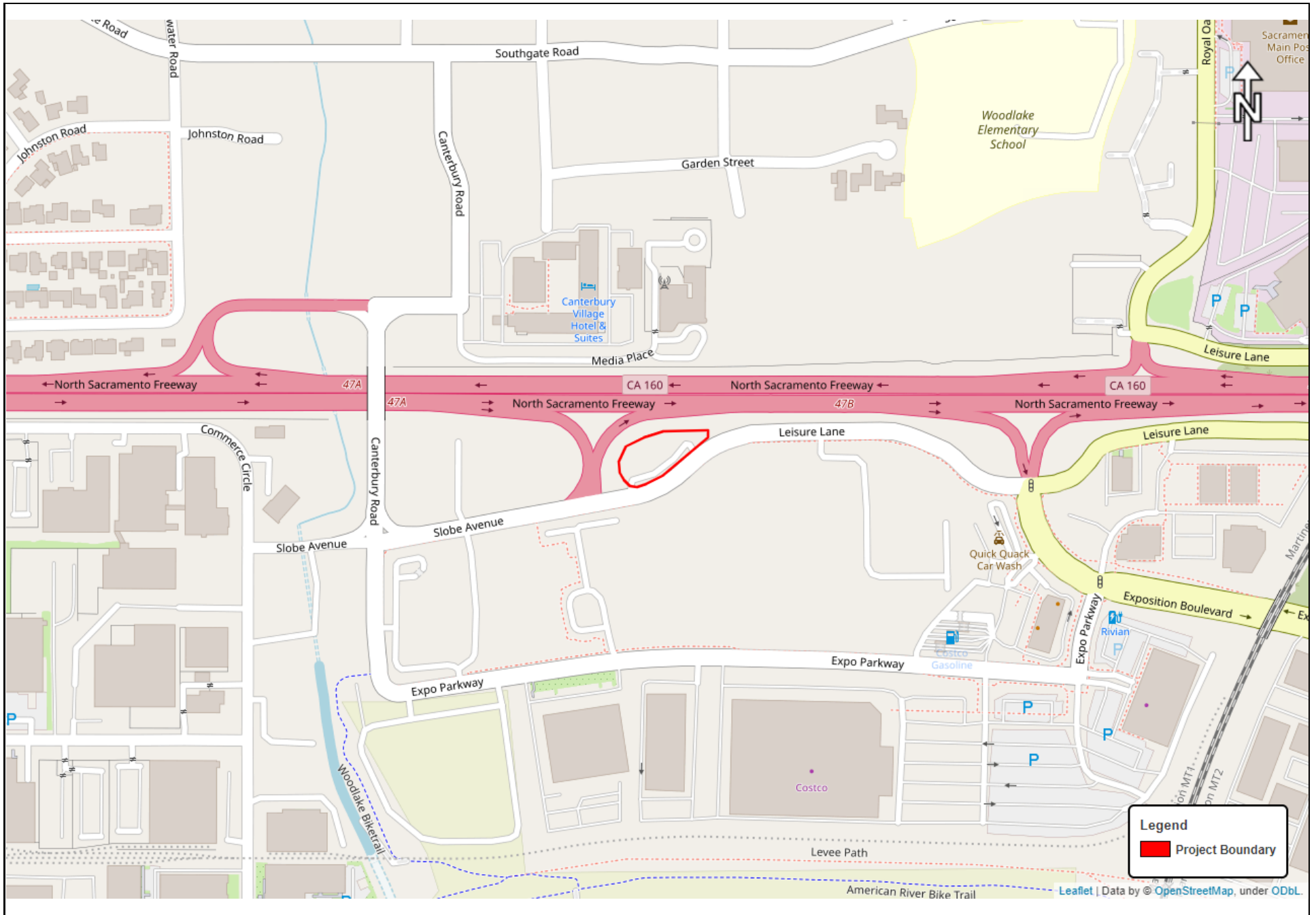
### **1.1 Project Location and Description**

The Project Site is located in the central portion of City of Sacramento on an irregular shaped property directly south of State Route (SR) 160. The Site can be accessed from SR 160 via Leisure Lane. The site is bounded by SR 160 to the north, with a commercial hotel and residential neighborhoods beyond, Leisure Lane and commercial land uses to the east, Leisure Lane to the south with vacant land beyond, an assisted living facility to the southwest, and vacant land to the west. The nearest residences to the north are located approximately 665 feet from the Project Site. The assisted living facility is approximately 275 feet to the southwest of the Project Site. The Project Site is relatively flat with no structures.

The Project proposes the construction of a gasoline dispensing station consisting of 12 fueling positions, a 1,640-square foot convenience store, 2,280-square foot drive-through restaurant and associated parking. The Project's expected gasoline throughput is 100,000 gallons per year. The Project would be accessible from Leisure Lane on the south-southeast side of the property boundary. The Project vicinity and location can be seen in Figures 1 and 2.



**Figure 1. Project Location**



**Figure 2. Project Vicinity**

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## **2.0 HEALTH RISK ASSESSMENT**

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### **2.1 Environmental Setting**

Air quality in a region is determined by its topography, meteorology, and existing air pollutant sources. These factors are discussed below, along with the current regulatory structure that applies to the Sacramento Valley Air Basin (SVAB), which encompasses the Project Site, pursuant to the regulatory authority of the SMAQMD.

Ambient air quality is commonly characterized by climate conditions, the meteorological influences on air quality, and the quantity and type of pollutants released. The air basin is subject to a combination of topographical and climatic factors that reduce the potential for high levels of regional and local air pollutants. The following section describes the pertinent characteristics of the air basin and provides an overview of the physical conditions affecting pollutant dispersion in the Project Area.

#### **2.1.1 Sacramento Valley Air Basin**

CARB divides the State into air basins that share similar meteorological and topographical features. The Project site lies in the SVAB, which is comprised all of Butte, Colusa, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties and parts of Solano and Placer County. The air basin is relatively flat, bordered by mountains to the east, west, and north and by the San Joaquin Valley to the south. Air flows into the SVAB through the Carquinez Strait, moving across the Sacramento Delta, and bringing pollutants from the heavily populated San Francisco Bay Area. The climate is characterized by hot, dry summers and cool, rainy winters. Characteristic of SVAB winter weather are periods of dense and persistent low-level fog, which are most prevalent between storm systems. From May to October, the region's intense heat and sunlight lead to high ozone pollutant concentrations. Summer inversions are strong and frequent but are less troublesome than those that occur in the fall. Autumn inversions, formed by warm air subsiding in a region of high pressure, have accompanying light winds that do not provide adequate dispersion of air pollutants.

Regional flow patterns affect air quality patterns by directing pollutants downwind of sources. Localized meteorological conditions, such as moderate winds, disperse pollutants and reduce pollutant concentrations. However, the mountains surrounding the SVAB can create a barrier to airflow, which can trap air pollutants in the valley when meteorological conditions are right and a temperature inversion exists. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells lie over the valley. The lack of surface wind during these periods and the reduced vertical air flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with smoke from agricultural burning or when temperature inversions trap cool air, fog, and pollutants near the ground.

The ozone season (May through October) in the valley is characterized by stagnant morning air or light winds, with the delta sea breeze arriving in the afternoon out of the southwest. Usually, the evening breeze transports the airborne pollutants to the north out of the valley. During about half of the days from July to September, however, a phenomenon called the Schultz Eddy prevents this from occurring. Instead of



allowing the prevailing wind patterns to move north and carry the pollutants out of the valley, the Schultz Eddy causes the wind pattern to circle back south. This phenomenon exacerbates the pollution levels in the area and increases the likelihood of exceeding federal or state standards.

## **2.1.2 Toxic Air Contaminants**

In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For regulatory purposes, carcinogenic TACs are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Public exposure to TACs can result from emissions from normal operations, as well as from accidental releases of hazardous materials during upset conditions. The health effects of TACs include cancer, birth defects, neurological damage, and death.

### **2.1.2.1 Gasoline Vapor**

Gasoline vapor consists of the TACs, benzene, ethyl benzene, n-hexane, naphthalene, propylene (or propene), xylenes, and toluene. However, of all the TACs in gasoline, benzene is the most toxic component of gas station emissions (CARB & CAPCOA 2022a). According to CAPCOA, benzene is the most important substance driving cancer risk, while xylene, another air toxic associated with gasoline stations, is the only substance which is associated with acute adverse health effects (CAPCOA 1997). According to CAPCOA, not until the benzene emissions are three orders of magnitude above the rate of an increase of 10 per million cancer risk, do the emissions of xylene begin to cause acute adverse health effects. Approximately 84 percent of the benzene emitted in California comes from motor vehicles, including evaporative leakage and unburned fuel exhaust. Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer health effects. Brief inhalation exposure to high concentrations can cause central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness.

Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions. Exposure to liquid and vapor may irritate the skin, eyes, and upper respiratory tract. Redness and blisters may result from dermal exposure to benzene. Chronic inhalation of certain levels of benzene causes blood disorders because benzene specifically affects bone marrow, which produces blood cells. Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in humans occupationally exposed to benzene.

### **2.1.3 Sensitive Receptors**

Sensitive receptors are defined as facilities or land uses that include members of the population who are particularly sensitive to the effects of air pollutants such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis.

The nearest sensitive land use to the Project Site is an assisted living facility to the southwest of the Project. The assisted living facility is approximately 275 feet (85 meters) southwest of the Project's fence line. In addition to this assisted living facility, there are houses located approximately 665 feet (200 meters) to the north, behind an existing hotel, temple, and small business park. The nearest school is located 350 meters to the northeast of the Project. The school is over 1,000 feet from the Project, while the assisted living facility and houses to the north are within 1,000 feet of the site.

## **2.2 Regulatory Framework**

### **2.2.1 Federal**

#### **2.2.1.1 Clean Air Act**

The Federal Clean Air Act (CAA) was amended in 1990 to address a large number of air pollutants that are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects. 188 specific pollutants and chemical groups were initially identified as HAPs, and the list has been modified over time. The CAA Amendments included new regulatory programs to control acid deposition and for the issuance of stationary source operating permits.

Unlike the criteria pollutants, toxics do not have National Ambient Air Quality Standards (NAAQS) making evaluation of their impacts more subjective. National Emissions Standards for Hazardous Air Pollutants (NESHAPs) were incorporated into a greatly expanded program for controlling toxic air pollutants. Section 112 of the CAA Amendments governs the federal control program for HAPs. NESHAPs are issued to limit the release of specified HAPs from specific industrial sectors. These standards are technology-based, meaning that they represent the best available control technology an industrial sector could afford. The level of emissions controls required by NESHAPs are not based on health risk considerations because allowable releases and resulting concentrations have not been determined to be safe for the general public. The CAA does not establish air quality standards for HAPs that define legally acceptable concentrations of these pollutants in ambient air.

## **2.2.2 State**

### **2.2.2.1 California Clean Air Act**

#### **California Air Resources Board**

CARB's statewide comprehensive air toxics program was established in 1983 with AB 1807 the Toxic Air Contaminant Identification and Control Act (Tanner Air Toxics Act of 1983). AB 1807 created California's program to reduce exposure to air toxics and sets forth a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an airborne toxics control measure (ATCM) for sources that emit designated TACs. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology (T-BACT) to minimize emissions.

CARB also administers the state's mobile source emissions control program and oversees air quality programs established by state statute, such as AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment and, if specific thresholds are exceeded, required to communicate the results to the public in the form of notices and public meetings. In September 1992, the "Hot Spots" Act was amended by Senate Bill (SB) 1731 which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.

#### *Tanner Air Toxics Act & Air Toxics "Hot Spot" Information and Assessment Act*

CARB's Statewide comprehensive air toxics program was established in 1983 with Assembly Bill (AB) 1807, the Toxic Air Contaminant Identification and Control Act (Tanner Air Toxics Act of 1983). AB 1807 created California's program to reduce exposure to air toxics and sets forth a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an ATCM for sources that emit designated TACs. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate T-BACT to minimize emissions.

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### Gasoline Service Station Industrywide Risk Assessment Technical Guidance

CARB and the CAPCOA have developed the 2022 Gasoline Service Station Industrywide Risk Assessment Technical Guidance Manual (2022a) to assess the health impacts of emissions from gasoline service stations in California. This manual provides guidance for local districts in the state to follow when preparing gas station emission inventories and health risk assessments to meet the requirements of the Air Toxics "Hot Spots" Information and Assessment Act (also known as the Hot Spots Act). The Hot Spots Act requires districts to establish health risk levels at which facilities are required to notify the public if these levels are exceeded and may also require facilities to implement measures to reduce emissions and potential health impacts if the cancer or noncancer risk levels are above certain levels.

#### **2.2.3 Local**

##### **2.2.3.1 Sacramento Metropolitan Air Quality Management District**

SMAQMD has stringent requirements for the control of gasoline vapor emissions from gasoline-dispensing facilities. SMAQMD Rule 448, Gasoline Transfer into Stationary Storage Containers, prohibits the transfer or allowance of the transfer of gasoline into stationary tanks at a gasoline-dispensing facility unless a CARB-certified Phase I vapor recovery system is used; and SMAQMD Rule 449, Transfer of Gasoline into Vehicle Fuel Tanks, further prohibits the transfer or allowance of the transfer of gasoline from stationary tanks into motor vehicle fuel tanks at a gasoline-dispensing facility unless a CARB-certified Phase II vapor recovery system is used during each transfer. Vapor recovery systems collect gasoline vapors that would otherwise escape into the air during bulk fuel delivery (Phase I) or fuel storage and vehicle refueling (Phase II). Phase I vapor recovery system components include the couplers that connect tanker trucks to the underground tanks, spill containment drain valves, overfill prevention devices, and vent pressure/vacuum valves. Phase II vapor recovery system components include gasoline dispensers, nozzles, piping, break away, hoses, face plates, vapor processors, and system monitors. SMAQMD Rule 448 also requires fuel storage tanks to be equipped with a permanent submerged fill pipe and the storage tank which prevents the escape of gasoline vapors. In addition, all gasoline must be stored underground with valves installed on the tank vent pipes to further control gasoline emissions.

Stationary sources having the potential to emit TACs, including gas stations, are required to obtain permits from the SMAQMD. Permits may be granted to these operations provided they are operated in accordance with applicable SMAQMD rules and regulations. SMAQMD's gasoline station permitting process provides for the review of gasoline TAC emissions to evaluate potential public exposure and health risk, to mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced. SMAQMD's permitting procedures require substantial control of emissions, and permits are not issued unless TAC risk screening or TAC risk assessment can show that risks are not significant. According to the SMAQMD (2017), SMAQMD may impose limits on annual throughput to ensure that risks are within acceptable limits. In addition, California has statewide limits on the benzene content in gasoline, which greatly reduces the toxic potential of gasoline emissions.

## 2.2.4 Threshold of Significance

The impact analysis provided below is based on the following local (SMAQMD) health risk thresholds, as shown in Table 2-1.

<b>Table 2-1. SMAQMD Health Risk Significance Thresholds</b>		
<b>Air Pollutant/Risk Parameter</b>	<b>Value</b>	<b>Units</b>
Elevated Cancer Risk	10	In One Million
Chronic Hazard Quotient	1	Health Hazard Index
Acute Hazard Quotient	1	Health Hazard Index

Cancer risk is expressed in terms of expected incremental incidence per million population. This threshold serves to determine whether Project sources of TACs (e.g., gasoline vapor) potentially have significant impacts on a receptor. The 10-in-one-million standard is a very health-protective significance threshold. A risk level of 10 in one million implies a likelihood that up to 10 persons out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of TACs over a specified duration of time. This risk would be an excess cancer that is in addition to any cancer risk borne by a person not exposed to these air toxics. To put this risk in perspective, the risk of dying from accidental drowning is 1,000 in a million, which is 100 times more than the SMAQMD's threshold of 10 in one million.

The SMAQMD has also established non-carcinogenic risk parameters for use in HRAs. Noncarcinogenic risks are quantified by calculating a *hazard index*, expressed as the ratio between the ambient pollutant concentration and its toxicity or Reference Exposure Level (REL). An REL is a concentration at, or below which health effects are not likely to occur. A hazard index less of than one (1.0) means that adverse health effects are not expected. Within this analysis, non-carcinogenic exposures of less than 1.0 are considered less than significant.

## 2.2.5 Methodology

### 2.2.5.1 Fueling Station Emission Calculations

Fueling station throughput for the permitted site was modeled using the estimated gasoline throughput of 100,000 gallons per year provided by the applicant. Maximum hourly throughput was calculated using the annual throughput and 2022 CARB & CAPCOA Gasoline Services Station Industrywide Risk Assessment Look-up Tool Version 1.0 (CARB & CAPCOA 2022b). Gasoline vapor emissions were calculated for tank loading and breathing; vehicle fueling and spillage and hose permeation for each station using emission factors found in the Gasoline Service Station Industrywide Risk Assessment Technical Guidance (CARB 2022a). The calculated gasoline vapor emissions were speciated in the TACs contained in total TOG using a summer/winter gasoline profile from the 2022 Gasoline Service Station Industrywide Risk Assessment Technical Guidance (CARB & CAPCOA 2022a). Emission calculations for fueling can be found in Attachment B of this document. Stage I and II Vapor Recovery are assumed for loading and fueling operations per SMAQMD Rule 449.

### 2.2.5.2 Dispersion Modeling

The air dispersion modeling for the HRA was performed using the USEPA AERMOD Version 22112 dispersion model. AERMOD is a steady-state, multiple-source, Gaussian dispersion model designed for use with emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources. The appropriate USGS\_NED file found at U.S. Geological Survey (USGS) was used for elevation data for all sources and receptors in the school domain. All regulatory defaults were used for dispersion modeling.

AERMOD requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. Pre-processed meteorological data files provided by SMAQMD using USEPA's AERMET program, designed to create AERMOD input files for the Sacramento Executive Airport monitoring station, were selected as being the most representative meteorology based on proximity. The location of the monitoring station in respect to the Project Site is presented in Attachment B to this document.

The unit emission rate of one gram per second was utilized in AERMOD to create plot files containing the dispersion factor (X/Q) for each source group. A uniform grid was placed over the Project Area with a spacing of 10 meters. Emissions for each source group as described above were input into HARP2 to calculate the ground level concentrations (GLC) at the modeled receptors. Source and receptor locations can be found in Attachment B of this document. AERMOD summary files can be found in Attachment C of this document.

### 2.2.5.3 Health Risk Modeling

Based on the OEHHA methodology, the residential inhalation cancer risk from the annual average TAC concentrations is calculated by multiplying the daily inhalation or oral dose, by a cancer potency factor, the age sensitivity factor (ASF), the frequency of time spent at home, and the exposure duration divided by averaging time, to yield the excess cancer risk. These factors are discussed in more detail below. Cancer risk must be separately calculated for specified age groups, because of age differences in sensitivity to carcinogens and age differences in intake rates (per kilogram [kg] body weight). Separate risk estimates for these age groups provide a health-protective estimate of cancer risk by accounting for greater susceptibility in early life, including both age-related sensitivity and amount of exposure.

Exposure through inhalation (Dose-air) is a function the breathing rate, the exposure frequency, and the concentration of a substance in the air. The breathing rates are determined for specific age groups, so Dose-air is calculated for each of these age groups, 3rd trimester, 0<2, 2<9, 2<16, 16<30 and 16-70 years. To estimate cancer risk, the dose was estimated by applying the following formula to each ground-level concentration:

$$\text{Dose-air} = (C_{\text{air}} * \{BR/BW\} * A * EF * 10^{-6})$$

Where:

Dose-air = dose through inhalation (mg/kg/day)  
 $C_{\text{air}}$  = air concentration ( $\mu\text{g}/\text{m}^3$ ) from air dispersion model

- {BR/BW} = daily breathing rate normalized to body weight (L/kg body weight – day) (361 L/kg BW-day for 3<sup>rd</sup> Trimester, 1,090 L/kg BW-day for 0<2 years, 861 L/kg BW-day for 2<9 years, 745 L/kg BW-day for 2<16 years, 335 L/kg BW-day for 16<30 years, and 290 L/kg BW-day 16<70 years)
- A = Inhalation absorption factor (unitless [1])
- EF = exposure frequency (unitless), days/365 days (0.96 [approximately 350 days per year])
- 10<sup>-6</sup> = conversion factor (micrograms to milligrams, liters to cubic meters)

OEHHA developed ASFs to consider the increased sensitivity to carcinogens during early-in-life exposure. In the absence of chemical-specific data, OEHHA recommends a default ASF of 10 for the third trimester to age 2 years, an ASF of 3 for ages 2 through 15 years to account for potential increased sensitivity to carcinogens during childhood and an ASF of 1 for ages 16 through 70 years.

Fraction of time at home (FAH) during the day is used to adjust exposure duration and cancer risk from a specific facility’s emissions, based on the assumption that exposure to Project gasoline vapors are not occurring away from home. OEHHA recommends the following FAH values: from the third trimester to age <2 years, 85 percent of time is spent at home; from age 2 through <16 years, 72 percent of time is spent at home; from age 16 years and greater, 73 percent of time is spent at home.

To estimate the cancer risk, the dose is multiplied by the cancer potency factor, the ASF, the exposure duration divided by averaging time, and the frequency of time spent at home (for residents only):

$$\text{Risk}_{\text{inh-res}} = (\text{Dose}_{\text{air}} * \text{CPF} * \text{ASF} * \text{ED/AT} * \text{FAH})$$

Where:

- Risk<sub>inh-res</sub> = residential inhalation cancer risk (potential chances per million)
- Dose<sub>air</sub> = daily dose through inhalation (mg/kg-day)
- CPF = inhalation cancer potency factor (mg/kg-day<sup>-1</sup>)
- ASF = age sensitivity factor for a specified age group (unitless)
- ED = exposure duration (in years) for a specified age group (0.25 years for 3<sup>rd</sup> trimester, 2 years for 0<2, 7 years for 2<9, 14 years for 2<16, 14 years for 16<30, 54 years for 16-70)
- AT = averaging time of lifetime cancer risk (years)
- FAH = fraction of time spent at home (unitless)

Non-cancer chronic impacts are calculated by dividing the annual average concentration by the REL for that substance. The REL is defined as the concentration at which no adverse non-cancer health effects are anticipated. The following equation was used to determine the non-cancer risk:

$$\text{Hazard Quotient} = \text{Ci}/\text{RELi}$$

Where:

- Ci = Concentration in the air of substance i (annual average concentration in µg/m<sup>3</sup>)
- RELi = Chronic noncancer Reference Exposure Level for substance i (µg/m<sup>3</sup>)

Lastly, the resultant values modeled using AERMOD and HARP2, as described above, are verified for accuracy against CARB’s “Look-up Tool”, which is health risk screening tool. The CARB Look-up Tool is a health risk screening spreadsheet that allows the user to select from predetermined modeling results and scale risk results by facility specific emissions. The Look-up Tool provides health risk screening results based on less robust calculations processes when compared to the AERMOD and HARP2 modeling prepared for this analysis; nonetheless, a comparison of the AERMOD and HARP2 modeling results against the Look-up Tool is helpful for verifying the certainty of results.

**2.2.5.4 Cancer Risk**

Operational cancer risk calculations for Project vicinity residential and worker receptors were completed for 70-, 30-, 25- and 9-year periods as shown in Table 2-2 of the Maximumly Exposed Individual Resident (MEIR) and Maximumly Exposed Individual Worker (MEIW) in the Project vicinity. The calculated cancer risk accounts for 350 days per year of exposure to residential and worker receptors. While the average American spends 87 percent of their life indoors (USEPA 2001), neither the pollutant dispersion modeling nor the health risk calculations account for the reduced exposure structures provide. Instead, health risk calculations account for the equivalent exposure of continual outdoor living and working.

The MEIR and MEIW are identified at the northeastern corner of the assisted living facility 275 feet (85 meters) to the southwest of the Project Site (see Attachment A). The specific health risk calculations shown in Table 2-2 are specific to this location. The residences to the north of the proposed gasoline dispensing station and offsite workers to the east have lower calculated risk values than those presented in Table 2-2.

<b>Table 2-2. Maximum Cancer Risk Summary</b>	
<b>Maximum Exposure Scenario</b>	<b>Total Maximum Risk (in 1 million)</b>
70-Year Exposure Resident	0.02
30-Year Exposure Resident	0.02
9-Year Exposure Resident	0.01
25-Year Exposure Worker	0.005
<i>CARB &amp; CAPCOA Screening Tool @ 85 Meters</i>	0.07
<i>Significance Threshold</i>	<i>10</i>
<b>Exceed Threshold?</b>	<b>No</b>

Source: ECORP Consulting 2022. See Attachment B.

As shown, the existing residents and workers in the surrounding area would not experience a significant amount of cancer risk from fueling operations at the Proposed Project. In addition, the values modeled using AERMOD and HARP2 have good agreement with the conservative numbers provided in the CARB Lookup Tool. As previously described, the Look-up Tool provides health risk screening results based on less robust calculations processes when compared to the AERMOD and HARP2 modeling prepared for this



analysis; nonetheless, a comparison of the AERMOD and HARP2 modeling results against the Look-up Tool is helpful for verifying the certainty of results.

**2.2.5.5 Non-Carcinogenic Hazards**

In addition to cancer risk, the significance thresholds for TAC exposure requires an evaluation of non-cancer risk stated in terms of a hazard index. Non-cancer chronic impacts are calculated by dividing the annual average concentration by the REL for that substance. The REL is defined as the concentration at which no adverse non-cancer health effects are anticipated. The potential for acute non-cancer hazards is evaluated by comparing the maximum short-term exposure level to an acute REL. RELs are designed to protect sensitive individuals within the population. The calculation of acute non-cancer impacts is like the procedure for chronic non-cancer impacts.

A chronic or acute hazard index of 1.0 is considered individually significant. The hazard index is calculated by dividing the chronic exposure by the REL. The highest maximum chronic and acute hazard indexes for residents and workers due to Project fueling operations are presented in Table 2-3.

<b>Table 2-3. Maximum Non-Cancer Risk Summary</b>		
<b>Maximum Exposure Scenario</b>	<b>Health Hazard Index (HHI)</b>	
	<b>Chronic</b>	<b>Acute</b>
Resident (70 Year for Chronic)	0.0001	0.15
Worker (25 Year for Chronic)	0.0001	0.15
<i>CARB &amp; CAPCOA Tool @ 90 Meters</i>	0.00	0.07
<i>Significance Threshold</i>	<i>1</i>	<i>1</i>
<b>Exceed Threshold?</b>	<b>No</b>	<b>No</b>

Source: ECORP Consulting 2022. See Attachment B.

As shown in Table 2-3, the highest maximum chronic hazard indexes for residents and workers are under the SMAQMD significance threshold of 1.0. As with cancer risk, benzene is the largest contributor to both acute and chronic scenarios. Like cancer risk, chronic and acute risk is calculated from the maximum annual concentration using the most recent five years of available meteorological data.

### **3.0 REFERENCES**

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## **LIST OF ATTACHMENTS**

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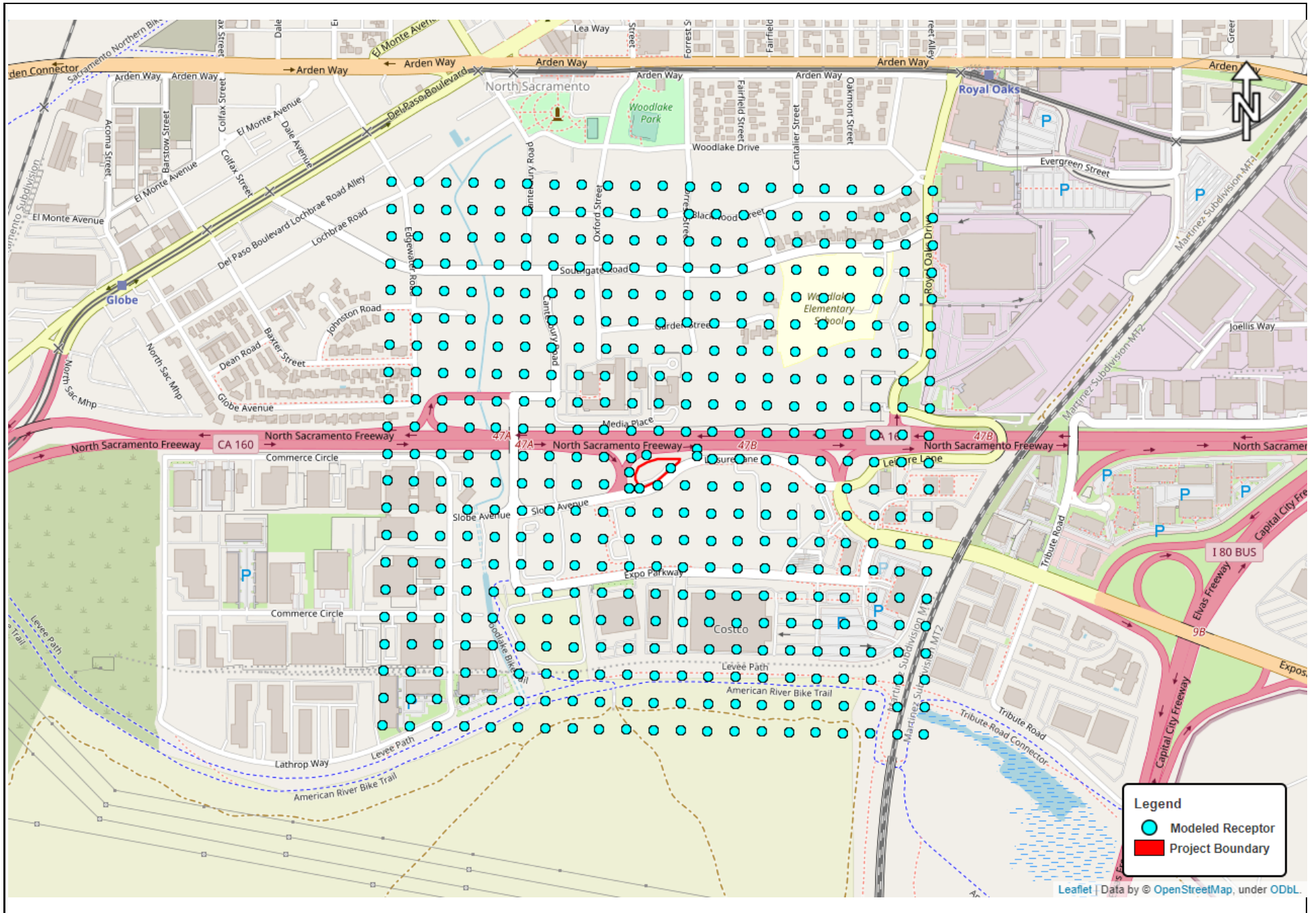
Attachment A – Supplemental Health Risk Figures

Attachment B – Health Risk Analysis Output Files

## **ATTACHMENT A**

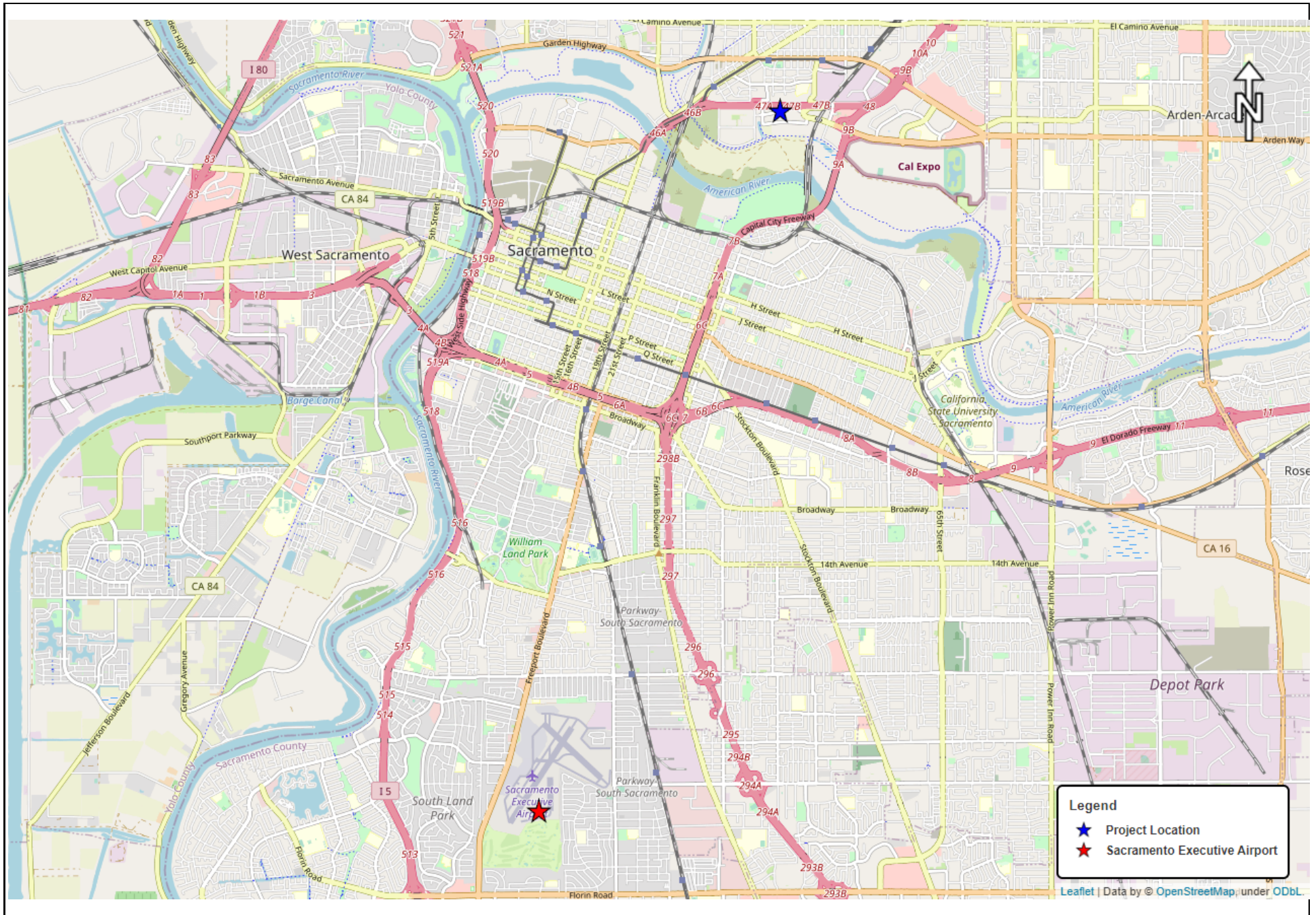
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Supplemental Health Risk Figures

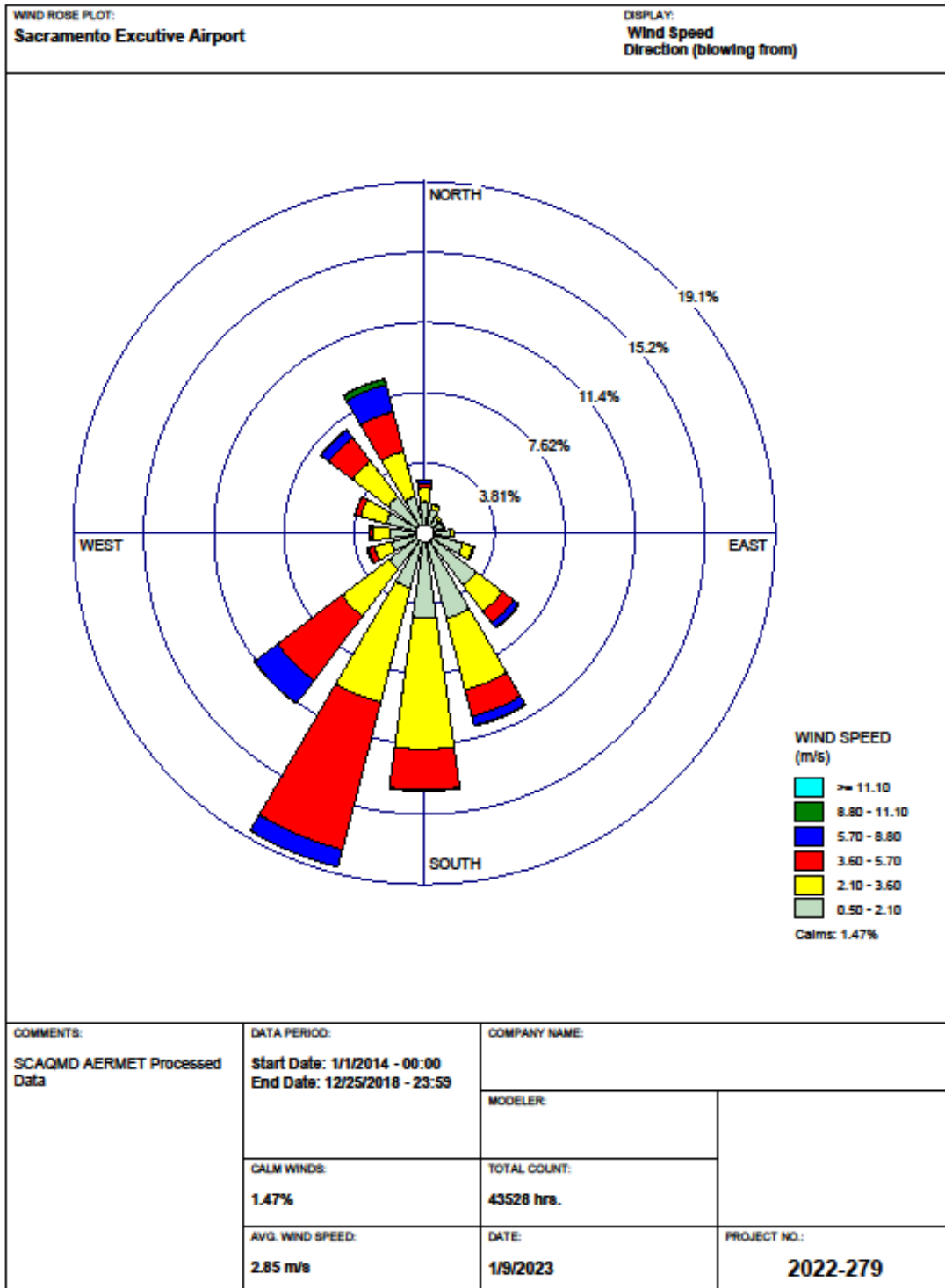


**Figure A-1. Receptor Location**  
2022-279 Leisure Lane-Expo Parkway Gas Station Project





**Figure A-2. Meteorological Monitoring Station Location**  
*2022-279 Leisure Lane-Expo Parkway Gas Station Project*



WRPLOT View - Lakes Environmental Software

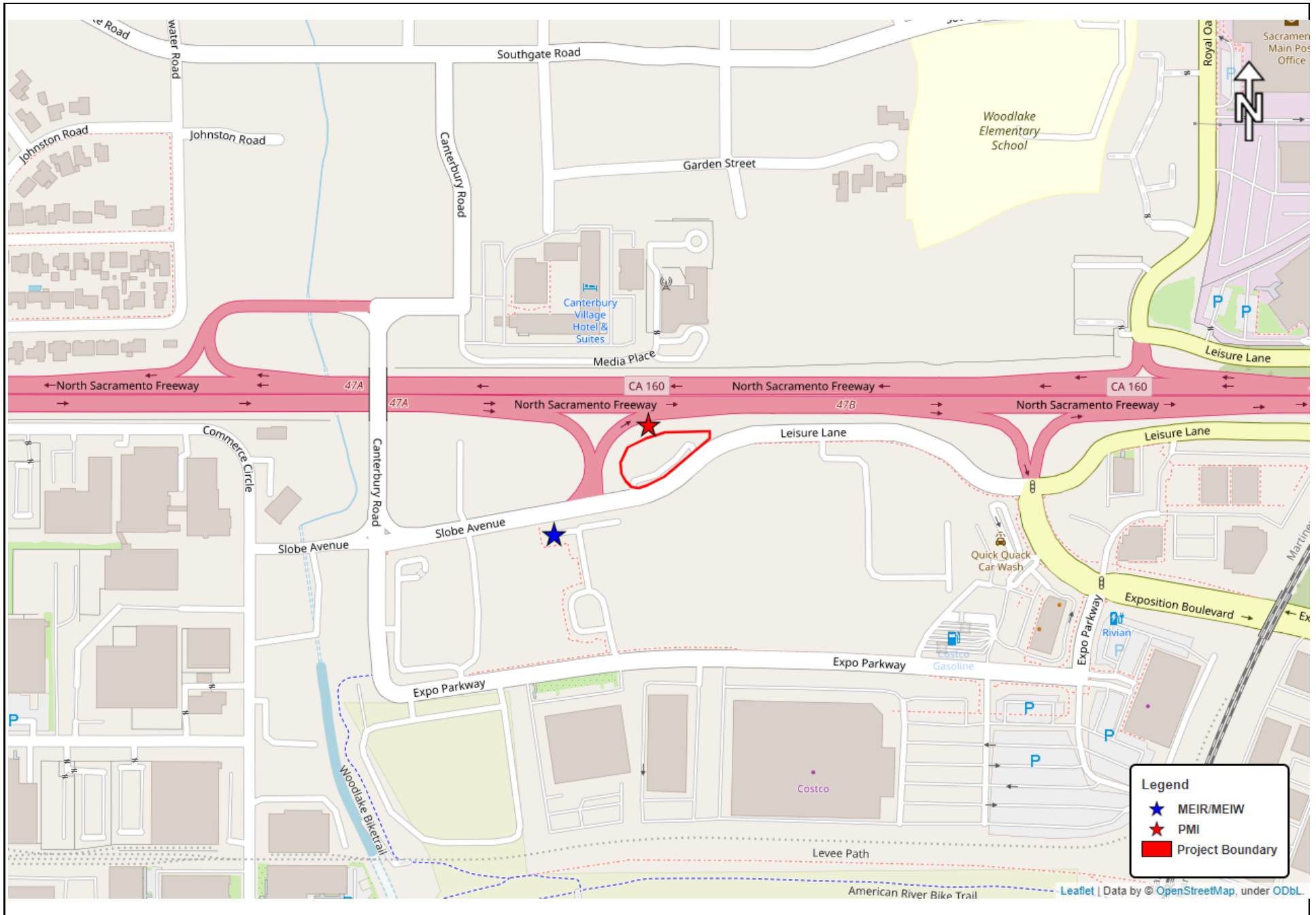
**Figure A-3. Sacramento Executive AP Wind Rose**

*2022-279 Leisure Lane-Expo Parkway Gas Station Project*



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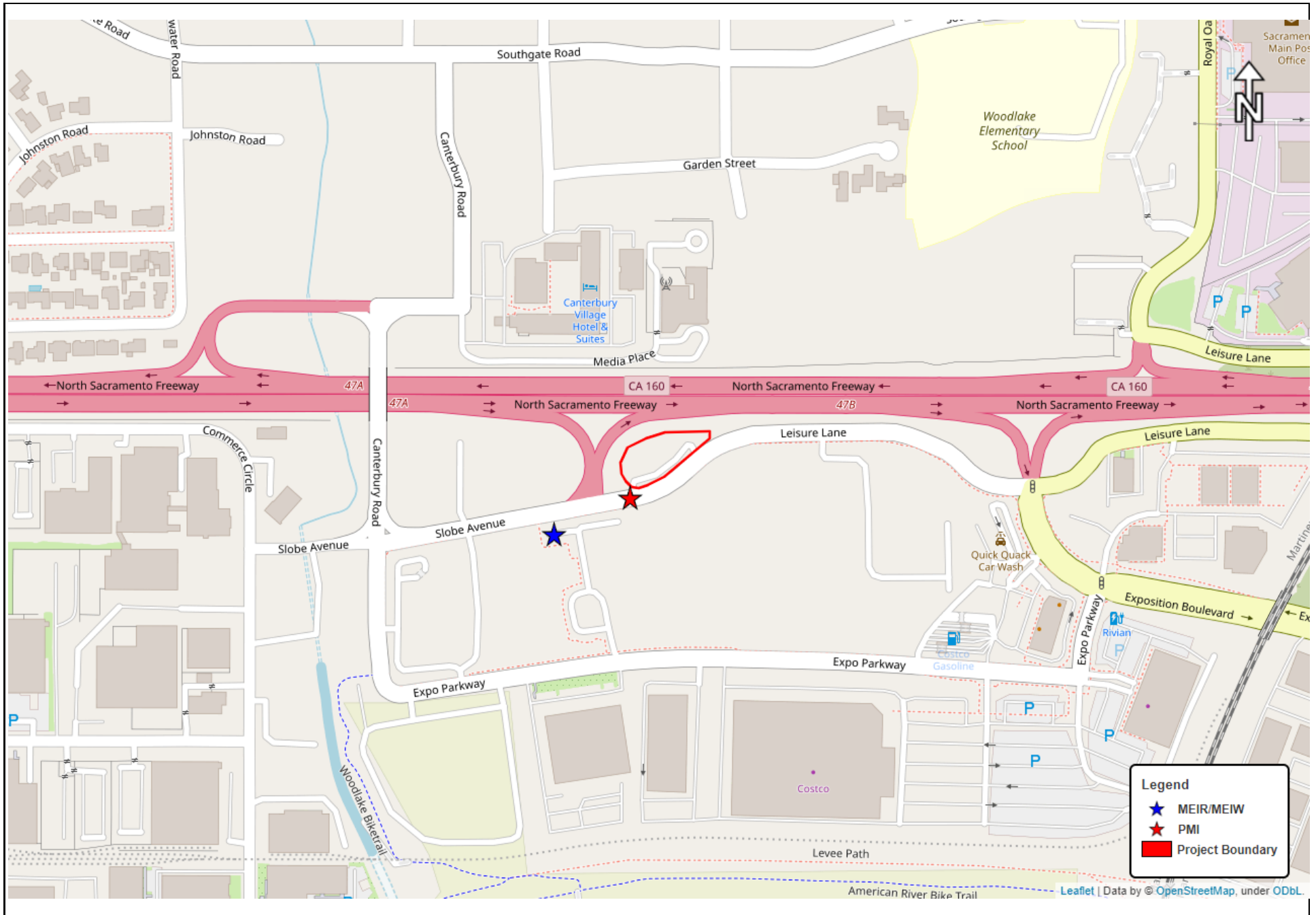




**Figure A-4. Maximum Resident and Worker Offsite Cancer and Chronic Risk**  
 2022-279 Leisure Lane-Expo Parkway Gas Station Project







**Figure A-5. Maximum Resident and Worker Offsite Acute Risk**  
 2022-279 Leisure Lane-Expo Parkway Gas Station Project