ATTACHMENTS

Initial Study and Mitigated Negative Declaration

MARINA VILLAGE - HOUSING PROJECT

LIST OF ATTACHMENTS

ATTACHMENT 4.3

Air Quality & Greenhouse Gas Emissions Assessment, Marina Village - Housing Project, ECORP Consulting, Inc., September 2021

Air Quality & Greenhouse Gas Emissions Assessment
Marina Village - Housing Project

Suisun City, California

Prepared For:

City of Suisun
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September 2021

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LIST OF ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CH_4	Methane
City	Suisun City
CFNR	California Northern Railroad
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalents
DPM	Diesel particulate matter
EO	Executive Order
GHG	Greenhouse gas emissions
hp	Horsepower
IPCC	Intergovernmental Panel on Climate Change
$\mu g/m^3$	Micrograms per cubic meter
lbs	Pounds
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen dioxide
NO_x	Nitrous oxides
OEHHA	Office of Environmental Health Hazard Assessment
O_3	Ozone
parts per million	ppm
PM_{10}	Coarse particulate matter
$PM_{2.5}$	Fine particulate matter
ppb	Parts per billion
Project	Marina Village Project
ROG	Reactive organic gases
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SB	Senate Bill
SFBAAB	San Francisco Bay Area Air Basin
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SR	State Route
TACs	Toxic air contaminants
tpy	Tons per year
USEPA	U.S. Environment Protection Agency
VMT	Vehicle Miles Traveled

1 INTRODUCTION

This report documents the results of an Air Quality and Greenhouse Gas (GHG) Emissions Assessment completed for the Suisun City Housing Project (Project). This assessment was prepared using methodologies and assumptions recommended in the rules and regulations of the Bay Area Air Quality Management District (BAAQMD), by the California Air Control Officers Association (CAPCOA) and by the California Air Resources Board (CARB). Regional and local existing conditions are presented, along with pertinent emissions standards and regulations. The purpose of this assessment is to estimate Project-generated criteria air pollutants and GHG emissions attributable to the Project and to determine the level of impact the Project would have on the environment. Significance levels set forth by BAAQMD and CAPCOA are utilized to compare modeled project emissions and determine significance.

1.1 Project Location and Description

The Solano Affordable Housing Foundation proposes the development of the Marina Village – Affordable Housing Project (Project), a 160-apartment complex with eight 3-story buildings, located at 201 Marina Boulevard on a 5.2-acre vacant property within the limits of Suisun City (City) in Solano County (see Figure 1. Regional Project Location). The Project Site is currently vacant and located in the western portion of the City within a suburban residential area. The Project Site is bounded by Buena Vista Avenue to the north, with single-family residences and the First Christian Church beyond; single-family residences to the east, Marina Boulevard to the west, with vacant land beyond; and an ARCO AM/PM gas station, Central County Bikeway, and State Route (SR) 12 to the south, with vacant land, Suisun Slough, and single-family residences and a shopping center beyond. Additionally, the California Northern Railroad (CFNR) is about 0.25-mile northwest of the Project Site and runs parallel to Railroad Avenue (see Figure 2. Project Site Location).

The Project proposes the construction of eight 3-story apartment buildings totaling 160 units consisting of a mix of 39 one-bedroom, 55 two -bedroom, 50 three-bedroom, and 16 four-bedroom units; a single-story 2,400 square foot community building; open space facilities including a plaza, patio, children’s play area, village walks, and green space. Additionally, the Project proposes landscaping throughout the Site, security fencing and gated entry, covered and uncovered parking with solar, and various infrastructure components such as utility connections and stormwater drainage systems.

Construction activities associated with the Proposed Project would require grading, utility connections, building construction, frontage improvements (e.g., new curb, gutter, sidewalk, and driveway construction), and landscaping on the Project Site. Construction is anticipated to begin in February 2022 and an 18-month construction schedule is anticipated. This would result in construction completion around August of 2024.

The Project Site is designated by the Suisun City General Plan as Mixed Use, which allows retail, commercial service, professional office, public services and facilities, and higher-density residential uses as described in the ’Higher-Density Residential’ General Plan Land Use Designation. The City does not interpret or apply the Mixed Use General Plan designation to require a mix of non-residential and residential uses on such a designated site, but rather allows either such a mix or exclusively allows the permitted non-residential or residential uses.

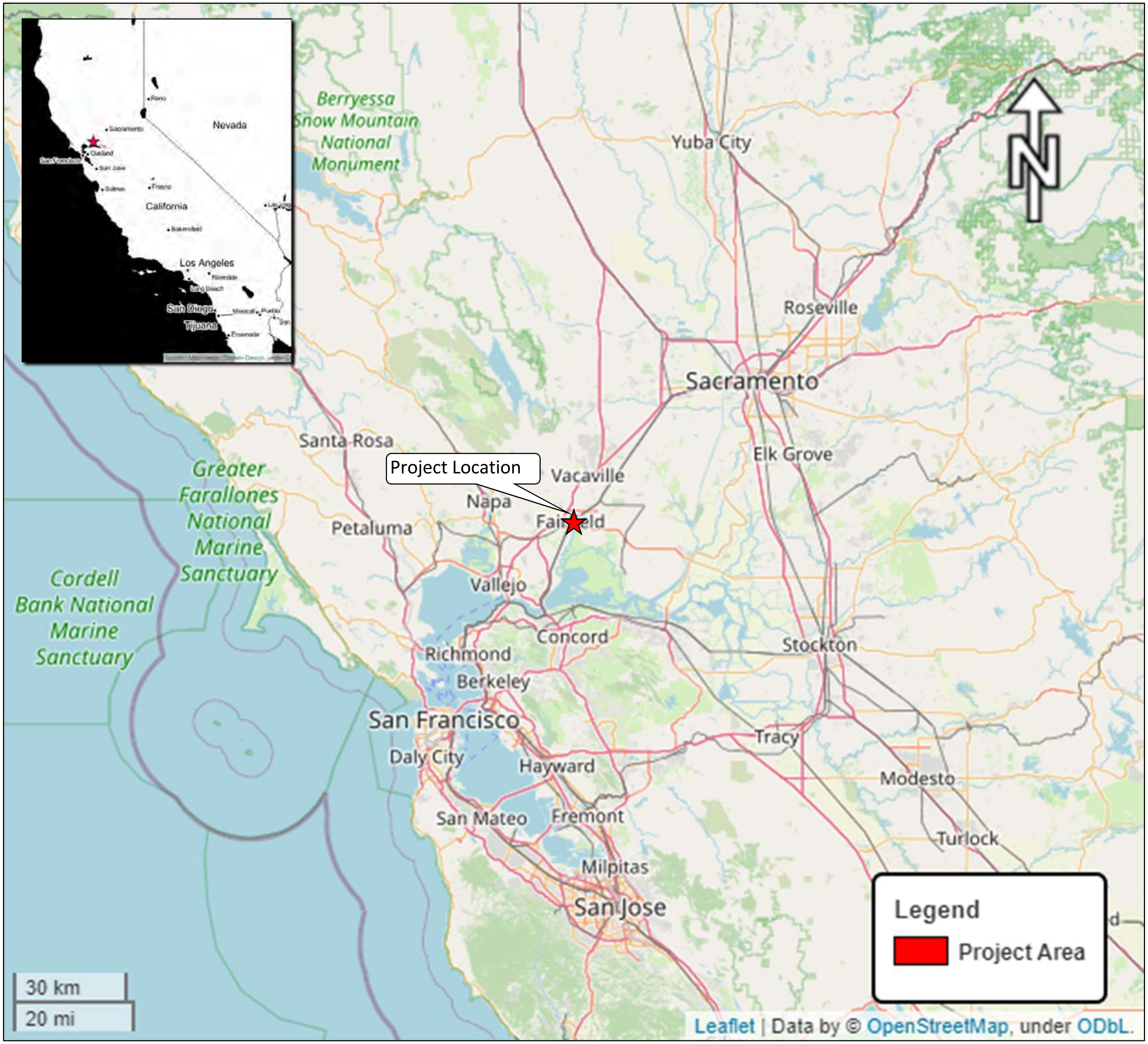

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Figure 1. Regional Location
Marina Village Affordable Housing Project

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Figure 2. Site Location
Marina Village Affordable Housing Project

2 AIR QUALITY

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 San Francisco Bay Area Air Basin (SFBAAB), which encompasses the Project site, pursuant to the regulatory authority of the BAAQMD.

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 *San Francisco Bay Air Basin*

The California Air Resources Board (CARB) divides the state into air basins that share similar meteorological and topographical features. The Project site is located in the southwestern portion of Solano County which is located in the SFBAAB. The SFBAAB is approximately 5,600 square miles in area and consists of nine counties that surround the San Francisco Bay, including all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties; the southwestern portion of Solano County; and the southern portion of Sonoma County.

The topography of the SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys and bays. This complex terrain, especially the higher elevations, distorts the normal wind flow patterns in the SFBAAB. The greatest distortions occur when low-level inversions are present and the air beneath the inversion flows independently of air above the inversion, a condition that is common in the summertime (BAAQMD 2017).

The air flowing in from the coast to the Central Valley, called the sea breeze, begins developing at or near ground level along the coast in late morning or early afternoon. As the day progresses, the sea breeze layer deepens and increases in velocity while spreading inland. The depth of the sea breeze depends in large part upon the height and strength of the inversion. If the inversion is low and strong, and hence stable, the flow of the sea breeze will be inhibited and stagnant conditions are likely to result (BAAQMD 2017).

Summertime temperatures in the SFBAAB are determined by the effect of differential heating between land and water surfaces. Because land tends to heat up and cool off more quickly than water, a large-scale gradient (differential) in temperature is often created between the coast and the Central Valley, and small-scale local gradients are often produced along the shorelines of the ocean and bays. (BAAQMD 2017)

During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more directly from the west as they stream through the Golden Gate. This channeling of wind through the Golden Gate produces a jet that sweeps eastward and splits off to the northwest toward Richmond and to the southwest toward San Jose when it meets the East Bay hills. Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait, the Golden Gate, or the San Bruno gap.

An inversion is a layer of warmer air over a layer of cooler air. Inversions affect air quality conditions significantly because they influence the mixing depth, i.e., the vertical depth in the atmosphere available for diluting air contaminants near the ground. The highest air pollutant concentrations in the SFBAAB generally occur during inversions. The areas having the highest air pollution potential tend to be those that experience the highest temperatures in the summer and the lowest temperatures in the winter. The coastal areas are exposed to the prevailing marine air, creating cooler temperatures in the summer, warmer temperatures in winter, and stratus clouds all year. The inland valleys are sheltered from the marine air and experience hotter summers and colder winters. Thus, the topography of the inland valleys creates conditions conducive to high air pollution potential.

2.1.2 *Criteria Air Pollutants*

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. Ozone (O_3), coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) are considered to be local pollutants because they tend to accumulate in the air locally. PM is also considered a local pollutant. Health effects commonly associated with criteria pollutants are summarized in Table 2-1.

Table 2-1. Summary of Criteria Air Pollutants Sources and Effects

Pollutant	Major Manmade Sources	Huma Health and Welfare Effects
CO	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, effecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.
NO_2	A reddish-brown gas formed during fuel combustion for motor vehicles, energy utilities and industrial sources.	Respiratory irritant; aggravates lung and heart problems. Precursor to ozone and acid rain. Causes brown discoloration of the atmosphere.
O_3	Formed by a chemical reaction between reactive organic gases (ROGs) and nitrous oxides (N_2O) in the presence of sunlight. Common sources of these precursor pollutants include motor vehicle exhaust, industrial emissions, solvents, paints and landfills.	Irritates and causes inflammation of the mucous membranes and lung airways; causes wheezing, coughing and pain when inhaling deeply; decreases lung capacity; aggravates lung and heart problems. Damages plants; reduces crop yield.
$PM_{2.5}$ & PM_{10}	Power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, automobiles and others.	Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).
SO_2	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, effecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.

Source: California Air Pollution Control Offices Association (CAPCOA 2013)

Carbon Monoxide

CO, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. CO combines with hemoglobin in the bloodstream and reduces the amount of oxygen that can be circulated through the body. High CO concentrations can cause headaches, aggravate cardiovascular disease and impair central nervous system functions. CO concentrations can vary greatly over comparatively short distances. Relatively high concentrations of CO are typically found near crowded intersections and along heavy roadways with slow moving traffic. Even under the most sever meteorological and traffic conditions, high concentrations of CO are limited to locations within relatively short distances (i.e., up to 600 feet or 185 meters) of the source. Overall CO emissions are decreasing as a result of the Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973.

Nitrogen Oxides

Nitrogen gas comprises about 80 percent of the air and is naturally occurring. At high temperatures and under certain conditions, nitrogen can combine with oxygen to form several different gaseous compounds collectively called nitric oxides (NOx). Motor vehicle emissions are the main source of NOx in urban areas. NOx is very toxic to animals and humans because of its ability to form nitric acid with water in the eyes, lungs, mucus membrane, and skin. In animals, long-term exposure to NOx increases susceptibility to respiratory infections, and lowering resistance to such diseases as pneumonia and influenza. Laboratory studies show that susceptible humans, such as asthmatics, who are exposed to high concentrations can suffer from lung irritation or possible lung damage. Precursors of NOx, such as NO and NO_2, attribute to the formation of O_3 and $PM_{2.5}$. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes and with hospital admissions for respiratory conditions.

Ozone

Ozone (O_3) is a secondary pollutant, meaning it is not directly emitted. It is formed when volatile organic compounds (VOCs) also known as reactive organic gases (ROG) and NOx undergo photochemical reactions that occur only in the presence of sunlight. The primary source of ROG emissions is unburned hydrocarbons in motor vehicle and other internal combustion engine exhaust. Sunlight and hot weather cause ground-level O_3 to form. Ground-level O_3 is the primary constituent of smog. Because O_3 formation occurs over extended periods of time, both O_3 and its precursors are transported by wind and high O_3 concentrations can occur in areas well away from sources of its constituent pollutants.

People with lung disease, children, older adults, and people who are active can be affected when O_3 levels exceed ambient air quality standards. Numerous scientific studies have linked ground-level O_3 exposure to a variety of problems including lung irritation, difficult breathing, permanent lung damage to those with repeated exposure, and respiratory illnesses.

Sulfur Dioxide

SO_2 is a colorless gas with a pungent odor, however sulfur dioxide can react with other particulates in the atmosphere to for particulates which contribute to the haze effect. SO_2 standards have been developed by the EPA to regulate all sulfur oxides, however SO_2 is by far the most abundant sulfur oxide in the atmosphere. Currently, SO_2 is primarily a result of the burning of fossil fuels for power generation and other industrial sources. Modern regulations on diesel fuel have greatly reduced the amount of SO_2 in the atmosphere and there are currently no areas in California that have levels of SO_2 that are not acceptable by state or federal standards.

Particulate Matter

Particulate matter includes both aerosols and solid particulates of a wide range of sizes and composition. Of concern are those particles smaller than or equal to 10 microns in diameter size (PM_{10}) and small than or equal to 2.5 microns in diameter ($PM_{2.5}$). Smaller particulates are of greater concern because they can penetrate deeper into the lungs than larger particles. PM_{10} is generally emitted directly as a result of mechanical processes that crush or grind larger particles or form the resuspension of dust, typically through construction activities and vehicular travel. PM_{10} generally settles out of the atmosphere rapidly and is not readily transported over large distances. $PM_{2.5}$ is directly emitted in combustion exhaust and is formed in atmospheric reactions between various gaseous pollutants, including NOx, sulfur oxides (SOx) and VOCs. $PM_{2.5}$ can remain suspended in the atmosphere for days and/or weeks and can be transported long distances.

The principal health effects of airborne PM are on the respiratory system. Short-term exposure of high $PM_{2.5}$ and PM_{10} levels are associated with premature mortality and increased hospital admissions and emergency room visits. Long-term exposure is associated with premature mortality and chronic respiratory disease. According to the U.S. Environmental Protection Agency (USEPA), some people are much more sensitive than others to breathing PM_{10} and $PM_{2.5}$. People with influenza, chronic respiratory and cardiovascular diseases, and the elderly may suffer worse illnesses; people with bronchitis can expect aggravated symptoms; and children may experience decline in lung function due to breathing in PM_{10} and $PM_{2.5}$. Other groups considered sensitive include smokers and people who cannot breathe well through their noses. Exercising athletes are also considered sensitive because many breathe through their mouths.

2.1.3 *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. Carcinogenic TACs can also have noncarcinogenic health hazard levels.

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. Additionally, diesel engines emit a complex mixture of air pollutants composed of gaseous and solid material. The solid emissions in diesel exhaust are known as diesel particulate matter (DPM). In 1998, California identified DPM as a TAC based on its potential to cause cancer, premature death, and other health problems (e.g., asthma attacks and other respiratory symptoms). Those most vulnerable are children (whose lungs are still developing) and the elderly (who may have other serious health problems). Overall, diesel engine emissions are responsible for the majority of California's known cancer risk from outdoor air pollutants. Diesel engines also contribute to California's $PM_{2.5}$ air quality problems. 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.

2.1.4 *Ambient Air Quality*

Ambient air quality at the Project site can be inferred from ambient air quality measurements conducted at nearby air quality monitoring stations. CARB maintains more than 60 monitoring stations throughout California. The Fairfield – Chadbourne Road air quality monitoring station (1010 Chadbourne Road, Fairfield), located approximately 3.2 miles west-southwest of the Project site, monitors O_3. The closest monitoring stations in the SFBAAB monitoring for PM_{10} and $PM_{2.5}$ are the Napa - Jefferson and Vallejo - Tuolumne Street monitoring stations, respectively, which are 15 miles north-northwest and 16 miles southwest of the Project site. Ambient emission concentrations will vary due to localized variations in emission sources and climate and should be considered "generally" representative of ambient concentrations in the development area.

Table 2-2 summarizes the published data concerning O_3 from the closes air quality monitoring stations within the SFBAAB for each available pollutant between 2017 and 2019 for each year that the monitoring data is provided. The historical air quality is compared to state and federal standards that are explained in detail below. O_3, PM_{10} and $PM_{2.5}$ are the pollutants of greatest concern in the Project region due to attainment issues. State and federal concentrations are different due to different attainment determination calculations. Days over standard for some PM measurements are not whole numbers as they are estimated using samples from USEPA recommended three ($PM_{2.5}$) and six (PM_{10}) day sampling schedules.

Table 2-2. Summary of Ambient Air Quality Data at Fairfield – Chadbourne Road Station

Pollutant Scenario	Standard (State/Federal)	Value (State/Federal)		
		2017	2018	2019
Fairfield – Chadbourne Road Station				
Max 1-Hour O_3 Concentration (ppm)	0.090/--[1]	0.080/--[1]	0.078/--[1]	0.080/--[1]
Days over 1-Hour O_3 Standard		0/--[1]	0/--[1]	0/--[1]
Max 8-Hour O_3 Concentration (ppm)	0.070/ 0.070	0.063/0.062	0.067/0.066	0.068/0.068
Days over 8-hour O_3 Standard		0/0	0/0	0/0
Napa Valley - College				
Max 24-hour PM_{10} Concentration (μg/m^3)	50/150	*/*	26.0/25.5	39.0/37.5
Days over 24-Hour PM_{10} Standard		*/*	*/*	*/0
Annual PM_{10} Concentration[2] (μg/m^3)	20/--[1]	*/*	*/12.7	*/13.5
Vallejo – 304 Tuolumne Street				
Max 24-hour $PM_{2.5}$ Concentration (μg/m^3)	--[1]/35	***/101.9**	***/197.2**	*/30.5
Days over 24-Hour $PM_{2.5}$ Standard		***/9.3**	***/16.4**	*/0
Annual $PM_{2.5}$ Concentration[2] (μg/m^3)	12/12	11.6/11.5	***/13.3**	8.8/8.6

Notes: * There was insufficient (or no) data to determine the value (CARB 2020).
(1) Currently no standard for this category
(2) A bold value signifies that this category is above the applicable standard.
Sources: CARB iADAM: Air Quality Data Statistics (https://www.arb.ca.gov/adam/index.html)
https://ww2.arb.ca.gov/sites/default/files/2020-07/aaqs2.pdf

The USEPA and CARB designate air basins or portions of air basins and counties as being in "attainment" or "nonattainment" for each of the criteria pollutants. Areas that do not meet the standards are classified as nonattainment areas. Acceptable exceedances of the maximum value vary for the National Ambient Air Quality Standards (NAAQS) from 4th highest concentration for the 8-hour ozone standard to 99th percentile to the SO_2 standard. The NAAQS for O_3, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over one- to three-year periods, depending on the pollutant. The California Ambient Air Quality Standards (CAAQS) are not to be exceeded during a three-year period.

The determination of whether an area meets the state and federal standards is based on air quality monitoring data. Some areas are unclassified, which means there is insufficient monitoring data for determining attainment or nonattainment. Unclassified areas are typically treated as being in attainment. Because the attainment/nonattainment designation is pollutant-specific, an area may be classified as nonattainment for one pollutant and attainment for another. Similarly, because the state and federal standards differ, an area could be classified as attainment for the federal standards of a pollutant and as nonattainment for the state standards of the same pollutant. The Solano County region is designated as a nonattainment area for the federal O_3 and $PM_{2.5}$ standards and is also a nonattainment area for the state standards for O_3, PM_{10}, and $PM_{2.5}$ (CARB 2019) as shown in Table 2-3 below.

Table 2-3. Attainment Status of Criteria Pollutants in the Solano County Portion of the SFBAAB

Pollutant	State Designation	Federal Designation
O_3	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Unclassified
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Attainment	Unclassified/Attainment
NO_2	Attainment	Unclassified/Attainment
SO_2	Attainment	Unclassified/Attainment

Source: CARB 2019

2.1.5 *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 uses to the Project site are the single-family residences located directly adjacent and east of the Project Site. Additionally, once construction is completed, the Project itself would be considered a sensitive land use.

2.2 Regulatory Framework

2.2.1 *Federal*

Clean Air Act

The Clean Air Act (CAA) of 1970 and the CAA Amendments of 1971 required the USEPA to establish the NAAQS, with states retaining the option to adopt more stringent standards or to include other specific pollutants. On April 2, 2007, the Supreme Court found that carbon dioxide (CO_2) is an air pollutant covered by the CAA; however, no NAAQS have been established for CO_2.

These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those "sensitive receptors" most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

The USEPA has classified air basins (or portions thereof) as being in attainment, nonattainment, or unclassified for each criteria air pollutant, based on whether or not the NAAQS have been achieved. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. Table 2-3 lists the federal attainment status of the Solano County portion of the SFBAAB for the criteria pollutants.

2.2.2 *State*

California Clean Air Act

The California Clean Air Act (CCAA) allows the state to adopt ambient air quality standards and other regulations provided that they are at least as stringent as federal standards. CARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both federal and state air pollution control programs within California, including setting the CAAQS. CARB also conducts research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. CARB also has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

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State law makes CARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB then forwards SIP revisions to the USEPA for approval and publication in the Federal Register. The *SFBAAB Air Quality Attainment Plan* constitutes the current SIP for the Solano County portion of the SFBAAB. The plan is updated on a triennial basis and was last updated in 2018. It presents comprehensive strategies to reduce the O_3 precursor pollutants (ROG and NOx) from stationary, area, mobile, and indirect sources.

2.2.3 *Local*

Bay Area Air Quality Management District

The BAAQMD is designated by law to adopt and enforce regulations to achieve and maintain ambient air quality standards. The BAAQMD responsibilities include preparing plans for the attainment of ambient air quality standards, adopting and enforcing air pollution rules, issuing permits for and inspecting stationary air pollution sources, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, and implementing state and federal programs and regulations. The BAAQMD has also adopted various rules and regulations that are designed to reduce and control pollutant emissions from project's construction and operational activities. The following provisions are applicable to the Proposed Project are summarized as follows:

- **Regulation 2, Rule 1, General Permit Requirements:** Includes criteria for issuance or denial of permits, exemptions, appeals against decisions of the Air Pollution Control Officer (APCO) and BAAQMD actions on applications.

- **Regulation 2, Rule 2, New Source Review:** Applies to new or modified sources and contains requirements for Best Available Control Technology and emission offsets. Rule 2 implements federal New Source Review and Prevention of Significant Deterioration requirements.

- **Regulation 6, Rule 1, General Requirements:** Limits the quantity of particulate matter in the atmosphere by controlling emission rates, concentration, visible emissions and opacity.

- **Regulation 6, Rule 6, Prohibition of Trackout:** Controls trackout of solid material onto public paved roads from three types of sites: large bulk material sites, large construction sites, and large disturbed area sites. Under this regulation, the owners and operators of a construction site are required to clean up trackout on public roadways within four hours of identification and at the conclusion of each workday. The rule also includes requirements regarding the emission of fugitive dust during cleanup of trackout, and requirements for monitoring and reporting trackout at regulated sites

- **Regulation 7, Odorous Substances:** Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. A person (or facility) must meet all limitations of this regulation but meeting such limitations shall not exempt such person from any other requirements of BAAQMD, state, or national law. The limitations of this regulation shall not be applicable until BAAQMD receives odor complaints from ten or more complainants within a 90-day period, alleging that a person has caused odors perceived at or beyond the property line of such person and deemed to be objectionable by the complainants in the normal course of their work, travel, or residence. When the limits of this regulation become effective, as a result of citizen complaints described above, the limits shall remain effective until such time as no citizen complaints have been received by BAAQMD for one year. The limits of this Regulation shall become applicable again if BAAQMD receives odor complaints from five or more complainants within a 90-day period. BAAQMD staff investigate and track all odor complaints it receives and make attempts to visit the site and identify the source of the objectionable odor and assist the owner or facility in finding a way to reduce the odor.

BAAQMD Construction Mitigation Measures

The BAAQMD recommends quantifying a proposed project's construction-generated emissions by implementing the Basic Construction Mitigation Measures as mitigation for dust and exhaust construction impacts in California Environmental Quality Act (CEQA) compliance documentation. If additional construction measures are required to reduce construction-generated emissions, the Additional Construction Mitigation Measures should then be applied. Table 2-4 identifies the Basic and Additional Construction Mitigation Measures. In addition, all projects must implement any applicable air toxic control measures. For example, projects that have the potential to disturb asbestos (from soil or building materials) must comply with all the requirements of CARB's air toxic control measures for construction, grading, quarrying, and surface mining operations.

Table 2-4. BAAQMD Basic and Additional Construction Mitigation Measures

BAAQMD Basic Construction Mitigation Measures
All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
All vehicle speeds on unpaved roads shall be limited to 15 mph.
All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The air district's phone number shall also be visible to ensure compliance with applicable regulations.
BAAQMD Additional Construction Mitigation Measures
All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
Wind breaks (e.g., trees, fences) shall be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the numbert of disturbed surfaces at any one time.
All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
Site accesses to a distance of 100 feet from the paved road shall be treated with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel.
Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than one percent.
Minimizing the idling time of diesel-powered construction equipment to 2 minutes.
The project shall develop a plan demonstrating that the off-road equipment (more than 50 horsepower) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would achieve a project wide fleet-average 20 percent NOx reduction and 45 percent PM reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products,

Table 2-4. BAAQMD Basic and Additional Construction Mitigation Measures
Use low VOC (i.e., ROG) coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings).
Requiring that all construction equipment, diesel trucks, and generators be equipped with Best Available Control Technology for emission reductions of NOx and PM.
Requiring all contractors use equipment that meets CARB's most recent certification standard for off-road heavy-duty diesel engines.

Solano County General Plan

The Solano County General Plan has various policies in place related to the improvement of air quality within the County. The following policies are applicable to the Proposed Project:

L.U.G-4: Encourage land use development patterns and circulation and transportation systems that promote health and wellness and minimize adverse effects on agriculture and natural resources, energy consumption, and air quality.

SS.I-13: Continue to promote the development of renewable energy production in the Collinsville area. Renewable energy should be considered in the development of the Water Dependent Industrial area. Maintain an agricultural or marsh buffer between homes in Collinsville and any future industrial uses to mitigate visual impacts, glare, noise, and particulates.

RS.I-8: Require the planting of shade and roadside trees in development projects for aesthetic, air quality, and other associated benefits. Encourage the use of native tree species, especially native oaks. Create development standards to ensure appropriate placement, care, and maintenance. The County shall evaluate the feasibility of planting of roadside trees as part of major County road improvement projects.

RS.I-49: Require all off-road diesel powered vehicles used for construction to be newer model, low-emission vehicles, or use retrofit emission control devices, such as diesel oxidation catalyst and diesel particulate filters verified by the California Air Resources Board.

2.3 Air Quality Emissions Impact Assessment

2.3.1 *Threshold of Significance*

The impact analysis provided below is based on the following California Environmental Quality Act (CEQA) Guidelines Appendix G thresholds of significance. The Project would result in a significant impact to air quality if it would do any of the following:

1) Conflict with or obstruct implementation of any applicable air quality plan.

2) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

3) Expose sensitive receptors to substantial pollutant concentrations.

4) Result in other emissions (such as those leading to odors adversely affecting a substantial number of people).

To assist local jurisdictions in the evaluation of air quality impacts under CEQA, the BAAQMD has published a guidance document for the preparation of the air quality portions of environmental documents that include thresholds of significance to be used in evaluating land use proposals. Thresholds of significance are based on a source's projected impacts and are a basis from which to apply mitigation measures. BAAQMD's CEQA thresholds have also been used to determine air quality impacts in this analysis. If a project's individual emissions exceed its identified significance thresholds, the Project would be cumulatively considerable. Projects that do not exceed significance thresholds would not be considered cumulatively considerable.

The BAAQMD's established thresholds of significance for air quality for construction and operational activities of land use development projects are shown in Table 2-5.

Table 2-5. BAAQMD Criteria Pollutant Regional Significance Thresholds

Air Pollutant	Construction-Related Emissions Daily (lb/day)	Operational-Related Emissions	
		Daily (lb/day)	Annual (tpy)
ROG	54	54	10
NOx	54	54	10
PM_{10} (exhaust)	82	82	15
$PM_{2.5}$ (exhaust)	54	54	10
PM_{10}/$PM_{2.5}$ (fugitive dust)	Best Management Practices	None	None
CO	None	9.0 ppm (8-hr avg), 20.0 ppm (1-hr avg)	

Source: BAAQMD 2017

By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size, by itself, to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's individual emissions exceed its identified significance thresholds, the project would be cumulatively considerable. Projects that do not exceed significance thresholds would not be considered cumulatively considerable.

2.3.2 *Methodology*

Air quality impacts were assessed in accordance with methodologies recommended by the BAAQMD. Where criteria air pollutant quantification was required, emissions were modeled using the California Emissions Estimator Model (CalEEMod), version 2020.4.0. CalEEMod is a statewide land use emissions computer model designed to quantify potential criteria pollutant emissions associated with both construction and operations from a variety of land use projects. Project construction-generated air pollutant emissions were calculated using CalEEMod model defaults for Solano County. Operational air pollutant emissions are calculated based on the estimated traffic trip generation rates provided by the previously conducted Project traffic analysis (GHD 2021). According to GHD (2021), the Project would result in 870 additional trips per day during normal operations.

2.3.3 *Impact Analysis*

Project Construction-Generated Criteria Air Quality Emissions

Construction-generated emissions are temporary and short-term but have the potential to represent a significant air quality impact. Three basic sources of short-term emissions will be generated through construction of the Proposed Project: operation of the construction vehicles (i.e., tractors, forklifts, pavers), the creation of fugitive dust during clearing and grading, and the use of asphalt or other oil-based substances during paving activities.

Construction-generated emissions associated the Proposed Project were calculated using the CARB-approved CalEEMod computer program, which is designed to model emissions for land use development projects, based on typical construction requirements. See Attachment A for more information regarding the construction assumptions, including construction equipment and duration, used in this analysis.

Predicted maximum daily construction-generated emissions for the Proposed Project are summarized in Table 2-6. Construction-generated emissions are short-term and of temporary duration, lasting only if construction activities occur, but would be considered a significant air quality impact if the volume of pollutants generated exceeds the BAAQMD's thresholds of significance.

Table 2-6. Construction-Related Project Emissions

Construction Year	ROG		NO_X		CO		PM_{10}		$PM_{2.5}$	
	Daily (lbs)	Annual (tons)	Daily (lbs)	Annual (tons)	Daily (lbs)	Annual (tons)	Daily (lbs)	Annual (tons)	Daily (lbs)	Annual (tons)
Construction Year 1	3.946	0.013	40.541	1.193	21.966	0.946	21.850	0.262	12.023	0.149
Construction Year 2	12.187	0.714	30.405	2.488	38.244	3.005	3.354	0.298	1.891	0.160
Construction Year 3	9.860	0.870	11.583	1.125	17.449	1.687	0.961	0.090	0.642	0.061
BAAQMD Threshold	54	--	54	--	--	--	82	--	54	--
Exceeded Threshold	**No**	**NA**	**No**	**NA**	**NA**	**NA**	**No**	**NA**	**No**	**NA**

Source: BAAQMD 2017
CalEEMod version 2020.4.0

As shown in Table 2-6, emissions generated during Project construction would not exceed the BAAQMD's thresholds of significance. Therefore, criteria pollutant emissions generated during Project construction would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or state ambient air quality standard. Emissions for SO_2 were also calculated by CalEEMod but are minimal (> 0.01 tpy and > 0.1 lb/day) and can be found in Attachment A of this document.

Project Operations Criteria Air Quality Emissions

Implementation of the Project would result in long-term operational emissions of criteria air pollutants such as PM_{10} and O_3 precursors such as ROG and NO_X. Operational-generated emissions associated with the Proposed Project were calculated using CalEEMod. Predicted maximum daily operational-generated emissions of criteria air pollutants for the Proposed Project are summarized in Table 2-7.

Table 2-7. Operation-Related Unmitigated Project Emissions

Operational Emissions	ROG Daily (lbs)		NO_X Daily (lbs)		CO Daily (lbs)		PM_{10} Daily (lbs)		$PM_{2.5}$ Daily (lbs)	
	Summer	**Winter**	**Summer**	**Winter**	**Summer**	**Winter**	**Summer**	**Winter**	**Summer**	**Winter**
Area	70.287	70.287	1.607	1.607	100.16	100.16	12.415	12.415	12.415	12.415
Energy	0.04	0.04	0.339	0.339	0.144	0.144	0.027	0.027	0.027	0.027
Mobile	2.325	2.097	2.175	2.509	19.29	20.62	4.2603	4.260	1.154	1.154
Total	72.651	72.424	4.121	4.455	119.60	120.93	16.703	16.703	13.597	13.597
BAAQMD Threshold	54	54	54	54	NA	NA	82	82	54	54
Exceeded Threshold	**Yes**	**Yes**	**No**	**No**	**NA**	**NA**	**No**	**No**	**No**	**No**

Source: BAAQMD 2017
CalEEMod version 2020.4.0

As shown in Table 2-7, daily emissions associated with Project operations would exceed the BAAQMD significance thresholds for ROG. The majority of Project ROG emissions is attributed to the use of wood-burning hearths. Therefore, mitigation measure AQ-2 is required in order to reduce ROG emissions to levels below the significance threshold. Mitigation measure AQ-2 would prohibit the installation of wood-burning hearths.

AQ-1: The Project applicant and/or its contractor shall prohibit the installation of wood-burning fireplaces within the Project. This prohibition shall be noted on the deed for future property owners to comply with.

Table 2-8 shows Project operations emissions with the imposition of mitigation measure AQ-1.

Table 2-8. Operation-Related Mitigated Project Emissions

Operational Emissions	ROG Daily (lbs)		NO_X Daily (lbs)		CO Daily (lbs)		PM_{10} Daily (lbs)		$PM_{2.5}$ Daily (lbs)	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Area	4.067	4.067	1.143	1.143	13.649	13.649	0.1533	0.1533	0.153	0.153
Energy	0.04	0.04	0.339	0.339	0.144	0.144	0.0274	0.0274	0.027	0.027
Mobile	2.325	2.097	2.175	2.509	19.29	20.62	4.2603	4.2603	1.154	1.154
Total	6.432	6.204	3.657	3.991	33.082	34.413	4.441	4.441	1.335	1.335
BAAQMD Threshold	54	54	54	54	NA	NA	82	82	54	54
Exceeded Threshold	**No**	**No**	**No**	**No**	**NA**	**NA**	**No**	**No**	**No**	**No**

Source: BAAQMD 2017
CalEEMod version 2020.4.0

Table 2-8 shows that once mitigations are applied the operational emissions from the project are under the BAAQMD thresholds for all pollutants. The average daily emissions correspond to annual emission levels under the BAAQMD thresholds of 10 tons per year (15 for PM_{10}).

Project Consistency with Air Quality Planning

As part of its enforcement responsibilities, the USEPA requires each state with nonattainment areas to prepare and submit a SIP that demonstrates the means to attain the federal standards. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution in nonattainment areas, using a combination of performance standards and market-based programs. Similarly, under state law, the CCAA requires an air quality attainment plan to be prepared for areas designated as nonattainment with regard to the federal and state ambient air quality standards. Air quality attainment plans outline emissions limits and control measures to achieve and maintain these standards by the earliest practical date.

As previously described, the BAAQMD is the agency responsible for enforcing many federal and state air quality requirements and for establishing air quality rules and regulations. The BAAQMD attains and maintains air quality conditions in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The most recently adopted air quality plan is the BAAQMD's 2017 Clean Air Plan, the primary goals of which are to protect public health and the climate. The 2017 Clean Air Plan includes a wide range of control measures and actions to reduce combustion-related activities, decrease combustion of fossil fuels, improve energy efficiency, and reduce emissions of potent greenhouse gases. Several measures address the reduction of multiple pollutants such as O_3 precursors, PM, air toxics, and greenhouse gases.

Determination of whether a project supports the goals in the 2017 Clean Air Plan is achieved by a comparison of project-estimated emissions with BAAQMD thresholds of significance. If project emissions would not exceed the thresholds of significance after the application of all feasible mitigation measures, the project is consistent with the goals of the 2017 Clean Air Plan. As shown in Table 2-6 and Table 2-8, emissions generated during Project construction and operations would not exceed the BAAQMD's significance thresholds. Therefore, the Project would not conflict with or obstruct reduction measures presented in the 2017 Clean Air Plan.

Additionally, the Project Site can be identified for its "location efficiency". Location efficiency describes the location of the Project Site relative to the type of urban landscape its proposed to fit within, such as an 'urban area', 'compact infill', or 'suburban center'. In general, compared to the statewide average, a project could realize vehicle miles traveled (VMT) reductions up to 65 percent in an urban area, up to 30 percent in a compact infill area, or up to 10 percent in a suburban center (CAPCOA 2017), and thus reductions in air pollutant emissions, a primary goal of the 2017 Clean Air Plan. The Project site represents an urban/compact infill location within the central portion of the Suisun City-Fairfield area. The Project Site is served by existing public transportation, there is a bus pick-up located at the northern boundary of the Project. Additionally, the Project is in proximity to a mini-market (directly adjacent), a church on Marina Boulevard, a park and community center 0.3 mile to the northeast. The increases in land use diversity and mix of uses in the Project Area would reduce vehicle trips and VMT by encouraging walking and non-automotive forms of transportation, which would result in corresponding reductions in transportation-related emissions, a primary goal of the 2017 Clean Air Plan.

Exposure of Sensitive Receptors to Toxic Air Contaminants

As previously described, sensitive receptors are defined as facilities or land uses that include members of the population that 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 age 65, children under age 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis. As previously described, the nearest sensitive land uses to the Project site are the single-family residences located directly adjacent and east of the Project Site.

Construction-Generated Air Contaminants

Construction-related activities would result in temporary, short-term Proposed Project-generated emissions of diesel particulate matter (DPM), ROG, NOx, CO, and PM_{10} from the exhaust of off-road, heavy-duty diesel equipment for site preparation (e.g., clearing, grading); soil hauling truck traffic; paving; and other miscellaneous activities. The Project is located in a portion of the SFBAAB that is listed as a nonattainment area for the federal O_3 and $PM_{2.5}$ standards and is also a nonattainment area for the state standards for O_3, $PM_{2.5}$ and PM_{10}. Thus, existing O_3, $PM_{2.5}$ and PM_{10} levels in the SFBAAB are at unhealthy levels during certain periods. However, as shown in Table 2-6 the Project would not exceed the BAAQMD significance thresholds for construction emissions.

The health effects associated with O_3 are generally associated with reduced lung function. Because the Project would not involve construction activities that would result in O_3 precursor emissions (ROG or NOx) in excess of the BAAQMD thresholds, the Project is not anticipated to substantially contribute to regional O_3 concentrations and the associated health impacts.

CO tends to be a localized impact associated with congested intersections. In terms of adverse health effects, CO competes with oxygen, often replacing it in the blood, reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can include dizziness, fatigue, and impairment of central nervous system functions. The Project would not involve construction activities that would result in CO emissions in excess of the BAAQMD thresholds. Thus, the Project's CO emissions would not contribute to the health effects associated with this pollutant.

PM_{10} and $PM_{2.5}$ contain microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. PM exposure has been linked to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. For construction activity, DPM is the primary toxic air contaminant (TAC) of concern. The potential cancer risk from the inhalation of DPM outweighs the potential for all other health impacts (i.e., non-cancer chronic risk, short-term acute risk) and health impacts from other TACs. Based on the emission modeling conducted, the maximum onsite construction-related daily emissions of exhaust PM_{10}, considered a surrogate for DPM and includes emissions of exhaust $PM_{2.5}$, would be 2.04 pounds/day during construction in the first year of construction, 0.8 pounds/day in the second year of construction and 0.51 pounds/day in the third year of construction (see Attachment A). PM_{10} exhaust is considered a surrogate for DPM as all diesel exhaust is considered to be DPM. PM_{10} exhaust is considered a surrogate for DPM as all diesel exhaust is considered to be DPM. As with O_3 and NO_X, the Project would not generate emissions of PM_{10} or $PM_{2.5}$ that would exceed the significance thresholds. Accordingly, the Project's PM_{10} and $PM_{2.5}$ emissions are not expected to cause any increase in related regional health effects for these pollutants.

In summary, Project construction would not result in a potentially significant contribution to regional concentrations of nonattainment pollutants and would not result in a significant contribution to the adverse health impacts associated with those pollutants.

Operational Air Contaminants

Operation of the Proposed Project would not result in the development of any substantial sources of air toxics. There are no stationary sources associated with the operations of the Project; nor would the Project attract mobile sources that spend long periods queuing and idling at the site. Onsite Project emissions would not result in significant concentrations of pollutants at nearby sensitive receptors with the imposition of mitigation measure AQ-1. The maximum operations-related emissions of exhaust PM_{10}, considered a surrogate for DPM, would be 0.21 pounds in a single day. Therefore, the Project would not be a substantial source of TACs. The Project will not result in a high carcinogenic or non-carcinogenic risk during operation.

This report also evaluates the potential health risks associated with the placement of residences at the Project Site. Specifically, the potential exposure of future residents at the Project site to the DPM and total organic gases (TOG) generated by the vehicular traffic traversing SR 12 as well as the gasoline vapors generated by the existing gasoline dispensing station adjacent to the Project Site. The BAAQMD provides a recommended methodology for assessing local risks and hazards. Specifically, the following TAC source types must be included:

1. Permitted Sources
2. Highways
3. Major Roadways

Permitted sources include any stationary source of TAC emissions which requires a permit to operate from the BAAQMD. Highways are identified by definition, and major roadways include any roadway with at least 10,000 average annual daily traffic (AADT). Consistent with BAAQMD recommendations, all such sources within 1,000 feet of the Proposed Project boundary are included in this analysis. The BAAQMD thresholds for identifying significant cumulative risk from local sources on a potential project are listed in Table 2-9.

Table 2-9. BAAQMD Cumulative Health Risk Thresholds

Description	Guidance
Receptor Thresholds Risks and Hazards (Individual Project)	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >10.0 in a million Increased non-cancer risk of > 1.0 Hazard Index (Chronic or Acute) Ambient PM2.5 increase: >0.3 µg/m3 annual average Zone of Influence: 1,000-foot radius from property line of receptor
Risks and Hazards (Cumulative Threshold)	Compliance with Qualified Community Risk Reduction Plan OR Cancer: > 100 in a million (from all local sources) Non-cancer: > 10.0 Hazard Index (from all local sources) (Chronic) PM2.5: > 0.8 µg/m3 annual average (from all local sources) Zone of Influence: 1,000-foot radius from property line of receptor
Accidental Release of Acutely Hazardous Air Pollutants	New receptors locating near stored or used acutely hazardous materials considered significant
Odors	5 confirmed complaints per year averaged over three years

Source: BAAQMD 2017

The BAAQMD was contacted to provide information on any stationary source within 1,000 feet of the Project. The BAAQMD identified one source in the within 1,000 feet of the Project Area which is the Diamond Petroleum Inc. Marina ARCO gas dispensing facility. The one highway near the Project SR 12, located directly to the south of the Project boundary. Details on these sources is presented in Table 2-10. The BAAQMD also provides guidelines for an initial screening of risk for single sources and cumulative risk for all surrounding sources. The provided conservative cancer risk data from the gas station is 78.3 which is higher than the 10 in a million-screening threshold, thus a detailed modeling analysis was conducted for cumulative risk. Screening values are currently not available for highway sources.

Table 2-10. Sources within 1,000 Feet of the Project			
Source Name	**Source Type**	**Emissions Data Source**	**Activity Data Source**
Diamond Petroleum Arco	Permitted Stationary	BAAQMD	BAAQMD
Highway 12	On road Mobile	EMFAC2021	GHD 2021 Report

Cumulative health risk was calculated for the Project Area using regulatory modeling tools. Emissions from sources within 1,000 feet of the Project were modeled using EMFAC2021 for the highways and BAAQMD-provided values for permitted stationary sources. Emissions from the highway source were calculated using the average daily trips calculated in the GHD 2021 traffic analysis conducted for the Project.

AERMOD version 19191 was used for dispersion modeling utilizing preprocessed Travis Air Force Base meteorological data available on the CARB AERMET website. This site is roughly five miles away and can be considered representative of the meteorological conditions at the site. The gas dispensing site was modeled as a point source at the center of the facility. Highway 12 was modeled as adjacent volume sources per the Office of Environmental Health Hazard Assessment (OEHHA) and CAPCOA guidance. Modeling receptors were placed on the facility fence line and in the center of the facility. Modeling summary files can be found in Attachment B of this document which includes a figure containing source and receptor locations.

The cumulative cancer risk and hazard values are below BAAQMD thresholds as shown in Table 2-11.

Table 2-11. Calculated Health Risk at the Project Site			
Description	**Cancer Risk**	**Chronic Hazard**	**Acute Hazard**
Calculated Health on the Project Site	29.1	0.0	0.3
BAAQMD Cumulative Health Risk Threshold	100	10	10
Exceeds Significance Threshold?	**No**	**No**	**No**

As shown, the calculated health risks at the Project Site are all below the BAAQMD health risk thresholds. Additionally, the Project includes the installation of MERV 13 air filters throughout the Project. The inclusion of these air filters will further reduce the potential for cumulative cancer risk.

Carbon Monoxide Hot Spots

It has long been recognized that CO exceedances are caused by vehicular emissions, primarily when idling at intersections. Concentrations of CO are a direct function of the number of vehicles, length of delay, and traffic flow conditions. Under certain meteorological conditions, CO concentrations close to congested intersections that experience high levels of traffic and elevated background concentrations may reach unhealthy levels, affecting nearby sensitive receptors. Given the high traffic volume potential, areas of high CO concentrations, or “hot spots,” are typically associated with intersections that are projected to operate at unacceptable levels of service during the peak commute hours. It has long been recognized that CO hotspots are caused by vehicular emissions, primarily when idling at congested intersections. However, transport of this criteria pollutant is extremely limited, and CO disperses rapidly with distance from the source under normal meteorological conditions. Furthermore, vehicle emissions standards have become increasingly more stringent in the last 20 years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the SFBAAB is designated as in attainment. Detailed modeling of Project-specific CO "hot spots" is not necessary and thus this potential impact is addressed qualitatively.

A CO "hot spot" would occur if an exceedance of the state one-hour standard of 20 parts per million (ppm) or the eight-hour standard of 9 ppm were to occur. The BAAQMD concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact.

According to GHD (2021), the Project would result in 870 additional trips per day during normal operations. Thus, the Proposed Project would not generate traffic volumes at any intersection of more than 44,000 vehicles per day and there is no likelihood of the Project traffic exceeding CO values.

Odors

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another. It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

During construction, the Proposed Project presents the potential for generation of objectionable odors in the form of diesel exhaust in the immediate vicinity of the site. However, these emissions are short-term in nature and will rapidly dissipate and be diluted by the atmosphere downwind of the emission sources. Additionally, odors would be localized and generally confined to the construction area. Therefore, construction odors would not adversely affect a substantial number of people to odor emissions.

Land uses commonly considered to be potential sources of obnoxious odorous emissions include agriculture (farming and livestock), wastewater treatment plants, food processing plants, chemical plants, composting facilities, refineries, landfills, dairies, and fiberglass molding. The Proposed Project does not include any of these uses identified as being associated with odors.

3 GREENHOUSE GAS EMISSIONS

3.1 Greenhouse Gas Setting

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected back toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. Because the earth has a much lower temperature than the sun, it emits lower-frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead trapped, resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth. Without the greenhouse effect, the earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Fluorinated gases also make up a small fraction of the GHGs that contribute to climate change. Fluorinated gases include chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride; however, it is noted that these gases are not associated with typical land use development. Human-caused emissions of these GHGs in excess of natural ambient concentrations are believed to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic factors together (Intergovernmental Panel on Climate Change [IPCC] 2014).

Table 3-1 describes the primary GHGs attributed to global climate change, including their physical properties, primary sources, and contributions to the greenhouse effect.

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. CH_4 traps over 25 times more heat per molecule than CO_2, and N_2O absorbs 298 times more heat per molecule than CO_2 (IPCC 2014). Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e), which weight each gas by its global warming potential. Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, or other forms. Of the total annual human-caused CO_2

emissions, approximately 55 percent is sequestered through ocean and land uptakes every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remains stored in the atmosphere (IPCC 2013).

Table 3-1. Summary of Greenhouse Gases

Greenhouse Gas	Description
CO_2	Carbon dioxide is a colorless, odorless gas. CO_2 is emitted in a number of ways, both naturally and through human activities. The largest source of CO_2 emissions globally is the combustion of fossil fuels such as coal, oil, and gas in power plants, automobiles, industrial facilities, and other sources. A number of specialized industrial production processes and product uses such as mineral production, metal production, and the use of petroleum-based products can also lead to CO_2 emissions. The atmospheric lifetime of CO_2 is variable because it is so readily exchanged in the atmosphere.[1]
CH_4	Methane is a colorless, odorless gas and is the major component of natural gas, about 87 percent by volume. It is also formed and released to the atmosphere by biological processes occurring in anaerobic environments. Methane is emitted from a variety of both human-related and natural sources. Human-related sources include fossil fuel production, animal husbandry (intestinal fermentation in livestock and manure management), rice cultivation, biomass burning, and waste management. These activities release significant quantities of CH_4 to the atmosphere. Natural sources of CH4 include wetlands, gas hydrates, permafrost, termites, oceans, freshwater bodies, non-wetland soils, and other sources such as wildfires. The atmospheric lifetime of CH_4 is about 12 years.[2]
N_2O	Nitrous oxide is a clear, colorless gas with a slightly sweet odor. Nitrous oxide is produced by both natural and human-related sources. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, adipic acid production, and nitric acid production. N_2O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests. The atmospheric lifetime of N_2O is approximately 120 years.[3]

Sources: (1) USEPA 2016a; (2) USEPA 2016b; (3) USEPA 2016c

The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; it is sufficient to say the quantity is enormous, and no single project alone would measurably contribute to a noticeable incremental change in the global average temperature or to global, local, or microclimates. From the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative.

3.1.1 *Sources of Greenhouse Gas Emissions*

In 2021, CARB released the 2021 edition of the California GHG inventory covering calendar year 2019 emissions. In 2019, California emitted 418.2 million gross metric tons of CO2e including from imported electricity. Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions in 2019, accounting for approximately 40 percent of total GHG emissions in the State. When emissions from extracting, refining and moving transportation fuels in California are included, transportation is responsible for over 50 percent of statewide emissions in 2019. Continuing the downward trend from 2018, transportation emissions decreased 3.5 million metric tons of CO2e in 2019, only being outpaced by electricity, which reduced emissions by 4.3 million metric tons of CO2e in 2019. Emissions from the electricity sector account for 14 percent of the inventory and have shown a substantial decrease in 2019 due to increases in renewables. California's industrial sector accounts for the second largest source of the State's GHG emissions in 2019, accounting for 21 percent. (CARB 2021.).

3.2 Regulatory Framework

3.2.1 *State*

Executive Order S-3-05

Executive Order (EO) S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the EO established total GHG emission targets for the state. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

Assembly Bill 32 Climate Change Scoping Plan and Updates

In 2006, the California legislature passed Assembly Bill (AB) 32 (Health and Safety Code § 38500 et seq., or AB 32), also known as the Global Warming Solutions Act. AB 32 requires CARB to design and implement feasible and cost-effective emission limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions). Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008, which outlines measures to meet the 2020 GHG reduction goals. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by the end of 2020.

The Scoping Plan is required by AB 32 to be updated at least every five years. The latest update, the 2017 Scoping Plan Update, addresses the 2030 target established by Senate Bill (SB) 32 as discussed below and establishes a proposed framework of action for California to meet a 40 percent reduction in GHG emissions by 2030 compared to 1990 levels. The key programs that the Scoping Plan Update builds on include increasing the use of renewable energy in the state, the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and reduction of methane emissions from agricultural and other wastes.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include § 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030.

Senate Bill X1-2 of 2011, Senate Bill 350 of 2015, and Senate Bill 100 of 2018

In 2018, SB 100 was signed codifying a goal of 60 percent renewable procurement by 2030 and 100 percent by 2045 Renewables Portfolio Standard.

3.2.2 *Local*

Bay Area Air Quality Management District

To provide guidance to local lead agencies on determining significance for GHG emissions in CEQA documents, BAAQMD CEQA Guidelines include guidance on assessing GHGs and climate change impacts as required under CEQA Section 15183.5(b) and establish thresholds of significance for impacts related to GHG emissions. These guidelines are based on substantial evidence to "attribute an appropriate share of greenhouse gas emission reductions necessary to reach AB 32 goals to new land use development projects in the BAAQMD's jurisdiction that are evaluated pursuant to CEQA" (BAAQMD 2017).

The BAAQMD project-level operational threshold of significance for GHG emissions is the project generation of 1,100 metric tons of CO_2e per year during operations (bright-line numeric threshold); or the project generation of 4.6 metric tons of CO_2e per service population (employees + residents) per year during operations (efficiency-based threshold); or compliance with a Qualified GHG Reduction Strategy.

BAAQMD 2017 Climate Action Plan

The 2017 Clean Air Plan provides a regional strategy to protect public health and protect the climate. To protect the climate, the 2017 Clean Air Plan defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious GHG reduction targets for 2030 and 2050 and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets. The 2017 Clean Air Plan includes a wide range of control measures designed to reduce emissions of methane and other "super GHGs" that are potent climate pollutants in the near term; and to decrease emissions of carbon dioxide by reducing fossil fuel combustion.

3.3 Greenhouse Gas Emissions Impact Assessment

3.3.1 *Thresholds of Significance*

The impact analysis provided below is based on the following CEQA Guidelines Appendix G thresholds of significance. The Project would result in a significant impact to greenhouse gas emissions if it would:

1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment or

2) Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The Appendix G thresholds for GHG's do not prescribe specific methodologies for performing an assessment, do not establish specific thresholds of significance, and do not mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency's discretion to determine the appropriate methodologies and thresholds of significance consistent with the manner in which other impact areas are handled in CEQA. With respect to GHG emissions, the CEQA Guidelines § 15064.4(a) states that lead agencies "shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate" GHG emissions resulting from a project. The CEQA Guidelines note that an agency has the discretion to either quantify a project's GHG emissions or rely on a "qualitative analysis or other performance-based standards." (14 California Code of Regulations [CCR] 15064.4(b)). A lead agency may use a "model or methodology" to estimate GHG emissions and has the discretion to select the model or methodology it considers "most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change." (14 CCR 15064.4(c)). Section 15064.4(b) provides that the lead agency should consider the following when determining the significance of impacts from GHG emissions on the environment:

1. The extent a project may increase or reduce GHG emissions as compared to the existing environmental setting.
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions (14 CCR 15064.4(b)).

In addition, Section 15064.7(c) of the CEQA Guidelines specifies that "[w]hen adopting or using thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies, or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence" (14 CCR 15064.7(c)). The CEQA Guidelines also clarify that the effects of GHG emissions are cumulative and should be analyzed in the context of CEQA's requirements for cumulative impact analysis (see CEQA Guidelines § 15130(f)). As a note, the CEQA Guidelines were amended in response to SB 97. In particular, the CEQA Guidelines were amended to specify that compliance with a GHG emissions reduction plan renders a cumulative impact insignificant.

Per CEQA Guidelines § 15064(h)(3), a project's incremental contribution to a cumulative impact can be found not cumulatively considerable if the project would comply with an approved plan or mitigation program that provides specific requirements that would avoid or substantially lessen the cumulative problem within the geographic area of the project. To qualify, such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. Examples of such programs include a "water quality control plan, air quality attainment or maintenance plan, integrated waste management plan, habitat conservation plan, natural community conservation plans [and] plans or regulations for the reduction of greenhouse gas emissions." Put another way, CEQA Guidelines § 15064(h)(3) allows a lead agency to make a finding of less than significant for GHG emissions if a project complies with adopted programs, plans, policies and/or other regulatory strategies to reduce GHG emissions.

The BAAQMD does not have an adopted threshold of significance for construction-related GHG emissions; however, the air district recommends the quantification and disclosure of construction-generated GHG emissions. The BAAQMD project-level operational threshold of significance for GHG emissions is the project generation of 1,100 metric tons of CO_2e per year during operations (bright-line numeric threshold); or the project generation of 4.6 metric tons of CO_2e per service population (employees + residents) per year during operations (efficiency-based threshold); or compliance with a Qualified GHG Reduction Strategy. However, it is noted that this threshold is based, in part, on the GHG-reducing target established for the year 2020 under AB 32, but the Project would be implemented after the year 2020. Statewide goals for GHG reductions in the years beyond 2020 were codified into state law with the passage of SB 32, which as described previously mandates that California achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. This equates to 40 percent below the statewide GHG reduction target for the year 2020.

Therefore, Project GHG emissions are quantified and compared to the thresholds issued by the California Air Pollution Control Officers Association (CAPCOA), which is an association of the air pollution control officers from all 35 local air quality agencies throughout California, including the BAAQMD. CAPCOA recommends a significance threshold of 900 metric tons annually. This threshold is based on a capture rate of 90 percent of land use development projects, which in turn translates into a 90 percent capture rate of all GHG emissions. The 900 metric ton threshold, the lowest promulgated in any region in the state, is considered by CAPCOA to be low enough to capture a substantial fraction of future projects that will be constructed to accommodate future (year 2050) statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions.

In Center for Biological Diversity v. Department of Fish and Wildlife (2015) 62 Cal. 4th 2014, 213, 221, 227, following its review of various potential GHG thresholds proposed in an academic study [Crockett, Addressing the Significance of Greenhouse Gas Emissions: California's Search for Regulatory Certainty in an Uncertain World (July 2011), 4 Golden Gate U. Envtl. L. J. 203], the California Supreme Court identified the use of numeric bright-line thresholds as a potential pathway for compliance with CEQA GHG requirements. The study found numeric bright line thresholds designed to determine when small projects were so small as to not cause a cumulatively considerable impact on global climate change was consistent with CEQA. Specifically, Public Resources Code section 21003(f) provides it is a policy of the state that "[a]ll persons and public agencies involved in the environmental review process be responsible for carrying out the process in the most efficient, expeditious manner in order to conserve the available financial, governmental, physical and social resources with the objective that those resources may be better applied toward the mitigation of actual significant effects on the environment." The Supreme Court-reviewed study noted, "subjecting the smallest projects to the full panoply of CEQA requirements, even though the public benefit would be minimal, would not be consistent with implementing the statute in the most efficient, expeditious manner. Nor would it be consistent with applying lead agencies' scarce resources toward mitigating actual significant climate change impacts." (Crockett, Addressing the Significance of Greenhouse Gas Emissions: California's Search for Regulatory Certainty in an Uncertain World (July 2011), 4 Golden Gate U. Envtl. L. J. 203, 221, 227.)

As previously described, the 900 metric tons of CO_2e per year threshold represents a 90 percent capture rate (i.e., this threshold captures projects that represent approximately 90 percent of GHG emissions from new sources). The 900 metric tons of CO_2e per year value is typically used in defining small projects that are considered less than significant because it represents less than one percent of future 2050 statewide GHG emissions target and the lead agency can provide more efficient implementation of CEQA by focusing its scarce resources on the top 90 percent. Land use projects above the 900 metric tons of CO_2e per year level would fall within the percentage of largest projects that are worth mitigating without wasting scarce financial, governmental, physical and social resources (Crockett 2011). As noted in the academic study, the fact that small projects below a numeric bright line threshold are not subject to CEQA-based mitigation, does not mean such small projects do not help the state achieve its climate change goals because even small projects participate in or comply with non-CEQA-based GHG reduction programs, such constructing development in accordance with statewide GHG-reducing energy efficiency building standards, called Cal Green or Title 24 energy-efficiency building standards (Crockett 2011), which among many goals seek to reduce GHG emissions from construction projects.

Methodology

Where GHG emission quantification was required, emissions were modeled using CalEEMod, version 2020.4.0. CalEEMod is a statewide land use emissions computer model designed to quantify potential GHG emissions associated with both construction and operations from a variety of land use projects. Project construction-generated air pollutant emissions were calculated using CalEEMod model defaults for Solano County. Operational GHG emissions are calculated based on the estimated traffic trip generation rates provided by the Project traffic analysis (GHD 2021). According to GHD (2021), the Project would result in 870 additional trips per day during normal operations.

3.3.2 *Impact Analysis*

Contribution of Greenhouse Gas Emissions

Construction

Construction-related activities that would generate GHG emissions include worker commute trips, haul trucks carrying supplies and materials to and from the Project site, and off-road construction equipment (e.g., backhoes, pavers, forklifts). Table 3-2 illustrates the specific construction generated GHG emissions that would result from construction of the Project.

Table 3-2. Construction Related Greenhouse Gas Emissions

Description	CO_2e Emissions (Metric Tons/Year)
Construction Year 1	167
Construction Year 2	555
Construction Year 3	247
Project Construction Maximum	**555**
CAPCOA Threshold	900
Exceed Threshold?	**No**

Sources: CalEEMod 2020.0.4.0

As shown in Table 3-2, Project construction would result in the generation of a maximum of approximately 555 metric tons of CO_2e over the course of construction. Annual emissions would be generated at levels below the CAPCOA significance threshold. Once construction is complete, the generation of these GHG emissions would cease.

Furthermore, GHG emissions generated by the construction sector have been declining in recent years. For instance, construction equipment engine efficiency has continued to improve year after year. The first federal standards (Tier 1) for new off-road diesel engines were adopted in 1994 for engines over 50 horsepower (hp) and were phased in from 1996 to 2000. In 1996, a Statement of Principles pertaining to off-road diesel engines was signed between the USEPA, CARB, and engine makers (including Caterpillar, Cummins, Deere, Detroit Diesel, Deutz, Isuzu, Komatsu, Kubota, Mitsubishi, Navistar, New Holland, Wis-Con, and Yanmar). On August 27, 1998, the USEPA signed the final rule reflecting the provisions of the Statement of Principles. The 1998 regulation introduced Tier 1 standards for equipment under 50 hp and increasingly more stringent Tier 2 and Tier 3 standards for all equipment with phase-in schedules from 2000 to 2008. As a result, all off-road, diesel-fueled construction equipment manufactured in 2006 or later has been manufactured to Tier 3 standards. Tier 3 engine standards reduce precursor and subset GHG emissions such as nitrogen oxide by as much as 60 percent. On May 11, 2004, the USEPA signed the final rule introducing Tier 4 emission standards, which were phased in over the period of 2008-2015. The Tier 4 standards require that emissions of nitrogen oxide be further reduced by about 90 percent. All off-road, diesel-fueled construction equipment manufactured in 2015 or later will be manufactured to Tier 4 standards.

In addition, the California Energy Commission recently released the 2019 Building Energy Efficiency Standards contained in the California Code of Regulations, Title 24, Part 6 (also known as the California Energy Code). The 2019 updates to the Building Energy Efficiency Standards focus on several key areas to improve the energy efficiency of newly constructed buildings and additions, and alterations to existing buildings. For instance, effective January 1, 2017, owners/builders of construction projects have been required to divert (recycle) 65 percent of construction waste materials generated during the project construction phase. This requirement greatly reduces the generation of GHG emissions by reducing decomposition at landfills, which is a source of CH_4, and reducing demand for natural resources.

Operations

Long-term operational GHG emissions attributable to the Project are identified in Table 3-3.

Table 3-3. Operational-Related Greenhouse Gas Emissions

Description	CO_2e Emissions (Metric Tons/Year)
Area Source Emissions	8.4
Energy Emissions	132.9
Mobile Source Emissions	641.8
Waste Emissions	37.0
Water Emissions	21.6
Project Operations Total	**841.7**
CAPCOA Threshold	900
Exceed Threshold?	**No**

Sources: CalEEMod 2020.0.4.0
Notes: Emission projections are predominantly based on CalEEMod model Defaults for Solano County.
Onroad source emissions data used in CalEEMod is based on trip generation data from GHD (2021)

As shown in Table 3-3 Project operations would result in the generation of 842 metric tons of CO_2e per year and would not exceed CAPCOA's significance threshold of 900 metric tons annually.

Conflict with any Applicable Plan, Policy, or Regulation of an Agency Adopted for the Purpose of Reducing the Emissions of Greenhouse Gases

Suisun City does not currently have an adopted plan for the purpose of reducing GHG emissions. However, as previously described the State of California promulgates several mandates and goals to reduce statewide GHG emissions, including the goal to reduce statewide GHG emissions to 40 percent below 1990 levels by the year 2030 and 80 percent below 1990 levels by the year 2050 (SB 32). The Proposed Project is subject to compliance with SB 32. As discussed previously, the Proposed Project generated GHG emissions would not surpass GHG significance thresholds, which were prepared with the purpose of complying with these requirements. The 900 metric tons of CO_2e per year CAPCOA significance threshold is used in defining small projects that are considered less than significant because it represents less than one percent of future 2050 statewide GHG emissions target and the lead agency can provide more efficient implementation of CEQA by focusing its scarce resources on the top 90 percent.

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ATTACHMENT A

CalEEMod Output Files – Criteria Air Pollutants

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Marina Village Apartments

Bay Area AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	234.00	Space	2.11	93,600.00	0
Apartments Mid Rise	160.00	Dwelling Unit	4.21	160,000.00	458

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 64

Climate Zone 4 **Operational Year** 2023

Utility Company Pacific Gas and Electric Company

CO2 Intensity (lb/MWhr) 203.98 **CH4 Intensity (lb/MWhr)** 0.033 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Empty lot
Construction, Paving and Coating expected to take place concurrently.

Area Mitigation - VOC Content updated per BAAQMD Regulation 8-3-301 Table 2

Stationary Sources - Emergency Generators and Fire Pumps -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	50
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblAreaMitigation	UseLowVOCPaintParkingValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	20.00	270.00
tblConstructionPhase	NumDays	230.00	270.00
tblConstructionPhase	NumDays	20.00	270.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9447	40.5330	21.9875	0.0456	19.8049	2.0453	21.8502	10.1417	1.8817	12.0233	0.0000	4,488.9806	4,488.9806	1.1961	0.1418	4,547.9674
2022	12.1754	30.2278	38.4663	0.0743	1.8679	1.4857	3.3535	0.5004	1.3909	1.8912	0.0000	7,273.4032	7,273.4032	1.4011	0.1451	7,351.6757
2023	9.8569	11.5661	17.4950	0.0291	0.3779	0.5829	0.9608	0.1002	0.5419	0.6422	0.0000	2,824.3009	2,824.3009	0.7393	7.9500e-003	2,845.1529
Maximum	**12.1754**	**40.5330**	**38.4663**	**0.0743**	**19.8049**	**2.0453**	**21.8502**	**10.1417**	**1.8817**	**12.0233**	**0.0000**	**7,273.4032**	**7,273.4032**	**1.4011**	**0.1451**	**7,351.6757**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9447	40.5330	21.9875	0.0456	19.8049	2.0453	21.8502	10.1417	1.8817	12.0233	0.0000	4,488.9806	4,488.9806	1.1961	0.1418	4,547.9673
2022	12.1754	30.2278	38.4663	0.0743	1.8679	1.4857	3.3535	0.5004	1.3909	1.8912	0.0000	7,273.4032	7,273.4032	1.4011	0.1451	7,351.6757
2023	9.8569	11.5661	17.4950	0.0291	0.3779	0.5829	0.9608	0.1002	0.5419	0.6422	0.0000	2,824.3009	2,824.3009	0.7393	7.9500e-003	2,845.1529
Maximum	**12.1754**	**40.5330**	**38.4663**	**0.0743**	**19.8049**	**2.0453**	**21.8502**	**10.1417**	**1.8817**	**12.0233**	**0.0000**	**7,273.4032**	**7,273.4032**	**1.4011**	**0.1451**	**7,351.6757**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	70.2866	1.6071	100.1640	0.1682		12.4151	12.4151		12.4151	12.4151	1,339.3354	616.7608	1,956.0962	1.8558	0.0947	2,030.7022
Energy	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Mobile	2.3251	2.1752	19.2895	0.0413	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,241.4882	4,241.4882	0.2550	0.1876	4,303.7670
Total	**72.6513**	**4.1209**	**119.5975**	**0.2116**	**4.2309**	**12.4719**	**16.7028**	**1.1268**	**12.4699**	**13.5967**	**1,339.3354**	**5,290.5032**	**6,629.8386**	**2.1191**	**0.2902**	**6,769.2922**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.0671	1.1433	13.6487	7.0200e-003		0.1533	0.1533		0.1533	0.1533	0.0000	1,288.7608	1,288.7608	0.0472	0.0232	1,296.8524
Energy	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Mobile	2.3251	2.1752	19.2895	0.0413	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,241.4882	4,241.4882	0.2550	0.1876	4,303.7670
Total	**6.4318**	**3.6571**	**33.0822**	**0.0505**	**4.2309**	**0.2101**	**4.4410**	**1.1268**	**0.2081**	**1.3349**	**0.0000**	**5,962.5032**	**5,962.5032**	**0.3106**	**0.2187**	**6,035.4424**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	91.15	11.26	72.34	76.15	0.00	98.32	73.41	0.00	98.33	90.18	100.00	-12.70	10.07	85.34	24.63	10.84

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/25/2021	9/21/2021	5	20	
2	Site Preparation	Site Preparation	9/22/2021	10/5/2021	5	10	
3	Grading	Grading	10/6/2021	11/2/2021	5	20	
4	Building Construction	Building Construction	11/3/2021	11/15/2022	5	270	
5	Architectural Coating	Architectural Coating	8/19/2022	8/31/2023	5	270	
6	Paving	Paving	9/21/2022	10/3/2023	5	270	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 20

Acres of Paving: 2.11

Residential Indoor: 324,000; Residential Outdoor: 108,000; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 5,616 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	155.00	32.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	31.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**		**1.5513**	**1.5513**		**1.4411**	**1.4411**		**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0471	0.0299	0.4225	1.1400e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		115.2462	115.2462	3.4000e-003	3.0300e-003	116.2356
Total	**0.0471**	**0.0299**	**0.4225**	**1.1400e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**115.2462**	**115.2462**	**3.4000e-003**	**3.0300e-003**	**116.2356**

3.2 Demolition - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**		**1.5513**	**1.5513**		**1.4411**	**1.4411**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0471	0.0299	0.4225	1.1400e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		115.2462	115.2462	3.4000e-003	3.0300e-003	116.2356
Total	**0.0471**	**0.0299**	**0.4225**	**1.1400e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**115.2462**	**115.2462**	**3.4000e-003**	**3.0300e-003**	**116.2356**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**19.6570**	**2.0445**	**21.7015**	**10.1025**	**1.8809**	**11.9834**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0566	0.0359	0.5070	1.3700e-003	0.1479	8.2000e-004	0.1487	0.0392	7.5000e-004	0.0400		138.2955	138.2955	4.0900e-003	3.6400e-003	139.4827
Total	**0.0566**	**0.0359**	**0.5070**	**1.3700e-003**	**0.1479**	**8.2000e-004**	**0.1487**	**0.0392**	**7.5000e-004**	**0.0400**		**138.2955**	**138.2955**	**4.0900e-003**	**3.6400e-003**	**139.4827**

3.3 Site Preparation - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**19.6570**	**2.0445**	**21.7015**	**10.1025**	**1.8809**	**11.9834**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0566	0.0359	0.5070	1.3700e-003	0.1479	8.2000e-004	0.1487	0.0392	7.5000e-004	0.0400		138.2955	138.2955	4.0900e-003	3.6400e-003	139.4827
Total	**0.0566**	**0.0359**	**0.5070**	**1.3700e-003**	**0.1479**	**8.2000e-004**	**0.1487**	**0.0392**	**7.5000e-004**	**0.0400**		**138.2955**	**138.2955**	**4.0900e-003**	**3.6400e-003**	**139.4827**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**7.0826**	**1.1599**	**8.2425**	**3.4247**	**1.0671**	**4.4919**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0471	0.0299	0.4225	1.1400e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		115.2462	115.2462	3.4000e-003	3.0300e-003	116.2356
Total	**0.0471**	**0.0299**	**0.4225**	**1.1400e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**115.2462**	**115.2462**	**3.4000e-003**	**3.0300e-003**	**116.2356**

3.4 Grading - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**7.0826**	**1.1599**	**8.2425**	**3.4247**	**1.0671**	**4.4919**	**0.0000**	**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0471	0.0299	0.4225	1.1400e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		115.2462	115.2462	3.4000e-003	3.0300e-003	116.2356
Total	**0.0471**	**0.0299**	**0.4225**	**1.1400e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**115.2462**	**115.2462**	**3.4000e-003**	**3.0300e-003**	**116.2356**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1071	2.0586	0.6085	6.9500e-003	0.2167	0.0344	0.2511	0.0624	0.0329	0.0953		744.7389	744.7389	0.0176	0.1105	778.1020
Worker	0.4870	0.3089	4.3655	0.0118	1.2733	7.0400e-003	1.2803	0.3377	6.4900e-003	0.3442		1,190.8778	1,190.8778	0.0352	0.0314	1,201.1011
Total	**0.5941**	**2.3675**	**4.9740**	**0.0187**	**1.4900**	**0.0414**	**1.5314**	**0.4001**	**0.0394**	**0.4395**		**1,935.6167**	**1,935.6167**	**0.0527**	**0.1418**	**1,979.2031**

3.5 Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1071	2.0586	0.6085	6.9500e-003	0.2167	0.0344	0.2511	0.0624	0.0329	0.0953		744.7389	744.7389	0.0176	0.1105	778.1020
Worker	0.4870	0.3089	4.3655	0.0118	1.2733	7.0400e-003	1.2803	0.3377	6.4900e-003	0.3442		1,190.8778	1,190.8778	0.0352	0.0314	1,201.1011
Total	**0.5941**	**2.3675**	**4.9740**	**0.0187**	**1.4900**	**0.0414**	**1.5314**	**0.4001**	**0.0394**	**0.4395**		**1,935.6167**	**1,935.6167**	**0.0527**	**0.1418**	**1,979.2031**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0690	1.7262	0.5127	6.7700e-003	0.2167	0.0184	0.2351	0.0624	0.0176	0.0800		726.3547	726.3547	0.0158	0.1076	758.8228
Worker	0.4509	0.2719	4.0070	0.0114	1.2733	6.6500e-003	1.2799	0.3377	6.1300e-003	0.3439		1,159.4976	1,159.4976	0.0316	0.0289	1,168.9037
Total	**0.5199**	**1.9981**	**4.5197**	**0.0182**	**1.4900**	**0.0250**	**1.5150**	**0.4001**	**0.0237**	**0.4238**		**1,885.8523**	**1,885.8523**	**0.0474**	**0.1365**	**1,927.7266**

3.5 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0690	1.7262	0.5127	6.7700e-003	0.2167	0.0184	0.2351	0.0624	0.0176	0.0800		726.3547	726.3547	0.0158	0.1076	758.8228
Worker	0.4509	0.2719	4.0070	0.0114	1.2733	6.6500e-003	1.2799	0.3377	6.1300e-003	0.3439		1,159.4976	1,159.4976	0.0316	0.0289	1,168.9037
Total	**0.5199**	**1.9981**	**4.5197**	**0.0182**	**1.4900**	**0.0250**	**1.5150**	**0.4001**	**0.0237**	**0.4238**		**1,885.8523**	**1,885.8523**	**0.0474**	**0.1365**	**1,927.7266**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**8.6922**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0902	0.0544	0.8014	2.2800e-003	0.2547	1.3300e-003	0.2560	0.0676	1.2300e-003	0.0688		231.8995	231.8995	6.3200e-003	5.7800e-003	233.7807
Total	**0.0902**	**0.0544**	**0.8014**	**2.2800e-003**	**0.2547**	**1.3300e-003**	**0.2560**	**0.0676**	**1.2300e-003**	**0.0688**		**231.8995**	**231.8995**	**6.3200e-003**	**5.7800e-003**	**233.7807**

3.6 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**8.6922**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0902	0.0544	0.8014	2.2800e-003	0.2547	1.3300e-003	0.2560	0.0676	1.2300e-003	0.0688		231.8995	231.8995	6.3200e-003	5.7800e-003	233.7807
Total	**0.0902**	**0.0544**	**0.8014**	**2.2800e-003**	**0.2547**	**1.3300e-003**	**0.2560**	**0.0676**	**1.2300e-003**	**0.0688**		**231.8995**	**231.8995**	**6.3200e-003**	**5.7800e-003**	**233.7807**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**8.6793**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0839	0.0482	0.7411	2.2100e-003	0.2547	1.2600e-003	0.2559	0.0676	1.1600e-003	0.0687		225.9419	225.9419	5.7000e-003	5.3600e-003	227.6817
Total	**0.0839**	**0.0482**	**0.7411**	**2.2100e-003**	**0.2547**	**1.2600e-003**	**0.2559**	**0.0676**	**1.1600e-003**	**0.0687**		**225.9419**	**225.9419**	**5.7000e-003**	**5.3600e-003**	**227.6817**

3.6 Architectural Coating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**8.6793**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0839	0.0482	0.7411	2.2100e-003	0.2547	1.2600e-003	0.2559	0.0676	1.1600e-003	0.0687		225.9419	225.9419	5.7000e-003	5.3600e-003	227.6817
Total	**0.0839**	**0.0482**	**0.7411**	**2.2100e-003**	**0.2547**	**1.2600e-003**	**0.2559**	**0.0676**	**1.1600e-003**	**0.0687**		**225.9419**	**225.9419**	**5.7000e-003**	**5.3600e-003**	**227.6817**

3.7 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1233**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0436	0.0263	0.3878	1.1000e-003	0.1232	6.4000e-004	0.1239	0.0327	5.9000e-004	0.0333		112.2095	112.2095	3.0600e-003	2.8000e-003	113.1197
Total	**0.0436**	**0.0263**	**0.3878**	**1.1000e-003**	**0.1232**	**6.4000e-004**	**0.1239**	**0.0327**	**5.9000e-004**	**0.0333**		**112.2095**	**112.2095**	**3.0600e-003**	**2.8000e-003**	**113.1197**

3.7 Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1233**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0436	0.0263	0.3878	1.1000e-003	0.1232	6.4000e-004	0.1239	0.0327	5.9000e-004	0.0333		112.2095	112.2095	3.0600e-003	2.8000e-003	113.1197
Total	**0.0436**	**0.0263**	**0.3878**	**1.1000e-003**	**0.1232**	**6.4000e-004**	**0.1239**	**0.0327**	**5.9000e-004**	**0.0333**		**112.2095**	**112.2095**	**3.0600e-003**	**2.8000e-003**	**113.1197**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694		2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0532**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**		**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0406	0.0233	0.3586	1.0700e-003	0.1232	6.1000e-004	0.1238	0.0327	5.6000e-004	0.0333		109.3267	109.3267	2.7600e-003	2.5900e-003	110.1686
Total	**0.0406**	**0.0233**	**0.3586**	**1.0700e-003**	**0.1232**	**6.1000e-004**	**0.1238**	**0.0327**	**5.6000e-004**	**0.0333**		**109.3267**	**109.3267**	**2.7600e-003**	**2.5900e-003**	**110.1686**

3.7 Paving - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694	0.0000	2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0532**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**	**0.0000**	**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0406	0.0233	0.3586	1.0700e-003	0.1232	6.1000e-004	0.1238	0.0327	5.6000e-004	0.0333		109.3267	109.3267	2.7600e-003	2.5900e-003	110.1686
Total	**0.0406**	**0.0233**	**0.3586**	**1.0700e-003**	**0.1232**	**6.1000e-004**	**0.1238**	**0.0327**	**5.6000e-004**	**0.0333**		**109.3267**	**109.3267**	**2.7600e-003**	**2.5900e-003**	**110.1686**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.3251	2.1752	19.2895	0.0413	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,241.4882	4,241.4882	0.2550	0.1876	4,303.7670
Unmitigated	2.3251	2.1752	19.2895	0.0413	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,241.4882	4,241.4882	0.2550	0.1876	4,303.7670

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	870.40	785.60	654.40	1,911,035	1,911,035
Parking Lot	0.00	0.00	0.00		
Total	870.40	785.60	654.40	1,911,035	1,911,035

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928
Parking Lot	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
NaturalGas Unmitigated	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3674.16	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0396**	**0.3386**	**0.1441**	**2.1600e-003**		**0.0274**	**0.0274**		**0.0274**	**0.0274**		**432.2543**	**432.2543**	**8.2800e-003**	**7.9200e-003**	**434.8229**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3.67416	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0396**	**0.3386**	**0.1441**	**2.1600e-003**		**0.0274**	**0.0274**		**0.0274**	**0.0274**		**432.2543**	**432.2543**	**8.2800e-003**	**7.9200e-003**	**434.8229**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.0671	1.1433	13.6487	7.0200e-003		0.1533	0.1533		0.1533	0.1533	0.0000	1,288.7608	1,288.7608	0.0472	0.0232	1,296.8524
Unmitigated	70.2866	1.6071	100.1640	0.1682		12.4151	12.4151		12.4151	12.4151	1,339.3354	616.7608	1,956.0962	1.8558	0.0947	2,030.7022

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6279					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.4572					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	65.8016	1.4547	86.9369	0.1675		12.3420	12.3420		12.3420	12.3420	1,339.3354	592.9412	1,932.2766	1.8328	0.0947	2,006.3079
Landscaping	0.4000	0.1524	13.2270	7.0000e-004		0.0732	0.0732		0.0732	0.0732		23.8196	23.8196	0.0230		24.3943
Total	**70.2866**	**1.6071**	**100.1640**	**0.1682**		**12.4151**	**12.4151**		**12.4151**	**12.4151**	**1,339.3354**	**616.7608**	**1,956.0962**	**1.8558**	**0.0947**	**2,030.7022**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3500					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.2012					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1160	0.9909	0.4217	6.3200e-003		0.0801	0.0801		0.0801	0.0801	0.0000	1,264.9412	1,264.9412	0.0242	0.0232	1,272.4581
Landscaping	0.4000	0.1524	13.2270	7.0000e-004		0.0732	0.0732		0.0732	0.0732		23.8196	23.8196	0.0230		24.3943
Total	**4.0671**	**1.1433**	**13.6487**	**7.0200e-003**		**0.1533**	**0.1533**		**0.1533**	**0.1533**	**0.0000**	**1,288.7608**	**1,288.7608**	**0.0472**	**0.0232**	**1,296.8524**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Marina Village Apartments

Bay Area AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	234.00	Space	2.11	93,600.00	0
Apartments Mid Rise	160.00	Dwelling Unit	4.21	160,000.00	458

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 64

Climate Zone 4 **Operational Year** 2023

Utility Company Pacific Gas and Electric Company

CO2 Intensity (lb/MWhr) 203.98 **CH4 Intensity (lb/MWhr)** 0.033 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Empty lot
Construction, Paving and Coating expected to take place concurrently.

Area Mitigation - VOC Content updated per BAAQMD Regulation 8-3-301 Table 2

Stationary Sources - Emergency Generators and Fire Pumps -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	50
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblAreaMitigation	UseLowVOCPaintParkingValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	20.00	270.00
tblConstructionPhase	NumDays	230.00	270.00
tblConstructionPhase	NumDays	20.00	270.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9457	40.5414	21.9661	0.0448	19.8049	2.0453	21.8502	10.1417	1.8817	12.0233	0.0000	4,404.1886	4,404.1886	1.1966	0.1468	4,464.7520
2022	12.1873	30.4048	38.2443	0.0732	1.8679	1.4857	3.3536	0.5004	1.3909	1.8913	0.0000	7,166.8507	7,166.8507	1.4064	0.1510	7,247.0005
2023	9.8601	11.5828	17.4485	0.0288	0.3779	0.5829	0.9608	0.1002	0.5419	0.6422	0.0000	2,800.5364	2,800.5364	0.7404	9.1600e-003	2,821.7754
Maximum	**12.1873**	**40.5414**	**38.2443**	**0.0732**	**19.8049**	**2.0453**	**21.8502**	**10.1417**	**1.8817**	**12.0233**	**0.0000**	**7,166.8507**	**7,166.8507**	**1.4064**	**0.1510**	**7,247.0005**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	3.9457	40.5414	21.9661	0.0448	19.8049	2.0453	21.8502	10.1417	1.8817	12.0233	0.0000	4,404.1886	4,404.1886	1.1966	0.1468	4,464.7520
2022	12.1873	30.4048	38.2443	0.0732	1.8679	1.4857	3.3536	0.5004	1.3909	1.8913	0.0000	7,166.8507	7,166.8507	1.4064	0.1510	7,247.0005
2023	9.8601	11.5828	17.4485	0.0288	0.3779	0.5829	0.9608	0.1002	0.5419	0.6422	0.0000	2,800.5364	2,800.5364	0.7404	9.1600e-003	2,821.7754
Maximum	**12.1873**	**40.5414**	**38.2443**	**0.0732**	**19.8049**	**2.0453**	**21.8502**	**10.1417**	**1.8817**	**12.0233**	**0.0000**	**7,166.8507**	**7,166.8507**	**1.4064**	**0.1510**	**7,247.0005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	70.2866	1.6071	100.1640	0.1682		12.4151	12.4151		12.4151	12.4151	1,339.3354	616.7608	1,956.0962	1.8558	0.0947	2,030.7022
Energy	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Mobile	2.0974	2.5089	20.6201	0.0390	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,004.1614	4,004.1614	0.2903	0.2061	4,072.8441
Total	**72.4236**	**4.4546**	**120.9282**	**0.2093**	**4.2309**	**12.4719**	**16.7028**	**1.1268**	**12.4699**	**13.5967**	**1,339.3354**	**5,053.1764**	**6,392.5118**	**2.1543**	**0.3087**	**6,538.3692**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	4.0671	1.1433	13.6487	7.0200e-003		0.1533	0.1533		0.1533	0.1533	0.0000	1,288.7608	1,288.7608	0.0472	0.0232	1,296.8524
Energy	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Mobile	2.0974	2.5089	20.6201	0.0390	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,004.1614	4,004.1614	0.2903	0.2061	4,072.8441
Total	**6.2041**	**3.9907**	**34.4129**	**0.0482**	**4.2309**	**0.2101**	**4.4410**	**1.1268**	**0.2081**	**1.3349**	**0.0000**	**5,725.1764**	**5,725.1764**	**0.3458**	**0.2372**	**5,804.5194**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	91.43	10.41	71.54	77.00	0.00	98.32	73.41	0.00	98.33	90.18	100.00	-13.30	10.44	83.95	23.15	11.22

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/25/2021	9/21/2021	5	20	
2	Site Preparation	Site Preparation	9/22/2021	10/5/2021	5	10	
3	Grading	Grading	10/6/2021	11/2/2021	5	20	
4	Building Construction	Building Construction	11/3/2021	11/15/2022	5	270	
5	Architectural Coating	Architectural Coating	8/19/2022	8/31/2023	5	270	
6	Paving	Paving	9/21/2022	10/3/2023	5	270	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 20

Acres of Paving: 2.11

Residential Indoor: 324,000; Residential Outdoor: 108,000; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 5,616 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	155.00	32.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	31.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411		3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**		**1.5513**	**1.5513**		**1.4411**	**1.4411**		**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0480	0.0369	0.4011	1.0600e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		107.0342	107.0342	3.8400e-003	3.5000e-003	108.1721
Total	**0.0480**	**0.0369**	**0.4011**	**1.0600e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**107.0342**	**107.0342**	**3.8400e-003**	**3.5000e-003**	**108.1721**

3.2 Demolition - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1651	31.4407	21.5650	0.0388		1.5513	1.5513		1.4411	1.4411	0.0000	3,747.9449	3,747.9449	1.0549		3,774.3174
Total	**3.1651**	**31.4407**	**21.5650**	**0.0388**		**1.5513**	**1.5513**		**1.4411**	**1.4411**	**0.0000**	**3,747.9449**	**3,747.9449**	**1.0549**		**3,774.3174**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0480	0.0369	0.4011	1.0600e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		107.0342	107.0342	3.8400e-003	3.5000e-003	108.1721
Total	**0.0480**	**0.0369**	**0.4011**	**1.0600e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**107.0342**	**107.0342**	**3.8400e-003**	**3.5000e-003**	**108.1721**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**19.6570**	**2.0445**	**21.7015**	**10.1025**	**1.8809**	**11.9834**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0576	0.0443	0.4813	1.2700e-003	0.1479	8.2000e-004	0.1487	0.0392	7.5000e-004	0.0400		128.4410	128.4410	4.6100e-003	4.2000e-003	129.8066
Total	**0.0576**	**0.0443**	**0.4813**	**1.2700e-003**	**0.1479**	**8.2000e-004**	**0.1487**	**0.0392**	**7.5000e-004**	**0.0400**		**128.4410**	**128.4410**	**4.6100e-003**	**4.2000e-003**	**129.8066**

3.3 Site Preparation - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**	**19.6570**	**2.0445**	**21.7015**	**10.1025**	**1.8809**	**11.9834**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0576	0.0443	0.4813	1.2700e-003	0.1479	8.2000e-004	0.1487	0.0392	7.5000e-004	0.0400		128.4410	128.4410	4.6100e-003	4.2000e-003	129.8066
Total	**0.0576**	**0.0443**	**0.4813**	**1.2700e-003**	**0.1479**	**8.2000e-004**	**0.1487**	**0.0392**	**7.5000e-004**	**0.0400**		**128.4410**	**128.4410**	**4.6100e-003**	**4.2000e-003**	**129.8066**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671		2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**7.0826**	**1.1599**	**8.2425**	**3.4247**	**1.0671**	**4.4919**		**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0480	0.0369	0.4011	1.0600e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		107.0342	107.0342	3.8400e-003	3.5000e-003	108.1721
Total	**0.0480**	**0.0369**	**0.4011**	**1.0600e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**107.0342**	**107.0342**	**3.8400e-003**	**3.5000e-003**	**108.1721**

3.4 Grading - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0826	0.0000	7.0826	3.4247	0.0000	3.4247			0.0000			0.0000
Off-Road	2.2903	24.7367	15.8575	0.0296		1.1599	1.1599		1.0671	1.0671	0.0000	2,871.9285	2,871.9285	0.9288		2,895.1495
Total	**2.2903**	**24.7367**	**15.8575**	**0.0296**	**7.0826**	**1.1599**	**8.2425**	**3.4247**	**1.0671**	**4.4919**	**0.0000**	**2,871.9285**	**2,871.9285**	**0.9288**		**2,895.1495**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0480	0.0369	0.4011	1.0600e-003	0.1232	6.8000e-004	0.1239	0.0327	6.3000e-004	0.0333		107.0342	107.0342	3.8400e-003	3.5000e-003	108.1721
Total	**0.0480**	**0.0369**	**0.4011**	**1.0600e-003**	**0.1232**	**6.8000e-004**	**0.1239**	**0.0327**	**6.3000e-004**	**0.0333**		**107.0342**	**107.0342**	**3.8400e-003**	**3.5000e-003**	**108.1721**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013		2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**		**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1066	2.1695	0.6274	6.9500e-003	0.2167	0.0344	0.2511	0.0624	0.0329	0.0953		744.8049	744.8049	0.0175	0.1106	778.2090
Worker	0.4956	0.3814	4.1444	0.0109	1.2733	7.0400e-003	1.2803	0.3377	6.4900e-003	0.3442		1,106.0197	1,106.0197	0.0397	0.0361	1,117.7787
Total	**0.6021**	**2.5509**	**4.7717**	**0.0179**	**1.4900**	**0.0415**	**1.5315**	**0.4001**	**0.0394**	**0.4396**		**1,850.8247**	**1,850.8247**	**0.0572**	**0.1468**	**1,895.9877**

3.5 Building Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9009	17.4321	16.5752	0.0269		0.9586	0.9586		0.9013	0.9013	0.0000	2,553.3639	2,553.3639	0.6160		2,568.7643
Total	**1.9009**	**17.4321**	**16.5752**	**0.0269**		**0.9586**	**0.9586**		**0.9013**	**0.9013**	**0.0000**	**2,553.3639**	**2,553.3639**	**0.6160**		**2,568.7643**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1066	2.1695	0.6274	6.9500e-003	0.2167	0.0344	0.2511	0.0624	0.0329	0.0953		744.8049	744.8049	0.0175	0.1106	778.2090
Worker	0.4956	0.3814	4.1444	0.0109	1.2733	7.0400e-003	1.2803	0.3377	6.4900e-003	0.3442		1,106.0197	1,106.0197	0.0397	0.0361	1,117.7787
Total	**0.6021**	**2.5509**	**4.7717**	**0.0179**	**1.4900**	**0.0415**	**1.5315**	**0.4001**	**0.0394**	**0.4396**		**1,850.8247**	**1,850.8247**	**0.0572**	**0.1468**	**1,895.9877**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0683	1.8206	0.5306	6.7800e-003	0.2167	0.0184	0.2352	0.0624	0.0176	0.0800		726.6489	726.6489	0.0157	0.1078	759.1639
Worker	0.4606	0.3356	3.8220	0.0106	1.2733	6.6500e-003	1.2799	0.3377	6.1300e-003	0.3439		1,077.1034	1,077.1034	0.0358	0.0333	1,087.9210
Total	**0.5289**	**2.1562**	**4.3526**	**0.0174**	**1.4900**	**0.0251**	**1.5151**	**0.4001**	**0.0238**	**0.4239**		**1,803.7523**	**1,803.7523**	**0.0515**	**0.1411**	**1,847.0849**

3.5 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0683	1.8206	0.5306	6.7800e-003	0.2167	0.0184	0.2352	0.0624	0.0176	0.0800		726.6489	726.6489	0.0157	0.1078	759.1639
Worker	0.4606	0.3356	3.8220	0.0106	1.2733	6.6500e-003	1.2799	0.3377	6.1300e-003	0.3439		1,077.1034	1,077.1034	0.0358	0.0333	1,087.9210
Total	**0.5289**	**2.1562**	**4.3526**	**0.0174**	**1.4900**	**0.0251**	**1.5151**	**0.4001**	**0.0238**	**0.4239**		**1,803.7523**	**1,803.7523**	**0.0515**	**0.1411**	**1,847.0849**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**8.6922**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0921	0.0671	0.7644	2.1200e-003	0.2547	1.3300e-003	0.2560	0.0676	1.2300e-003	0.0688		215.4207	215.4207	7.1600e-003	6.6600e-003	217.5842
Total	**0.0921**	**0.0671**	**0.7644**	**2.1200e-003**	**0.2547**	**1.3300e-003**	**0.2560**	**0.0676**	**1.2300e-003**	**0.0688**		**215.4207**	**215.4207**	**7.1600e-003**	**6.6600e-003**	**217.5842**

3.6 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**8.6922**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0921	0.0671	0.7644	2.1200e-003	0.2547	1.3300e-003	0.2560	0.0676	1.2300e-003	0.0688		215.4207	215.4207	7.1600e-003	6.6600e-003	217.5842
Total	**0.0921**	**0.0671**	**0.7644**	**2.1200e-003**	**0.2547**	**1.3300e-003**	**0.2560**	**0.0676**	**1.2300e-003**	**0.0688**		**215.4207**	**215.4207**	**7.1600e-003**	**6.6600e-003**	**217.5842**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**8.6793**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0860	0.0594	0.7098	2.0500e-003	0.2547	1.2600e-003	0.2559	0.0676	1.1600e-003	0.0687		209.9267	209.9267	6.4800e-003	6.1700e-003	211.9274
Total	**0.0860**	**0.0594**	**0.7098**	**2.0500e-003**	**0.2547**	**1.2600e-003**	**0.2559**	**0.0676**	**1.1600e-003**	**0.0687**		**209.9267**	**209.9267**	**6.4800e-003**	**6.1700e-003**	**211.9274**

3.6 Architectural Coating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4876					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**8.6793**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0860	0.0594	0.7098	2.0500e-003	0.2547	1.2600e-003	0.2559	0.0676	1.1600e-003	0.0687		209.9267	209.9267	6.4800e-003	6.1700e-003	211.9274
Total	**0.0860**	**0.0594**	**0.7098**	**2.0500e-003**	**0.2547**	**1.2600e-003**	**0.2559**	**0.0676**	**1.1600e-003**	**0.0687**		**209.9267**	**209.9267**	**6.4800e-003**	**6.1700e-003**	**211.9274**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1233**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0446	0.0325	0.3699	1.0200e-003	0.1232	6.4000e-004	0.1239	0.0327	5.9000e-004	0.0333		104.2358	104.2358	3.4600e-003	3.2200e-003	105.2827
Total	**0.0446**	**0.0325**	**0.3699**	**1.0200e-003**	**0.1232**	**6.4000e-004**	**0.1239**	**0.0327**	**5.9000e-004**	**0.0333**		**104.2358**	**104.2358**	**3.4600e-003**	**3.2200e-003**	**105.2827**

3.7 Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.1233**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0446	0.0325	0.3699	1.0200e-003	0.1232	6.4000e-004	0.1239	0.0327	5.9000e-004	0.0333		104.2358	104.2358	3.4600e-003	3.2200e-003	105.2827
Total	**0.0446**	**0.0325**	**0.3699**	**1.0200e-003**	**0.1232**	**6.4000e-004**	**0.1239**	**0.0327**	**5.9000e-004**	**0.0333**		**104.2358**	**104.2358**	**3.4600e-003**	**3.2200e-003**	**105.2827**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694		2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0532**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**		**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0416	0.0288	0.3434	9.9000e-004	0.1232	6.1000e-004	0.1238	0.0327	5.6000e-004	0.0333		101.5775	101.5775	3.1300e-003	2.9900e-003	102.5455
Total	**0.0416**	**0.0288**	**0.3434**	**9.9000e-004**	**0.1232**	**6.1000e-004**	**0.1238**	**0.0327**	**5.6000e-004**	**0.0333**		**101.5775**	**101.5775**	**3.1300e-003**	**2.9900e-003**	**102.5455**

3.7 Paving - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0327	10.1917	14.5842	0.0228		0.5102	0.5102		0.4694	0.4694	0.0000	2,207.5841	2,207.5841	0.7140		2,225.4336
Paving	0.0205					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0532**	**10.1917**	**14.5842**	**0.0228**		**0.5102**	**0.5102**		**0.4694**	**0.4694**	**0.0000**	**2,207.5841**	**2,207.5841**	**0.7140**		**2,225.4336**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0416	0.0288	0.3434	9.9000e-004	0.1232	6.1000e-004	0.1238	0.0327	5.6000e-004	0.0333		101.5775	101.5775	3.1300e-003	2.9900e-003	102.5455
Total	**0.0416**	**0.0288**	**0.3434**	**9.9000e-004**	**0.1232**	**6.1000e-004**	**0.1238**	**0.0327**	**5.6000e-004**	**0.0333**		**101.5775**	**101.5775**	**3.1300e-003**	**2.9900e-003**	**102.5455**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	2.0974	2.5089	20.6201	0.0390	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,004.1614	4,004.1614	0.2903	0.2061	4,072.8441
Unmitigated	2.0974	2.5089	20.6201	0.0390	4.2309	0.0294	4.2603	1.1268	0.0274	1.1542		4,004.1614	4,004.1614	0.2903	0.2061	4,072.8441

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	870.40	785.60	654.40	1,911,035	1,911,035
Parking Lot	0.00	0.00	0.00		
Total	870.40	785.60	654.40	1,911,035	1,911,035

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928
Parking Lot	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
NaturalGas Unmitigated	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3674.16	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0396**	**0.3386**	**0.1441**	**2.1600e-003**		**0.0274**	**0.0274**		**0.0274**	**0.0274**		**432.2543**	**432.2543**	**8.2800e-003**	**7.9200e-003**	**434.8229**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3.67416	0.0396	0.3386	0.1441	2.1600e-003		0.0274	0.0274		0.0274	0.0274		432.2543	432.2543	8.2800e-003	7.9200e-003	434.8229
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0396**	**0.3386**	**0.1441**	**2.1600e-003**		**0.0274**	**0.0274**		**0.0274**	**0.0274**		**432.2543**	**432.2543**	**8.2800e-003**	**7.9200e-003**	**434.8229**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.0671	1.1433	13.6487	7.0200e-003		0.1533	0.1533		0.1533	0.1533	0.0000	1,288.7608	1,288.7608	0.0472	0.0232	1,296.8524
Unmitigated	70.2866	1.6071	100.1640	0.1682		12.4151	12.4151		12.4151	12.4151	1,339.3354	616.7608	1,956.0962	1.8558	0.0947	2,030.7022

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6279					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.4572					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	65.8016	1.4547	86.9369	0.1675		12.3420	12.3420		12.3420	12.3420	1,339.3354	592.9412	1,932.2766	1.8328	0.0947	2,006.3079
Landscaping	0.4000	0.1524	13.2270	7.0000e-004		0.0732	0.0732		0.0732	0.0732		23.8196	23.8196	0.0230		24.3943
Total	**70.2866**	**1.6071**	**100.1640**	**0.1682**		**12.4151**	**12.4151**		**12.4151**	**12.4151**	**1,339.3354**	**616.7608**	**1,956.0962**	**1.8558**	**0.0947**	**2,030.7022**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3500					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	3.2012					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1160	0.9909	0.4217	6.3200e-003		0.0801	0.0801		0.0801	0.0801	0.0000	1,264.9412	1,264.9412	0.0242	0.0232	1,272.4581
Landscaping	0.4000	0.1524	13.2270	7.0000e-004		0.0732	0.0732		0.0732	0.0732		23.8196	23.8196	0.0230		24.3943
Total	**4.0671**	**1.1433**	**13.6487**	**7.0200e-003**		**0.1533**	**0.1533**		**0.1533**	**0.1533**	**0.0000**	**1,288.7608**	**1,288.7608**	**0.0472**	**0.0232**	**1,296.8524**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

ATTACHMENT B

Operational Health Risk Analysis Output Files

Table B-1 BAAQMD Emission from Gasoline Dispensing Operation (Facility 112143)

Maximum Hours Per Day	Hours Per Day	Days Per Week	Weeks Per Year	Material Type	Pollutant ID	Pollutant	Abated Annual Emissions (lbs/yr)	Abated Hourly Emissions (lbs/hr)
24	24	7	52	Gasoline	41	Benzene	22.152	0.003
24	24	7	52	Gasoline	148	Hexane	87.360	0.010
24	24	7	52	Gasoline	293	Toluene	212.160	0.024
24	24	7	52	Gasoline	307	Xylene	177.060	0.020
24	24	7	52	Gasoline	333	Ethylbenzene	31.590	0.004
24	24	7	52	Gasoline	10007	Precursor Organic Compounds (POC)	47.730	0.598

Table B-2 Modeled Data and Emissions From Highway 12

Trips per Day[1]	Modeled Roadway Distance	Vehile Type	EMFAC Emissions Factor[2] (g/mi)		Calculated Toxic Air Contaminant Emissions[3,4,5] (lb/yr)					
					Benzene		Tolulene		Diesel Particulate	
			ROG	PM10 Exhaust	lbs/hr	lbs/yr	lbs/hr	lbs/yr	lbs/hr	lbs/yr
15570	0.50	LDA	0.0085	0.0011	0.0006	2.14	0.0015	5.34	-	-
6920	0.50	LDT2	0.0103	0.0011	0.0003	1.15	0.0008	2.88	-	-
5190	0.50	MDV	0.0450	0.0288	0.0010	3.76	0.0026	9.40	-	-
3460	0.50	MHDT	0.0229	0.0126	-	-	-	-	0.0048	17.52
3460	0.50	HHDT	0.0113	0.0217	-	-	-	-	0.0083	30.21
				Total	**0.0019**	**7.05**	**0.0048**	**17.62**	**0.0131**	**47.73**

(1) Trips per vehicle type estimated using Solano traffic data calculated by EMFAC2021 using 34,600 total trips.

(2) EMFAC emissions factor for 55 miles per hour used per average roadway speed.

(3) Annual Emissions = 365 days/year * trips per day * miles per trip * grams per mile / 454 (g/lb)

(4) Hourly Emissions = trips per day * miles per trip * Emission Factor (g/mi) / 454 (g/lb)

(5) Benzene and Toluene are estimated at 4 and 10 percent, respectively of gasoline ROG emissions and DPM is estimated to be 100% of Diesel exhaust PM

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION. DRYDPLT = F
**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Uses Regulatory DEFAULT Options:
1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:
CCVR_Sub - Meteorological data includes CCVR substitutions
TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: SO2

**Note that special processing requirements apply for the 1-hour SO2 NAAQS - check available guidance.
Model will process user-specified ranks of daily maximum 1-hour values averaged across the number of years modeled.

**Model Calculates 1 Short Term Average(s) of: 1-HR
and Calculates PERIOD Averages

**This Run Includes: 17 Source(s);   3 Source Group(s); and   14 Receptor(s)

with: 1 POINT(s), including

```
                    0 POINTCAP(s) and      0 POINTHOR(s)
          and:     16 VOLUME source(s)
          and:      0 AREA type source(s)
          and:      0 LINE source(s)
          and:      0 RLINE/RLINEXT source(s)
          and:      0 OPENPIT source(s)
          and:      0 BUOYANT LINE source(s) with      0 line(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of PERIOD Averages by Receptor
          Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE
Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
          Model Outputs Separate Summary File of High Ranked Values (SUMMFILE
Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                 m for Missing
Hours
                                                                 b for Both Calm
and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =     3.00 ;  Decay
Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC                               ;
Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.5 MB of RAM.

 **Input Runstream File:          aermod.inp

 **Output Print File:             aermod.out


 **Detailed Error/Message File:   MarinaVillage.err

 **File for Summary of Results:   MarinaVillage.sum

↑ *** AERMOD - VERSION  19191 ***   *** C:\Users\agne\Desktop\Lakes AERMOD
Outputs\Marina Village\MarinaVill ***        08/31/21
 *** AERMET - VERSION  14134 ***   ***
                        ***        09:56:59
```

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

(1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1
1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** MODELOPTs: RegDFAULT CONC ELEV RURAL

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ..\745160.SFC
Met Version: 14134
Profile file: ..\745160.PFL

Surface format: FREE

```
   Profile format: FREE

   Surface station no.:    23202                  Upper air station no.:    23230
                  Name: UNKNOWN                                    Name:
OAKLAND/WSO_AP
                  Year:   2009                                     Year:   2009

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN
ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - -
 09 01 01   1 01   -9.7  0.168 -9.000 -9.000 -999.  166.     44.7  0.47   0.92
1.00    1.76  121.   10.0  278.4    2.0
 09 01 01   1 02 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.4    2.0
 09 01 01   1 03 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.4    2.0
 09 01 01   1 04 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.2    2.0
 09 01 01   1 05 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.4    2.0
 09 01 01   1 06 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.4    2.0
 09 01 01   1 07 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.1    2.0
 09 01 01   1 08 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  278.1    2.0
 09 01 01   1 09 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
0.42    0.00    0.   10.0  278.1    2.0
 09 01 01   1 10    5.6  0.226  0.239  0.015   88.  258.   -187.2  0.38   0.92
0.29    1.76  111.   10.0  278.1    2.0
 09 01 01   1 11   14.2  0.371  0.401  0.014  165.  543.   -328.7  0.24   0.92
0.24    3.36   24.   10.0  278.4    2.0
 09 01 01   1 12   18.9  0.297  0.492  0.016  230.  392.   -126.7  0.17   0.92
0.23    2.86  356.   10.0  278.2    2.0
 09 01 01   1 13   19.6  0.274  0.534  0.016  281.  345.    -95.6  0.24   0.92
0.23    2.36    3.   10.0  278.1    2.0
 09 01 01   1 14   16.4  0.239  0.523  0.015  317.  281.    -75.6  0.38   0.92
0.24    1.76   99.   10.0  278.1    2.0
 09 01 01   1 15    9.2 -9.000 -9.000 -9.000  336. -999. -99999.0  0.26   0.92
0.27    0.00    0.   10.0  278.1    2.0
 09 01 01   1 16 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
0.35    0.00    0.   10.0  279.1    2.0
 09 01 01   1 17 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
0.60    0.00    0.   10.0  279.1    2.0
 09 01 01   1 18 -999.0 -9.000 -9.000 -9.000 -999. -999. -99999.0  0.26   0.92
1.00    0.00    0.   10.0  279.0    2.0
 09 01 01   1 19  -19.7  0.344 -9.000 -9.000 -999.  484.    187.1  0.47   0.92
```

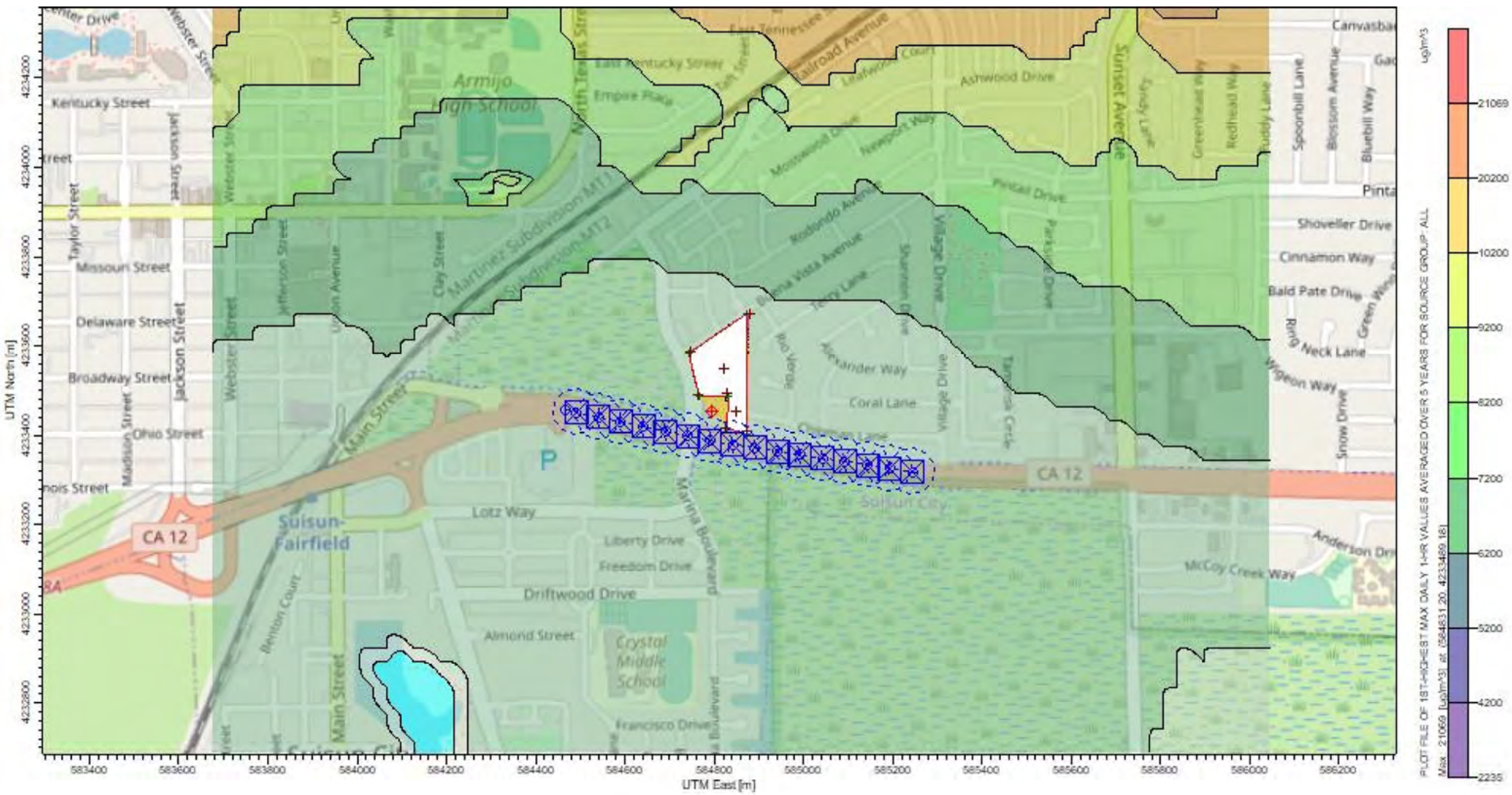
```
1.00    2.86  154.   10.0  279.2    2.0
 09 01 01   1 20  -13.2  0.230 -9.000 -9.000 -999.  272.     83.6  0.47   0.92
1.00    2.10  127.   10.0  279.1    2.0
 09 01 01   1 21  -13.2  0.230 -9.000 -9.000 -999.  265.     83.6  0.47   0.92
1.00    2.10  130.   10.0  279.1    2.0
 09 01 01   1 22  -21.7  0.378 -9.000 -9.000 -999.  559.    226.5  0.47   0.92
1.00    3.10  132.   10.0  279.1    2.0
 09 01 01   1 23  -13.2  0.230 -9.000 -9.000 -999.  280.     83.6  0.47   0.92
1.00    2.10  130.   10.0  279.1    2.0
 09 01 01   1 24  -23.7  0.415 -9.000 -9.000 -999.  641.    272.2  0.47   0.92
1.00    3.36  150.   10.0  279.5    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 09 01 01 01   10.0 1  121.    1.76   278.4   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION  19191 ***   *** C:\Users\agne\Desktop\Lakes AERMOD
Outputs\Marina Village\MarinaVill ***        08/31/21
 *** AERMET - VERSION  14134 ***   ***
                        ***        09:56:59

                                   PAGE   4
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  RURAL

                                        *** THE SUMMARY OF MAXIMUM PERIOD ( 43872
HRS) RESULTS ***


                                    ** CONC OF SO2      IN MICROGRAMS/M**3
                ** 


                         NETWORK
GROUP ID                       AVERAGE CONC               RECEPTOR  (XR, YR,
ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SLINE1    1ST HIGHEST VALUE IS      33.03672 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS      25.80564 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS      25.44112 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS      23.42080 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS      23.37162 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
```

```
          6TH HIGHEST VALUE IS      22.72756 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS      22.66643 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS      22.05278 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS      21.70863 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
         10TH HIGHEST VALUE IS      14.52078 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC

STCK1     1ST HIGHEST VALUE IS     447.26487 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS     400.80975 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS     224.71886 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS     112.42894 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS     111.71652 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          6TH HIGHEST VALUE IS     107.56791 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS      95.90722 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS      61.29403 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS      43.63828 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
         10TH HIGHEST VALUE IS      40.00790 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC

ALL       1ST HIGHEST VALUE IS     470.68566 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS     423.47618 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS     257.75558 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS     137.52215 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS     134.48172 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          6TH HIGHEST VALUE IS     129.27653 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS     121.34833 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS      75.81481 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS      67.00990 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
```

```
        10TH HIGHEST VALUE IS      62.73546 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION  19191 ***   *** C:\Users\agne\Desktop\Lakes AERMOD
Outputs\Marina Village\MarinaVill ***        08/31/21
 *** AERMET - VERSION  14134 ***   ***
                        ***        09:56:59

                                   PAGE   5
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  RURAL

                      *** THE SUMMARY OF MAXIMUM   1ST-HIGHEST MAX DAILY  1-HR
RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF SO2      IN MICROGRAMS/M**3
                **



                         NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR,
ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - -

SLINE1    1ST HIGHEST VALUE IS     903.88581 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS     853.86320 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS     789.68888 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS     781.38283 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS     596.59051 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          6TH HIGHEST VALUE IS     489.38718 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS     483.94018 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS     459.05975 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS     446.48758 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
         10TH HIGHEST VALUE IS     308.78765 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC
```

```
STCK1     1ST HIGHEST VALUE IS   20750.30154 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS   18538.63977 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS   18256.22868 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS   18140.97847 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS   17458.25751 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
          6TH HIGHEST VALUE IS   12136.38201 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS   10421.46753 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS    8669.00882 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS    8311.67803 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC
         10TH HIGHEST VALUE IS    7773.67178 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC

ALL       1ST HIGHEST VALUE IS   21068.82303 AT (  584831.20,  4233489.18,
2.00,     2.00,    0.00)  DC
          2ND HIGHEST VALUE IS   18891.19378 AT (  584850.21,  4233454.96,
2.00,     2.00,    0.00)  DC
          3RD HIGHEST VALUE IS   18434.89504 AT (  584829.30,  4233492.98,
2.00,     2.00,    0.00)  DC
          4TH HIGHEST VALUE IS   18291.51848 AT (  584825.50,  4233416.93,
2.00,     2.00,    0.00)  DC
          5TH HIGHEST VALUE IS   17485.75629 AT (  584827.40,  4233416.93,
2.00,     2.00,    0.00)  DC
          6TH HIGHEST VALUE IS   12354.10737 AT (  584768.47,  4233489.18,
2.00,     2.00,    0.00)  DC
          7TH HIGHEST VALUE IS   10638.20369 AT (  584764.66,  4233491.08,
2.00,     2.00,    0.00)  DC
          8TH HIGHEST VALUE IS    8716.69118 AT (  584871.13,  4233407.43,
2.00,     2.00,    0.00)  DC
          9TH HIGHEST VALUE IS    8530.38308 AT (  584819.80,  4233550.01,
2.00,     2.00,    0.00)  DC
         10TH HIGHEST VALUE IS    7823.32397 AT (  584873.03,  4233403.63,
2.00,     2.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 *** AERMET - VERSION  14134 ***   ***
                       ***        09:56:59

                                  PAGE   6
 *** MODELOPTs:    RegDFAULT  CONC  ELEV  RURAL

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         5334 Informational Message(s)

 A Total of        43872 Hours Were Processed

 A Total of         3700 Calm Hours Identified

 A Total of         1634 Missing Hours Identified (  3.72 Percent)


    ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


    ********   WARNING MESSAGES   ********
 CO W361      25       COCARD: Multiyear PERIOD/ANNUAL values for NO2/SO2 require
MULTYEAR Opt
 MX W481   43873         MAIN: Data Remaining After End of Year. Number of Hours=
        48
```



UTM North [m]
UTM East [m]
4234200
4234000
4233800
4233600
4233400
4233200
4233000
4232800
583400
583600
583800
584000
584200
584400
584600
584800
585000
585200
585400
585600
585800
586000
586200
ug/m^3
21069
20200
10200
9200
8200
7200
6200
5200
4200
2235
PLOT FILE OF 1ST-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL
Max: 21069 [ug/m^3] at (584831.20, 4233489.18)
Kentucky Street
Missouri Street
Delaware Street
Broadway Street
Ohio Street
Armijo High School
Suisun-Fairfield
CA 12
Lotz Way
Liberty Drive
Freedom Drive
Driftwood Drive
Almond Street
Crystal Middle School
Francisco Drive
Marina Boulevard
Coral Lane
Alexander Way
Village Drive
Sunset Avenue
Ashwood Drive
Pintail Drive
Shoveller Drive
Cinnamon Way
Bald Pate Drive
Ring Neck Lane
Wigeon Way
McCoy Creek Way

*HARP - HRACalc v21081 8/31/2021 3:31:13 PM - Cancer Risk - Input File: C:\Users\agne\Desktop\Lakes AERMOD Outputs\Marina Village\MARINAVILLAGE\hra\MarinaVillageHRAInput.hra

REC	GRP	NETID	X	Y	RISK_SUM	SCENARIO	INH_RISK	SOIL_RISK	DERMAL_R	MMILK_RIS	WATER_RIS	FISH_RISK	CROP_RISK	BEEF_RISK	DAIRY_RISK	PIG_RISK	CHICKEN_R	EGG_RISK
1	ALL		584741.9	4233584	8.18E-06	70YrCancer	8.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	ALL		584768.5	4233489	2.09E-05	70YrCancer	2.09E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	ALL		584831.2	4233489	2.88E-05	70YrCancer	2.88E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	ALL		584827.4	4233417	1.80E-05	70YrCancer	1.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	ALL		584873	4233404	1.67E-05	70YrCancer	1.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	ALL		584873	4233674	5.13E-06	70YrCancer	5.13E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	ALL		584745.7	4233586	8.07E-06	70YrCancer	8.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	ALL		584880.6	4233674	5.16E-06	70YrCancer	5.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	ALL		584819.8	4233550	1.17E-05	70YrCancer	1.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	ALL		584764.7	4233491	2.02E-05	70YrCancer	2.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	ALL		584829.3	4233493	2.70E-05	70YrCancer	2.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12	ALL		584825.5	4233417	1.83E-05	70YrCancer	1.83E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13	ALL		584871.1	4233407	1.73E-05	70YrCancer	1.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14	ALL		584850.2	4233455	2.91E-05	70YrCancer	2.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

From: Matthew Hanson
To: Seth Myers
Cc: Collin Crawford-Martin; William Duvall
Subject: RE: Stationary Source Data Request
Date: Monday, July 12, 2021 11:31:19 AM
Attachments: image003.png
image004.png
image005.png
image006.png
Emissions Report_112143.csv
Permitted Facilities 2018_MH.csv

Hi Seth,

Attached is your request for:

1. Marina Village

Let me know if there are any additional questions.

Best Regards,

Matthew Hanson
Environmental Planner
Bay Area Air Quality Management District
Planning & Climate Protection Department
375 Beale St. Suite 600 | San Francisco, CA 94105
415-749-8733 | mhanson@baaqmd.gov

From: Seth Myers <smyers@ecorpconsulting.com>
Sent: Friday, July 2, 2021 1:18 PM
To: Matthew Hanson <mhanson@baaqmd.gov>
Cc: Collin Crawford-Martin <ccrawfordmartin@ecorpconsulting.com>; William Duvall <wduvall@ecorpconsulting.com>
Subject: RE: Stationary Source Data Request

Thanks Matthew, the emissions report breaking down the pollutants and average emissions (lb/day) would be great.

Seth Myers
Senior Air Quality / Noise Analyst
ECORP Consulting, Inc.

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
Federal Small Business (SB)
California Small Business for Public Works (SB-PW)

55 Hanover Lane, Chico, CA 95926
Ph: 530.965.5925 ◆ Cell: 530.717.7600
smyers@ecorpconsulting.com ◆ www.ecorpconsulting.com[ecorpconsulting.com]
Rocklin ◆ Redlands ◆ Santa Ana ◆ San Diego ◆ Chico ◆ Flagstaff, AZ ◆ Santa Fe, NM

From: Matthew Hanson <mhanson@baaqmd.gov>
Sent: Friday, July 2, 2021 12:31 PM
To: Seth Myers <smyers@ecorpconsulting.com>
Cc: Collin Crawford-Martin <ccrawfordmartin@ecorpconsulting.com>; William Duvall <wduvall@ecorpconsulting.com>
Subject: RE: Stationary Source Data Request

Hello Seth,

Thank you for submitting your Stationary Source Request. I suggest that you make a public records request if you want the throughput data. I can provide an emissions report which will brake down the pollutants and average emissions (lb/day).

Note: Stationary Source Request will be completed in the order it was received and it may take between 5-10 business days from the submittal date to complete your request.

Best Regards,

Matthew Hanson
Environmental Planner
Bay Area Air Quality Management District
Planning & Climate Protection Department
375 Beale St. Suite 600 | San Francisco, CA 94105
415-749-8733 | mhanson@baaqmd.gov

From: Seth Myers <smyers@ecorpconsulting.com>
Sent: Thursday, July 1, 2021 3:12 PM
To: Matthew Hanson <mhanson@baaqmd.gov>
Cc: Collin Crawford-Martin <ccrawfordmartin@ecorpconsulting.com>; William Duvall <wduvall@ecorpconsulting.com>
Subject: Stationary Source Data Request

Hello Mr. Hanson,

Thank you for taking on my stationary source data request. I look forward to hearing from you. Thank again.

Seth Myers
Senior Air Quality / Noise Analyst
ECORP Consulting, Inc.

Federal Small Business (SB)
California Small Business for Public Works (SB-PW)
55 Hanover Lane, Chico, CA 95926
Ph: 530.965.5925 ◆ Cell: 530.717.7600
smyers@ecorpconsulting.com ◆ www.ecorpconsulting.com[ecorpconsulting.com]
Rocklin ◆ Redlands ◆ Santa Ana ◆ San Diego ◆ Chico ◆ Flagstaff, AZ ◆ Santa Fe, NM

ATTACHMENT C

CalEEMod Output Files – Greenhouse Gases

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Marina Village Apartments

Bay Area AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	234.00	Space	2.11	93,600.00	0
Apartments Mid Rise	160.00	Dwelling Unit	4.21	160,000.00	458

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2023
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Empty lot
Construction, Paving and Coating expected to take place concurrently.

Area Mitigation - VOC Content updated per BAAQMD Regulation 8-3-301 Table 2

Stationary Sources - Emergency Generators and Fire Pumps -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintNonresidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintNonresidentialInteriorValue	100	50
tblAreaMitigation	UseLowVOCPaintParkingCheck	False	True

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblAreaMitigation	UseLowVOCPaintParkingValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	100
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	100	50
tblConstructionPhase	NumDays	20.00	270.00
tblConstructionPhase	NumDays	230.00	270.00
tblConstructionPhase	NumDays	20.00	270.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1282	1.1933	0.9463	1.8700e-003	0.2030	0.0589	0.2619	0.0939	0.0547	0.1486	0.0000	165.3931	165.3931	0.0366	2.9000e-003	167.1707
2022	0.7136	2.4878	3.0050	6.1500e-003	0.1789	0.1194	0.2983	0.0482	0.1122	0.1603	0.0000	547.9051	547.9051	0.0929	0.0147	554.6064
2023	0.8695	1.1246	1.6867	2.7800e-003	0.0330	0.0566	0.0896	8.7800e-003	0.0526	0.0613	0.0000	245.3306	245.3306	0.0659	7.1000e-004	247.1888
Maximum	**0.8695**	**2.4878**	**3.0050**	**6.1500e-003**	**0.2030**	**0.1194**	**0.2983**	**0.0939**	**0.1122**	**0.1603**	**0.0000**	**547.9051**	**547.9051**	**0.0929**	**0.0147**	**554.6064**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.1282	1.1933	0.9463	1.8700e-003	0.2030	0.0589	0.2619	0.0939	0.0547	0.1486	0.0000	165.3929	165.3929	0.0366	2.9000e-003	167.1706
2022	0.7136	2.4878	3.0050	6.1500e-003	0.1789	0.1194	0.2983	0.0482	0.1122	0.1603	0.0000	547.9047	547.9047	0.0929	0.0147	554.6060
2023	0.8695	1.1246	1.6867	2.7800e-003	0.0330	0.0566	0.0896	8.7800e-003	0.0526	0.0613	0.0000	245.3303	245.3303	0.0659	7.1000e-004	247.1885
Maximum	**0.8695**	**2.4878**	**3.0050**	**6.1500e-003**	**0.2030**	**0.1194**	**0.2983**	**0.0939**	**0.1122**	**0.1603**	**0.0000**	**547.9047**	**547.9047**	**0.0929**	**0.0147**	**554.6060**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-25-2021	11-24-2021	1.0170	1.0170
2	11-25-2021	2-24-2022	0.6901	0.6901
3	2-25-2022	5-24-2022	0.6327	0.6327
4	5-25-2022	8-24-2022	0.6738	0.6738
5	8-25-2022	11-24-2022	1.2139	1.2139
6	11-25-2022	2-24-2023	0.7196	0.7196
7	2-25-2023	5-24-2023	0.6812	0.6812
8	5-25-2023	8-24-2023	0.7039	0.7039
9	8-25-2023	9-30-2023	0.1747	0.1747
		Highest	1.2139	1.2139

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1507	0.0222	1.6988	1.0700e-003		0.0793	0.0793		0.0793	0.0793	7.2944	4.9409	12.2353	0.0136	4.8000e-004	12.7178
Energy	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	131.8335	131.8335	0.0111	2.4900e-003	132.8547
Mobile	0.3617	0.4097	3.3443	6.7700e-003	0.7043	5.0800e-003	0.7094	0.1882	4.7300e-003	0.1929	0.0000	631.4498	631.4498	0.0429	0.0311	641.7829
Waste						0.0000	0.0000		0.0000	0.0000	14.9401	0.0000	14.9401	0.8829	0.0000	37.0136
Water						0.0000	0.0000		0.0000	0.0000	3.3073	7.3473	10.6546	0.3409	8.1600e-003	21.6096
Total	**1.5196**	**0.4937**	**5.0694**	**8.2300e-003**	**0.7043**	**0.0893**	**0.7937**	**0.1882**	**0.0890**	**0.2772**	**25.5417**	**775.5715**	**801.1133**	**1.2915**	**0.0422**	**845.9785**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6847	0.0192	1.1928	1.0000e-004		7.0300e-003	7.0300e-003		7.0300e-003	7.0300e-003	0.0000	8.3366	8.3366	2.0000e-003	1.2000e-004	8.4215
Energy	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	131.8335	131.8335	0.0111	2.4900e-003	132.8547
Mobile	0.3617	0.4097	3.3443	6.7700e-003	0.7043	5.0800e-003	0.7094	0.1882	4.7300e-003	0.1929	0.0000	631.4498	631.4498	0.0429	0.0311	641.7829
Waste						0.0000	0.0000		0.0000	0.0000	14.9401	0.0000	14.9401	0.8829	0.0000	37.0136
Water						0.0000	0.0000		0.0000	0.0000	3.3073	7.3473	10.6546	0.3409	8.1600e-003	21.6096
Total	**1.0537**	**0.4908**	**4.5634**	**7.2600e-003**	**0.7043**	**0.0171**	**0.7214**	**0.1882**	**0.0168**	**0.2049**	**18.2474**	**778.9672**	**797.2145**	**1.2799**	**0.0418**	**841.6822**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**30.66**	**0.60**	**9.98**	**11.79**	**0.00**	**80.85**	**9.10**	**0.00**	**81.17**	**26.06**	**28.56**	**-0.44**	**0.49**	**0.90**	**0.85**	**0.51**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/25/2021	9/21/2021	5	20	
2	Site Preparation	Site Preparation	9/22/2021	10/5/2021	5	10	
3	Grading	Grading	10/6/2021	11/2/2021	5	20	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4	Building Construction	Building Construction	11/3/2021	11/15/2022	5	270	
5	Architectural Coating	Architectural Coating	8/19/2022	8/31/2023	5	270	
6	Paving	Paving	9/21/2022	10/3/2023	5	270	

Acres of Grading (Site Preparation Phase): 15

Acres of Grading (Grading Phase): 20

Acres of Paving: 2.11

Residential Indoor: 324,000; Residential Outdoor: 108,000; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 5,616 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36

Paving	Rollers	2	8.00	80	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	155.00	32.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	31.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0008	34.0008	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**		**0.0155**	**0.0155**		**0.0144**	**0.0144**	**0.0000**	**34.0008**	**34.0008**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.4000e-004	3.9000e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9789	0.9789	3.0000e-005	3.0000e-005	0.9886
Total	**4.4000e-004**	**3.4000e-004**	**3.9000e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9789**	**0.9789**	**3.0000e-005**	**3.0000e-005**	**0.9886**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0317	0.3144	0.2157	3.9000e-004		0.0155	0.0155		0.0144	0.0144	0.0000	34.0007	34.0007	9.5700e-003	0.0000	34.2400
Total	**0.0317**	**0.3144**	**0.2157**	**3.9000e-004**		**0.0155**	**0.0155**		**0.0144**	**0.0144**	**0.0000**	**34.0007**	**34.0007**	**9.5700e-003**	**0.0000**	**34.2400**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.4000e-004	3.9000e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9789	0.9789	3.0000e-005	3.0000e-005	0.9886
Total	**4.4000e-004**	**3.4000e-004**	**3.9000e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9789**	**0.9789**	**3.0000e-005**	**3.0000e-005**	**0.9886**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0983	0.0000	0.0983	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7179	16.7179	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0983**	**0.0102**	**0.1085**	**0.0505**	**9.4000e-003**	**0.0599**	**0.0000**	**16.7179**	**16.7179**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	2.0000e-004	2.3400e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.5873	0.5873	2.0000e-005	2.0000e-005	0.5932
Total	**2.7000e-004**	**2.0000e-004**	**2.3400e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.5873**	**0.5873**	**2.0000e-005**	**2.0000e-005**	**0.5932**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0983	0.0000	0.0983	0.0505	0.0000	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0194	0.2025	0.1058	1.9000e-004		0.0102	0.0102		9.4000e-003	9.4000e-003	0.0000	16.7178	16.7178	5.4100e-003	0.0000	16.8530
Total	**0.0194**	**0.2025**	**0.1058**	**1.9000e-004**	**0.0983**	**0.0102**	**0.1085**	**0.0505**	**9.4000e-003**	**0.0599**	**0.0000**	**16.7178**	**16.7178**	**5.4100e-003**	**0.0000**	**16.8530**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-004	2.0000e-004	2.3400e-003	1.0000e-005	7.1000e-004	0.0000	7.2000e-004	1.9000e-004	0.0000	1.9000e-004	0.0000	0.5873	0.5873	2.0000e-005	2.0000e-005	0.5932
Total	**2.7000e-004**	**2.0000e-004**	**2.3400e-003**	**1.0000e-005**	**7.1000e-004**	**0.0000**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**0.0000**	**0.5873**	**0.5873**	**2.0000e-005**	**2.0000e-005**	**0.5932**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0708	0.0000	0.0708	0.0343	0.0000	0.0343	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2644
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0708**	**0.0116**	**0.0824**	**0.0343**	**0.0107**	**0.0449**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2644**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.4000e-004	3.9000e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9789	0.9789	3.0000e-005	3.0000e-005	0.9886
Total	**4.4000e-004**	**3.4000e-004**	**3.9000e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9789**	**0.9789**	**3.0000e-005**	**3.0000e-005**	**0.9886**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0708	0.0000	0.0708	0.0343	0.0000	0.0343	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0229	0.2474	0.1586	3.0000e-004		0.0116	0.0116		0.0107	0.0107	0.0000	26.0537	26.0537	8.4300e-003	0.0000	26.2643
Total	**0.0229**	**0.2474**	**0.1586**	**3.0000e-004**	**0.0708**	**0.0116**	**0.0824**	**0.0343**	**0.0107**	**0.0449**	**0.0000**	**26.0537**	**26.0537**	**8.4300e-003**	**0.0000**	**26.2643**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4000e-004	3.4000e-004	3.9000e-003	1.0000e-005	1.1900e-003	1.0000e-005	1.1900e-003	3.2000e-004	1.0000e-005	3.2000e-004	0.0000	0.9789	0.9789	3.0000e-005	3.0000e-005	0.9886
Total	**4.4000e-004**	**3.4000e-004**	**3.9000e-003**	**1.0000e-005**	**1.1900e-003**	**1.0000e-005**	**1.1900e-003**	**3.2000e-004**	**1.0000e-005**	**3.2000e-004**	**0.0000**	**0.9789**	**0.9789**	**3.0000e-005**	**3.0000e-005**	**0.9886**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0409	0.3748	0.3564	5.8000e-004		0.0206	0.0206		0.0194	0.0194	0.0000	49.8020	49.8020	0.0120	0.0000	50.1024
Total	**0.0409**	**0.3748**	**0.3564**	**5.8000e-004**		**0.0206**	**0.0206**		**0.0194**	**0.0194**	**0.0000**	**49.8020**	**49.8020**	**0.0120**	**0.0000**	**50.1024**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2900e-003	0.0459	0.0133	1.5000e-004	4.5100e-003	7.4000e-004	5.2500e-003	1.3100e-003	7.1000e-004	2.0100e-003	0.0000	14.5263	14.5263	3.4000e-004	2.1600e-003	15.1775
Worker	9.8700e-003	7.4900e-003	0.0866	2.4000e-004	0.0263	1.5000e-004	0.0265	7.0100e-003	1.4000e-004	7.1400e-003	0.0000	21.7474	21.7474	7.3000e-004	6.6000e-004	21.9631
Total	**0.0122**	**0.0534**	**0.0998**	**3.9000e-004**	**0.0308**	**8.9000e-004**	**0.0317**	**8.3200e-003**	**8.5000e-004**	**9.1500e-003**	**0.0000**	**36.2736**	**36.2736**	**1.0700e-003**	**2.8200e-003**	**37.1406**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0409	0.3748	0.3564	5.8000e-004		0.0206	0.0206		0.0194	0.0194	0.0000	49.8020	49.8020	0.0120	0.0000	50.1023
Total	**0.0409**	**0.3748**	**0.3564**	**5.8000e-004**		**0.0206**	**0.0206**		**0.0194**	**0.0194**	**0.0000**	**49.8020**	**49.8020**	**0.0120**	**0.0000**	**50.1023**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2900e-003	0.0459	0.0133	1.5000e-004	4.5100e-003	7.4000e-004	5.2500e-003	1.3100e-003	7.1000e-004	2.0100e-003	0.0000	14.5263	14.5263	3.4000e-004	2.1600e-003	15.1775
Worker	9.8700e-003	7.4900e-003	0.0866	2.4000e-004	0.0263	1.5000e-004	0.0265	7.0100e-003	1.4000e-004	7.1400e-003	0.0000	21.7474	21.7474	7.3000e-004	6.6000e-004	21.9631
Total	**0.0122**	**0.0534**	**0.0998**	**3.9000e-004**	**0.0308**	**8.9000e-004**	**0.0317**	**8.3200e-003**	**8.5000e-004**	**9.1500e-003**	**0.0000**	**36.2736**	**36.2736**	**1.0700e-003**	**2.8200e-003**	**37.1406**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1937	1.7724	1.8573	3.0600e-003		0.0918	0.0918		0.0864	0.0864	0.0000	263.0082	263.0082	0.0630	0.0000	264.5834
Total	**0.1937**	**1.7724**	**1.8573**	**3.0600e-003**		**0.0918**	**0.0918**		**0.0864**	**0.0864**	**0.0000**	**263.0082**	**263.0082**	**0.0630**	**0.0000**	**264.5834**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.7700e-003	0.2030	0.0591	7.7000e-004	0.0238	2.0900e-003	0.0259	6.8900e-003	2.0000e-003	8.8900e-003	0.0000	74.8020	74.8020	1.6300e-003	0.0111	78.1479
Worker	0.0483	0.0348	0.4207	1.2100e-003	0.1390	7.6000e-004	0.1398	0.0370	7.0000e-004	0.0377	0.0000	111.8029	111.8029	3.4700e-003	3.2300e-003	112.8508
Total	**0.0561**	**0.2378**	**0.4798**	**1.9800e-003**	**0.1628**	**2.8500e-003**	**0.1657**	**0.0439**	**2.7000e-003**	**0.0466**	**0.0000**	**186.6049**	**186.6049**	**5.1000e-003**	**0.0143**	**190.9987**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1937	1.7724	1.8572	3.0600e-003		0.0918	0.0918		0.0864	0.0864	0.0000	263.0078	263.0078	0.0630	0.0000	264.5831
Total	**0.1937**	**1.7724**	**1.8572**	**3.0600e-003**		**0.0918**	**0.0918**		**0.0864**	**0.0864**	**0.0000**	**263.0078**	**263.0078**	**0.0630**	**0.0000**	**264.5831**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.7700e-003	0.2030	0.0591	7.7000e-004	0.0238	2.0900e-003	0.0259	6.8900e-003	2.0000e-003	8.8900e-003	0.0000	74.8020	74.8020	1.6300e-003	0.0111	78.1479
Worker	0.0483	0.0348	0.4207	1.2100e-003	0.1390	7.6000e-004	0.1398	0.0370	7.0000e-004	0.0377	0.0000	111.8029	111.8029	3.4700e-003	3.2300e-003	112.8508
Total	**0.0561**	**0.2378**	**0.4798**	**1.9800e-003**	**0.1628**	**2.8500e-003**	**0.1657**	**0.0439**	**2.7000e-003**	**0.0466**	**0.0000**	**186.6049**	**186.6049**	**5.1000e-003**	**0.0143**	**190.9987**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4074					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8200e-003	0.0676	0.0871	1.4000e-004		3.9200e-003	3.9200e-003		3.9200e-003	3.9200e-003	0.0000	12.2556	12.2556	8.0000e-004	0.0000	12.2756
Total	**0.4172**	**0.0676**	**0.0871**	**1.4000e-004**		**3.9200e-003**	**3.9200e-003**		**3.9200e-003**	**3.9200e-003**	**0.0000**	**12.2556**	**12.2556**	**8.0000e-004**	**0.0000**	**12.2756**

3.6 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0900e-003	2.9400e-003	0.0356	1.0000e-004	0.0118	6.0000e-005	0.0118	3.1300e-003	6.0000e-005	3.1900e-003	0.0000	9.4565	9.4565	2.9000e-004	2.7000e-004	9.5451
Total	**4.0900e-003**	**2.9400e-003**	**0.0356**	**1.0000e-004**	**0.0118**	**6.0000e-005**	**0.0118**	**3.1300e-003**	**6.0000e-005**	**3.1900e-003**	**0.0000**	**9.4565**	**9.4565**	**2.9000e-004**	**2.7000e-004**	**9.5451**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4074					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.8200e-003	0.0676	0.0871	1.4000e-004		3.9200e-003	3.9200e-003		3.9200e-003	3.9200e-003	0.0000	12.2556	12.2556	8.0000e-004	0.0000	12.2756
Total	**0.4172**	**0.0676**	**0.0871**	**1.4000e-004**		**3.9200e-003**	**3.9200e-003**		**3.9200e-003**	**3.9200e-003**	**0.0000**	**12.2556**	**12.2556**	**8.0000e-004**	**0.0000**	**12.2756**

3.6 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0900e-003	2.9400e-003	0.0356	1.0000e-004	0.0118	6.0000e-005	0.0118	3.1300e-003	6.0000e-005	3.1900e-003	0.0000	9.4565	9.4565	2.9000e-004	2.7000e-004	9.5451
Total	**4.0900e-003**	**2.9400e-003**	**0.0356**	**1.0000e-004**	**0.0118**	**6.0000e-005**	**0.0118**	**3.1300e-003**	**6.0000e-005**	**3.1900e-003**	**0.0000**	**9.4565**	**9.4565**	**2.9000e-004**	**2.7000e-004**	**9.5451**

3.6 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7384					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0167	0.1134	0.1576	2.6000e-004		6.1600e-003	6.1600e-003		6.1600e-003	6.1600e-003	0.0000	22.2133	22.2133	1.3300e-003	0.0000	22.2465
Total	**0.7551**	**0.1134**	**0.1576**	**2.6000e-004**		**6.1600e-003**	**6.1600e-003**		**6.1600e-003**	**6.1600e-003**	**0.0000**	**22.2133**	**22.2133**	**1.3300e-003**	**0.0000**	**22.2465**

3.6 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-003	4.7200e-003	0.0598	1.8000e-004	0.0213	1.1000e-004	0.0214	5.6700e-003	1.0000e-004	5.7700e-003	0.0000	16.7025	16.7025	4.8000e-004	4.6000e-004	16.8511
Total	**6.9000e-003**	**4.7200e-003**	**0.0598**	**1.8000e-004**	**0.0213**	**1.1000e-004**	**0.0214**	**5.6700e-003**	**1.0000e-004**	**5.7700e-003**	**0.0000**	**16.7025**	**16.7025**	**4.8000e-004**	**4.6000e-004**	**16.8511**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7384					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0167	0.1134	0.1576	2.6000e-004		6.1600e-003	6.1600e-003		6.1600e-003	6.1600e-003	0.0000	22.2133	22.2133	1.3300e-003	0.0000	22.2465
Total	**0.7551**	**0.1134**	**0.1576**	**2.6000e-004**		**6.1600e-003**	**6.1600e-003**		**6.1600e-003**	**6.1600e-003**	**0.0000**	**22.2133**	**22.2133**	**1.3300e-003**	**0.0000**	**22.2465**

3.6 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-003	4.7200e-003	0.0598	1.8000e-004	0.0213	1.1000e-004	0.0214	5.6700e-003	1.0000e-004	5.7700e-003	0.0000	16.7025	16.7025	4.8000e-004	4.6000e-004	16.8511
Total	**6.9000e-003**	**4.7200e-003**	**0.0598**	**1.8000e-004**	**0.0213**	**1.1000e-004**	**0.0214**	**5.6700e-003**	**1.0000e-004**	**5.7700e-003**	**0.0000**	**16.7025**	**16.7025**	**4.8000e-004**	**4.6000e-004**	**16.8511**

3.7 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0403	0.4061	0.5322	8.3000e-004		0.0207	0.0207		0.0191	0.0191	0.0000	73.1006	73.1006	0.0236	0.0000	73.6916
Paving	7.5000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0410**	**0.4061**	**0.5322**	**8.3000e-004**		**0.0207**	**0.0207**		**0.0191**	**0.0191**	**0.0000**	**73.1006**	**73.1006**	**0.0236**	**0.0000**	**73.6916**

3.7 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	1.0800e-003	0.0131	4.0000e-005	4.3300e-003	2.0000e-005	4.3500e-003	1.1500e-003	2.0000e-005	1.1700e-003	0.0000	3.4794	3.4794	1.1000e-004	1.0000e-004	3.5121
Total	**1.5000e-003**	**1.0800e-003**	**0.0131**	**4.0000e-005**	**4.3300e-003**	**2.0000e-005**	**4.3500e-003**	**1.1500e-003**	**2.0000e-005**	**1.1700e-003**	**0.0000**	**3.4794**	**3.4794**	**1.1000e-004**	**1.0000e-004**	**3.5121**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0403	0.4061	0.5322	8.3000e-004		0.0207	0.0207		0.0191	0.0191	0.0000	73.1005	73.1005	0.0236	0.0000	73.6916
Paving	7.5000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0410**	**0.4061**	**0.5322**	**8.3000e-004**		**0.0207**	**0.0207**		**0.0191**	**0.0191**	**0.0000**	**73.1005**	**73.1005**	**0.0236**	**0.0000**	**73.6916**

3.7 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	1.0800e-003	0.0131	4.0000e-005	4.3300e-003	2.0000e-005	4.3500e-003	1.1500e-003	2.0000e-005	1.1700e-003	0.0000	3.4794	3.4794	1.1000e-004	1.0000e-004	3.5121
Total	**1.5000e-003**	**1.0800e-003**	**0.0131**	**4.0000e-005**	**4.3300e-003**	**2.0000e-005**	**4.3500e-003**	**1.1500e-003**	**2.0000e-005**	**1.1700e-003**	**0.0000**	**3.4794**	**3.4794**	**1.1000e-004**	**1.0000e-004**	**3.5121**

3.7 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1017	1.0039	1.4365	2.2500e-003		0.0503	0.0503		0.0462	0.0462	0.0000	197.2646	197.2646	0.0638	0.0000	198.8596
Paving	2.0200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1037**	**1.0039**	**1.4365**	**2.2500e-003**		**0.0503**	**0.0503**		**0.0462**	**0.0462**	**0.0000**	**197.2646**	**197.2646**	**0.0638**	**0.0000**	**198.8596**

3.7 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7800e-003	2.5900e-003	0.0328	1.0000e-004	0.0117	6.0000e-005	0.0117	3.1100e-003	6.0000e-005	3.1600e-003	0.0000	9.1501	9.1501	2.6000e-004	2.5000e-004	9.2315
Total	**3.7800e-003**	**2.5900e-003**	**0.0328**	**1.0000e-004**	**0.0117**	**6.0000e-005**	**0.0117**	**3.1100e-003**	**6.0000e-005**	**3.1600e-003**	**0.0000**	**9.1501**	**9.1501**	**2.6000e-004**	**2.5000e-004**	**9.2315**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1017	1.0039	1.4365	2.2500e-003		0.0503	0.0503		0.0462	0.0462	0.0000	197.2644	197.2644	0.0638	0.0000	198.8594
Paving	2.0200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1037**	**1.0039**	**1.4365**	**2.2500e-003**		**0.0503**	**0.0503**		**0.0462**	**0.0462**	**0.0000**	**197.2644**	**197.2644**	**0.0638**	**0.0000**	**198.8594**

3.7 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7800e-003	2.5900e-003	0.0328	1.0000e-004	0.0117	6.0000e-005	0.0117	3.1100e-003	6.0000e-005	3.1600e-003	0.0000	9.1501	9.1501	2.6000e-004	2.5000e-004	9.2315
Total	**3.7800e-003**	**2.5900e-003**	**0.0328**	**1.0000e-004**	**0.0117**	**6.0000e-005**	**0.0117**	**3.1100e-003**	**6.0000e-005**	**3.1600e-003**	**0.0000**	**9.1501**	**9.1501**	**2.6000e-004**	**2.5000e-004**	**9.2315**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3617	0.4097	3.3443	6.7700e-003	0.7043	5.0800e-003	0.7094	0.1882	4.7300e-003	0.1929	0.0000	631.4498	631.4498	0.0429	0.0311	641.7829
Unmitigated	0.3617	0.4097	3.3443	6.7700e-003	0.7043	5.0800e-003	0.7094	0.1882	4.7300e-003	0.1929	0.0000	631.4498	631.4498	0.0429	0.0311	641.7829

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	870.40	785.60	654.40	1,911,035	1,911,035
Parking Lot	0.00	0.00	0.00		
Total	870.40	785.60	654.40	1,911,035	1,911,035

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928
Parking Lot	0.552821	0.058334	0.189005	0.121481	0.023262	0.005577	0.010166	0.007476	0.001000	0.000579	0.026545	0.000826	0.002928

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	60.2690	60.2690	9.7500e-003	1.1800e-003	60.8649
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	60.2690	60.2690	9.7500e-003	1.1800e-003	60.8649
NaturalGas Mitigated	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	71.5645	71.5645	1.3700e-003	1.3100e-003	71.9898
NaturalGas Unmitigated	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	71.5645	71.5645	1.3700e-003	1.3100e-003	71.9898

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.34107e+006	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	71.5645	71.5645	1.3700e-003	1.3100e-003	71.9898
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**7.2300e-003**	**0.0618**	**0.0263**	**3.9000e-004**		**5.0000e-003**	**5.0000e-003**		**5.0000e-003**	**5.0000e-003**	**0.0000**	**71.5645**	**71.5645**	**1.3700e-003**	**1.3100e-003**	**71.9898**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.34107e+006	7.2300e-003	0.0618	0.0263	3.9000e-004		5.0000e-003	5.0000e-003		5.0000e-003	5.0000e-003	0.0000	71.5645	71.5645	1.3700e-003	1.3100e-003	71.9898
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**7.2300e-003**	**0.0618**	**0.0263**	**3.9000e-004**		**5.0000e-003**	**5.0000e-003**		**5.0000e-003**	**5.0000e-003**	**0.0000**	**71.5645**	**71.5645**	**1.3700e-003**	**1.3100e-003**	**71.9898**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	618629	57.2379	9.2600e-003	1.1200e-003	57.8039
Parking Lot	32760	3.0311	4.9000e-004	6.0000e-005	3.0611
Total		**60.2690**	**9.7500e-003**	**1.1800e-003**	**60.8649**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	618629	57.2379	9.2600e-003	1.1200e-003	57.8039
Parking Lot	32760	3.0311	4.9000e-004	6.0000e-005	3.0611
Total		**60.2690**	**9.7500e-003**	**1.1800e-003**	**60.8649**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

Use Low VOC Paint - Non-Residential Interior

Use Low VOC Paint - Non-Residential Exterior

Use only Natural Gas Hearths

Use Low VOC Cleaning Supplies

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6847	0.0192	1.1928	1.0000e-004		7.0300e-003	7.0300e-003		7.0300e-003	7.0300e-003	0.0000	8.3366	8.3366	2.0000e-003	1.2000e-004	8.4215
Unmitigated	1.1507	0.0222	1.6988	1.0700e-003		0.0793	0.0793		0.0793	0.0793	7.2944	4.9409	12.2353	0.0136	4.8000e-004	12.7178

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1146					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.6309					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.3692	8.5000e-003	0.5084	1.0100e-003		0.0727	0.0727		0.0727	0.0727	7.2944	2.9961	10.2905	0.0117	4.8000e-004	10.7261
Landscaping	0.0360	0.0137	1.1904	6.0000e-005		6.5800e-003	6.5800e-003		6.5800e-003	6.5800e-003	0.0000	1.9448	1.9448	1.8800e-003	0.0000	1.9917
Total	**1.1507**	**0.0222**	**1.6988**	**1.0700e-003**		**0.0793**	**0.0793**		**0.0793**	**0.0793**	**7.2944**	**4.9409**	**12.2353**	**0.0136**	**4.8000e-004**	**12.7179**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0639					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.5842					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	6.5000e-004	5.5200e-003	2.3500e-003	4.0000e-005		4.5000e-004	4.5000e-004		4.5000e-004	4.5000e-004	0.0000	6.3918	6.3918	1.2000e-004	1.2000e-004	6.4298
Landscaping	0.0360	0.0137	1.1904	6.0000e-005		6.5800e-003	6.5800e-003		6.5800e-003	6.5800e-003	0.0000	1.9448	1.9448	1.8800e-003	0.0000	1.9917
Total	**0.6847**	**0.0192**	**1.1928**	**1.0000e-004**		**7.0300e-003**	**7.0300e-003**		**7.0300e-003**	**7.0300e-003**	**0.0000**	**8.3366**	**8.3366**	**2.0000e-003**	**1.2000e-004**	**8.4215**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	10.6546	0.3409	8.1600e-003	21.6096
Unmitigated	10.6546	0.3409	8.1600e-003	21.6096

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	10.4246 / 6.57206	10.6546	0.3409	8.1600e-003	21.6096
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**10.6546**	**0.3409**	**8.1600e-003**	**21.6096**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	10.4246 / 6.57206	10.6546	0.3409	8.1600e-003	21.6096
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**10.6546**	**0.3409**	**8.1600e-003**	**21.6096**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	14.9401	0.8829	0.0000	37.0136
Unmitigated	14.9401	0.8829	0.0000	37.0136

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	73.6	14.9401	0.8829	0.0000	37.0136
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**14.9401**	**0.8829**	**0.0000**	**37.0136**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	73.6	14.9401	0.8829	0.0000	37.0136
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**14.9401**	**0.8829**	**0.0000**	**37.0136**

9.0 Operational Offroad

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

ATTACHMENT 4.4

Biological Report for Marina Village Project, Suisun City, CA
LSA Associates, Inc., September 10, 2020

LSA

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

Via Email

September 10, 2020

Mr. Carlton Randle
Solano Affordable Housing Foundation
1411 Oliver Rd # 220,
Fairfield, CA 94534

Subject: Biological Report for Marina Village Project, Suisun City, CA

Dear Mr. Randle:

At your request, LSA conducted an analysis of the biological resources within the 5.4-acre Marina Village Project site at Marina Blvd and Buena Vista Blvd in Suisun City, CA (Figure 1).

This report provides a site assessment of the status of special-status species, sensitive biological communities, and wetlands and other waters under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (Corps), and/or the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW). In addition, this report analyzes the potential impacts to biological resources from the proposed project regarding the California Environmental Quality Act (CEQA) Initial Study Checklist questions.

PROJECT DESCRIPTION

The proposed project involves developing the 5.4-acre Project site for residential, affordable housing (Figure 2). The Solano Affordable Housing Foundation is proposing to develop the Project site for residential housing consisting of approximately 216 units, and approximately 180 parking stalls. A total of 10 buildings will be erected, including an office and tenant amenities complex. The development will also include public bikeway access, a play area, several plazas and associated walkways, landscaping, and driveways. The site is adjacent to an existing an AM/PM gas station and convenience store. The project site encompasses 9 legal parcels (Table 1). All construction will be set back 15 feet from the parcel boundary and the setback areas will contain trees and landscaping. All construction work will be restrained to this designated work area. Access will be from the main entry Drive on Marina Blvd (right turn in/right turn out). An additional entry drive will be along the Northern boundary on Buena Vista Avenue. Public access will be also to the Central County Bikeway along Highway 12 at the southern boundary of the project. There will be no direct access to the gas station from the Project site.

Table 1: Assessor's parcel numbers and approximate parcel sizes for Marina Village Project.

Assessor's Parcel Number (APN)	Approximate size (acres)
0032-441-020	0.95
0032-441-030	0.22
0032-441-050	0.48
0032-441-060	0.53
0032-441-070	0.53
0032-441-080	0.08
0032-441-090	0.71
0032-441-100	0.10
0032-441-110	1.80
Total	5.4 acres

METHODS

On August 31, 2020, senior wildlife biologist Steve Kohlmann, PhD., CWB surveyed the property to identify potential wetlands, or special status species habitats that may be present on the Project site. In addition, we reviewed the updated Solano Habitat Conservation Plan (HCP) database (SCWA 2019), which incorporates California Natural Diversity Data Base (CNDDB; CDFW 2020) records and the California Native Plant Society (CNPS 2020) rare plant database, to locate records of special-status species and habitats known to occur within a 1-mile radius of the property. The 1-mile search area was used since the Project site is small in area, primarily surrounded by urban development, and is within the City's urban growth boundary. We also reviewed the USFWS Species List (Appendix 1) the biological assessment for the extension of Railroad Avenue from Marina Boulevard to Main Street (Hunting Environmental 2017) for species and habitats that may be present on this adjacent site.

RESULTS AND DISCUSSION

Existing Conditions

Location

The Project site is located at a vacant parcel at an unassigned address along Marina Boulevard, within the urban growth boundary of Suisun City, Solano County. The Project site's elevation ranges 5-10 feet above MSL (Figure 2). It is zoned as "Mixed Use" in the current Suisun City General Plan (City of Suisun City 2015). The Project site is located near the western boundary of the former Brennan – Fairfield Suisun Air Park. The airpark was established as an auxiliary airfield in 1944 and was an irregularly-shaped grass field, with a 3,500 foot unpaved runway, and a few small buildings on the southeast corner (near today's Sunset Avenue). The airfield was closed in 1961. Since then, the Project site has been vacant land, and appears to have been mowed frequently. The site is shown on the U.S. Geological Survey (USGS) US Topo 7.5-minute map for Fairfield South, CA

Topography and Soils

The Project site is a flat lot with a substrate of imported fill and compacted natural soil. The underlying native soils are Capay silty clay loams and Clear Lake clay, saline, drained. The native soils are poorly drained with slow to very slow permeability. The water table is reported to be at depths of 4 to 10 feet in the late summer.

Land Cover

The Project site is surrounded by urban habitat on all sides. Urban habitat is characterized by the presence of highly disturbed and developed land. These areas contain the developed residential areas to the east and north of the Project site, the existing gas station and Highway 12 to the south and southwest, and Marina Blvd on the western boundary. Beyond Marina Blvd on the western boundary, the habitat is ruderal grassland (Hunting Environmental 2017). Vegetation present in the urban areas includes ornamental trees, shrubs and herbaceous species, many of them potentially invasive.

The Project site consist of predominantly ruderal grassland, and some bare ground caused by walking trails and vehicle tracks. Ruderal grasslands are typically dominated by invasive species. The Project site is highly disturbed and shows evidence of routine mowing. Dominant species within the ruderal grassland include foxtail barley (*Hordeum murinum*), Italian ryegrass (*Festuca perennis*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), wild oats (*Avena fatua*), yellow starthistle (*Centaurea solstitialis*), redstem stork's bill (*Erodium cicutarium*), and perennial pepperweed (*Lepidium latifolium*) near the gas station. Aside from a white mulberry tree (*Morus alba*) along the lot boundary with the gas station, there are no shrubs or trees on the Project site.

The presence of perennial pepperweed and of green grass behind the gas station during the August 31 field survey indicates higher soil moisture. No evidence of wetland hydrology (prolonged standing water, algal mats, soil crust, etc.) were observed in this area. Examination of soil test pits found no evidence of hydric soil characteristics in the upper 18 inches of the soils. As such this area was not identified as a wetland. The source of this late season moisture has not been positively determined, but appears to originate from anthropogenic irrigation from the gas station/convenience market landscaping.

The site is mowed at least annually for weed abatement and has multiple trails and vehicle tracks going through it. The site is littered with heavy trash accumulation (Figure 3).

Wildlife

No special-status species were observed on the property during the August 31, 2020 field survey. Wildlife species observed on or near the Project site included northern mockingbird (*Mimus polyglottos*), Eurasian collared doves (*Streptopelia decaocto*) and American crow (*Corvus brachyrhynchos*). These species are typical of disturbed open habitats and/or vegetated urban areas in Solano County. No raptor nests were observed near the property. There was no evidence of burrowing mammals, such as California ground squirrel (*Otospermophilus beecheyi*) or Botta's pocket gopher (*Thomomys bottae*), on the property. Burrows of these mammals provide habitat such as underground shelter for other animals, including special-status species such as the burrowing owl (*Athene cunicularia*). In addition, no evidence of California voles (*Microtus californicus*) such as runways or burrows was found on the property; this this species is an important prey item for many raptors in Solano County.

Potential Impacts to Biological Resources

The following CEQA checklist summarizes potential impacts from the proposed Project on biological resources on the Project site. Each item is addressed in detail on the following pages.

Topics	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact	Not Applicable
Biological Resources Would The Project:					
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?	☐	☐	☐	☒	☐

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans,

policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The CNDDB (CDFW 2020) lists 10 plant species and 15 animal species occurrences within 1 mile of the Project site (Table 2, Figure 4); the CNPS lists 15 rare plant species (Table 2). Of the rare animal species vernal pool crustaceans have been found on the adjacent property to the west, south of Railroad Avenue (Hunting Environmental 2017). Two vernal pools on that site potentially have been reported by Hunting Environmental (2017) to provide potential habitat for the Federally listed vernal pool fairy shrimp (*Branchinecta lynchi*), and conservancy fairy shrimp (*Branchinecta conservatio*), and vernal pool tadpole shrimp (*Lepidurus packardi*). California linderiella (*Linderiella occidentalis*) has been listed in the CNDDB for that property. However, the Marina Village Project site has no vernal pools present and hence there is no suitable habitat for these vernal pool species. Any project activities on the Project site will occur at a distance of over 1500 feet from existing vernal pools and thus are unlikely to affect their habitat or hydrology.

Only two special-status plant species, Contra Costa goldfields (*Lasthenia conjugens*) and soft bird's beak (*Chloropyron molle ssp. molle*) are federally endangered species with CNDDB occurrences within 1 mile of the Project site. The remainder of special-status species have a California rare plant rank of 1B, meaning that they are rare, threatened, or endangered throughout their range and many are endemic to California. Impacts to any of these species would be considered significant under CEQA. However, these species would not be expected to occur on the Project site because it has been disturbed by mowing, tilling, grading and imported fill and there is no suitable vernal pool, wetland or coastal marsh habitat present within the Project site. Based on these conditions it is unlikely that the property would support populations of any of the special-status plants shown in Table 2. In addition, since the property is located within an urban developed landscape and frequently disturbed by mowing and vehicle access, the natural dispersal of propagules from rare plant populations in other parts of Solano County is unlikely to occur on this property

Table 2: Special-Status Species Occurring within 1 Mile of the Project Site

Common Name/ Scientific Name	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank	CDFW Status	Habitat	Potential to Occur
Plants								
Alkali milk-vetch *Astragalus tener var. tener*	None	None	G2T1	S1	1B.2		Playas, Valley and foothill grassland (adobe clay), Vernal pools	No suitable habitat
Vernal pool smallscale *Atriplex persistens*	None	None	G2	S2	1B.2		Vernal pools (alkaline)	No suitable habitat
Pappose tarplant *Centromadia parryi ssp. parryi*	None	None	G3T2	S2	1B.2		Often alkaline soils, marshes and swamps, valley and foothill grasslands (vernally mesic).	No suitable habitat
Soft Bird's beak *Chlorpyron molle ssp molle*	Endangered	CR	G2T1	S1	1b.2		Coastal Marsh	No suitable habitat
Bolander's water-hemlock *Cicuta maculata var. bolanderi*	None	None	G5T4T5	S2?	2B.1		Marshes and swamps Coastal, fresh or brackish water	No suitable habitat
Suisun thistle *Cirsium hydrophilum var. hydrophilum*	Endangered	None	G2T1	S1	1B.1		Marshes and swamps (salt)	No suitable habitat
Mt. Diablo buckwheat *Eriogonum truncatum*	None	None	G1	S1	1B.1		Chaparral, Coastal scrub, Valley and foothill grassland	No suitable habitat
San Joaquin spearscale *Extriplex joaquinana*	None	None	G2	S2	1B.2		Chenopod scrub, Meadows and seeps, Playas, Valley and foothill grassland	No suitable habitat
Contra Costa goldfields *Lasthenia conjugens*	Endangered	None	G1	S1	1B.1		Cismontane woodland, Playas (alkaline), Valley and foothill grassland, Vernal pools	No suitable habitat
Delta tule pea *Lathyrus jepsonii var. jepsonii*	None	None	G5T2	S2	1B.2		Marshes and swamps (freshwater and brackish)	No suitable habitat
Mason's lilaeopsis *Lilaeopsis masonii*	None	CR	G2	S2	1B.1		Marshes and swamps (brackish or freshwater), Riparian scrub	No suitable habitat

Common Name/ Scientific Name	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank	CDFW Status	Habitat	Potential to Occur
California alkali grass *Puccinellia simplex*	None	None	G3	S2	1B.2		Chenopod scrub, Meadows and seeps, Valley and foothill grassland, Vernal pools	No suitable habitat
Long-styled sand-spurrey *Spergularia macrotheca var. longistyla*	None	None	G5T2	S2	1B.2		Meadows and seeps, Marshes and swamps	No suitable habitat
Suisun Marsh aster *Symphyotrichum lentum*	None	None	G2	S2	1B.2		Marshes and swamps (brackish and freshwater).	No suitable habitat
Saline clover *Trifolium hydrophilum*	None	None	G2	S2	1B.2		Salt marshes, open areas in alkaline soils, alkaline grassland.	No suitable habitat
Crustaceans								
California linderiella *Linderiella occidentalis*	None	None	G2G3	S2S3			Vernal pools	No suitable habitat
Vernal pool tadpole shrimp *Lepidurus packardi*	Endangered	None	G4	S3S4			vernal pool or other seasonally ponded habitats	No suitable habitat
Vernal pool fairy shrimp *Branchinecta lynchi*	Threatened	None	G3	S3			Vernal Pools	No suitable habitat
Conservancy fairy shrimp *Branchinecta conservatio*	Endangered	None	G2	S2			Vernal pools	No suitable habitat
Fishes								
Longfin smelt *Spirinchus thaleichthys*	Candidate	Threatened	G5	S1			Coastal lagoons, bays, estuaries, sloughs, tidal freshwater streams and offshore	No suitable aquatic habitat
Mammals								
Hoary bat *Lasiurus cinereus*	None	None	G5	S4			foliage of mature deciduous and coniferous trees, forages near the edge of open areas.	No suitable roosting habitat
Salt-marsh harvest	Endangered	Endangered	G1G2	S1S2		FP	Pickleweed (Salicornia), salt marshes,	No suitable habitat

Common Name/ Scientific Name	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank	CDFW Status	Habitat	Potential to Occur
mouse *Reithrodontomys raviventris*								
Suisun shrew *Sorex ornatus sinuosus*	None	None	G5T1T2Q	S1S2		SSC	Tidal marshes, brackish marshes dominated by California bulrush and common cattail.	No suitable habitat
Birds								
Burrowing owl *Athene cunicularia*	None	None	G4	S3		SSC	Grasslands,	No suitable nesting habitat (burrows), marginal foraging habitat present.
California Clapper Rail *Rallus longirostris obsoletus*	Endangered	Endangered	G5T1	S1		FP	Tidal and brackish marshes with unrestricted daily tidal flows	No suitable habitat
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	None	None	G5T3	S3		SSC	woody swamp, brackish marsh, and freshwater marsh	No suitable habitat
Swainson's hawk *Buteo swainsoni*	None	Threatened	G5	S3			Open and semi-open country – deserts, grasslands and prairies – hayfields, and pastures, tied very closely to the distribution of various small mammals.	Marginal foraging habitat present site
Suisun song sparrow *Melospiza melodia maxillaris*	None	None	G5T3	S3		SSC	Tidal marshes in Suisun Bay, dense vegetation is required for nesting sites, song perches, and cover for refuge from predators.	No suitable habitat

Most of the CNDDB records for Mason's lilaeopsis, Suisun marsh aster, salt marsh common yellowthroat, Suisun song sparrow and salt marsh harvest mouse are from CDFW properties at Hills Slough Wildlife Area, south of Highway 12 near the Project site. The Hill Slough Wildlife Area has diverse and intact marsh habitats, which do not exist on the Project site. The Project site is separated from the Hill Slough Wildlife Area by a divided four-lane highway (SR 12).

The Swainson's hawk occurs widely in the lowlands of Solano County, and Swainson's hawks are known to nest in trees within industrial landscapes as long as suitable foraging habitat is located in nearby areas. The closest know Swainson's hawk nest site are approximately 3 miles from the project site. A burrowing owl record is located approximately 1 mile southwest of the project site at the western edge of Suisun City near the Train Station (CNDDB Element Occurrence Index 66386) and burrowing owls may winter on the site. While the property, itself, is not a high value foraging site for Swainson's hawks, burrowing owls, or other raptors, it could be used for by these species on an occasional basis. As such, development of the property contributes to the regional reduction of foraging habitat for Swainson's hawk and burrowing owl and may therefore require mitigation under CEQA. Mitigation for lost foraging habitat is also required under the Solano HCP once it is adopted. Mitigation of direct impacts to foraging habitat for Swainson's hawk and burrowing owl will reduce the CEQA impact category to "Less Than Significant with Mitigation Incorporation".

Mitigation for unavoidable impacts to Swainson's hawk and burrowing owl pursuant to the current draft of the Solano HCP is described in **Mitigation Measure SH MIT 2: Valley Floor Grassland Foraging Habitat Conservation,** stating that "Direct impacts to Swainson's hawk foraging habitat in the Valley Floor Grassland and Vernal Pool Conservation Area […] shall be mitigated through the preservation and management of foraging habitat at a ratio of 1:1 mitigation-to-impact. This mitigation will also meet the CDFW's mitigation measures for the loss of foraging habitat (CDFW 1994), which requires that "Projects within 5 miles of an active nest tree but greater than 1 mile from the nest tree shall provide 0.75 acres of HM land for each acre of urban development authorized (0-75:1 ratio)". Likewise, mitigation for the direct disturbance, destruction, or conversion of nesting and non-breeding/wintering burrowing owl habitat from urban development or other permanent facilities shall be provided at a minimum 1:1 ratio (**Mitigation Measure BO MIT 1: Mitigation for Direct and Indirect Impacts to Foraging Habitat)**. The same mitigation acreage can satisfy mitigation for Swainson's' hawk and burrowing owl habitat. Although, the Solano HCP exempts construction of infill developments on small, infill lots the Project site does not qualify for this exemption.

Birds protected under the California Fish and Game Code and the Migratory Bird Treaty Act (MBTA) could potentially nest on or near the property; however, as long as the project complies with provisions of the MBTA and California Fish and Game Section 3513, the project will not result in significant impacts to any protected nesting birds.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No riparian or other sensitive natural communities are present on the Project site. Coastal salt marsh alliances, which are considered sensitive natural communities, are known to occur south of the Project site within Suisun Marsh. However, since salt marsh alliances are not present on or adjacent to the Project site, the proposed project will not impact these natural communities. Low value vernal pool habitat is present west of Marina Boulevard along the railroad tracks (Hunting Environmental 2017). The Marina Village project will not affect this sensitive community.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

The proposed project is restricted to the designated work area and will not directly or indirectly affect any jurisdictional wetlands. Construction of the proposed project will direct runoff from the proposed driveways and buildings to established storm drains and potential bio-retention swales on-site. The project applicant shall follow applicable laws and regulations for erosion control and storm water management. Thus, there will be no significant impacts to federally protected wetlands.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The CDFW Biogeographic Information & Observation System (CDFW 2017a) was reviewed to determine if the project is located within an Essential Connectivity Area. The Marina Village project does not occur within an Essential Connectivity Area; therefore, the project is not likely to adversely affect migratory corridors. Connectivity to open marshland areas is severed by four lanes and the median of Highway 12. There are no wildlife nursery sites on the property. The Marina Village project will not affect wildlife movement or nursery sites of any native wildlife species.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The City of Suisun City General Plan Open Space, Conservation, and Recreation Element includes goals, policies, and programs encouraging the protection of biological resources. The primary open space, conservation, and recreation policies are related to Objective OSC-1: "Increase the number of new developments that preserve and integrate drainages and other wildlife movement into site plans." The proposed development does not conflict with this objectives and the respective policies OSC-1.1 through OSC-1.10 of the Suisun City General Plan (2015), because there are no drainages or wildlife movement corridors on the Project site.

The City of Suisun City General Plan (2015) also provides Objective OSC-2: "New development in the Planning Area supports the conservation objectives of the Solano HCP", including the following policies:

1. Policy OSC-2.1. The City will coordinate environmental review and mitigation requirements with the Solano HCP.

2. Policy OSC-2.2. The City will support the use of mitigation fees from the Solano HCP to fund preservation and restoration elements of the City's conservation and open space strategy.

3. Policy OSC-2.3. The City will require that new developments comply with relevant conservation measures detailed within the Conservation Strategy chapter of the Solano HCP, as applicable.

Development on the Project site would not conflict with any of the above policies as long as the Project adheres to the Solano HCP Conservation, Avoidance and Mitigation measures. The City will likely require mitigation for the Project's direct impact to Swainson's hawk and burrowing owl foraging habitat.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

There are no conflicts with any adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or State conservation plans. The Project site is within an area identified for development within the City's urban growth boundary in the Solano HCP's Covered Activity Zone 1 (SCWA 2019). The primary focus of the Solano HCP Swainson's Hawk Conservation Strategy involves establishing and maximizing foraging potential and nesting habitat in agricultural areas and natural habitat. The HCP has established site design avoidance measures that require protection of traditional nest sites in urban areas. Currently, the site has no active or known nest site within 3 miles. Similarly, the focus of the Burrowing Owl Conservation Strategy involves establishing and maximizing foraging potential and protecting nesting habitat in agricultural and natural habitat areas outside of city growth areas, rather than trying to protect small isolated habitat areas in urban environments. Therefore, no special site design considerations are required for the burrowing owl. However, under the Solano HCP, loss of foraging habitat for Swainson's hawk and burrowing owl must be mitigated, by establishing protected foraging habitat at a ratio of 1:1 (Impact to Mitigation). However, the Solano HCP, of which the City of Suisun is a Plan Participant, has not yet been adopted.

Summary

- The Project site is surrounded by transportation corridors (i.e., residential roads and highway) and urban development. It is located within the City's urban growth boundary.

- The proposed project will not affect natural marshland or vernal pool communities.

- The Project site does not support habitat for special-status species or sensitive natural communities, except foraging habitat for Swainson's hawk and burrowing owl. Implementing mitigation measures (e.g., habitat conservation) will reduce the direct impacts to Swainson's hawk and burrowing owl habitat to "less than significant.

- Implementing appropriate conservation measures for erosion control during construction, rehabilitating soils, and establishing bio-retention swales will avoid potential impacts to water quality.

If you have any questions, please feel free to contact me at 510/236-6810, or by email at steve.kohlmann@lsa.net.

LSA Associates, Inc.

Steve Kohlmann, PhD, CWB
Associate/Wildlife Biologist

Attachment: Figure 1: General Project Location
Figure 2: Project Site Location and Planned Development
Figure 3: Site Photos
Figure 4: Special-Status Species Occurrences within 1 Mile of the Project Site

LITERATURE CITED

California Department of Fish and Wildlife, 1994 Staff Report Regrading Mitigation for Impacts to Swainson's hawks (*Buteo swainsoni*) in the Central Valley of California. Nongame Bird and Mammal Section report # 94-18. Available online at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83992&inline#:~:text=Since%20over%2095%25%20of%20Swainson's,urban%20development%20and%20other%20changes

_______2020. California Natural Diversity Data Base (CNDDB). CDFW, Sacramento, California. Online at https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data#43018408-cnddb-in-bios.

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MAPS AND FIGURES

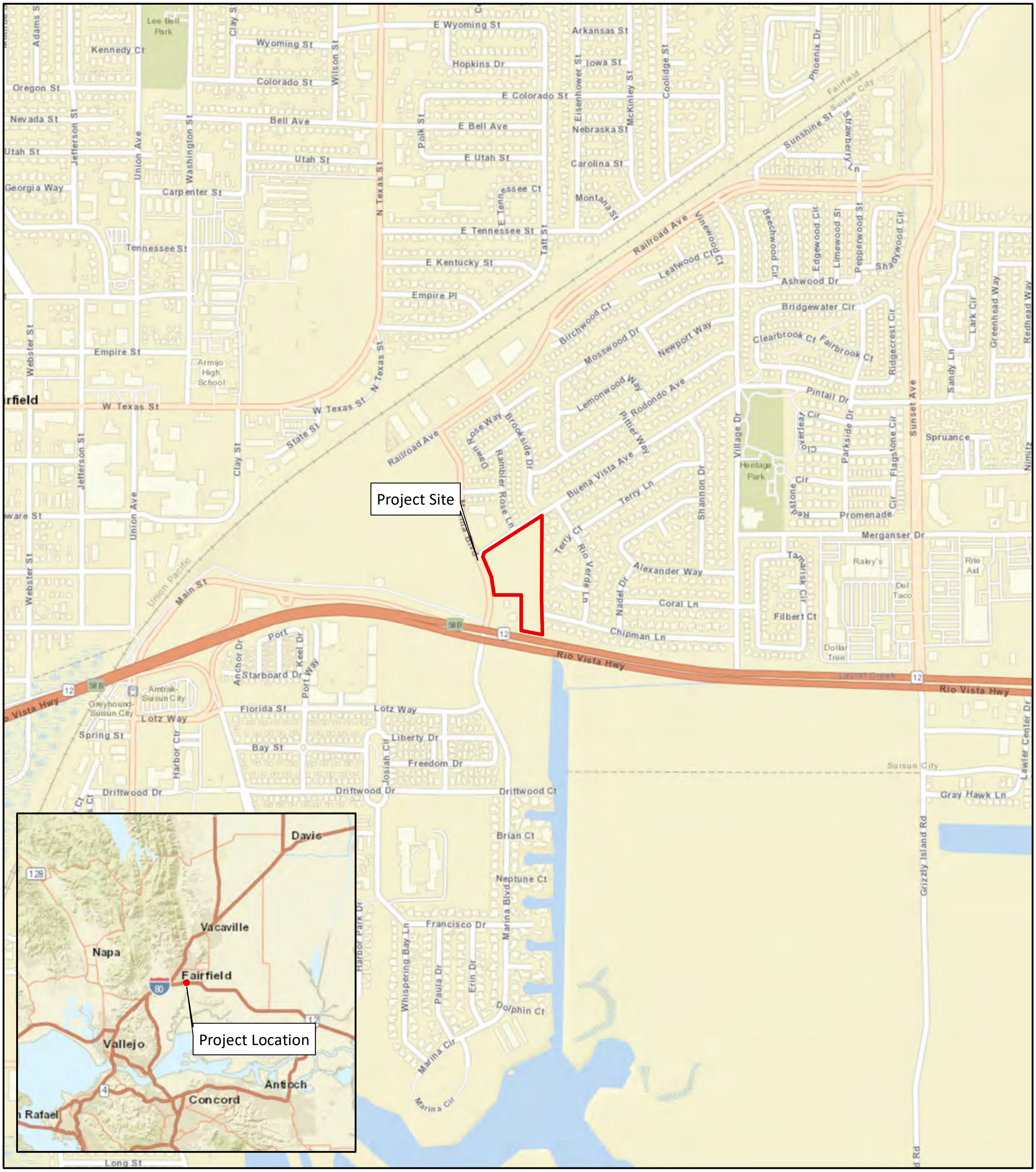


FIGURE 1

0 500 1000

FEET

Solano Affordable Housing Foundation
Marina Village Project
Suisun City, Solano County, California
Project Location and Vicinity

SOURCE: ESRI World Street Map (03/20).

I:\SHF2001\GIS\Maps\Figure 1_Project Location and Vicinity.mxd (9/4/2020)

LSA

LEGEND

Project Site

FIGURE 2

N

0 500 1000
FEET

Solano Affordable Housing Foundation
Marina Village Project
Suisun City, Solano County, California

Project Site

SOURCE: SOURCE: Google Maps Sat (05/2020).

I:\SHF2001\GIS\Maps\Figure 2_Project Site.mxd (9/10/2020)


View from North


Trash along eastern fence line


View from south


Green vegetation east of the gas station

Figure 3: Site Photos

LSA

LEGEND

Project Site

1-Mi Buffer of Project Site

CNDDB Occurrences

0 1000 2000

FEET

Solano Affordable Housing Foundation
Marina Village Project
Suisun City, Solano County, California

CNDDB Occurrences within
1 Mile of Project Site

SOURCE: SOURCE: CDFW CNDDB (08/2020).

I:\SHF2001\GIS\Maps\CNDDB\CNDDB_1Mi_2020-09.mxd (9/4/2020)

APPENDIX 1: USFWS LIST OF THREATENED AND ENDANGERED SPECIES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: September 03, 2020
Consultation Code: 08ESMF00-2020-SLI-2810
Event Code: 08ESMF00-2020-E-08616
Project Name: Marina Village affordable housing

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2020-SLI-2810

Event Code: 08ESMF00-2020-E-08616

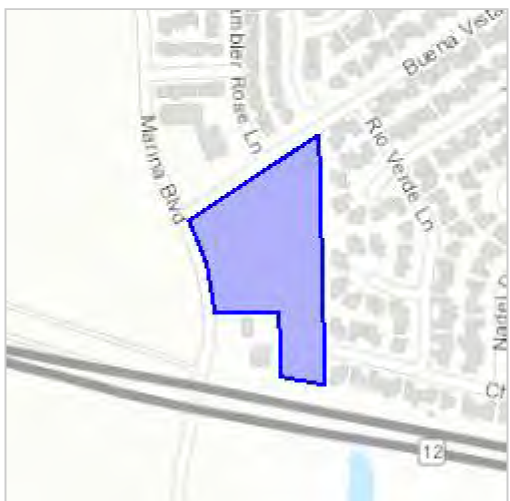
Project Name: Marina Village affordable housing

Project Type: DEVELOPMENT

Project Description: 5.2 acres of affordable housing development on a vacant lot in Suisun City. The development will consist of 216 residential units and 180 parking stalls.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/38.245830497151005N122.0307822714496W



Counties: Solano, CA

Endangered Species Act Species

There is a total of 18 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Salt Marsh Harvest Mouse *Reithrodontomys raviventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/613	Endangered

Birds

NAME	STATUS
California Clapper Rail *Rallus longirostris obsoletus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/205/office/11420.pdf	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
Callippe Silverspot Butterfly *Speyeria callippe callippe* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3779	Endangered
Delta Green Ground Beetle *Elaphrus viridis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2319	Threatened
San Bruno Elfin Butterfly *Callophrys mossii bayensis* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3394	Endangered
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/436/office/11420.pdf	Threatened

Crustaceans

NAME	STATUS
California Freshwater Shrimp *Syncaris pacifica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7903	Endangered
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Contra Costa Goldfields *Lasthenia conjugens* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7058	Endangered
Santa Cruz Tarplant *Holocarpha macradenia* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6832	Threatened
Soft Bird's-beak *Cordylanthus mollis ssp. mollis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8541	Endangered
Suisun Thistle *Cirsium hydrophilum var. hydrophilum* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2369	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

ATTACHMENT 4.6

Energy, Total Construction-Related and Operational Gasoline Usage,
ECORP Consulting, Inc., September 2021

Proposed Project
Total Construction-Related and Operational
Gasoline Usage

Table 1. Construction Year One (2021)			
Action	**Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]**	**Conversion of Metric Tons to Kilograms[2]**	**Construction Equipment Emission Factor[2]**
Project Construction	167	167,000	10.15
Total Gallons Consumed During Construction Year One (2021):			**16,453**

Table 2. Construction Year Two (2022)			
Action	**Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]**	**Conversion of Metric Tons to Kilograms[2]**	**Construction Equipment Emission Factor[2]**
Project Construction	554	554,000	10.15
Total Gallons Consumed During Construction Year Two (2022):			**54,581**

Table 3. Construction Year Three (2023)			
Action	**Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]**	**Conversion of Metric Tons to Kilograms[2]**	**Construction Equipment Emission Factor[2]**
Project Construction	247	247,000	10.15
Total Gallons Consumed During Construction Year Three (2023):			**24,335**

Notes:
Fuel used by all construction equipment, including vehicle hauling trucks, assumed to be diesel.
[1]Per CalEEMod Output Files found in Air Quality and Greenhouse Gas Emissions Assessment
[2]Per Climate Registry Equation 13e

Sources:
[1]ECORP Consulting. 2021. Air Quality and Greenhouse Gas Emissions Assessment: Marina Village Apartments
[2]Climate Registry. 2016. *General Reporting Protocol for the Voluntary Reporting Program version 2.1.* January 2016.
http://www.theclimateregistry.org/wp-content/uploads/2014/11/General-Reporting-Protocol-Version-2.1.pdf

Table 4. Average Miles per Gallon in Butte County in 2020 [3]								
Area	**Sub-Area**	**Cal. Year**	**Season**	**Veh_tech**	**EMFAC 2021 Category**	**Total Onroad Vehicle Gallons Consumed in Butte County in 2020**	**Total Onroad Vehicle Miles Traveled in Butte County in 2020**	**Total Passenger Vehicle Miles per Gallon in Butte County in 2020**
Sub-Areas	Butte County	2022	Annual	All Vehicles	All Vehicles	200,969,970	3,880,924,266	19.3

Sources:
[3]California Air Resource Board. 2021. EMFAC2021 Mobile Emissions Model.

Table 5. Total Gallons During Project Operations				
Project Onroad Vehicle Daily Trips[4]	**Estimated Miles per Trip[4]**	**Project Onroad Vehicle Daily Miles Traveled**	**Project Onroad Vehicle Daily Fuel Consumption**	**Project Onroad Vehicle Annual Fuel Consumption**
870	7.1	6,177.00	319.87	**116,753**

Sources:
[4]CalEEMod 2020.4.0

ATTACHMENT 4.7

Geotechnical Investigation: Marina Village, 201 Marina Boulevard, Suisun City, California
Geocon Consultants, Inc., April 2021

GEOTECHNICAL INVESTIGATION

Marina Village
201 Marina Boulevard
Suisun City, California

PREPARED FOR:

SOLANO AFFORDABLE HOUSING FOUNDATION
1411 OLIVER ROAD, SUITE 220
FAIRFIELD, CALIFORNIA 94534

PREPARED BY:

GEOCON CONSULTANTS, INC.
2480 HILBORN ROAD, SUITE 240
FAIRFIELD, CALIFORNIA 94534

GEOCON PROJECT NO. E9251-04-01 **APRIL 2021**

Project No. E9251-04-01
April 23, 2021

Solano Affordable Housing Foundation
1411 Oliver Road, Suite 220
Fairfield, California 94534

Attention: Mr. Carlton Randle

Subject: MARINA VILLAGE
201 MARINA BOULEVARD
SUISUN CITY, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Dear Mr. Randle:

In accordance with your authorization, we have performed a geotechnical investigation for the subject affordable housing project in Suisun City, California. Our investigation was performed to observe the soil and geologic conditions that may impact site development for the project as presently planned. The accompanying report presents the results of our investigation and conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The findings of this study indicate the site is suitable for development as planned provided the recommendations of this report are implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

A. E. Ashour

Andre E. Ashour, PE
Senior Project Engineer

Shane Rodacker, GE
Senior Engineer

(1/e-mail) Addressee

TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the planned Marina Village affordable housing project in Suisun City, California (Vicinity Map, Figure 1). The purpose of this investigation was to evaluate the subsurface soil and geologic conditions in the planned development and provide conclusions and recommendations pertaining to the geotechnical aspects of project design and construction, based on the conditions encountered during our study.

The scope of this investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Our field exploration consisted of six soil borings drilled on March 4, 2021 to depths ranging from approximately 5 to 30 ½ feet, and four Cone Penetrometer Tests (CPTs) advanced on March 1, 2021 to a depth of about 50 feet. The locations of our explorations are depicted on the Site Plan, Figure 2. A detailed discussion of our field investigation, boring and CPT profiles are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent geotechnical parameters. In addition, two soil samples were submitted to our laboratory for screening-level corrosion testing. Appendix B presents the laboratory test results in tabular format and graphical format. Appendix C presents output from our liquefaction analysis.

The opinions expressed herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

The approximately 5.2-acre site comprises 7 contiguous parcels at the eastern corner of the intersection of Marina Boulevard and Buena Vista Avenue in Suisun City. The site is currently undeveloped and covered with grasses that are mowed or tilled seasonally as a fire control measure. The site is relatively flat with ground surface elevations of approximately 10 feet MSL per web-based mapping. Development in the site vicinity is mostly single-family residential.

Per the provided plans, we understand that construction of a 160-unit housing community including leasing offices is planned. The community will include new wood-framed apartments up to three stories in height with no subterranean levels. The conceptual layout of the proposed development is depicted on the Site/Development Plan, Figure 2. We anticipate the apartment buildings and leasing office will utilize conventional shallow footings and slab-on-grade or post-tension mats for foundation support. Landscaping, at-grade asphalt parking and driveways, exterior flatwork, underground utilities, and other improvements necessary for the site development are also expected.

Grading plans were not available at the time of this report. We have assumed cuts and fills to establish design subgrade elevation will be approximately 2 feet or less throughout the site.

3. GEOLOGIC SETTING

Suisun City is located at the western margin of the Great Valley Geomorphic Province of California, more commonly known as the Central Valley. The valley is a broad lowland between the Sierra Nevada to the east and Coast Ranges to the west. The Central Valley has been filled by a sequence of deep alluvial deposition derived from weathering processes in surrounding mountain ranges and foothills. The weathering and subsequent deposition within the valley has resulted in alluvial deposits that can be thousands of feet in thickness. Available geologic mapping by the United States Geological Survey (USGS) indicates the site is underlain by Holocene age alluvial deposits.

4. SEISMICITY AND GEOLOGIC HAZARDS

Geologists and seismologists recognize the San Francisco Bay Area as one of the most seismically active regions in the United States. The significant earthquakes that occur in the Bay Area are associated with crustal movements along well-defined active fault zones that generally trend in a northwesterly direction.

The site and greater Bay Area are seismically dominated by the presence of the active San Andreas Fault System. In the theory of plate tectonics, the San Andreas Fault System is a transform fault that forms the boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). Locally, the movement is distributed across a complex system of strike-slip, right lateral parallel and subparallel faults, which include the San Andreas, Hayward and Green Valley faults, among others.

The table below presents approximate distances to active faults within approximately 25 miles of the site based on web-based mapping by CGS, as previously published by Caltrans. WGS 84 site coordinates are N 38.2462°, W 122.0309°.

TABLE 4.1
REGIONAL FAULT SUMMARY

Fault Name	Approximate Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
Great Valley 5	3 ¾	6.6
Great Valley 04b	5 ¼	6.7
Cordelia	6	6.5
Green Valley	7 ¼	6.8
Los Medanos – Roe Island	12	6.8
Contra Costa Shear Zone	13 ¼	6.5
Concord	13 ½	6.6
West Napa	14 ¼	6.6
Clayton	19	6.9
Great Valley 6	21 ½	6.8
Hayward (North)	25	7.3

Faults tabulated above and many others in the Bay Area are sources of potential ground motion. However, earthquakes that might occur on other faults within the northern California area are also potential generators of significant ground motion and could cause ground shaking at the site.

4.1 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards. No active or potentially active faults are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. By CGS definition, an active fault is one with surface displacement within the last 11,000 years. A potentially active fault has demonstrated evidence of surface displacement with the past 1.6 million years. Faults that have not moved in the last 1.6 million years are typically considered inactive.

4.2 Ground Shaking

We used the USGS web-based *Unified Hazard Tool* to estimate the peak ground acceleration (PGA) and mean and modal (most probable) magnitude associated with a 2,475-year return period that corresponds to an event with 2 percent chance of exceedance in 50 years. The USGS estimated PGA is 0.73 g and the mean magnitude is 6.7 for Seismic Site Class D (V_s30 = 259 m/sec) based on a recent 2014 model within the application.

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

4.3 Liquefaction

The site is not located within a State of California Seismic Hazard Zone for liquefaction since no such zones have been established in Solano County. However, the Solano County General Plan indicates high liquefaction potential at the site. Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary loss of shear strength due to pore pressure buildup under the cyclic shear stresses associated with intense earthquakes. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile.

We assessed the potential for liquefaction using the computer software program *CLiq* (Version 2.2.0.35, Geologismiki) and the in-situ soil parameters measured in the CPT soundings. The software applied the methodology of Boulanger and Idriss (2014) to the CPT data to evaluate liquefaction potential and estimate resultant settlements. Our analysis considered the potential for cyclic softening in clayey soils and incorporated an earthquake moment magnitude (M_w) of 6.7. Based on USGS seismic design criteria for 2019 CBC, a ground motion/Peak Ground Acceleration (PGA) of 0.72g was used in our analysis.

Our liquefaction analysis identified potentially liquefiable layers at each CPT location. In general, these layers are located approximately between 10 and 35 feet below existing grade. Consequences of liquefaction can include ground surface settlement, ground loss (sand boils) and lateral slope displacements (lateral spreading). For liquefaction-induced sand boils or fissures to occur, pore water pressure induced within liquefied strata must exert enough force to break through overlying, non-liquefiable layers. Based on methodology recommended by Youd and Garris (1995), which advanced original research by Ishihara (1985), a capping layer of non-liquefiable soil can prevent the occurrence of sand boils and fissures. Based on the presence of the non-liquefiable layer that mantles the site and the depth and locations/intervals to significant liquefiable layers, the potential for ground loss due to sand boils or fissures in a seismic event is considered low.

Based on the depth to potentially liquefiable layers and the generally flat topography in the site vicinity, the potential for lateral spreading is considered low.

The likely consequence of potential liquefaction at the site is settlement. Our analysis indicates that total ground surface settlements approximately 2 inch or less may result from liquefaction and/or cyclic softening after a design-level seismic event. We recommend that foundations be designed to accommodate approximately 1½ inch or less of differential seismic settlement across a horizontal distance of 50 feet. Output from our liquefaction analysis is presented in Appendix C.

4.4 Landslides

There are no known landslides near the site, nor is the site in the path of any known or potential landslides. We do not consider the potential for a landslide to be a hazard to this project.

4.5 Tsunamis and Seiches

The site is not subject to inundation from a tsunami per the Solano County General Plan. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically induced seiche is considered unlikely.

5. SOIL AND GROUNDWATER CONDITIONS

5.1 Alluvium

Our soil borings encountered Holocene age alluvial deposits from the ground surface to the maximum depths explored– approximately 30 ½ feet below existing grade. The alluvium generally consists of soft to stiff lean to fat clay with various amounts of sand, silt and gravel and loose to medium dense silty sand. Below the depth of our soil borings, our CPT soundings indicated generally stiff to hard clay/silty clay with interbedded loose to dense sandy layers to the maximum depths explored – approximately 50 feet below existing grade.

Based on our laboratory test results, the surficial clays possess borderline medium to high plasticity and moderate to high expansion potential.

5.2 Groundwater

Groundwater was initially encountered in our Borings B1, B3, and B4 at depths ranging from approximately 17 feet and 19 feet below grade during our field exploration. Actual groundwater levels will fluctuate seasonally and with variations in rainfall, temperature and other factors and may be higher or lower than observed during our study.

5.3 Soil Corrosion Screening

Soil samples obtained during our field exploration were subjected to laboratory testing for minimum resistivity, pH, and chloride and water-soluble sulfate. We performed soil corrosion potential screening by conducting laboratory testing on two near-surface soil samples. The laboratory test results and published screening levels are presented in Appendix B. Soil corrosivity should be considered in the design of buried metal pipes, underground structures, etc.

Water-soluble sulfate test results on selected samples of site soils indicate an S0 exposure classification for sulfate attack on normal portland cement concrete (PCC) as defined in Chapter 318, Table 19.3.1.1 of the ACI *Building Code Requirements for Structural Concrete*. ACI does not set forth requirements for S0 sulfate exposure classification. In addition, neither of the soil samples tested would be classified as corrosive to buried metal improvements based on Caltrans criteria.

Geocon does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 It is our opinion that neither soil nor geologic conditions were encountered during our investigation that would preclude the project as presently proposed.

6.1.2 Primary geotechnical considerations are the presence of expansive nature of the native alluvium, the potential for liquefaction-induced settlement, and strong seismic shaking. Proper soil moisture conditioning, compaction and surface drainage are recommended to reduce the shrink-swell potential of the site soils. A layer of low-expansive material will be required beneath interior slabs-on-grade, or post-tensioned foundation systems should be used for the planned structures.

6.1.3 Unknown underground improvements and additional areas of undocumented fill materials may be present. Any undocumented fill may contain constituents not reported herein. If undocumented fills or existing improvements are encountered, supplemental recommendations will be provided during site development.

6.1.4 Based on the assumed structural loading, we anticipate the planned apartment buildings and leasing office can be supported on post-tensioned mat foundations or conventional shallow footings.

6.1.5 As discussed in Section 4.3, the site is susceptible to liquefaction. Our analysis indicates that, if liquefaction and/or cyclic softening were to occur, total ground surface settlements would be approximately 2 inches or less. We recommend the project be designed to accommodate at least 1½ inch of seismically induced settlement over a distance of 50 feet.

6.1.6 Provided the site is graded in accordance with the recommendations of this report and foundation systems are constructed as described herein, we estimate that post-construction settlement due foundation loads will be approximately ¾ inch and corresponding differential settlement will approximately ½ inch across a horizontal distance of 50 feet.

6.1.7 All references to relative compaction and optimum moisture content in this report are based on the latest edition of ASTM D 1557.

6.1.8 The conclusions and recommendations provided in this report are based on our review of the referenced literature, analysis of data obtained from our field exploration and laboratory testing program, and our understanding of the proposed development at this time. Any changes in the design, location or elevation of the proposed improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

6.1.9 We should be retained to review the project plans as they develop further, provide engineering consultation as needed, and perform geotechnical observation and testing services during construction.

6.2 Seismic Design Criteria

6.2.1 We understand that seismic structural design will be performed in accordance with the provisions of the 2019 CBC which is based on the American Society of Civil Engineers (ASCE) publication *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-16). We derived the following seismic design parameters using the web-based Structural Engineers Association of California application *U.S. Seismic Design Maps*. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE_R) and Seismic Risk Category II.

TABLE 6.2.1
2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.594g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.558g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.0	Table 1613.2.3(1)
Site Coefficient, F_V	1.742*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.594g	Section 1613.2.3 (Eq. 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.972g*	Section 1613.2.3 (Eq. 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.063g	Section 1613.2.4 (Eq. 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.648g*	Section 1613.2.4 (Eq. 16-39)

Note:
*Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions where ground motion hazard analysis may be waived. Using the code-based values presented in the table above, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed in project design.

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-16 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
2019 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.651g	Figure 22-7
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.717g	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil and Excavation Characteristics

6.3.1 Based on the soil conditions encountered in our exploratory borings, the onsite soils can be excavated with moderate effort using conventional excavation equipment. We do not anticipate the native alluvium at the site will generate oversize material (greater than 6 inches in nominal dimension).

6.3.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

6.3.3 The existing soils encountered at the site are "expansive" as defined by 2019 CBC. The recommendations of this report assume proposed foundation systems will derive support in properly compacted fills and/or competent alluvial soils.

6.4 Materials for Fill

6.4.1 Excavated soils generated from cut operations at the site are suitable for use as engineered fill in structural areas provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension.

6.4.2 If needed, import or low-expansive fill material should be primarily granular with a " low" expansion potential (Expansion Index less than 50), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock larger than 6 inches in greatest dimension. It should be assumed that soils excavated from the site do not meet the requirements for low-expansive fill. Low-expansive fill may also consist of aggregate base, or lime-treated native soils. We should perform additional analyses to determine the percent lime required to mitigate the expansion potential of the native soils. Approximately 5 percent quicklime (by weight) should be assumed for estimating purposes. Lime treatment would require an initial application and mixing followed by a subsequent mixing and compaction operation approximately 24 hours later. Care should be taken to contain lime-treatment operations such that lime is not applied to areas where vegetation is planned.

6.4.3 Environmental characteristics and corrosion potential of import soil materials may also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

6.5.1 All clearing operations and earthwork (including over-excavation, scarification, and re-compaction) should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon. All earthwork should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.

6.5.2 Structural building pad areas should be considered as areas extending a minimum of 5 feet horizontally beyond the outside dimensions of buildings, including footings and overhangs carrying structural loads, where not restricted by property boundaries.

6.5.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance. Special soil handling requirements can be discussed at that time.

6.5.4 The site should be stripped of all surface vegetation from the area to be developed/graded. All active or inactive utilities within the construction area should be protected, relocated, or abandoned. Any pipelines to be abandoned that less than 18 inches in diameter should be removed or filled with sand-cement slurry. Utilities larger than 18 inches in diameter should be removed. Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.5 After stripping, the exposed subgrade in building pad areas should then be over-excavated to a depth of approximately 1 foot. The exposed bottom should be scarified 8 to 12 inches moisture conditioned to at least 2% above optimum moisture and recompacted to at least 88% relative compaction.

6.5.6 In general, over-excavated materials may be used for new engineered fill provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension. Over-excavations and the exposed bottom surfaces and bottom processing should be observed by our representatives.

6.5.7 All structural fill and backfill should be placed in layers no thicker than will allow for adequate bonding and compaction (typically 8 to 12 inches). Where native clays are used for the fill, the materials should be moisture conditioned to at least 2% above optimum moisture content, and compacted to at least 88% relative compaction. Fills derived from import or low-expansive materials should be compacted to at least 90% relative compaction near optimum moisture.

6.5.8 If grading commences in winter or spring, or in periods of precipitation, excavated and in-place soils may be wet. Earthwork contractors should be aware of potential compaction/workability difficulties. The most effective site preparation alternatives will depend on site conditions prior to and during grading operations; we should evaluate site conditions at those times and provide supplemental recommendations, if necessary.

6.6 Shallow Foundations

6.6.1 Shallow strip foundations (footings) founded in competent native soil or engineered fill may be used for the planned apartment buildings and leasing office, as well as ancillary site structures such as short retaining walls, screen walls, or trash enclosures.

6.6.2 We recommend that conventional continuous footings have a minimum embedment depth of 24 inches below lowest adjacent compacted pad grade. The footings should be at least 12 inches wide Footings proportioned as recommended may be designed for an allowable soil bearing pressure of 2,500 pounds per square foot (psf). The allowable bearing pressure is for dead + live loads may be increased by up to one-third for transient loads due to wind or seismic forces.

6.6.3 The allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The allowable coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided that the frictional resistance is reduced by 50%.

6.6.4 Minimum reinforcement for continuous footings should consist of four No. 5 steel reinforcing bars; two placed near the top of the footing and two near the bottom.

6.6.5 The foundation dimensions and minimum reinforcement recommendations presented herein are based upon soil conditions only and are not intended to be in lieu of those required for structural purposes.

6.6.6 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

6.6.7 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Our representative should observe all footing excavations prior to placing reinforcing steel.

6.6.8 Where shallow foundation systems are designed and constructed as recommended herein, post-construction settlement due to dead + live loads should be approximately ¾ inch or less with differential settlement of approximately ½ inch or less over 50 feet.

6.7 Post-Tensioned Foundations

6.7.1 Post-tensioned foundations may be used to support the proposed apartments and leasing office and should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI), Third Edition. The post-tensioned design should incorporate the geotechnical parameters presented on the table below. The parameters presented are based on the guidelines presented in the PTI, Third Edition design manual.

TABLE 6.7
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI), Third Edition Design Parameters	Recommended Value
Equilibrium Suction	3.6
Edge Lift Moisture Variation Distance, eM (feet)	4.9
Edge Lift, yM (inches)	1.58
Center Lift Moisture Variation Distance, eM (feet)	9.0
Center Lift, yM (inches)	1.13

6.7.2 To reduce potential differential movement, all post-tensioned mats should be designed for an average mat contact pressure of 350 psf for dead plus live loads; at column or wall loading, the maximum localized bearing pressure should be limited to 2,000 psf.

6.7.3 Post-tensioned foundations should be embedded in accordance with the recommendations of the structural engineer. If a post-tensioned mat foundation system is planned, the slab should possess a thickened edge with a minimum width of 12 inches. The thickened edge should extend below the crushed rock underlayment layer.

6.7.4 The thickness of post-tensioned mat foundation systems should be determined by the project structural engineer. Based on our experience with similar projects and soils conditions, we anticipate the post-tensioned slab thicknesses will be on the order of 10 to 12 inches.

6.7.5 Our experience indicates that post-tensioned slabs are susceptible to excessive edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. PTI design procedures primarily address the potential center lift of slabs but, because of the placement of the reinforcing tendons in the top of the slab, the resulting eccentricity after tensioning reduces the ability of the system to mitigate edge lift. The structural engineer should design the foundation system to reduce the potential of edge lift occurring for the proposed structures.

6.7.6 During the construction of the post-tension foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints be allowed to form between the footings/grade beams and the slab during the construction of the post-tension foundation system.

6.7.7 The use of isolated footings, which are located beyond the perimeter of the building and support structural elements connected to the building, are not recommended. Where this condition cannot be avoided, the isolated footings should be connected and tied to the building foundation system with grade beams.

6.7.8 Consideration should be given to connecting patio slabs to the building foundation to reduce the potential for future separation to occur.

6.7.9 Post-tensioned slabs should be underlain by at least 3 inches of ½-inch or ¾-inch crushed rock with no more than 5 percent passing the No. 200 sieve to serve as a capillary break.

6.7.10 Subgrade for post-tensioned foundations should be tested immediately prior to placing underlayment materials (crushed rock and vapor barrier) to verify that subgrade moisture content is appropriate.

6.7.11 Where post-tensioned foundation systems are designed and constructed as recommended herein, post-construction settlement due to dead + live loads should be approximately ¾ inch with differential settlements of less than ½ inch across a horizontal distance of 50 feet.

6.8 Concrete Slabs-on-Grade

6.8.1 Concrete slabs-on-grade subject to vehicle loading are pavements and should be designed in accordance with the recommendations in Section 6.13 of this report.

6.8.2 Concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 5 inches thick and should be underlain by at least 18 inches of low-expansive fill meeting the requirements of Section 6.4.2 to reduce the potential for slab distress due to shrink/swell in the expansive soils. The minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint. Final slab thickness and reinforcing should be specified by the project structural engineer.

6.8.3 Interior slabs should be underlain by 3 inches of ½-inch or ¾-inch crushed rock with no more than 5 percent passing the No. 200 sieve to serve as a capillary break. The rock should be subjected to several passes with a walk-behind vibrating plate compactor prior to placing rebar or slab underlayment materials. The 3 inches of crushed rock should not be counted toward the 18 inches of low-expansive fill recommended above.

6.8.4 Sidewalk, and curb and gutter should be designed and constructed in accordance with the latest City standards and details as applicable.

6.8.5 Exterior concrete flatwork, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. We recommend that at least 6 inches of Class 2 Aggregate Base (AB) compacted to at least 95% relative compaction be used below exterior concrete slabs. Prior to placing AB, the subgrade should be moisture conditioned to at least 2% over optimum and properly compacted to at least 88% relative compaction (near optimum and minimum 90% compaction if subgrade comprises low-expansive import or lime-treated native soils).

6.8.6 Crack control joints should be spaced at intervals not greater than 8 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. The project structural engineer should design construction joints as necessary.

6.8.7 Construction joints that abut building foundations should include a felt strip, or approved equivalent, that extends the full depth of the exterior slab. Exterior slabs should be structurally independent of building foundations except at doorways. Where vertical offset is not desirable, dowels are typically used.

6.8.8 The recommendations of this report are intended to reduce the potential for cracking of slabs. However, even with the incorporation of these recommendations, concrete flatwork may exhibit some cracking due to soil movement and/or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.8.9 The slab dimensions and minimum reinforcement recommendations presented herein are based upon soil conditions only and are not intended to be used in lieu of those required for structural purposes.

6.8.10 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.9 Slab-on-Grade Moisture Protection Considerations

6.9.1 A vapor barrier is not required beneath slab-on-grade for geotechnical purposes. Further, the migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.

6.9.2 A vapor barrier meeting ASTM E 1745-09 Class C requirements may be placed directly below the slab, without a sand cushion. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) should be used. The vapor barrier, if used, should extend to the edges of the slab, and should be sealed at all seams and penetrations.

6.9.3 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.

6.9.4 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.10 Temporary Excavations

6.10.1 The native alluvium can be considered a Type B soil in accordance with OSHA guidelines. Where free water, sandy or cohesionless soils or undocumented fills are encountered the materials should be downgraded to Type C. The contractor should have a "competent person" as defined by OSHA evaluate all excavations. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping and possibly shoring.

6.10.2 It is the contractor's responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.

6.11 Retaining Wall Design

6.11.1 Lateral earth pressures may be used in the design of retaining walls and buried structures. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. Table 6.11 summarizes the weights of the equivalent fluid based on the different design conditions.

TABLE 6.11
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active	60 pcf
At-Rest	80 pcf

6.11.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.01H (where H is the height of the wall). The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area.

6.11.3 Unless project-specific loading information is provided by the structural engineer, where vehicle loads are expected atop the wall backfill, an additional uniform surcharge pressure equivalent to 2 feet of backfill soil should be used for design. Where the vehicle loading will be limited to passenger cars, the additional uniform surcharge equivalent may be reduced to 1 foot of backfill soil.

6.11.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

6.11.5 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

6.12 Underground Utilities

6.12.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than six inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding eight inches and should be compacted to at least 90% relative compaction at least 2% above optimum moisture content (near optimum where backfill materials are predominantly sands and gravels). Where/if native clayey soils are permitted as backfill above the pipe zone, the materials should be compacted to at least 88% compaction at least 2% above optimum moisture content.

6.12.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to a minimum of 6 inches above the crown of the pipe. Pipe bedding material should consist of crushed aggregate, clean sand or similar open-graded material. Proposed bedding and pipe zone materials should be reviewed by Geocon prior to construction; open-graded materials such as ¾ inch drain rock may require wrapping with filter fabric to mitigate the potential for piping. Pipe bedding and backfill should also conform to the requirements of the governing utility agency.

6.12.3 Utility trenches backfilled with granular material (including pipe bedding material) may serve as conduits for groundwater and may cause pumping, seepage or other undesirable effects at the lower ends of trench lines. Consideration should be given to constructing “trench plugs” at periodic intervals along utility line alignments to reduce those potential problems. Trench plugs should be located where the utility trench enters the perimeter of a structural area. Trench plugs may consist of compacted native clay soil or concrete. Trench plug material should completely surround the pipe and be in contact with the undisturbed walls and bottom of the trench. The length of soil trench plugs should be on the order of one to two feet. The geotechnical engineer should review the placement and design of trench plugs prior to plan finalization.

6.13 Pavements

6.13.1 The upper 12 inches of pavement subgrade should be scarified and reworked, moisture conditioned to at least 2% above optimum and compacted to at least 92% relative compaction (at least 95% relative compaction and near optimum if import materials or lime-treated native soil is present at subgrade. Prior to placing aggregate base, the finished subgrade should be proof rolled with a laden water truck (or similar equipment with high contact pressure) to verify stability.

6.13.2 We recommend the following asphalt concrete (AC) pavement sections for design to establish subgrade elevations in pavement areas. The project civil engineer should determine the appropriate Traffic Index (TI) based on anticipated traffic conditions. The flexible pavement sections below are based on estimated design TIs. We can provide additional sections based on other TIs if necessary.

TABLE 6.13
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

Location	Estimated Traffic Index (TI)	Alternative #1		Alternative #2		
		AC (inches)	AB (inches)	AC (inches)	AB (inches)	LTS (inches)
Parking Stalls	4.5	3	8	3	4	12
Driveways	6.0	3 ½	12 ½	3 ½	4	12
Heavy Duty	7.0	4	15 ½	4	6	12

Note: The recommended flexible pavement sections are based on the following assumptions:

1. Subgrade soil has an R-Value of 5.
2. AB: Class 2 AB with a minimum R-Value of 78 and meeting the requirements of Section 26 of the latest Caltrans Standard Specifications.
3. AB is compacted to 95% or higher relative compaction at or near optimum moisture content. Prior to placing AB, the subgrade should be proof rolled with a loaded water truck to verify stability.
4. AC: Asphalt concrete conforming to local agency standards or Section 39 of the latest Caltrans Standard Specifications.
5. LTS: Lime-treated subgrade per Section 6.4.

6.13.3 The AC sections in Table 6.13 are final, minimum thicknesses. If staged pavements are used, the construction bottom AC lift should be at least 2 inches thick. Following construction, the finish top AC lift should be at least 1½ inches thick.

6.13.4 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles, we recommend the concrete be a minimum of 6 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. In addition, doweling, reinforcing steel or other load-transfer mechanism should be provided at joints if desired to reduce the potential for vertical offset. The concrete should have a minimum 28-day compressive strength of 3,500 psi.

6.13.5 We recommend that at least 6 inches of Class 2 Aggregate Base (AB) be used below rigid concrete pavements. The aggregate base should be compacted to at least 95% relative compaction near optimum moisture content.

6.13.6 Consideration should be given to providing a thickened edge on the outside of concrete slabs subject to wheel loads. The thickened edge should be 2 inches thicker than the design slab thickness at the slab edge and taper back to the design slab thickness 3 feet behind the face of the slab.

6.13.7 In general, we recommend that concrete pavements be designed, constructed and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.13.8 Crack control joints should be spaced at intervals not greater than 12 feet for 6-inch-thick slabs and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.

6.13.9 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 6 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving. Alternatives such as plastic moisture cut-offs or modified drop-inlets may also be considered in lieu of deepened curbs.

6.13.10 The asphalt pavement section recommendations herein are based on the design procedures of Caltrans Highway Design Manual (HDM). It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The HDM indicates that the resulting pavement sections for parking lots are minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems. It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas, therefore, should be anticipated.

6.14 Surface Drainage

6.14.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

6.14.2 All site drainage should be collected and transferred to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundations or retaining walls. Drainage should not be allowed to flow uncontrolled over any descending slope. The proposed structures should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers not permitted onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed or properly drained to prevent moisture intrusion into the materials providing foundation support. Landscape irrigation within five feet of the building perimeter footings should be kept to a minimum to just support vegetative life.

6.14.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond. Final soil grade should slope a minimum of 2% away from structures.

6.14.4 We recommend implemented measures to reduce infiltrating surface water near buildings and slabs-on-grade. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 5 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers.
- Using automatic timers for irrigation systems.
- Appropriately spaced area drains.
- Hard-piping roof downspouts to appropriate collection facilities.

7. FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

7.1.1 We should review project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

7.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase and provide compaction testing and observation services and foundation observations throughout the project. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

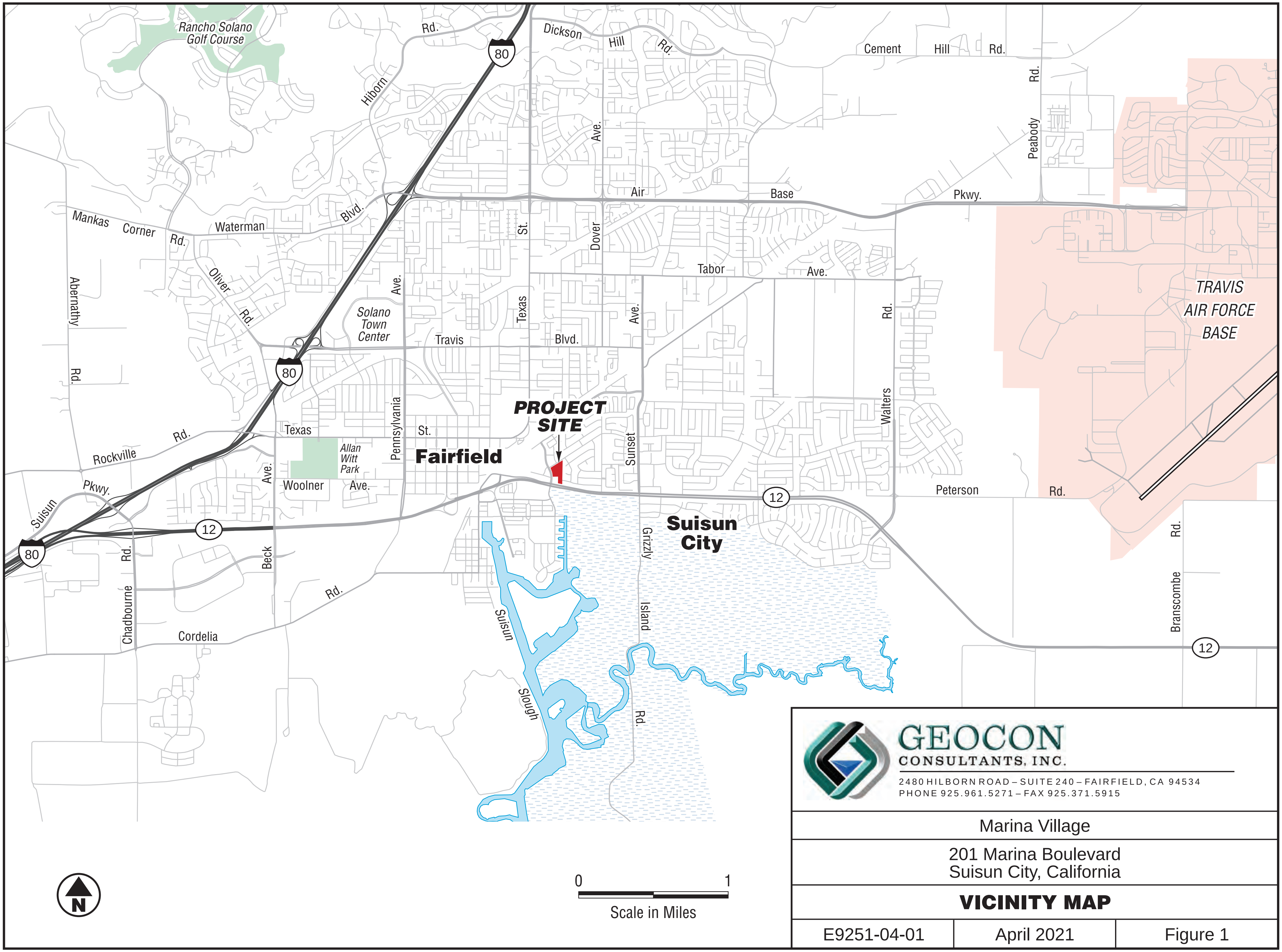
LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Consultants, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the geotechnical scope of services provided by Geocon Consultants, Inc.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.



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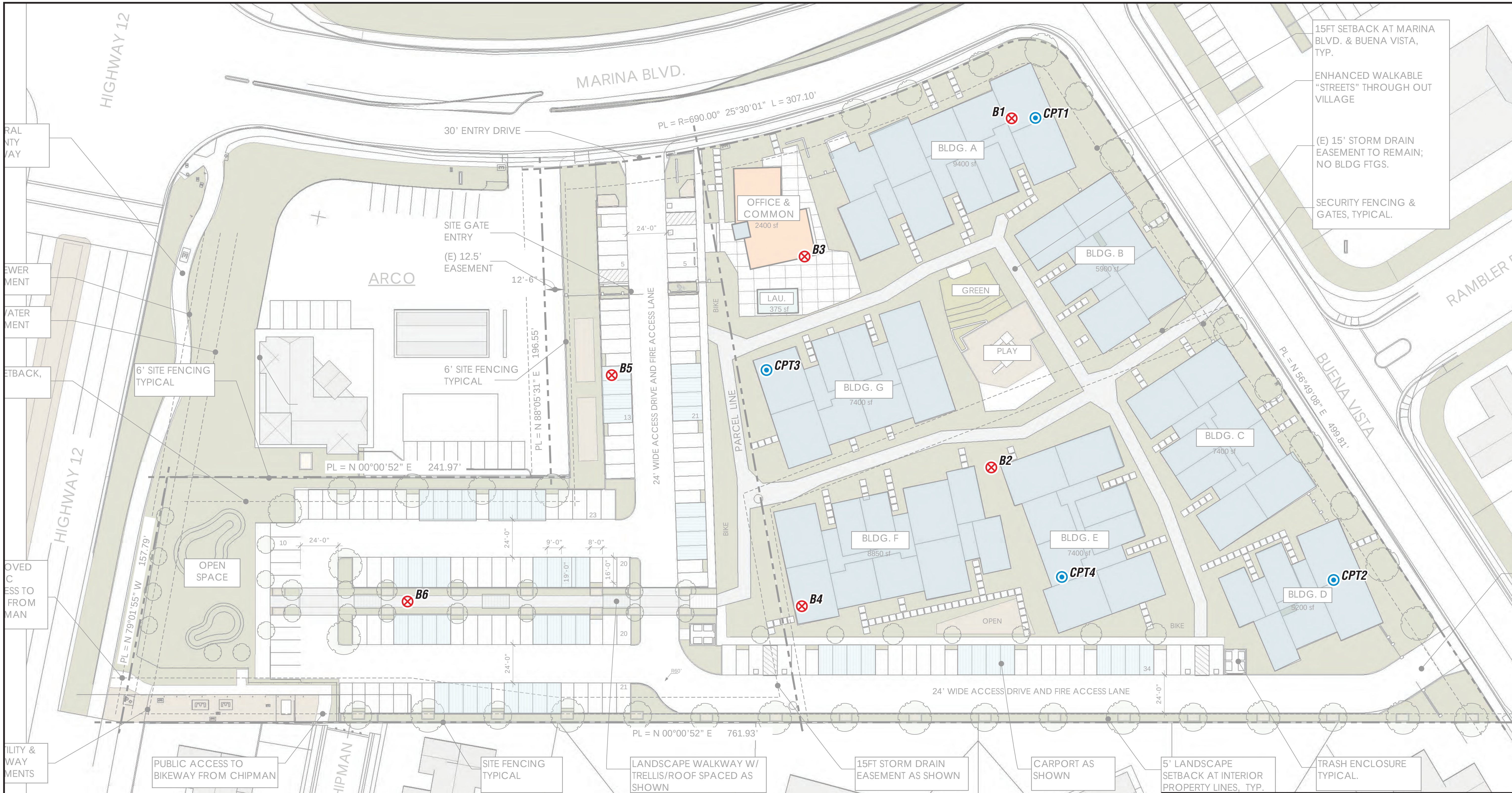
Marina Village

201 Marina Boulevard
Suisun City, California

VICINITY MAP

E9251-04-01	April 2021	Figure 1



Ref: Vrilakas I Groen Architects (12/01/2020)

LEGEND:

B1 Approximate Boring Location

CPT1 Approximate CPT Location

0 60
Scale in Feet

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SITE PLAN

E9251-04-01	April 2021	Figure 2

APPENDIX A

APPENDIX A
FIELD EXPLORATION

Fieldwork for our investigation included a site visit, subsurface exploration, and soil sampling. The locations of our exploratory borings and Cone Penetrometer Tests (CPTs) are shown on the Site Plan, Figure 2. Soil boring and CPT profiles for our exploration are presented as figures following the text in this appendix. The borings and CPTs were located by pacing from existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our field exploration included five exploratory soil borings to depths ranging from 5 to 30 ½ feet. Our borings were performed on March 4, 2021 by Cuesta Geo using a limited access track-mounted MPP LLD drill rig equipped with 6 ½ -inch O.D. hollow stem augers. Sampling in the borings was accomplished using a 140-pound auto hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT "N" values; corrections have not been applied.

Our exploration also included four CPT soundings to maximum depths of approximately 50 feet below existing grade utilizing a truck-mounted CPT rig with a down-pressure capacity of approximately 20 tons. The CPTs were performed on March 1, 2021 by Middle Earth Geo Testing using an integrated electronic cone system. The cone has a tip area of 15 square centimeters, a friction sleeve area of 225 square centimeters, and a ratio of friction sleeve area to tip end area equal to 0.8. The cone bearing (Q_c) and sleeve friction (F_s) were measured and recorded during tests at approximately 2-inch depth intervals. The CPT data consisting of cone bearing, sleeve friction, friction ratio and equivalent standard penetration blow counts (N) versus penetration depth below the existing ground surface for each location has been recorded and is presented in this appendix.

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

Upon completion, our soil borings and CPT boreholes were backfilled with cement grout in accordance with Solano County permit requirements.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TRENCH LOG LEGEND

- No Recovery
- Shelby Tube Sample
- Bulk Sample
- SPT Sample
- Modified California Sample
- Groundwater Level (At Completion)
- Groundwater Level (Seepage)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	$S<25$	DRY
SLIGHT INDICATION OF MOISTURE	$25 \le S<50$	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	$50 \le S<75$	MOIST
MINOR VISIBLE FREE WATER	$75 \le S<100$	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 5/8-INCH TO 1 FOOT	MODERATELY BEDDED
1 1/4-INCH TO 3 5/8-INCH	THINLY BEDDED
3/8-INCH TO 1 1/4-INCH	VERY THINLY BEDDED
LESS THAN 3/8-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/4-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/4-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/8-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **ONE** BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **COUPLE** BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **MANY** BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

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KEY TO LOGS

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B1

ELEV. (MSL.) ____ DATE COMPLETED **3/4/2021**

ENG./GEO. **AA** DRILLER **Cuesta Geo**

EQUIPMENT **MPP Limited Access w/ 6.5-inch HSA** HAMMER TYPE **Autohammer**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM			
1	B1-1-5				Stiff, brown, damp to moist, (f) Sandy CLAY -approximately 2-3 inches topsoil at surface			
2	B1-2.5				-trace rooting observed			
3	B1-3				-brown to dark brown, with trace gravels	17	101.1	9.6
4								
5								
6								
7	B1-6.5				-dark brown, moist, less sand, no gravel	16	106.3	18.8
8								
9								
10	B1-9.5 B1-10				-brown, more sand	13	108.4	19.2
11								
12								
13								
14								
15	B1-14.5					18	111.0	17.5
16								
17								
18			▼					
19								
20	B1-19.5 B1-20				-more sand	10		27.6
21				SM	Loose to medium dense, brown, wet, Silty (f-m) SAND			
22								
23								
24	B1-23.5-24.5				-medium dense	16		22.7
25								
26								
27								
28								
29								
30	B1-29.5-30.5				-loose, reddish-brown	8		

END OF BORING AT APPROXIMATELY 30½ FEET
GROUNDWATER INITIALLY ENCOUNTERED AT APPROXIMATELY 18½ FEET
BACKFILLED WITH NEAT CEMENT GROUT

Figure A2, Log of Boring B1, Page 1 of 1

GEOCON

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B2

ELEV. (MSL.) ______ DATE COMPLETED **3/4/2021**

ENG./GEO. **AA** DRILLER **Cuesta Geo**

EQUIPMENT **MPP Limited Access w/ 6.5-inch HSA** HAMMER TYPE **Autohammer**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	ALLUVIUM			
1					Stiff, brown to dark brown, moist, (f) Sandy CLAY with few gravels -approximately 2-3 inches topsoil			
3	B2-3				-dark brown	15		13.1
6	B2-6				-less sandy	18	104.8	15.9
11	B2-10.5				-brown	16	101.0	24.2
13	B2-13.5			SM	Loose, brown, wet, Silty SAND	13		22.5
14	B2-14			CL	Medium stiff, brown, moist, (f) Sandy CLAY			19.7

END OF BORING AT APPROXIMATELY 14½ FEET
NO FREE WATER ENCOUNTERED
BACKFILLED WITH NEAT CEMENT GROUT

Figure A3, Log of Boring B2, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9251-04-01 BORING LOGS.GPJ 04/19/21

GEOCON

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL ... STANDARD PENETRATION TEST ... DRIVE SAMPLE (UNDISTURBED)

... DISTURBED OR BAG SAMPLE ... CHUNK SAMPLE ... WATER TABLE OR SEEPAGE

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B3

ELEV. (MSL.) ____________ DATE COMPLETED **3/4/2021**

ENG./GEO. **AA** DRILLER **Cuesta Geo**

EQUIPMENT **MPP Limited Access w/ 6.5-inch HSA** HAMMER TYPE **Autohammer**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CL	Stiff, brown to dark brown, damp to moist, Sandy CLAY with (f) gravel -approximately 2-3 inches topsoil			
2	B3-2-3.5							
4	B3-4					17		11.1
5	B3-4.5				-dark brown to black, moist, no gravel		99.1	19.3
10	B3-10				-dark brown	15		
11	B3-10.5				-brown		110.1	17.7
16	B3-16				-olive-brown	14	106.9	21.5
19			▼		-moist to wet			
24				SM	Loose, brown, wet, Silty (f-m) SAND			
25	B3-24.5-25.5					8		25.8

END OF BORING AT APPROXIMATELY 25½ FEET
GROUNDWATER INITIALLY ENCOUNTERED AT APPROXIMATELY 19 FEET
BACKFILLED WITH NEAT CEMENT GROUT

Figure A4, Log of Boring B3, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9251-04-01 BORING LOGS.GPJ 04/19/21

GEOCON

SAMPLE SYMBOLS: ... SAMPLING UNSUCCESSFUL; ... STANDARD PENETRATION TEST; ... DRIVE SAMPLE (UNDISTURBED); ... DISTURBED OR BAG SAMPLE; ... CHUNK SAMPLE; ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B4

ELEV. (MSL.) ____________ DATE COMPLETED **3/4/2021**

ENG./GEO. **AA** DRILLER **Cuesta Geo**

EQUIPMENT **MPP Limited Access w/ 6.5-inch HSA** HAMMER TYPE **Autohammer**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CH	ALLUVIUM			
1					Stiff, brown to dark brown, moist, (f-m) Sandy fat CLAY with few (f) gravels			
2					-approximately 2-3 inches topsoil			
3	B4-3					15		
4					-less sand			
5								
6				CL	Stiff, dark brown, moist, CLAY with (f-m) sand			
7								
8	B4-8					16	110.4	19.5
9								
10								
11								
12								
13					-dark brown, less sand			
14					-medium stiff, brown	10		
15	B4-14.5						95.6	28.2
16								
17			▼					
18								
19	B4-19				-moist to wet	6		22.8
20	B4-19.5				-more sand, wet			22.8

END OF BORING AT APPROXIMATELY 20 FEET
GROUNDWATER INITIALLY ENCOUNTERED AT APPROXIMATELY 17 FEET
BACKFILLED WITH NEAT CEMENT GROUT

Figure A5, Log of Boring B4, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9251-04-01 BORING LOGS.GPJ 04/19/21

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B5

ELEV. (MSL.) ____________ DATE COMPLETED **3/4/2021**

ENG./GEO. **AA** DRILLER **Cuesta Geo**

EQUIPMENT **MPP Limited Access w/ 6.5-inch HSA** HAMMER TYPE **Autohammer**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CH	ALLUVIUM Stiff, dark brown, moist, (f) Sandy fat CLAY -approximately 2 inches topsoil			
1								
2	B5-2					19	115.5	15.4
3	B5-2.5-5							
4								
5					END OF BORING AT APPROXIMATELY 5 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT			

Figure A6, Log of Boring B5, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9251-04-01 BORING LOGS.GPJ 04/19/21

GEOCON

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

PROJECT NO. **E9251-04-01** PROJECT NAME: **Marina Village**

BORING B6

ELEV. (MSL.)	
DATE COMPLETED	3/4/2021
ENG./GEO.	AA
DRILLER	Cuesta Geo
EQUIPMENT	MPP Limited Access w/ 6.5-inch HSA
HAMMER TYPE	Autohammer

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				CH	ALLUVIUM Stiff, dark brown, moist, fat CLAY with sand -approximately 2 inches topsoil -brown to olive-brown, more sand			
1								
2	B6-2 B6-2.5-5					15	111.4	15.3
3								
4					-dark brown to brown			
5					END OF BORING AT APPROXIMATELY 5 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT			

Figure A7, Log of Boring B6, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9251-04-01 BORING LOGS.GPJ 04/19/21

GEOCON

SAMPLE SYMBOLS

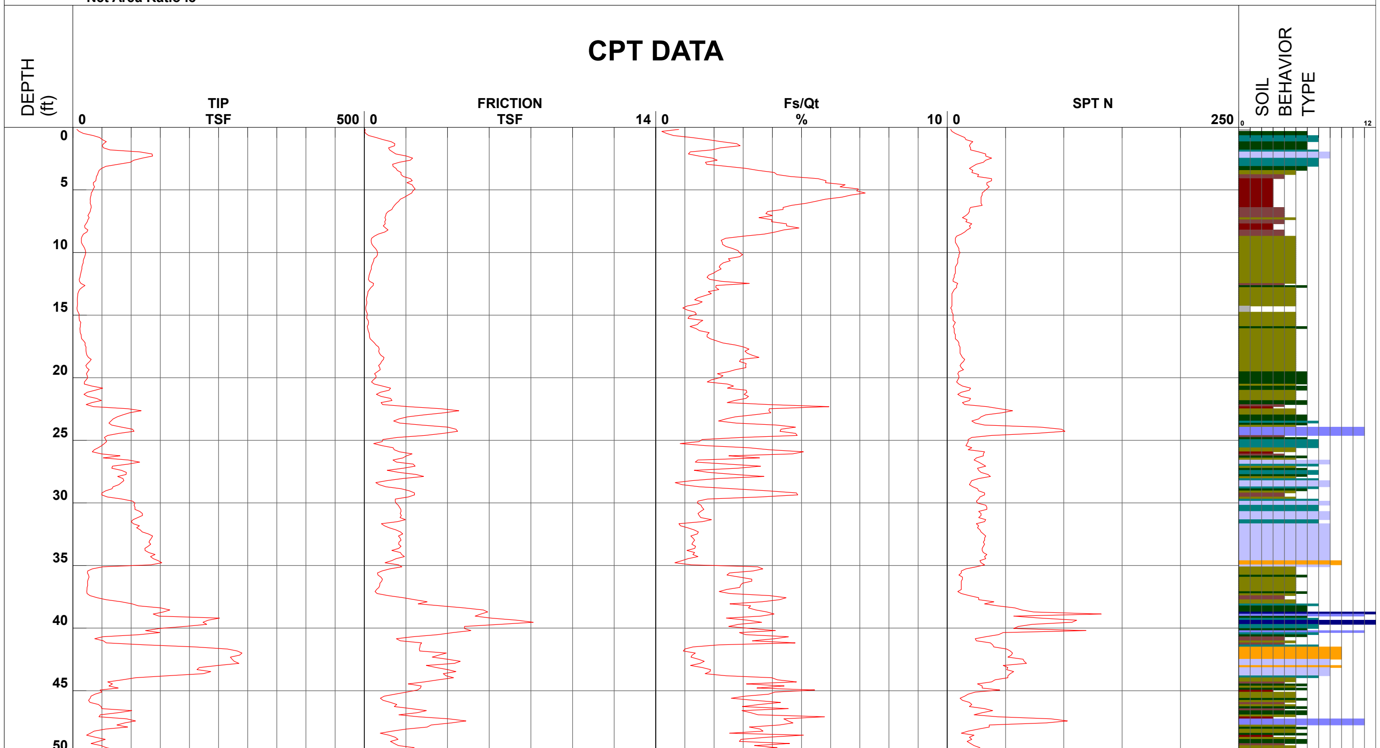
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Geocon Inc.

Project	Marina Village Housing	Operator	JM-AJ	Filename	SDF(122).cpt
Job Number	E9251-4-1	Cone Number	DDG1281	GPS	
Hole Number	CPT-01	Date and Time	3/1/2021 9:17:10 AM	Maximum Depth	50.52 ft
EST GW Depth During Test	9.00 ft				

Net Area Ratio .8



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925 371 5900 – FAX 925 371 5915

CONE PENETROMETER TEST DATA - CPT-1

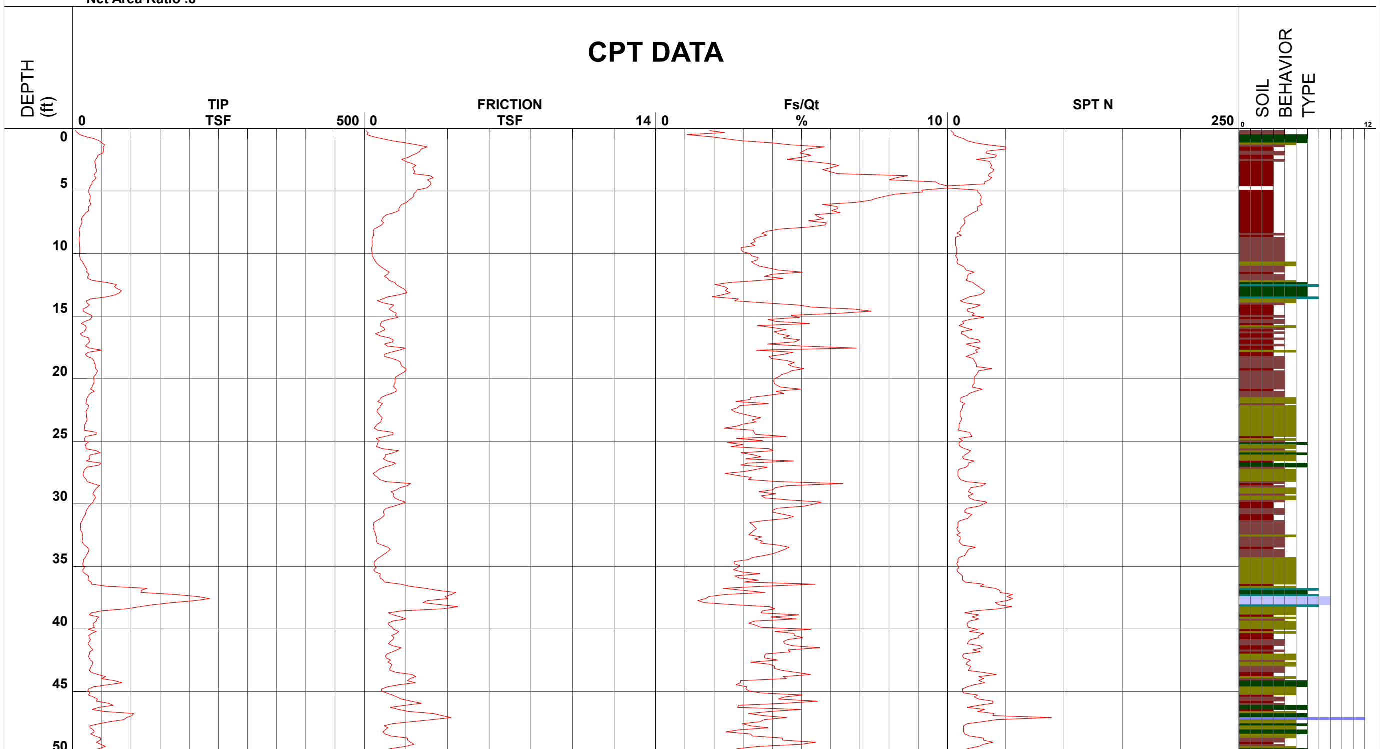
Project: Marina Village
Project No. E9251-04-01
Date: April 2021

FIGURE A8

Geocon Inc.

Project	Marina Village Housing	Operator	JM-AJ	Filename	SDF(123).cpt
Job Number	E9251-4-1	Cone Number	DDG1281	GPS	
Hole Number	CPT-02	Date and Time	3/1/2021 10:16:05 AM	Maximum Depth	50.69 ft
EST GW Depth During Test			10.00 ft		

Net Area Ratio .8



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925 371 5900 – FAX 925 371 5915

CONE PENETROMETER TEST DATA - CPT-2

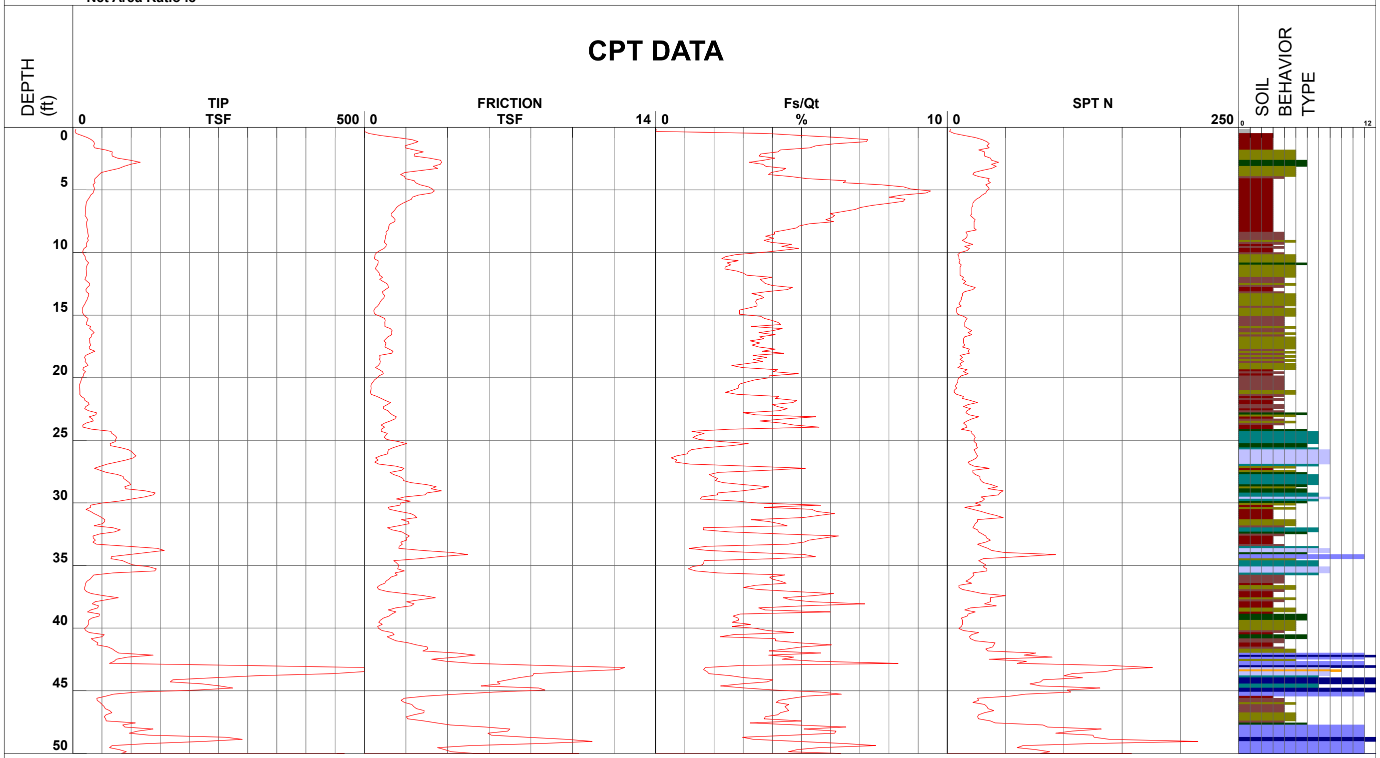
Project: Marina Village
Project No. E9251-04-01
Date: April 2021

FIGURE A9

Geocon Inc.

Project	Marina Village Housing	Operator	JM-AJ	Filename	SDF(125).cpt
Job Number	E9251-4-1	Cone Number	DDG1281	GPS	
Hole Number	CPT-03	Date and Time	3/1/2021 12:21:48 PM	Maximum Depth	50.69 ft
EST GW Depth During Test		10.00 ft			

Net Area Ratio .8



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925 371 5900 – FAX 925 371 5915

CONE PENETROMETER TEST DATA - CPT-3

Project: Marina Village
Project No. E9251-04-01
Date: April 2021

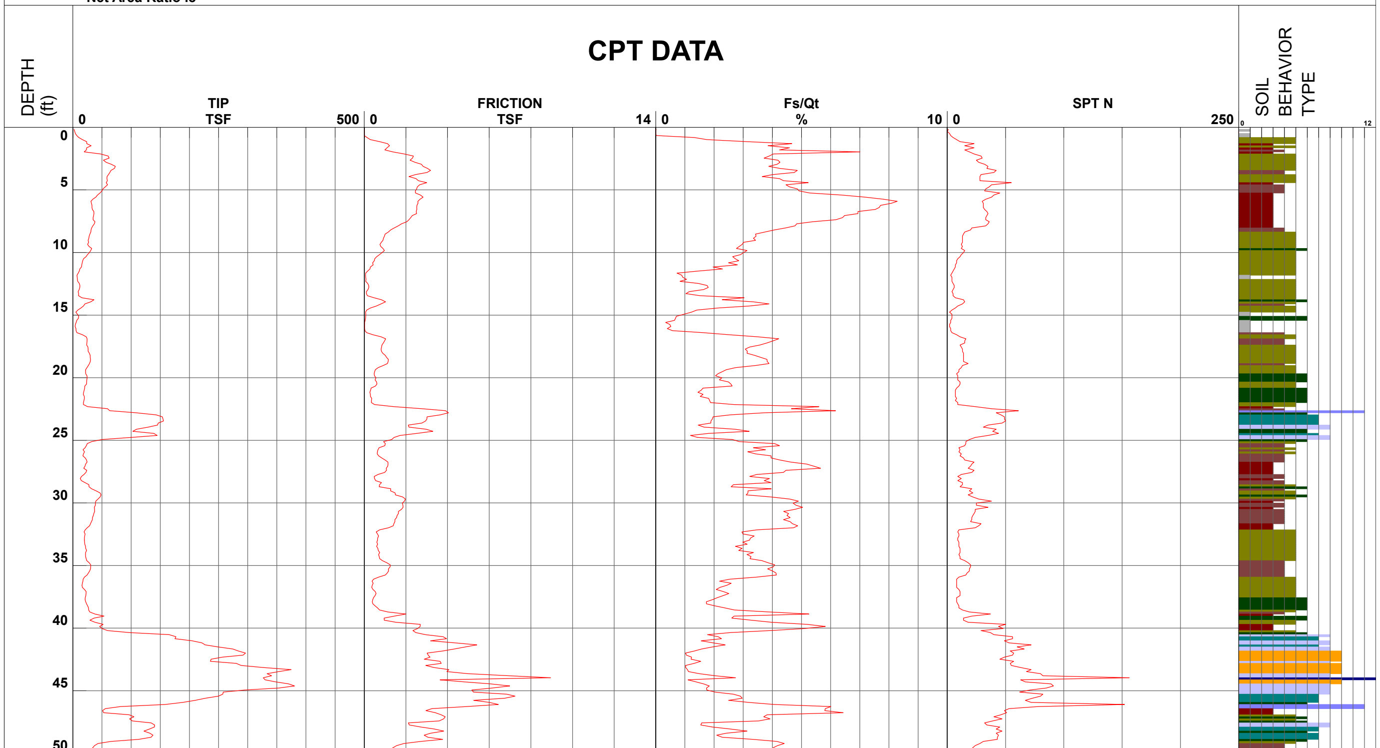
FIGURE A10

Geocon Inc.

Project	Marina Village Housing	Operator	JM-AJ	Filename	SDF(124).cpt
Job Number	E9251-4-1	Cone Number	DDG1281	GPS	
Hole Number	CPT-04	Date and Time	3/1/2021 11:41:04 AM	Maximum Depth	50.52 ft
EST GW Depth During Test		11.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925 371 5900 – FAX 925 371 5915

CONE PENETROMETER TEST DATA - CPT-4

Project: Marina Village
Project No. E9251-04-01
Date: April 2021

FIGURE A11

APPENDIX B

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for in-situ dry density and/or moisture content, grain size distribution, plasticity, expansion index, and screening-level corrosion parameters. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and moisture content test results are included on the boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
B1-2.5	35	15	20
B4-3	50	19	31
B5-2.5-5	51	19	32

TABLE B-II
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density* (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B1-1-5	11.8	24.1	103.8	74
B3-2-3.5	12.4	27.0	101.2	93

*Before saturation.

TABLE B-III
SUMMARY OF LABORATORY GRAIN SIZE ANALYSIS – NO. 200 WASH
ASTM D1140

Boring No.	Sample Depth (feet)	Fraction Passing No. 200 Sieve (%)
B01	20	57
B2	3	63
B2	14	68
B3	4	61
B3	24.5-25.5	39
B4	19.5	70

APPENDIX B
LABORATORY TESTING (continued)

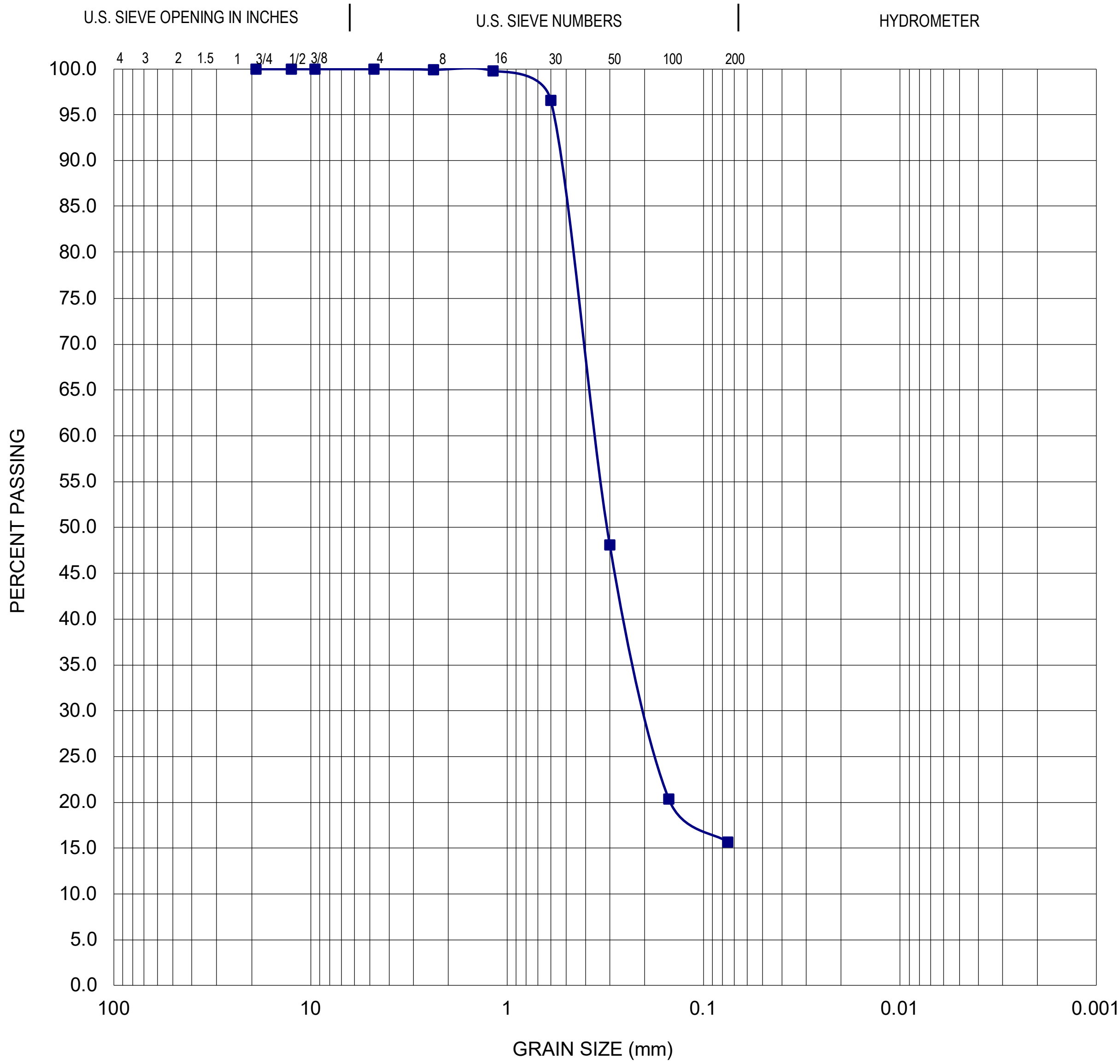
TABLE B-IV
SUMMARY OF SOIL CORROSION PARAMETERS
(CTM 643, CTM 417, CTM 422)

Boring No. (sample depth in feet)	Soil Type (USCS Classification)	Resistivity (ohm-cm)	pH	Chloride (ppm)	Sulfate (ppm)
B1-1-5	Sandy CLAY (CL)	930	7.8	72	100
B3-2-3.5	Sandy CLAY (CL)	740	7.8	62	<10

*Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples at the site:

- The pH is equal to or less than 5.5.
- Chloride concentration is equal to or greater than 500 parts per million (ppm) or 0.05%.
- Sulfate concentration is equal to or greater than 1,500 ppm (0.2%)

**According to the American Concrete Institute 318 Chapter 19, Type II cement may be used where sulfate levels are below 2,000 ppm (0.2%)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring: B1

Depth To Sample: 29.5-30.5

Sieve Date: 3/6/2021

Tested and Computed by: EH

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	100	100	100	100	99.8	96.6	48.1	20.4	15.6

Geocon Consultants, Inc.
2480 Hilborn Road, Suite 240
Fairfield, CA 94534
Telephone: (925) 961 5271

Particle Size Analysis - ASTM D422

Project: Marina Village

Location: Suisun City, CA

Project No.: E9251-04-01

Figure B1

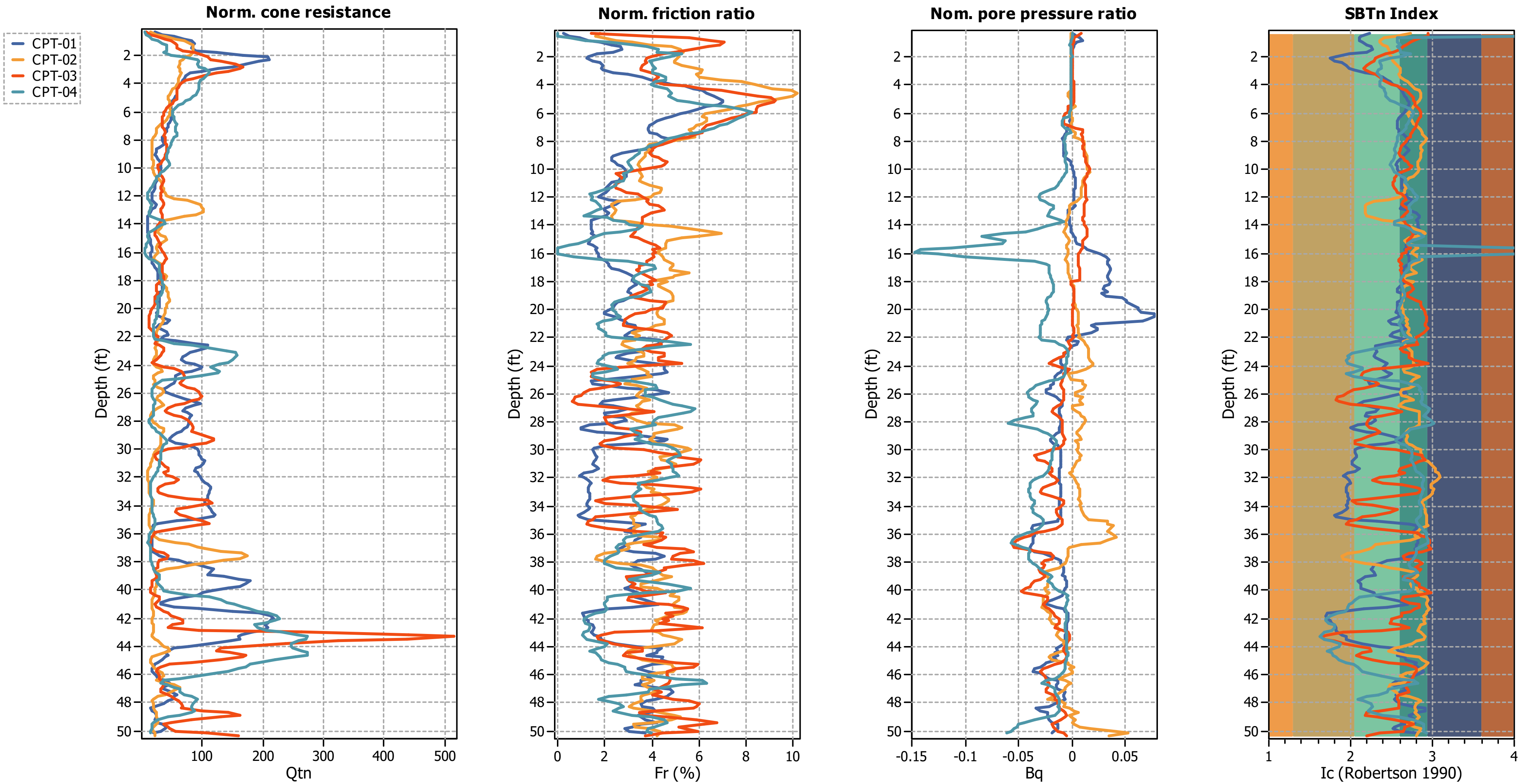
APPENDIX C

APPENDIX C
LIQUEFACTION ANALYSIS

Geocon Consultants Inc.
6671 Brisa Street
Livermore, CA 94550

Project: Marina Village

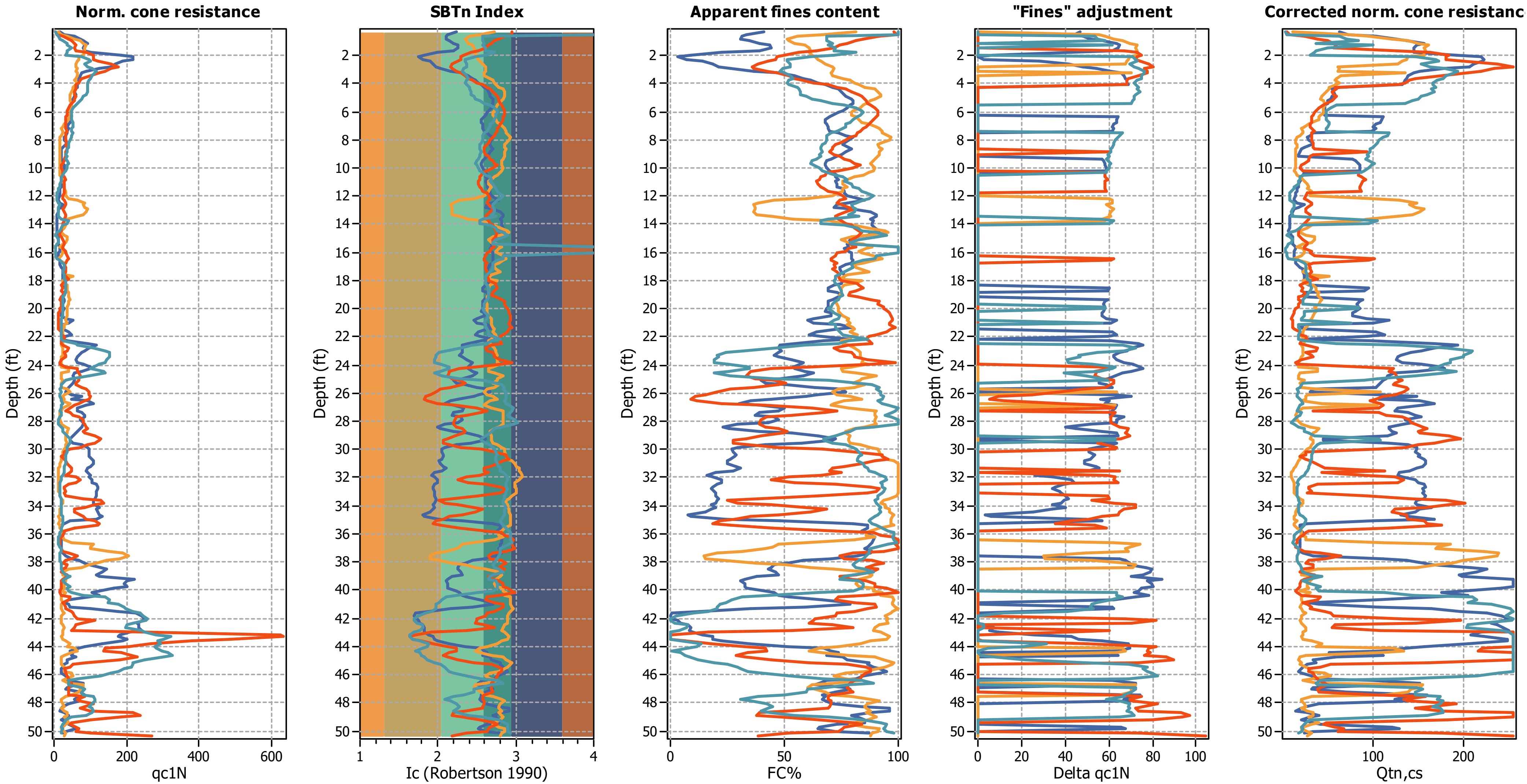
Overlay Normalized Plots



Geocon Consultants Inc.
6671 Brisa Street
Livermore, CA 94550

Project: Marina Village

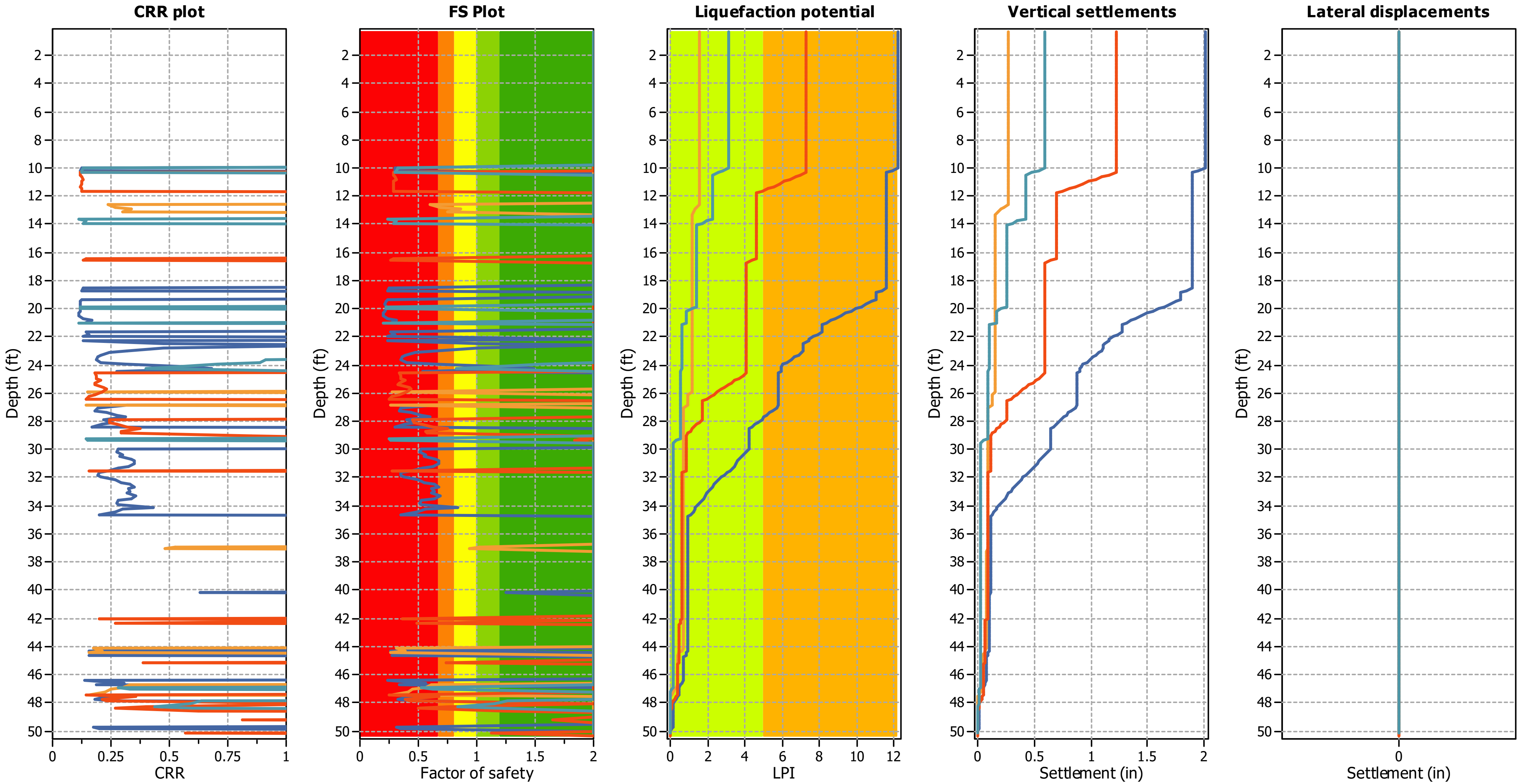
Overlay Intermediate Results



Geocon Consultants Inc.
6671 Brisa Street
Livermore, CA 94550

Project: **Marina Village**

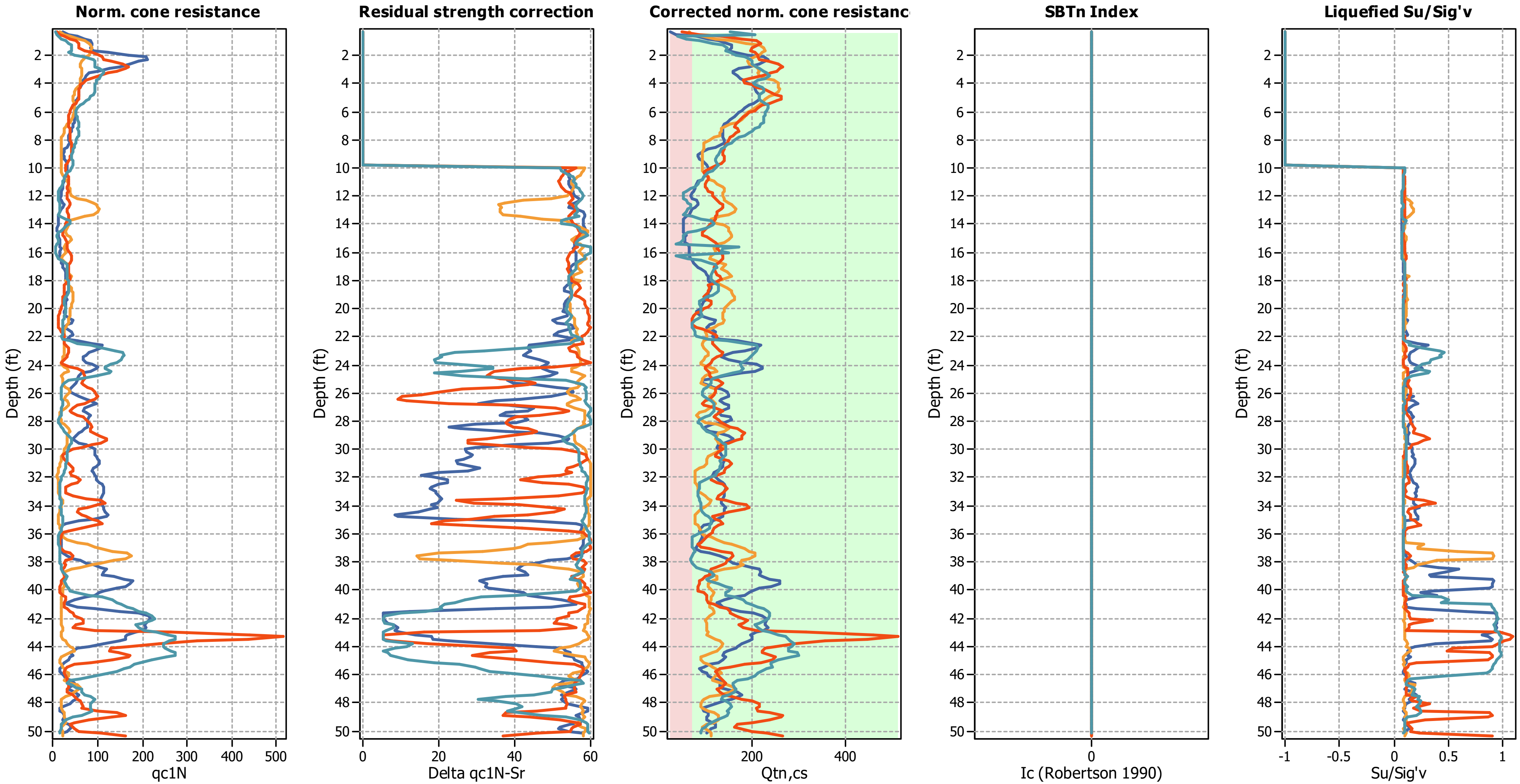
Overlay Cyclic Liquefaction Plots



Geocon Consultants Inc.
6671 Brisa Street
Livermore, CA 94550

Project: Marina Village

Overlay Strength Loss Plots



LIST OF REFERENCES

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ATTACHMENT 4.13

Noise Impact Assessment Marina Village Housing Project,
ECORP Consulting, Inc., September 2021

Noise Impact Assessment
Marina Village Housing Project

Suisun City, California

Prepared For:

City of Suisun City
701 Civic Center Boulevard
Suisun City, California 94585

Prepared By:

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS
55 Hanover Lane
Chico, CA 95926

September 2021

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Trips
Caltrans	California Department of Transportation
CBC	California Building Code
CEQA	California Environmental Quality Act
CFNR	California Northern Railroad
City	Suisun City
CNEL	Community Noise Equivalent Level
County	Solano County
dB	Decibel
dBA	Decibel is A-weighted
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
HMMH	Harris Miller, Miller & Hanson Inc.
HUD	Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
L_{eq}	Measure of ambient noise
NIOSH	National Institute for Occupational Safety and Health
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
OSHPD	Office of State Health Planning and Development
PPV	Peak particle velocity
Project	Marina Village Housing Project
RMS	Root mean square
sf	Square Foot
SR	State Route
STC	Sound Transmission Class
Vdb	Vibration Velocity Level
WEAL	Western Electro-Acoustic Laboratory, Inc.

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Marina Village – Affordable Housing Project (Project). The Project involves the construction of a 160-unit, 100 percent Affordable Housing multi-family residential apartment complex, with one additional unit proposed for management, and associated features in Suisun City, California. This report was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the City of Suisun City General Plan Public Health and Safety Element, Municipal Code and the Housing and Urban Development (HUD) noise standards. The purpose of this report is to estimate Project-generated noise and to determine the level of impact the Project would have on the environment.

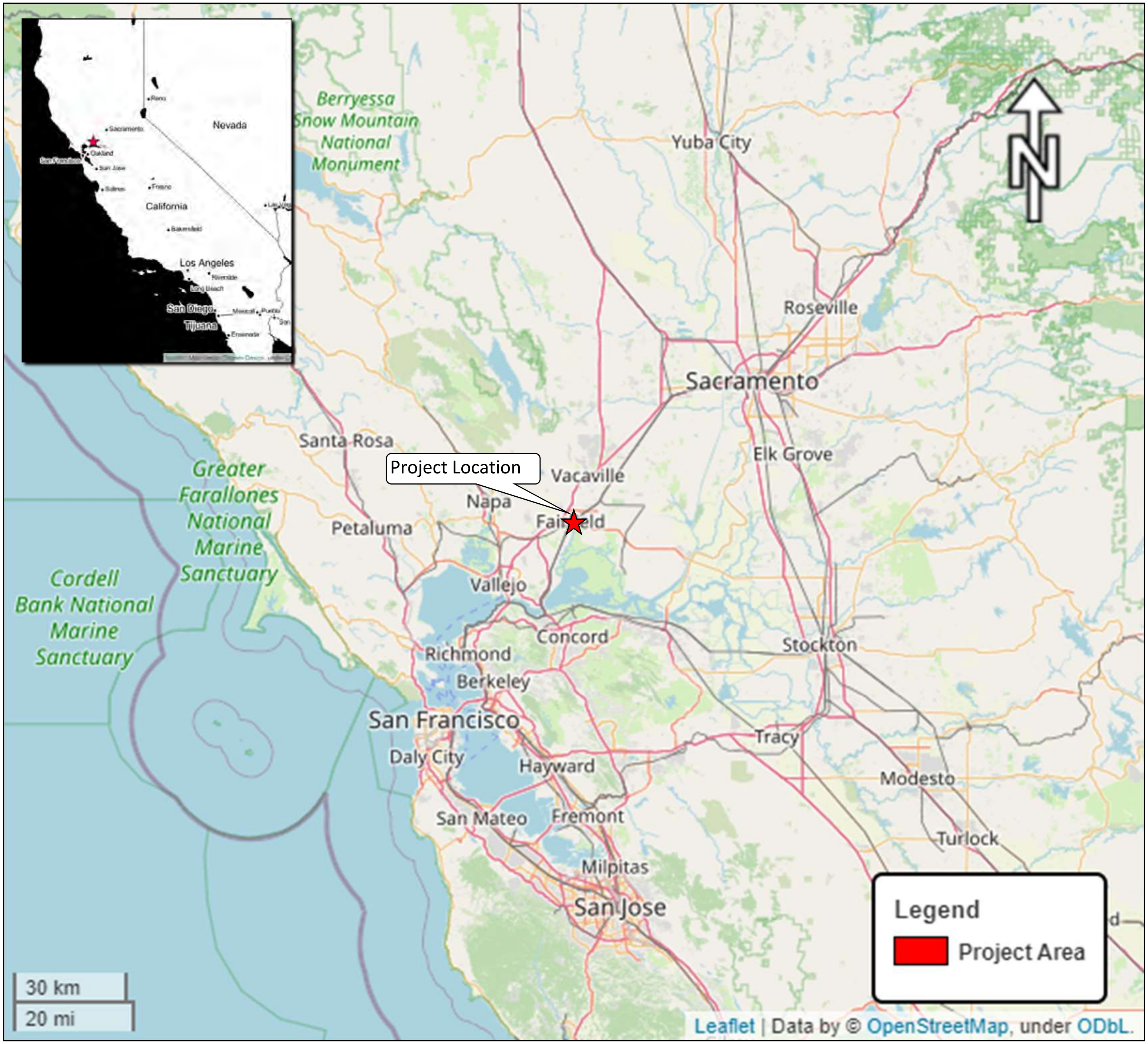
1.1 Project Location and Description

The Solano Affordable Housing Foundation proposes the development of the Marina Village – Affordable Housing Project (Project), a 160-apartment complex with eight 3-story buildings, located at 201 Marina Boulevard on a 5.2-acre vacant property within the limits of Suisun City (City) in Solano County (see Figure 1. *Regional Project Location*). The Project Site is currently vacant and located in the western portion of the City within a suburban residential area. The Project Site is bounded by Buena Vista Avenue to the north, with single-family residences and the First Christian Church beyond; single-family residences to the east, Marina Boulevard to the west, with vacant land beyond; and an ARCO AM/PM gas station, Central County Bikeway, and State Route (SR) 12 to the south, with vacant land, Suisun Slough, and single-family residences and a shopping center beyond. Additionally, the California Northern Railroad (CFNR) is about 0.25-mile northwest of the Project Site and runs parallel to Railroad Avenue (see Figure 2. *Project Site Location*).

The Project proposes the construction of eight 3-story apartment buildings totaling 160 units consisting of a mix of 39 one-bedroom, 55 two -bedroom, 50 three-bedroom, and 16 four-bedroom units; a single-story 2,400 square foot community building; open space facilities including a plaza, patio, children's play area, village walks, and green space. Additionally, the Project proposes landscaping throughout the Site, security fencing and gated entry, covered and uncovered parking with solar, and various infrastructure components such as utility connections and stormwater drainage systems (see Figure 3. *Site Plan*).

Construction activities associated with the Proposed Project would require grading, utility connections, building construction, frontage improvements (e.g., new curb, gutter, sidewalk, and driveway construction), and landscaping on the Project Site. Construction is anticipated to begin in February 2022 and an 18-month construction schedule is anticipated. This would result in construction completion around August of 2024.

The Project Site is designated by the Suisun City General Plan as Mixed Use, which allows retail, commercial service, professional office, public services and facilities, and higher-density residential uses as described in the 'Higher-Density Residential' General Plan Land Use Designation. The City does not interpret or apply the Mixed Use General Plan designation to require a mix of non-residential and residential uses on such a designated site, but rather allows either such a mix or exclusively allows the permitted non-residential or residential uses.



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 1. Regional Location
Marina Village Affordable Housing Project

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Site Location
Marina Village Affordable Housing Project

UNIT BREAK DOWN BY BUILDING

BUILDINGS	1 BED	2 BED	3 BED 1BA	3BED 2BA	4 BED	TOTAL
A1	6	9	6	0	3	24
A2	6	9	6	0	3	24
A3	6	9	6	0	3	24
A4	6	9	6	0	3	24
B1	3	6	0	8	1	18
B2	3	6	0	8	1	18
C1	3	2	0	3	1	9
C2	3	2	0	3	1	9
D	3	3	0	4	0	10
TOTAL	39	55	24	26	16	160

VRILAKAS | GROEN

VRILAKAS | GROEN ARCHITECTS

1221 18TH STREET SACRAMENTO CA 95811
TEL 916-441-4655

MARINA VILLAGE

201 Marina Blvd., Suisun, Ca

PROJECT NO: 2004

PROJECT DATE: Issue Date

LIFE SAFETY - SITE PLAN

A0.10

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 3. Site Plan

Suisun City Marina Village Apartments

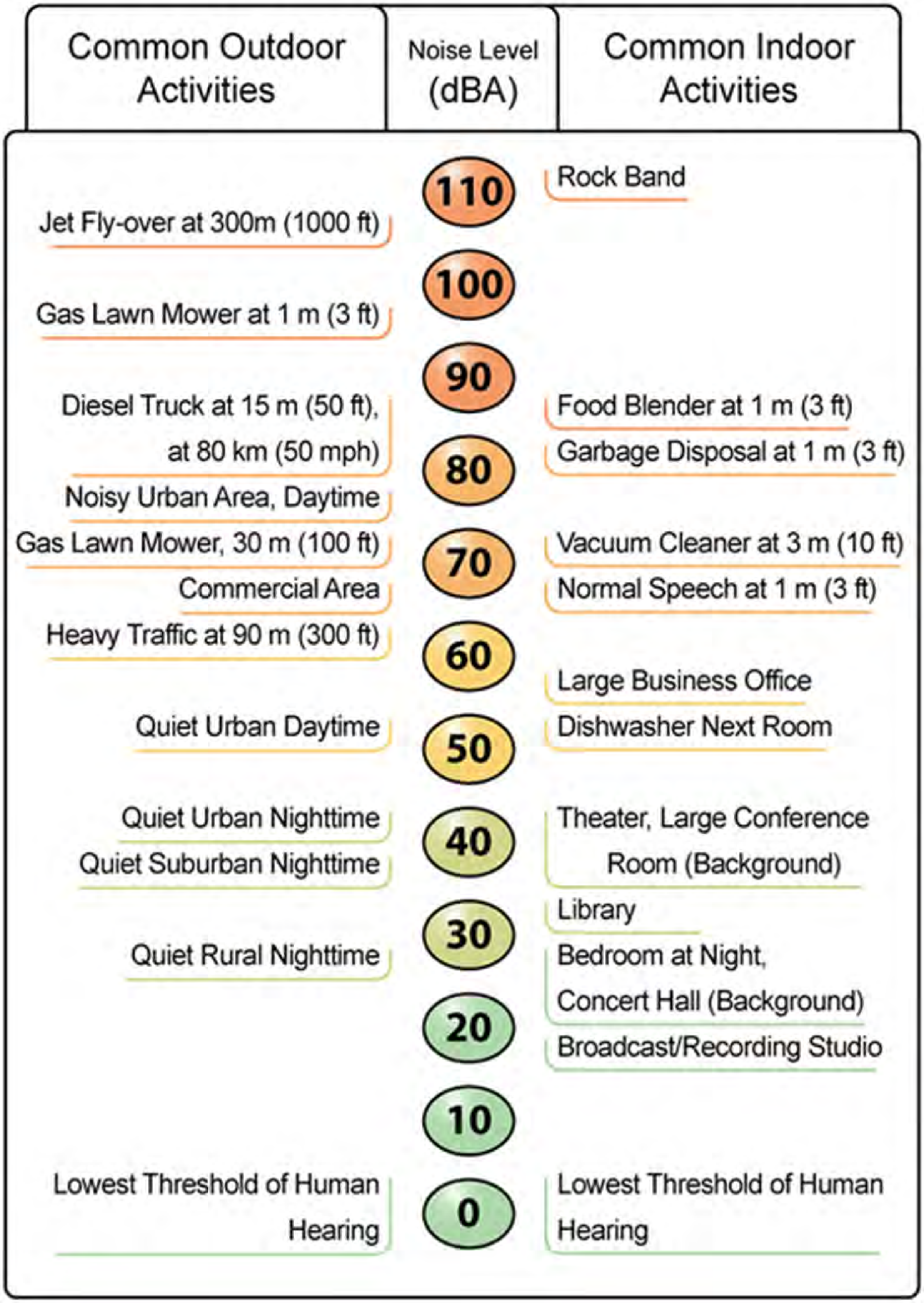
2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted in Figure 4. *Common Noise Levels*



Source: California Department of Transportation (Caltrans) 2020a

Figure 4. Common Noise Levels

Marina Village Housing Project

2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately six dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately three dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2011). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. [WEAL] 2000). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the “line of sight” between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typical residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations). In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels/community noise equivalent level (in L_{dn}/CNEL). The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined as follows:

- **Equivalent Noise Level (L_{eq})** is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- **Day-Night Average (L_{dn})** is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
- **Community Noise Equivalent Level (CNEL)** is a 24-hour average L_{eq} with a 5-dBA weighting during the hours of 7:00 pm to 10:00 pm and a 10-dBA weighting added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

Table 2-1 provides a list of other common acoustical descriptors.

Table 2-1. Common Acoustical Descriptors

Descriptor	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ±1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ±1 to 2 dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

2.2 Fundamentals of Environmental Groundborne Vibration

2.2.1 Vibration Sources and Characteristics

Sources of earthborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically a 1-second period (FTA 2018).

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high-noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise, causing induced vibration in exterior doors and windows.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment.

Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration-sensitive activities	Virtually no risk of architectural damage to normal buildings
0.2	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
0.4–0.6	98–104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage

Source: Caltrans 2020b

3.0 EXISTING ENVIRONMENTAL NOISE SETTING

3.1 Noise-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as hospitals, historic sites, cemeteries, and certain recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

The nearest existing noise-sensitive land uses to the Project Site are the single-family residences located directly adjacent and east of the Project Site. Additionally, once construction is completed, the Project itself would become a noise-sensitive land use.

3.2 Existing Ambient Noise Environment

The Project Site consists of flat grassy terrain with a minimal of 0–1-degree slope. As previously described, the Site is generally bound by Buena Vista Avenue to the north, with a single-family residential neighborhood, First Christian Church, and a small commercial/industrial park beyond; a single-family residential neighborhood to the east, with more residential neighborhoods, a community center and park, and shopping center beyond; AM/PM gas station abutting the southwest corner of the Site, with SR 12, Suisun Slough, a single-family residential neighborhood, Crystal Middle School, and a shopping center to beyond to the south; and Marina Boulevard to the west, with a vacant lot zoned Downtown Commercial in the Suisun City General Plan Downtown Waterfront Specific Plan and commercial and industrial uses beyond. Additionally, the CFNR is about 0.25-mile northwest of the Project Site and runs parallel to Railroad Avenue. Residential development within the immediate vicinity of the Project Site ranges from one to two stories tall. The principal noise source in the area is related to vehicular traffic on SR 12, Marina Boulevard, vehicular and anthropogenic sources emanating from the adjacent gas station and residential neighborhoods. According to the City General Public Health and Safety Chapter, *Noise and Vibration* section, the portion of the irregular-shaped Project Site positioned just east of the ARCO AM/PM gas station experiences traffic noise levels of 60 dBA CNEL generated on SR 12 (Suisun City 2015, Exhibit 9-1). No portion of the Project Site is located within the 65 dBA SR 12 traffic noise contour (Suisun City 2015, Exhibit 9-1). Additionally, no portion of the Project Site is located within the 65 dBA or 60 dBA noise contours for the CFNR (Suisun City 2015, Exhibit 9-1).

The City General Public Health and Safety Chapter was prepared in 2015. In order to quantify existing ambient noise levels in the Project area, ECORP Consulting, Inc. conducted a 24-hour noise measurement on August 23rd, 2021. The noise measurement site was representative of typical existing noise exposure on the Project site during a typical 24-hour day. The 24-hour measurement was taken between 1:06 p.m. and 1:05 p.m. the following day. As shown in Table 3-1, the existing noise levels (Baseline) in the Project vicinity is approximately 60.5 dBA L_{eq}.

Table 3-1. Existing (Baseline) Noise Measurements

Location Number	Location	L_{dn} dBA	L_{eq} dBA	L_{min} dBA	L_{max} dBA	Time
1	Midway Along Fence Line of Project Site Eastern Boundary	**65.6**	60.5	42.8	88.3	1:06 p.m. - 1:06 p.m.

Source: Measurements were taken by ECORP with a Larson Davis LxT SE precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. See Attachment A for noise measurement outputs.

Notes: L_{dn} is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime.

L_{eq} is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. L_{min} is the minimum noise level during the measurement period and L_{max} is the maximum noise level during the measurement period.

4.0 REGULATORY FRAMEWORK

4.1 Federal

4.1.1 U.S. Environmental Protection Agency Office of Noise Abatement and Control

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate Federal noise control activities. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, documents and research completed by the EPA Office of Noise Abatement and Control continue to provide value in the analysis of noise effects

4.1.2 Occupational Safety and Health Act of 1970

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 decibels with A-weighting (dBA) over an eight-hour work shift (29 Code of Regulations 1910.95). Employers are required to develop a hearing conservation program when employees are exposed to noise levels exceeding 85 dBA. These programs include provisions of hearing protection devices and testing employees for hearing loss periodically.

4.1.3 National Institute of Occupational Safety and Health

A division of the US Department of Health and Human Services, the National Institute for Occupational Safety and Health (NIOSH) has established a construction-related noise level threshold as identified in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998. NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to

100 dBA for more than 15 minutes per day. The intention of these thresholds is to protect people from hearing losses resulting from occupational noise exposure.

4.1.4 Federal Interagency Committee on Noise (FICON)

The 2000 FICON findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA L_{dn} and the Project creates a readily perceptible 5 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA L_{dn} and the Project creates a barely perceptible 3 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA L_{dn}, and the Project creates a community noise level increase of greater than 1.5 dBA L_{dn}.

4.1.5 HUD Noise Standards

HUD's noise standards can be found in 24 CFR Part 51, Subpart B. It is the purpose of this subpart B to call attention to the threat of noise pollution and protect new construction of noise sensitive uses on sites having unacceptable noise exposure. Table 4-1 presents the acceptable, normally unacceptable and unacceptable HUD noise level standards.

Table 4-1. HUD Site Acceptability Standards		
Noise Zone	**Day/Night (L_{eq}) Average Sound Level (in decibels)**	**Special Approvals and Requirements**
Acceptable	Not exceeding 65 dB	None
Normally Acceptable	Above 65 dB but not exceeding 75 dB	• Environmental assessment and attenuation required for new construction • Attenuation strongly encouraged for major rehabilitation Note: An environmental impact statement is required if the project site is largely undeveloped or will encourage incompatible development.
Unacceptable	Above 75 dB	• Environmental impact statement required Attenuation required for new construction with approval by the Assistant Secretary of Certifying Officer.

Source: CFR Part 51 Subpart B 2013

4.2 State

4.2.1 State of California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The State of California General Plan Guidelines (State of California 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

4.2.2 State Office of Planning and Research Noise Element Guidelines

The State OPR *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a Land Use Compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the L_{dn}.

4.2.3 California Department of Transportation

In 2020, the California Department of Transportation (Caltrans) published the Transportation and Construction Vibration Manual (Caltrans 2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

4.3 Local

4.3.1 Suisun City General Plan

The City's regulations regarding noise are found in the City of Suisun City General Plan Public Health and Safety Chapter, which contains the following objectives, policies, and programs that are relevant to the Proposed Project:

Objective PHS-1 Require review and conditioning of new developments to mitigate noise impacts.

Policy PHS-1.2 New development shall be designed to disperse vehicular traffic onto a network of fully connected smaller roadways.

Policy PHS-1.3 Industrial and other noise-generating land uses should be located away from noise-sensitive land uses or should use noise attenuation methods, such as enclosing substantial noise sources within buildings or structures, using muffling devices, or incorporating other technologies designed to reduce noise levels.

Policy PHS-1.4 The City will use all feasible means to reduce the exposure of sensitive land uses to excessive noise levels and mitigate where noise levels exceed those specified in Table 9-1 [shown here as Table 4-2.

Table 4-2. Maximum Allowable Noise Exposure from Transportation Noise Sources at Noise-Sensitive Land Uses

Land Use	Outdoor Activity Area (dBA L_{dn})	Interior Spaces	
		dBA L_{dn}	dBA L_{eq}
Residential	60	45	--
Residential (in Downtown Waterfront Specific Plan Area or other Mixed-Use Designations)	70	45	--
Transient Lodging	60	45	--
Hospitals, Nursing Homes	60	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	60	--	45
Playgrounds, Neighborhoods	70	--	--

Source: Suisun City 2015

Notes: Noise-sensitive land uses include schools, hospitals, rest homes, long-term care, mental care facilities, residences, and other similar land uses. Outdoor activity areas are considered to be the portion of a noise-sensitive property where outdoor activities would normally be expected (i.e., patios of residences and outdoor instructional areas of schools). Outdoor activity areas for the purposes of this element do not include gathering spaces alongside transportation corridors or associated public rights-of-way. Where development projects or roadway improvement projects could potentially create noise impacts, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design. Such analysis shall be the financial responsibility of the applicant and be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics. Mitigation strategies shall include site planning and design over other types of mitigation.

Policy PHS-1.8 Soundwalls are prohibited as a method for reducing noise exposure that could be addressed through other means, such as, site design, setbacks, earthen berms, or a combination of these techniques.

Policy PHS-1.9 New developments shall implement feasible noise mitigation to reduce construction noise and vibration impacts. Projects that incorporate feasible mitigation will not be considered by the City to have significant impacts for the purposes of California Environmental Quality Act review.

Program PHS-1.1 Reduce Noise Exposure for Noise-Sensitive Land Uses Development of noise-sensitive land uses in areas with existing noise from mobile, stationary, or agricultural sources will be reviewed and conditioned according to the City's noise policies. Projects that could expose noise-sensitive uses will be required to incorporate feasible mitigation to address potentially significant noise effects.

Methods may include, but are not limited to: traffic calming, site planning that orients noise-sensitive outdoor gathering areas away from sources, buffering, sound insulation, and other methods deemed effective by the City.

Development projects that are affected by non-transportation related noise shall be mitigated to achieve acceptable levels specified in Table 9-2 [shown here as Table 4-3], as measured at outdoor activity areas of existing and planned noise-sensitive land uses. If existing noise levels exceed acceptable levels in Table 9-2 [Table 4-3] as measured at outdoor activity areas of noise sensitive land uses, then:

- Where existing exterior noise levels are between 60 and 65 dBA at outdoor activity areas of noise-sensitive uses, an increase of 3 dBA or greater is considered significant and requires mitigation to achieve acceptable levels.
- Where existing exterior noise levels are greater than 65 dBA at outdoor activity areas of noise-sensitive uses, an increase of 1.5 dBA or greater is considered significant and requires mitigation to achieve acceptable levels.
- Where it is not possible to reduce noise in outdoor activity areas to 60 dBA or less using practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dBA may be allowed, provided that feasible exterior noise level reduction measures have been implemented.

Table 4-3. Noise Level Performance Standards for New Projects Affected By, or Including, Non-Transportation Noise Sources

Noise Level Descriptor	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
Hourly L_{eq}	60 dBA	45 dBA
L_{max}	75 dBA	65 dBA

Source: Suisun City 2015

Program PHS-1.5 (Construction Noise and Vibration Reduction Measures) The City will require new developments proposing construction adjacent to existing noise-sensitive uses or close enough to noise- sensitive uses that relevant performance standards could be exceeded to incorporate feasible mitigation to reduce construction noise exposure. This may include additional limits on the days and times of day when construction can occur, re-routing construction equipment away from adjacent noise-sensitive uses, locating noisy construction equipment away from noise-sensitive uses, shrouding or shielding impact tools, use of intake and exhaust mufflers and engine shrouds, construction of acoustic barriers (e.g., plywood, sound attenuation blankets), pre-drilling holes for placement of piles or non-impact pile driving where piles would be needed, and other feasible technologies or reduction measures necessary to achieve the City's relevant performance standards.

Suisun City Municipal Code

Presently, the City does not have an adopted noise ordinance. Instead, there are policies in the 2035 General Plan which encourage the discussion and ultimate adoption of noise regulations. In Title 15, "Buildings and Construction," of the City Municipal Code there are regulations relative to construction work hours, but no regulations that generally addresses noise or other activities that generate noise or could be considered a nuisance. Absent an adopted ordinance that addresses more comprehensive issues, the Police Department is limited in what they can do in response to citizen complaints. On January 14, 2020 the City Council met to discuss the proposed ordinance and whether it be included in Title 8 under Chapter 8.12 "Public Nuisances." Updating Suisun City Code, Title 8 "Health and Safety," to include noise regulations would allow for needed policy updates, as well as an enforceable standard by which the Police Department can uphold.

Although no noise standards exist for construction equipment activities conducted within the City limits, Title 15, *Buildings and Construction*, Chapter 15.04 states that no construction equipment shall be operated, nor any outdoor construction or repair work shall be permitted within 500 feet from any occupied residence except during the hours of 7:00 a.m. to 10:00 p.m., Monday through Saturday, and 8:00 a.m. to 10:00 p.m., on Sunday.

The Suisun City Municipal Code also includes Section 15.12.320, *Dust Control Measures*, Paragraph B which states the following related to construction noise:

B. For the purposes of construction machinery for earthwork, trenching, concrete or paving, the hours of work activity on the site shall be restricted as follows:

1. Work is allowed between the hours of 7:00 a.m. to 6:00 p.m. Monday through Friday.
2. Work is allowed between the hours of 9:00 a.m. to 5:00 p.m. on Saturdays.
3. Work is totally prohibited on Sundays and holidays with the exception that water trucks for the purposes of dust control may operate from nine a.m. to five p.m. on said Sundays and holidays if needed.

5.0 IMPACT ASSESSMENT

5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The Project would result in a significant noise-related impact if it would produce:

1) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2) Generation of excessive groundborne vibration or groundborne noise levels.

3) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

For purposes of this analysis, the Suisun City noise standards for Mixed Use Residential were used for the evaluation of Project Site noise/land use compatibility (see Table 4-2) and stationary-source (onsite) noise impacts (see Table 4-3) as a result of the Proposed Project as well as noise standards established by HUD that are presented in Table 4-1 . The increase in offsite transportation-related noise is compared against the FICON recommendation for evaluating the impact of increased traffic noise, as described in section 4.1.4 above. Project construction noise is compared to the NIOSH standard of 85 dBA for more than 8 hours per day since construction work for the Proposed Project is anticipated to span a typical workday of 8 hours daily, as described in section 4.1.3 above.

5.2 Methodology

This analysis of the existing and future noise environments is based on empirical observations. To estimate the worst-case onsite construction noise levels that may occur at the nearest noise-sensitive receptor in the Project vicinity, typical construction equipment noise levels were calculated using the Roadway Construction Noise Model (2006). Groundborne vibration levels associated with construction-related activities for the Project have been evaluated utilizing typical groundborne vibration levels associated with construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage and human annoyance.

An assessment of the land use compatibility of the Project's proposal to locate sensitive residential noise receptors within the existing noise environment affecting the Project Site was completed by conducting a long-term, 24-Hour existing ambient baseline noise measurement on the Site with the use of a Larson Davis SoundExpert LxT precision sound level meter, which satisfies the American National Standards Institute standard for general environmental noise measurement instrumentation. Prior to the measurements, the SoundExpert LxT sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator. This existing ambient noise level measurement spanned August 23rd and 24th, 2021. Onsite noise impacts as a result of the Proposed Project are addressed qualitatively and offsite transportation noise was calculated for the roadway segments in the Project vicinity using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic volumes calculated by GHD (2021).

5.3 Impact Analysis

5.3.1 Project Construction Noise

Would the Project Result in Short-Term Construction-Generated Noise in Excess of Standards?

Onsite Construction Noise

Construction noise associated with the Proposed Project would be temporary and would vary depending on the nature of the activities being performed. Noise generated would primarily be associated with the operation of off-road equipment for onsite construction activities as well as construction vehicle traffic on area roadways. Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., land clearing, grading, excavation, paving). Noise generated by construction equipment, including earthmovers, material handlers, and portable generators, can reach high levels. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbances would be random incidents, which could last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). During construction, exterior noise levels could negatively affect the health of sensitive land uses in the vicinity of the construction site.

The nearest existing noise-sensitive land uses to the Project Site are single-family residences to the north, east, and south of the Project Site, with the closest receptor located directly adjacent to the east. As previously described, the City does not promulgate a numeric threshold pertaining to the noise associated with construction. This is due to the fact that construction noise is temporary, short term, intermittent in nature, and would cease on completion of the Project. Instead, Chapter 15.04 of the City Municipal Code states that no construction equipment shall be operated, nor any outdoor construction or repair work shall be permitted within 500 feet from any occupied residence except during the hours of 7:00 a.m. to 10:00 p.m., Monday through Saturday, and 8:00 a.m. to 10:00 p.m., on Sunday. Furthermore, construction would occur throughout the Project Site and would not be concentrated at one point.

To estimate the worst-case onsite construction noise levels that may occur at the nearest noise-sensitive receptor in the Project vicinity in order to evaluate the potential health-related effects (physical damage to the ear) from construction noise, the construction equipment noise levels were calculated using the Roadway Noise Construction Model and compared against the construction-related noise level threshold established in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998 by NIOSH. A division of the US Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. For the purposes of this analysis, the lowest, more conservative threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receptors.

The anticipated short-term construction noise levels generated for the necessary equipment were calculated using the Roadway Noise Construction Model for the demolition, site preparation, grading, building construction, paving and painting anticipated for the Proposed Project. It is acknowledged that the majority of construction equipment is not situated at any one location during construction activities, but rather spread throughout the Project Site and at various distances from sensitive receptors. Therefore, this analysis employs FTA guidance for calculating construction noise, which recommends measuring construction noise produced by all construction equipment operating simultaneously from the center of the Project (FTA 2018), which in this case is approximately 180 feet distant from the nearest sensitive receptor.

The anticipated short-term construction noise levels generated for the necessary construction equipment are presented in Table 5-1.

Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptor

Equipment	Estimated Exterior Construction Noise Level at Existing Residences	Construction Noise Standards (dBA L_{eq})	Exceed Daytime Standard?
Demolition			
Concrete/Industrial Saw	71.5	*85*	**No**
Excavators (3)	65.6 (each)	*85*	**No**
Rubber Tired Dozers (2)	66.6 (each)	*85*	**No**
Combined Demolition Equipment	**75.3**	*85*	**No**
Site Preparation			
Tractors/Loaders/Backhoes (4)	68.9 (each)	*85*	**No**
Rubber Tired Dozers (2)	66.6 (each)	*85*	**No**
Combined Site Preparation Equipment	**76.0**	*85*	**No**
Grading			
Tractors/Loaders/Backhoes (3)	68.9 (each)	*85*	**No**
Excavator	65.6	*85*	**No**
Rubber Tired Dozers (2)	66.6 (each)	*85*	**No**
Grader	69.9	*85*	**No**
Combined Grading Equipment	**76.6**	*85*	**No**
Construction, Paving, Architectural Coating			
Crane	61.5	*85*	**No**
Forklifts (3)	68.3 (each)	*85*	**No**
Generator Sets	66.5	*85*	**No**
Tractors/Loaders/Backhoes (3)	68.9 (each)	*85*	**No**
Welder	58.9	*85*	**No**
Air Compressor	62.6	*85*	**No**
Pavers (2)	63.1	*85*	**No**
Paving Equipment (2)	71.4	*85*	**No**
Rollers (2)	61.9	*85*	**No**
Combined Construction, Paving, & Architectural Coating	**79.4**	*85*	**No**

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment B for Model Data Outputs.

Notes: Construction equipment used during construction derived from CalEEMod 2020.4.0. CalEEMod is designed to calculate air pollutant emissions from construction activity and contains default construction equipment and usage parameters for typical construction projects based on several construction surveys conducted in order to identify such parameters. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 180 feet from the nearest sensitive receptor. Additionally, Construction, Paving, and Architectural Coating phases are assumed to occur simultaneously.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-1, during onsite construction activities no individual or cumulative piece of construction equipment would exceed the NIOSH threshold of 85 dBA L_{eq} at the nearest potential receptors to onsite construction and therefore no health effects from construction noise would occur. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

Offsite Construction Worker Traffic Noise

Project construction would result in minimal additional traffic on adjacent roadways over the timeframe that construction occurs. According to the Caltrans *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (2013), doubling of traffic on a roadway is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). The majority of construction-related traffic trips would access the Project via SR 12. According to the Caltrans Traffic Census Program (Caltrans 2020c), the segment of SR 12 between Marina Boulevard and Sunset Avenue (the segment traversing the Project Site) experiences traffic volumes between 30,700 and 34,600 average daily trips (ADT). According to the CalEEMod model, which contains default usage parameters for typical construction projects, including the number of worker commute trips and material haul truck trips; the maximum number of construction workers and haul trucks traveling to and from the Project Site on a single day would be during the building construction phase with 155 total daily worker trips and 32 vendor trips. These trips would largely occur within two distinct segments of the day, the morning and afternoon. Therefore, Project construction would not result in a long-term, consistent doubling of traffic on SR 12. For this reason, the contribution to existing traffic noise during Project construction would not be perceptible.

5.3.2 Project Operational Noise

Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of County or City Standards During Operations?

Project Land Use Compatibility

The City of Suisun City uses the land use compatibility standards presented in the General Plan Public Health and Safety Chapter which provides the City with a tool to gauge the compatibility of new land users relative to existing noise levels. These standards, presented as Table 4-1, identify the maximum allowable exterior noise levels for various land uses, including for lands designated Mixed Use such as the Project Site. As previously stated, the Project Site is designated by the Suisun City General Plan as Mixed Use, which allows retail, commercial service, professional office, public services and facilities, and higher-density residential uses as described in the 'Higher-Density Residential' General Plan Land Use Designation. The City does not interpret or apply the Mixed Use General Plan designation to require a mix of non-residential and residential uses on such a designated site, but rather allows either such a mix or exclusively allows the permitted non-residential or residential uses. In the case that the noise levels identified at the Proposed Project Site fall below the limits of the General Plan standard for Mixed Use (70 dBA L_{dn}), the Project is considered compatible with the existing noise environment.

In order to quantify existing ambient noise levels at the Project Site, ECORP conducted a 24-hour noise measurement from August 23rd to August 24th, 2021. The 24-hour noise measurement is representative of the typical existing noise exposure on the Project Site on a typical day. As shown in Table 3-1, the ambient noise level recorded on the Project Site is 65.6 dBA L_{dn}, with the predominant noise sources in the area being traffic on SR 12. This noise level is below the City's land use compatibility noise standard of 70 dBA L_{dn} for mixed use residential sites. Therefore, the Project Site is considered an appropriate noise environment to locate the proposed land use. Additionally, the Project Site is predominately surrounded by residential land uses and would be compatible with the existing noise environment.

Furthermore, as previously mentioned the exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA to 65 dBA, interior noise levels can typically be maintained below 45 dBA, a typical residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations). In exterior noise environments of 65 dBA or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA with proper wall construction techniques following California Building Code (CBC) methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

With the incorporation of standard CBC methods, noise levels experienced by future residents of the Proposed Project would be below the City's interior standard of 45 dBA.

Project Operations

In addition to the analysis of Project compatibility with the existing and future predicted ambient noise environment, this analysis also evaluates the effects of Project noise on the surrounding existing land uses. The main operational noise sources associated with the Proposed Project would be that of operational stationary sources. Potential stationary noise sources related to long-term operation of future development of the Project site would include mechanical equipment. Mechanical equipment (e.g., HVAC equipment) typically generates noise levels less than 40 dBA at 50 feet, which is less than the daytime and nighttime noise standards promulgated by the City. ECORP staff has conducted numerous noise measurements within various existing residential neighborhoods in order to develop a wide sampling of potential noise levels associated with such uses. Table 5-2 identifies daytime noise levels measured within various residential neighborhoods. These measurements were taken with a Larson Davis SoundExpert LxT precision sound level meter, which satisfies the ANSI for general environmental noise measurement instrumentation. Prior to the measurements, the SoundExpert LxT sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator.

Table 5-2. Representative Residential Noise Levels

Land Use Type	dBA L_{eq}
Residential Neighborhoods	46.4 dBA
	49.5 dBA
	49.7 dBA
	52.9 dBA
	54.0 dBA
	59.0 dBA

Source: ECORP Consulting. Measurements taken by ECORP with a Larson Davis SoundExpert LxT precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. Prior to the measurements, the SoundExpert LxT sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator.

As shown, the measured daytime noise levels within six distinct residential neighborhoods range from 46.4 through 59.0 dBA L_{eq}, which is under the City daytime threshold for non-transportation noise sources associated with new projects. Additionally, the Project Site is predominately surrounded by residential land uses and would be compatible with the existing noise environment. The most basic planning strategy to minimize adverse impacts on new land uses due to noise is to avoid designating certain land uses at locations within the community that would negatively affect noise sensitive land uses. The Project is consistent with the types, intensity, and patterns of land use envisioned for the Project vicinity, and as previously described, the Project is considered compatible with the existing noise environment. Operation of the Project would not result in a significant noise-related impact associated with onsite sources. For these reasons, Project noise generated during the nighttime hours would also be expected to fall under the City nighttime threshold of 45 dBA L_{eq} for non-transportation noise sources associated with new projects.

Operational Offsite Traffic Noise

Project operations would result in additional traffic on adjacent roadways, thereby increasing vehicular noise in the Project vicinity. The Project's contribution to traffic noise levels throughout the Project vicinity (i.e., vicinity roadway segments that traverse noise sensitive residential land uses) were calculated using the FHWA's Highway Noise Prediction Model (FHWA-RD-77-108) and based on the traffic volumes identified by GHD (2021). Table 5-3 shows the calculated offsite roadway noise levels under existing traffic levels compared to existing traffic levels plus the Project. The calculated noise levels as a result of the Project at affected sensitive land uses are compared to the noise standards recommended by FICON.

FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA L_{dn} and the Project creates a readily perceptible 5 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA L_{dn} and the Project creates a barely perceptible 3 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA L_{dn}, and the Project creates a community noise level increase of greater than 1.5 dBA L_{dn}.

Table 5-3. Existing Plus Project Conditions - Predicted Traffic Noise Levels

Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway		dBA Increase	Noise Standard (dBA L_{dn})	Exceed Standard?
		Existing Conditions	Existing + Project Conditions			
State Route 12						
East of Marina Boulevard	Residential	58.3	58.3	0.0	>5.0	**No**
West of Village Drive	Residential	55.6	55.6	0.0	>5.0	**No**
East of Village Drive	Residential	61.3	61.3	0.0	>3.0	**No**
Marina Boulevard						
North of Buena Vista Avenue	Residential	48.4	48.4	0.0	>5.0	**No**
South of Railroad Avenue	Residential	46.3	46.4	0.1	>5.0	**No**
South of State Route 12	Residential	48.3	48.3	0.0	>5.0	**No**
Railroad Avenue						
East of Marina Boulevard	Residential	51.8	51.8	0.0	>5.0	**No**
West of Village Drive	Residential	49.3	49.4	0.1	>5.0	**No**
East of Village Drive	Residential	55.3	55.3	0.0	>5.0	**No**
Buena Vista Avenue						
East of Marina Boulevard	Residential	47.5	47.6	0.1	>5.0	**No**
West of Village Drive	Residential	41.7	42.2	0.5	>5.0	**No**
Pintail Drive						
East of Village Drive	Residential	45.2	45.3	0.1	>5.0	**No**
West of Sunset Avenue	Residential	43.5	43.8	0.3	>5.0	**No**
East of Sunset Avenue	Residential	48.8	51.8	3.0	>5.0	**No**
Village Drive						
South of Railroad Avenue	Residential	42.1	42.1	0.0	>5.0	**No**
West of Pintail Drive	Residential	42.1	42.1	0.0	>5.0	**No**
South of Pintail Drove	Residential	43.5	43.5	0.0	>5.0	**No**
North of State Route 12	Residential	40.4	40.4	0.0	>5.0	**No**
Sunset Avenue						
North of Pintail Drive	Residential	57.8	57.8	0.0	>5.0	**No**
South of Pintail Drive	Residential	56.1	56.1	0.0	>5.0	**No**

Source: Traffic noise levels were calculated by ECORP Consulting using the FHWA's Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels in conjunction with the trip generation rate identified by GHD 2021. Refer to Attachment C for traffic noise modeling assumptions and results.
Notes: A total of 7 intersections were analyzed in the Traffic Impact Study; however, all roadway segments that impact sensitive receptors were included for the purposes of this analysis.

As shown in Table 5-3, no roadway segment would experience an increase of noise beyond the FICON significance standards as a result of the Project. Additionally, roadway noise as a result of the Project would not exceed noise levels beyond the acceptable noise zone presented in Table 4-1, HUD Site Acceptability Standards.

5.3.3 Project Construction Groundborne Vibration

Would the Project Expose Structures to Substantial Groundborne Vibration During Construction?

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the Project Site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increasing distance.

Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. It is noted that pile drivers would not be necessary during Project construction. Vibration decreases rapidly with distance and it is acknowledged that construction activities would occur throughout the Project Site and would not be concentrated at the point closest to sensitive receptors. Groundborne vibration levels associated with typical construction equipment at 25 feet distant are summarized in Table 5-4.

Table 5-4. Representative Vibration Source Levels for Construction Equipment

Equipment Type	Peak Particle Velocity at 25 Feet (inches per second)
Large Bulldozer	0.089
Caisson Drilling	0.089
Loaded Trucks	0.076
Hoe Ram	0.089
Jackhammer	0.035
Small Bulldozer/Tractor	0.003
Vibratory Roller	0.210

Source: FTA 2018; Caltrans 2020b

The City does not regulate vibrations associated with construction. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended standard of 0.2 inch per second PPV with respect to the prevention of structural damage for older residential buildings is used as a threshold. This is also the level at which vibrations may begin to annoy people in buildings. Consistent with FTA recommendations for calculating vibration generated from construction equipment, construction vibration was measured from the center of the Project Site (FTA 2018). The nearest structure of concern to the construction Site, concerning groundborne vibrations, is a single-family residence located 180 feet east of the Project Site center.

Based on the representative vibration levels presented for various construction equipment types in Table 5-4 and the construction vibration assessment methodology published by the FTA (2018), it is possible to estimate the potential Project construction vibration levels. The FTA provides the following equation:

$$[PPVequip = PPVref \times (25/D)^{1.5}]$$

Table 5-5 presents the expected Project-related vibration levels at a distance of 180 feet.

Table 5-5. Construction Vibration Levels at 180 Feet

Receiver PPV Levels (in/sec)[1]					Peak Vibration	Threshold	Exceed Threshold
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Small Bulldozer	Vibratory Roller			
0.005	0.004	0.002	0.000	0.011	**0.011**	*0.2*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included in Table 5-4 (FTA 2018). Distance to the nearest structure of concern is approximately 180 feet measured from Project Site center.

As shown in Table 5-5, vibration as a result of construction activities would not exceed 0.2 PPV at the nearest structure. Thus, Project construction would not exceed the recommended threshold.

5.3.4 Project Operational Groundborne Vibration

Would the Project Expose Structures to Substantial Groundborne Vibration During Operations?

Project operations would not include the use of any large-scale stationary equipment that would result in excessive vibration levels. Therefore, the Project would not result in groundborne vibration impacts during operations.

5.3.5 Excess Airport Noise

Would the Project Expose People Residing or Working in the Project area to Excessive Airport Noise?

The closest public airport to the Project Site is the Nut Tree Airport, a General Aviation airport located approximately 19 miles northeast of the Project Site; and the nearest private airport is the Travis Airforce Base, located approximately 7 miles to the east. The Project Site is well outside of the airports' noise contours (Solano County Airport Land Use Commission 2015). Aircraft noise does not significantly impact the residents in the Project vicinity and the Proposed Project would not expose people visiting or working on the Project Site to excessive airport noise levels.

5.3.6 Railway Noise

There are two railroads that operate in Susin City, the California Northern Railroad and the Union Pacific Railroad. The Projects northern most boundary is located approximately 1,2000 feet distant from the centerline of the California Northern Railroad. According to the City's General Plan Noise Technical Background Report, the Project Site is located outside of the 65 dBA CNEL noise contours. Therefore, railway noise in the vicinity of the Project Site would not exceed noise levels beyond the acceptable HUD noise standard.

5.3.7 Cumulative Noise

Would the Project Contribute to Cumulatively Considerable Noise During Construction?

Construction activities associated with the Proposed Project and other construction projects in the area may overlap, resulting in construction noise in the area. However, construction noise impacts primarily affect the areas adjacent to the construction Site. Construction noise for the Project was determined to be less than significant following compliance with City noise standards. Cumulative development in the vicinity of the Project Site could result in elevated construction noise levels at sensitive receptors in the Project vicinity. However, each project would be required to comply with the applicable noise limitations on construction. Therefore, the Project would not contribute to cumulative impacts during construction.

Would the Project Contribute to Cumulatively Considerable Noise from Offsite Traffic?

Future cumulative traffic noise levels, 10 to 20 years from construction of project, throughout the Project vicinity (i.e., vicinity roadway segments that traverse noise sensitive land uses) for all approved projects were modeled based on the traffic volumes identified by GHD (2021) to determine the noise levels along Project vicinity roadways under future conditions. Future cumulative conditions reflect conditions in the year 2040, represented by local and regional growth in approximately 20 years using future transportation conditions (volumes and facilities). Table 5-6 shows the calculated offsite roadway noise levels under future 2040 conditions for all approved project's traffic levels without the Project, compared to future build-out of the Project and including all approved projects. The calculated noise levels as a result of the Project at affected sensitive land uses are compared to the noise standards promulgated in Suisun City and significance thresholds recommended by FICON. As traffic noise levels do not exceed noise thresholds in 2040, they would also not exceed noise thresholds in 2032, 10 years from anticipated Project construction.

FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA L_{dn} and the Project creates a readily perceptible 5 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA L_{dn} and the Project creates a barely perceptible 3 dBA L_{dn} or greater Project-related noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA L_{dn}, and the Project creates a community noise level increase of greater than 1.5 dBA L_{dn}.

Table 5-6. Existing Plus Project Conditions - Predicted Traffic Noise Levels

Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway		dBA Increase	Noise Standard (dBA L_{dn})	Exceed Standard?
		Existing Conditions	Existing + Project Conditions			
State Route 12						
East of Marina Boulevard	Residential	59.7	59.7	0.0	>5.0	**No**
West of Village Drive	Residential	57.6	57.6	0.0	>5.0	**No**
East of Village Drive	Residential	62.7	62.7	0.0	>3.0	**No**
Marina Boulevard						
North of Buena Vista Avenue	Residential	53.2	53.2	0.0	>5.0	**No**
South of Railroad Avenue	Residential	50.5	50.5	0.0	>5.0	**No**
South of State Route 12	Residential	51.8	51.8	0.0	>5.0	**No**
South of Buena Vista Avenue	Residential	51.2	51.4	0.2	>5.0	**No**
North of State Route 12	Residential	54.3	54.4	0.1	>5.0	**No**
Railroad Avenue						
East of Marina Boulevard	Residential	58.5	58.5	0.0	>5.0	**No**
West of Village Drive	Residential	57.3	57.3	0.0	>5.0	**No**
East of Village Drive	Residential	61.8	61.8	0.0	>5.0	**No**
Buena Vista Avenue						
East of Marina Boulevard	Residential	48.7	48.8	0.1	>5.0	**No**
West of Village Drive	Residential	42.9	43.3	0.4	>5.0	**No**
Pintail Drive						
East of Village Drive	Residential	46.0	46.1	0.1	>5.0	**No**
West of Sunset Avenue	Residential	45.8	45.9	0.1	>5.0	**No**
East of Sunset Avenue	Residential	53.0	53.0	3.0	>5.0	**No**
Village Drive						
South of Railroad Avenue	Residential	43.2	43.2	0.0	>5.0	**No**
West of Pintail Drive	Residential	42.9	42.9	0.0	>5.0	**No**
South of Pintail Drove	Residential	44.3	47.4	0.1	>5.0	**No**
North of State Route 12	Residential	41.2	41.2	0.0	>5.0	**No**
Sunset Avenue						
North of Pintail Drive	Residential	58.6	58.7	0.0	>5.0	**No**

Table 5-6. Existing Plus Project Conditions - Predicted Traffic Noise Levels

Roadway Segment	Surrounding Uses	L_{dn} at 100 feet from Centerline of Roadway		dBA Increase	Noise Standard (dBA L_{dn})	Exceed Standard?
		Existing Conditions	Existing + Project Conditions			
South of Pintail Drive	Residential	56.7	56.7	0.0	>5.0	**No**

As shown in Table 5-6, no roadway segment would generate an increase of noise beyond the FICON significance standards in any scenario. Therefore, no mobile-source cumulative impacts would occur.

Would the Project Contribute to Cumulatively Considerable Noise from Stationary Sources?

Long-term stationary noise sources associated with the development of the Proposed Project, combined with other cumulative projects, could cause local noise level increases. Noise levels associated with the Project and related cumulative projects together could result in higher noise levels than considered separately. As previously described, onsite noise sources associated with the Project was found to be acceptable. Therefore, the Project would not contribute to cumulative impacts during operations.

6.0 REFERENCES

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LIST OF ATTACHMENTS

ATTACHMENT A

Baseline Noise Measurements

Site Number: 1			
Recorded By: Collin Crawford-Martin			
Job Number: 2021-221 Marina Village – Affordable Housing			
Date: 08/23/21			
Time: 1:06 p.m. – 1:05 p.m. on 8/24/21			
Location: SE corner of Marina Blvd/Buena Vista Intersection halfway along east boundary fenceline			
Source of Peak Noise: Transient activity and meter adjustment in first 15 min.			
Noise Data			
L_{dn} (dB)	**Lmin (dB)**	**Lmax (dB)**	**Peak (dB)**
65.9	42.8	88.3	121.7

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Larson Davis**	**LxT SE**	**0006133**	**02/24/2021**	
	Microphone	**Larson Davis**	**377B02**	**315201**	**02/24/2021**	
	Preamp	**Larson Davis**	**PRMLxT1L**	**069947**	**02/24/2021**	
	Calibrator	**Larson Davis**	**CAL200**	**17325**	**02/25/2021**	

Weather Data			
Est.	**Duration:** 24 hour		**Sky:** Clear/semi cloudy
	Note: dBA Offset = -0.00		**Sensor Height (ft):** 3.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	15 - 18	80 / 52	29.84

Photo of Measurement Location

Measurement Report

Report Summary

Meter's File Name	LxT_Data.082.s	Computer's File Name	LxT_0006133-20210823 130634-LxT_Data.082.ldbin
Meter	LxT1 0006133		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2021-08-23 13:06:34	Duration	24:00:00.0		
End Time	2021-08-24 13:06:34	Run Time	24:00:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	60.5 dB		
LAE	109.9 dB	SEA	134.7 dB
EA	10.9 mPa²h		
EA8	3.6 mPa²h		
EA40	18.2 mPa²h		
LZS_{peak}	121.7 dB	2021-08-23 13:14:50	
LAS_{max}	88.3 dB	2021-08-23 18:18:50	
LAS_{min}	42.8 dB	2021-08-24 01:59:00	
LA_{eq}	60.5 dB		
LC_{eq}	75.1 dB	LC_{eq} - LA_{eq}	14.5 dB
LAI_{eq}	64.2 dB	LAI_{eq} - LA_{eq}	3.7 dB

Exceedances	Count	Duration
LAS > 85.0 dB	4	0:00:10.8
LAS > 115.0 dB	0	0:00:00.0
LZSpeak > 135.0 dB	0	0:00:00.0
LZSpeak > 137.0 dB	0	0:00:00.0
LZSpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	65.6 dB	61.4 dB	0.0 dB	
	LDEN	**LDay**	**LEve**	**LNight**
	65.9 dB	61.5 dB	60.8 dB	58.7 dB

Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	60.5 dB		--- dB		--- dB	
$Ls_{(max)}$	88.3 dB	2021-08-23 18:18:50	--- dB		--- dB	
$LS_{(min)}$	42.8 dB	2021-08-24 01:59:00	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		121.7 dB	2021-08-23 13:14:50

Overloads	Count	Duration
	1	0:00:02.0

Statistics

LAS 5.0	64.3 dB
LAS 10.0	63.0 dB
LAS 33.3	59.7 dB
LAS 50.0	57.9 dB
LAS 66.6	56.1 dB
LAS 90.0	52.0 dB

ATTACHMENT B

Federal Highway Administration Highway Roadway Construction Noise Outputs – Project Construction Noise

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/25/2021
Case Description: Marina Village - Demolition

Description	**Afffected Land Use**
Demolition	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Concrete/Industrial Saw	No	20		89.6	180
Excavator	No	40		80.7	180
Excavator	No	40		80.7	180
Excavator	No	40		80.7	180
Rubber Tired Dozer	No	40		81.7	180
Rubber Tired Dozer	No	40		81.7	180

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Concrete/Industrial Saw	78.5	71.5
Excavator	69.6	65.6
Excavator	69.6	65.6
Excavator	69.6	65.6
Rubber Tired Dozer	70.5	66.6
Rubber Tired Dozer	70.5	66.6
Total	**78.5**	**75.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date:	8/25/2021
Case Description:	Marina Village - Site Preparation

Description	**Land Use**
Site Preparation	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Rubber Tired Dozer	No	40		81.7	180
Rubber Tired Dozer	No	40		81.7	180

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Rubber Tired Dozer	70.5	66.6
Rubber Tired Dozer	70.5	66.6
Total	**72.9**	**76**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/25/2021
Case Description: Marina Village - Grading

Description	**Affected Land Use**
Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Excavator	No	40		80.7	180
Rubber Tired Dozer	No	40		81.7	180
Rubber Tired Dozer	No	40		81.7	180
Grader	No	40	85		180

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Excavator	69.6	65.6
Rubber Tired Dozer	70.5	66.6
Rubber Tired Dozer	70.5	66.6
Grader	73.9	69.9
Total	**73.9**	**76.6**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 8/25/2021

Case Description: Marina Village - Construction/Paving/Painting

Description	**Affected Land Use**
Contruction/Paving/Painting	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Crane	No	16		80.6	180
Forklift	No	40		83.4	180
Forklift	No	40		83.4	180
Forklift	No	40		83.4	180
Generator Sets	No	50		80.6	180
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Tractor/Loader/Backhoe	No	40	84		180
Welder	No	40		74	180
Air Compressor	No	40		77.7	180
Paver	No	50		77.2	180
Paver	No	50		77.2	180
Paving Equipment	No	20		89.5	180
Paving Equipment	No	20		89.5	180
Roller	No	20		80	180
Roller	No	20		80	180

	Calculated (dBA)	
Equipment	***Lmax**	**Leq**
Crane	69.4	61.5
Forklift	72.3	68.3
Forklift	72.3	68.3
Forklift	72.3	68.3
Generator Sets	69.5	66.5
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Tractor/Loader/Backhoe	72.9	68.9
Welder	62.9	58.9
Air Compressor	66.5	62.6
Paver	66.1	63.1
Paver	66.1	63.1
Paving Equipment	78.4	71.4
Paving Equipment	78.4	71.4
Roller	68.9	61.9
Roller	68.9	61.9
Total	**78.4**	**79.4**

*Calculated Lmax is the Loudest value.

ATTACHMENT C

Federal Highway Administration Highway Noise Prediction Model

TRAFFIC NOISE LEVELS

Project Number: 2021-221
Project Name: Marina Village - Affordable Housing

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s):	**Existing**
Source of Traffic Volumes:	GHD 2021
Community Noise Descriptor:	L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) Ldn
State Route 12 (SR 12)													
East of Marina Boulevard	Residential	4	30	1944	8,748	30	100	0.5	0	1.8%	0.7%	62.9	58.3
West of Village Drive	Residential	4	30	1033	4,649	30	100	0.5	0	1.8%	0.7%	60.2	55.6
East of Village Drive	Residential	4	30	1912	17,208	30	100	0.5	0	1.8%	0.7%	62.9	61.3
Marina Boulevard													
North of Buena Vista Avenue	Residential	4	0	312	1,404	25	100	0.5	0	1.8%	0.7%	53.0	48.4
South of Railroad Avenue	Residential	4	0	190	855	25	100	0.5	0	1.8%	0.7%	50.8	46.3
South of SR 12	Residential	4	0	151	1,359	25	100	0.5	0	1.8%	0.7%	49.8	48.3
Railroad Avenue													
East of Marina Boulevard	Residential	4	0	346	1,557	35	100	0.5	0	1.8%	0.7%	56.4	51.8
West of Village Drive	Residential	4	0	195	878	35	100	0.5	0	1.8%	0.7%	54.0	49.3
East of Village Drive	Residential	4	0	387	3,483	35	100	0.5	0	1.8%	0.7%	56.9	55.3
Buena Vista Avenue													
East of Marina Boulevard	Residential	2	0	258	1,161	25	100	0.5	0	1.8%	0.7%	52.1	47.5
West of Village Drive	Residential	2	0	68	306	25	100	0.5	0	1.8%	0.7%	46.3	41.7
Pintail Drive													

East of Village Drive	Residential	2	0	152	684	25	100	0.5	0	1.8%	0.7%	**49.8**	**45.2**
West of Sunset Avenue	Residential	2	0	104	468	25	100	0.5	0	1.8%	0.7%	**48.1**	**43.5**
East of Sunset Avenue	Residential	2	0	174	1,566	25	100	0.5	0	1.8%	0.7%	**50.4**	**48.8**
Village Drive													
South of Railroad Avenue	Residential	2	0	75	338	25	100	0.5	0	1.8%	0.7%	**46.7**	**42.1**
West of Pintail Drive	Residential	2	0	75	338	25	100	0.5	0	1.8%	0.7%	**46.7**	**42.1**
South of Pintail Drive	Residential	2	0	102	459	25	100	0.5	0	1.8%	0.7%	**48.0**	**43.5**
North of SR 12	Residential	2	0	50	225	25	100	0.5	0	1.8%	0.7%	**44.9**	**40.4**
Sunset Avenue													
North of Pintail Drive	Residential	4	15	669	6,021	35	100	0.5	0	1.8%	0.7%	**59.4**	**57.8**
South of Pintail Drive	Residential	4	15	451	4,059	35	100	0.5	0	1.8%	0.7%	**57.7**	**56.1**

TRAFFIC NOISE LEVELS

Project Number: 2021-221
Project Name: Marina Village - Affordable Housing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s): Existing Plus Project
Source of Traffic Volumes: GHD 2021
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) Ldn
State Route 12 (SR 12)													
East of Marina Boulevard	Residential	4	30	1948	8,766	30	100	0.5	0	1.8%	0.7%	62.9	58.3
West of Village Drive	Residential	4	30	1039	4,676	30	100	0.5	0	1.8%	0.7%	60.2	55.6
East of Village Drive	Residential	4	30	1916	17,244	30	100	0.5	0	1.8%	0.7%	62.9	61.3
Marina Boulevard													
North of Buena Vista Avenue	Residential	4	0	313	1,409	25	100	0.5	0	1.8%	0.7%	53.0	48.4
South of Railroad Avenue	Residential	4	0	198	891	25	100	0.5	0	1.8%	0.7%	51.0	46.4
South of SR 12	Residential	4	0	151	1,359	25	100	0.5	0	1.8%	0.7%	49.8	48.3
Railroad Avenue													
East of Marina Boulevard	Residential	4	0	347	1,562	35	100	0.5	0	1.8%	0.7%	56.5	51.8
West of Village Drive	Residential	4	0	197	887	35	100	0.5	0	1.8%	0.7%	54.0	49.4
East of Village Drive	Residential	4	0	388	3,492	35	100	0.5	0	1.8%	0.7%	56.9	55.3
Buena Vista Avenue													
East of Marina Boulevard	Residential	2	0	268	1,206	25	100	0.5	0	1.8%	0.7%	52.2	47.6
West of Village Drive	Residential	2	0	76	342	25	100	0.5	0	1.8%	0.7%	46.8	42.2
Pintail Drive													
East of Village Drive	Residential	2	0	156	702	25	100	0.5	0	1.8%	0.7%	49.9	45.3
West of Sunset Avenue	Residential	2	0	110	495	25	100	0.5	0	1.8%	0.7%	48.4	43.8

East of Sunset Avenue	Residential	2	0	348	3,132	25	100	0.5	0	1.8%	0.7%	**53.4**	**51.8**
Village Drive													
South of Railroad Avenue	Residential	2	0	75	338	25	100	0.5	0	1.8%	0.7%	**46.7**	**42.1**
West of Pintail Drive	Residential	2	0	75	338	25	100	0.5	0	1.8%	0.7%	**46.7**	**42.1**
South of Pintail Drive	Residential	2	0	103	464	25	100	0.5	0	1.8%	0.7%	**48.1**	**43.5**
North of SR 12	Residential	2	0	50	225	25	100	0.5	0	1.8%	0.7%	**44.9**	**40.4**
Sunset Avenue													
North of Pintail Drive	Residential	4	15	673	6,057	35	100	0.5	0	1.8%	0.7%	**59.5**	**57.8**
South of Pintail Drive	Residential	4	15	451	4,059	35	100	0.5	0	1.8%	0.7%	**57.7**	**56.1**

TRAFFIC NOISE LEVELS

Project Number: 2021-221
Project Name: **Marina Village - Affordable Housing**

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s):	**Cumulative No Project**
Source of Traffic Volumes:	GHD 2021
Community Noise Descriptor:	L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) Ldn
State Route 12 (SR 12)													
East of Marina Boulevard	Residential	4	30	2645	11,903	30	100	0.5	0	1.8%	0.7%	**64.3**	**59.7**
West of Village Drive	Residential	4	30	1635	7,358	30	100	0.5	0	1.8%	0.7%	**62.2**	**57.6**
East of Village Drive	Residential	4	30	2645	23,805	30	100	0.5	0	1.8%	0.7%	**64.3**	**62.7**
Marina Boulevard													
North of Buena Vista Avenue	Residential	4	0	935	4,208	25	100	0.5	0	1.8%	0.7%	**57.8**	**53.2**
South of Railroad Avenue	Residential	4	0	500	2,250	25	100	0.5	0	1.8%	0.7%	**55.0**	**50.5**
South of SR 12	Residential	4	0	340	3,060	25	100	0.5	0	1.8%	0.7%	**53.4**	**51.8**
South of Buena Vista Avenue	Residential	4	0	598	2,691	25	100	0.5	0	1.8%	0.7%	**55.8**	**51.2**
North of SR 12	Residential	4	0	1220	5,490	25	100	0.5	0	1.8%	0.7%	**58.9**	**54.3**
Railroad Avenue													
East of Marina Boulevard	Residential	4	0	1620	7,290	35	100	0.5	0	1.8%	0.7%	**63.2**	**58.5**
West of Village Drive	Residential	4	0	1226	5,517	35	100	0.5	0	1.8%	0.7%	**61.9**	**57.3**
East of Village Drive	Residential	4	0	1705	15,345	35	100	0.5	0	1.8%	0.7%	**63.4**	**61.8**
Buena Vista Avenue													
East of Marina Boulevard	Residential	2	0	340	1,530	25	100	0.5	0	1.8%	0.7%	**53.3**	**48.7**
West of Village Drive	Residential	2	0	90	405	25	100	0.5	0	1.8%	0.7%	**47.5**	**42.9**
Pintail Drive													

East of Village Drive	Residential	2	0	185	833	25	100	0.5	0	1.8%	0.7%	**50.6**	**46.0**
West of Sunset Avenue	Residential	2	0	173	779	25	100	0.5	0	1.8%	0.7%	**50.3**	**45.8**
East of Sunset Avenue	Residential	2	0	462	4,158	25	100	0.5	0	1.8%	0.7%	**54.6**	**53.0**
Village Drive													
South of Railroad Avenue	Residential	2	0	96	432	25	100	0.5	0	1.8%	0.7%	**47.8**	**43.2**
West of Pintail Drive	Residential	2	0	90	405	25	100	0.5	0	1.8%	0.7%	**47.5**	**42.9**
South of Pintail Drive	Residential	2	0	125	563	25	100	0.5	0	1.8%	0.7%	**48.9**	**44.3**
North of SR 12	Residential	2	0	60	270	25	100	0.5	0	1.8%	0.7%	**45.7**	**41.2**
Sunset Avenue													
North of Pintail Drive	Residential	4	15	810	7,290	35	100	0.5	0	1.8%	0.7%	**60.3**	**58.6**
South of Pintail Drive	Residential	4	15	515	4,635	35	100	0.5	0	1.8%	0.7%	**58.3**	**56.7**

TRAFFIC NOISE LEVELS

Project Number: 2021-221
Project Name: **Marina Village - Affordable Housing**

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s):	**Cumulative Plus Project**
Source of Traffic Volumes:	GHD 2021
Community Noise Descriptor:	L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	**Land Use**	**Lanes**	**Median Width**	**Peak Hour Volume**	**ADT Volume**	**Design Speed (mph)**	**Dist. from Center to Receptor**	**Alpha Factor**	**Barrier Attn. dB(A)**	**Vehicle Mix Medium Trucks**	**Vehicle Mix Heavy Trucks**	**Peak Hour dB(A) L_{eq}**	**24-Hour dB(A) Ldn**
State Route 12 (SR 12)													
East of Marina Boulevard	Residential	4	30	2649	11,921	30	100	0.5	0	1.8%	0.7%	**64.3**	**59.7**
West of Village Drive	Residential	4	30	1641	7,385	30	100	0.5	0	1.8%	0.7%	**62.2**	**57.6**
East of Village Drive	Residential	4	30	2649	23,841	30	100	0.5	0	1.8%	0.7%	**64.3**	**62.7**
Marina Boulevard													
North of Buena Vista Avenue	Residential	4	0	936	4,212	25	100	0.5	0	1.8%	0.7%	**57.8**	**53.2**
South of Railroad Avenue	Residential	4	0	502	2,259	25	100	0.5	0	1.8%	0.7%	**55.1**	**50.5**
South of SR 12	Residential	4	0	340	3,060	25	100	0.5	0	1.8%	0.7%	**53.4**	**51.8**
South of Buena Vista Avenue	Residential	4	0	620	2,790	25	100	0.5	0	1.8%	0.7%	**56.0**	**51.4**
North of SR 12	Residential	4	0	1250	5,625	25	100	0.5	0	1.8%	0.7%	**59.0**	**54.4**
Railroad Avenue													
East of Marina Boulevard	Residential	4	0	1621	7,295	35	100	0.5	0	1.8%	0.7%	**63.2**	**58.5**
West of Village Drive	Residential	4	0	1228	5,526	35	100	0.5	0	1.8%	0.7%	**62.0**	**57.3**
East of Village Drive	Residential	4	0	1706	15,354	35	100	0.5	0	1.8%	0.7%	**63.4**	**61.8**
Buena Vista Avenue													
East of Marina Boulevard	Residential	2	0	350	1,575	25	100	0.5	0	1.8%	0.7%	**53.4**	**48.8**
West of Village Drive	Residential	2	0	98	441	25	100	0.5	0	1.8%	0.7%	**47.9**	**43.3**
Pintail Drive													

East of Village Drive	Residential	2	0	189	851	25	100	0.5	0	1.8%	0.7%	**50.7**	**46.1**
West of Sunset Avenue	Residential	2	0	178	801	25	100	0.5	0	1.8%	0.7%	**50.5**	**45.9**
East of Sunset Avenue	Residential	2	0	462	4,158	25	100	0.5	0	1.8%	0.7%	**54.6**	**53.0**
Village Drive													
South of Railroad Avenue	Residential	2	0	96	432	25	100	0.5	0	1.8%	0.7%	**47.8**	**43.2**
West of Pintail Drive	Residential	2	0	90	405	25	100	0.5	0	1.8%	0.7%	**47.5**	**42.9**
South of Pintail Drive	Residential	2	0	252	1,134	25	100	0.5	0	1.8%	0.7%	**52.0**	**47.4**
North of SR 12	Residential	2	0	60	270	25	100	0.5	0	1.8%	0.7%	**45.7**	**41.2**
Sunset Avenue													
North of Pintail Drive	Residential	4	15	814	7,326	35	100	0.5	0	1.8%	0.7%	**60.3**	**58.7**
South of Pintail Drive	Residential	4	15	515	4,635	35	100	0.5	0	1.8%	0.7%	**58.3**	**56.7**

ATTACHMENT 4.17

Technical Memorandum, Marina Village Project Traffic Study & VMT Analysis
GHD Transportation, September 2021

Technical Memorandum

28 October 2021

To	Carlton Randle, Solano Affordable Housing Foundation 1411 Oliver Rd #220, Fairfield, CA 94534	**Tel**	(916) 245-4211
Copy to	Mike Martin, ECORP Consulting, Inc. Seth Myers, ECORP Consulting, Inc.	**Email**	Makinzie.Clark@ghd.com
From	Kamesh Vedula, PE, TE, GHD Makinzie Clark, GHD Ethan Angold, GHD	**Ref. No.**	11229090
Subject	Marina Village Project Traffic Study & VMT Analysis		

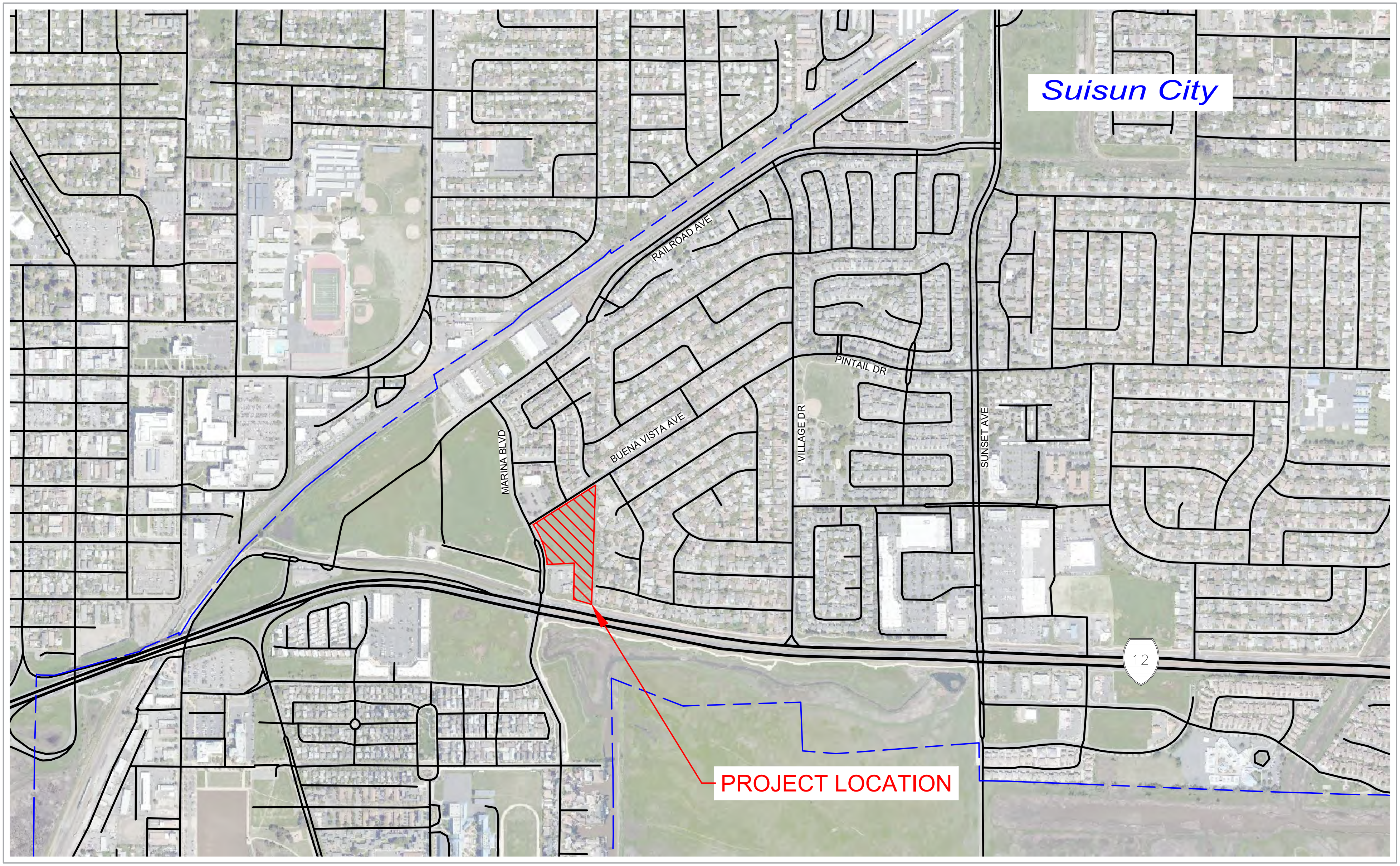
1. Introduction

The City of Suisun City has retained GHD to perform a traffic study for the proposed Marina Village development project (referred to herein as the "Project"). The proposed affordable multi-family development is located in the northeast quadrant of the intersection of State Route (SR) 12 and Marina Boulevard, adjacent to the existing ARCO station. Project access is proposed along Marina Boulevard and Buena Vista Avenue.

This technical memorandum has been prepared to document the results of the level of service (LOS) and vehicle miles traveled (VMT) analysis conducted for external intersections associated with the Marina Village development project. Included in this technical memorandum is discussion of the following:

– Technical analysis parameters and methodologies
– Study intersections, data collection, and existing conditions assumptions
– Project description, including quantification of the trip generation and trip distribution
– Analysis scenarios (Existing and Cumulative No Project and Plus Project conditions)
– Intersection improvement recommendations
– VMT analysis and Project impacts

Figure 1.1 presents the project location.



LEGEND:
ROADWAYS
CITY LIMITS

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1 inch = 1000 ft.

GHD

City of Suisun City
Marina Village Housing Development

Vicinity Map

Project No. **11229090**
Report No. **MEM002**
Date **06/30/2021**

FIGURE 1.1

Filename: \\ghdnet\ghd\US\Sacramento - 2200 21st\Projects\561\11229090\Digital_Design\11229090TRG002.dwg Plot Date: 19 August 2021 - 2:10 PM

Source:

2. Technical Analysis Parameters & Methodologies

The following section outlines the analysis parameters and methodologies that will be used in the transportation impact study to quantify potential project impacts for the analysis scenarios.

2.1 Vehicle Miles Travelled (VMT)

Senate Bill (SB) 743 was signed into law in 2013, with the intent to better align CEQA practices with statewide sustainability goals related to efficient land use, greater multimodal choices, and greenhouse gas reductions. The provisions of SB 743 became effective Statewide on July 1, 2020. Under SB 743, automobile delay, traditionally measured as level of service (LOS), is no longer considered an environmental impact under CEQA. Instead, impacts are determined by changes to vehicle miles traveled (VMT). VMT measures the number and length of vehicle trips made on a daily basis. VMT is a useful indicator of overall land use and transportation efficiency, where the most efficient system is one that minimizes VMT by encouraging shorter vehicle trip lengths, more walking and biking, or increased carpooling and transit. In recognition that the character of communities, availability of travel modes options and geographic areas all differ throughout the State, each jurisdiction, from regional agency, to County, to City, has been given the opportunity to establish their own VMT thresholds consistent with the State's guidelines and regulatory framework. For this analysis, VMT will be analyzed to determine compliance under CEQA, and LOS will also be analyzed in alignment with City policy.

Existing and future vehicle miles traveled (VMT) will be estimated using the City of Fairfield travel demand model (TDM) to evaluate the amount and distance of automobile travel attributable to the project. Project VMT will be evaluated using the thresholds of significance for residential land uses as described in *Exhibit A – VMT Thresholds of Significance* from Resolution No. 2020-122 (September 2020), as explained in Section 9 of this memorandum.

2.2 Level of Service Methodologies

In addition to VMT, traffic operations will be quantified through the determination of "Level of Service" (LOS). Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection, or roadway segment, representing progressively worsening traffic conditions. LOS "A" represents free-flow operating conditions and LOS "F" represents over-capacity conditions. Levels of Service will be calculated for all intersection control types using the methods documented in the Transportation Research Board publication *Highway Capacity Manual, Sixth Edition, A Guide for Multimodal Mobility Analysis,* 2016 (HCM 6).

2.2.1 Intersection Operations

The Synchro 10 (Trafficware) software program will be used to implement the HCM 6 analysis methodologies. Synchro 10 has the capability to produce results based on HCM 2000, HCM 2010, HCM 6, or Synchro methodologies, and takes into account intersection signal timing and queuing constraints when calculating delay, the corresponding delay, and queue lengths. Intersection Level of Service (LOS) will be calculated for all control types using the methods documented in HCM 6. For signalized or all-way stop-controlled (AWSC) intersections, an LOS determination is based on the calculated averaged delay for all approaches and movements. For two-way or side-street stop-controlled (TWSC) intersections, an LOS determination is based upon the calculated average delay for all movements of the worst performing approach. The vehicular-based LOS criteria for different types of intersection controls are presented in Table 2.1.

Table 2.1 Level of Service (LOS) Criteria for Intersections

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay per Vehicle	
				Signalized	Un-signalized
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤10.0	≤10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>10.0 and ≤20.0	>10.0 and ≤15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and ≤35.0	>15.0 and ≤25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and ≤55.0	>25.0 and ≤35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and ≤80.0	>35.0 and ≤50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	>80.0	>50.0

2.2.2 Technical Analysis Parameters

This traffic study focuses on a “planning level” evaluation of traffic operating conditions. The planning level evaluation incorporates appropriate heavy vehicle adjustment factors, peak hour factors, and signal lost time factors and reports the resulting operational analysis as estimated using the HCM 6-based analysis methodologies. Assessments of “design level” parameters (including queuing on intersection lane groups, stacking length requirements, etc.) are not included in this study.

Table 2.2 presents the technical parameters that will be utilized for the evaluation of the study intersections and ramp segments for the analysis scenarios. All parameters not listed should be assumed as default values or calculated based on parameters listed.

Table 2.2 Technical Parameter Assumptions

	Technical Parameter	Assumption
1	Intersection Peak Hour Factor	Based on counts, intersection overall, minimum 2 percent
2	Intersection Heavy Vehicle Percent	Based on counts, intersection overall, minimum 2 percent
3	Pedestrian & Bicycle Volumes	Based on counts
4	Intersection Peak Hour Factor	Existing scenarios: based on counts Cumulative scenarios: based on counts, minimum 0.92
5	Signal Timings	Based on Caltrans and City timing plans
6	Right Turn on Red at Signals	Intersection counts (collected with new counts), or based on Synchro

2.2.3 Level of Service Policies

Caltrans

Caltrans' Guide for the Preparation of Traffic Impact Studies contains the following policy pertaining to the LOS standards within Caltrans jurisdiction:

Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.

City of Suisun City

The City of Suisun City 2035 General Plan Transportation Element (August 2015) specifies the following minimum Level of Service standards for all streets and intersections within the City’s jurisdiction:

Policy T-1.1:

The City will review and condition developments to maintain level of service E or better during peak travel periods, as feasible.

2.2.4 Multimodal Policies

The Project must be consistent with the City of Suisun City’s 2035 General Plan Transportation Element policies, including the following:

Policy T-1.3:

The City’s Level of Service policy will be implemented in consideration of the need for pedestrian and bicycle access, the need for emergency vehicle access, and policies designed to reduce vehicle miles travelled.

Policy T-1.6:

The City will design and operate streets and intersections to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.

3. Study Locations & Data Collection

For this study, seven (7) existing intersections have been identified for study under AM and PM peak hour conditions. These locations will be evaluated for average weekday AM and PM peak hour operations under all analysis scenarios. The AM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 7:00 am and 9:00 am on a typical weekday. The PM peak hour is defined as the one hour of peak traffic flow counted between 4:00 pm and 6:00 pm on a typical weekday. Existing geometry including lane usage and storage capacity at the study locations will be determined based on current aerial images.

3.1 Study Intersections

The study intersections are listed below. Peak hour turning movement counts were collected at these intersections on Wednesday, June 2, 2021.

1. Marina Boulevard & State Route 12
2. Marina Boulevard & Buena Vista Avenue
3. Marina Boulevard & Railroad Avenue
4. Village Drive & Railroad Avenue
5. Village Drive & Buena Vista Avenue / Pintail Drive
6. Village Drive & State Route 12
7. Sunset Avenue & Pintail Drive

3.1.1 Traffic Count Validation

The COVID-19 pandemic has caused atypical traffic conditions to occur in many regions since March 2020, often a decrease from typical traffic volumes due to reduced frequency of travel and commuting. In order to verify that the count data collected on June 2, 2021 represents typical traffic conditions, the peak hour count volumes at intersection #1 - Marina Boulevard & State Route (SR) 12 were compared against 2019 (pre-COVID-19 conditions) Caltrans data, as well as data from Replica, a “big data” source that utilizes geographic data from mobile devices to estimate traffic volumes.

Based on Caltrans published Average Annual Daily Traffic (AADT) data at post mile (PM) 5.150, the 2019 AADT measured on SR 12 west of Marina Boulevard was 34,600, and the AADT measured east of Marina Boulevard was 30,700, for an average of approximately 33,000 AADT. Peak hour data was not available at these locations for 2019 or recent years prior. To determine if the turning movement counts collected in June 2021 reflect typical traffic conditions with respect to daily traffic volumes, GHD evaluated Caltrans published peak hour data along SR 12 within the project vicinity and determined that the global maximum portion of daily traffic experienced on SR 12 during the AM or PM peak hours (k factor) was 8 percent (i.e., AM or PM peak hour volume is equal to approximately 8 percent of AADT volume at Caltrans count locations along SR 12)[1]. To produce a conservative (upper) estimate of Caltrans data for comparison against the 2021 turning movement counts, the AM peak hour is assumed to make up 8 percent of AADT, and the PM peak hour is assumed to make up 10 percent of AADT. Using these proportions, GHD estimated total (both directions) peak hour volumes for SR 12 at Marina Boulevard to be 2,640 (8 percent of 33,000 AADT) during the AM peak hour and 3,300 (10 percent of 33,000 AADT) during the PM peak hour (directionality was not determined).

Replica data was gathered for single vehicle trips for the west leg of the SR 12 & Marina Boulevard intersection, for both eastbound and westbound traffic, for the period between September and November 2019. The total peak hour volumes estimated by Replica were 2,400 during the AM peak hour and 3,200 during the PM peak hour.

[1] From Caltrans 2019 peak hour data, AM peak hour times on State Route 12 varied between 5:00am to 8:00am (start time). PM peak hour times on State Route 12 varied between 1:00pm to 5:00pm (start time).

Table 3.1 presents a summary of turning movement count (TMC) volumes and estimates from Caltrans and Replica.

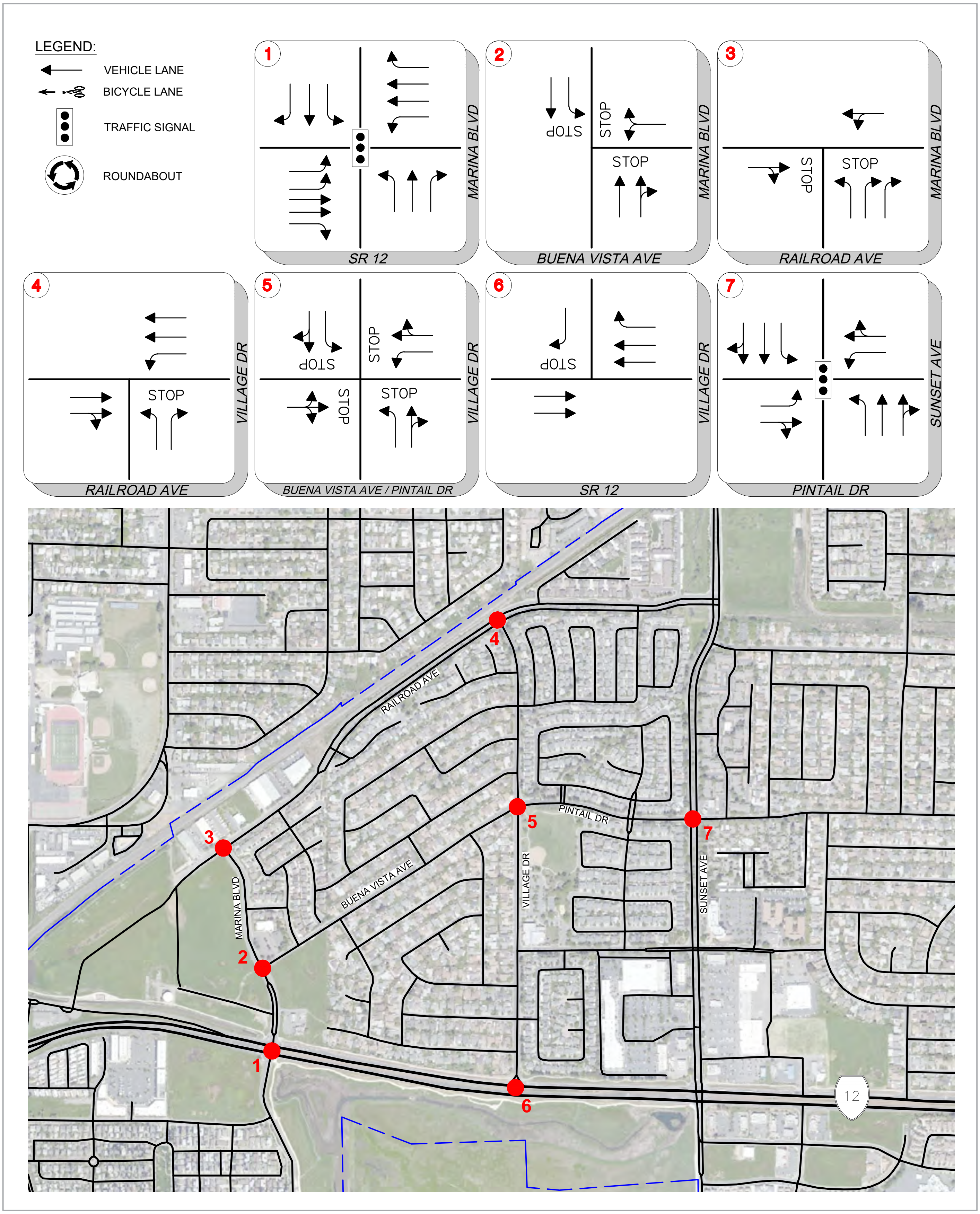
Table 3.1 Traffic Data Source Comparison

Source	Data Year	Location	AM Peak			PM Peak		
			EB	WB	Total	EB	WB	Total
Peak Hour TMC	2021	SR 12 & Marina Blvd	774	1,785	2,559	2,190	1,166	3,356
Caltrans[2]	2019	SR 12 & Marina Blvd (PM 5.150)	-	-	2,640	-	-	3,300
Replica	2019	SR 12 w/o Marina Blvd	800	1,600	2,400	2,200	1,000	3,200

As presented in Table 3.1, the observed peak hour volume totals from the 2021 turning movement counts were within 100 vehicles of the 2019 Caltrans estimates for both AM and PM, and exceeded 2019 Replica estimates for both AM and PM. Based on this comparison, 2021 turning movement count volumes at the seven study intersections can be considered within the range of typical traffic conditions and can be used to evaluate existing traffic conditions and to forecast traffic volumes under Cumulative conditions.

Figure 3.1 presents the existing intersection lane geometry and control in place at each study intersection. Figure 3.2 presents the AM and PM peak hour turning movement volumes under Existing conditions, gathered from counts collected on Wednesday, June 2, 2021.

[2] Estimated from available ADT data, and the global maximum k factor of 8%



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1 inch = 1000ft.

GHD

City of Suisun City
Marina Village Housing Development

Existing
Lane Geometrics and Control

Project No. **11229090**
Report No. **MEM002**
Date **06/30/2021**

FIGURE 3.1

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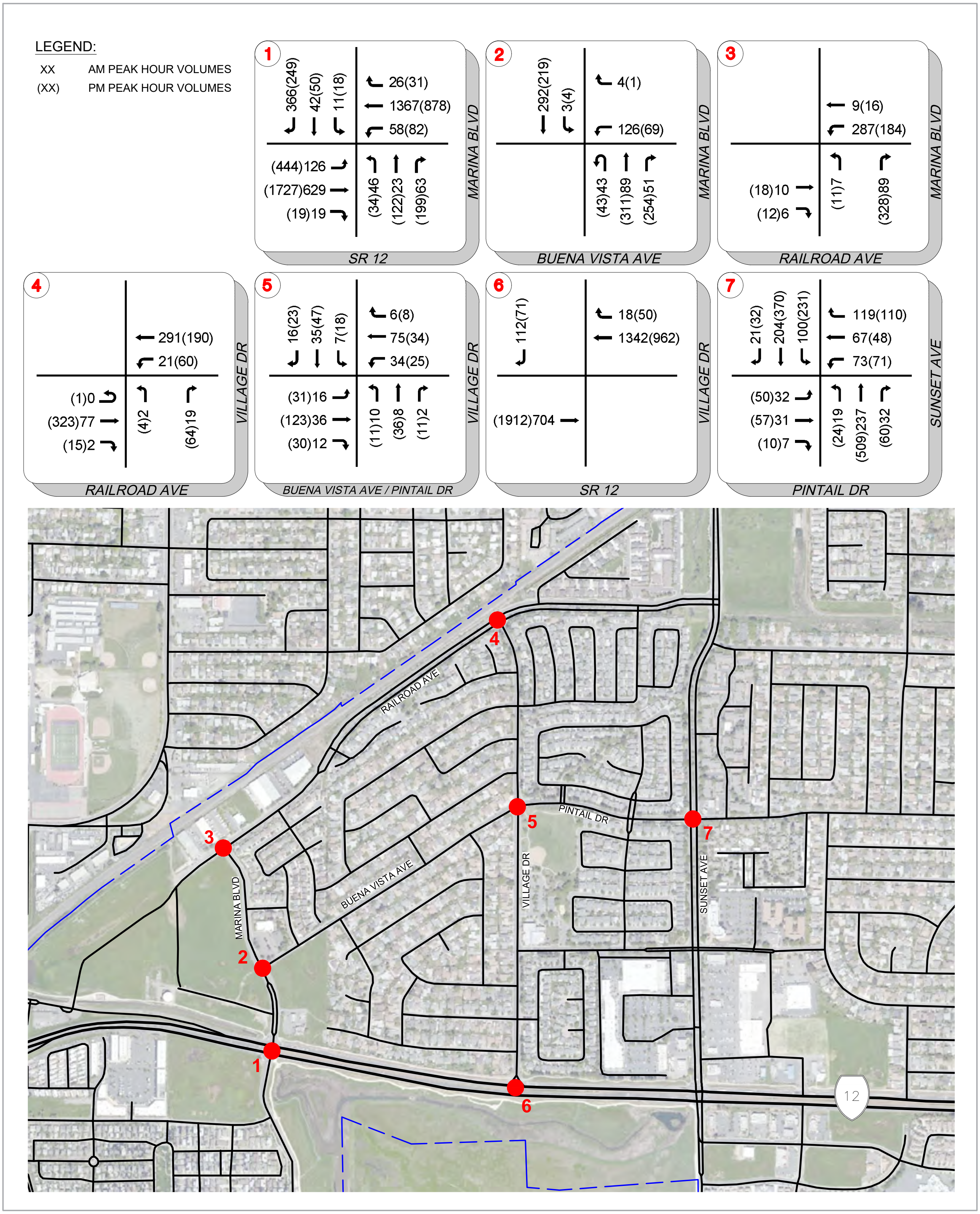

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1 inch = 1000ft.

City of Suisun City
Marina Village Housing Development

AM & PM Peak Hour Volumes
Existing Conditions

Project No. **11229090**
Report No. **MEM002**
Date **06/30/2021**

FIGURE 3.2

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Source:

4. Project Description

The term “Project” as used in this study refers to the proposed residential development located in western Suisun City, north of State Route 12 and east of Marina Boulevard. The project is considered affordable multifamily housing. The proposed 5.2-acre development is an apartment complex comprised of an estimated 160 apartment units of varying sizes, a site management office, 220 parking stalls, and spaces for various amenities and landscaping. The planned apartment buildings are three stories, so they are considered mid-rise residential developments.

4.1 Project Site Plan & Site Access

Figure 4.1 presents the site plan for the proposed development. The primary site access will be located adjacent to the management office, along the western edge of the site, connecting to Marina Boulevard through a right-turn-only driveway. A few guest parking spaces and a truck turnaround zone will be accessible from this entrance in advance of auto access gates. A secondary site access will be located at the north-eastern corner of the development, connecting to Buena Vista Avenue through a new driveway. In addition to the auto access points, pedestrian access points will provide connections to Marina Boulevard and Buena Vista Avenue.

The proposed development includes security gates at the two vehicular entrances. These gates will remain open during the hours of 7:00 AM through 7:00 PM daily. The development also includes an eastbound right turn pocket at the proposed Buena Vista Avenue driveway (this would require eliminating several existing on-street parking spaces).

4.1.1 Project Parking Supply

As mentioned above, the project proposes 220 parking stalls on the project site. This section documents the proposed parking demand per the project site plan. Table 4.1 presents the project parking demand using *ITE Parking Generation Manual 5th edition* weekly average fitted-curve equations or average rates. As shown, the project is anticipated to generate a parking demand of 206 parking spaces during the weekday (Monday-Friday). Parking demand should be revaluated if parking spaces are eliminated to accommodate an eastbound right turn pocket at the Buena Vista Avenue driveway.

Table 4.1 Project Parking Supply

Land Use Category (ITE Code)	Unit[1]	Parking Demand Rate/Unit[2]
Multifamily Housing (Mid-Rise) - 221	DU	P=1.34(DU)-8.73
Project Name	**Quantity (Units)**	**Parking Demand: Weekday**
Marina Village Housing Development	160	206

1. DU = dwelling unit

2. Parking rates based on ITE Parking Generation Manual 5th edition weekday average fitted-curve equations or average rates.

4.1.2 Project Driveways Sight Distance

This section documents the sight distance calculated for the two (2) project driveways described above. A Stopping Sight Distance Analysis was performed for the Northern and Western Driveways of the Marina Village Housing Development. The assumed driveway locations were determined based on the draft Site Plan provided by the City (see Figure 4.1).

Site Plan

Project Data

TOTAL APARTMENTS: +/- 160 UNITS					
bd / ba	1/1	2/2	3/2	4/2	total
Bldg A	2	3	2	1	8
Bldg B	6	9	6	3	24
Bldg C	9	15	6	3	33
Bldg D	9	15	6	3	33
Bldg E	0	3	12	0	15
Bldg F	6	9	6	3	24
Bldg G	6	0	6	3	15
Bldg H	2	2	4	0	8
totals:	40	56	48	16	160

TOTAL PARKING: +/- 234 STALLS

Calc. Per Zoning Code Table_18.42.110
(40) 1-bed = 40 covered + 10 guest
(56) 2-bed = 56 covered + 28 uncovered + 14 guest
(64) 3 & 4 bed = 64 covered + 6 uncovered + 16 guest
Total Req'd Spaces = 160 covered: 74 uncovered = 234 stalls

Standard Stall: 144 stalls (9'x19')
Compact Stall: 90 stalls (8'x16')
Elec. Vehicle: (EV.) 5 stalls (10 future)

SITE AREAS / COVERAGE / OPEN SPACE

Bldg Lot Coverage = +/- 26%
Bldg Site: 226,512 sf (5.2ac)
Bldg footprints: +/- 58,363 sf

Parking Landscape % = 18% (10% min per 18.42.040)
Parking Paved Area: 75,413 sf
Parking Landscape: 16,726 sf

Usable Open Space: +/- 27,400sf
Community Rm + Plaza: +/- 2400 sf
Play Area/Patio/Green: +/- 5,000 sf
Village Walks & Green Space: +/- 15,000 sf

SETBACKS & HEIGHT – RH2 MF

Street Frontage: 15'-0" min.
Side to Side Interior: 5'-0" min.
Rear yard: 5'-0" min.

Max. Bldg Height: 55'-0"

PRIVATE OPEN SPACE

Each apartment to have a private Patio or Balcony having a min. 5' dimension.

Marina Village - Housing
Solano Affordable Housing Foundation
201 Marina Blvd., Suisun, CA
03.01.21

VRILAKAS | GROEN

City of Suisun City
Marina Village Housing Development

Site Plan

Project No. **11229090**
Report No. **MEM002**
Date **06/30/2021**

FIGURE 4.1

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Source:

Both Buena Vista Avenue and Marina Boulevard have posted speeds of 25 miles per hour (mph) in the vicinity of the proposed Project driveways. On Marina Boulevard north of State Route 12, generous lane widths and gentle curves allow drivers to navigate the roadway at higher speeds. To produce a conservative estimate of sight distance requirements, sight distance on Buena Vista Avenue was analyzed based on a design speed of 30 miles per hour. Sight distance on Marina Boulevard was analyzed based on a design speed of 40 miles per hour. Table 4.2 summarizes the assumed design speed and the resulting stopping sight distance for each Project driveway.

Table 4.2 Design Criteria and Stopping Sight Distance

Project Driveway	Design Speed (mph)	Stopping Sight Distance (feet)
Marina Boulevard	40	305
Buena Vista Avenue	30	200

Due to the proximity to traffic signals and stop controlled intersections, it is likely that the driveways provide adequate stopping sight distance in their current locations. As stopping sight distance is a key aspect of safe design, it is critical that obstructions (including but not limited to: signs, fences, bus shelters and stops, parking stalls, and trees) be placed in a manner not to impede the view of a stopped vehicle (sight triangle). Because Marina Boulevard lies on the convex side of a horizontal curve, there is a potential for a blind spot approximately mid-way through the curve. It is essential that sight be maintained from approximately from the curb return at the intersection with Highway 12 through the driveway opening. Sight distance figures are provided in the Appendix.

4.2 Project Trip Generation

Project site trip generation has been estimated for the total number of dwelling units. These estimations were achieved by utilizing the Institute of Transportation Engineers (ITE) publication *Trip Generation Manual (10th Ed.)*. Trip rates for the 160 dwelling units used the land use code 221 for Multi-Family Housing (Mid-Rise). The amenities seen in the Site Plan are assumed to be local-serving, so will not generate additional trips. Table 4.3 presents the project trip generation for Plus Project conditions

Table 4.3 Project Trip Generation

Land Use Category (ITE Code)	Unit[1]	Daily Trip Rate/Unit[2]	AM Peak Hour Trip Rate/Unit			PM Peak Hour Trip Rate/Unit		
			Total	In percent	Out percent	Total	In percent	Out percent
Multifamily Housing (Mid-Rise) - 221	DU	T = 5.45(DU) - 1.75	0.32	27 percent	73 percent	0.41	60 percent	40 percent
Project Name	**Quantity (Units)**	**Daily Trips**	**AM Peak Hour Trips**			**PM Peak Hour Trips**		
			Total	**In**	**Out**	**Total**	**In**	**Out**
Marina Village Housing Development	160	870	51	14	37	66	40	26
Net New Project Trips		**870**	**51**	**14**	**37**	**66**	**40**	**26**

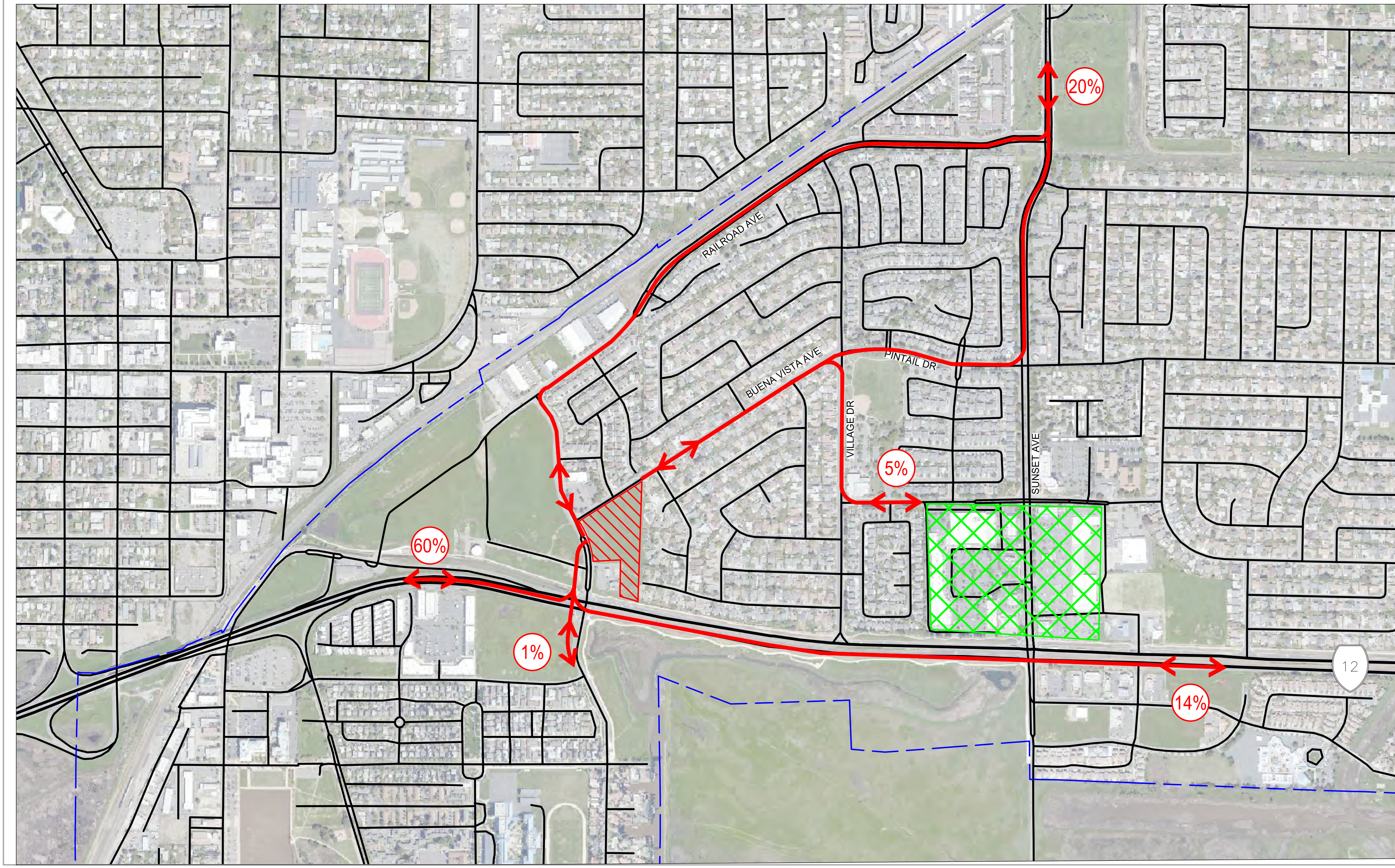
Notes:
1. DU = dwelling unit
2. Trip rates based on ITE Trip Generation Manual 10th edition weekday average fitted-curve equations or average rates.

As presented in Table 4.3, the Project will generate an estimated 870 daily vehicle trips, 51 vehicle trips during the AM peak hour, and 66 vehicle trips during the PM peak hour. The Project's trip generation is assumed to remain constant for between Existing Plus Project and Cumulative Plus Project scenarios.

4.3 Project Trip Distribution

Figure 4.2 presents the distribution of Project-generated vehicle trips under Existing and Cumulative Plus Project conditions[3]. The Project-generated inbound and outbound trips presented in Table 4.3 were assigned to the study intersections based on the trip distribution, and the resulting additional traffic through study intersections generated by the Project is presented in Figure 4.3.

[3] Figure 4.2 specificly identifies the local Sunset Avenue Commercial Center because a portion of Project traffic (5%) makes a distinct turning movement at one of the study intersections to access this center. Other local commercial centers exist near the Project Site, and the Project traffic that accesses these sites is included in the other percentages shown.



LEGEND:

TRIP DISTRIBUTION PATHS

PROJECT LOCATION

LOCAL COMMERCIAL AREA

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1 inch = 1000ft.

GHD

City of Suisun City
Marina Village Housing Development

Project Daily Residential Trip Distribution

Project No. **11229090**
Report No. **MEM002**
Date **07/06/2021**

FIGURE 4.2

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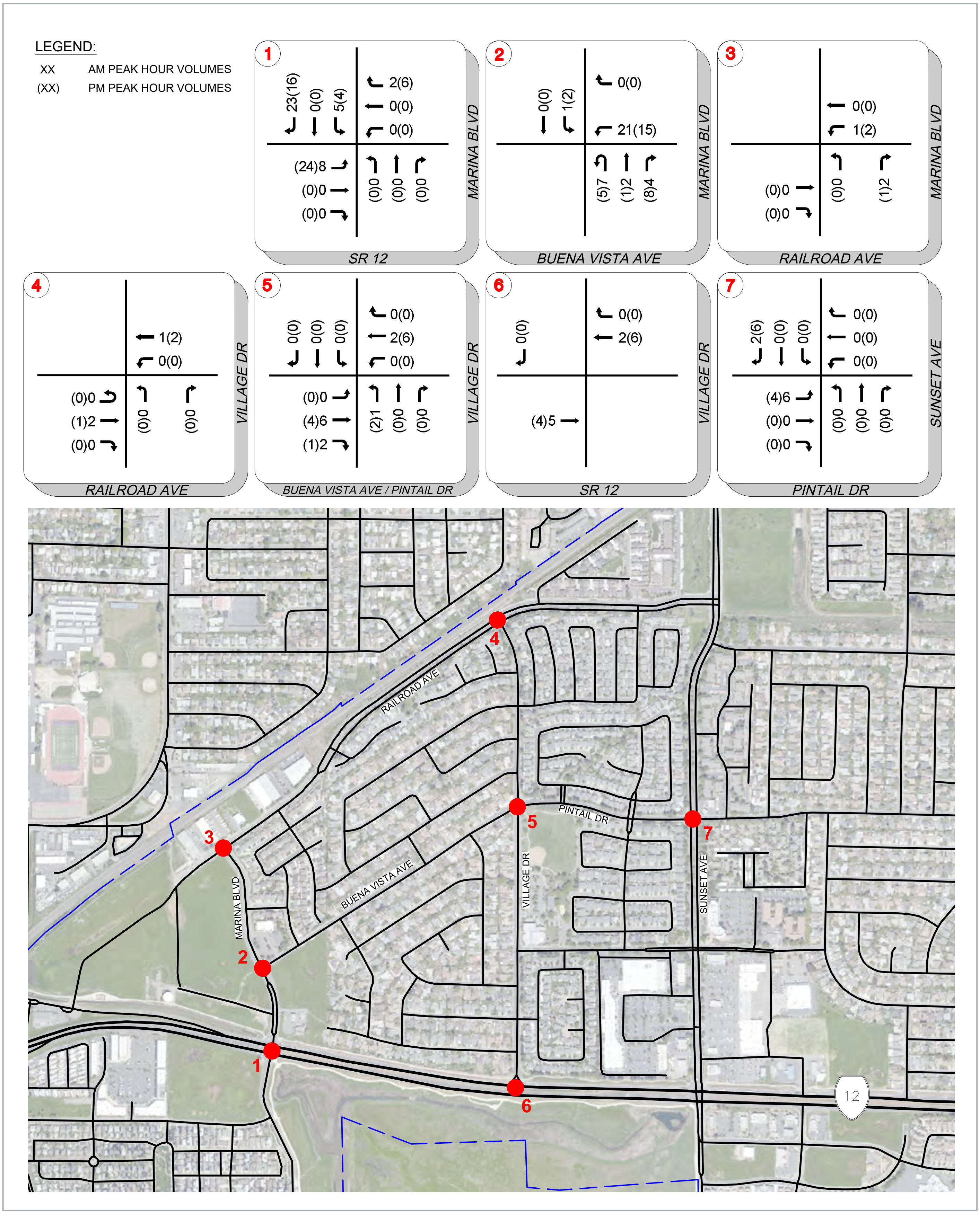

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1 inch = 1000ft.

GHD

City of Suisun City
Marina Village Housing Development

AM & PM Peak Hour Volumes
Project-Generated Volumes

Project No. **11229090**
Report No. **MEM002**
Date **08/02/2021**

FIGURE 4.3

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Source:

5. Existing Conditions

The Existing conditions scenario represent existing transportation facilities serving the project site and establish the traffic conditions which currently exist for those facilities. Existing conditions intersection operations are presented in the following tables.

5.1 Existing Conditions Intersection Operations

Existing conditions weekday AM and PM peak hour intersection operations were quantified utilizing the existing traffic volumes and intersection lane geometrics and control. Table 5.1 provides the delay (in sec/veh) and resulting LOS for the seven study intersections under Existing conditions.

Table 5.1 Intersection LOS – Existing Conditions

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
1	Marina Blvd & State Route 12	Signal	D	45.2	D	45.5	D
2	Marina Blvd & Buena Vista Ave	AWSC	E	9.2	A	11.8	B
3	Marina Blvd & Railroad Ave	TWSC	E	9.2	A	10.4	A
4	Village Dr & Railroad Ave	TWSC	E	8.9	A	10.1	B
5	Village Dr & Buena Vista Ave / Pintail Dr	AWSC	E	8.1	A	8.7	A
6	Village Dr & State Route 12	TWSC	D	19.6	C	13.1	B
7	Sunset Ave & Pintail Dr	Signal	E	12.1	B	14.9	B

Notes:
1. *AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout*
2. *LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, and RNDBT*
3. ***Bold** = Unacceptable Conditions*
4. *OVR = Delay over 300 seconds*

As shown in Table 5.1, all study intersections operate at or above the target LOS during the Existing conditions AM and PM peak hours. #1 Marina Boulevard & State Route 12 operates at the target LOS "D" during both peak hours.

5.2 Collision History

Collision data was gathered from the Statewide Integrated Traffic Records System (SWITRS) for the years 2015 to 2019. Table 5.2 presents the number of collisions by severity that occurred at each study intersection during the 5-year analysis period, including collisions that occurred on the intersection approaches.

Table 5.2 Study Intersection Collisions by Severity – All Collisions 2015 - 2019

#	Location	TOTAL COLLISIONS	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	Property Damage Only
1	Marina Blvd & State Route 12	**102**	2	2	2	26	70
2	Marina Blvd & Buena Vista Ave	**7**	-	-	1	1	5
3	Marina Blvd & Railroad Ave	**2**	-	1	1	-	-
4	Village Dr & Railroad Ave	**5**	-	1	-	-	4
5	Village Dr & Buena Vista Ave / Pintail Dr	**7**	-	-	1	2	4
6	Village Dr & State Route 12	**20**	-	-	-	-	20
7	Sunset Ave & Pintail Dr	**28**	-	1	2	9	16

As presented in Table 5.2, a substantial number of collisions occurred at the study intersections along State Route 12, as well as #7 – Sunset Avenue & Pintail Drive. Collisions resulting in fatality or severe injury (FSI collisions) occurred at four of the seven study intersections during the 5-year period between 2015 and 2019.

Table 5.3 presents the collisions involving pedestrians or bicyclists.

Table 5.3 Study Intersection Collisions by Severity – Pedestrian & Bike Collisions 2015 - 2019

#	Location	TOTAL PED & BIKE COLLISIONS	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	Property Damage Only
1	Marina Blvd & State Route 12	**6**	2	-	-	1	3
2	Marina Blvd & Buena Vista Ave	**1**	-	-	-	-	1
3	Marina Blvd & Railroad Ave	**1**	-	1	-	-	-
4	Village Dr & Railroad Ave	**-**	-	-	-	-	-
5	Village Dr & Buena Vista Ave / Pintail Dr	**2**	-	-	1	1	-
6	Village Dr & State Route 12	**-**	-	-	-	-	-
7	Sunset Ave & Pintail Dr	**5**	-	1	-	4	-

As presented in Table 5.3, a higher proportion of collisions involving pedestrians or bicyclists result in severe injury or fatality. Of the 15 total pedestrian and bicycle-involved collisions, 7 involved pedestrians and 8 involved bicyclists.

5.3 Roadway Classification

According to the City of Suisun General Plan, Marina Boulevard north of SR 12 and Railroad Avenue are considered arterials. Marina Boulevard south of SR 12, Buena Vista Avenue, Village Drive, and Merganser Drive are considered collectors.

5.4 Multimodal Facilities

Limited sidewalk coverage is provided along isolated segments of Marina Boulevard. There is currently no sidewalk fronting the Project site on the east side of Marina Boulevard, nor along the south side of Buena Vista Avenue. However, there is continuous sidewalk coverage along the south side of Buena Vista Avenue from the eastern edge of the project site to Sunset Avenue.

The Central County Bikeway (Class I trail) is located along the north side of SR 12 within the project vicinity. Class II bike lanes are provided along Marina Boulevard, Railroad Avenue, and Sunset Avenue in the project vicinity.

The development will provide walking access to adjacent sidewalk facilities on Marina Boulevard and Buena Vista Avenue. The Project will also provide improved public access from Chipman Lane to the Central County Bikeway located to the south of the Project site.

There is a bus stop located on the south side of Buena Vista Avenue directly fronting the Project site, Additionally, the Project site is located approximately a quarter mile north of the Driftwood Drive & Marina Boulevard bus stop. These stops are served by FAST Transit Route 5, which travels east/west between the Fairfield Transportation Center and Suisun City Senior Center on Merganser Drive.

6. Existing Plus Project Conditions

The *Existing Plus Project* condition presents traffic impacts after superimposing the additional increment traffic generated by the proposed project onto *Existing* traffic volumes, intersection lane geometrics, and controls for the proposed project site layout. This scenario evaluates project generated traffic with the Project circulation plan. This scenario assumes no additional background development to occur beyond the proposed Project. Existing Plus Project intersection turning movement estimates for the AM and PM peak hours are presented in Figure 6.1.

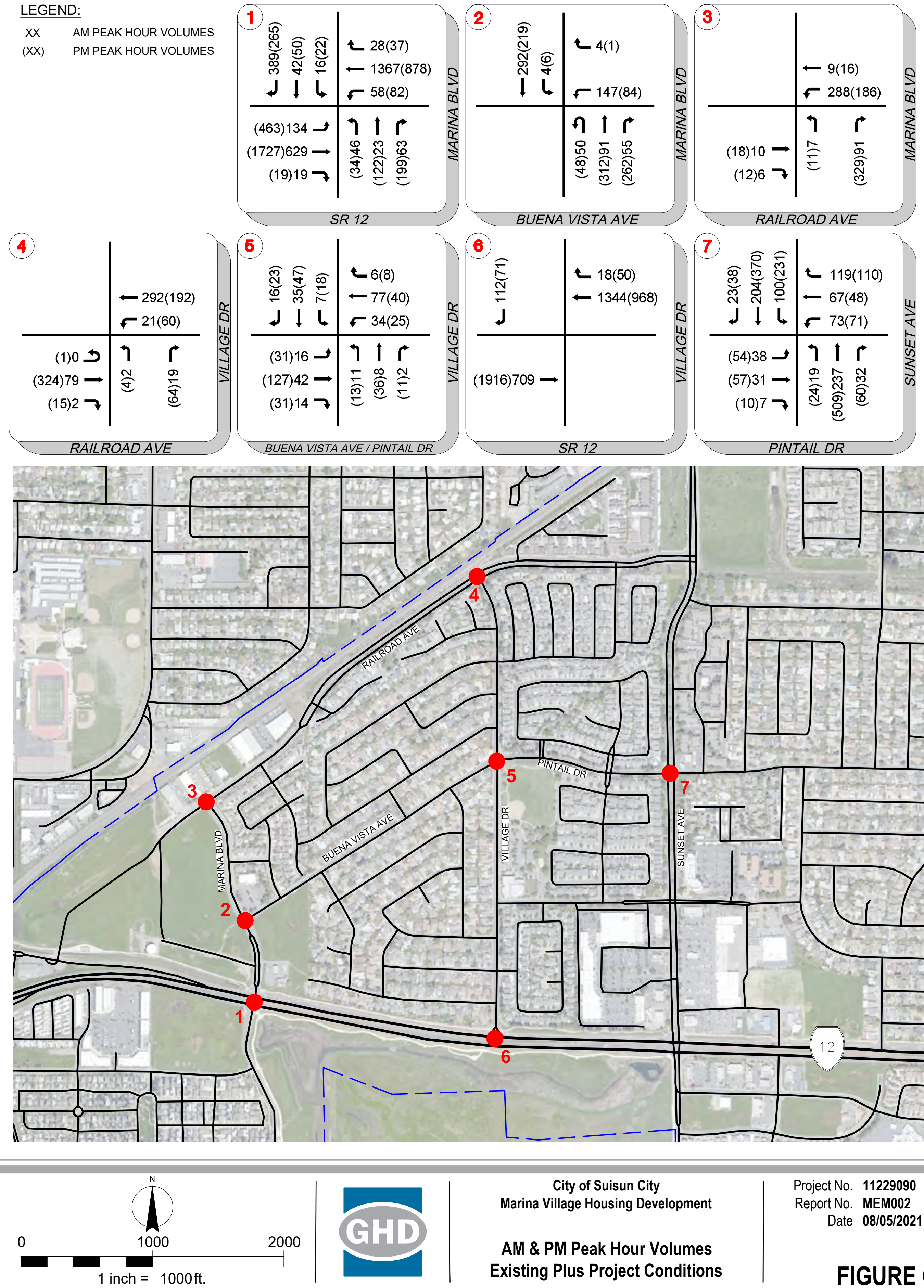
Table 6.1 provides the delay (in sec/veh) and resulting LOS for the seven study intersections under Existing plus Project conditions.

Table 6.1 Intersection LOS – Existing Plus Project Conditions

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
1	Marina Blvd & State Route 12	Signal	D	49.7	D	48.6	D
2	Marina Blvd & Buena Vista Ave	AWSC	E	9.6	A	12.3	B
3	Marina Blvd & Railroad Ave	TWSC	E	9.3	A	10.4	B
4	Village Dr & Railroad Ave	TWSC	E	8.9	A	10.1	B
5	Village Dr & Buena Vista Ave / Pintail Dr	AWSC	E	8.1	A	8.8	A
6	Village Dr & State Route 12	TWSC	D	19.7	C	13.1	B
7	Sunset Ave & Pintail Dr	Signal	E	12.1	B	14.9	B

Notes:
1. *AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout*
2. *LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT*
3. ***Bold** = Unacceptable Conditions*
4. *OVR = Delay over 300 seconds*

As shown, all study intersections operate at or above the target LOS during the Existing conditions AM and PM peak hours. Intersection #1 Marina Boulevard & State Route 12 operates at the target LOS “D” during both peak hours.



GHD

City of Suisun City
Marina Village Housing Development

AM & PM Peak Hour Volumes
Existing Plus Project Conditions

Project No. **11229090**
Report No. **MEM002**
Date **08/05/2021**

FIGURE 6.1

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Source:

7. Cumulative Conditions

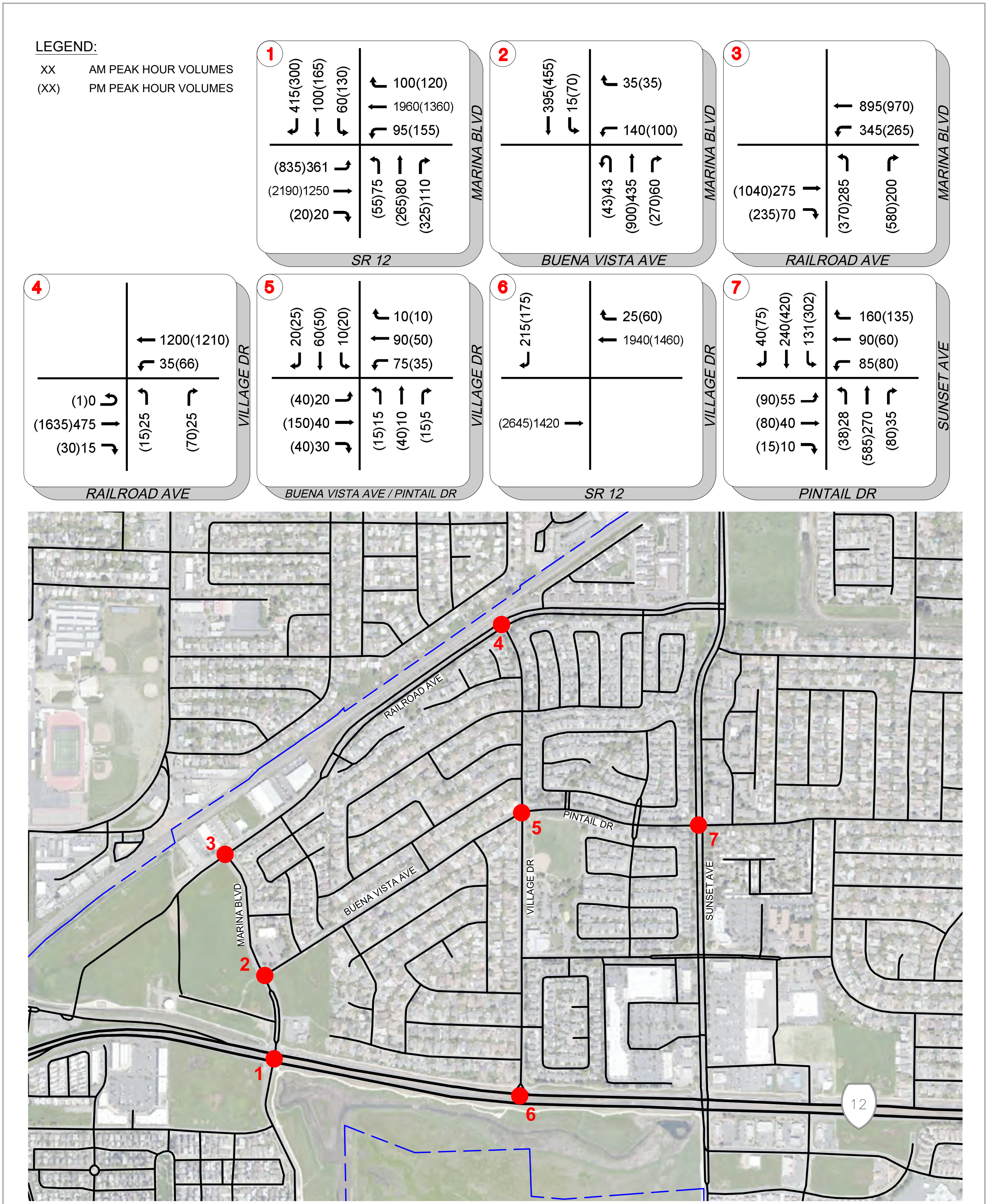
Cumulative (2040) conditions refer to the analysis scenarios which reflect future conditions represented by local and regional growth in approximately 20 years using future transportation conditions (volumes and facilities) assumed within the City of Fairfield travel demand model (TDM). Cumulative No Project conditions analyze the scenario that considers the projected 20-Year development forecast, including the currently planned and approved developments, but without the proposed Marina Village project. Cumulative intersection turning movement forecasts for the AM and PM peak hours are presented on Figure 7.1.

Table 7.1 provides the delay (in sec/veh) and resulting LOS for the seven study intersections under Cumulative conditions. As shown, intersections #1-4 and #6 operate below the target LOS during Cumulative conditions AM or PM peak hours.

Table 7.1 Intersection LOS – Cumulative Conditions

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
1	**Marina Blvd & State Route 12**	**Signal**	**D**	**106.2**	**F**	**109.9**	**F**
2	**Marina Blvd & Buena Vista Ave**	**AWSC**	**E**	13.7	B	**86.6**	**F**
3	**Marina Blvd & Railroad Ave**	**TWSC**	**E**	**OVR**	**F**	**OVR**	**F**
4	**Village Dr & Railroad Ave**	**TWSC**	**E**	21.5	C	**140.6**	**F**
5	Village Dr & Buena Vista Ave / Pintail Dr	AWSC	E	8.5	A	9.2	A
6	**Village Dr & State Route 12**	**TWSC**	**D**	**109.0**	**F**	25.3	D
7	Sunset Ave & Pintail Dr	Signal	E	19.1	B	27.4	C

Notes:
1. *AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout*
2. *LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT*
3. ***Bold** = Unacceptable Conditions*
4. *OVR = Delay over 300 seconds*



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1 inch = 1000ft.

City of Suisun City
Marina Village Housing Development

AM & PM Peak Hour Volumes
2040 No Project Conditions

Project No. **11229090**
Report No. **MEM002**
Date **08/11/2021**

FIGURE 7.1

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Source:

8. Cumulative Plus Project Conditions

The Cumulative (2040) Plus Project conditions presents traffic impacts after superimposing the additional increment traffic generated by the proposed project onto Cumulative traffic volumes, intersection lane geometrics, and controls for the proposed Project. This scenario evaluates project generated traffic with the Project circulation plan. Cumulative plus Project intersection turning movement counts for the AM and PM peak hours are presented in Figure 8.1.

Table 8.1 provides the delay (in sec/veh) and resulting LOS for the seven study intersections under Cumulative plus Project conditions. As shown, intersections #1-4 and #6 operate below the target LOS during Cumulative conditions AM or PM peak hours.

Table 8.1 Intersection LOS – Cumulative Plus Project Conditions

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
1	**Marina Blvd & State Route 12**	**Signal**	**D**	**110.4**	**F**	**113.2**	**F**
2	**Marina Blvd & Buena Vista Ave**	**AWSC**	**E**	14.4	B	**93.8**	**F**
3	**Marina Blvd & Railroad Ave**	**TWSC**	**E**	**OVR**	**F**	**OVR**	**F**
4	**Village Dr & Railroad Ave**	**TWSC**	**E**	21.7	C	**140.6**	**F**
5	Village Dr & Buena Vista Ave / Pintail Dr	AWSC	E	8.5	A	9.2	A
6	**Village Dr & State Route 12**	**TWSC**	**D**	**110.5**	**F**	25.5	D
7	Sunset Ave & Pintail Dr	Signal	E	19.3	B	27.7	C

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
*3. **Bold** = Unacceptable Conditions*
4. OVR = Delay over 300 seconds

8.1 Recommended Intersection Improvements

Under Cumulative Plus Project conditions, average vehicle delay at Intersection #2 (Marina Boulevard at Buena Vista Avenue) is anticipated to exceed Cumulative No Project conditions by 5 or more seconds. The following table provides LOS results with two improvement options:

- Maintain all-way stop control and add a northbound right turn pocket
- Construct a traffic signal

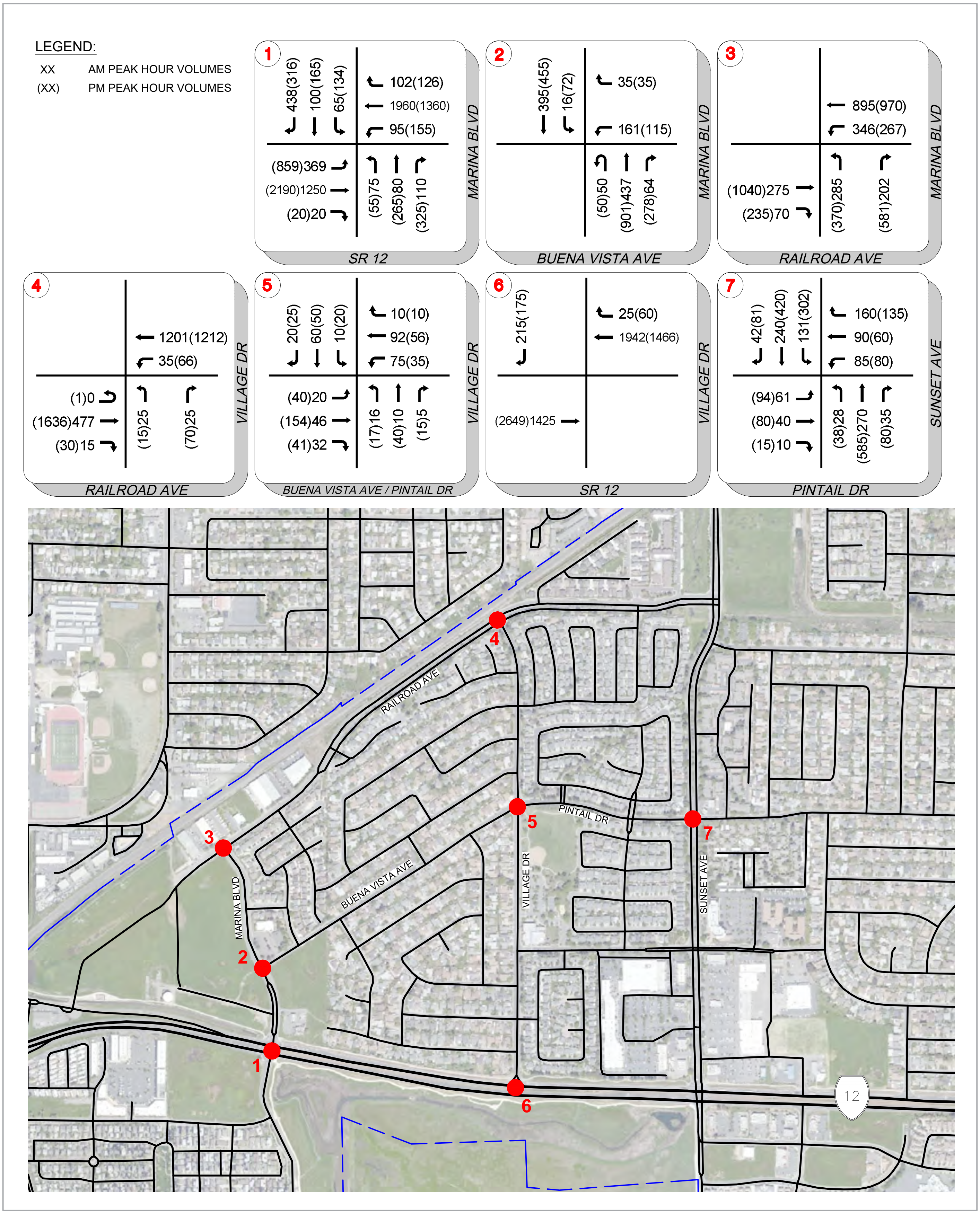
Table 8.2 Intersection LOS with Improvements

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
2	Marina Blvd & Buena Vista Ave (with Right Turn Pocket)	AWSC	E	13.8	B	49.4	E
2	Marina Blvd & Buena Vista Ave (converted to Signal)	Signal	E	9.9	A	12.0	B

Notes:
1. AWSC = All Way Stop Control; TWSC = Two Way Stop Control; RNDBT = Roundabout
2. LOS = Delay based on worst minor street approach for TWSC intersections, average of all approaches for AWSC, Signal, RNDBT
*3. **Bold** = Unacceptable Conditions*
4. OVR = Delay over 300 seconds

As shown, Intersection #2 (Marina Boulevard at Buena Vista Avenue) is anticipated to operate at acceptable LOS under both improvement options.

In addition, it is recommended that Intersection #3 (Marina Boulevard at Railroad Avenue) be converted to a traffic signal to accommodate future traffic volumes as projected using the City of Fairfield travel demand model. (Note: Future volume projections on Marina Boulevard and Railroad Avenue are not intuitive and may require further evaluation should an improvement be deemed necessary.)



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1 inch = 1000ft.

GHD

City of Suisun City
Marina Village Housing Development

AM & PM Peak Hour Volumes
2040 Plus Project Conditions

Project No. **11229090**
Report No. **MEM002**
Date **08/11/2021**

FIGURE 8.1

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Source:

There is no change in seconds of delay at Intersection #4 (Village Drive at Railroad Avenue) under Cumulative Plus Project Conditions; however, a traffic signal may be desired to achieve acceptable LOS.

8.1.1 Fair Share Calculation

The proposed Project's equitable share of improvement costs is calculated based on the portion of traffic volume growth attributable to the Project. This method of calculation is outlined in the *Caltrans Guide for the Preparation of traffic Impact Studies* (State of California, DOT, December 2002), shown below:

$P = T / (T_B - T_E)$ where

P = The equitable share for the Project's added traffic

T = The vehicle trips generated by the Project

T_B = The Forecasted traffic volume at the effected roadway facility at the time of general plan buildout, in vehicles per hour

T_E = The traffic volume existing on the effected roadway facility

Table 8.3 presents the fair share calculation for the signalization improvement at the intersection of Marina Boulevard and Buena Vista Avenue. Because the operational deficiency occurred in the PM peak hour, the PM peak hour volumes for each scenario were used in this calculation.

Table 8.3 Fair Share Calculation - Marina Boulevard and Buena Vista Avenue Improvement

Scenario / Calculated Variable	Formula	Marina Blvd at Buena Vista Ave Total Intersection Volume (PM Peak Hour)
Existing (PM Peak)	T_E	901
Cumulative Plus Project (PM Peak)	T_B	1906
Total Volume Growth (PM Peak)	$T_B - T_E$	1005
Project Traffic (PM Peak)	T	31
Fair Share Percentage	$P = T / (T_B - T_E)$	**3.1%**

As presented in Table 8.3, the Project's equitable share of improvement costs is 3.1%.

9. Impact Determination and Mitigation Measures

The following section summarizes the criteria for determining Project impact significance.

9.1 VMT

Existing and future vehicle miles traveled (VMT) will be estimated using the City of Fairfield travel demand model (TDM) to evaluate the amount and distance of automobile travel attributable to the Project. Project VMT will be evaluated using the thresholds of significance for residential land uses as described in *Exhibit A – VMT Thresholds of Significance* from Resolution No. 2020-122 (City of Suisun City, September 2020):

– The project would cause a significant transportation impact if it would generate an average home-based VMT per resident that is greater than 85-percent of the city-wide average.

– If the above threshold is exceeded, the project's VMT impact could still be found to be less-than-significant if it did not cause the total City-wide VMT to increase.

The following policies pertaining to VMT impacts are found in Suisun City's 2035 General Plan Transportation Element:

Policy T-3.2:

The City will encourage new developments and public facility investments designed to minimize vehicle trips and vehicle miles travelled.

Policy T-3.4:

The City's analytical methods, review requirements, impact fees, and investments will be designed and implemented, in part, to reduce VMT by Suisun City residents and to local commercial and employment uses.

Policy T-3.5:

The City's Traffic Impact Fee Program will be designed to provide incentives for new developments that are located and designed to reduce vehicular travel demand.

The proposed Project is considered affordable housing and could be presumed to have a less than significant impact on VMT per OPR's Technical Advisory. However, the City of Suisun City does not currently have guidance for project screening.

9.2 VMT Thresholds

Under CEQA, Project impacts must be evaluated by comparing environmental conditions after Project implementation to conditions at a point in time referred to as the baseline. The City of Suisun City has identified these VMT baselines and thresholds in the previously referred-to document. Table 9.1 presents the SB 743 thresholds for residential land uses which will be utilized to determine Project impacts. The land uses analyzed for the Marina Village development project consist of Multi-Family Dwelling Units and were analyzed against corresponding thresholds below.

Table 9.1 VMT Thresholds

Residential	Base Year (2020)		Cumulative (2035)	
Use	SB 743 VMT Threshold	Average VMT Per Resident	SB 743 VMT Threshold	Average VMT Per Resident
Residential Units	10.7	12.59	9.63	11.33

Source: VMT-Based CEQA Thresholds for the City of Suisun City, September 2020 and GHD, 2021.

Notes: Derived from City of Fairfield travel demand model. Threshold applied is 85 percent of the average for the associated land use type.

9.3 VMT Methodology

Existing 2020 and future 2035 vehicle miles traveled (VMT) and associated VMT efficiency metrics were estimated using the City of Fairfield travel demand model, last updated in 2020, to evaluate the amount and distance of automobile travel attributable to the Project. The City's model generates daily trip-based VMT estimates for each traffic analysis zone (TAZ) by land use. The Project's land uses were added to new TAZs for each model scenario, 2020 and 2035. As identified in the City's VMT guidance, Residential VMT from the model reflects "home-based trip productions" only. The VMT estimates reflect the full length of trips that enter/exit the City of Suisun City by incorporating external trip lengths for trips external to the City on one end, and internal to the City on the other end.

Table 9.2 presents the travel demand model land uses associated with the TAZ in which the Project is located, utilized for the VMT evaluation.[4]

Table 9.2 Travel Demand Model Land Use within the Vicinity of the Project

TAZ	Land Use	DU	Location
526	Single-Family (SF) and Multi-Family (MF) dwelling units (DUs)	735 SF; 0 MF	South of Buena Vista Avenue, North of Central County Bikeway

In addition to the VMT efficiency metrics, the net change in total VMT has been calculated using a trip-based VMT methodology with and without the Project under both existing (2015) and future (2050) model conditions. The trip-based methodology incorporates both the length and number of vehicle trips that are generated in the model. The total trip-based VMT comparison supports the evaluation of the Project's resulting change in net VMT, and is not used in determining significant impacts of the proposed Project. Project impacts are determined based on the VMT efficiency metrics for each use compared to the City's thresholds previously identified.

9.3.1 Final VMT Estimation

The VMT attributable to the multi-family residential development of the Project was calculated by multiplying the number of daily trips according to the ITE Trip Generation Manual by the average trip length associated with the Project's TAZ. The average trip length for the Project was obtained directly from the model outputs. The VMT for the Project was then divided by the proposed number of multifamily dwelling units to estimate the Project-level multifamily residential VMT per dwelling unit. The VMT per dwelling unit for the project was then divided by the population per dwelling unit to estimate the residential VMT per resident. Then, the VMT per resident was compared to the City's respective threshold.

9.4 VMT Analysis & Results

The City's travel demand model processes and outputs all the metrics necessary for the VMT analysis, by TAZ, including number of trips by trip type, total trips by land use category, and VMT by land use category. As previously discussed, these outputs are utilized to estimate average trip lengths, the trip outputs are adjusted to account for internal capture as appropriate, and then the adjusted number of trips are utilized to estimate the Project's VMT and VMT per unit for each use.

9.4.1 2020 Model VMT Results

Table 9.3 presents the model output trip and VMT results for 2020, for TAZ 526 and the Project. Table 9.4 presents the vehicle trips and resulting VMT per DU for the residential uses of the Project for 2020. (Note: The population estimate for the Project was based on the Census average population per household estimate for 2015 through 2019 for the City of Suisun City.) As shown, the Project's multi-family VMT per Resident for 2020 is 7.9 which is below the VMT per Resident threshold of 10.7.

[4] The Project is located in the western edge portion of TAZ 526.

Table 9.3 2020 Model VMT Outputs & Average Trip Length

TAZ or Project	Land Use	Units (DU or KSF)	Trips	VMT	Average Trip Length (mi)
526	Res Single-Family	735	5,675	25,921	4.57
	Res Multi-Family	0			
Project	Res Multi-Family	160	870	3,974	4.57

Table 9.4 2020 Residential VMT per Resident Results

TAZ or Project	Land Use	VMT	Population	VMT per Resident Threshold	VMT per Resident	Project Over Threshold?
Project	Residential Multi-Family	3,974	504	10.7	7.9	No

9.4.2 2035 Model VMT Results

In the Project TAZ 526, the Fairfield Travel Demand Model reflects a total of 66 multifamily dwelling units. For purposes of analyzing the 2035 Without Project scenario, the 2035 travel demand model was re-run to exclude these 66 Multifamily Units. Table 9.5 presents the model output trip and VMT result for 2035, for TAZ 526 and the Project. Table 9.6 presents the vehicle trips and resulting VMT per Resident for the residential uses of the Project for 2035. (Note: The population estimate for the Project was based on the Census average population per household estimate for 2015 through 2019 for the City of Suisun City.) As shown, the Project's multi-family VMT per Resident for 2035 is 7.0 which is below the VMT per Resident threshold of 9.63.

Table 9.5 2035 Model VMT Outputs & Average Trip Length

TAZ or Project	Land Use	Units (DU or KSF)	Trips	VMT	Average Trip Length (mi)
526	Res Single-Family	735	5,835	23,647	4.05
	Res Multi-Family	0			
Project	Res Multi-Family	160	870	3,526	4.05

Table 9.6 2035 Residential VMT per Resident Results

TAZ or Project	Land Use	VMT	Population	VMT per Resident Threshold	VMT per Resident	Project Over Threshold?
Project	Residential Multi-Family	3,526	504	9.6	7.0	No

9.4.3 Net Change in Total VMT

Using a trip-based methodology, VMT was quantified by the lengths of all vehicle trips that are generated within the model (for the model TAZs). Table 9.7 presents the VMT results for both 2020 and 2035 model scenarios, with and without the Project, and the net change in total VMT. As shown, the model's total VMT will increase with the Project in both scenarios, and the model has a larger increase in 2015 than 2050. This VMT comparison is for reference and information only and is not used in determining significant impacts of the proposed project.

Table 9.7 Net Change in Total Residential VMT Model-Wide

Model Scenario	Net VMT
2020	330,447
2020 With Project	334,421
2020 Net Change	3,974
2035	275,665
2035 With Project	279,191
2035 Net Change	3,526

9.5 VMT Conclusion

The VMT analysis for the proposed Marina Village development project quantified VMT per Resident for the proposed multi-family dwelling units, utilizing the City of Fairfield Travel Demand Model outputs. Under both years 2020 and 2035, the calculated VMT per resident for the Project's multi-family land use is lower than the City's thresholds. Therefore, the Project does not have a significant impact on VMT, does not have a significant impact on transportation, and does not necessitate the implementation of mitigation measures.

10. Project Driveways Assessment

The Project proposes a right-in/right-out driveway along Marina Boulevard south of Buena Vista Avenue and a full-access driveway along Buena Vista Avenue east of Marina Boulevard. This section summarizes potential access challenges associated with the proposed driveways and provides recommendations.

10.1 Marina Boulevard Driveway

The City has requested that a northbound right turn lane at the proposed Marina Boulevard driveway to facilitate right turns into the Project site be evaluated as part of this traffic study. This section documents GHD's evaluation of the need for a northbound right turn lane at the Marina Boulevard driveway, with the following assumptions:

a) The development's security gates will remain open during the hours of 7:00 AM through 7:00 PM to allow for the unimpeded flow of vehicles into the development from Marina Boulevard at the peak travel times.

b) The estimated number of Project inbound trips estimated to turn right on Marina Boulevard to enter the Project Site is 8 trips during the AM peak hour and 22 trips during the PM peak hour (out of a total of 14 AM peak hour inbound trips and 40 PM peak hour inbound trips respectively, as presented in Table 4.3).

10.1.1 Effect on Vehicle Queuing

A site visit was conducted on October 25th, 2021, between 4:00 and 5:00 PM to observe existing queues for northbound travel along Marina Boulevard south of Buena Vista Avenue. During this period, platoons of vehicles from the signalized intersection to the south were observed to queue at the all-way stop-controlled intersection at Buena Vista Avenue. The average queue observed was 5 vehicles (approximately 125 feet), and the maximum queue observed was 10 vehicles (approximately 250 feet).

SimTraffic software (TrafficWare) was used to perform queuing analysis for the PM peak hour under Existing and Existing Plus Project conditions to identify the relative effect of the Project traffic on the Marina Boulevard northbound queues. SimTraffic was determined to be an effective way to evaluate the relative effect of added Project traffic on northbound queues due its ability to replicate the average and maximum observed existing queue lengths documented above. Table 10.1 presents the results of the SimTraffic queuing analysis.

Table 10.1 Average and 95th Percentile Queues – Existing and Existing Plus Project Conditions

Scenario	Queue Lengths (ft)*	
	Average	95th Percentile
Existing	139	216
Existing Plus Project	141	224

**Queue lengths were analyzed by lane. The queue lengths shown are for the outermost northbound through-right lane, which experienced the longer queues.*

As presented in Table 10.1, the Project traffic is estimated to result in an increase to the PM peak hour average northbound queue length by 2 feet, and an increase to the 95th percentile northbound queue length by 8 feet. The effect of Project traffic on queuing represent minor increases.

The Arco gas station driveway is located approximately 300 feet south of the intersection of Marina Boulevard and Buena Vista Avenue. Based on the field observations and analysis results presented above, queued vehicles are not expected to block the gas station driveway under Existing Plus Project conditions.

10.1.2 Right Turn Lane Need Assessment

The California Manual on Uniform Traffic Control Devices (CA MUTCD) does not lay out specific thresholds for the required or recommended implementation of right turn lanes.

The Highway Capacity Manual indicates the following factors may contribute to the need for a channelized right turn lane, but does not lay out specific thresholds:

– High volumes of right-turning traffic causing backup and delay on the through lanes.
– Conflicts between crossing pedestrians and right-turning vehicles and bicycles.
– Frequent rear-end and sideswipe collisions involving right-turning vehicles.

As the right turn volume into the driveway is low (8 right-turning vehicles in the AM peak hour, 22 vehicles in the PM peak hour), and the proposed driveway does not currently exist, none of these factors apply.

Several other sources were gathered to identify potential thresholds that would justify a recommended right turn treatment. Among these sources, including guidance thresholds from Washington State and Minnesota Departments of Transportation, none indicated a right turn lane is necessary or warranted based on the traffic conditions at the proposed Marina Village driveway (see graphs provided in the Appendix).

10.1.3 Right Turn Flare Assessment

A right turn flare (also known as a right turn taper) was also considered as an option to facilitate right turns into the driveway. A right turn flare consists of a triangular paved area adjacent to the right travel lane, which allows right-turning vehicles to move to the side partially out of the travel lane as they decelerate. While none of the sources reviewed gave criteria which would necessitate a flare, several listed it as an optional treatment.

At this driveway location, implementing a flare would serve multiple functions, including keeping the sight distance area clear of obstructions for vehicles turning out of the driveway (see sight distance figures in the Appendix), and also aiding the ingress and egress vehicle paths for large vehicles entering and exiting the driveway. However, need for guidance on taper/flare was reviewed and none indicated a taper/flare was warranted.

10.1.4 Recommendation

Because Marina Boulevard lies on the convex side of a horizontal curve, there is a potential for a blind spot approximately mid-way through the curve. It is essential that the required line of sight be maintained from approximately the curb return at the intersection with State Route 12 through the driveway opening.

Based on the considerations discussed above, GHD recommends one of the following courses of action to ensure the safety and proper function of the proposed Project driveway on Marina Boulevard:

1) Maintain the required sight distance area, such that it remains free of visual obstructions, or
2) Keep the sight distance area clear by adding a right turn flare in advance of the Marina Boulevard Driveway.

Additionally, ensure the driveway design can accommodate the turning movements of the required design vehicle and/or delivery vehicles according to City guidelines.

10.2 Buena Vista Boulevard Driveway

Although sight distance calculations suggest adequate stopping sight distance at the Buena Vista driveway, existing on-street parking could impact visibility at this driveway. GHD recommends a striped right turn pocket which would remove space for approximately two (2) on-street parking spaces immediately preceding the Buena Vista driveway.

Appendix

GHD

City of Suisun City
Marina Village Housing Development

DRIVEWAY STOPPING SIGHT DISTANCE

Project No. 11229090
Report No. N/A
Date 8/16/2021

FIGURE 1

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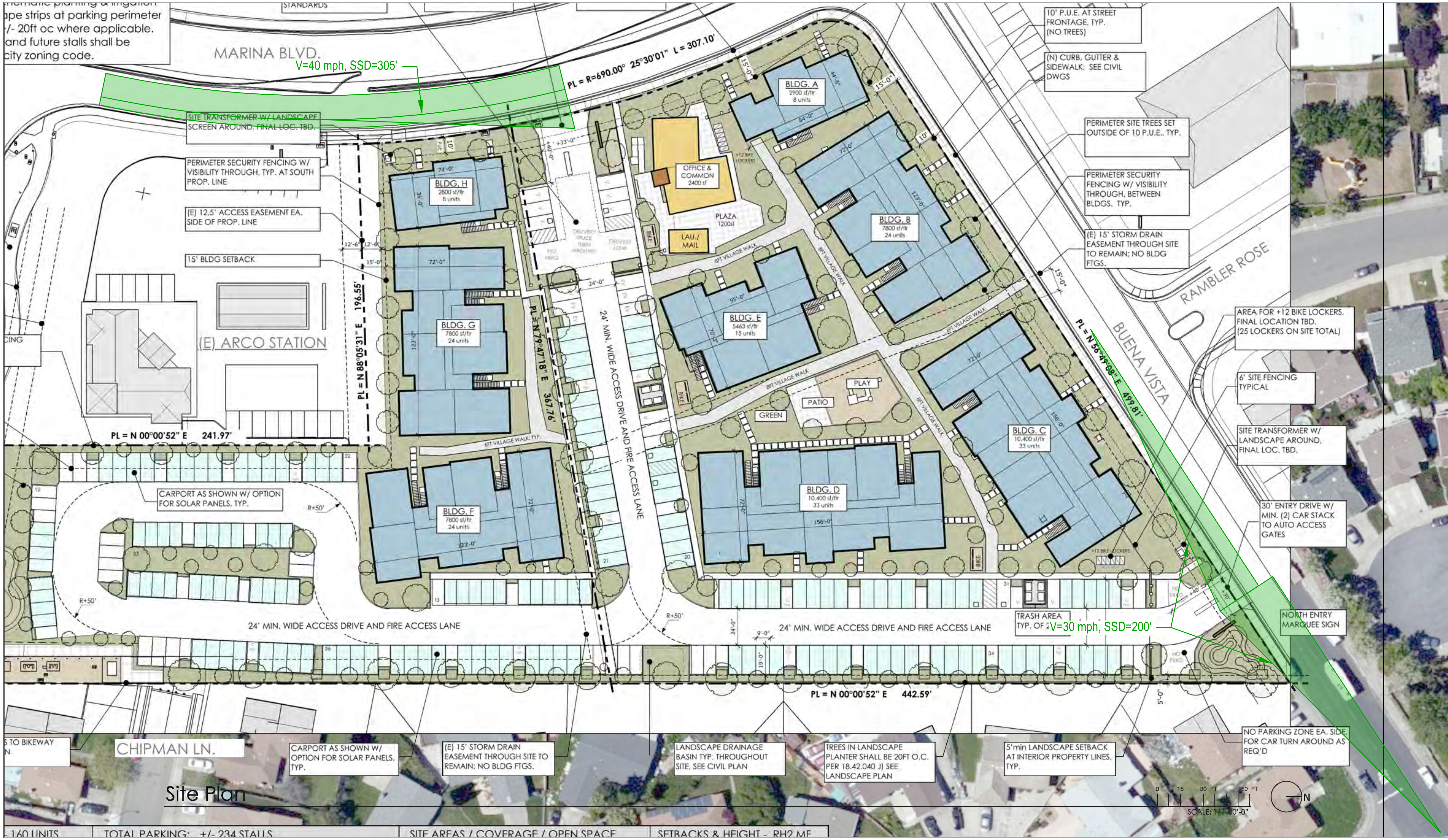


City of Suisun City
Marina Village Housing Development

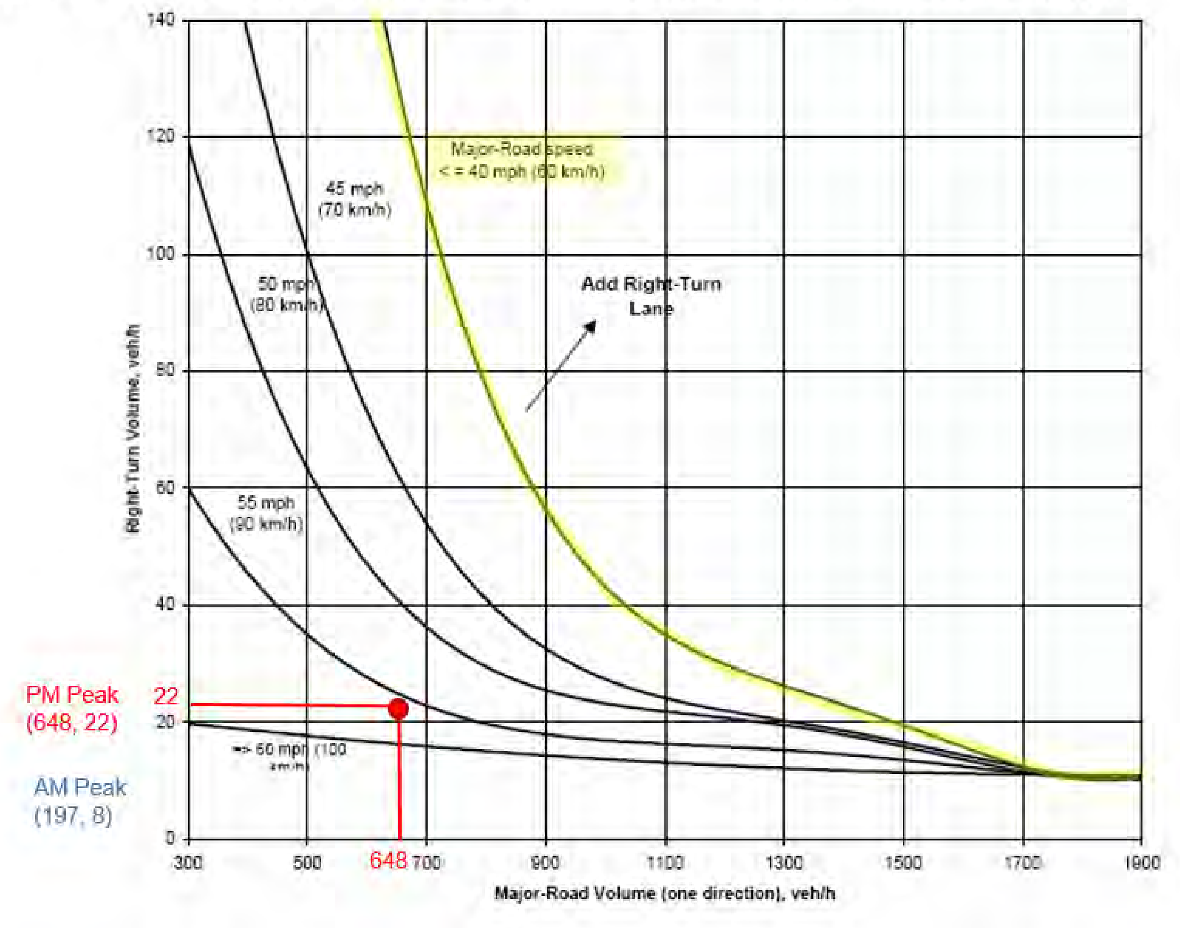
DRIVEWAY STOPPING SIGHT DISTANCE

Project No. 11229090
Report No. N/A
Date 8/16/2021

FIGURE 1

From the Missouri Department of Transportation policy 940.9 on Auxiliary Acceleration and Turning Lanes[1]:

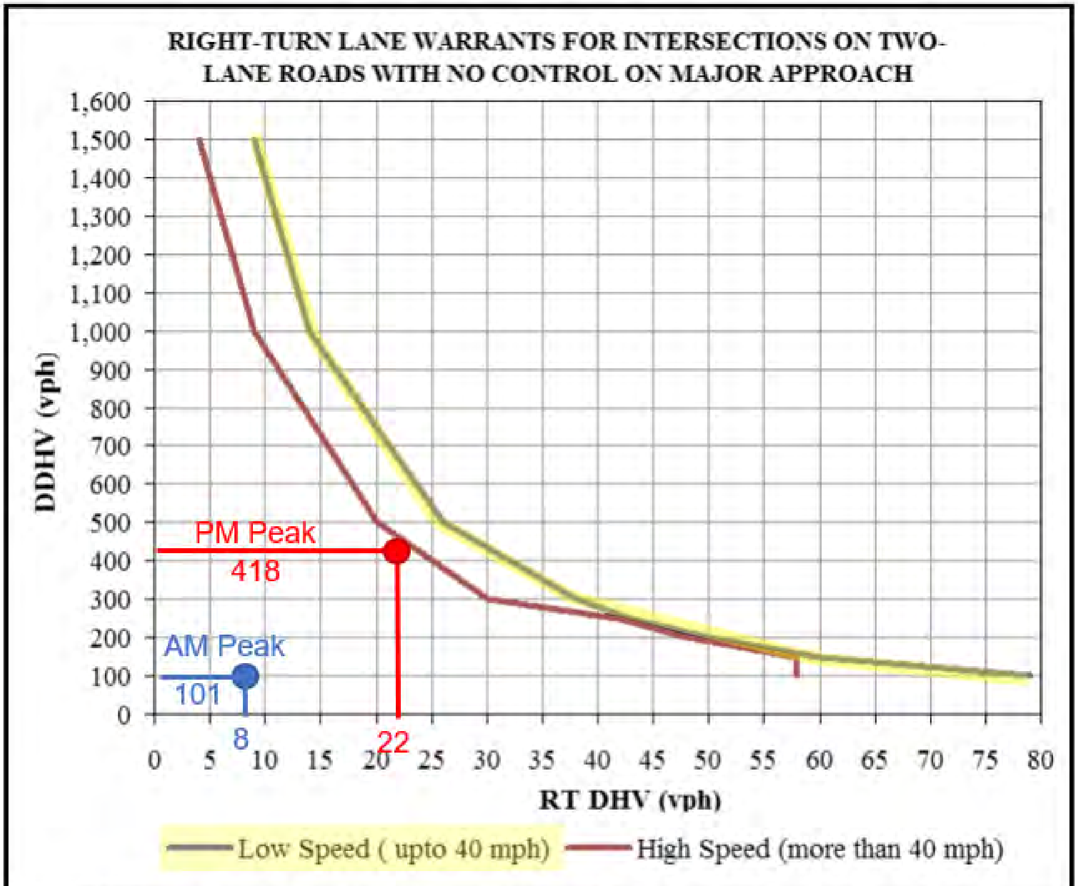
940.9.9 Right Turn Lane Guidelines for Four-Lane Roadways



The conditions at the Marina Boulevard Driveway (shown in blue and red for the AM and PM peak hours respectively), do not warrant a right turn lane per this policy.

[1]https://epg.modot.org/index.php/940.9_Auxiliary_Acceleration_and_Turning_Lanes#940.9.9_Right_Turn_Lane_Guidelines_for_Four-Lane_Roadways

From a 2008 research study performed by North Dakota State University for the Minnesota Department of Transportation[2]:



Minimum Right-turn DHV (vph) Required to Warrant a Right-turn Lane (Right-turn Lane Cost = $20,000 / Cost of Fuel = $3)								
Speed (mph)	DDHV (vph)							
	100	150	200	250	300	500	1,000	1,500
≤ 40	79	60	50	43	38	26	14	9
> 40	58	58	48	42	30	20	9	4

Figure 6.7. Right-turn lane warrants for intersections (fuel cost $3/gallon, delay cost $13/hr, right-turn lane cost $20,000).

This study presented several version of this graph, with varying suggested warrant thresholds based on fuel cost (ranging $3/gallon - $4/gallon) and improvement cost (ranging $20,000 - $60,000). The graph shown above shows the lowest threshold of these ranges. As this graph applies to two-lane roads, the Directional Design Hour Volume (DDHV) was estimated by adding the northbound right turn volume and half of the northbound through volume from the intersection north of the driveway.

Even using the most generous thresholds, the conditions at the Marina Boulevard Driveway (shown in blue and red for the AM and PM peak hours respectively), do not warrant a right turn lane per this research study.

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[2] Varma, et al. 2008. "Warrants for Right-turn Lanes/Treatments on Two-lane Roads". *https://www.lrrb.org/pdf/200825.pdf*

RIGHT TURN LANE
WARRANT ANALYSIS

Study Intersection **Marina Blvd proposed Project driveway**

Study Scenario **Existing plus Project (weekday PM peak hour)**

INPUT		
Advancing Volume	Va	648
Right Turn Volume	V_{RT}	22
Speed	SP	40 MPH
4-Lane Roadway		

Data Entry

Advancing Volumes

LT	TH	RT
0	626	22

Speed

40 mph

Advancing Volume Thresholds

speed	AV lane	AV taper
<45 mph	885.1	680
>=45 mph	735	480

RIGHT TURN LANE WARRANTS

1. Check for right turn volume criteria — Thresholds not met, continue to next step

2. Check advance volume threshold criteria for turn lane

Advancing Volume Threshold	AV	885.1
If AV>Va then warrant is met		No

Right Turn Lane Warranted — NO

RIGHT TURN TAPER WARRANTS
(evaluate if right turn lane is unwarranted)

1. Check taper volume criteria — Thresholds not met, continue to next step

2. Check advance volume threshold criteria for taper

Advancing Volume Threshold	AV =	680
If AV>Va then warrant is met		No

Right Turn Taper Warranted — NO

Methodology based on Washington State Transportation Center Research Report *Method For Prioritizing Intersection Improvements*, January 1997. The right turn lane and taper analysis is based on work conducted by Cottrell in 1981.