APPENDIX L

ENERGY ANALYSIS

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MEMORANDUM

To:	David Geiser, Managing Director, Merlone Geier Partners
From:	Jennifer Reed, Dudek; Ian McIntire, Dudek
Subject:	Northgate Town Square Project Energy Analysis
Date:	August 18, 2023
cc:	Rachel Struglia, Dudek
Attachment A:	Energy Calculations

This memorandum describes the existing setting related to energy, identifies associated regulatory requirements, and evaluates potential energy impacts from implementation of the proposed Northgate Town Square Project (Project) to support an energy analysis under the California Environmental Quality Act (CEQA). The contents and organization of this memorandum are as follows: (1) Project description; (2) environmental setting; (3) regulatory setting; (4) thresholds of significance; (5) methodology, including construction and operational assumptions; (6) energy environmental impact analysis; (7) cumulative impact analysis; and (8) references cited.

1 Project Description

The Project Applicant, Merlone Geier Partners, proposes redevelopment of the existing Northgate Mall (Mall) within the San Rafael Town Center located at 5800 Northgate Drive in the City of San Rafael (City), California. The 44.76-acre site consists of the following Assessor's Parcel Numbers: 175-060-12, 175-060-40, 175-060-59, 175-060-61, and 175-066-67 ("Project Site"). The Project Site is to the west of Highway 101 and to the south of the Manuel T Freitas Parkway, and is bounded by Northgate Drive and Las Gallinas Avenue.

The proposed Project would involve the redevelopment of the existing Mall through the demolition of the majority of the Mall structure and the Sears, Macy's, and Kohl's anchor buildings; redevelopment of commercial spaces; construction of new commercial pads at the northern periphery of the property; construction of new structured and surface-level parking facilities; development of multifamily dwelling units; and development of community open space and amenities. The Applicant proposes to complete this redevelopment in two phases pursuant to its 2025 Master Plan and 2040 Vision Plan.

The Project contemplates a combined total of approximately 1,964,456 square feet of commercial and new residential use (excluding parking facilities). Including the Project, the Project Site would consist of 217,520 square feet of commercial regional and neighborhood-serving commercial use and approximately 1,746,936 square feet of residential use. Residential redevelopment would be concentrated on the southern, eastern, and western portions of the Project Site and commercial redevelopment would be concentrated in the central and northern portions of the Project Site. During the 2025 Master Plan phase, 922 of the residential units would be constructed on residential parcels identified as "Residential 1," "Residential 2," "Residential 3," and "Residential 4," while the remaining 500

units would be built during the 2040 Vision Plan phase on residential parcels identified as "Residential 5" and "Residential 6." Multifamily apartments are proposed for Residential 1, 3, 4, 5, and 6, and townhomes are proposed for Residential 2. A total of 44,380 square feet of new retail would be developed under the 2025 Master Plan and a total of 55,400 square feet of new retail would be developed under the 2040 Vision Plan.

The Project proposes a development plan that includes the following mix of commercial and residential land uses:

- The demolition and reconstruction of the existing central Mall building and the construction of related commercial structures, as depicted in the 2025 Master Plan and 2040 Vision Plan illustrations
- A net decrease in commercial square footage of approximately 577,487 square feet
- The construction of five commercial pads (26,500 square feet)
- The construction of additional new commercial spaces (99,820 square feet)
- A renovated 65,000-square-foot cinema (addition of 20,000 square feet)
- The development of multifamily housing on six separate residential parcels, in a variety of sizes and densities, in the configuration depicted in the 2025 Master Plan and 2040 Vision Plan (1,422 dwelling units)
- Implementation of a shared parking plan resulting in seven public parking lots with 1,325 public parking stalls, and resident-specific parking facilities with a total of 2,644 residential parking stalls
- Development of a central 48,075-square-foot town square
- Creation of additional open space, community area, greenway areas, and community garden totaling 601,227 square feet under the 2025 Master Plan and 705,384 square feet under the 2040 Vision Plan

The Project includes project design features (PDFs) to proactively reduce potential Project-generated criteria air pollutant, toxic air contaminant, and greenhouse gas (GHG) emissions associated with Project implementation and achieve sustainability goals, which also reduce energy use. Applicable to energy is the following Project PDF:

PDF-AQ/GHG-2: All Project residential development and non-restaurant retail buildings shall be 100% electric and natural gas will be prohibited.

2 Environmental Setting

2.1 Electricity

The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources, into electrical energy. The delivery of electricity involves a number of system components, including power generation facilities, transmission and distribution lines, substations, and transformers that lower transmission line power (voltage) to a level appropriate for on-site distribution and use. The electricity generated is distributed through a network of transmission and distribution lines commonly called a power grid. Production of electricity and its conveyance through the power grid occur in response to market demand.

Energy capacity, or electrical power, is generally measured in watts while energy use is measured in watt-hours (Wh). For example, if a light bulb has a capacity rating of 100 watts, the energy required to keep the bulb on for 1 hour would be 100 Wh. If 10 100-watt bulbs were on for 1 hour, the energy required would be 1,000 Wh or 1 kilowatt-hour (kWh).

On a utility scale, a generator's capacity is typically rated in megawatts (MW), which is 1 million watts, while energy usage is measured in megawatt-hours (MWh, or 1 million watt-hours) or gigawatt-hours (1 billion watt-hours).

Residences and businesses within the City of San Rafael, including the Project, receive electricity from the Pacific Gas and Electric Company (PG&E) and/or Marin Clean Energy (MCE), a Community Choice Aggregation, which residents can opt into to ensure that electricity usage would come from renewable resources (e.g., water, wind, and solar) and carbon-free sources (e.g., hydroelectric and geothermal). PG&E provides electric services to 5.4 million customers via 106,681 circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines over a 70,000-square-mile service area that includes Northern California and Central California (PG&E 2021). According to PG&E, its customers consumed 78,588 million kWh of electricity in 2021 (Table 1) (CEC 2022a).

Table 1. Pacific Gas and Electric Company 2021 Electricity Consumption

Sector	Total Electricity (in Millions of kWh)
Agricultural and Water Pump	7,446
Commercial Buildings	26,009
Commercial Other	3,869
Industry	9,959
Mining and Construction	1,764
Residential	29,230
Streetlight	311
Total Consumption	**78,588**

Source: CEC 2022a.
Notes: kWh = kilowatt-hour.
Total may not sum precisely due to rounding.

PG&E receives electric power from a variety of sources. According to the California Public Utilities Commission (CPUC) 2021 California Renewables Portfolio Standard (RPS) Annual Report, 54% of PG&E's power came from eligible renewable energy sources in 2021, including biomass/waste, geothermal, small hydroelectric, solar, and wind sources (CPUC 2022). Therefore, PG&E exceeded the state's annual RPS goal of 35.75% renewable energy delivered by 2021.

MCE is a load–serving entity supporting a 1,200 MW peak load. MCE provides electricity service and innovative programs to more than 540,000 customer accounts and more than one million residents and businesses in 37 communities across four Bay Area counties: Contra Costa, Marin, Napa, and Solano (MCE 2021a). Customers have three electricity options to choose from: MCE Light Green, which is 61% renewable energy; MCE Deep Green, which is 100% renewable energy (50% from wind and 50% from solar); and MCE Local Sol, which is 100% renewable energy (100% from solar) (MCE 2021a). MCE achieved the Light Green service option of 95% GHG free in 2023 and aims to achieve a portfolio with a minimum of 85% renewable energy by 2029. According to MCE, its customers consumed 6,203 million kWh of electricity in 2020, with the City of San Rafael consuming 216 million kWh of electricity (MCE 2021b).

In Marin County, PG&E reported an annual electrical consumption of approximately 1,348 million kWh in 2021, with 630 million kWh for non-residential uses and 718 million kWh for residential uses (CEC 2022b).

Based on recent energy supply and demand projections in California, statewide annual peak electricity demand is projected to grow an average of 1,087 MW per year for the next decade, or 1.5% annually, and consumption per capita is expected to remain relatively constant at 7.6 to 8.0 MWh per person (CEC 2018).

According to the U.S. Energy Information Administration, California used approximately 247,250 gigawatt-hours of electricity in 2021 (EIA 2022a). Electricity usage in California for different land uses varies substantially by the types of uses in a building, the type of construction materials used in a building, and the efficiency of all electricity-consuming devices within a building. Due to the state's energy efficiency building standards and efficiency and conservation programs, California's electricity use per capita in the residential sector is lower than all but three other states (EIA 2023).

2.2 Natural Gas

Natural gas is a combustible mixture of simple hydrocarbon compounds (primarily methane) that is used as a fuel source. Natural gas consumed in California is obtained from naturally occurring reservoirs, mainly located outside the state, and is delivered through high-pressure transmission pipelines. The natural gas transportation system is a nationwide network; therefore, resource availability is typically not an issue. Natural gas provides almost one-third of the state's total energy requirements and is used in electricity generation, space heating, cooking, water heating, and industrial processes and as a transportation fuel. Natural gas can be measured in terms of cubic feet, therms, or British thermal units (BTU).

CPUC regulates natural gas utility service for approximately 10.8 million customers who receive natural gas from PG&E, Southern California Gas, San Diego Gas and Electric Company, Southwest Gas, and several smaller natural gas utilities. PG&E provides natural gas service to most of Northern California, including Marin County. As shown in Table 2, PG&E customers consumed approximately 4,467 million therms of natural gas in 2021 (CEC 2022c).

Table 2. Pacific Gas and Electric Company 2020 Natural Gas Consumption

Sector	Total Natural Gas (in Millions of Therms)
Agricultural and Water Pump	52
Commercial Buildings	835
Commercial Other	50
Industry	1,429
Mining and Construction	223
Residential	1,877
Total Consumption	**4,467**

Source: CEC 2022c.
Note: Total may not sum precisely due to rounding.

In 2021, PG&E delivered 68 million therms of natural gas to Marin County, with the majority going to residential uses (50 million therms) (CEC 2022d).

According to the U.S. Energy Information Administration, California used approximately 2,092,612 million cubic feet of natural gas in 2021 (EIA 2022b). The majority of California's natural gas customers are residential and small commercial customers (core customers). These customers account for approximately 35% of the natural gas delivered by California utilities (CPUC 2021). Large consumers, such as electric generators and industrial customers

(noncore customers), account for approximately 65% of the natural gas delivered by California utilities (CPUC 2021). CPUC regulates California natural gas rates and natural gas services, including in-state transportation over transmission and distribution pipeline systems, storage, procurement, metering, and billing. Most of the natural gas used in California comes from out-of-state natural gas basins. California gas utilities may soon also begin receiving biogas into their pipeline systems (CPUC 2021).

2.3 Petroleum

There are more than 35.7 million registered vehicles in California, and those vehicles consume an estimated 16 billion gallons of fuel each year (CEC 2023; DMV 2023). The transportation sector used approximately 83% of the petroleum consumed in the state (EIA 2023). However, technological advances, market trends, consumer behavior, and government policies could result in significant changes in fuel consumption by type and in total. At the federal and state levels, various policies, rules, and regulations have been enacted to improve vehicle fuel efficiency, promote the development and use of alternative fuels, reduce transportation-source air pollutants and GHG emissions, and reduce vehicle miles traveled (VMT). Section 3, Regulatory Setting, of this memorandum discusses in more detail both federal and state regulations that would help increase fuel efficiency of motor vehicles and reduce GHG emissions. Market forces have driven the price of petroleum products steadily upward over time, and technological advances have made use of other energy resources or alternative transportation modes increasingly feasible.

Largely as a result of and in response to these multiple factors, gasoline consumption within the state has declined in recent years, and availability of other alternative fuels/energy sources has increased. The quantity, availability, and reliability of transportation energy resources have increased in recent years, and this trend will likely continue and accelerate. Increasingly available and diversified transportation energy resources act to promote continuing reliable and affordable means to support vehicular transportation within the state. According to the California Air Resources Board (CARB) Emission Factor (EMFAC) Web Database, Marin County on-road transportation sources were projected to consume 69 million gallons of gasoline and 12.8 million gallons of diesel fuel in 2023 (CARB 2021a).

3 Regulatory Setting

3.1 Federal

Federal Energy Policy and Conservation Act and CAFE Standards

In 1975, Congress enacted the federal Energy Policy and Conservation Act, which established the first fuel economy standards, known as the Corporate Average Fuel Economy (CAFE) standards, for on-road motor vehicles in the United States. Pursuant to the act, the National Highway Traffic Safety Administration (NHTSA) is responsible for establishing additional vehicle standards. In 2012, new CAFE standards for passenger cars and light trucks were approved for model years 2017 through 2021 (77 FR 62624–63200). Fuel economy is determined based on each manufacturer's average fuel economy for the fleet of vehicles available for sale in the United States.

Energy Policy Act of 1992 and 2005

The Energy Policy Act of 1992 was passed to reduce the country's dependence on foreign petroleum and improve air quality. The act includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The act requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in the act. Federal tax deductions are allowed for businesses and individuals to cover the incremental cost of AFVs. The Energy Policy Act also requires states to consider a variety of incentive programs to help promote AFVs. The Energy Policy Act provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

On December 19, 2007, the Energy Independence and Security Act of 2007 (EISA) was signed into law. In addition to setting increased CAFE standards for motor vehicles, the EISA facilitates the reduction of national GHG emissions by requiring the following:

- Increasing the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard (RFS) that requires fuel producers to use at least 36 billion gallons of biofuel in 2022
- Prescribing or revising standards affecting regional efficiency for heating and cooling products, procedures for new or amended standards, energy conservation, energy efficiency labeling for consumer electronic products, residential boiler efficiency, electric motor efficiency, and home appliances
- Requiring approximately 25% greater efficiency for light bulbs by phasing out incandescent light bulbs between 2012 and 2014; requiring approximately 200% greater efficiency for light bulbs, or similar energy savings, by 2020
- While superseded by the U.S. Environmental Protection Agency (EPA) and NHTSA actions described previously, establishing miles per gallon targets for cars and light trucks and directing the NHTSA to establish a fuel economy program for medium-and heavy-duty trucks and create a separate fuel economy standard for trucks

This federal legislation requires ever-increasing levels of renewable fuels (the RFS) to replace petroleum (EPA 2017). EPA is responsible for developing and implementing regulations to ensure that transportation fuel sold in the United States contains at least a minimum volume of renewable fuel. The RFS program regulations were developed in collaboration with refiners, renewable fuel producers, and many other stakeholders.

The RFS program was created under the Energy Policy Act and established the first renewable fuel volume mandate in the United States. As required under the Energy Policy Act, the original RFS program required 7.5 billion gallons of renewable fuel to be blended into gasoline by 2012. Under the EISA, the RFS program was expanded in several ways that laid the foundation for achieving significant reductions in GHG emissions from the use of renewable fuels, reducing imported petroleum, and encouraging the development and expansion of the renewable fuels sector in the United States. The updated program is referred to as "RFS2" and includes the following:

- The EISA expanded the RFS program to include diesel, in addition to gasoline.

- The EISA increased the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022.
- The EISA established new categories of renewable fuel and set separate volume requirements for each one.
- The EISA required EPA to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

Additional provisions of the EISA address energy savings in government and public institutions, research for alternative energy, additional research in carbon capture, international energy programs, and the creation of green (environmentally beneficial) jobs.

Intermodal Surface Transportation Efficiency Act of 1991

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 promoted the development of intermodal transportation systems to maximize mobility and address national and local interests in air quality and energy. ISTEA contained factors for metropolitan planning organizations to address in developing transportation plans and programs, including some energy-related factors. To meet the new ISTEA requirements, metropolitan planning organizations adopted policies defining the social, economic, energy, and environmental values guiding transportation decisions.

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century was signed into law in 1998 and builds on the initiatives established in the ISTEA legislation (previously discussed). The Transportation Equity Act authorizes highway, highway safety, transit, and other efficient surface transportation programs. The act continues the program structure established for highways and transit under ISTEA, such as flexibility in the use of funds, emphasis on measures to improve the environment, and focus on a strong planning process as the foundation of transportation decisions. The Transportation Equity Act also provides for investment in research and its application to maximize the performance of the transportation system through, for example, deployment of intelligent transportation systems to help improve operations and management of transportation systems and vehicle safety.

Infrastructure Investment and Jobs Act

The Infrastructure Investment and Jobs Act (Infrastructure Deal) was signed into law November 15, 2021. The legislation includes $39 billion of new investment to modernize transit, in addition to continuing the existing transit programs for five years as part of surface transportation reauthorization. The Infrastructure Deal would also invest $7.5 billion to build out a national network of electric vehicle (EV) chargers. The Infrastructure Deal would provide funding for deployment of EV chargers along highway corridors to facilitate long-distance travel and within communities to provide convenient charging where people live, work, and shop to support a goal of building a nationwide network of 500,000 EV chargers. This would accelerate the adoption of EVs, which would help reduce emissions and improve air quality. In addition, the Infrastructure Deal would include more than $65 billion of investments in clean energy transmission including upgrading existing power infrastructure through expanding transmission lines to facilitate the expansion of renewables and clean energy.

The Inflation Reduction Act of 2022

The Inflation Reduction Act was signed into law by President Biden in August 2022. The bill includes specific investment in energy and climate reform and is projected to reduce GHG emissions within the U.S. by 40% as compared to 2005 levels by 2030. The bill allocates funds to boost renewable energy infrastructure (e.g., solar panels and wind turbines), includes tax credits for the purchase of electric vehicles, and includes measures that will make homes more energy efficient.

3.2 State

Warren-Alquist Act

The California legislature passed the Warren-Alquist Act in 1974. The Warren-Alquist Act created the California Energy Commission (CEC). The legislation also incorporated the following three key provisions designed to address the demand side of the energy equation:

- It directed CEC to formulate and adopt the nation's first energy conservation standards for buildings constructed and appliances sold in California.
- It removed the responsibility of electricity demand forecasting from the utilities, which had a financial interest in high-demand projections, and transferred it to a more impartial CEC.
- It directed CEC to embark on an ambitious research and development program, with a particular focus on fostering what were characterized as non-conventional energy sources.

State of California Energy Action Plan

CEC and CPUC approved the first State of California Energy Action Plan in 2003. The Energy Action Plan established shared goals and specific actions to ensure that adequate, reliable, and reasonably priced electrical power and natural gas supplies are provided, and identified policies, strategies, and actions that are cost effective and environmentally sound for California's consumers and taxpayers. In 2005, CEC and CPUC adopted a second Energy Action Plan to reflect various policy changes and actions of the preceding 2 years.

At the beginning of 2008, CEC and CPUC determined that it was not necessary or productive to prepare a new Energy Action Plan. This determination was based, in part, on a finding that the state's energy policies have been significantly influenced by the passage of Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (discussed in "Assembly Bill 32 and Senate Bill 32"). Rather than produce a new Energy Action Plan, CEC and CPUC prepared an update that examines the state's ongoing actions in the context of global climate change.

Senate Bills 1078, 107, X1-2, 350, 100, and 1020

Senate Bill (SB) 1078 (2002) established the California RPS Program and required that a retail seller of electricity purchase a specified minimum percentage of electricity generated by eligible renewable energy resources as defined in any given year, culminating in a 20% standard by December 31, 2017. These retail sellers include electrical corporations, community choice aggregators, and electric service providers. As a related measure, SB 1078 required CEC to certify eligible renewable energy resources, design and implement an accounting system to verify compliance with the RPS by retail sellers, and allocate and award supplemental energy payments to cover above-market costs of renewable energy.

SB 107 (2006) accelerated the RPS Program established by SB 1078 by requiring that 20% of electricity retail sales be served by renewable energy resources by 2010 (not 2017). Additionally, SB X1-2 (2011) required all California utilities to generate 33% of their electricity from eligible renewable energy resources by 2020. Specifically, SB X1-2 set a three-stage compliance period: by December 31, 2013, 20% of electricity had to come from renewables; by December 31, 2016, 25% of electricity had to come from renewables; and by December 31, 2020, 33% was required to come from renewables.

SB 350 (2015) expanded the RPS Program by requiring retail seller and publicly owned utilities to procure 50% of their electricity from eligible renewable energy resources by 2030, with interim goals of 40% by 2024 and 45% by 2027.

SB 100 (2018) accelerated and expanded the standards set forth in SB 350 by establishing that 44% of the total electricity sold to retail customers in California per year by December 31, 2024; 52% by December 31, 2027; and 60% by December 31, 2030, should be obtained from qualifying renewable energy sources. SB 100 also states that it is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100% of the retail sales of electricity to California. This bill requires that the achievement of 100% zero-carbon electricity does not increase carbon emissions elsewhere in the western grid. Additionally, 100% zero-carbon electricity cannot be achieved through resource shuffling.

SB 1020 (September 2022) revises the standards from SB 100, requiring the following percentage of retail sales of electricity to California end-use customers to come from eligible renewable energy resources and zero-carbon resources: 90% by December 31, 2035; 95% by December 31, 2040; and 100% by December 31, 2045.

Consequently, utility energy generation from non-renewable resources is expected to be reduced based on implementation of the RPS requirements described above. The Project's reliance on non-renewable energy sources would be reduced accordingly.

Assembly Bill 1007

AB 1007 (2005) required CEC to prepare a statewide plan to increase the use of alternative fuels in California (State Alternative Fuels Plan). CEC prepared the State Alternative Fuels Plan in partnership with CARB and in consultation with other state agencies, plus federal and local agencies. The State Alternative Fuels Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Assembly Bill 32, Senate Bill 32, and Assembly Bill 1279

In 2006, the state legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires California to reduce its GHG emissions to 1990 levels by 2020. In 2016, the legislature enacted SB 32, which extended the horizon year of the state's codified GHG reduction planning targets from 2020 to 2030, requiring California to reduce its GHG emissions to 40% below 1990 levels by 2030. In 2022, the legislature enacted AB 1279, the California Climate Crisis Act, with the goal of the state to achieve net zero GHG emissions as soon as possible, but no later than 2045, and for statewide anthropogenic GHG emissions be reduced to at least 85% below 1990 levels by 2045. In accordance with AB 32 and SB 32, and more recently, AB 1279, CARB prepares scoping plans to guide the development of statewide policies and regulations for the reduction of GHG emissions. Many of

the policy and regulatory concepts identified in the scoping plans focused on increasing energy efficiencies, using renewable resources, and reducing the consumption of petroleum-based fuels (such as gasoline and diesel). As such, the state's GHG emissions reduction planning framework creates co-benefits for energy-related resources.

Assembly Bill 1757

AB 1757 (September 2022) requires the CNRA to determine a range of targets for natural carbon sequestration, and for nature-based climate solutions that reduce GHG emissions for future years 2030, 2038, and 2045. These targets are to be determined by no later than January 1, 2024, and are established to support the state's goals to achieve carbon neutrality and foster climate adaptation and resilience.

California Building Standards

The California Building Standards Code was established in 1978 and serves to enhance and regulate California's building standards (codified in the California Code of Regulations, Title 24). Part 6 of Title 24 establishes energy efficiency standards for residential and non-residential buildings constructed in California to reduce energy demand and consumption. Part 6 is updated periodically (every 3 years) to incorporate and consider new energy efficiency technologies and methodologies.

The 2019 Title 24 standards were approved and adopted by the California Building Standards Commission in December 2018. The 2019 standards became effective January 1, 2020. The standards require that all low-rise residential buildings have a photovoltaic system meeting the minimum qualification requirements such that annual electrical output is equal to or greater than the dwelling's annual electrical usage. Notably, net energy metering rules limit residential rooftop solar generation to produce only as much electricity as the home is expected to consume on an annual basis. Single-family homes built with the 2019 standards will use approximately 7% less energy due to energy efficiency measures compared to those built under the 2016 standards, while new non-residential buildings will use approximately 30% less energy.

Beyond the 2019 standards, the most important energy characteristic for a building will be that it produces and consumes energy at times that are appropriate and responds to the needs of the grid, which reduces the building's emissions.

In furtherance of that characteristic, the 2019 standards require that new single-family homes include solar photovoltaic to meet the home's expected annual electric needs and also encourage demand-responsive technologies, including battery storage, heat pump water heaters, and improving the building's thermal envelope through high-performance attics, walls, and windows. These smarter homes perform better and affect the grid less, which reduces the building's GHG emissions.

The 2022 standards will improve upon the 2019 standards for new construction of, and additions and alterations to, residential and nonresidential buildings. CEC updates the Title 24 Energy Code every 3 years. CEC adopted the 2022 Title 24 Energy Code in August 2021 and the California Building Standards Commission approved incorporating the updated code into the California Building Standards Code (CALGreen) in December 2021. The 2022 Energy Code will go into effect on January 1, 2023. The 2022 Energy Code focuses on four key areas in newly constructed homes and businesses:

- Encouraging electric heat pump technology for space and water heating, which consumes less energy and produces fewer emissions than gas-powered units
- Establishing electric-ready requirements for single-family homes to position owners to use cleaner electric heating, cooking, and EV charging options whenever they choose to adopt those technologies
- Expanding solar photovoltaic (PV) system and battery storage standards to make clean energy available on site and complement the state's progress toward a 100% clean electricity grid
- Strengthening ventilation standards to improve indoor air quality

CALGreen instituted mandatory minimum environmental performance standards for all ground-up new construction of commercial, low-rise residential, and state-owned buildings, as well as schools and hospitals. The current code is the 2019 California Building Code. The mandatory standards require the following:

- In new projects or additions to alterations that add 10 or more vehicular parking spaces, provide designated parking for low-emitting, fuel-efficient, and carpool/vanpool vehicles.
- Construction shall facilitate future installation of EV supply equipment.
- Shade trees shall be planted to comply with specifications for surface parking areas, landscape areas, and hardscape areas.
- Water conserving plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with efficiency standards.
- Outdoor potable water use in landscaped areas shall comply with a local water-efficient landscape ordinance or the current California Department of Water Resources Model Water Efficient Landscape Ordinance, whichever is more stringent.
- Outdoor recycled water supply systems shall be installed in accordance with applicable state codes.
- Installations of heating, ventilation, and air conditioning (HVAC); refrigeration; and fire suppression equipment shall comply with specified standards.

The CALGreen standards also include voluntary efficiency measures that are implemented at the discretion of agencies and applicants.

Integrated Energy Policy Report

CEC is responsible for preparing integrated energy policy reports, which identify emerging trends related to energy supply, demand, conservation, public health and safety, and maintenance of a healthy economy. The latest Integrated Energy Policy Report was released in February 2022 and addressed a variety of issues including, but not limited to, implementation of SB 350, electricity resource/supply plans, electricity and natural gas demand forecast, natural gas outlook, transportation energy demand forecasts, doubling energy efficiency savings, integrated resource planning, climate adaptation and resiliency, renewable gas, distributed energy resources, strategic transmission investment plan, and existing power plant reliability issues (CEC 2022).

State Vehicle Standards

In response to the transportation sector accounting for more than half of California's carbon dioxide (CO_2) emissions, AB 1493 was enacted in 2002. AB 1493 required CARB to set GHG emissions standards for passenger vehicles, light-duty trucks, and other vehicles determined by CARB to be vehicles whose primary use is

noncommercial personal transportation in the state. AB 1493 required that CARB set GHG emissions standards for motor vehicles manufactured in 2009 and all subsequent model years. The 2009–2012 standards resulted in a reduction in GHG emissions of approximately 22% compared to emissions from the 2002 fleet, and the 2013–2016 standards resulted in a reduction of approximately 30% compared to the 2002 fleet.

In 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global-warming gases with requirements for greater numbers of zero-emission vehicles (ZEVs) into a single package of standards called Advanced Clean Cars (ACC). By 2025, when the rules would be fully implemented, new automobiles would emit 34% fewer global-warming gases and 75% fewer smog-forming emissions (CARB 2020).

In 2019, EPA and NHTSA published the Safer Affordable Fuel-Efficient Vehicles Rule Part One: One National Program (SAFE-1) (84 FR 51310), which revoked California's authority to set its own GHG emissions standards and set ZEV mandates in California. In March 2020 Part Two was issued, which set CO_2 emissions standards and CAFE standards for passenger vehicles and light-duty trucks for model years 2021 through 2026. In December 2021, NHTSA withdrew its portions of the SAFE I rule (NHTSA 2021). In March 2022, EPA reinstated California's authority under the Clean Air Act to implement its own GHG emission standards and ZEV sales mandate. EPA's action concludes its reconsideration of the 2019 SAFE-1 rule by finding that the actions taken under the previous administration as a part of SAFE-1 were decided in error and are now entirely rescinded.

Advanced Clean Cars Program

The ACC I program (January 2012) is an emissions-control program for model years 2015 through 2025. The program combines the control of smog- and soot-causing pollutants and GHG emissions into a single coordinated package of regulations: the Low-Emission Vehicle (LEV) regulation for criteria air pollutant and GHG emissions and a technology forcing regulation for ZEVs that contributes to both types of emission reductions (CARB 2021b). The package includes elements to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars. To improve air quality, CARB has implemented new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. It is estimated that in 2025 cars will emit 75% less smog-forming pollution than the average new car sold in 2015. The ZEV program will act as the focused technology of the ACC I program by requiring manufacturers to produce increasing numbers of ZEVs and plug-in hybrid EVs in the 2018 to 2025 model years.

The ACC II program is currently in development to establish the next set of LEV and ZEV requirements for model years after 2025 to contribute to meeting federal ambient air quality ozone (O_3) standards and California's carbon neutrality standards (CARB 2021b). The main objectives of ACC II are as follows:

- Maximize criteria and GHG emission reductions through increased stringency and real-world reductions.
- Accelerate the transition to ZEVs through both increased stringency of requirements and associated actions to support wide-scale adoption and use.

The ACC II rulemaking package also considers technological feasibility, environmental impacts, equity, economic impacts, and consumer impacts.

AB 1236

AB 1236 (October 2015) required a city, county, or city and county to approve an application for the installation of EV charging stations, as defined, through the issuance of specified permits, unless the city or county makes specified written findings based upon substantial evidence in the record that the proposed installation would have a specific, adverse impact upon the public health or safety, and there is no feasible method to satisfactorily mitigate or avoid the specific, adverse impact. The bill provided for appeal of that decision to the planning commission, as specified. The bill provided that the implementation of consistent Statewide standards to achieve the timely and cost-effective installation of EV charging stations is a matter of Statewide concern. The bill required EV charging stations to meet specified standards.

EO N-79-20

Governor Gavin Newsom signed EO N-79-20 in September 2020, which sets a statewide goal that 100% of all new passenger car and truck sales in the state will be zero-emissions by 2035. It also sets a goal that 100% of statewide new sales of medium- and heavy-duty vehicles will be zero emissions by 2045, where feasible, and for all new sales of diesel-fuel heavy duty trucks to be zero emissions by 2035. Additionally, the EO targets 100% of new off-road vehicle sales in the state to be zero emission by 2035. CARB is responsible for implementing the new vehicle sales regulation.

Advanced Clean Trucks Program

The purpose of the ACT Regulation (June 2020) is to accelerate the market for ZEVs in the medium- and heavy-duty truck sector and to reduce emissions of oxides of nitrogen (NO_x), fine particulate matter ($PM_{2.5}$), toxic air contaminants, GHGs, and other criteria pollutants generated from on-road mobile sources (CARB 2021c). Requiring medium- and heavy-duty vehicles to transition to zero-emissions technology will reduce health risks to people living in and visiting California and is needed to help California meet established near- and long-term air quality and climate mitigation targets. The regulation has two components, including (1) a manufacturer sales requirement and (2) a reporting requirement:

1. Zero-emission truck sales: Manufacturers who certify Class 2b–8 chassis or complete vehicles with combustion engines will be required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b–3 truck sales, 75% of Class 4–8 straight truck sales, and 40% of truck tractor sales.
2. Company and fleet reporting: Large employers including retailers, manufacturers, brokers, and others will be required to report information about shipments and shuttle services. Fleet owners with 50 or more trucks will be required to report about their existing fleet operations. This information will help identify future strategies to ensure that fleets purchase available zero-emission trucks and place them in service where suitable to meet their needs.

Senate Bill 375

The Sustainable Communities and Climate Protection Act of 2008, or SB 375, coordinates land use planning, regional transportation plans, and funding priorities to help California meet its GHG emissions reduction mandates established in AB 32. As codified in California Government Code Section 65080, SB 375 requires metropolitan planning organizations to include a sustainable communities strategy in their regional transportation plan. The main

focus of the sustainable communities strategy is to plan for growth in a fashion that will ultimately reduce GHG emissions, but the strategy is also part of a bigger effort to address other development issues, including transit and VMT, which influence the consumption of petroleum-based fuels. Plan Bay Area 2050 is the sustainable communities strategy for the region. As required by SB 375, Plan Bay Area 2050 defines a transportation and land use/housing strategy for the Bay Area to address transportation mobility and accessibility needs, land development, and GHG emissions reduction requirements through 2050 (MTC and ABAG 2021). The Project Site is located entirely within the new Northgate Priority Development Area adopted in Plan Bay Area 2050.

Executive Order B-16-12

Governor Brown issued Executive Order (EO) S-16-12 on March 23, 2012. The EO requires that state entities under the governor's direction and control support and facilitate the rapid commercialization of ZEVs. It orders CARB, CEC, CPUC, and other relevant agencies work with the Plug-In Electric Vehicle Collaborative and the California Fuel Cell Partnership to identify benchmarks to help achieve the following by 2015:

- The state's major metropolitan areas will be able to accommodate ZEVs, each with infrastructure plans and streamlined permitting.
- The state's manufacturing sector will be expanding ZEV and component manufacturing.
- The private sector's investment in ZEV infrastructure will be growing.
- The state's academic and research institutions will be contributing to ZEV research, innovation, and education.

CARB, CEC, and CPUC are also directed to identify benchmarks to help achieve the following goals by 2020:

- The state's ZEV infrastructure will be able to support up to one million vehicles.
- The costs of ZEV will be competitive with conventional combustion vehicles.
- ZEVs will be accessible to mainstream consumers.
- There will be widespread use of ZEVs for public transportation and freight transport.
- Transportation sector GHG emissions will be falling as a result of the switch to ZEVs.
- EV charging will be integrated into the electricity grid.
- The private sector's role in the supply chain for ZEV component development and manufacturing will be expanding.

Benchmarks are also to be identified to help achieve the following goals by 2025:

- Over 1.5 million ZEVs will be on California roads and their market share will be expanding.
- Californians will have easy access to ZEV infrastructure.
- The ZEV industry will be a strong and sustainable part of California's economy.
- California's clean, efficient vehicles will annually displace at least 1.5 billion gallons of petroleum fuels.

On a statewide basis, the EO identifies a target reduction of GHG emissions from the transportation sector equaling 80% less than 1990 levels by 2050.

Assembly Bill 1007

AB 1007 (2005) required CEC to prepare a statewide plan to increase the use of alternative fuels in California (State Alternative Fuels Plan). The CEC prepared the State Alternative Fuels Plan in partnership with CARB and in consultation with other state agencies, as well as federal and local agencies. The State Alternative Fuels Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality.

Senate Bill 1383

SB 1383 (Chapter 395, Statutes of 2016) establishes targets to achieve a 50% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020 and a 75% reduction by 2025. The law grants the California Department of Resources Recycling and Recovery (CalRecycle) the regulatory authority required to achieve the organic waste disposal reduction targets and establishes an additional target that not less than 20% of currently disposed of edible food is recovered for human consumption by 2025 (CalRecycle 2019).

3.3 Local

City of San Rafael General Plan

As discussed in the City's General Plan, policies pertaining to energy are addressed in multiple chapters of the General Plan. The Conservation and Climate Change Element contains goals and policies that would reduce energy use contained in the Land Use Element and the Mobility Element (City of San Rafael 2021a). Policies applicable to energy are described in the following subsections.

Land Use Element

Goal LU-1: Well-Managed Growth and Change. Grow and change in a way that serves community needs, protects the environment, improves fiscal stability, and enhances the quality of life.

Policy LU-1.3: Land Use and Climate Change. Focus future housing and commercial development in areas where alternatives to driving are most viable and shorter trip lengths are possible, especially around transit stations, near services, and on sites with frequent bus service. This can reduce the GHG emissions associated with motor vehicle trips and support the City's climate action goals.

Policy LU-2.3: Neighborhood-Serving Commercial Uses. Encourage the retention and improvement of neighborhood-serving retail stores and services. In the event such spaces become vacant, consider other activities that reinforce their role as neighborhood centers. Neighborhood-serving commercial areas should reinforce the City's goal of reducing GHG emissions and traffic congestion by providing walkable, bikeable services and shopping close to residents.

Conservation and Climate Change Element

Goal C-3: Clean Water. Improve water quality by reducing pollution from urban runoff and other sources, restoring creeks and natural hydrologic features, and conserving water resources.

Policy C-3.4: Green Streets. Design streets and infrastructure so they are more compatible with the natural environment, mitigate urban heat island effects, and have fewer negative impacts on air and water quality, flooding, climate, and natural habitat.

Policy C-3.8: Water Conservation. Encourage water conservation and increased use of recycled water in businesses, homes, and institutions. Local development and building standards shall require the efficient use of water.

Policy C-3.9: Water-Efficient Landscaping. Encourage—and where appropriate require—the use of vegetation and water-efficient landscaping that is naturalized to the San Francisco Bay region and compatible with water conservation, fire prevention and climate resilience goals.

Goal C-4: Sustainable Energy Management. Use energy in a way that protects the environment, addresses climate change, and conserves natural resources.

Policy C-4.1: Renewable Energy. Support increased use of renewable energy and remove obstacles to its use.

Policy C-4.2: Energy Conservation. Support construction methods, building materials, and home improvements that improve energy efficiency in existing and new construction.

Policy C-4.3: Managing Energy Demand. Reduce peak demands on the electric power grid through development of local sources, use of battery storage, deployment of "smart" energy and grid systems that use technology to manage energy more efficiently, and public education.

Policy C-4.4: Sustainable Building Materials. Encourage the use of building materials that reduce environmental impacts and the consumption of nonrenewable resources.

Goal C-5: Reduced GHG Emissions. Achieve a 40% reduction in 1990 GHG emission levels by 2030 and a 60% reduction by 2040.

Policy C-5.2: Consider Climate Change Impacts. Ensure that decisions regarding future development, capital projects, and resource management are consistent with San Rafael's Climate Change Action Plan and other climate goals, including GHG reduction and adaptation.

Mobility Element

Goal M-3: Cleaner Transportation. Coordinate transportation, land use, community design, and economic development decisions in a way that reduces greenhouse gas emissions, air and water pollution, noise, and other environmental impacts related to transportation.

Policy M-3.1: VMT Reduction. Achieve State-mandated reductions in Vehicle Miles Traveled by requiring development and transportation projects to meet specific VMT metrics and implement VMT reduction measures.

Policy M-3.2: Using VMT in Environmental Review. Require an analysis of projected VMT as part of the environmental review process for projects with the potential to significantly increase VMT. As appropriate, this shall include transportation projects and land use/policy plans as well as proposed development projects.

Policy M-3.3: Transportation Demand Management. Encourage, and where appropriate require, transportation demand measures that reduce VMT and peak period travel demand. These measures include, but are not limited to, transit passes and flextime, flexible work schedules, pedestrian and bicycle improvements, ridesharing, and changes to project design to reduce trip lengths and encourage cleaner modes of travel.

Policy M-3.4: Reducing Commute Lengths. Support reduced commute lengths and frequency by encouraging: (a) hiring of local residents by San Rafael employers. (b) opportunities for persons who work in San Rafael to live in San Rafael. (c) telecommuting and flexible work arrangements. (d) local-serving shopping, restaurants, and services that reduce the need to drive elsewhere.

Policy M-3.5: Alternative Transportation Modes. Support efforts to create convenient, cost-effective alternatives to single passenger auto travel. Ensure that public health, sanitation, and user safety is addressed in the design and operation of alternative travel modes.

Policy M-3.6: Low-Carbon Transportation. Encourage electric and other low-carbon emission vehicles, as well as the infrastructure needed to support these vehicles.

Policy M-3.7: Design Features that Support Transit. For projects located in or near transit hubs such as Downtown San Rafael, incorporate design features that facilitate walking, cycling, and easy access to transit.

Policy M-3.8: Land Use and VMT. Encourage higher-density employment and residential uses near major transit hubs such as Downtown San Rafael, recognizing the potential for VMT reduction in areas where there are attractive alternatives to driving, concentrations of complementary activities, and opportunities for shorter trips between different uses.

Goal M-6: Safe Walking and Cycling. Encourage walking and bicycling as safe, pleasurable, healthful ways to travel.

Policy M-6.1: Encouraging Walking and Cycling. Wherever feasible, encourage walking and cycling as the travel mode of choice for short trips, such as trips to school, parks, transit stops, and neighborhood services. Safe, walkable neighborhoods with pleasant, attractive streets, bike lanes, public stairways, paths, and sidewalks should be part of San Rafael's identity.

Policy M-6.3: Encouraging Walking and Cycling. Develop pedestrian and bicycle networks that connect residents and visitors to major activity and shopping centers, existing and planned transit, schools, and other neighborhoods. Work to close gaps between existing facilities. Funding and prioritization for projects should consider relative costs and benefits, including such factors as safety, number of potential users, and impacts on parking.

Climate Change Action Plan

In 2006, the City of San Rafael was one of the early signatories to the U.S. Conference of Mayors Climate Protection Agreement, committing the City to working towards meeting the goals of the Kyoto Protocol. The City Council adopted San Rafael's first San Rafael Climate Change Action Plan (CCAP) on April 20, 2009, which was developed by a 14-member Green Ribbon Committee along with volunteer subject matter experts. It set goals of a 25% reduction of GHGs by 2020, and an ambitious 80% reduction by 2050 to meet targets set by the State of California.

As of 2019, the City met the state target of 15% reduction of GHGs as well as a local 25% stretch goal. In the meantime, the state issued new interim targets for 2030: 40% reduction of GHGs below 1990 levels. In 2017 the City convened a 20-member Climate Action Working Group to revise the CCAP toward these new 2030 targets. The result is the Climate Change Action Plan 2030 (CCAP 2030), which was approved by City Council on May 20, 2019 (City of San Rafael 2019). The CCAP 2030 includes a variety of regulatory, incentive-based, and voluntary strategies that are expected to reduce emissions from both existing and new development in the City. Several of the strategies build on existing programs while others provide new opportunities to address climate change. State actions will have a substantial impact on future emissions. Local strategies, listed below, will supplement these state actions and achieve additional GHG emissions reductions:

- Low carbon transportation
- Energy efficiency
- Renewable energy
- Waste reduction
- Water conservation
- Sequestration and adaptation
- Community engagement
- Implementation and monitoring

The CCAP 2030 establishes targets similar to the state's goals to reduce emissions to 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050. Emissions reductions are estimated for each state and local strategy; combined, they show that the City could reduce emissions 19% below 1990 levels by 2020 (equivalent to 31% below 2005 levels) and 42% below 1990 levels by 2030, which is enough to surpass the City and state goals for those years. Community emissions are projected to be 233,920 metric tons (MT) carbon dioxide equivalent (CO_2e)[1] in 2030 with all state and local actions implemented, while the reduction target is 241,455 MT CO_2e. Overall, state actions represent about 40% of the reduction expected through implementation of the CCAP while local actions represent about 60% (City of San Rafael 2019).

City of San Rafael Municipal Code

In December 2022, the San Rafael Council approved a reach code ordinance, codified as Chapter 12.245.020, Amendments, of the City's Municipal Code. The amendments prohibit new fuel gas and oil piping in new construction unless for use in emergency electrical generation when required by the code, commercial kitchen for preparing food, commercial laundry for laundry, or in an approved industrial process. Furthermore, at the discretion of the building official, the building official may approve fuel gas in new construction or expand fuel gas in existing construction when replacing with electric has been demonstrated to be technically infeasible or has a disproportionate cost to the project causing an insurmountable hardship.

4 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would have a significant effect on the environment with respect to energy if the project would:

1. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation.
2. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

[1] *MT CO_2e* means the number of MT CO_2 emissions with the same global warming potential as 1 MT of another GHG.

The above listed Appendix G energy thresholds are applied herein.

5 Methodology

5.1 Construction

Project construction would primarily consume energy in the form of petroleum-based fuels associated with the use of off-road construction equipment on the Project Site and construction worker vehicles, delivery trucks, and haul trucks traveling to and from the Project Site. During Project construction, electricity use is anticipated to be minimal, and the construction of new buildings typically does not involve the consumption of natural gas. Each energy source is discussed further below.

Electricity

Electricity used on a limited basis to power lighting, electronic equipment, and construction activities necessitating electrical power, as well as electricity usage associated with the supply and conveyance of water used for dust control during construction, is assumed to be minimal and is not estimated herein.

Natural Gas

Construction activities typically do not involve the consumption of natural gas, and any use is anticipated to be negligible and is not estimated herein.

Petroleum

Construction of the Project would consume energy resources as a result of the use of heavy-duty construction equipment, on-road delivery and haul trucks, and workers commuting to and from the Project Site. Petroleum emissions associated with the use of construction equipment and vehicles, which were used to calculate gallons of petroleum consumed, were calculated using the California Emissions Estimator Model (CalEEMod) and are provided in Attachment A. Fuel consumption from construction equipment was estimated by converting the total CO_2 emissions from each construction phase to gallons using the conversion factors for CO_2 to gallons of gasoline or diesel. The conversion factor for gasoline is 8.78 kilograms per MT CO_2 per gallon, and the conversion factor for diesel is 10.21 kilograms per MT CO_2 per gallon (The Climate Registry 2022).

5.2 Operation

The existing Mall (modeled herein as the Existing Scenario) consumes energy resources for the building HVAC system, water demand, wastewater treatment, and vehicle travel. Operation of the Project would consume those same resources. The first full year after buildout of the 2025 Master Plan was assumed to be 2025, and buildout of the 2040 Vision Plan was assumed to be 2040. The Existing Scenario was assumed to be operational in 2023. Each energy source is discussed further below.

Electricity

Project electricity usage (including electricity usage for water) is based on the estimated total annual building load summaries from CalEEMod as estimated in the Air Quality and Greenhouse Gas Emissions Technical Report for the Northgate Town Square Project (Dudek 2023). Crucially, the Project's residential development would be 100% electric; natural gas usage would be prohibited in the residential development.

To estimate energy use associated with the proposed residential buildings (2025 Master Plan and 2040 Vision Plan), default CalEEMod values for natural gas demand were converted to electricity demand. In other words, electricity demand was increased to accommodate the removal of natural gas to ensure that the energy demand that was assumed to be natural gas for space heating, water heating, and cooking in CalEEMod is adequately covered in the Project's energy consumption estimates. For the proposed newly built retail buildings under the 2025 Master Plan and the 2040 Vision Plan, default CalEEMod values were applied.

In CalEEMod 2022.1, the default energy use from nonresidential land uses is based on 2019 consumption estimates from the CEC's 2018-2030 Uncalibrated Commercial Sector Forecast (Commercial Forecast), and the energy use from residential land uses is based on the 2019 Residential Appliance Saturation Survey (RASS). The Commercial Forecast and RASS datasets derive energy intensities of different end use categories for different land use subtypes for electricity demand forecast zones (EDFZ) throughout the state. However, the energy use estimates are based on existing buildings and residences and are not representative of those constructed in compliance with energy efficiency requirements of the latest Title 24 Building Energy Efficiency Standards (e.g., the average residence surveyed in the RASS was constructed in 1974). Therefore, per Appendix D, Technical Source Documentation for Emissions Calculations, of the CalEEMod Version 2022.1 User Guide, "the default energy consumption estimates provided in CalEEMod based on the Commercial Forecast and RASS are very conservative, overestimating expected energy use compared to what would be expected for new buildings subject to the latest Energy Code with more stringent energy efficiency measures" (CAPCOA 2022).

Furthermore, in December 2022, the City adopted changes to the San Rafael Municipal Code, which would require electricity as the only fuel source for newly constructed buildings, with an exemption for commercial kitchens (Municipal Code Chapter 12.245.020); therefore, it was assumed that per City requirements, the residential and retail uses would be all-electric, while it was assumed that the restaurants would still utilize natural gas.

For the Existing Scenario, which is based on existing conditions at the Project Site, default CalEEMod values were applied assuming historical energy use, which in CalEEMod reflects 2005 energy assumptions.

Natural Gas

Project natural gas consumption is based on the estimated total annual building load summaries from CalEEMod. Notably, the residential development components of the Project under the 2025 Master Plan and the 2040 Vision Plan would prohibit the use of natural gas, while all nonresidential developments were assumed to consume natural gas consistent with CalEEMod default values. Default natural gas usage rates in CalEEMod were used for the nonresidential components of the Project. The energy use from nonresidential land uses (natural gas usage per square foot per year) is calculated in CalEEMod based on the California Commercial End-Use Survey database. CalEEMod default values for energy consumption were assumed for the retail components. Notably, as previously discussed, the residential and retail uses would be all-electric, while it was assumed that the restaurants would still utilize natural gas. Therefore, the residential and retail natural gas consumption was converted to electricity.

For the Existing Scenario, default CalEEMod values were applied assuming historical energy use (2005).

Petroleum

Petroleum would be consumed by Project-generated vehicle trips. Such consumption is a function of total VMT and estimated vehicle fuel economies for the vehicles accessing the Project Site. With respect to estimated VMT and based on the number of trips and VMT methodologies used in the Air Quality and Greenhouse Gas Emissions Technical Report for the Project, buildout of the 2025 Master Plan and 2040 Vision Plan would generate an estimated 51,428,573 VMT and 35,761,945 VMT, respectively; see Attachment A for details.[2] The Existing Scenario was estimated to generate 57,944,797 VMT per year. Similar to construction worker and vendor trips, fuel consumption was estimated by converting the total CO_2 emissions from Project mobile sources to gallons using the conversion factors for CO_2 to gallons of gasoline or diesel. Based on the annual fleet mix provided in EMFAC2021, for buildout of the 2025 Master Plan, 2040 Vision Plan, and the Existing Scenario, approximately 96% of the fleet mix using fossil fuels (with the exception of natural gas) were assumed to run on gasoline and approximately 4% of the fleet mix was assumed to use diesel.[3]

6 Impact Analysis

6.1 Would the Project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation?

The Project Applicant proposes a development plan that includes a mix of commercial and residential land uses. Implementation of the Project would result in the demand for electricity and natural gas at the Project Site and gasoline and diesel consumption in the Project area during construction and operation. However, the existing uses of the Project Site also currently demand energy. The one-time construction energy demand and the operational net change in energy demand are evaluated below.

Construction

Energy use during Project construction associated with each parcel would primarily occur in association with fuel use by vehicles and other equipment to conduct construction activities.

Electricity

The electricity demand at any given time would vary throughout the Project construction period based on the construction activities being performed and would cease upon completion of construction. When not in use, electric equipment would be powered off to avoid unnecessary energy consumption. The electricity used for construction

[2] The reduction in VMT from the 2025 Master Plan to the 2040 Vision Plan is primarily a result of a reduction in retail land uses and associated reduction in total trips.

[3] Vehicles using natural gas are anticipated to be minimal and associated emissions was assumed to be fossil fuel. Electric vehicles were excluded for this calculation because CalEEMod Version 2022.1.1.16 assumes electric vehicles generate zero GHG emissions and the energy calculated is based on the CalEEMod CO_2 estimates for mobile sources.

activities would be temporary and minimal; it would be within the supply and infrastructure service capabilities of PG&E and MCE and it would not require additional local or regional capacity. The electricity demand during construction is anticipated to be minimal because the Project would be built during the anticipated 19-month 2025 Master Plan construction duration and the anticipated 14-month 2040 Vision Plan construction duration.

Natural Gas

Natural gas is not anticipated to be required during Project construction because construction of new buildings and facilities typically does not consume natural gas. Peak energy demand specifically applies to electricity; because natural gas and petroleum are liquid, these energy resources do not have the same constraints as electricity supply. Nonetheless, if any natural gas is needed, it would be sufficiently served by existing supply from PG&E and would not require additional local or regional capacity. Any minor amounts of natural gas that may be consumed as a result of construction would be temporary and negligible and would not have an adverse effect.[4]

Petroleum

Off-road equipment used during construction of the Project would primarily rely on diesel fuel, as would vendor trucks involved in delivery of materials to the individual parcels, haul trucks exporting demolition material, and haul trucks importing or exporting soil, tree debris, and other materials to and from the Project Site. In addition, construction workers would travel to and from the Project Site throughout the duration of construction. It is assumed in this analysis that construction workers would travel in gasoline-powered light-duty vehicles.

The estimated diesel fuel usage from construction equipment, haul trucks, and vendor trucks and the estimated gasoline fuel usage from worker vehicles are shown in Table 3. Attachment A lists the assumed equipment usage and vehicle trips.

Table 3. Total Proposed Project Construction Petroleum Demand

Project	Off-Road Equipment (Diesel)	Haul Trucks (Diesel)	Vendor Trucks (Diesel)	Worker Vehicles (Gasoline)
	Gallons			
Master Plan 2025				
Residential 1	17,121	0	3,486	6,707
Residential 2	37,590	222	5,087	9,259
Residential 3	27,892	245	18,280	27,626
Residential 4	32,500	9,494	18,355	44,843
Retail[a]	51,920	6,334	3,357	2,526
Subtotal[b]	*167,024*	*16,296*	*48,566*	*90,961*
Vision Plan 2040				
Residential 5	35,530	8,427	14,699	24,203
Residential 6	25,382	8,888	12,827	22,815
Retail[a]	24,246	1,351	1,079	1,503

[4] While no natural gas is anticipated to be used during construction because construction equipment is typically diesel fueled, the possibility of natural gas use is acknowledged in the event a natural-gas-fueled piece of equipment is used. However, as noted previously, all equipment was assumed to be diesel fueled in CalEEMod.

Table 3. Total Proposed Project Construction Petroleum Demand

Project	Off-Road Equipment (Diesel)	Haul Trucks (Diesel)	Vendor Trucks (Diesel)	Worker Vehicles (Gasoline)
	Gallons			
Subtotal[b]	*85,158*	*18,665*	*28,605*	*48,521*
Total[b]	**252,181**	**34,961**	**77,171**	**139,482**

Source: Attachment A.
Notes:
[a] Retail includes community construction activities such as usable open space and landscaping.
[b] Subtotals and totals may not sum due to rounding.

In summary, construction associated with the development under the Master Plan 2025 is estimated to consume a total of approximately 90,961 gallons of gasoline and 231,885 gallons of diesel. Under the 2040 Vision Plan, construction is estimated to consume a total of approximately 48,521 gallons of gasoline and 132,428 gallons of diesel.[5] In total, Project construction fuel consumption would total approximately 139,482 gallons of gasoline and 364,313 gallons of diesel.

Notably, the Project would be subject to CARB's In-Use Off-Road Diesel Vehicle Regulation that applies to certain off-road diesel engines, vehicles, or equipment greater than 25 horsepower. The regulation (1) imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles; (2) requires all vehicles to be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled; (3) restricts the adding of older vehicles into fleets starting on January 1, 2014; and (4) requires fleets to reduce their emissions by retiring, replacing, or repowering older engines or installing Verified Diesel Emission Control Strategies (i.e., exhaust retrofits). The fleet must either show that its fleet average index was less than or equal to the calculated fleet average target rate, or that the fleet has met the Best Achievable Control Technology requirements. Overall, the Project would not be unusual as compared to overall local and regional demand for energy resources and would not involve characteristics that require equipment that would be less energy efficient than at comparable construction sites in the region or state.

Therefore, because petroleum use during construction would be temporary and would not be wasteful or inefficient, impacts would be less than significant.

Operation

Electricity

Project operation would require electricity for multiple purposes including, but not limited to, building HVAC, lighting, appliances, and electronics. Additionally, the supply, conveyance, treatment, and distribution of water would indirectly result in electricity usage. CalEEMod was used to estimate the Project electricity uses (see Attachment A for calculations). Default electricity generation rates in CalEEMod were used based on the proposed land use and climate zone. Notably, the Project's residential development would be 100% electric to support the City's goals including the City's CCAP; natural gas usage would be prohibited in the residential development. Additionally, solar

[5] For disclosure only, by comparison, California as a whole consumes approximately 29 billion gallons of petroleum per year. Countywide total petroleum use by on-road vehicles only (i.e., not including construction off-road equipment) is expected to be 7.3 million gallons per year in 2023 (CARB 2021a).

power generation would be incorporated into the Project Site via solar panels that would be located on top of residential buildings and the existing parking structure and would provide power to Project common areas.

Title 24 of the California Code of Regulations serves to enhance and regulate California's building standards. The Project would meet the 2019 California Building Energy Efficiency Standards (24 CCR, Part 6) at a minimum and it is anticipated that the 2025 Master Plan development would be subject to the 2022 Title 24 code. The Project's operational energy emissions assumed the default assumptions in CalEEMod Version 2022.1.1.16, which is based on the 2019 consumption estimates from the CEC's 2018-2030 Uncalibrated Commercial Sector Forecast (Commercial Forecast), and the energy use from residential land uses is based on the 2019 Residential Appliance Saturation Survey (RASS). According to these estimates, the buildout of the 2025 Master Plan would consume approximately 11,946,526 kWh per year during operation and buildout of the 2040 Vision Plan would consume approximately 12,057,307 kWh per year. The Existing Scenario would consume approximately 9,213,642kWh per year. As such, upon Project implementation, electricity demand at the Project Site would increase by 2,732,884 kWh per year with buildout of the 2025 Master Plan and 2,843,665 kWh per year with buildout of the 2040 Vision Plan. The increase in electricity use at the Project Site is due to the elimination of natural gas within the residences and replacement with electricity, which is a cleaner and potentially renewable energy source, as well as the change in land use.

The energy demand calculations do not take into account all of the Project's energy-saving design features that would result in exceedances of the code requirements. As such, the Project's electricity use would likely be more efficient than what is assumed due to more stringent regulations anticipated in the future, and would potentially be lower than the calculations presented above.

In summary, although electricity consumption would increase at the Project Site due to the implementation of the 2025 Master Plan and 2040 Vision Plan, the Project would support the City's goals, including by implementing residential development that would be 100% electric. For these reasons, electricity consumption of the Project would not be considered inefficient, wasteful, or unnecessary, and impacts would be less than significant.

Natural Gas

As previously discussed under Section 5.2, Methodology (Operation), the Project would prohibit the installation of natural gas infrastructure in all residential buildings. Instead, an electric fuel source would be provided for space heating, water heating, cooking, and clothes drying. Accordingly, the residential components of the Project would be built all electric and would not result in natural gas consumption. Natural gas use associated with the Project would be limited to the retail land uses. The Existing Scenario is estimated to consume approximately 9,063,757thousand British thermal units (kBTU) per year. Buildout of the 2025 Master Plan would result in consumption of approximately 3,976,405 kBTU of natural gas per year while buildout of the 2040 Vision Plan would result in consumption of approximately 5,964,608 kBTU per year (Attachment A). As such, upon Project implementation, natural gas demand at the Project Site would decrease by 5,087,351 kBTU per year with buildout of the 2025 Master Plan and would decrease by 3,099,149kBTU per year with buildout of the 2040 Vision Plan. For these reasons, the natural gas consumption of the Project would not be considered inefficient or wasteful, and impacts would be less than significant.

Petroleum

During operations, the majority of fuel consumption resulting from the Project would involve the use of motor vehicles traveling to and from the Project Site, as well as fuels used for alternative modes of transportation that may be used by residents, employees, visitors, and guests of the Project.

Petroleum fuel consumption associated with motor vehicles traveling to and from the Project Site is a function of the operational VMT. The annual VMT attributable to buildout of the 2025 Master Plan is expected to be 51,428,573 (Attachment A). The 2025 Master Plan would result in the consumption of an estimated 1,890,974 gallons of gasoline per year and 83,284 gallons of diesel per year from vehicles traveling to and from the Project Site, or 1,974,258 gallons of petroleum per year. Buildout of the 2040 Vision Plan is expected to result in 35,761,945 VMT (Attachment A). The 2040 Vision Plan would result in the consumption of an estimated 1,312,788 gallons of gasoline per year and 56,183 gallons of diesel per year from vehicles traveling to and from the Project Site, or 1,368,971 gallons of petroleum per year.

Under the Existing Scenario at the Project Site, the existing shopping center is estimated to result in 57,944,797VMT per year (Attachment A). The Existing Scenario would consume an estimated 2,225.708 gallons of gasoline per year and 89,797 gallons of diesel per year from vehicles traveling to and from the Project Site, or 2,315,505 gallons of petroleum per year. As such, implementation of the 2025 Master Plan and 2040 Vision Plan would lead to a decrease in petroleum consumption of 341,246gallons of petroleum per year and 946,534 gallons of petroleum per year, due to the decreased number of vehicles traveling to and from the Project Site.

Over the lifetime of the Project, the fuel efficiency of the vehicles being used by the residents, visitors, employees, and guests of the Project is expected to increase. As such, the amount of gasoline consumed as a result of vehicular trips to and from the Project Site during operation would decrease over time. As discussed in Section 3, there are numerous regulations in place that require and encourage increased fuel efficiency. For example, CARB has adopted a new approach to passenger vehicles by combining the control of smog-causing pollutants and GHG emissions into a single coordinated package of standards. The new approach also includes efforts to support and accelerate the numbers of plug-in hybrids and ZEVs in California (CARB 2021b). Additionally, in response to SB 375, CARB has adopted the goal of reducing per capita GHG emissions from 2005 levels by 10% by the year 2020 and 19% by the year 2035 for light-duty passenger vehicles in the Metropolitan Transportation Commission and Association of Bay Area Governments planning area (MTC and ABAG 2021). This reduction would occur by reducing VMT through the integration of land use planning and transportation. As such, operation of the Project is expected to use decreasing amounts of petroleum over time, due to advances in fuel economy.

An important reason that the Project would not result in wasteful, inefficient, or unnecessary consumption of energy is that it would bring multifamily housing to a site that is both a Priority Development Area under Plan Bay Area 2050 and—except for its northwesternmost corner—a Transit Priority Area (see City of San Rafael 2021b, Figure 4-2). The Project Site is a designated Priority Development Area and Transit Priority Area because it is well served by passenger rail and bus services. Therefore, it is expected that residents, visitors, guests, and employees may use transit or non-vehicular modes of transportation to travel to and from the Project Site. The Marin Transit system serves the Project Site and operates several routes with transit stops adjacent to the Project Site, which provides local and regional public transit within the Project area. The Project area is also served by the Sonoma–Marin Area Rail Transit (SMART) rail system, located at 3801 Civic Center Drive, approximately 1,310 feet east of the Project Site. Furthermore, use of transit and non-vehicular modes of transportation is anticipated to increase over time, as local and regional plans and policies facilitating increased use and development of transit and non-

vehicular transportation modes are implemented. Section 3 summarizes some of these plans and policies, including the Plan Bay Area 2050, which was adopted by the Metropolitan Transportation Commission and Association of Bay Area Governments in October 2021. Additionally, Project-specific sustainable design features would include EV charging electric infrastructure consistent with state and local requirements as identified at the time of plan check submittal. Such features include on-site bicycle storage and preferential parking for low-emission/fuel-efficient vehicles and carpools/vanpools for residents, visitors, guests, and employees. The Project design would also allow for pedestrian circulation in the Project Site by employing design features that improve the landscape and streetscape, making the area more pedestrian friendly. Increased EV use would reduce petroleum use and increase electricity use; however, electricity is a cleaner and a potentially renewable energy source.

In summary, Project implementation would result in a decrease in petroleum use during operation compared with the Existing Scenario. Additionally, the Project would include a variety of features that are expected to reduce the number of vehicles traveling to and from the site during operation. When viewed on a regional scale, the Project is an urban infill project located within a large population center that serves an existing demand for a mix of commercial and residential land uses. When compared with new development projects sited on previously undeveloped land and away from population centers, infill projects are generally expected to involve fewer VMT during operation. Given these considerations, the petroleum consumption associated with the Project would not be considered inefficient or wasteful, and impacts would be less than significant.

Renewable Energy Potential

As part of the Project's design process, the Project Applicant considered how the Project could increase its reliance on renewable energy sources to meet its energy demand. Renewable energy sources that were considered for their potential to be used to power the Project, consistent with CEC's definition of eligible renewables, include biomass, geothermal, solar, wind, and small hydroelectric facilities.

Given the Project Site's location in an urban area and the nature of the Project (i.e., a residential and commercial project on approximately 45 acres), there are considerable site constraints, including limited land availability, incompatibility with on-site and surrounding land uses for large-scale power generation facilities, unknown interconnection feasibility, compatibility with utility provider systems, and no known water or geothermal resources to harness, that would eliminate the potential for biomass, geothermal, and hydroelectric renewable energy to be installed on site.

Regarding wind power, first, due to the urban nature of the site and surrounding land uses, wind turbines are generally not feasible because they would represent an incompatible use. Specifically, a general rule of thumb is to install a wind turbine on a tower with the bottom of the rotor blades at least 30 feet above anything within a 500-foot horizontal radius and to be sited upwind of buildings and trees (APA 2011; NREL 2015), which the Project Site cannot accommodate. Secondly, ideal places for wind turbines are where the annual average wind speed is at least 9 miles per hour (4 meters per second) for small wind turbines and 13 miles per hour (5.8 meters per second) for utility-scale turbines (EIA 2022c). However, the latest 5-year meteorological data (2009–2014) for the Napa County Airport station, which is determined to be the most representative data set for the Project Site, shows an average wind speed of 3.41 meters per second. As such, wind power was determined not to be feasible for the Project.

The Project does include solar power, which would be provided by solar panels installed on top of all residential buildings and the existing parking structures, while the retail buildings would be solar ready. Battery storage would be provided in the apartment-style residential buildings. As solar power technology improves in the future and

regulations require additional solar, it is reasonable to assume that additional solar power may be provided to the Project Site. In addition, the Project does not preclude installation of additional battery storage in the future.

In summary, the Project includes the on-site renewable energy source (i.e., solar) that was determined to be feasible for the site and does not include the on-site renewable energy sources that were determined to be infeasible.

Summary

As explained above, the Project would use renewable energy on site as determined to be feasible and would not result in wasteful, inefficient, or unnecessary consumption of energy resources, including electricity, natural gas, or petroleum, during Project construction or operation. Impacts would be **less than significant**.

Mitigation Measures

Impacts would be less than significant; therefore, no mitigation is required.

Level of Significance After Mitigation

No mitigation measures are proposed, and energy impacts would be less than significant without mitigation.

6.2 Would the Project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The Project would be subject to and would comply with, at a minimum, the 2022 California Building Energy Efficiency Standards (24 CCR, Part 6). Part 6 of Title 24 establishes energy efficiency standards for residential and non-residential buildings constructed in California to reduce energy demand and consumption. Part 11 of Title 24 sets forth voluntary and mandatory energy measures that are applicable to the project under CALGreen. As discussed in Section 6.1, the Project would result in an increased demand for electricity during operation and a temporary demand for petroleum during construction; however, compared to the Existing Scenario, the Project would result in decreased demand for natural gas and petroleum during operation under both the 2025 Master Plan and the 2040 Vision Plan. In addition, the Project would support the City's goals, including the City's CCAP, because the residential development would be 100% electric. The Project would also be consistent with the strategies of the City's CCAP by including solar power generated on site, EV charging stations, bicycle amenities, site connectivity, and a connection to the SMART Marin Civic Center station. As such, the Project would meet and exceed the applicable California Code requirements for energy efficiency.

Furthermore, as explained in Section 2, Environmental Setting, the City joined MCE, a Community Choice Aggregation, which residents can opt into in order to ensure that electricity usage would come from renewable resources (e.g., water, wind, and solar). Customers have three electricity options to choose from: MCE Light Green, which is 61% renewable energy; MCE Deep Green, which is 100% renewable energy (50% from wind and 50% from solar); and MCE Local Sol, which is 100% renewable energy (100% from solar). Understanding the diverse needs of the community, projects can change the service by selecting one of MCE's options. Under each option, the Project would include renewable energy as part of the power content mix and would be consistent with the City's renewable energy commitment.

Because the Project would comply with and exceed the existing energy standards and regulations, the Project would result in a **less than significant** impact associated with the potential to conflict with energy standards and regulations.

Mitigation Measures

Impacts would be less than significant; therefore, no mitigation is required.

Level of Significance After Mitigation

No mitigation measures are proposed, and energy impacts would be less than significant without mitigation.

7 Cumulative Impact Analysis

Cumulative projects that could exacerbate the Project's impacts include any projects that could result in wasteful, inefficient, or unnecessary use of energy. However, cumulative projects would be required by the City's Department of Building Inspection to conform to current federal, state, and local energy conservation standards, including the California Energy Code Building Energy Efficiency Standards (24 CCR Part 6), the CALGreen Code (24 CCR Part 11), and SB 743. As a result, the Project, in combination with other reasonably foreseeable projects, would not cause a wasteful use of energy or other non-renewable natural resources. Therefore, the energy demand and use associated with the Project and cumulative projects would not substantially contribute to a cumulative impact on existing or proposed energy supplies or resources and **would not cause a significant cumulative impact** on energy resources.

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Attachment A

Energy Calculations

Construction

Source	Percent	Total MTCO2	Gallons Diesel	Gallons Gasoline
Residential 1 - 2024				
Off-road	65.0%	174	17,079	
Electricity	0.0%	0		
Worker	21.8%	58		6,661
Vendor	13.2%	35	3,468	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*268*	*20,547*	*6,661*
Residential 1 - 2025				
Off-road	42.5%	0.43	42	
Electricity	0.0%	0		
Worker	39.6%	0.40		46
Vendor	17.9%	0.18	18	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*1*	*60*	*46*
Residential 2 - 2024				
Off-road	74.3%	337	33,010	
Electricity	0.0%	0		
Worker	15.3%	69		7,905
Vendor	9.9%	45	4,398	
Hauling	0.5%	2	222	
Onsite Truck	0.0%	0		
Total	*100.0%*	*454*	*37,631*	*7,905*
Residential 2 - 2025				
Off-road	71.2%	47	4,580	
Electricity	0.0%	0		
Worker	18.1%	12		1,354
Vendor	10.7%	7	688	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*66*	*5,268*	*1,354*
Residential 3 - 2024				
Off-road	39.2%	245	24,045	
Electricity	0.0%	0		
Worker	33.9%	212		24,180
Vendor	26.5%	166	16,255	
Hauling	0.4%	3	245	
Onsite Truck	0.0%	0		
Total	*100.0%*	*626*	*40,545*	*24,180*
Residential 3 - 2025				
Off-road	43.5%	39	3,848	
Electricity	0.0%	0		
Worker	33.5%	30		3,446
Vendor	22.9%	21	2,026	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*99.9%*	*90*	*5,873*	*3,446*
Residential 4 - 2024				
Off-road	32.3%	280	27,381	
Electricity	0.0%	0		
Worker	38.1%	330		37,558
Vendor	18.4%	159	15,598	
Hauling	11.2%	97	9,494	
Onsite Truck	0.0%	0		
Total	*100.0%*	*866*	*52,473*	*37,558*
Residential 4 - 2025				
Off-road	36.2%	52	5,119	
Electricity	0.0%	0		
Worker	44.3%	64		7,285
Vendor	19.5%	28	2,758	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*144*	*7,877*	*7,285*
Retail 2025 - 2024				
Off-road	78.6%	351	34,333	
Electricity	0.0%	0		
Worker	2.9%	13		1,473
Vendor	4.0%	18	1,747	
Hauling	14.5%	65	6,334	
Onsite Truck	0.0%	0		

Operation

Type	Total	Units
Existing (2023)		
Petroleum	2,315,505	gallons/year
Electricity	9,213,642	kWh/year
Natural Gas	9,063,757	kBTU/year
Master Plan 2025		
Petroleum	1,974,258	gallons/year
Electricity	11,946,526	kWh/year
Natural Gas	3,976,405	kBTU/year
Vision Plan 2040		
Petroleum	1,368,971	gallons/year
Electricity	12,057,307	kWh/year
Natural Gas	5,964,608	kBTU/year

Constants		
Fuel	**KgCO2/Gallon**	1000 Kg in MT
Gasoline	8.78	
Diesel	10.21	

Source: The Climate Registry 2021

Table 2.1 U.S. Default Factors for Calculating CO_2 Emissions from Combustion of Transport Fuels

Fuel Type	Carbon Content (Per Unit Energy)	Heat Content	Fraction Oxidized	CO_2 Emission Factor (Per Unit Volume)
Fuels Measured in Gallons	**kg C / MMBtu**	**MMBtu / barrel**		**kg CO_2 / gallon**
Gasoline	19.2	5.25	1	8.78
Diesel Fuel	20.2	5.80	1	10.21

Total	*100.0%*	*446*	*42,414*	*1,473*
Retail 2025 - 2025				
Off-road	87.4%	180	17,586	
Electricity	0.0%	0		
Worker	4.5%	9		1,053
Vendor	8.0%	16	1,610	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*99.9%*	*205*	*19,196*	*1,053*
Residential 5 - 2030				
Off-road	44.4%	316	30,922	
Electricity	0.0%	0		
Worker	25.3%	180		20,490
Vendor	18.2%	129	12,675	
Hauling	12.1%	86	8,427	
Onsite Truck	0.0%	0		
Total	*100.0%*	*711*	*52,024*	*20,490*
Residential 5 - 2031				
Off-road	46.9%	47	4,608	
Electricity	0.0%	0		
Worker	32.5%	33		3,713
Vendor	20.6%	21	2,024	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*100*	*6,632*	*3,713*
Residential 6 - 2030				
Off-road	38.0%	257	25,204	
Electricity	0.0%	0		
Worker	29.3%	198		22,599
Vendor	19.3%	131	12,801	
Hauling	13.4%	91	8,888	
Onsite Truck	0.0%	0		
Total	*100.0%*	*677*	*46,893*	*22,599*
Residential 6 - 2031				
Off-road	45.7%	2	178	
Electricity	0.0%	0		
Worker	47.7%	2		216
Vendor	6.6%	0.26	26	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	4	*203*	*216*
Retail 2040 - 2030				
Off-road	86.6%	234	22,935	
Electricity	0.0%	0		
Worker	4.5%	12		1,386
Vendor	3.8%	10	1,006	
Hauling	5.1%	14	1,351	
Onsite Truck	0.0%	0		
Total	*100.0%*	*270*	*25,292*	*1,386*
Retail 2040 - 2031				
Off-road	88.3%	13	1,311	
Electricity	0.0%	0		
Worker	6.8%	1		117
Vendor	4.9%	1	73	
Hauling	0.0%	0		
Onsite Truck	0.0%	0		
Total	*100.0%*	*15*	*1,384*	*117*

Total Proposed Project Construction Petroleum Demand

	Off-road	Hauling	Vendor	Worker
Master Plan 2025				
Residential 1	17,121	0	3,486	6,707
Residential 2	37,590	222	5,087	9,259
Residential 3	27,892	245	18,280	27,626
Residential 4	32,500	9,494	18,355	44,843
Retail	51,920	6,334	3,357	2,526
Subtotal	*167,024*	*16,296*	*48,566*	*90,961*
Vision Plan 2040				
Residential 5	35,530	8,427	14,699	24,203
Residential 6	25,382	8,888	12,827	22,815
Retail	24,246	1,351	1,079	1,503
Subtotal	*85,158*	*18,665*	*28,605*	*48,521*

Total	**252,181**	**34,961**	**77,171**	**139,482**
Master Plan 2025				
Total Diesel	231,885			
Total Gasoline	90,961			
Vision Plan 2040				
Total Diesel	132,428			
Total Gasoline	48,521			
Project Total		check		
Total Diesel	364,313		*364,313*	
Total Gasoline	139,482		*139,482*	

Existing Scenario (2023)

Category	Fuel	EMFAC%	CalEEMod%	Wtd%
LDA	GAS	98.35%	48.98%	48.17%
LDA	DSL	1.65%	48.98%	0.81%
LDT1	GAS	99.97%	5.28%	5.28%
LDT1	DSL	0.03%	5.28%	0.00%
LDT2	GAS	98.81%	25.17%	24.87%
LDT2	DSL	1.19%	25.17%	0.30%
MDV	GAS	96.01%	12.90%	12.39%
MDV	DSL	3.99%	12.90%	0.52%
LHDT1	GAS	54.28%	2.80%	1.52%
LHDT1	DSL	45.72%	2.80%	1.28%
LHDT2	GAS	32.81%	0.60%	0.20%
LHDT2	DSL	67.19%	0.60%	0.40%
MHDT	GAS	20.08%	0.77%	0.16%
MHDT	DSL	79.92%	0.77%	0.62%
HHDT	GAS	0.38%	0.37%	0.00%
HHDT	DSL	99.62%	0.37%	0.37%
OBUS	GAS	64.40%	0.07%	0.05%
OBUS	DSL	35.60%	0.07%	0.03%
UBUS	GAS	54.53%	0.07%	0.04%
UBUS	DSL	45.47%	0.07%	0.03%
MCY	GAS	100.00%	2.67%	2.67%
SBUS	GAS	26.86%	0.06%	0.02%
SBUS	DSL	73.14%	0.06%	0.05%
MH	GAS	69.26%	0.29%	0.20%
MH	DSL	30.74%	0.29%	0.09%
			TOTAL	100%

Gas	95.54%
Diesel	4.48%
Total	100.02%

Project	Vehicle MT CO_2		
Operations	20,453.56		
Fuel Type	**Vehicle MT CO_2**	**Kg/CO2/Gallon**	**Gallons**
Gasoline	19,541.71	8.78	2,225,708
Diesel	916.83	10.21	89,797
		Total	**2,315,505**

2025 Master Plan

Category	Fuel	EMFAC%	CalEEMod%	Wtd%
LDA	GAS	98.48%	48.48%	47.74%
LDA	DSL	1.52%	48.48%	0.74%
LDT1	GAS	99.98%	4.90%	4.90%
LDT1	DSL	0.02%	4.90%	0.00%
LDT2	GAS	98.81%	25.66%	25.35%
LDT2	DSL	1.19%	25.66%	0.31%
MDV	GAS	96.03%	13.31%	12.78%
MDV	DSL	3.97%	13.31%	0.53%
LHDT1	GAS	52.79%	2.79%	1.47%
LHDT1	DSL	47.21%	2.79%	1.32%
LHDT2	GAS	31.07%	0.62%	0.19%
LHDT2	DSL	68.93%	0.62%	0.43%
MHDT	GAS	20.35%	0.78%	0.16%
MHDT	DSL	79.65%	0.78%	0.62%
HHDT	GAS	0.32%	0.78%	0.00%
HHDT	DSL	99.68%	0.78%	0.78%
OBUS	GAS	58.30%	0.07%	0.04%
OBUS	DSL	41.70%	0.07%	0.03%
UBUS	GAS	57.80%	0.05%	0.03%
UBUS	DSL	42.20%	0.05%	0.02%
MCY	GAS	100.00%	2.63%	2.63%
SBUS	GAS	28.48%	0.06%	0.02%
SBUS	DSL	71.52%	0.06%	0.05%
MH	GAS	68.84%	0.28%	0.19%
MH	DSL	31.16%	0.28%	0.09%
			TOTAL	100%

Gas	95.50%
Diesel	4.89%
Total	100.39%

Project	Vehicle MT CO_2		
Operations	17,384.87		
Fuel Type	**Vehicle MT CO_2**	**Kg/CO2/Gallon**	**Gallons**
Gasoline	16,602.75	8.78	1,890,974
Diesel	850.33	10.21	83,284
		Total	**1,974,258**

2040 Vision Plan

Category	Fuel	EMFAC%	CalEEMod%	Wtd%
LDA	GAS	98.76%	48.48%	47.87%
LDA	DSL	1.24%	48.48%	0.60%
LDT1	GAS	99.99%	4.90%	4.90%
LDT1	DSL	0.01%	4.90%	0.00%
LDT2	GAS	98.96%	25.66%	25.39%
LDT2	DSL	1.04%	25.66%	0.27%
MDV	GAS	96.43%	13.31%	12.83%
MDV	DSL	3.57%	13.31%	0.47%
LHDT1	GAS	50.09%	2.79%	1.40%
LHDT1	DSL	49.91%	2.79%	1.39%
LHDT2	GAS	27.97%	0.62%	0.17%
LHDT2	DSL	72.03%	0.62%	0.45%
MHDT	GAS	20.50%	0.78%	0.16%
MHDT	DSL	79.50%	0.78%	0.62%
HHDT	GAS	0.18%	0.78%	0.00%
HHDT	DSL	99.82%	0.78%	0.78%
OBUS	GAS	43.67%	0.07%	0.03%
OBUS	DSL	56.33%	0.07%	0.04%
UBUS	GAS	59.56%	0.05%	0.03%
UBUS	DSL	40.44%	0.05%	0.02%
MCY	GAS	100.00%	2.63%	2.63%

Gas	95.63%
Diesel	4.76%
Total	100.39%

Project	Vehicle MT CO_2		
Operations	12,052.61		
Fuel Type	**Vehicle MT CO_2**	**Kg/CO2/Gallon**	**Gallons**
Gasoline	11,526.28	8.78	1,312,788
Diesel	573.63	10.21	56,183
		Total	**1,368,971**

Difference from 2025 MP	-341,246
Difference from 2040 VP	-946,534

SBUS	GAS	41.74%	0.06%	0.03%
SBUS	DSL	58.26%	0.06%	0.04%
MH	GAS	68.72%	0.28%	0.19%
MH	DSL	31.28%	0.28%	0.09%
			TOTAL	100%

Existing

5.11. Operational Energy Consumption

5.11.1 Unmitigated

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Regional Shopping Center	6125073.988	203.983	0.033	0.004	4714497.114
Parking Lot	995938.416	203.983	0.033	0.004	0
Enclosed Parking with Elevator	650024.1848	203.983	0.033	0.004	0
High Turnover (Sit Down Restaurant)	1442605.499	203.983	0.033	0.004	4349259.677
Total	**9,213,642**				**9,063,757**

2025 Master Plan

5.11. Operational Energy Consumption

5.11.1 Unmitigated

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Apartments Mid Rise	2624485.041	203.983	0.033	0.004	9231956.662
Enclosed Parking with Elevator	2387503.504	203.983	0.033	0.004	0
Condo/Townhouse	413853.9946	203.983	0.033	0.004	2594305.583
Other Non-Asphalt Surfaces	0	203.983	0.033	0.004	0
City Park	0	203.983	0.033	0.004	0
Regional Shopping Center	4722137.48	203.983	0.033	0.004	0
Recreational Swimming Pool	0	203.983	0.033	0.004	0
High Turnover (Sit Down Restaurant)	1318933.501	203.983	0.033	0.004	3976405.398
Parking Lot	475455.6576	203.983	0.033	0.004	0
Total	**11,942,369**				**15,802,668**

5.11. Operational Energy Consumption

5.11.2 Mitigated

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Apartments Mid Rise	2626444.425	203.983	0.033	0.004	0
Enclosed Parking with Elevator	2387503.504	203.983	0.033	0.004	0
Condo/Townhouse	416051.3345	203.983	0.033	0.004	0
Other Non-Asphalt Surfaces	0	203.983	0.033	0.004	0
City Park	0	203.983	0.033	0.004	0
Regional Shopping Center	4722137.48	203.983	0.033	0.004	0
Recreational Swimming Pool	0	203.983	0.033	0.004	0
High Turnover (Sit Down Restaurant)	1318933.501	203.983	0.033	0.004	3976405.398
Parking Lot	475455.6576	203.983	0.033	0.004	0
Total	**11,946,526**				**3,976,405**

2040 Vision Plan

5.11. Operational Energy Consumption

5.11.1 Unmitigated

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Apartments Mid Rise	4220887.134	203.983	0.033	0.004	14847502.08
Enclosed Parking with Elevator	3382595.329	203.983	0.033	0.004	0
Condo/Townhouse	413853.9946	203.983	0.033	0.004	2594305.583
Other Non-Asphalt Surfaces	0	203.983	0.033	0.004	0
City Park	0	203.983	0.033	0.004	0
Regional Shopping Center	1726197.04	203.983	0.033	0.004	0
Recreational Swimming Pool	0	203.983	0.033	0.004	0
High Turnover (Sit Down Restaurant)	1978400.251	203.983	0.033	0.004	5964608.097
Parking Lot	331216.3008	203.983	0.033	0.004	0

Total	**12,053,150**				**23,406,416**

5.11. Operational Energy Consumption

5.11.2 Mitigated

Land Use	**Electricity (kWh/yr)**	**CO2**	**CH4**	**N2O**	**Natural Gas (kBTU/yr)**
Apartments Mid Rise	4222846.518	203.983	0.033	0.004	0
Enclosed Parking with Elevator	3382595.329	203.983	0.033	0.004	0
Condo/Townhouse	416051.3345	203.983	0.033	0.004	0
Other Non-Asphalt Surfaces	0	203.983	0.033	0.004	0
City Park	0	203.983	0.033	0.004	0
Regional Shopping Center	1726197.04	203.983	0.033	0.004	0
Recreational Swimming Pool	0	203.983	0.033	0.004	0
High Turnover (Sit Down Restaurant)	1978400.251	203.983	0.033	0.004	5964608.097
Parking Lot	331216.3008	203.983	0.033	0.004	0
Total	**12,057,307**				**5,964,608**

	Electricity (kWh/yr)	**Natural Gas (kBTU/yr)**
Difference from 2025 MP	2,732,884	-5,087,351
Difference from 2040 VP	2,843,665	-3,099,149