

APPENDIX B. ENERGY ANALYSIS

(Attached as separate file)



Energy Analysis
2014 Housing Element
Implementation H-IM37
Multifamily Rezoning Program:
Garden Apartments

April 13, 2018

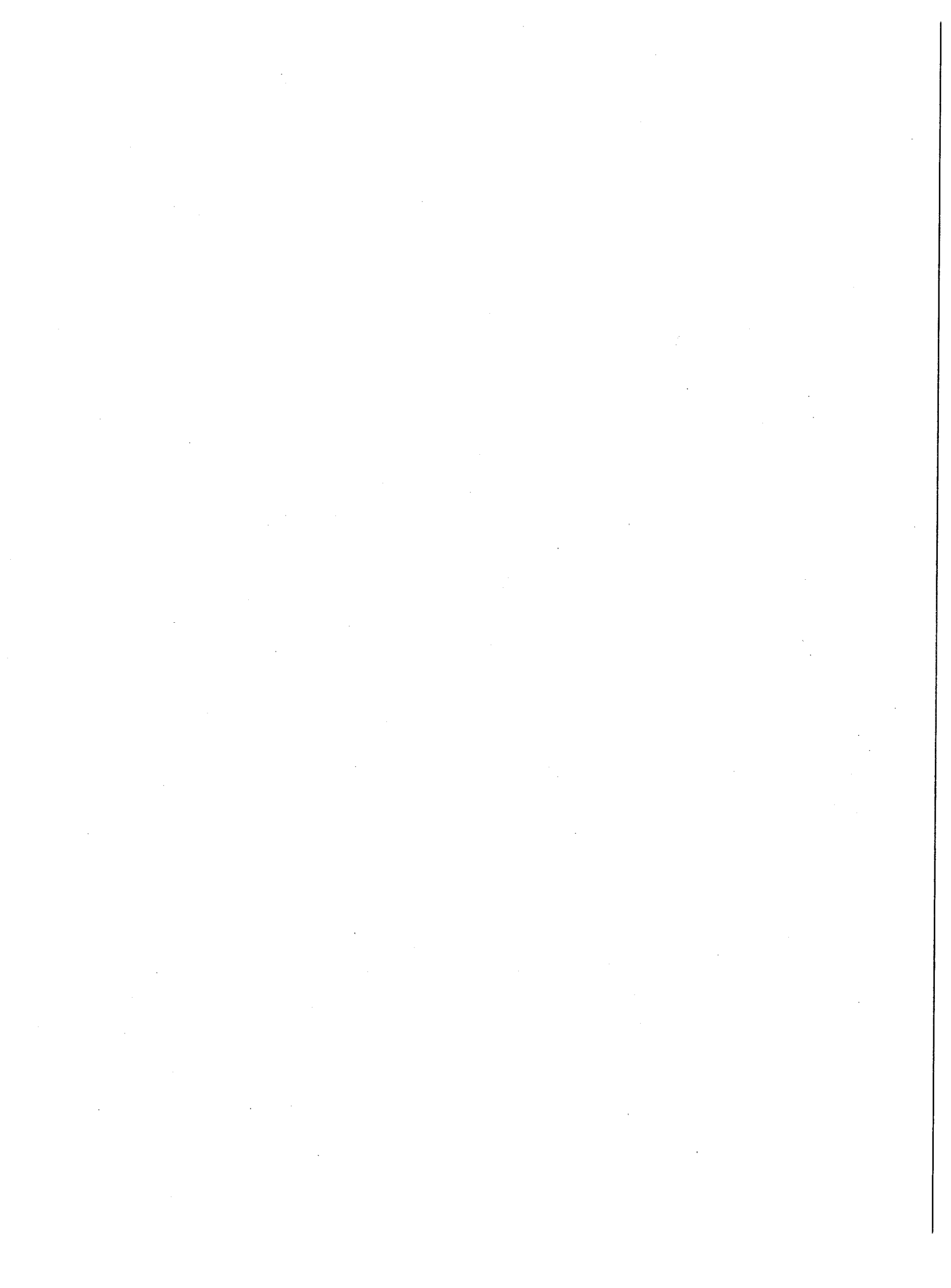
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ENERGY ANALYSIS

Table of Contents

1.0 INTRODUCTION1.1

1.1 REPORT PURPOSE 1.1

1.2 PROJECT DESCRIPTION..... 1.1

2.0 ENVIRONMENTAL SETTING2.1

2.1 ENERGY RESOURCES..... 2.1

 2.1.1 Climate and Energy Demand 2.1

 2.1.2 Energy Production and Use 2.1

 2.1.3 Electric and Natural Gas Transmission and Distribution 2.2

3.0 REGULATORY SETTING.....3.1

3.1 FEDERAL 3.1

 3.1.1 Federal Energy Regulatory Commission 3.1

 3.1.2 National Highway Traffic Safety Administration Standards 3.1

3.2 STATE..... 3.1

 3.2.1 California Public Utilities Commission Requirements 3.1

 3.2.2 California Energy Commission 3.2

 3.2.3 Title 20 and Title 24, California Code of Regulations 3.2

 3.2.4 Assembly Bill 1493 - Clean Car Standards (Pavley) 3.2

 3.2.5 Warren-Alquist Energy Resources Conservation and
Development Act..... 3.3

3.3 LOCAL 3.3

 3.3.1 Humboldt County General Plan..... 3.3

 3.3.2 Redwood Coast Energy Authority 3.4

4.0 ENERGY REQUIREMENTS OF THE PROPOSED PROJECT4.1

4.1 SHORT-TERM CONSTRUCTION..... 4.1

 4.1.1 Off-Road Equipment 4.1

ENERGY ANALYSIS

4.1.2 On-Road Vehicles 4.1

4.2 LONG-TERM OPERATIONS 4.2

4.2.1 Transportation Energy Demand 4.2

4.2.2 Building Energy Demand 4.4

5.0 ENERGY IMPACT ANALYSIS5.1

5.1 THRESHOLDS OF SIGNIFICANCE 5.1

5.2 IMPACT ANALYSIS 5.2

5.2.1 Impact Energy-1: ... Increase demand for energy, specifically electricity and natural gas, the construction of which could cause significant environmental effects? 5.2

5.2.2 Impact Energy-2:Result in in the wasteful, inefficient, or unnecessary use of energy? 5.3

5.2.3 Impact Energy-3: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency? 5.4

6.0 REFERENCES.....6.1

LIST OF TABLES

Table 1 Construction Off-Road Fuel Consumption 4.1

Table 2 Construction On-Road Vehicle Fuel Consumption 4.2

Table 3 Daily Vehicle Fuel Consumption..... 4.3

Table 4 Electricity Usage 4.4

Table 5 Natural Gas Usage 4.4

APPENDIX A: ENERGY DATA SHEETS

ENERGY ANALYSIS

Introduction
April 13, 2018

1.0 INTRODUCTION

1.1 REPORT PURPOSE

The purpose of this Energy Analysis is to evaluate the overall energy consumption that could occur with the construction of the Garden Apartments Multi-Family Rezone Project (proposed project) in Humboldt County, California. This assessment was conducted within the context of Appendix F of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.), and in anticipation of OPR's Proposed Updates to the CEQA Guidelines.

OPR proposed updates to the CEQA Guidelines in 2017, and the Natural Resources Agency is in conducting the formal administrative rulemaking process under the Administrative Procedure Act at the time of writing this report. As part of the Proposed Updates to the CEQA Guidelines, relevant questions regarding potential energy impacts have been added to the sample environmental checklist in Appendix G to better integrate the energy analysis in Appendix F with the rest of CEQA. OPR has also proposed to add a new subdivision (b) to section 15126.2 of the CEQA Guidelines, which includes the required contents of an environmental impact report (EIR), to specifically include the analysis of a project's potential energy impacts.

1.2 PROJECT DESCRIPTION

The proposed project would rezone four adjacent parcels in the Myrtle town area, northeast of the City of Eureka, from Commercial General (CG) to Residential Multifamily (RM). The proposed project parcels have a total area of 2.2 acres and include APN numbers 016-152-020, 016-152-021, 016-152-022, and 016-222-001. The proposed project parcels are part of a group of 64 parcels that have been identified for potential rezone as part of implementation measure H-IM37 of the 2014 Housing Element of the Humboldt County General Plan. The purpose of H-IM37 is to accommodate the housing need for extremely low, very low and low income households pursuant to Government Code Section 65583 (c)(1)(A), by rezoning parcels to multifamily designation.

The parcels are located in the Coastal Zone and within the Humboldt Bay Area Plan. The current General Plan designation (CG) would change to RM - Residential Medium Density; the current zoning designation (also CG) would change to RM - Multi-family Residential. Along with the proposed changes to the General Plan and zoning for the site, the County will be reviewing a coastal development permit for demolition of the existing structures and construction of the new multifamily housing development.

The scope of the proposed project is to demolish the existing structures and construct up to 66 apartment units and 1 community building; made up of 1- and 2-bedroom units. The proposed project site will have 87 parking spaces. New sewer, water, gas and electrical infrastructure will be installed to accommodate the proposed project, along with new sidewalk along Hubbard

ENERGY ANALYSIS

Introduction

April 13, 2018

Lane. Landscaping will be planted throughout the property to enhance the visual components of the proposed project. Construction is anticipated to being in January 2019.

ENERGY ANALYSIS

Environmental Setting
April 13, 2018

2.0 ENVIRONMENTAL SETTING

The following information is from the revised Draft EIR for the County of Humboldt General Plan Update prepared in 2017 for the 24-year planning period of the General Plan Update from 2016 to 2040.

2.1 ENERGY RESOURCES

2.1.1 Climate and Energy Demand

Humboldt County (County) is a region with moderate temperatures and considerable precipitation. Average temperatures along the coast vary only about 10 degrees from summer (58°F) to winter (48°F), although a greater range is found over inland areas. Maximum temperatures on the coast typically do not exceed 80°F, while inland areas may reach 100°F or greater. Temperatures of 32°F or lower are experienced nearly every winter throughout the area, and colder temperatures are common in the interior. Because of its moderate summer temperatures, the County's electricity demand peaks in the winter, rather than the summer when the peak is reached in most of California.

2.1.2 Energy Production and Use

Humboldt County is geographically isolated and is almost an energy island. The majority of petroleum-based transportation fuels are imported to the county by barge. There is only one pipeline connecting the county to the larger natural gas grid, and only two major connections to the larger electric grid. The electric transmission capacity (approximately 60-70 megawatts [MW]) that connects Humboldt County to the regional grid is less than half of the County's 170 MW peak electrical demand. For this reason, Humboldt County generates much of its own electricity, mostly using natural gas and biomass fuels. (RePower Humboldt a Strategic Plan for Renewable Energy Security and Prosperity, Schatz Energy Research Center for the Redwood Coast Energy Authority, Page 11-Humboldt Energy Background)

While the majority of electricity (73%) is generated within the County, a large portion of this locally generated electricity is generated using natural gas (the new Pacific Gas and Electric Company [PG&E] Humboldt Bay Generating Station that began operation in September 2010), and the natural gas is primarily imported (89%). The PG&E Humboldt Bay Generating Station provides 163 MW of total output, which can serve approximately 120,000 homes. The rest of locally generated electricity is primarily produced from biomass (Pacific Lumber and Fairhaven Power), with the remainder coming from local hydroelectric facilities and a very small amount from distributed rooftop solar electric and wind energy systems.

In 2003, diesel/gasoline for transportation comprised 49% of the energy used in the County. Gasoline and diesel consumption in Humboldt County in 2003 was about 71 million gallons.

ENERGY ANALYSIS

Environmental Setting
April 13, 2018

Between 1997 and 2003, gasoline consumption rose at 1.5% per year, according to the Humboldt County Energy Element Background Technical Report. The use of transportation fuels is closely linked to the number of vehicle miles traveled (VMT). Because it is rural, Humboldt County has a higher average VMT than many more densely populated areas.

2.1.3 Electric and Natural Gas Transmission and Distribution

2.1.3.1 Electricity

According to Humboldt County as a Renewable Energy Secure Community - Resource and Technology Assessment Report, Schatz Energy Research Center August 2012 (CEC-500-2013-005), the Humboldt area electrical grid covers about 3,000 square miles and is connected to the bulk PG&E transmission system by four transmission circuits, each ranging from 31 to 115 miles in length. Electricity imports are primarily transmitted through two 115 kV circuits that originate near the community of Cottonwood in the Central Valley and follow a route roughly parallel to Highway 36 and Highway 299 to the Humboldt County coast. Lower capacity circuits include a 60 kV circuit coming from the south between the Bridgeville and Garberville areas (roughly parallel to Highway 101) and a second 60 kV line coming from Trinity County to the east that connects to the 115 kV lines. The total electrical transmission capacity into Humboldt County through the existing lines is 60 to 70 MW, less than half of the county's current peak demand. Therefore, local electrical generators are critical to meeting local electricity needs.

According to the Community Infrastructure and Services Technical Report, electric service for most of the unincorporated area is provided by PG&E. PG&E is an investor owned utility regulated by the California Public Utilities Commission (CPUC). The CPUC establishes rules for operation, customer rates, and PG&E's rate of return. The PG&E electric distribution system serving the County is largely in place, and PG&E is obligated to provide service to users within its service area. New service requests, or requests for additional service, are generally governed by CPUC approved Rule 15 (Distribution Line Extensions) and Rule 16 (Service Extensions). Among other things, the line extension rules specify the allocation of construction cost between PG&E and the customer.

2.1.3.2 Natural Gas

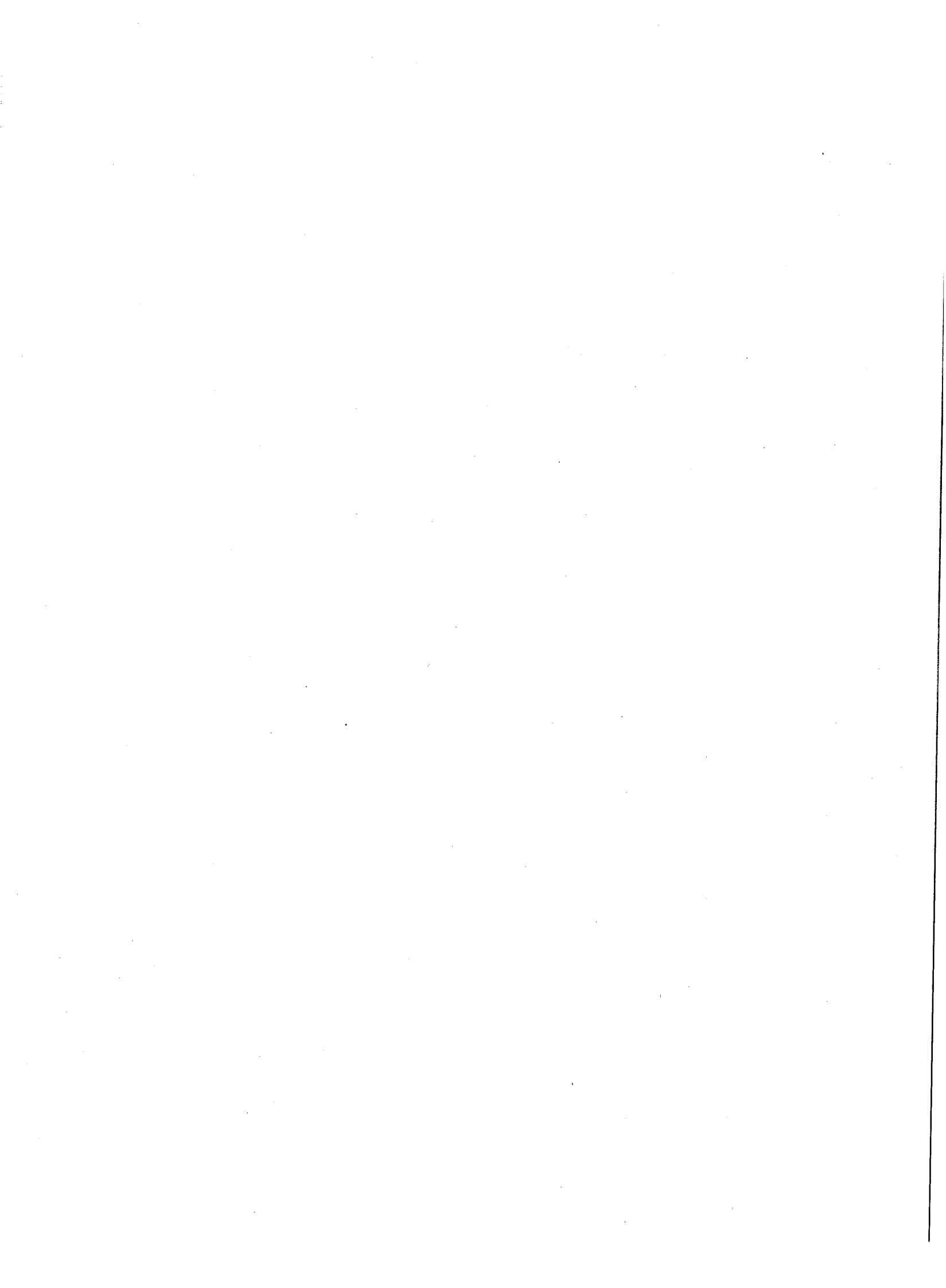
According to Humboldt County as a Renewable Energy Secure Community - Resource and Technology Assessment Report, Humboldt County is remotely located at the end of the electrical and natural gas supply grids. PG&E owns the natural gas and electricity transmission and distribution systems in Humboldt County. There is one major natural gas supply line that comes from a compressor station in Gerber in the Central Valley and follows a route roughly parallel to Highway 36. This pipe is between two and 12 inches in diameter and according to PG&E is capable of transporting enough natural gas to meet current local needs. There are no gas storage fields in the local area, though there are some native gas fields in the Eel River

ENERGY ANALYSIS

Environmental Setting
April 13, 2018

Valley. It is estimated that approximately 65 to 70 percent of households in Humboldt County have access to the natural gas grid.

Natural gas service provided by PG&E is regulated in a manner similar to electric service. Natural gas is generally available to residents of the broader Humboldt Bay area communities and as far south as Scotia. As with electricity, PG&E is obligated to provide service to users proximate to its natural gas facilities. New service requests or requests for additional service are generally governed by Rule 15 (Gas Main Extensions) and Rule 16 (Gas Service Extensions). Where natural gas is not available, residents can purchase propane for cooking and heating, from a variety of suppliers.



ENERGY ANALYSIS

Regulatory Setting
April 13, 2018

3.0 REGULATORY SETTING

3.1 FEDERAL

3.1.1 Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines as well as licensing hydropower projects. Licensing of hydroelectric facilities under the authority of FERC includes input from state and federal energy and power generation, environmental protection, fish and wildlife, and water quality agencies.

3.1.2 National Highway Traffic Safety Administration Standards

Vehicle fuel efficiency is regulated at the federal level. Pursuant to the Federal Energy Policy and Conservation Act of 1975, the National Highway Traffic Safety Administration (NHTSA) is responsible for establishing additional vehicle standards and for revising existing standards.

The NHTSA and the U.S. Environmental Protection Agency (U.S. EPA) are taking coordinated steps to enable the production of clean energy vehicles with improved fuel efficiency. NHTSA sets the Corporate Average Fuel Economy (CAFE) levels, which are rapidly increasing over the next several years in order to improve energy security and reduce fuel consumption. The first phase of the CAFE standards (for model year 2017 to 2021) is projected to require, on an average industry fleet-wide basis, a range from 40.3 to 41.0 mpg in model year 2021. The second phase of the CAFE program (for model years 2022 to 2025) is projected to require, on an average industry fleet-wide basis, a range from 48.7 to 49.7 mpg in model year 2025. The second phase of standards has not been finalized due to the statutory requirement that the NHTSA set average fuel economy standards not more than five model years at a time.

Additional information on NHTSA and U.S. EPA coordination is below in Section 4.2.4 of this document.

3.2 STATE

3.2.1 California Public Utilities Commission Requirements

The CPUC is a state agency created by a constitutional amendment to regulate privately-owned utilities providing telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation services, and in-state moving companies. The CPUC is responsible for assuring that California utility customers have safe, reliable utility services at reasonable rates, while protecting utility customers from fraud. The CPUC regulates the planning and approval for

ENERGY ANALYSIS

Regulatory Setting
April 13, 2018

the physical construction of electric generation, transmission, or distribution facilities; and local distribution pipelines of natural gas.

3.2.2 California Energy Commission

The California Energy Commission (CEC) is California's primary energy policy and planning agency. Created by the California Legislature in 1974, the CEC has five major responsibilities: (1) forecasting future energy needs and keeping historical energy data; (2) licensing thermal power plants 50 MW or larger; (3) promoting energy efficiency through appliance and building standards; (4) developing energy technologies and supporting renewable energy; and (5) planning for and directing state response to energy emergencies. Under the requirements of the California Public Resources Code, the CEC in conjunction with the California Department of Conservation Division of Oil, Gas, and Geothermal Resources is required to assess electricity and natural gas resources on an annual basis or as necessary.

3.2.3 Title 20 and Title 24, California Code of Regulations

New buildings constructed in California must comply with the standards in Title 20, Energy Building Regulations, and Title 24, Energy Conservation Standards, of the California Code of Regulations (CCR).

Title 20 contains a range of standards, such as power plant procedures and siting, energy efficiency standards for appliances, and ensuring reliable energy sources are provided and diversified through energy efficiency and renewable energy resources.

Title 24 (Assembly Bill 970) contains energy efficiency standards for residential and nonresidential buildings based on a state mandate to reduce California's energy demand. Specifically, Title 24 addresses a number of energy efficiency measures that impact energy used for lighting, water heating, heating and air conditioning, including the energy impact of the building envelope such as windows, doors, skylights, wall/floor/ceiling assemblies, attics, and roofs.

Part 11 of Title 24 is the California Green Building Standards Code (CALGreen), which sets minimum and mandatory sustainability requirements in order to reduce environmental impact through better planning, design, and construction practices. CALGreen works along with the mandatory construction codes of Title 24 and is enforced at the local level.

Any project-related construction would be required to comply with the Title 24 codes currently in place, including the CALGreen code. The existing 2016 standards became effective on July 1, 2017.

3.2.4 Assembly Bill 1493 - Clean Car Standards (Pavley)

This bill was passed in 2002 and requires the California Air Resources Board to develop and implement regulations to reduce automobile and light truck greenhouse gas (GHG) emissions, through mandating gradual reductions in global warming pollutants from cars and light trucks

ENERGY ANALYSIS

Regulatory Setting
April 13, 2018

sold in California from 2009 through 2016. The average gram-per-mile reduction of GHG emissions from new California cars and light trucks is required to be about 30% in 2016, compared to model year 2004 vehicles.

ARB adopted the Advanced Clean Cars (ACC) program in 2012 in coordination with the U.S. EPA and NHTSA. The ACC program combined the control of criteria pollutants and GHG emissions into a single coordinated set of requirements for model years 2015 through 2025. ARB adopted a new approach to passenger vehicles – cars and light trucks – 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 zero-emission vehicles in California. The new standard drops GHG emissions to 166 grams per mile, a reduction of 34% compared to 2016 levels, through 2025.

3.2.5 Warren-Alquist Energy Resources Conservation and Development Act

Initially passed in 1974 and amended since, the Warren-Alquist Energy Resources Conservation and Development Act (Warren-Alquist Act) created the CEC, California's primary energy and planning agency. The seven responsibilities of the CEC are: forecasting future energy needs, promoting energy efficiency and conservation through setting standards, supporting energy related research, developing renewable energy resources, advancing alternative and renewable transportation fuels and technologies, certifying thermal power plants 50 MW or larger, and planning for and directing state response to energy emergencies. The CEC regulates energy resources by encouraging and coordinating research into energy supply and demand problems to reduce the rate of growth of energy consumption. Additionally, the Warren-Alquist Act acknowledges the need for renewable energy resources and encourages the CEC to explore renewable energy options that would be in line with environmental and public safety goals. (Warren-Alquist Energy Resources Conservation and Development Act Public Resources Code section 25000 et seq.)

3.3 LOCAL

3.3.1 Humboldt County General Plan

The Humboldt County Housing Element contains Implementation Measure H-IM18, Encourage Energy and Water Conservation, which directs the County to support changes to the County's tax code (likely to Division 5, Assessment of Property, of Title VII - Finance, Revenue and Taxation, of the County Code) to encourage new alternative energy systems, such as solar, wind and hydroelectric energy systems, among other water related items. This measure is intended to limit increases to a property's assessed value for property tax purposes when any of the above improvements are made and is to be fully implemented by April 30, 2018.

ENERGY ANALYSIS

Regulatory Setting
April 13, 2018

3.3.2 Redwood Coast Energy Authority

In 2003, the Redwood Coast Energy Authority (RCEA) was formed as a joint powers authority (JPA), representing seven municipalities (the cities of Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Trinidad, and Rio Dell) and Humboldt County. As a JPA, RCEA is governed by a board composed of a representative from each jurisdiction. RCEA's mission statement is to develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient, and renewable resources available in the region.

The RCEA adopted the Comprehensive Energy Action Plan (CAPE) in September 2012, which is intended to foster, coordinate, and facilitate countywide strategic energy planning, implementation, and education. The CAPE does not directly regulate land use or energy use; instead it contains energy efficiency and conservation strategies and programs that could be implemented by RCEA, its member agencies, and others. The CAPE's broad strategies that are intended to achieve the above objectives include: coordinated strategic energy planning within Humboldt County; energy reliability and security programs; support for the development of emerging energy technologies; and support for energy efficiency and renewable energy retrofits in existing buildings.

ENERGY ANALYSIS

Energy Requirements of the Proposed Project
April 13, 2018

4.0 ENERGY REQUIREMENTS OF THE PROPOSED PROJECT

Short-term construction and long-term operational energy consumption are discussed below.

4.1 SHORT-TERM CONSTRUCTION

4.1.1 Off-Road Equipment

The proposed project is anticipated to break ground as early as January 2019 and is to be completed in approximately 13 months. Table 1 provides estimates of the proposed project's construction fuel consumption from off-road construction equipment.

Table 1 Construction Off-Road Fuel Consumption

Phase	Fuel Consumption (gallons)
Demolition	32,556
Site Preparation	5,226
Site Grading	8,762
Building Construction	336,162
Paving	12,576
Architectural Coating	1,721
Total Fuel Consumption	397,003

Source: Stantec Consulting Services Inc.

As shown in Table 1, construction activities associated with the proposed project would be estimated to consume 397,003 gallons of diesel or gasoline. There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in other parts of the state. Therefore, it is expected that construction fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than at other construction sites in the region. Furthermore, proposed idling restrictions adopted to reduce potential air quality impacts would have the co-benefit of reducing fuel consumption. A conservative estimate would assume a five percent reduction in fuel use through idling restrictions.

4.1.2 On-Road Vehicles

On-road vehicles for construction workers, vendors, and haulers would require fuel for travel to and from the site during construction. Table 3 provides an estimate of the total on-road vehicle fuel usage during construction. There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at

ENERGY ANALYSIS

Energy Requirements of the Proposed Project
April 13, 2018

comparable construction sites in other parts of the state. Furthermore, the proposed project will be encouraging construction workers to carpool to the work site. Therefore, it is expected that construction fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than at other construction sites in the region.

Table 2 Construction On-Road Vehicle Fuel Consumption

Phase	Worker VMT	Vendor VMT	Hauling VMT	Worker Fuel Economy	Vendor Fuel Economy	Hauling Fuel Economy	Total Annual Fuel Consumption (gallons)
Demolition	2,808	0	1,000	26.2	6.1	6.1	271
Site Preparation	1,728	0	0	26.2	6.1	6.1	66
Grading	2,160	0	0	26.2	6.1	6.1	82
Building Construction	14,688	24,090	0	26.2	6.1	6.1	4,510
Paving	3,240	0	0	26.2	6.1	6.1	124
Architectural Coating	3,024	0	0	26.2	6.1	6.1	115
Total							5,168

4.2 LONG-TERM OPERATIONS

4.2.1 Transportation Energy Demand

Table 3 provides an estimate of the daily and annual fuel consumed by vehicles traveling to and from the proposed project. These estimates were derived using the same assumptions used in the operational air quality analysis for the proposed project.

ENERGY ANALYSIS

Energy Requirements of the Proposed Project
April 13, 2018

Table 3 Daily Vehicle Fuel Consumption

Vehicle Type	Percent of Vehicle Trips	Daily VMT	Annual VMT	Average Fuel Economy (miles/gallon) ¹	Total Daily Fuel Consumption (gallons)	Total Annual Fuel Consumption (gallons)
Passenger Cars	47%	1,650	602,192	34.2	48	17,608
Light Trucks	40%	1,407	513,416	26.2	54	19,596
Light-Heavy to Heavy-Heavy Diesel Trucks	12%	427	155,756	6.1	70	25,534
Other	0%	11	3,845	6.1	2	630
Motorcycles	1%	18	6,408	50	0	128
Total	100%	3,511	1,281,617	-	174	63,496

Notes:
Percent of Vehicle Trips and VMT provided by CalEEMod.
Average fuel economy is provided by United States Department of Transportation, Bureau of Transportation Statistics and reflects fuel economy of overall fleet, not just new vehicles.
"Other" consists of buses and motor homes.
Source: Stantec Consulting Services Inc.

As shown above, daily vehicular fuel consumption is estimated to be 174 gallons of both gasoline and diesel fuel. Annual consumption is estimated at 63,946 gallons.

In terms of land use planning decisions, the proposed project would constitute development within an established community and would not be opening up a new geographical area for development such that it would draw mostly new trips, or substantially lengthen existing trips. The proposed project would be well positioned to accommodate existing population and reduce VMT. For these reasons, it would be expected that vehicular fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than for any other similar land use activities in the region.

¹ As of December 2014, NHTSA indicated that the fuel economy of passenger vehicles averaged 34.2 miles per gallon and light trucks averaged 26.2 miles per gallon.

ENERGY ANALYSIS

Energy Requirements of the Proposed Project
April 13, 2018

4.2.2 Building Energy Demand

The proposed project is estimated to demand 314,097.30 kilowatt-hours (KWhr) of electricity and 712,772.28 1000-British Thermal Units (KBTU) of natural gas on an annual basis.

Table 4 Electricity Usage

Land Use	Dwelling Units	Title 24 Electricity Energy Intensity (KWhr/size/year)	Nontitle 24 Electricity Energy Intensity (KWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Total Electricity Energy Demand (KWhr/size/year)	Total Electricity Demand (KWhr/year)
Apartments	66	775.93	3,172.76	810.36	4,759.05	314,097.30
Notes: Energy use provided by CalEEMod Source: Stantec Consulting Services Inc.						

Table 5 Natural Gas Usage

Land Use	Dwelling Units	Title 24 Natural Gas Energy Intensity (KBTU/size/year)	Nontitle 24 Natural Gas Energy Intensity (KBTU/size/year)	Total Natural Gas Energy Demand (KBTU/size/year)	Total Natural Gas Demand (KBTU/year)
Apartments	66	9,200.58	1,599.00	10,799.58	712,772.28
Notes: Energy use provided by California Emissions Estimator Model (CalEEMod) Source: Stantec Consulting Services Inc.					

ENERGY ANALYSIS

Energy Impact Analysis
April 13, 2018

5.0 ENERGY IMPACT ANALYSIS

5.1 THRESHOLDS OF SIGNIFICANCE

This analysis uses the significance criteria from the CEQA Guidelines Appendix F:

1. The project's energy requirements and its energy use efficiencies by amount and fuel type for each stage of the project including construction, operation, maintenance and/or removal. If appropriate, the energy intensiveness of materials maybe discussed;
2. The effects of the project on local and regional energy supplies and on requirements for additional capacity;
3. The effects of the project on peak and base period demands for electricity and other forms of energy;
4. The degree to which the project complies with existing energy standards;
5. The effects of the project on energy resources; and
6. The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

The proposed project would result in a significant impact on energy demand and conservation if it would:

- a) Require or result in the construction of new energy production and/or transmission facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- b) Result in the wasteful, inefficient, or unnecessary consumption of energy for project construction or operation, including transportation energy.
- c) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

ENERGY ANALYSIS

Energy Impact Analysis
April 13, 2018

5.2 IMPACT ANALYSIS

5.2.1 Impact Energy-1: Increase demand for energy, specifically electricity and natural gas, the construction of which could cause significant environmental effects?

5.2.1.1 Impact Analysis

Electricity and Natural Gas

As noted previously, the proposed project would be served by connections to PG&E's existing distribution network. As shown in Table 4, the anticipated electricity demand for the proposed project is 314,097 KWhr/year. As shown in Table 5, the anticipated natural gas demand for the proposed project is 712,772.28 KBTU.

Humboldt County confirmed that PG&E had adequate electricity and natural gas supplies to service new development through its service area. According to the Humboldt County General Plan EIR, approximately 1,721 new housing units and 3,130,717 square feet of commercial and industrial buildings are projected to be constructed during the General Plan Update planning period, from 2016 to 2040. Furthermore, federal and state regulations and would help to ensure that sufficient energy supplies are available to serve projected development during the General Plan Update planning period including the proposed project. Additionally, PG&E is obligated to the CPUC to provide reliable service to new development within its service area.

The proposed project represents less than 4% of the total General Plan buildout of new residential units and is located adjacent to existing facilities. Additionally, the proposed project would comply with CALGreen and Title 24 standards in place at the time building permits are issued. These regulations continue to become increasingly more stringent resulting in more energy efficient buildings and less energy demand. The potential need for new power generation facilities is unlikely. The impact is less than significant.

5.2.1.2 Conclusion

The proposed project represents less than 4% of the total General Plan buildout of new residential units and is located adjacent to existing facilities. The potential need for new power generation facilities is unlikely. The impact is less than significant.

5.2.1.3 Level of Significance Before Mitigation

Less Than Significant Impact.

5.2.1.4 Mitigation Measures

None

ENERGY ANALYSIS

Energy Impact Analysis
April 13, 2018

5.2.1.5 Level of Significance After Mitigation

Less Than Significant Impact.

5.2.2 Impact Energy-2: Result in in the wasteful, inefficient, or unnecessary use of energy?

5.2.2.1 Impact Analysis

Construction Energy Demand

As summarized in Table 1 and Table 3, the proposed project will require 397,003 gallons of diesel fuel for construction off-road equipment and 5,168 gallons of gasoline for on-road vehicles during construction. The proposed project has incorporated idling restrictions and is encouraging construction workers to carpool to the work site. These features would serve to reduce the amount of fuel consumed by the project.

There are no unusual project characteristics that would necessitate the use of construction equipment that would be less energy-efficient than at comparable construction sites in other parts of the state. Furthermore, the proposed project will be implementing idling restrictions and encouraging construction workers to carpool to the work site. Therefore, it is expected that construction fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than at other construction sites in the region.

Building Energy Demand

Buildings and infrastructure constructed pursuant to the proposed project would comply with the versions of CCR Titles 20 and 24, including CALGreen, that are applicable at the time that building permits are issued. In addition, the County's General Plan includes policies and programs that seek to reduce energy consumption.

It would be expected that building energy consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than for any other similar buildings in the region. Current state regulatory requirements for new building construction contained in the 2016 CALGreen and Title 24 would increase energy efficiency and reduce energy demand in comparison to existing residential structures, and therefore reduces actual environmental effects associated with energy use from the proposed project.

Transportation Energy Demands

The daily vehicular fuel consumption is estimated to be 174 gallons of both gasoline and diesel fuel. Annual consumption is estimated at 63,946 gallons.

ENERGY ANALYSIS

Energy Impact Analysis
April 13, 2018

The proposed project would constitute development within an established community and would not be opening up a new geographical area for development such that it would draw mostly new trips, or substantially lengthen existing trips. The proposed project would be well positioned to accommodate existing population and reduce VMT. For these reasons, it would be expected that vehicular fuel consumption associated with the proposed project would not be any more inefficient, wasteful, or unnecessary than for any other similar land use activities in the region.

5.2.2.2 Conclusion

Construction and operation of the proposed project would not result in a wasteful or unnecessary use of energy. The impact is less than significant.

5.2.2.3 Level of Significance Before Mitigation

Less Than Significant Impact.

5.2.2.4 Mitigation Measures

None.

5.2.2.5 Level of Significance After Mitigation

Less Than Significant Impact.

5.2.3 Impact Energy-3: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

5.2.3.1 Impact Analysis

As described previously, the Humboldt County Housing Element contains Implementation Measure H-IM18, Encourage Energy and Water Conservation to encourage new alternative energy systems, such as solar, wind and hydroelectric energy systems, among other water related items. This measure is intended to limit increases to a property's assessed value for property tax purposes when any of the above improvements are made and is to be fully implemented by April 30, 2018. The proposed project would not interfere with implementation of Measure H-IM18.

The RCEA adopted its CAPE in September 2012 to foster, coordinate, and facilitate countywide strategic energy planning, implementation, and education. The proposed project would not conflict with the CAPE.

ENERGY ANALYSIS

Energy Impact Analysis
April 13, 2018

The proposed project would comply with the versions of CCR Titles 20 and 24, including CALGreen, that are applicable at the time that building permits are issued and with all applicable County measures.

5.2.3.2 Conclusion

The proposed project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

5.2.3.3 Level of Significance Before Mitigation

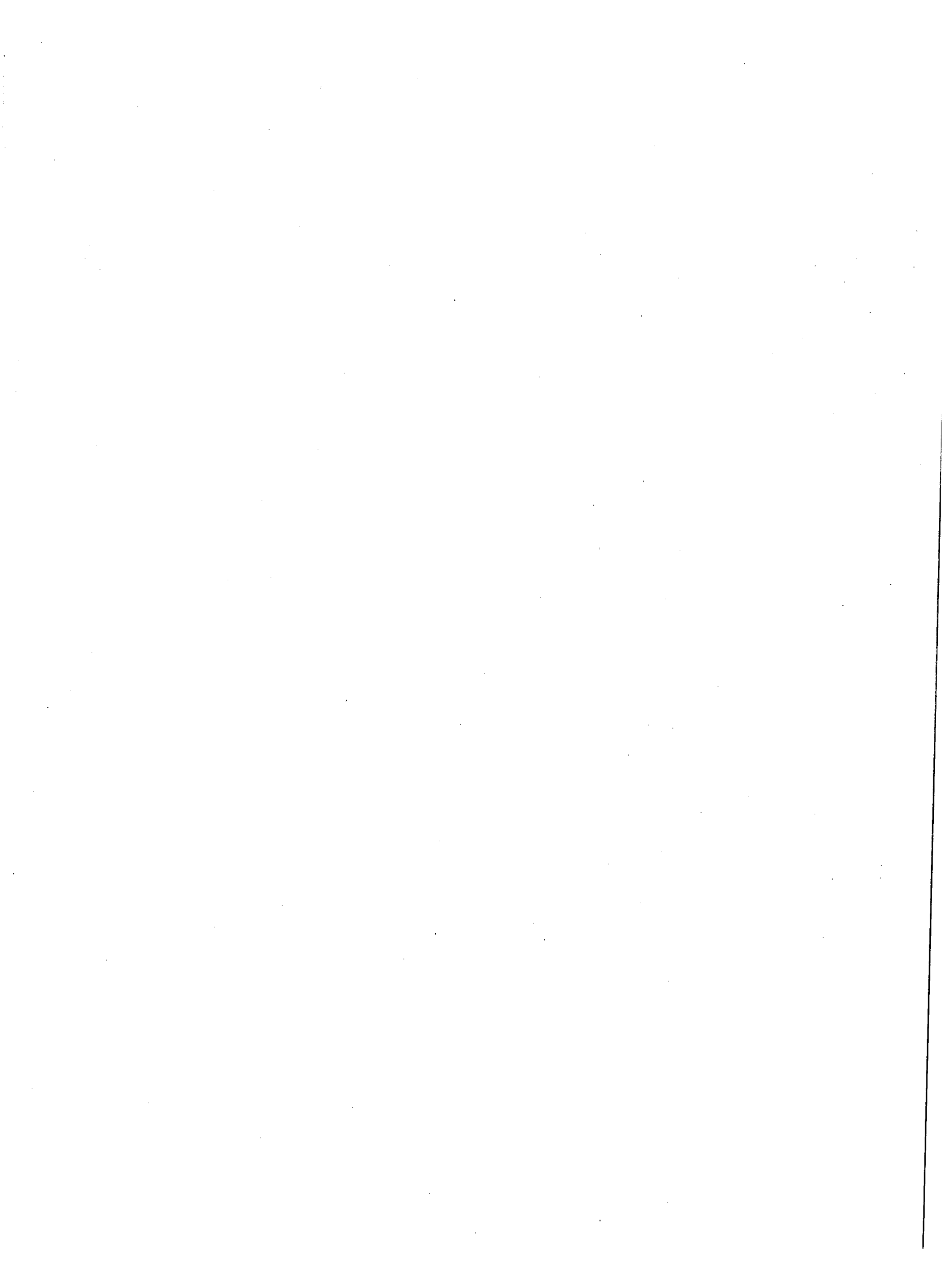
Less Than Significant Impact.

5.2.3.4 Mitigation Measures

None.

5.2.3.5 Level of Significance After Mitigation

Less Than Significant Impact.



ENERGY ANALYSIS

Energy Use Data Sheets

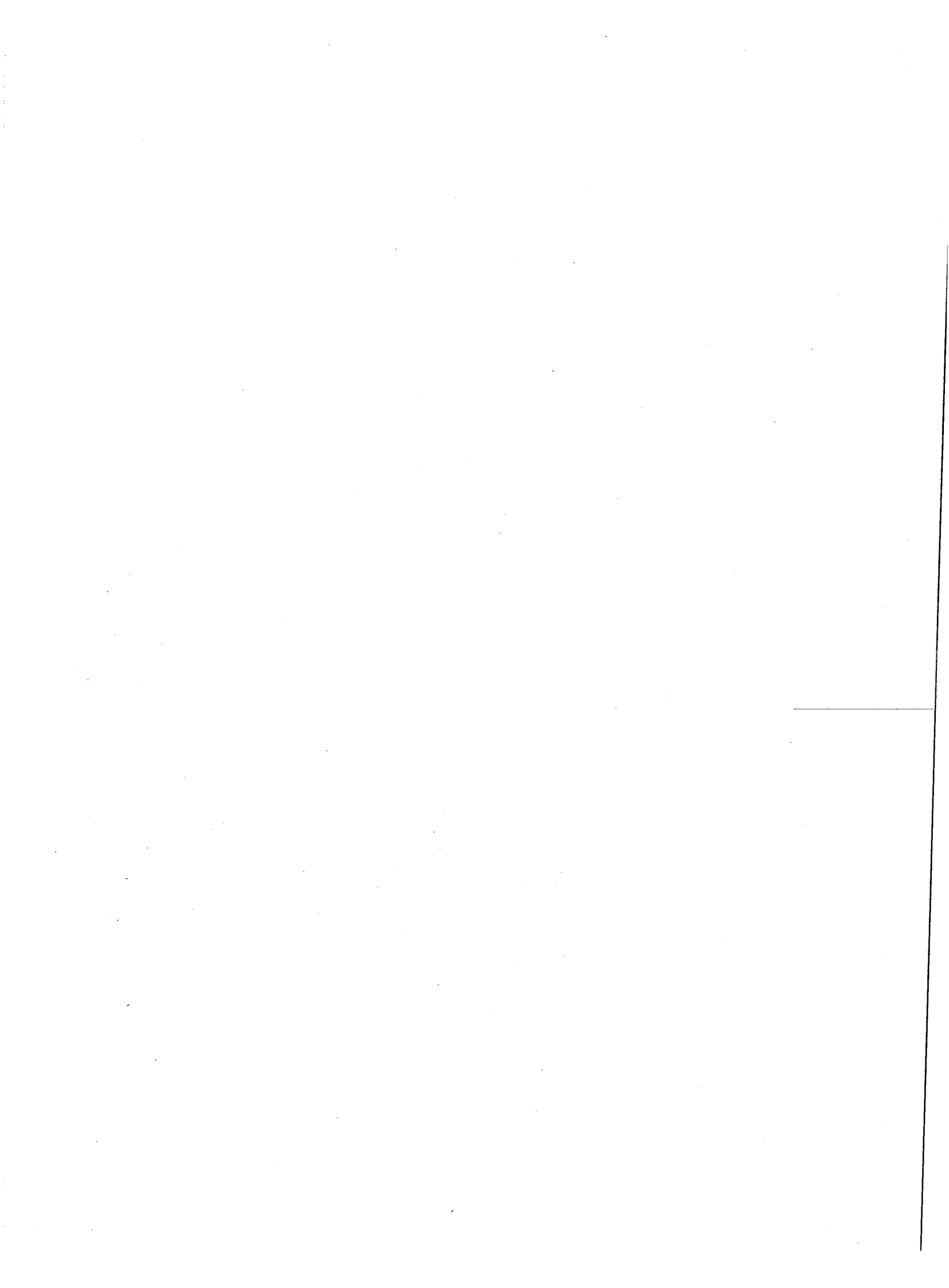
April 13, 2018

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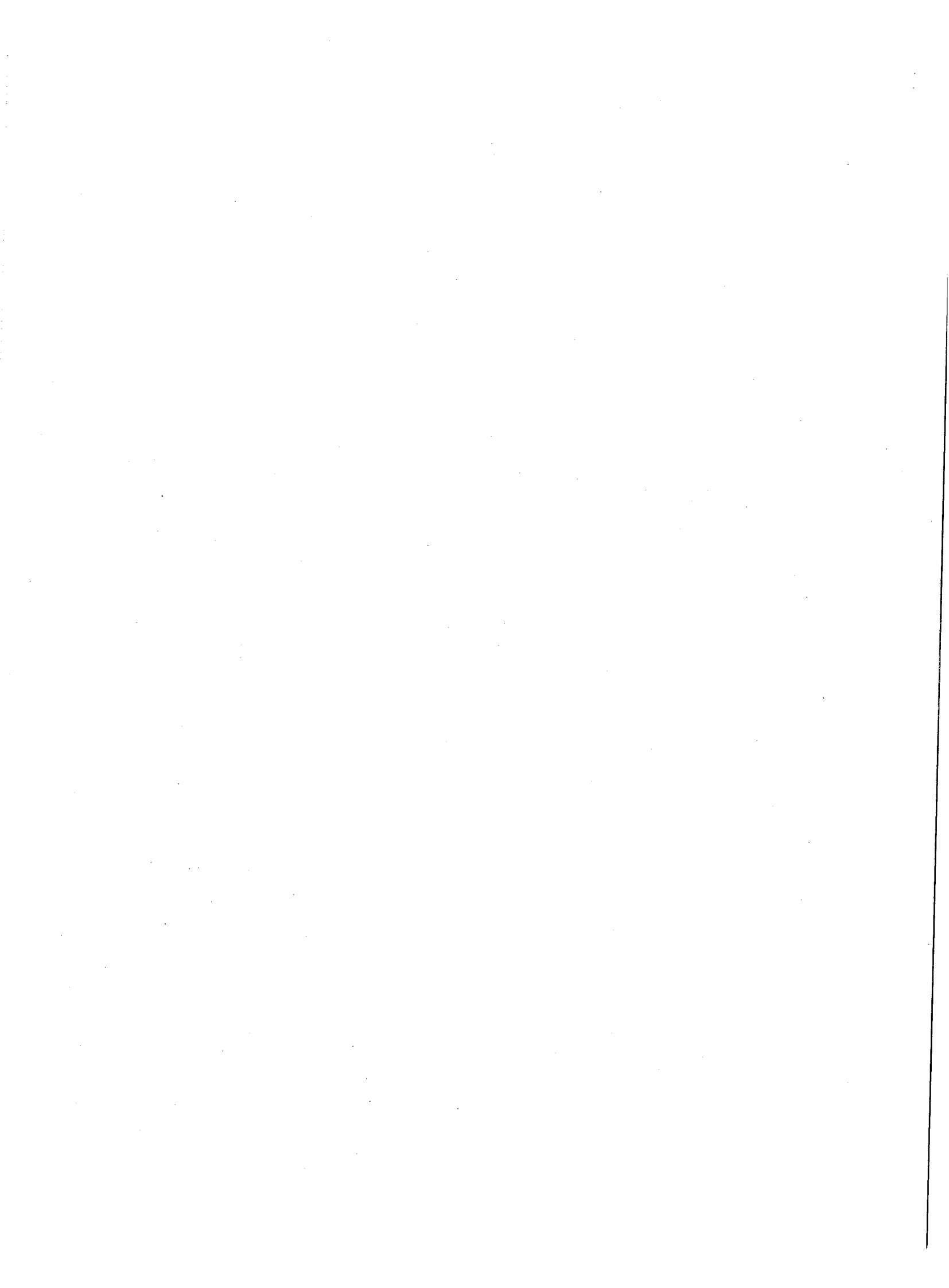


ENERGY ANALYSIS

Energy Use Data Sheets

April 13, 2018

APPENDIX A: ENERGY USE DATA SHEETS



Phase	Start Date	End Date	# work days
Demolition	1/7/19	2/1/19	20
Site Preparation	2/2/19	2/6/19	3
Grading	2/7/19	2/14/19	6
Building Construction	2/15/19	12/19/19	220
Paving	12/20/19	1/2/20	10
Architectural Coating	1/3/20	1/16/20	10

Diesel Fuel Consumption Rates

Formula:

$$LPMH = (K \times GHP \times LF) \div KPL$$

Constants:

Desc	Symbol	Quantity	Units	
fuel consumption	K =	0.17	kg/brake hp-hour	1 Liter = 0.264172 gallons
weight	KPL =	0.84	kg/liter	

Construction Equipment

Phase / Type	GHP	LF	LPMH	GPH	Quantity	hrs/day	Total Days	Total Fuel (gals)
Demolition								
Concrete/Industrial Saws	81	0.73	11.97	45.30	1	8	20	7,248
Rubber Tired Dozers	247	0.40	20.00	75.69	1	8	20	12,110
Tractors/Loaders/Backhoes	97	0.37	7.26	27.50	3	8	20	13,198
<i>Subtotal</i>								32,556
Site Preparation								
Graders	187	0.41	15.52	58.74	1	8	3	1,410
Scrapers	367	0.48	35.65	134.96	1	8	3	3,239
Tractor/loader/backhoe	97	0.37	7.26	27.50	1	7	3	577
<i>Subtotal</i>								5,226
Site Grading								
Graders	187	0.41	15.52	58.74	1	8	6	2,819
Rubber Tired Dozers	247	0.4	20.00	75.69	1	8	6	3,633
Tractors/Loaders/Backhoes	97	0.37	7.26	27.50	2	7	6	2,310
<i>Subtotal</i>								8,762
Building Construction								
Cranes	231	0.29	13.56	51.32	1	8	220	90,324
Forklifts	89	0.2	3.60	13.64	2	7	220	42,000
Generator Sets	84	0.74	12.58	47.62	1	8	220	83,812
Tractors/Loaders/Backhoes	97	0.37	7.26	27.50	1	6	220	36,294
Welders	46	0.45	4.19	15.86	3	8	220	83,731
<i>Subtotal</i>								336,162
Paving								
Cement and Mortar Mixers	9	0.56	1.02	3.86	1	8	10	309
Pavers	130	0.42	11.05	41.83	1	8	10	3,346
Paving Equipment	132	0.36	9.62	36.40	1	8	10	2,912
Rollers	80	0.38	6.15	23.29	2	8	10	3,726
Tractors/Loaders/Backhoes	97	0.37	7.26	27.50	1	8	10	2,282
<i>Subtotal</i>								12,576
Architectural Coating								
Air Compressors	78	0.48	7.58	28.68	1	6	10	1,721

Total Diesel Consumption 397,003

Energy Calculations.xls

The fuel consumption rate for a piece of equipment depends on the engine size, load factor, the condition of the equipment, operator's habit, environmental conditions, and the basic design of equipment.

To determine the hourly fuel cost, the total fuel cost is divided by the productive time of the equipment. If fuel consumption records are not available, the following formula can be used to estimate liters of fuel used per machine hour,

$$LMPH = \frac{K \times GHP \times LF}{KPL}$$

where:

- LMPH is the liters used per machine hour,
- K is the kg of fuel used per brake hp/hour,
- GHP is the gross engine horsepower at governed engine rpm,
- LF is the load factor in percent, and
- KPL is the weight of fuel in kg/liter.

Typical values are given in Table 3.3. The load factor is the ratio of the average horsepower used to gross horsepower available at the flywheel.

TABLE 3.3. Weights, fuel consumption rates, and load factors for diesel and gasoline engines.

Engine	Weight (KPL) kg/liter	Fuel Consumption (K) kg/brake hp-hour	Load Factor (LF)		
			Low	Med	High
Gasoline	0.72	0.21	0.38	0.54	0.7
Diesel	0.84	0.17	0.38	0.54	0.7

Source:

Cost Control in Forest Harvesting and Road Construction. Food and Agriculture Organization of the United Nations. Rome, 1992

Operational Fuel Use

Vehicle Type	Percent of Vehicle Trips	Daily Vehicle Miles Traveled	Annual Vehicle Miles Traveled	Average Fuel Economy (miles/gallon)	Total Daily Fuel Consumption (gallons)	Total Annual Fuel Consumption (gallons)
Passenger Cars	47%	1,650	602,192	34.2	48	17,608
Light Trucks	40%	1,407	513,416	26.2	54	19,596
Light-Heavy to Heavy-Heavy Diesel Trucks	12%	427	155,756	6.1	70	25,534
Other	0%					
Motorcycles	1%	11	3,845	6.1	2	630
Total	100%	3,511	1,281,617	50	0	128
				-	174	63,496

Land Use	Dwelling Units	Title 24 Natural Gas Energy Intensity (KBTU/si ze/year)	Nontitle 24 Natural Gas Energy Intensity (KBTU/si ze/year)	Total Natural Gas Energy Demand (KBUT/si ze/year)	Total Natural Gas Demand (KBTU/yea r)
Apartments	66	9,200.58	1,599.00	10,799.58	712,772.28