

Redwood Coast Offshore Wind Project

Environmental Impact Report

Prepared by: Valerie Andrews, Andrew Cairns, Natalie Greenleaf, Ryan Kim, Giselle Rangel

Introduction

Environmental Setting

Location

The Offshore Wind Energy project takes place in two locations: facilities on the Samoa Peninsula, and 21 to 29 nautical miles off the coast of Humboldt County. The facilities on the peninsula are planned for upgrades to maximize the holding and working capacity for the assemblage of the turbines as shown in *Figure 1.3*. The quay also needs improvements to be more accessible. The area in the pacific where the turbines are planned to go will be held up by WindFloats.



Figure 1.1: Map detailing the parcels of ocean that would be leased from the BOEM

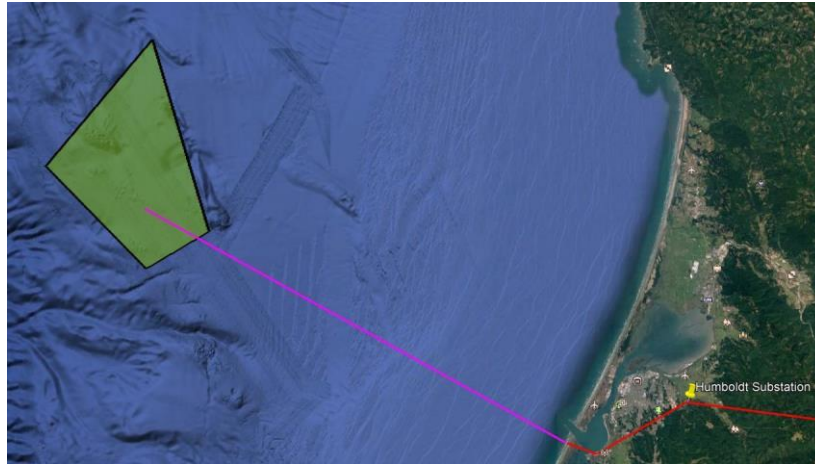


Figure 1.2 Site specific map of the WindFloat area 21-29 nautical miles off the Humboldt coast. Red line is the inland power cable connection, the purple line is undersea.



Figure 1.3 Redwood Marine Terminal 1 - location for the onshore operations involving storage, assemblage, and repair of the turbines and wind floats.

Humboldt Bay is a 14 mile long natural bay and a multi-basin, bar-built coastal lagoon. It's the only deep-water port in Northern California with considerable port infrastructure. Agriculture and grazing land account for 46.6 percent of total land use in the coastal areas, with an additional 14.1 percent used for timber production. The Offshore Wind Energy Project, aims to use existing harbor facilities which will act as staging, storage, fabrication, and assembly operations, however harbor improvements are necessary to support this project. It currently lacks a wharf or quay with ample size and capacity to support any turbine implementation operations. The goal is to utilize Redwood Marine Terminal 1, owned by Humboldt Bay Harbor, Recreation, and Conservation District, to develop a new dock terminal and accommodating facilities for the offshore wind turbines and related equipment. The land has been previously zoned as an MC Coastal Dependent area by the municipal government, eliminating the need to reclassify it for harbor related industrial purposes. The exact boundaries and designations of the surrounding parcels can be obtained from the Humboldt County GIS website.

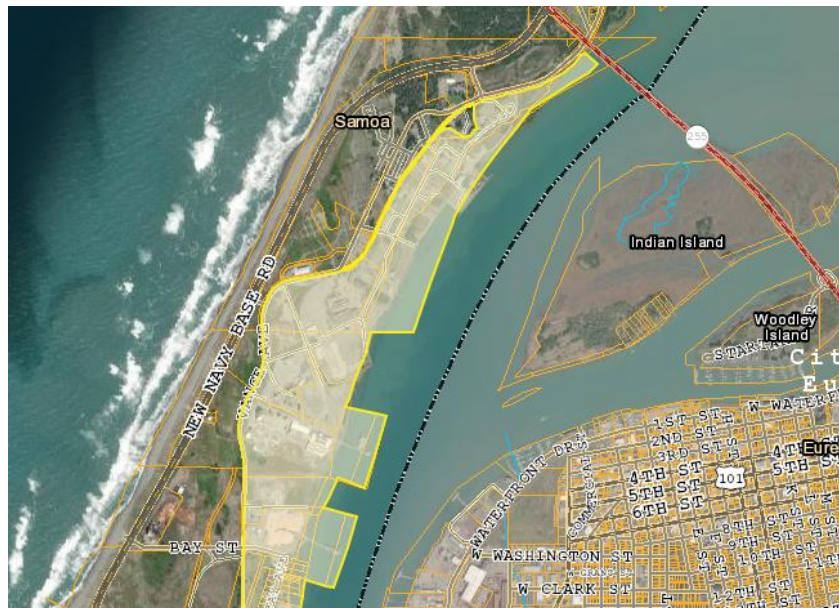


Figure 1.4: The highlighted area bordering Humboldt Bay is currently zoned as coastal related industrial areas. (Designation MC)

Historical and Current use

Humboldt Bay has a long, intricate history. The first people to settle in the Humboldt Bay region were the Yurok, Karuk, Wiyot, Chilula, Whilkut, and Hupa tribes. The first colonizing explorers arrived in 1775. In 1804, Humboldt Bay was first “discovered,” though it was not mapped and was lost to future explorers until 1849. Shortly after, the area began commercializing, focusing on agriculture, fishing, shipping, and logging (Humboldt Bay Harbor District, 2020). In the mid 20th century, commercial fisheries became the primary focus for the Humboldt Bay area with the construction of the Northwest Pacific Railroad and Highway 101 (Pomeroy, Thompson, and Stevens, 2010). There has, however, been a decline in commercial fishing over the long-term, and levels are not expected to recover to their highest historical levels (BST Associates, 2018, p. 2). This has resulted in the infrastructure and land of these areas falling into disrepair and disuse. The successful completion of this project will create opportunity for the revitalization of the area.

The offshore project site, located approximately 24 to 36 miles off the coast of Humboldt County, is occasionally used for trawl fishing operations and cargo ship passage. The project site was chosen to minimize conflicts with the fishing and shipping operations. The distance from the shore will also minimize visual impacts. This site is ideal for wind energy, as it has the highest average annual wind speed offshore of Humboldt Bay (RCEA, 2018), thus the capacity for energy production is maximized.

The onshore project site will be located along Humboldt Bay, which has abundant space and adequate port infrastructure (RCEA, 2018). The proposed project will bring potential improvements and upgrades, as to support the operation. Redwood Marine Terminal 1 currently operates as a working dock for commercial fishermen, an aquaponics research facility, and a

hagfish processing and shipping facility (HBHRCD, 2020). The goal for this terminal is to become a multipurpose facility that can also support the offshore wind energy operations and other maritime uses (RCEA, 2018).

Climate and Habitat

The entirety of Humboldt County is an area of moderate temperature and considerable precipitation, especially in the Humboldt Bay where the proposed projects development will take place. Annual temperatures are moderate, with a low of 47 degrees F in January to a high of 57 degrees F in August. The months of October through April see increased rainfall relative to the rest of the year, with December historically averaging over 8 inches of rain. There has historically been little to no worry of extreme inclement weather hazards such as snow or tornados. However, the risk of earthquakes and tsunamis has always existed. Also, in recent years there has been a steadily increasing risk of wildfire. Sea level rise also poses an ever present risk to the area surrounding the Bay however, as projections show that it faces a 16 inch sea level rise by 2050 and a 50 inch rise by the year 2100. The average annual surface temperature of the oceanic area outside the bay is a mild 55 degrees F, neither excessively warm nor cold in comparison to the other oceans around the world. Like most oceans its weather can change quite rapidly, with high winds and stormy conditions being the most severe and unpredictable in the winter months.

The upwelling of ocean currents and canyons near Humboldt Bay, provide immense biodiversity due to richness in nutrient and biological resources. The project resides on three major Mendocino plate tectonic junctions such as, the Gorda, the North American, and the Pacific Plates. (RCEA, 2018). There are various marine biological resources such as, marine

birds, marine habitats, fish species, marine mammals, threatened and endangered species. The Offshore Wind Project turbines will be near benthic areas and affect avian species flight path. Humboldt Bay is composed of various benthic habitats, there is an intertidal benthic beach habitat near the Samoa Peninsula that has various crustaceans that burrow themselves in the sandy beach substrate, which is a vital food resource for many species. (RCEA, 2018). In fact, there are shallow benthic habitats that contain eelgrass beds in which many fish species are dependent on. This shallow benthic eelgrass habitat also provides a nursery area for fish species and Dungeness crab populations, which is utilized for commercial and recreational use. (RCEA, 2018). The Rocky reef habitat is of Habitat Area of Particular Concern (HAPC) to the National Marine Fisheries Service (NMFS) in this Offshore Wind Project area because of how sensitive and vulnerable this ecosystem is to fish species. (RCEA, 2018).

Project Description

Location of Project Components

The onshore Redwood Marine Terminal 1 would act as support, staging and lead in assembly operations. The terminal shown in *Figures 1.3* and *2.1* is located on the Samoa Peninsula. It's goal is to develop a dock terminal to aid in the assemblage and maintenance of the floating wind turbines for the offshore floating wind industry and other maritime uses. In order for the project's turbines to have power, a 24-mile offshore power cable will travel from the eastern most WindFloat unit in a straight line to shore.



Figure 2.1. Location of the Redwood Marine Terminal 1 for the Onshore storage and fabrication site of the offshore wind turbines.

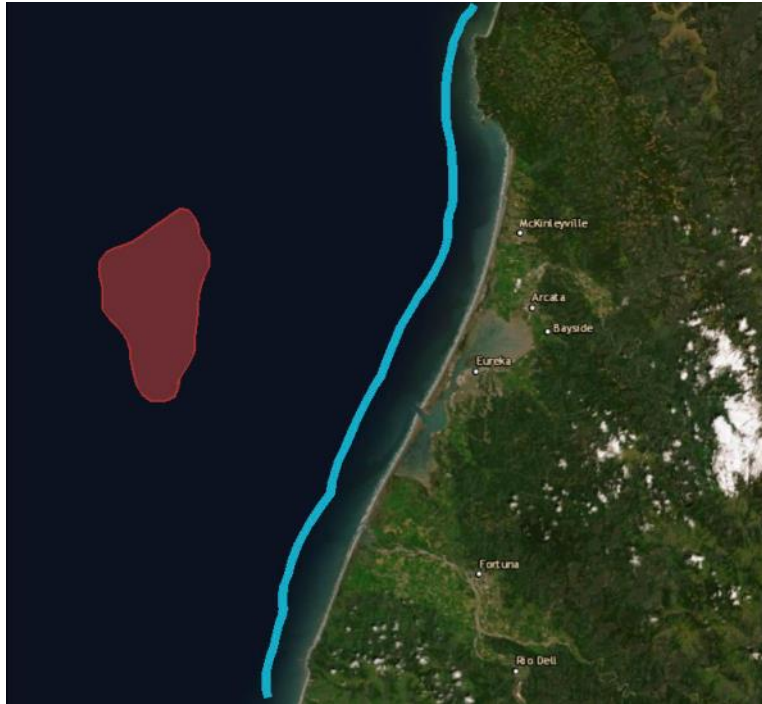


Figure 2.2. The red zone is the WindFloat area designated to the turbines approximately 21 to 29 nautical miles off the coast of Humboldt Bay.

Facilities to be installed

The bulk of the infrastructure that will be produced for this project will consist of offshore wind turbines and the power transmission cables that will transport the energy to the main grid. A total of 15 turbines at 12 MW capacity each will be installed via steel cables moored to the ocean floor for a total of approximately 120 MW of fully renewable energy over a 12 square mile area. Each turbine will stand 260 meters with a blade diameter of 220m, covering 38000 square meters of blade sweep, which has the potential to interfere with both bird migrations and marine wildlife ecosystems. One parallel 115 kV export cable will be installed extending from a substation floating adjacent to the wind farm, through the south spit of the Humboldt Bay, and then to an inland junction that will connect it to onshore power

infrastructure. This cable will run approximately 24 miles in a straight line on the sea bed and below the beach, avoiding ecologically sensitive areas where required. Dry dock infrastructure would also have to be installed in Redwood Marine Terminal 1 to allow for the fabrication and launching of the offshore wind floats. Construction for this project would not require installation of any additional roads, as the area had previously been used as a fishing port for the Samoa peninsula and thus already has serviceable roads for transportation of building supplies.

This Offshore Wind Project, intends to become the first floating wind farm and wind industry center in California. This project will bring clean and sustainable energy for Humboldt County. The WindFloat structure is semi-submersible with column stabilizers, a mooring system, an offshore platform to trap water, and a wind turbine will be located on one of the columns (RCEA, 2018). Turbine blades can potentially impact avian species flight path because they move along through that area to reach nearshore environments. There will be around 8-16 WindFloat foundations in which will be assembled on the port facility and then transported to the designated location. Marine mammals can be subjected to collide or affect whale migrations with the Offshore wind platforms because it is 21 to 29 nautical miles off the coast of Humboldt County. The mooring system cables are made of heavy chains, polyester rope, which are connected to anchors. (RCEA, 2018). This cable system will contain the electrical cable connection, where it will go through benthic environments to reach the land grid transformer. The electrical cable connection can potentially cause electromagnetic field effects on sharks, rays, sea turtles, and many fish species. The cable system which will reach the land infrastructure will be placed or adjusted in areas that will not affect vulnerable benthic habitats. This mooring cable system can also contribute to an accumulation and entanglement of fishing line. The onshore power infrastructure will contain a 115kV (kilovolt) export cable extended 24-miles

offshore to the wind turbines. (RCEA, 2018). Harbor improvements in Redwood Marine Terminal 1, located in the Samoa Peninsula, must be made in order to withstand turbine construction, daily maintenance operations for the Offshore wind turbines, and exporting boating vessels. The onshore power station will assess and avoid sensitive onshore environments before the power cable system is drilled and connected to the wind turbine floating structure. Sensitive environmental habitats areas are to be assessed and discussed with California state agencies, local commercial fishing fleets, the general public, and local tribes to consider if the Offshore Wind Project area is to be established.

Project Phases

The Bureau of Ocean Energy Management (BOEM) defines four phases in the lease process for new energy projects. These four phases include:

1. Planning and Analysis - This phase is focused on identifying the best potential locations that offer the best wind strength, near areas that have energy demands, with an eye on other ocean uses. It also includes discussions with stakeholders in the area, environmental review, and industry input on development of the potential site.
2. Leasing - This involves an auction for potential developers.
3. Site Assessment - The winner of the auction phase then proceeds with its own site assessment, and submits plans for BOEM to review.
4. Construction and Operations - This phase is where the construction and operation plans are submitted for review and BOEM goes through a more extensive

environmental review of the proposed project before either approving or denying the project (BOEM, 2019).

The Redwood Coast Energy Authority (RCEA) however, envisions seven phases of the Redwood Coast Offshore Wind Project (2018).

1. Pre-site Control - or securing the lease for the project from BOEM. This is expected to take anywhere between nine months to just over two years depending on the bidding process.
2. Early Development - This phase is expected to take about two years and hash out all the potential foreseeable issues likely to take place with further construction.
3. Late Development - Which will cover one year and finalize the steps and actions needed to continue.
4. Financing and Preconstruction - is expected to take around three months and is crucial in collecting and maintaining the funding needed for the project as a whole.
5. Construction - This will occur over two years and begin at the onshore facilities.
6. Operations - The wind turbines will operate for twenty-five years and be repaired and maintained by the Redwood Marine Terminal onshore facility.
7. Decommissioning or Renewing - A decision that will be made at the appropriate time.

Activities (and techniques) associated with the different phases

1. Financing and Pre-Construction: Hold an auction for interested companies. Companies will place their bids to win the right to develop in the area. Leases will be granted and companies will assess their leased areas to begin creating their site assessment plan that

will go to BOEM for review. Companies will then submit a project proposal. BOEM will conduct environmental and technical reviews of the project proposal. Plans must be approved by BOEM before any construction can begin.

2. Construction: After project proposals have been approved, construction at the project sites will begin.
 - a. Upgrades and appropriate construction will begin at the Redwood Terminal to ensure that the facilities are up to date and adequate for the project.
 - b. Construction of the Windfloat foundations will begin at the onshore facilities.
 - c. The power transmission and grid interconnection facilities will be prepared.
 - d. The installation of the windfloat foundations on the offshore project site will begin and include the installation of the parallel 115 kV export cable. The power cable will connect the offshore site to the onshore facilities.
 - e. Wind turbines will be constructed and installed on the Windfloat foundations and power can begin to be generated.
3. Operation through 2049: The wind farms are planned to operate for 25 years after construction is completed.
4. Decommissioning or renewal/repowering: At this time, an appropriate decision will be made to either decommission or renew the operations at the wind farms.

Purpose and Need

Not all energy use throughout the county is used to heat homes, Humboldt County is “geographically and is almost an energy island” (Humboldt County General Plan Revised Draft

EIR 2020). The need for safer, powerful and eco-friendly ways to source power is urgent. The Offshore Wind Energy project would reduce some of the logistical challenges associated with land based wind energy projects. It enables the development of larger turbines capable of producing more energy for the county. The National Renewable Energy Laboratory estimates that offshore wind has the potential to produce more than 2,000 gigawatts of wind energy, or 7,200 terawatt-hours per year of generation (Top 10 things you didn't know about offshore wind energy 2020). Information drawn from the Humboldt County Energy Element Background Technical Report in 2003 states the “residential, commercial, industrial and agricultural sectors consumed 940 Gigawatt-hours (GWh), and total peak electrical demand was 158 Megawatts (MW). This comprised approximately 0.3% of the State total (note that Humboldt County’s population accounted for 0.4% of the State total)” (Energy Consumption and Conservation). The average usage of electricity between the three facets was spread fairly evenly.

Humboldt County leads the nation in the number of indoor-grown cannabis operations. Many different opinions and viewpoints remain on the topic of medical marijuana uses, both for and against it, but one inarguable consequence in Humboldt County is greenhouse gas emissions produced from electricity generation. A lot of energy is diverted into these grows, legal or not; the environment and populations worldwide are suffering from the effects of this abundant energy consumption.

Humboldt County general energy consumption heavily relies on imported energy resources such as gasoline, diesel, and natural gas. “In 2003, diesel/gasoline for transportation comprised 49% of the energy used in the County.” (Humboldt County General Plan Revised Draft EIR, 2020). Humboldt County can become the leading offshore wind energy producer in California and offset dependency on non-renewable energy resources. Offsetting non-renewable

resources, will also support “meeting zero Carbon standards and reduce exposure to price volatility associated with electricity and natural gas, while assisting the state in meeting the renewable-energy requirements established in Senate Bill (SB 350),” which is a high priority with rising climate change. (Humboldt County Wind Energy Project Draft EIR, 2020). The state of California must meet 50% of its electrical energy production from renewable energy sources by 2030. (Redwood Coast Energy Authority, 2018). With that said, the Offshore Wind Project can meet these new and important standards because of its renewability energy production. According to BOEM (2016), “Offshore wind energy has the potential to meet some of this demand in the future.” The Offshore Wind Project has the capability to provide cleaner energy to the locals of Humboldt County and assist California’s energy needs as well. As stated by BOEM (2020), it can reduce the use of natural gas by 29%, 51%, and 64% from Humboldt Bay Generating System (HBGS) and significantly reduce 92,000, 158,000, and 202,000 metric tons of carbon dioxide emissions per year. In fact, the Offshore Wind Project will be able to convert and connect with some adjustments to the state of California’s energy infrastructures and meet the demand of renewable electrical energy for the people in California. The California greenhouse gas programs (GHG) are strong supporters of this renewable energy and are established through the California Air Resources Board to keep projects such as the Offshore Wind on track in (GHG) reductions. (RCEA, 2018).

The area in which the wind turbines will reside is an ideal location for Humboldt County because of the high wind capacity it will produce. The Wind Project will have a “strong wind resource, that is greater than 18 miles per hour (mph) (8 meters per second [m/s]) average wind speed, with sufficient potential to generate project revenue.” (RCEA, 2018). The California Wind Atlas, from the California Department of Water Resources deems Humboldt County to

have “ “excellent” or “good” wind energy generation potential” as well. (Humboldt County General Plan Revised Draft EIR, 2020). Having this excellent source of wind with the Offshore Wind Energy project, can potentially aid Humboldt County with its outage difficulties which occur quite frequently. In fact, this renewable technology will assist in having “advance, secure, sustainable, clean and affordable energy resources” for all of Humboldt County communities. (RCEA, 2018).

The Offshore Wind Energy Project, can provide new employment and economical value to Humboldt County due to new infrastructure development that will take place. During the construction and maintenance of the wind turbines, more personale must be hired in order to run the harbor and turbine facilities. This in turn, will produce and aid Humboldt County with new employment opportunities and economic revenue. In the Humboldt County Wind Energy Project, it states, “wind energy supports the economy by creating short- and long- term employment opportunities and increasing tax revenue.” (Humboldt County Wind Energy Project Draft EIR, 2020). Humboldt County will become the leading offshore wind farm industry in California and have the potential to influence other areas to adopt renewable energy production throughout the United States or other countries. As stated by the RCEA (2018), Humboldt County will be the, “offshore wind industry hub of the West Coast and as a flagship for the Floating Offshore Wind industry worldwide.” (RCEA, 2018). In Humboldt County, most of the electricity is converted from using natural gas through the PG&E Humboldt Bay Generating Station and most of it is generally 89% imported. (Humboldt County General Plan Revised Draft EIR, 2020). Having a sustainable and local Offshore Wind energy resource, will boost power efficiency and allow Humboldt County to not rely on electricity that is run on natural gas. Becoming the first Offshore Wind Project farm, will illustrate grand innovative technology that

is reliable, sustainable, and efficient for residents and communities throughout Humboldt County and California.

Scoping Considerations/Permits Required

_____ Due to the complex nature and large scale of this project, it is important to understand that there are a large number of agencies and regulations that must be acknowledged prior to the outset of the project. Consultation with local, state, and federal non-governmental organizations will also be vital to the thorough review process of potential benefits and impacts of this project. Other stakeholders will need to be involved throughout every step of this project as well to minimize the odds of encountering time consuming legal hurdles.

Permit	Agency	Actions allowed by permit
Site Lease	Bureau of Ocean Energy Management	Leasing of offshore project site
Coastal Development Permit	California Coastal Commission	Construction and development of coastal industrial zone
Development Permit	Humboldt Bay Harbor District	Construction and development in Humboldt Bay Harbor
Offshore Geophysical Analysis Permit	California State Lands Commission	Buried transmission cable
Clean Water Act Section 404 Permit	United States Army Corps of Engineers	Discharge into wetlands
Rivers and Harbors act Section 10 Permit	United States Army Corps of Engineers	Allow construction located in designated navigable waters of the United States.
NPDES stormwater permit	United States Environmental Protection Agency	Allows discharge of pollutants from construction sites into waters of the US.

Section 7627 Clean Air Permit	United States Environmental Protection Agency	Allows for structures located on the OCS (Outer Continental Shelf) or in or on waters above the OCS.
Section 7 Consultation	U.S. Fish and Wildlife	Threatened or Endangered Species: Marb. Murrelet
Tribal Consultation	Yurok and Chilula Tribes	Review potential impacts of cultural resources.
Rivers and Harbors act Section 10 Permit	United States Army Corps of Engineers	Allow construction located in designated navigable waters of the United States.
Code 49, Section 44718 Permit	Federal Aviation Administration	Allow for construction of structures greater than 200 feet in height occupying US navigable airspace.
US Coast Guard Regulation Permit	US Coast Guard	Permit to establish and operate Private Aid-to Navigation to a Fixed Structure
Coastal Zone Management Act Federal Consistency Review	California Coastal Commission	Required for any project with a reasonably foreseeable effect on land or water uses or natural resources of coastal zones.
Marine Mammal Protection Act Consultation	NOAA Fisheries	Ensure no unnecessary take of pinnipeds and cetaceans will occur.
Migratory Bird Treaty Act	US Fish and Wildlife	Promote best possible practice for conservation of migratory birds in US territory.
Consultation	Federal Communications Commission	Potential interference with radio communications
Consultation	Department of Defense	Potential interference with missile defense system
Consultation	National Weather Service	Possible interference with NEXRAD

Proposed Action and Alternatives

1. Alternative 1: Proposed Action

- a. The proposed action involves the installation of 8-16 Windfloat foundations that will support large-scale commercial offshore wind turbines that produce 8.0MW. The project site for the proposed action is 21 to 29 nautical miles off the shore of Humboldt County. The total installed capacity will be approximately 100-150MW. This project will also include a 24 mile power cable that connects the offshore operation to the onshore site. This cable will be carefully placed, as to avoid ecologically sensitive areas. This onshore site will be located at the Redwood Marine Terminal I and will act as a support to the wind farm and as a place for construction. The terminal will need upgrades, but no additional roads will be constructed.

2. Alternative 2: No action

- a. In 2019, Humboldt County consumed approximately 791kWh total (residential and non-residential) according to the California Energy Commission. No action would mean that Humboldt County would continue to rely on imported natural gas and petroleum to create 66% of the primary energy that is consumed (Shatz 2013). The other 33% of energy consumption is from local sources, with biomass being the largest sources (33%) and hydropower, PV, and propane making the other 3%. Without changing the sources of energy, Humboldt County will

continue to use natural gas and petroleum both of which have significant CO2 emissions that exacerbate climate change.

3. Alternative 3: Downsized Offshore Wind Farm

- a. An alternative to the proposed project would be to downsize the operations.

Downsizing the operation could potentially have a lesser impact on the surrounding environment. Creating an offshore wind farm with a maximum of 7 wind turbines will only require approximately 37 square miles of surface area compared to the 75 square miles of surface area for the proposed project. Not only would this project use less space, but it would require less construction of the turbines, Windfloat foundations, and port infrastructure. At this size, the operations would have a total installed capacity of approximately 50-75MW.

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