KRRBI AIR QUALITY TECHNICAL REPORT

This section evaluates the potential air quality impacts of the proposed KRRBI project, considering both operational and construction effects. The primary focus of the air quality analysis was to evaluate project-related construction and operational emissions on regional air quality. This analysis was conducted following the available guidance provided by the North Coast Unified Air Quality Management District (NCUAQMD).

1. Setting

The following discussion provides an overview of existing air quality conditions in Humboldt County along the KRRBI Fiber Optic construction route. Ambient standards and the regulation framework relating to air quality are described. The proposed KRRBI project route lies solely within the boundaries of Humboldt County. The Proponent's Environmental Assessment (PEA) provides detailed descriptions of the route, route segments, tower sites, existing infrastructure, construction schedule, manpower requirements, etc.

a. Local Climate

The ambient air quality in a given area depends on the quantities of pollutants emitted within the area, transport of pollutants to and from surrounding areas, local and regional meteorological conditions, as well as the surrounding topography of the air basin. Air quality is described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate ambient air quality standard. The standards represent the allowable pollutant concentrations designed to ensure that the public health and welfare are protected, while including a reasonable margin of safety to protect the more sensitive individuals in the population.

In general, the climate of the north coastal area of California is characterized by cool summers and mild winters with frequent fog and significant amounts of rain. In the coastal areas, the Pacific Ocean helps to moderate temperatures year-round. Average temperatures on the coast range from the low 60s in the summer to the low 40s in the winter. Inland areas, such as the KRRBI route will experience a different range of summer and wintertime temperatures. Average annual rainfall in the coastal areas ranges from 38 inches in Eureka to 141 inches in Honeydew. Winds across Humboldt County are primarily out of the northwest to north-northwest in the spring and summer months, out of the southeast during the winter months, and predominantly out of the north, with a slight component from the southeast during the fall months. The Humboldt County General Plan contains a detailed description of climate in Section 3.12 (Air Quality and GHG Emissions). *Humboldt County General Plan Update, Draft Environmental Impact Report, SCH #2007012089, April 2012.*

b. Existing Air Quality Conditions

(1) Criteria Air Pollutants and Effect

Air quality studies generally focus on five pollutants that are most commonly measured and regulated: carbon monoxide (CO), ground level ozone (0_3) formed through reactions of nitrogen

oxides and reactive organic gases, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and suspended particulate matter, i.e., PM_{10} and $PM_{2.5}$. In the NCUAQMD particulate matter (PM_{10}) is the pollutant of greatest concern since measured air pollutant levels have exceeded the state ambient air quality standards.

Ozone

While ozone (O_3)serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing ultraviolet radiation potentially harmful to humans, when it reaches elevated concentrations in the lower atmosphere it can be harmful to the human respiratory system and to sensitive species of plants. Ozone concentrations build to peak levels during periods of light winds, bright sunshine, and high temperatures. Short-term ozone exposure can reduce lung function in children, make persons susceptible to respiratory infection, and produce symptoms that cause people to seek medical treatment for respiratory distress. Long-term exposure can impair lung defense mechanisms and lead to emphysema and chronic bronchitis. Sensitivity to ozone varies among individuals, but about 20 percent of the population is sensitive to ozone, with exercising children being particularly vulnerable. Ozone is formed in the atmosphere by a complex series of photochemical reactions that involve “ozone precursors” that are two families of pollutants: oxides of nitrogen (NOx) and reactive organic gases (ROG). NOx and ROG are emitted from a variety of stationary and mobile sources.

PM_{10} and $PM_{2.5}$

Particulate matter pollution consists of very small particles suspended in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when industry and gaseous pollutant undergo chemical reactions in the atmosphere. Respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) represent fractions of particulate matter. PM_{10} refers to particulate matter less than 10 microns in diameter and $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter. Major sources of $PM_{2.5}$ results primarily from fuel combustion, which includes motor vehicles, power generation facilities, industrial facilities, residential fireplaces, and wood stoves. PM_{10} include all $PM_{2.5}$ sources as well as emissions from dust generated by construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands, and atmospheric chemical and photochemical reactions. PM_{10} and $PM_{2.5}$ pose a greater health risk than larger-size particles because these tiny particles can penetrate the human respiratory system’s natural defenses and damage the respiratory tract, increasing the number and severity of asthma attacks, causing or aggravating bronchitis and other lung diseases, and reducing the body’s ability to fight infections. Whereas larger particles tend to collect in the upper portion of the respiratory system, $PM_{2.5}$ are miniscule and can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle, as well as produce haze and reduce regional visibility.

Carbon Monoxide

Since the primary source of carbon monoxide in is automobiles, highest concentrations would be found near congested roadways that carry large volumes of traffic. Carbon monoxide is a non-reactive pollutant that is a product of incomplete combustion. Ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing.

Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a reddish-brown gas that can cause breathing difficulties at high concentrations. Like ozone, NO_2 is not directly emitted, but is formed through a reaction between nitrogen oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as nitrogen oxides (NO_x) and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10} (see discussion of PM_{10} below).

Sulfur Oxides

Sulfur oxides, primarily sulfur dioxide (SO_2), are a product of high-sulfur fuel combustion. The main sources of SO_2 are coal and oil used in power stations, in industries, and for domestic heating. SO_2 is an irritant gas that attacks the throat and lungs. It can cause acute respiratory symptoms and diminished ventilator function in children. SO_2 concentrations have been reduced to levels well below the state and national standards, but further reductions in emissions are needed to attain compliance with standards for PM_{10}, of which SO_2 is a contributor.

(2) Toxic Air Contaminants (TAC)

Toxic air contaminants (TACs) are a broad class of compounds known to cause morbidity or mortality, usually because they cause cancer. They include, but are not limited to, the criteria air pollutants listed above. TACs are found in ambient air, especially in urban areas, and can be caused by industry, agriculture, fuel combustion, and commercial operations. TACs are typically found in low concentrations, even near their source; for example, while diesel particulate matter and benzene may be present near a freeway, the concentration of these materials in the air is typically low. However, chronic exposure to these low levels can result in adverse health effects. As a result, TACs are regulated at the regional, State, and federal level.

Smoke from residential wood combustion can also be a source of TACs. Wood smoke is typically emitted during wintertime when dispersion conditions are poor. Localized high TAC concentrations can result when cold stagnant air traps smoke near the ground and, with no wind, the pollution can persist for many hours, especially in sheltered valleys during winter. Wood smoke also contains a significant amount of PM_{10} and $PM_{2.5}$. Wood smoke is an irritant and is implicated in worsening asthma and other chronic lung problems.

(3) Air Quality

Air quality in the region is controlled by the rate of pollutant emissions and meteorological conditions. Meteorological conditions such as wind speed, atmospheric stability, and mixing height may all affect the atmosphere's ability to mix and disperse pollutants. Long-term variations in air quality typically result from changes in air pollutant emissions, while frequent, short-term variations result from changes in atmospheric conditions.

(4) Attainment Status

The EPA administers the National Ambient Air Quality Standards (NAAQS) under the Federal Clean Air Act. EPA sets the NAAQS and determines if areas meet those standards. Violations of ambient air quality standards are based on air pollutant monitoring data and are judged for each air pollutant. Areas that do not violate ambient air quality standards are considered to have attained the standard. EPA has classified the region as an attainment area for all the current national ambient air quality standards. At the State level, the NCUAQMD is classified as nonattainment for PM_{10} only. (http://www.ncuaqmd.org/index.php?page=air.quality)

(5) Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following who are most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. The project site is located in a rural portion of Humboldt County, where population density is very low, and the area is devoid of significant sensitive receptors. The EA provides a list of identified sensitive receptors along the proposed corridor route.

c. Regulatory Setting

The Federal Clean Air Act (CAA) is the primary federal law regulating air quality in the United States. In addition to being subject to federal requirements, air quality in California is also governed by more stringent regulations under the California Clean Air Act. At the federal level, the U.S. Environmental Protection Agency (US EPA) administers the CAA. The California Clean Air Act is administered by the California Air Resources Board (CARB) at the state level and by the appropriate air quality management district at the regional and local levels. The NCUAQMD regulates air quality at the regional level, which includes the three-county region composed of Humboldt, Trinity and Del Norte counties. Following is a discussion of regulation programs and policies.

(1) United States Environmental Protection Agency

The US EPA is responsible for enforcing the CAA. The US EPA is also responsible for establishing the National Ambient Air Quality Standards (NAAQS). NAAQS are required under the CAA. The US EPA regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain types of locomotives. The agency has jurisdiction over emission sources outside state waters (e.g., beyond the outer continental shelf) and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

(2) California Air Resources Board

In California, CARB, which is part of the California Environmental Protection Agency, is responsible for meeting the state requirements of the CAA, administering the California Clean Air Act (CCAA), and establishing the California Ambient Air Quality Standards (CAAQS). The

CCAA requires all air districts in the state to endeavor to achieve and maintain CAAQS. CARB regulates mobile air pollution sources, such as motor vehicles. The agency is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB has established passenger vehicle fuel specifications and oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level. CARB also conducts or supports research into the effects of air pollution on the public and develops innovative approaches to reducing air pollutant emissions.

(3) North Coast Unified Air Quality Management District

NCUAQMD is primarily responsible for assuring that the national and state ambient air quality standards are attained and maintained in the region. NCUAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, conducting public education campaigns, as well as many other activities. NCUAQMD has jurisdiction over the three-county region. (http://www.ncuaqmd.org/index.php?page=district.info)

(4) National and State Ambient Air Quality Standards

As required by the Federal Clean Air Act, NAAQS have been established for seven major air pollutants: carbon monoxide, nitrogen oxides, ozone, respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), sulfur oxides, and lead. Pursuant to the CCAA, the State of California has also established ambient air quality standards. These standards are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride and visibility reducing particles. Both state and federal standards are summarized in Table 1. The “primary” standards have been established to protect the public health. The “secondary” standards are intended to protect the nation’s welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare. CAAQS are more stringent than NAAQS. Thus, CAAQS are used as the equal to or standard in this analysis.

(5) NCUAQMD Regulations and Plans

To protect public health, NCUAQMD has adopted regulations and plans to achieve ambient air quality standards. The NCUAQMD must continuously monitor its progress in implementing attainment plans and must periodically report to CARB and the EPA. It must also periodically revise its attainment plans to reflect new conditions and requirements.

In 1995, the NCUAQMD, prepared the initial attainment plan for PM_{10}. This air quality plan addresses the California Clean Air Act. Updates are developed approximately every three years. The current plan addresses PM10 emissions, air quality, and the steps necessary to achieve attainment of the state PM10 standards. *North Coast Unified Air Quality Management District Particulate Matter (PM_{10}) Attainment Plan, NCUAQMD, May 1995.*

TABLE 1 AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	National Standards
Ozone	8-hour	0.070 ppm	0.070 ppm
	1-hour	0.09 ppm	—
Carbon monoxide	8-hour	9 ppm	9 ppm
	1-hour	20 ppm	35 ppm
Nitrogen dioxide	Annual	0.030 ppm	0.053 ppm
	1-hour	0.18 ppm	100 ppb
Sulfur dioxide [e]	Annual	—	0.030 ppm
	24-hour	0.04 ppm	0.14 ppm
	1-hour	0.25 ppm	75 ppb
PM_{10}	Annual	20 µg/m^3	--
	24-hour	50 µg/m^3	150 µg/m^3
$PM_{2.5}$	Annual	12 µg/m^3	15 µg/m^3
	24-hour	—	35 µg/m^3 [f]

Source: CARB 12/16, https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

In addition, California's Senate Bill 656 (SB 656, Sher, 2003) that amended Section 39614 of the Health and Safety Code, required further action by CARB and air districts to reduce public exposure to PM_{10} and $PM_{2.5}$. Efforts identified by a variety of California air districts, in response to SB 656, are primarily targeting reductions in wood smoke emissions; adoption of new rules to further reduce NO_X and particulate matter from internal combustion engines; and reductions in particulate matter from commercial charbroiling activities.

2. Impacts and Mitigations

This section discusses potential impacts to air quality that could result from implementation of the project. The section begins with the significance criteria, which establish the thresholds used to determine whether an impact is significant. The latter part of this section presents the impacts associated with the project and identifies mitigation measures, as appropriate.

a. Significance Criteria

The NCUAQMD has not, to date, adopted CEQA significance thresholds. A review of the County General Plan also did not reveal any established significance thresholds. The significance thresholds identified by NCUAQMD for stationary sources, pursuant to the New Source Review (NSR) rules and used in this analysis for operations are summarized in Table 2.

Table 2 AIR QUALITY SIGNIFICANCE THRESHOLDS

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Maximum Daily Emissions (lbs/day)	Annual Maximum Emissions (tons/year)
ROC	not set	50	40
NO_x	not set	50	40
PM_{10}	not set	80	15
$PM_{2.5}$	not set	50	10
CO	not set	500	100
SO_x	not set	80	40

Note: ROC = reactive organic compounds, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (μm) or less, and $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5μm or less.
Source: NCUAQMD Rule 110, http://www.ncuaqmd.org/index.php?page=rules.regulations

As noted above, neither the NCUAQMD nor the county planning department have adopted significance thresholds applicable to construction projects. The South Coast AQMD, with much greater air quality problems, has developed significance thresholds, and we used them to compare the construction emissions for the KRRBI project to the South Coast AQMD significance thresholds in order to show the insignificance of the projects emissions, shown below Table 3 (*SCAQMD Air Quality Significance Thresholds, SCAQMD, Revision March 2015)*. Operational emissions from the one stationary source proposed are compared to the above noted NSR thresholds.

b. Less-Than-Significant Air Quality Impacts

A discussion of less-than-significant impacts of the proposed project is provided below.

Construction emissions were estimated using proprietary calculation spreadsheets that utilize existing methods and factors found in EPA AP-42 (*Compilation of Air Pollutant Emissions Factors, Volume 1, Stationary and Point Sources, 5th Ed., January 1995)*, CalEEMod (*California Emissions Estimator Model, CAPCOA, Trinity Consultants, Ver 2016.3.1, September 2016)*, etc. These calculation procedures have been used on numerous large CEQA related construction projects across the state, as well as for construction emissions calculations for projects subject to the California Energy Commission CEQA equivalent process. Data supplied by the applicant was used and supplemented by data from other similar projects and the use of "best estimates" in cases where actual data was not available.

Construction Period Emissions

Construction of the entire project, i.e., Segments 1 through 5, and the Orick tower site, will take place over a combined period of approximately 19 months. Table 3 presents the summary of estimated construction emissions for the KRRBI project.

TABLE 3 CONSTRUCTION PERIOD EMISSIONS (TONS/PERIOD)

Description	ROC (VOC)	NOx	PM_{10}	$PM_{2.5}$	CO	SOx	CO2e
Const Equipment Exhaust	.291	1.865	.124	.123	1.542	.003	268.3
Const Fugitive Dust	0	0	.689	.145	0	0	0
Const Support Vehicle Exhaust	.052	.369	.015	.012	.344	.001	98.2
Site Support Vehicle Exhaust	.009	.008	.001	.001	.084	.0001	17.4
Worker Commute Exhaust	.036	.031	.006	.004	.325	.001	67.2
Paved Road Fugitive Dust	0	0	.175	.043	0	0	0
Wind Blown Dust	0	0	.0001	0	0	0	0
Project Totals							
Tons per Period	.371	2.273	1.01	.327	2.296	.005	451.1
Lbs per Month	39.1	239.3	106.32	34.42	241.68	.53	NA
Lbs per Day	1.78	10.88	4.83	1.56	10.99	.024	NA
NCUAQMD Thresholds	NA	NA	NA	NA	NA	NA	NA
Exceed Threshold?	No	No	No	No	No	No	No

Monthly emissions normalized based on a 19 month construction period.
Daily emissions normalized based on 22 days per month.

In an effort to show that the project construction emissions are insignificant, we have compared them to the South Coast AQMD significance thresholds for construction. These levels are as follows:

NOx 100 lbs/day
VOC 75 lbs/day
CO 550 lbs/day
SOx 150 lbs/day
PM10 150 lbs/day
PM2.5 55 lbs/day

The KRRBI project construction emissions are significantly below these threshold values.

Operational Period Emissions

The project operational emissions are derived from the single stationary source proposed for the project, i.e., a single propane emergency electricity generator. The generator is rated at approximately 11 Kw, and will fire propane as the only fuel. The generator will operate 12 minutes per week, or 10.4 hrs per year for maintenance purposes.

TABLE 4 OPERATIONAL PERIOD EMISSIONS

Description	ROC	NOx	PM_{10}	$PM_{2.5}$	CO	SOx	CO2e
Lbs/day							
Generator	.01	.14	<.0001	<.0001	.02	<.0001	na
NCUAQMD NSR Thresholds	50	50	80	50	500	80	na
Exceed Threshold?	No	No	No	No	No	No	na

Source: Applicant data, 2016. NCUAQMD Rule 110, http://www.ncuaqmd.org/index.php?page=rules.regulations

The generator emissions were compared to the NCUAQMD NSR significance thresholds. This comparison indicates that the emissions are insignificant. Although these emissions are well below the NSR thresholds, we note that the proposed generator will be required to obtain a construction and operating permit from NCUAQMD. In addition, the proposed propane generator will emit approximately 0.0236 tons of CO2e per year. This value is also insignificant.

(1) Objectionable Odors

During construction, the various diesel powered vehicles and equipment in use on the construction route would create localized odors. These odors would be temporary and not likely to be noticeable for extended periods of time much beyond the project route corridor.

(2) Substantial Pollutant Concentrations

Operational TACs are discussed below and TACs from construction are discussed further in this section.

Operation of the project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. In addition, the proposed project does not involve locating new residences near local roadways with average annual daily traffic (AADT) above 10,000 vehicles per day. Proximity to major roadways with a traffic volume of at least 10,000 AADT is associated with exposure to TACs or $PM_{2.5}$. (*Bay Area Air Quality Management District, CEQA Guidelines, May 2010*)

(3) Greenhouse Gases

This report indicates that GHG emissions from operations will be less than 0.03 tons/yr. The BAAQMD has set an operational-related GHG threshold of 1100 metric tons of CO2e/year (equivalent to 1213 short tons/yr). The analysis concludes that the project will result in a potential operational increase of GHGs, which is well below the BAAQMD significance threshold value (*Bay Area Air Quality Management District, CEQA Guidelines, Table 2-1, May 2010*).

(4) Cumulative Air Quality Impacts

The NCUAQMD NSR significance thresholds applicable to operational aspects of the project represent the levels at which a project's individual emissions of criteria pollutants and precursors would result in a cumulatively considerable contribution to the region's air quality conditions as determined by NCUAQMD. As discussed above, the proposed project's

operational emissions are well below these significance thresholds, therefore cumulative impacts relative to operational emissions would be less than significant.

c. Significant Air Quality Impacts

A determination of significant impacts of the proposed project is provided below.

Based on the data provided by the project proponent, and this support analysis, the following significance criteria are evaluated as follows:

a. Conflict with or obstruct implementation of the applicable air quality plan?
   NO

b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?
   NO

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?
   NO

d. Expose sensitive receptors to substantial pollutant concentrations?
   NO

e. Create objectionable odors affecting a substantial number of people?
   NO

As such the proposed project will have no significant impacts on air quality for either the construction or operations phases.

Additional References:

Draft Proponent's Environmental Assessment-Klamath River Rural Broadband Initiative, prepared for the CPUC and BIA, Karuk Tribe, October 2016.

Initial Study and Draft Mitigated Negative Declaration for the Karuk Tribe's Orleans Broadband Project Tower Special Permit, Case # SP-13-005, June 2013.

Rinconada Waste Treatment Plant Upgrade Project, City of San Jose, CA., Air Quality Technical Report, Atmospheric Dynamics, Inc., for Denise Duffy and Associates, July 2014.

Cannery Park Planned Development Project, Air Quality Technical Report, Atmospheric Dynamics, Inc., for Denise Duffy and Associates, December 2014.

Harker School Planned Development Project, Air Quality Technical Report, Atmospheric Dynamics, Inc., for Denise Duffy and Associates, October 2015.