A HEALTH IMPACT ASSESSMENT OF THE PROPOSED CABIN CREEK BIOMASS ENERGY FACILITY IN PLACER COUNTY, CALIFORNIA

Prepared by the Sequoia Foundation

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Executive Summary

An HIA of a Proposed Biomass Energy Facility in Placer County

Background

California, like other states and countries, is striving for energy efficiency. In 2006, Assembly Bill 32 was passed into law, mandating the reduction of greenhouse gas emissions in California to 1990 levels by the year 2020. As communities adopt new practices and technologies to achieve clean energy goals, they will need to find ways to health and environmental co-benefits; biomass energy (from garbage, wood, waste, landfill gases and alcohol fuels) offers a unique opportunity to promote environmental health and public health in many communities with a high risk of wildfire.

What is health impact assessment?

Health impact assessment is a tool to objectively assess and communicate the potential positive and negative health effects that a decision may have on a community. The use of HIA to support including health in decision-making processes has greatly increased in the past 10 years.

This Health Impact Assessment

This Health Impact Assessment (HIA), performed by the Sequoia Foundation in collaboration with the Placer County Departments of Planning and Health and Human Services with technical support from the California Department of Public Health, was a year-long process to assess the potential health effects related to the proposed biomass energy facility (BEF). Health impacts related to air quality, wildfires, greenhouse gas emissions, traffic and transportation, water quality, noise, and economic and energy security were considered. Both positive and negative health effects were considered in the assessment, and recommendations were made to protect and improve community health. Community input was solicited and incorporated in many phases of the assessment.

Audience

The audience for this report is both decision-makers and other interested stakeholders, such as community residents and community-based organizations. We recommend that this HIA be used in the discussions about this BEF, and future similar projects, in pursuit of policies supportive of community health and well-being.

HIA Summary Findings

Placer County's proposal for the two megawatt Cabin Creek Biomass Facility Project will likely benefit community health in the Lake Tahoe Region through the removal of forest slash and reduction of wildfire fuels, the diversion of open pile burns to more emission efficient combustion, and the diversification of energy sources.

Project Health Impacts and Recommendations

AIR QUALITY - Regional air quality will improve from the reduction of open pile burning. Low levels of emissions will be concentrated at the proposed project site; there is little evidence to suggest that these emissions will negatively impact health in surrounding communities.

Recommendations

- Develop a communications plan between residents and facility operators. Clear communication from facility operators and/or County staff could ease community anxieties regarding the facility.
- More frequent on-site inspections—for example, once during summer months and once during winter months—could ease community anxieties regarding emissions during winter months when an inversion layer is often present

WILDFIRES - The project will reduce health effects related to wildfires and wildfire risk.

Recommendations

- Explore the feasibility of using residential wood waste as biomass fuel for the facility, including materials from wildfire defensible space clearance around homes.

GREENHOUSE GAS (GHG) EMISSIONS - The project can benefit GHG reduction strategies when considering its broader impact on energy production and wildfire reduction. Health effects due to GHG emission reductions will not occur from this project alone.

No Recommendations

TRAFFIC AND TRANSPORTATION - The relative increase in traffic and its associated risk to health is very small.

Recommendations

- Improve signage on SR 89 near Cabin Creek Road warning cyclists of project-related vehicles, and warning vehicles of the presence of a cyclist/pedestrian pathway.

WATER QUALITY - The proposed biomass facility will pose minimal health risk in terms of water security given mitigation measures in place.

No Recommendations

NOISE - Noise is not expected to impact health given the small impact the additional traffic will have on existing noise levels, and the remoteness of the project facility from the nearest households.

Recommendations

- Develop strong communication channels between nearby community residents and the Project Manager of the biomass facility to ensure that any noise complaints are quickly and expediently resolved.

ECONOMIC AND ENERGY SECURITY - The project may have small and limited positive health effects related to energy and economic security.

Recommendations

- Prioritize the hiring of local contractors for both facility construction and operations, as feasible.

Introduction

This Health Impact Assessment (HIA) examines potential health impacts from the proposed Cabin Creek Road Biomass Energy Facility (BEF) in Placer County, California. The National Research Council defines HIA as a "systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects."[1] The focus of this HIA is on the environmental and social factors associated with the proposed facility that could impact the health of the regional community and nearby residents. This HIA is meant to supplement the existing environmental impact assessment processes (including the California Environmental Quality Act (CEQA), National Environmental Protection Act (NEPA), and Health Risk Assessment (HRA)) and to inform the Placer County decision making process.

Sequoia Foundation prepared this assessment with technical assistance from the California Department of Public Health and in collaboration with Placer County Division of Planning Services and Department of Health and Human Services. This HIA is supported by a grant from the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts.[i] In December of 2012, the Placer County Planning Commission will hear the project proposal and vote on whether to certify the Environmental Impact Report (EIR) and grant a conditional use permit approving the construction and operation of a biomass energy facility. The results from this HIA will be provided to the Commission. As such, the main audience for this report is the Placer County Planning Commission and Board of Supervisors and interested local residents. Placer County is one of the first counties to implement elements of the California 2012 Bio-energy Action Plan.[2] As other counties in California consider similar biomass facilities, this HIA should inform their decision making process by providing criteria for evaluating health impacts.

Project Description

The proposed BEF would be a two-megawatt (MW) wood-to-energy plant located on the approximately 290-acre Eastern Regional Materials Recovery Facility (MRF) and Transfer Station in the unincorporated portion of Placer County near Squaw Valley. The facility would be located on a 3.7-acre site on the south end of the former landfill property (the landfill was closed in 1995). The primary function of the current MRF and transfer station is to receive and process municipal solid waste, wood waste, and recyclable materials.

The MRF and transfer station is located at the end of Cabin Creek Road. The site is approximately 2 miles south of Interstate 80 (I-80) and the Town of Truckee, and to the west of State Route 89 (SR 89). The closest residents to the proposed facility site are two temporary caretaker's residences on the southern end of the MRF property. The closest off-site residences are approximately 1,500 feet to the southeast, across SR 89 and on the west side of the Truckee River.[3]

[i] The views expressed are those of the author(s) and do not necessarily reflect the views of The Pew Charitable Trusts or the Robert Wood Johnson Foundation

The proposed facility is part of the broader Placer County Biomass Program. The Placer County objectives for the proposed Cabin Creek Biomass Facility include, but are not limited to:

- the construction of a small-scale biomass energy facility close to source material;
- the improvement of regional air quality and reduction in harmful greenhouse gas emissions associated with open pile burning of biomass waste; and
- the support of healthy forest management practices designed to reduce catastrophic wildfire risks.

Forest management projects designed to reduce fire hazard and improve forest health produce excess biomass in the form of limbs and tree tops. The removal and processing of this excess biomass is expensive, therefore the usual method of treatment is to burn or masticate/grind the excess biomass in place. The cost of manual removal is usually prohibitive, unless the biomass is located very close to the site where processing will occur.

Biomass materials for the facility would be processed at their off-site harvest locations and collected from within a 20-30 mile radius of the facility. Materials would be transported to the facility by truck, stored on site, and converted to energy using gasification technology. Gasification systems convert solid biomass into "syngas" (synthetic gas) under conditions strictly controlling temperature and oxygen (high heat, and relatively low oxygen levels). The syngas is then combusted in a standard EPA approved engine to create energy. Biochar, a solid carbon char, is produced as a byproduct, and commonly used as a soil amendment. The proposed facility would consume approximately 14,000-17,000 bone dry tons of biomass each year.[4]

Health Impact Assessment Process

HIAs typically consist of the following six steps: screening; scoping; assessment; recommendations; reporting; and monitoring and evaluation. Screening was completed at the end of February 2012. Scoping for this HIA finished in March 2012 and a report was created and disseminated to those who provided input. Most of the assessment process occurred during the summer of 2012.

Stakeholder Engagement

Engagement of stakeholders is very important in health impact assessments. Different types of stakeholders were engaged during different steps. Stakeholders representing Placer County local health service and planning divisions were engaged throughout the entire HIA process. Content experts from community organizations and air pollution

Steps of an HIA[1]

Screening: establishes the need for and value of conducting an HIA and is essential for high-quality HIA practice

Scoping: identifies the populations that might be affected, determines which health effects will be evaluated with the HIA, and identifies the data and methods to be used and alternatives to be assessed

Assessment: describes the baseline health status of the affected populations and characterizes the expected effects on health of the proposal

Recommendations: identifies alternatives to the proposal or specific actions that could be taken to avoid, minimize, or mitigate adverse effects, or augment positive health effects

Reporting: communicates the findings and recommendations to decision-makers, the public, and other stakeholders

Monitoring and evaluation: tracks the adoption and implementation of HIA recommendations, determines whether the HIA was conducted according to plan and/or whether it influenced the decision-making process

control agencies were engaged through multiple steps. Community residents were engaged during the scoping, assessment, recommendations, and reporting steps. A community stakeholder meeting was held on March 16, 2012 at Squaw Valley in the Tahoe Region to obtain feedback on health issues most relevant to community concerns. Community residents were most concerned about impacts to air quality, greenhouse gas emissions, wildfires, water quality, community stress and anxiety, facility waste, and potential employment opportunities. Another community meeting was held on August 21, 2012 in Truckee to present draft assessment findings and to solicit recommendations based on initial findings. On November 6, 2012 a final community meeting in Truckee was held to share report findings and to make any final modifications to recommendations. Sequoia Foundation partnered with the Community Collaborative of Tahoe Truckee to promote these community meetings and to provide Spanish translation at meetings.

Report Overview

This report begins by describing the communities most likely to be affected by the construction and operation of the proposed BEF, incorporating baseline community health data. In addition, relevant health studies were reviewed to clarify potential health concerns of greatest community interest.

The remainder of the report is dedicated to the assessment of potential health impacts. The assessment is divided into sections, each describing a potential health influence associated with the project. Each section contains information on potential health effects, relevant health studies, related community health data, a discussion of how the proposed facility could impact health, and a list of recommendations to lessen negative health impacts and promote positive health impacts. Some recommendations fall under the jurisdiction of a different agency; these recommendations contain additional information on which jurisdiction has authority to implement the recommendation. The assessment includes the following sections:

- Air quality and health
- Wildfires and health
- Greenhouse gas emissions and health
- Traffic and transportation and health
- Water quality and health
- Noise and health
- Economic and energy security and health

Methods

Health Impact Assessments (HIA) typically includes steps for screening, scoping, assessment, recommendations, reporting, and monitoring and evaluations. Each step is described in more detail below.

Screening

In the spring and early summer of 2011, HIA practitioners at the Sequoia Foundation approached Placer County staff (Planning Department & Health and Human Services) and the California Department of Public Health to assess the usefulness and feasibility of performing an HIA for the proposed BEF sited at Cabin Creek Road. Given the potential for the HIA to add health issues that may not be otherwise considered in the decision-making process, the HIA was deemed of value, and funding from the Health Impact Project was obtained to perform the assessment.

Scoping

The HIA Team initially discussed with Placer County staff potential health pathways—those processes by which the proposed facility could impact community health, positively or negatively—and performed cursory reviews of existing research. A community meeting was held in March 2012 in Squaw Valley to introduce the concept of HIA and elicit community feedback regarding potential health issues of interest. Utilizing this feedback, the HIA Team narrowed health pathways to be considered in the HIA to air quality, wildfires, greenhouse gas emissions, traffic and transportation, water quality, noise, and economic and energy security.

Assessment

The assessment phase is a multi-step process that consists of:

1) defining the community or communities most likely to be impacted and assessing baseline health, economic, and environmental conditions in these communities;
2) reviewing relevant health studies to understand how the health pathways described in the scoping phase can impact community health;
3) reviewing data related to potential project impacts; and
4) synthesizing the data related to current community conditions, health pathways, and project impact to summarize and communicate potential health impacts (i.e. effect characterization).

Baseline Community Profile

Given the rural nature of this community, there are limited local level health data available. There are, however, two recent surveys that provide a snapshot of existing community health assets and needs. In 2010, the Tahoe Forest Hospital District (TFHD) conducted a Behavioral Risk Factor Surveillance System (BRFSS) study among its adult community.[5] The study was conducted using the Centers for Disease Control and Prevention (CDC) BRFSS tool, and included additional questions and an interview component that lasted 10-12 minutes. The data provide the most complete assessment of local health, and sample sizes are robust enough to describe gender and ethnic differences in health among survey respondents. However, the data may not always be representative of those communities nearest the proposed BEF due to the limited responses and spatial mismatch of the BRFSS study area.

Data from the 2010 US Census and the 2006-10 American Community Survey are used to describe community demographics.[6,7] Communities of varying geographic scale for which some data are available include: Town of Truckee (local community); Tahoe Forest Hospital District (local-regional community); Placer and Nevada Counties (regional community); and California (provides a statewide comparison).

Review of the Relevant Health Studies

The review of health studies relies on peer-reviewed systematic reviews and meta-analyses as much as possible, and supplements this work with other more current literature that highlight the most recent understanding of the relevant science. The following criteria were used to gather data:

- Search engines included Google, Google Scholar, and Medline/PubMed.
- Articles were limited to those printed in the English language.
- Both scientific peer-reviewed literature and other literature were used to provide evidence for health pathways. Systematic literature reviews were preferred over singular studies, however, single studies were included in some cases. Other literature included publications by national government-funded organizations (e.g., Centers for Disease Control and Prevention) and local government (e.g., California Environmental Protection Agency).
- When literature existed from two geographic locations (e.g., Canada vs. southern California) preference was given to local area data.
- More recent data were favored over older data; however when recent (i.e. within the last 10 years) data were not available, older publications were used.

Review of Potential Project Impacts

Original data related to potential project impacts were not collected for the HIA. Rather, data from the Draft Environmental Impact Report (EIR) were used, as were occasional data from Placer County staff with content expertise. In addition, a third party Health Risk Assessment (HRA) was performed to quantify the public health risks associated with exposure to any toxic air pollutants that may be released from the biomass to energy conversion process.

Effect Characterization & Assessment

Effect characterization is the process by which findings are synthesized to communicate an overall judgment as to the certainty, magnitude, duration, and distribution of potential health effects. Regardless of whether or not health effects are quantified, an HIA should characterize each potential impact to the extent possible. Additional information on the effect characterization used in this HIA is found in the Assessment Section. Draft findings were presented at a community meeting in August 2012, and feedback from that meeting was used to address the communication of findings as needed.

Recommendations and Reporting

Recommendations were crafted based on potential project impacts, as well as their feasibility to be implemented. Recommendations from residents also emerged during each of the previous community meetings. Recommendations were reviewed with staff from Placer County and the California Department of Public Health to assess their ability to improve health or mitigate health risks. Recommendations were also reviewed at a meeting of the Community Collaborative of Tahoe Truckee on November 6. Reporting includes the dissemination of key findings to residents in community meetings, as well as to County officials via this report. Additional reporting will occur as-needed.

Monitoring and Evaluation

Evaluation and monitoring plans were developed at the beginning of this HIA process. The evaluation plan focuses on process and impact outcomes. The monitoring plan tracks indicators used to inform the process and impact evaluation. The impact evaluation will answer the following questions.

1. Did policy makers find the HIA process useful and use the findings/recommendations to inform their decision?
2. Were community stakeholders engaged in the HIA process, and did they contribute to the recommendations shared with decision makers?

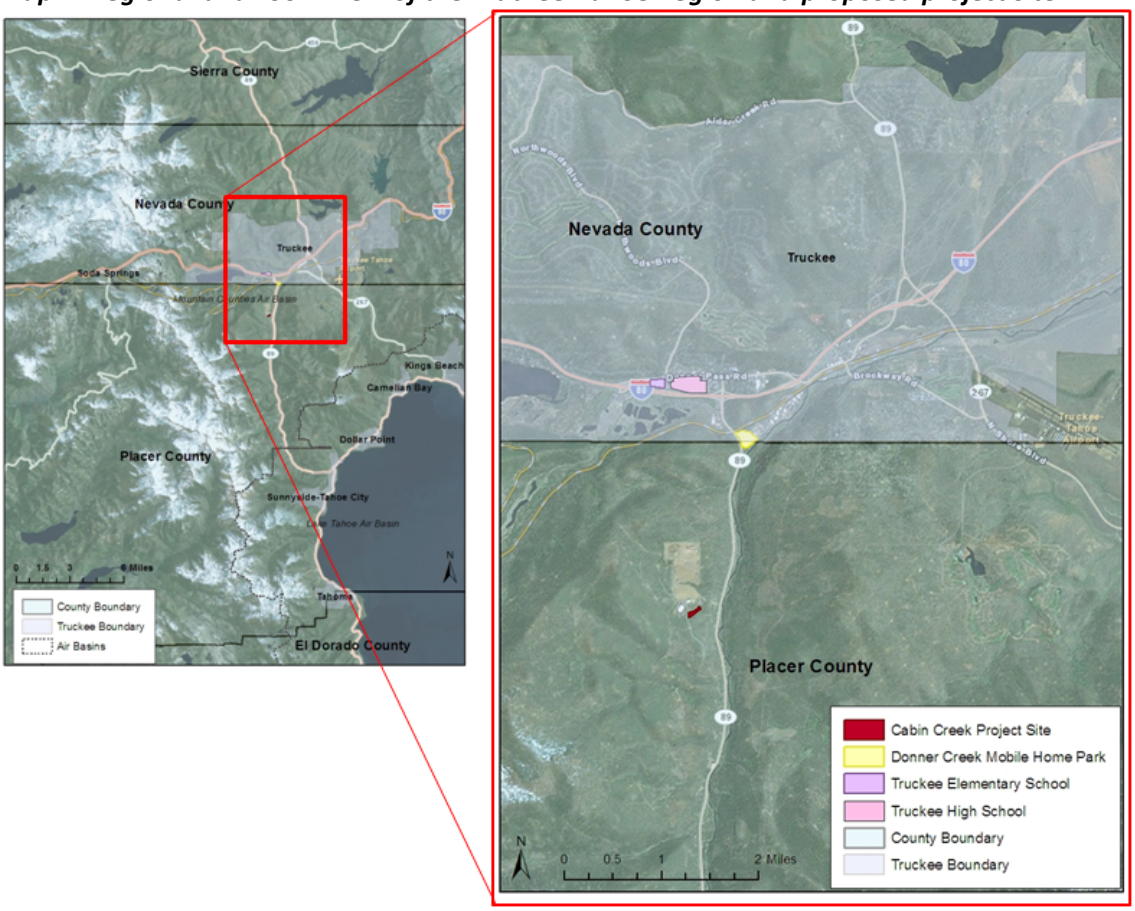
The process evaluation assesses how well the HIA adheres to best practices identified in the National Research Council's *Improving Health in the United States: The Role of Health Impact Assessment*. The monitoring plan uses these results to inform future HIAs. Process and outcome evaluations are currently occurring and will be completed by June 30, 2013.

Baseline Community Profile

Local Community Geography

The proposed BEF would be located in Placer County on Cabin Creek Road, 0.3 miles west of State Route 89 (SR 89). There are no large population centers near the proposed facility. The nearest population center—the Town of Truckee in Nevada County—is approximately 3 miles to the north, sited alongside Interstate 80 (I-80). In Placer County, the nearest residential areas are Squaw Valley with a population of 777 residents (5.9 direct miles away), Northstar with a population of 456 residents (5.2 direct miles away), and Martis Valley with a population of 111 residents (2.8 direct miles away).[8] The nearest residential enclave is the Donner Creek Mobile Home Park, to the south side of I-80 and along the east side of SR 89, approximately 2.6 miles from Cabin Creek Road. The Truckee Elementary School and Truckee High School are located just to the north of Interstate 80, about 4 miles north of Cabin Creek Road.

Map 1. Regional and zoom view of the Truckee-Tahoe Region and proposed project site



Demographic & Social Data

The Town of Truckee, as defined by the 2010 Census, has just over 16,000 residents, nearly one-fifth of the population of Nevada County (Table 1).[9] Eastern Placer County, the location of the project site, is largely rural and is home to a small portion of County residents. Placer County and Truckee, CA each have a higher median household income compared to California as a whole. Compared to California, each of the three local geographic communities has a much higher proportion of White residents and fewer non-White residents. The Town of Truckee has a very low percentage of high school dropouts, and is much more educated than the surrounding counties (outside of Placer) or California.

Table 1. Demographic characteristics of surrounding communities

	Placer County	Nevada County	Truckee, CA	California
Population	348,432	98,764	16,180	37,253,956
Median Household Income*	$74,447	$57,121	$65,351	$60,883
Over 65 years of age	15%	19%	8%	11%
Race / Ethnicity				
White	76%	87%	78%	40%
African-American	1%	0.3%	0.3%	6%
Asian & Pacific Islander	6%	1%	1%	13%
Hispanic	13%	9%	19%	38%
Other	4%	3%	2%	3%
High school dropout (25+ years old)*	4%	4%	1%	9%
Bachelor's degree or more (25+ years old)*	34%	32%	45%	30%

*Source: US Census 2010. Data marked with an * are from the 2006-10 American Community Survey.*

Compared to California, there are a greater proportion of owner-occupied units, and the housing is much newer, with less than half of occupied housing units built before 1980 (Table 2).[10]

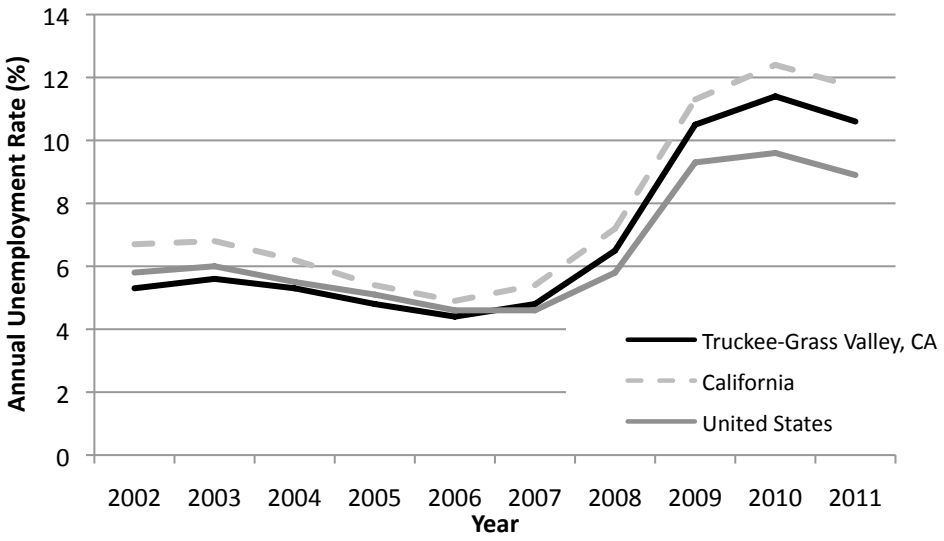
Table 2. Housing characteristics of Truckee and surrounding communities

	Placer County	Nevada County	Truckee, CA	California
Owner occupied	71%	72%	68%	56%
Renter occupied	29%	28%	32%	44%
Mobile home, boat, van, etc*	3%	6%	3%	4%
Built prior to 1980*	35%	47%	34%	63%

*Source: US Census 2010. Data marked with an * are from the 2006-10 American Community Survey.*

Nevada and Placer Counties, similar to the rest of the country and California, have experienced steep increases in the unemployment rate since 2007. Since 2002, the unemployment rate in the Truckee-Grass Valley area has closely followed the unemployment rate of California, though at a slightly diminished rate.[11]

***Figure 1. Unemployment rate of the Truckee-Grass Valley area since 2002* (source: Bureau of Labor Statistics)**



Community Health and Health Exposure Data

The demographic profile of the Tahoe Forest Hospital District (TFHD) is shown in Table 3, along with demographic data from Truckee as a comparison.[12,13] The TFHD and the Town of Truckee have fairly similar social and economic characteristics, and racial/ethnic distributions are also similar.

Table 3. Demographic characteristics of the Tahoe Forest Hospital District

	Tahoe Forest Hospital District	Truckee, CA
Population	38,393	16,180
Median Household Income*	$58,700	$65,351
Over 65 years of age	8%	8%
Race / Ethnicity**		
White	82%	78%
African-American	-	0.3%
Asian & Pacific Islander	1%	1%
Hispanic	21%	19%
Other	17%	2%
High school dropout (25+ years old)*	6%	1%
Bachelor's degree or more (25+ years old)*	40%	45%

***For TFHD data, Hispanic ethnicity is reported as alone or in combination with another race, so total percentages add to over 100%.*

Self-reported general health and general satisfaction with life was higher compared to national averages. Among TFHD residents, Hispanic residents were more likely to report poorer overall health and mental health. All residents reported lower health care access compared to national data across several health care access measures, including health insurance coverage, time since

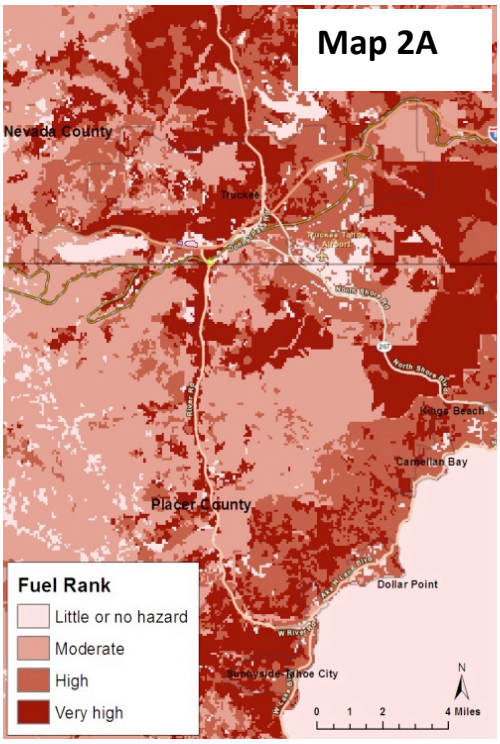
their last routine check-up, basic health care screenings, and flu shots. These measures were consistently poorer among Hispanic residents.[14]

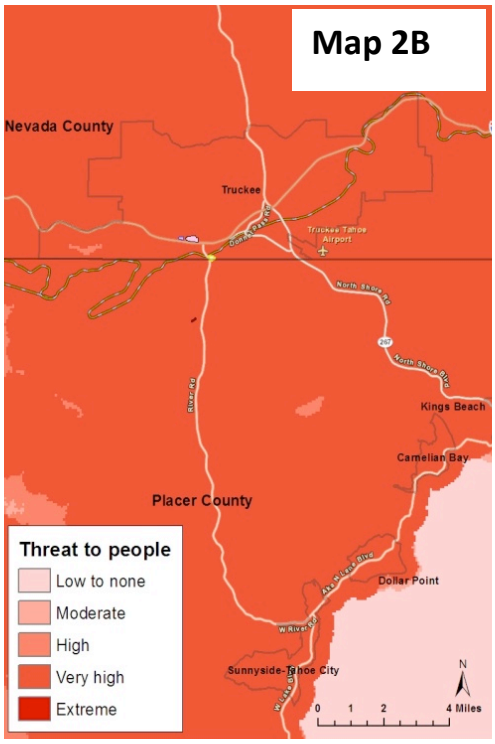
Overall, TFHD residents are in good health; they have lower self-reported measures of diabetes, high blood pressure, and heart disease than national averages. Self-reported asthma was also lower in the TFHD compared to national data. Known chronic disease health determinants—such as smoking, body mass index (BMI), and the frequency and duration of moderate exercise—are all healthier compared to national survey results. Personal limitations due to physical, mental, and emotional health problems are lower among TFHD residents compared to national averages.[15]

Environmental Health Risks

Fuel rank—a value of expected fire behavior based on a combination of topography, vegetation, and weather conditions—is moderate, high, and very high throughout the Lake Tahoe area and in the more immediate vicinity of the proposed BEF; wildfire as a threat to people is ranked as "very high" (Map 2A & 2B).[16]

Map 2.Wildfire Risks in the Truckee / Lake Tahoe area





According to data from ongoing air monitoring, air quality in the Truckee area is relatively good compared to the surrounding counties (Table 4).[17] Despite local measurements, Truckee residents have expressed concerns about their local air quality. This is in part due to particulate matter from wood-burning stoves and road dust.[18]

Table 4. Air quality standards and non-attainment days for 2011

	Placer County	Nevada County	Town of Truckee	Mountain Counties Air Basin	Sacramento County
Ozone - Days > National 8hr Standard	21	7	0	32	41
Ozone - Days > State 8hr Standard	34	23	0	60	53
PM2.5 - State Annual Average ($\mu g/m^3$)*	10.7	6.6	6.6	11.9	11.6
PM10 - State Annual Average ($\mu g/m^3$)+	NA	NA	NA	NA	NA
Pm10 - State Annual 3-yr Average ($\mu g/m^3$)++	NA	NA	NA	24	NA

Source: California Air Resources Board.

*The California annual standard is exceeded when the state annual average is > 12 $\mu g/m^3$.
+The California annual standard is exceeded when the highest state annual average for 3 consecutive years is > 20 $\mu g/m^3$.
++The state annual PM10 standard is exceeded when the state 3-year average is > 20 $\mu g/m^3$.

Review of Relevant Health Studies

Fire Hazard

Most health impacts related to wildfire generally occur during or immediately after a wildfire event. Long-term health effects from wildfires are poorly studied and are considered rare in the general population.[19,20,21] Acute health impacts from wildfires include: eye irritation and infection, upper respiratory tract irritation and infection, skin irritation from the burning of plant compounds (e.g., poison ivy), carbon monoxide poisoning, reductions in lung function, acute asthma, and chest pain. Delayed and long term health impacts may occur from increased exposure to carcinogens, suppressed immunity, physical and cognitive impairments, and physical injury.[22]

Wildfire smoke is a complex mixture of pollutants. It consists of small and large particles called particulate matter (PM), carbon dioxide (CO2), carbon monoxide (CO), nitrous oxides (NOx), sulfur oxides (SOx), ozone, and polynuclear aromatic hydrocarbons (PAHs).[23] The majority of particulate matter in wildfire smoke is PM_{10} (up to 90 percent) and the remaining is made up of $PM_{2.5}$.[24] Factors such as fuel conditions (type, amount, and arrangement), fire behavior, fire intensity, and weather all impact human exposure to wildfire air pollutants. Individual responses to adverse health effects will vary by genetic predisposition, age, co-morbidities, cumulative exposure patterns, and personal resilience.[25] The most notable health impacts from wildfire pollution are: decline in lung functioning, decline in breathing rate, breathing discomfort, emphysema, asthma, allergies, bronchitis, angina, myocardial infarction/heart attack, and pneumonia.[26]

Vulnerable populations include those who have asthma or other respiratory diseases, such as chronic obstructive pulmonary disease (COPD), cardiovascular disease, sensitive respiratory tracts, or people with weakened immune systems. In addition, the elderly, children, pregnant women, and people who smoke tobacco are all at greater risk.[27,28]

Air Quality

The main air pollutants relevant to this project include: dust during construction, vehicle emissions from project-related traffic, emissions from the BEF, and wildfire pollutants.

Road dust can contain many different substances including: PAHs and allergens such as pollen, animal dander, and molds.[29,30] A local study conducted in the Lake Tahoe basin concluded that road dust was also a major source of PM_{10}.[31] The health impacts of PAHs, allergens, and PM_{10} are listed in Table 5.[32,33,34]

Table 5. Health effects associated with substances in road dust

Pollutant	Health effects
Polynuclear aromatic hydrocarbons (PAHs)	Short term impacts: eye irritation, nausea, vomiting, diarrhea and confusion Long term impacts: cataracts, kidney and liver damage and jaundice
Allergens (pollen, animal dander, molds)	Sneezing, coughing, itching, runny noses, watering eyes, asthma, and irritation, and worsening of chronic respiratory diseases
Particulate matter (PM)	Eye irritation, asthma, bronchitis, lung damage, cancer, heavy metal poisoning, and cardiovascular effects.

Vehicle emissions from project-related traffic can also impact air quality. The air pollutants emitted by vehicles include a number of Environmental Protection Agency (EPA) criteria pollutants such as nitrogen oxides, particulate matter, sulfur oxides, and carbon monoxide. Greenhouse gases, particularly carbon dioxide, are also emitted. Table 6 summarizes the health effects that have been linked with criteria pollutants most commonly related to vehicle exhaust.[35]

Table 6. Health effects linked with EPA Criteria Pollutants

Pollutant	Sources	Health Effects
Carbon Monoxide (CO)	Motor vehicle exhaust and indoor sources include kerosene or wood burning stoves.	Headaches, reduced mental alertness, heart attack, cardiovascular diseases, impaired fetal development, death.
Nitrogen Oxides (NO_x)	Motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels.	Susceptibility to respiratory infections, irritation of the lung and respiratory symptoms (e.g., cough, chest pain, difficulty breathing).
Ozone (O_3)	Vehicle exhaust and certain other fumes. Formed from other air pollutants in the presence of sunlight.	Eye and throat irritation, coughing, respiratory tract problems, asthma, lung damage.
Particulate Matter (PM)	Diesel engines, power plants, industries, windblown dust, wood stoves.	Eye irritation, asthma, bronchitis, lung damage, cancer, heavy metal poisoning, cardiovascular effects.

In 1988, the state of California concluded that diesel exhaust PM was a "toxic air contaminant", because of its potential to cause cancer, premature death and other health problems.[36] There are many known health impacts of diesel exhaust including irritation of the eyes, throat and lungs, lightheadedness, nausea, exacerbation of asthma, acute coronary symptoms, hypertension, and low-birth weight.[37,38]

The negative health impacts of poor air quality are not distributed equally among the population. Elderly, children, and people who suffer from asthma or other respiratory illnesses and heart disease are particularly susceptible to changes in air quality. Low-income populations and people of color are more likely to live near high-traffic areas or industrial locations.[39,40,41] For these reasons, industrial activities should be sited away from "sensitive uses" like schools, houses, hospitals or elderly care centers and environmental burdens of low-income communities should be considered.[42]

Air pollution has also contributed to global climate change, and climate change is a major risk to

public health. According to the Intergovernmental Panel on Climate Change (IPCC) most of the observed temperature increases in the last 50 years is very likely the result of human activities, such as burning of fossil fuels.[43] The majority of impacts of climate change on human health will be negative. Climate change impacts may include flooding along the coast due to increasing sea levels; a dramatic increase in the number of heat waves; an increase in ambient ozone levels; and a longer spring and summer dry season that in turn leads to more drought, reduced storage of water in reservoirs, and longer fire seasons.[44]

Water Quality

In the Lake Tahoe region contaminants from forest fires have the potential to affect water quality. The largest physical impact to water quality following a wildfire burn is a change in stream sediment loads due to erosion and ash, with impacts on water treatment operations and ecological health.[45,46] Studies have found that nitrates can exceed drinking water standards following wildfires.[47] Although short-term concentrations have been directly associated with wildfire severity, long-term follow-up data (3 – 10 years post fire) suggest that nitrate concentration in streams can remain elevated and can be up to 10 times the drinking water standard regardless of fire severity.[48] The U.S. Public Health Service set the limit for nitrate in drinking water at 10mg/L in 1962.[49] The Environmental Protection Agency has also adopted this limit as the maximum contaminant level.[50] Consuming nitrate in concentrations greater than 10mg/L is a condition usually experienced by infants called methemoglobinemia, limiting the blood's ability to carry oxygen to cells, causing the veins and skin to appear blue. Phosphorous and mercury may also be present in forest fire ash and may be deposited in waterways; however, the health implications of these deposits have not been studied.[51]

Traffic

There are several characteristics that have the potential to impact traffic safety: the number of vehicles on the road, the types of vehicles, road infrastructure, the driving behaviour of those operating vehicles, and the population density through which the vehicles are travelling. However, vehicle volumes independently predict pedestrian injuries.[52,53,54,55]

Driver behavior greatly influences traffic-related health risks. Slower-moving vehicles on rural roads can motivate risky or illegal passing maneuvers by other drivers, which increases the likelihood of collisions.[56] And there is a direct relationship between vehicle speed and the severity of pedestrian injuries. For example, there is generally less than a 20% probability of serious or fatal injury when vehicle speeds are lower than 20 mph, while speeds greater 35 mph can result in death or disability.[57] Additional behaviors of concern include the presence of alcohol, medicinal or recreational drugs, fatigue, and traveling in darkness.[58] The elderly and very young are most susceptible to vehicle-pedestrian injuries, often due to slower walking speeds and slower reaction times.[59]

Growing research suggests that the shift to motorized vehicles is associated with the rising levels of obesity witnessed across the globe.[60,61] Studies suggest that when traffic calming measures are implemented, physical activity levels (walking and cycling) in children increase and accidents decrease.[62,63,64,65]

Community Mental Health

Stress and mental health are essential to overall health and well-being. Unmanaged stress has physical health consequences that include weakened immune systems, weakened functioning of the circulatory and metabolic systems, and increased incidence of cardiovascular disease and Type 2 diabetes.[66] Industrial projects can decrease stress levels through providing economic and employment benefits.[67]

Industrial projects can impact health in other myriad ways. Noise disturbance, odor, proximity to site, socioeconomic status, and perceptions of personal powerlessness in decisions about a project and concerns regarding environmental health effects are some of the factors that mediate the impact to mental wellbeing.[68,69,70,71] Health impacts resulting from perceived risk include stress-related symptoms and a heightened awareness of actual symptoms of toxicological exposure.[72]

Available literature suggests the wildfire impacts can vary from feelings of frustration about a temporary or permanent change in quality of life, to feelings of grief, to the development of Post-Traumatic Stress Disorder[ii] (PTSD).[73,74,75] Positive impacts have also been noted and include financial profit, community cooperation, and positive changes to interpersonal relations.[76]

Noise

Much research has been conducted on the potential health impacts of environmental noise. It is generally agreed that environmental noise ranging from 40 to 55 dBA is likely to lead to annoyance in a portion of a population.[77] Noise levels above the range of 65 to 70 dBA have been associated with decreased school performance and ischemic heart disease. In general, intermittent, higher frequency, short duration, intense sounds have greater impacts on health than do continuous low frequency, long duration, low intensity sounds.[78] Sleep disturbance and annoyance are the first impacts of nighttime noise and can lead to mental disorders.[79] Annoyance can affect people's perceived levels of happiness and increase stress.[80] Low-level chronic noise from moderate traffic can stress children and raise their blood pressure, heart rates and levels of stress hormones.[81]

Economic Security

On an individual level, employment and income are core determinants of one's health.[82] Literature consistently shows that health outcomes differ by socioeconomic status; those who are in lower income brackets and have lower levels of education, experience higher rates of morbidity and mortality compared to those in higher income brackets and who have completed higher levels of education.[83] Increased income for individuals or families has the potential to improve health through increases in the standard of living, reductions in stress, and opportunities for personal growth and social relationships.[84] Conversely, low income is associated with increased risk of low birth weight babies, injuries, violence, some cancers, and chronic disease.[85] Unemployment is associated with increased stress, depression, and anxiety, and is a known contributor to cardiovascular disease.[86]

[ii] Post Traumatic Stress Disorder – an anxiety disorder that results following the witness or experience of a traumatic event involving the threat of injury or death.

Employment and income can also provide better access to health care insurance. Provision of health insurance to the uninsured is associated with improved health outcomes; reductions in mortality by as much as 5-15%; improvement of chronic conditions such as cardiovascular disease and diabetes, cancer, and depression; and improvement of acute conditions, such as asthma or heart attacks.[87,88]

Energy Security

For the individual, energy security relates to one's ability to pay for personal and family energy needs. At the community or national level, energy security is critical for the health of communities and sustained economic well-being. Energy security can be defined as a resilient energy system and includes the protection and proper functioning of a community's or nation's energy resources and assets.

Energy systems are complex. Their interconnected nature makes understanding the relationship between energy security and human health challenging. Overall, disruptions or assets in energy resources have the potential to affect the power grid, water supply and distribution system, transportation network, telecommunications system, and in turn create a multitude of human health and safety issues. These include potential health effects associated with damage to nuclear facilities; potential health effects related to the failing hydroelectric dams; potential health effects connected to the interruptions of power to hospitals and other core public infrastructure; potential environmental and health effects linked to the pollution from offshore oil spills; and potential environmental and health effects linked to power outages.

Interest in local and renewable energy sources has become an important and strategic goal for the federal government and many states and communities.[89] Local and renewable sources have the following positive impacts: reduction in pollution and emissions; increased independence from imported energy sources; increased diversity and flexibility of power systems; and benefits to the local economy from job creation.[90]

Assessment

Section 1: Effect Characterization

Effect characterization is the synthesis of findings to communicate an overall judgment as to the certainty, magnitude, duration, and distribution of potential health effects. Regardless of whether or not health effects are quantified, an HIA should characterize each potential impact to the extent feasible. Effect characterization ultimately relies on both quantitative and qualitative evidence, and the final characterization of the overall impacts should be transparent and clearly communicated. To characterize potential health effects, the following definitions were employed.

Certainty

Certainty describes the expected likelihood of a health effect occurring.

Unlikely	There is little evidence that impacts will occur as a result of the project, or limited plausibility given existing conditions
Possible	Health effects are logically plausible, but limited data and/or consensus exist to suggest a substantial risk for positive or negative impacts above existing baseline conditions
Likely	Health effects are logically plausible, and there is strong evidence to suggest that a change in health risks or health effects will occur
Very likely / certain	Adequate evidence exists that a health effect will occur, and that the impact will directly and causally impact health
Insufficient evidence / not evaluated	Evidence is inadequate to judge the certainty of a project impact/health effect

Magnitude

Magnitude describes the extent of the health effect on the impacted population.

Low	Positive or negative health effects would not be perceptible and/or any changes would impact few people
Medium	Positive or negative health effects could result in minor changes in health for some households, and these changes would be reversible
High	Positive or negative health effects would accrue across the entire impacted community and would result in permanent changes in health
Insufficient evidence / not evaluated	Evidence is inadequate to judge the magnitude of a project impact/health effect

Duration & Distribution

Duration describes the expected timeframe of project impacts/health effects. Most health effects are expected to persist for the life of the project. Some health effects may only occur during the construction phase. Other health effects could continue for a limited time period after the lifespan of the proposed facility.

Distribution describes the expected impact on various population subgroups based on location and/or demographic characteristics (e.g., age, race). Some health effects may accrue at

different geographic scales (e.g., local health effects compared to regional health effects). The distribution of health effects is described for each health pathway.

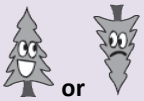
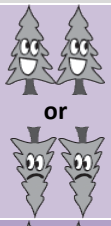
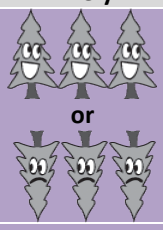
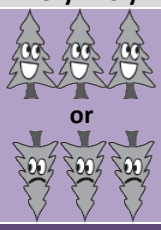
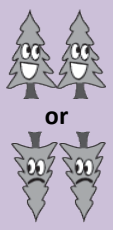
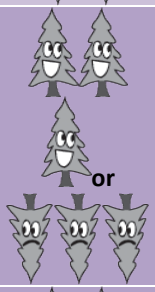
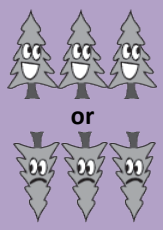
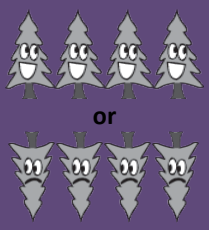
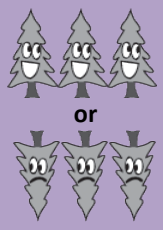
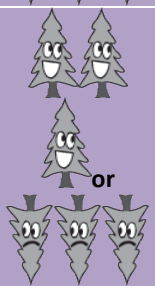
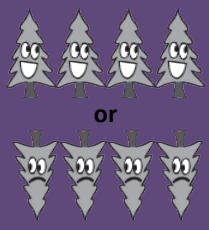
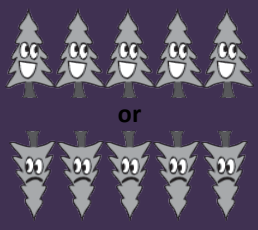
Determination of Health Effects

The HIA team was responsible for the final determination of scoped project impacts/health effects. Final decisions were made in an iterative group format—with input provided by air pollution, planning, and health experts—utilizing the best evidence available, including literature reviews, data from the Draft EIR, case studies, and data and information from content experts and community meetings. The HIA team consists of HIA experts from Sequoia Foundation and an environmental and occupational health expert from the California Department of Public Health.

Finally, certainty and magnitude were placed into a matrix as a way to summarize potential health effects. The number of conifer trees (up for positive impact; down for negative impact) indicates the general direction of potential influence of a project impact or health effect. See Figure 2.

- **1-2 conifer trees**—the effect is unlikely, or if possible expected to produce a low magnitude impact for few people in the community. Not likely to substantially impact community health in a noticeable or important manner.
- **3 conifer trees**—the effect is unlikely to possible, but could lead to a high magnitude impact, or is likely to very likely but with a lower expected magnitude of impact. Some potential to impact community health in a positive or negative manner, but effects would be readily reversible.
- **4-5 conifer trees** —the effect is likely with a high magnitude effect or very likely to occur with medium to high magnitude. Most likely to positively or negatively impact health in the broader community in a noticeable manner, and health effects may be permanent for the lifespan of the project.

Table 7. Summary of the certainty and magnitude of health effects

Magnitude of Impact	Certainty of Impact: Unlikely	Possible	Likely	Very likely
Low				
Medium				
High				

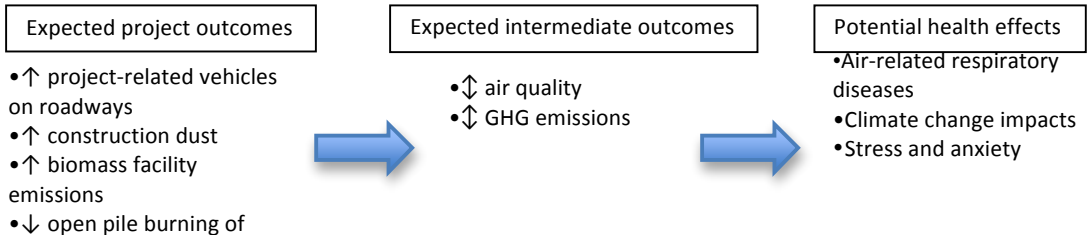
The following chapters are divided by health determinants as described in the scoping process—air quality, wildfire, greenhouse gas emissions, traffic and transportation, water quality, noise, and economic impacts and energy security. For each health determinant, the main health pathway from expected project outcome to potential health impact is reviewed, a brief synopsis of available research evidence is provided, the local existing conditions and potential project outcomes are assessed, and potential health effects are characterized using the definitions and measures described above. Some health effects may appear in multiple sections of this report, as several health determinants lead to similar health outcomes.

The summary of health effects is shown below, and explained in greater detail in each of the sections that follow.

Table 8. Summary of the certainty and magnitude of health effects as described by the HIA

Potential Health Effect	Certainty	Magnitude	Summary Effect
AIR QUALITY & HEALTH			
Respiratory irritation from fugitive dust	Unlikely	Low	
Health impacts from construction and operations	Unlikely	Low	
Health impacts from biomass facility emissions	Possible	Low	
Health impacts from reduction in open-pile burns	Very likely	Medium	
Stress and anxiety from biomass facility emissions	Insufficient Evidence	Insufficient Evidence	Insufficient Evidence
WILDFIRES & HEALTH			
Improvements in air quality and reductions in air-related respiratory illnesses.	Likely	Medium	
Reductions in physical injuries and home displacement	Possible	Low	
Impacts to community mental health	Possible	Medium	
Community anxiety related to on-site wood storage & fire risks	Possible	Low	
GREENHOUSE GAS EMISSIONS & HEALTH			
Mitigation of climate change and related health effects related to greenhouse gas emission reductions from the proposed biomass facility	Unlikely	Low	
TRAFFIC AND TRANSPORTATION & HEALTH			
Injuries and deaths due to traffic accidents	Unlikely	Low	
Reductions in physical activity due to increases in traffic	Unlikely	Low	
WATER QUALITY & HEALTH			
Health effects from storm water contamination	Unlikely	Low	
Health effects from increased sediment load and overflow of storm water	Unlikely	Low	
Health effects related to improved water quality resulting from reduced open pile burns and wildfire risks	Insufficient evidence	Insufficient evidence	Insufficient evidence
NOISE & HEALTH			
Annoyance caused by daytime onsite construction noise	Unlikely	Low	
Annoyance caused by daytime onsite operations noise	Unlikely	Low	
Annoyance or sleep disturbance caused by nighttime operations	Unlikely	Low	
Annoyance caused by daytime vehicle traffic	Unlikely	Low	
ECONOMIC and ENERGY SECURITY & HEALTH			
Health effects related to increased energy security	Unlikely	Low	
Health effects related to increased income	Unlikely	Low	
Health effects related to increased medical access	Unlikely	Low	

Section 2: Air Quality and Health



Health Effects of Air Quality

- Fine dust is a common source of air pollution-related complaints by community members exposed to industrial activities, including earthmoving and grading.[91]
- Inhalation of fine dust can cause respiratory and cardiovascular complications. Road dust can contain many different substances including: PAHs[92] and allergens such as pollen, animal dander and molds.[93] A significant fraction of road dust can be particulate with a diameter less than 10 microns (PM_{10}).[94]
- There are many established health impacts of PAHs, allergens and particulate matter.[95,96,97] The extent of health impacts depends on the amount of exposure, the concentration of the various components, and individual susceptibility.
- Criteria air pollutants have been linked with a range of health effects, including: asthma, chronic bronchitis, decreased pulmonary function, cardiovascular events, cancer, increased hospital admissions, and increased mortality.[98]
- Diesel particulate matter (a contributor to $PM_{2.5}$) from diesel engines is a carcinogen. It also has health impacts including irritation of the eyes, throat, and lungs; lightheadedness; nausea; exacerbation of asthma; acute coronary symptoms; hypertension; and low-birth weight.[99,100]
- There are no long term studies that have examined the health impacts of emissions from biomass gasification projects (facilities that produce syngas and burn the syngas in internal combustion engines). Residents have expressed anxiety regarding potential unknown risks to air quality and health.
- Air pollutants from biomass gasification systems include criteria air pollutants and air toxics, including trace organic and inorganic constituents contained in woody biomass.[101]

Existing Local Conditions

Air quality is a concern for both Placer and Nevada Counties and both counties have implemented programs to address air quality. In 2004, Placer County Air Pollution Control amended Rule 225 to reduce particulate matter production from wood burning appliances and implemented a wood stove replacement incentive program "*Burn Bright Burn Right.*"[102] According to results from ongoing monitoring, Tahoe Forest's air quality in the Truckee area is currently relatively good compared to the region. In 2011, ambient air monitors for PM and ozone in Truckee indicated there were no instances of ozone exceeding the National Ambient Air Quality Standards and $PM_{2.5}$ on average is lower than the surrounding area and the entire Mountain Counties Air Basin (in which Truckee and the project site are located). The next closest measures of PM_{10} are available in the South Lake Tahoe-Sandy Way area. In Truckee and South Lake Tahoe, in 2010 there were two days where PM_{10} levels exceeded the national standard; in 2011, there were three days.[103] Vehicle emissions are estimated to account for 94%

and 82% of Placer County's PM_{10} and $PM_{2.5}$ levels, respectively.[104] Truckee residents and officials have, however, noted the need to improve air quality, particularly during the winter months when wood burning stoves are in higher use and roadway particulate matter is high. The PM levels in Truckee have improved in the recent years as the result of new natural gas lines, better performing wood stoves, and the reduction of PM from winter road applications.

Forest biomass removal is facilitated with open-pile burns of forest slash. There are generally over 200 allowable "burn" days in the Eastern County and Tahoe Basin during the season. There are no precise data on the amount of burning and when the burning takes place. Open burns are conducted by various land managers including the U.S. Forest Service, Cal Fire, CA state parks, timber management companies, local fire districts, and private land owners. Burning typically occurs from November through mid-December, and sometimes in the Spring.[105]

Potential Health Effects Related to Air Quality Risks

Air pollutants of concern for this project come from sources including: facility construction, project-related traffic and project-related equipment, emissions from the BEF, wildfires, and open-pile burns.

The on-site construction phase is scheduled to take place over 14 months, divided over two summer construction seasons. During construction periods, trucks bringing workers and equipment to the site and construction activities (e.g., clearing and grading) will generate dust. Most of the construction dust will be concentrated on-site, and thus would impact on-site workers or residents living on-site. Fugitive dust (particulate matter that becomes suspended in the air due to wind action and human activities) will be managed to meet the requirements of the Placer County Air Pollution Control District's (PCAPCD) Rule 228, Fugitive Dust and Rule 205, Nuisance.[106,107]

The Draft Environmental Impact Report (EIR) analyzed air quality impacts resulting from construction and operations activities, including delivery vehicles, equipment used in excavation, grading and clearing, and idling vehicles on site and in biomass pick-up areas and BEF operations. Emissions from these sources are summarized in Table 9-6 and 9-7 of the Draft EIR.[108] For both construction related activities and long-term operations, estimates for maximum daily emissions for reactive organic gases (ROGs), nitrogen oxides (NOx), and PM_{10} and $PM_{2.5}$ do not exceed the PCAPCD CEQA significance thresholds (note that ROG and NOx are precursors to ground level ozone formation). Although the estimated emissions will be below the significance thresholds, there will be project emissions which could exacerbate health issues in vulnerable population groups; however, since the nearest residence is over 1000 feet from the project site, impact on human health will be unlikely. Most traffic-related pollutants drop significantly within 500 meters of the road.[109]

Previous studies documented up to 55 toxic air pollutants including benzene, formaldehyde, acrolein, and nickel that are potentially associated with a biomass gasification system using an internal combustion (IC) engine generator set. A Health Risk Assessment (HRA) modeled the emissions for the proposed BEF and determined cancerous and non-cancerous health outcomes in the surrounding population. Using a conservative modeling technique, the HRA concluded that air emissions from the BEF would not cause significant health risk for the surrounding community members. Overall, residents that live in the area continuously for 70 years could expect an additional risk of 2.0 excess cancers per million people. As a comparison, living next to a large gasoline service station presents an increased risk of between 10 and 120 cancers per million.[110]

Risk of chronic disease (non-cancerous health outcomes) was also well below threshold levels for health concern. It should be noted, however, that the HRA did not have estimates of emissions from the gasification technology used to convert biomass into energy (gasification of biomass followed by combustion of the syngas in an internal combustion engine). The HRA concluded that the method used in modeling (the direct combustion of the biomass fuel with standard emission controls) would overestimate actual emissions from the gasification system; in other words, the calculations used for estimating emissions looked at a worst case scenario for efficiency, with emissions larger than expected from the gasification technology.[111] No additional review of emissions from the BEF has been performed for this HIA.

The proposed BEF will produce emissions from the IC engine combustion of the gasification syngas, but it will also reduce the number of open pile burns in the surrounding forests through the removal of forest slash to fuel the facility. PM emissions from the BEF are comparable to the PM emissions of 36 EPA compliant stoves.[112] The overall impact is a reduction in air pollutant emissions. If the facility is running at full capacity, up to 17,000 bone dry tons of forest sourced biomass per year will be displaced from open-pile burns, leading to a reduction of 78 tons of nitrogen oxides, 102 tons of reactive organic gases, 167 tons of PM_{10}, and 142 tons of $PM_{2.5}$.[113]

Potential Health Effect	Certainty	Magnitude	Summary Effect
Respiratory irritation from fugitive dust	Unlikely	Low	
Health impacts from construction and operations	Unlikely	Low	
Health impacts from biomass facility emissions	Possible	Low	
Health impacts from reduction in open-pile burns	Very Likely	Medium	
Stress and anxiety from biomass facility emissions	Insufficient Evidence	Insufficient Evidence	Insufficient Evidence

Duration & Distribution

Elderly, children, and people who suffer from asthma or other respiratory illnesses and heart disease are particularly susceptible to changes in air quality. For these reasons, industrial activities (including high volume project-related vehicular traffic) should be sited away from "sensitive uses" like schools, houses, hospitals, or elderly care centers.[114] Low-income populations and people of color in California are more likely to live near high-traffic areas or

industrial locations, and these populations have higher rates of exposure to noise, air, soil and water pollution as a result.[115,116,117]

Since so few households are near the proposed BEF, it is unlikely that there would be substantial health effects related to its operation. Positive air quality impacts related to the reduction of open pile burns will be shared throughout the Mountain Counties Air Basin.

Air quality impacts related to construction will only last during the construction phase. Air quality impacts from the operation of the BEF and reduction of open pile burning will last throughout the project's lifespan.

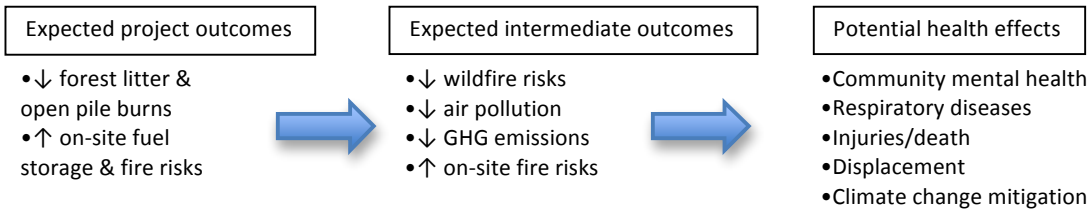
SUMMARY: Regional air quality will improve from the reduction of open pile burning. Low levels of emissions will be concentrated at the proposed project site; there is little evidence to suggest that these emissions will negatively impact health in surrounding communities.

RECOMMENDATIONS

Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

- Develop a communications plan between residents and facility operators. Clear communication from facility operators and/or County staff describing facility emissions and emissions avoided from a reduction in open pile burning could ease community anxieties regarding the facility. Establishing a phone number and/or email address for local residents to voice comments and/or request information could maximize transparency regarding facility operations.
- The Placer County Air Pollution Control District typically performs unannounced on-site inspections at least once a year on these types of facilities. More frequent on-site inspections—for example, once during summer months and once during winter months—could ease community anxieties regarding emissions during winter months when an inversion layer is often present. This recommendation falls under the jurisdiction of the Placer County Air Pollution District.

Section 3: Wildfire Risks & Health



Health Effects of Wildfires

- Health effects from wildfires include skin burns, asphyxiation, irritation, and pollution inhalation.[118,119,120]
- Indirect effects from wildfires, such as erosion, landslides, and flooding, can threaten safety and health.[121]
- Particulate matter is a significant wildfire pollutant; health impacts from PM can include aggravation of pre-existing respiratory and cardiovascular disease, persistent cough, wheezing, difficulty breathing, and premature mortality.[122]
- CO, ROG, and NOx are also released in significant quantities during wildfires and can negatively impact respiratory and cardiovascular health.
- Wildfire threat can have psychosocial impacts, including frustration, a change in quality of life, feelings of grief, or the development of PTSD.[123,124,125]
- Residents have expressed the possibility of a reduction in wildfire risk easing anxieties and impacting community mental health related to the cancellation of home fire insurance, family and personal safety, and family displacement/evacuation.

Existing Local Conditions

Wildfire risks are an everyday fact of living in the Lake Tahoe region. Fuel rank—a measure of expected fire behavior based on a combination of topography, vegetation, and weather conditions—is moderate, high, and very high throughout the Lake Tahoe area and in the more immediate vicinity of the proposed BEF. The California Department of Forestry and Fire Protection (CAL FIRE) also produces a measure of Wildland Urban Interface (WUI) "threat to people", which considers fuel rank, fire threat, and community development and population density. The majority of the Lake Tahoe region and most of Truckee is classified as having a 'very high' threat to people from wildfire risks.

Case Study 1. Wildfires in the Lake Tahoe Area[126, 127]

The Angora Fire in 2007, thought to have started from an illegal campfire or a cigarette tossed into a campfire pit, spread rapidly across the South Lake Tahoe area due to dry, windy conditions. In total, 3,100 acres were burned over 17 days. 254 homes and 75 buildings were destroyed; 35 additional homes were damaged. The total cost of the fire was estimated at $11.7 million. A study estimated that the Angora fire produced 143,129 tons of greenhouse gas emissions (carbon monoxide, methane, and nitrous oxide), equivalent to the annual GHG emissions from 25,000 cars. The study hypothesized that the GHG emitted were much higher than historical averages because of the heavy amounts of biomass that exist in today's dense forests. Three injuries were recorded as a result of this fire. Chronic health effects have not been studied.

Potential Health Effects Related to Wildfire Risks

Diverting forest slash from open-pile burns to the biomass facility can reduce forest fuel loads, mitigate wildfire risks and effects, and reduce emissions. On an annual basis, up to 17,000 bone dry tons of biomass litter will be removed from the surrounding forests each year, reducing open pile burns in the collection area by 60-70%.[128] Reductions in PM, CO, ROG, and NOx will accrue from a reduction in the effects of wildfires. On-site storage of biomass fuels poses a localized fire risk; systems will be in place to minimize the fire risk, including temperature monitoring of fuel storage piles, sprinkler systems, three fire hydrants, a minimum 50-foot setback from the surrounding forest, and forest thinning in the seventy acres surrounding the facility.[129]

Overall, reductions in wildfires and open pile burns can have a substantial effect on community health, mental health, anxiety, and well-being. The use of excess forest slash for biomass energy in lieu of open pile burning can reduce regional emissions. There is a benefit to physically removing the wood from the forest, reducing the wildfire risks from the storing and burning of slash piles. Accounting for emissions reductions related to use of biomass for energy in lieu of open pile burning can be accurate when the quantity of the biomass is measureable.

Potential Health Effect	Certainty	Magnitude	Summary Effect
Improvements in air quality and reductions in air-related respiratory illnesses	Likely	Medium	
Reductions in physical injuries and home displacement	Possible	Low	
Impacts to community mental health	Possible	Medium	
Community anxiety related to on-site wood storage& fire risks	Unlikely	Low	

Duration & Distribution

The reduction in emissions from open-pile burning and the subsequent health impacts will commence when forest litter and slash from forest thinning operations begins being diverted from open-pile burns, and will last for the lifespan of the project. Improved forest health could continue for some time beyond the life of the project. Populations most vulnerable to wildfire include those with existing respiratory diseases, cardiovascular disease, or people with

weakened or sensitive respiratory tracts or immune systems. Specifically, the elderly, children, pregnant women, and people who smoke tobacco are all at greater risk.[130,131] Firefighters, people who work or recreate outdoors, and people living nearest areas with greater wildfire risk are more susceptible to health impacts from wildfires. Wildfire impacts related to smoke, PM, and reduced air quality can impact the entire air basin.

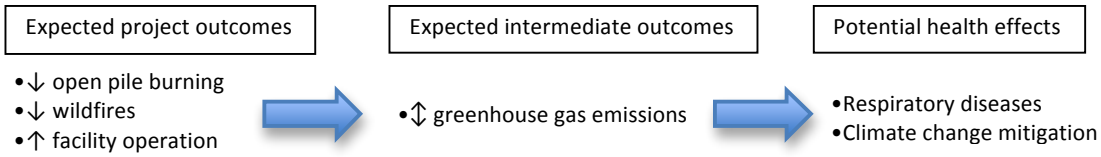
SUMMARY: The project will reduce health effects related to wildfires and wildfire risk.

RECOMMENDATIONS

Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

- Explore the feasibility of using residential wood waste as biomass fuel for facility, including materials from wildfire defensible space clearance around homes. This may facilitate defensible space activities near homes and buildings in high-risk wildfire areas.

Section 4: Greenhouse Gas Emissions & Health



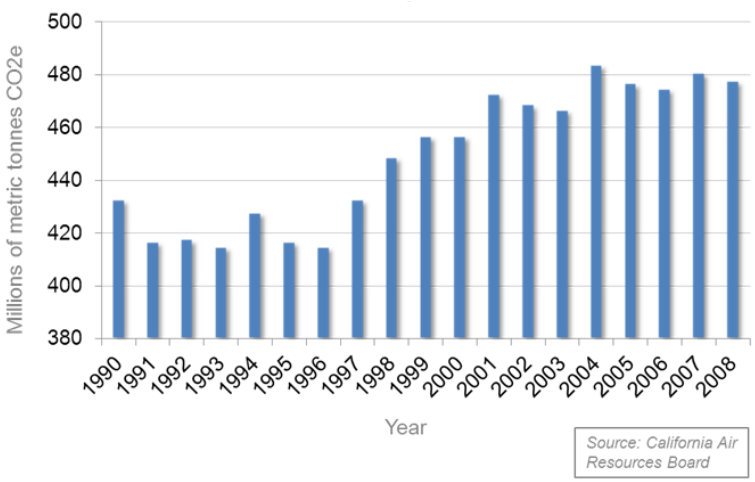
Health Effects of Greenhouse Gas Emissions

- Air pollutants such as CO2, methane, and nitrous oxides are the main greenhouse gases (GHG) in the earth's atmosphere and contribute to global climate change.
- Global climate change has many potential health effects in California, including:
  - Changes in the frequency and distribution of food-, vector-, and water-borne diseases;
  - Increases in ambient temperatures and the frequency of extreme heat waves, contributing to more heat-related illnesses;
  - Reductions in snowpack, early spring flooding, and water insecurity,
  - Sea-level rise, coastal flooding, and community displacement;
  - Increases in air pollution and related respiratory diseases; and
  - Increases in wildfire risk and subsequent health effects.
- Population groups at greatest risk from the impacts of climate change include the elderly, children, those with existing heart and lung diseases, immuno-compromised individuals, and socially or economically disadvantaged communities.[132,133]

Existing Local Conditions

Greenhouse gas (GHG) emissions have been steadily rising in California since the 1990s (Figure 5).[134] In 2006, Assembly Bill 32 was passed to reduce GHG emissions to 1990 levels by the year 2020. Greenhouse gas emission reductions in California alone would not impact global climate change, but such emission reduction strategies will be necessary throughout many local, state, and national jurisdictions to impact future climate change. Data on local GHG emissions were not available.

Figure 2. Total greenhouse gas emissions (CO2e) in California, 1990-2008



Potential Health Effects Related to Greenhouse Gas Emissions

The proposed BEF will generate a net 3,809 Metric Tons of CO2e/year (an increase of 28,672 Metric Tons of CO2e/year from facility operation, and 24,858 MT CO2e/year avoided due to a reduction in open pile burns of forest slash).[135] This calculation is likely conservative given that it does not consider 1) greenhouse gas emission reductions from avoided future wildfires and 2) avoided emissions that result from a displacement in the reliance on current existing energy sources from fossil fuels (coal, natural gas, and petroleum) combustion that are not renewable. The Lake Tahoe Region obtains the majority of its electricity from coal-fired boilers. As a comparison, 2 MW from a utility coal-fired boiler energy facility would emit CO2 at rate of 2 tons/hour and the proposed gasification/IC engine system is projected to produce net .48 MT CO2/hr (taking into account reduced emissions from fewer open pile burns).[136] Overall, the proposed BEF would produce energy more efficiently than would be needed to meet current California GHG reductions goals by 2020.[iii] Any GHG benefits related to facility operation, given its small scale, would not mitigate global climate change or reduce the impacts of climate change on health. It is the cumulative efforts of many relatively small policies and projects to reduce greenhouse gas emissions that can mitigate future climate change and related health effects.

The operation of the proposed BEF would result in a net decrease in GHG emissions when considering displaced fossil fuel combustion required for producing the equivalent amount of energy as well as the potential for wildfire reductions. Further, the facility will have an efficiency metric greater than current California goals. A small decrease in GHG emissions compared to business as usual will not impact health effects related to climate change. Rather, the global accumulation of similar efforts will be necessary to mitigate climate change and related health effects.

[iii] To meet the emission reduction goals of AB 32, the estimated GHG-efficiency of electricity consumed will average 0.28 MT CO2e/MW-hr. Energy generating facilities that are more efficient would have a GHG-efficiency less than 0.28 MT CO2e/MW-hr. The proposed biomass facility's efficiency metric is 0.22 MT CO2e/MW-hr.

Potential Health Effect	Certainty	Magnitude	Summary Effect
Mitigation of climate change and related health effects related to greenhouse gas emission reductions from the proposed facility	Unlikely	Low	

Duration & Distribution

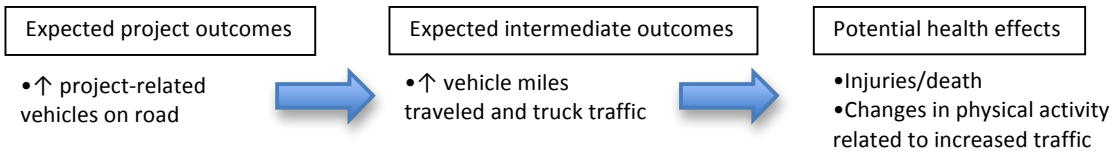
Benefits to GHG emissions will last for the duration of the project's lifespan. Population groups at greatest risk from the impacts of climate change include the elderly, children, those with existing heart and lung diseases, immuno-compromised individuals, and socially or economically disadvantaged communities. The proposed BEF is unlikely to have health effects related to greenhouse gas emissions and climate change mitigation.

SUMMARY: The project can benefit GHG reduction strategies when considering its broader impact on energy production and wildfire reduction. Health effects due to GHG emission reductions will not occur from this project alone.

RECOMMENDATIONS

- No Recommendations.

Section 5: Traffic & Health



Health Effects of Traffic and Transportation

- Research demonstrates that vehicle volumes independently predict pedestrian injuries in urban areas.[137,138,139,140]
- Slower-moving vehicles on rural roads have been found to spur risky or illegal passing maneuvers by other drivers, which increases the likelihood of collisions.[141]
- Studies show a direct relationship between vehicle speed and the severity of pedestrian injuries. There is generally less than a 20% probability of serious or fatal injury when vehicle speeds are lower than 20 mph, while speeds greater 35 mph can result in death or disability.[142]
- Driver behaviors that are of greatest concern for traffic collisions include inappropriate speed, presence of alcohol, medicinal or recreational drugs, fatigue, and driving at night.[143]
- The elderly and the very young are most susceptible to vehicle-pedestrian injuries, mainly due to slower walking speeds and slower reaction times.[144]
- Some research suggests that the shift to increased reliance on motorized vehicles and unsafe pedestrian environments are associated with the rising levels of obesity witnessed across the globe, although the evidence is inconclusive.[145]
- Due to traffic concerns and parental fears about traffic safety, children often experience reduced physical activity levels.[146,147]
- Studies suggest that when traffic calming measures are implemented, physical activity levels (walking and cycling) in children increase and accidents decrease.[148,149,150, 151]
- Community residents expressed concern regarding increased traffic due to facility construction and operation and how increased traffic may impact traffic safety.

Existing Local Conditions

State Route (SR) 89 is a two-lane conventional road and is functionally classified as a Rural Minor Arterial. Traffic volumes for SR 89 in the project area are listed in Table 9. Daily traffic counts in both directions average between 10,600 and 18,400 vehicles. During the tourist season, this value peaks at 25,000 vehicles near the Placer County/Nevada County line, and it is around 14,000 vehicles for areas closer to Cabin Creek Road.[152]

Table 9. 2010 traffic counts for SR 89 at various locations in project area

Intersection with SR 89	Peak Hour - ADT	Peak Month - ADT	Annual - ADT
Placer/Nevada County Line	2,300	25,000	18,400
West River St.	1,600	13,600	10,600
Squaw Valley Rd.	1,600	14,000	10,600

Abbreviations: ADT – Average Daily Traffic

Annual truck traffic counts for the project area are presented in Table 10. Truck traffic makes up between 7 and 12 percent of all traffic in the project area.

Table 10. 2010 truck traffic counts for SR 89 at various locations in project area

Intersection with SR 89	Truck – Annual ADT	Truck - Percent of Total Vehicles	Truck - Annual ADT Total by Axle			
			2	3	4	5+
Squaw Valley Road	783	7.4%	554	115	48	67
Hobart Mills Road	209	12.7%	48	38	36	56
Abbreviations: ADT – Average Daily Traffic						

Traffic collisions in the project area are monitored by the Truckee Police Department. Traffic collisions for 2009, 2010, and 2011 that were investigated by the police department are recorded in Table 11.[153] Overall, the annual number of traffic collisions has remained fairly steady over the past three years.

Table 11. Traffic collisions reported by the Truckee Police Department

Type of collision	2009	2010	2011
Fatal accidents	1	0	1
Injury accidents	44	32	31
Non-injury/PDO	101	109	123
DUI Accidents	12	10	11
Total collisions	*158*	*151*	*166*

Potential Health Effects Related to Traffic

During construction, there will be short-term construction related traffic, including employees traveling to and from the site of the BEF and the transportation of project-related equipment and building materials. Construction will last up to 14 months, which could occur over two summer seasons (May – November). The heaviest traffic will occur during grading when 12,000 cubic yards of material will be removed from the site. There will be an estimated additional 66 vehicle trips per day going to and from the project site (includes employees and grading trucks) during this peak period of traffic.[154]

During operations, woody biomass would be delivered to the site on weekdays during the months of May to November (approximately 152 days a year). The main routes for project-related truck traffic would be SR 89, I-80, and Cabin Creek Road. Assuming the haul trucks will carry the equivalent of 12.5 bone dry tons (BDT) of biomass fuel, it is estimated that there would be 1,340 total truck loads per year going to the Cabin Creek facility. This would be equivalent to 22 truck loads per day during the summer months.[155] During the winter and summer there would be employee vehicles and biochar removal trucks traveling to and from the facility. This would add an additional 22 vehicle trips per day, for a total of 46 trips during the summer months and 22 trips during the winter months (December to April).[156]

Since the number of additional trucks per day is small relative to current traffic volumes, it is reasonable to conclude that truck traffic related to the BEF would not cause additional strain on the roadways during construction or operations. The results of the Draft EIR traffic studies indicate that project-related traffic would not change the level of service (LOS) on Cabin Creek Road or SR 89. However, traffic volume is only one component of vehicle safety. Vehicle speed

and driving behavior also affect risk of traffic accidents. In order to minimize the risk of traffic accidents Placer County has the following policies and procedures in place: "the owner and operator of the BEF and all contractors would have to strictly enforce a driving policy that included adherence to posted speed limits; prohibition of cell phone use and consumption of alcohol and drugs; restrictions on number of hours worked; and either limited or prohibited driving during nighttime hours in project-vehicles".[157]

SR 89 is also a designated bicycle route. Unfortunately, there is no information on the number of cyclists or pedestrians that use this roadway for commuting or recreational purposes, so it is difficult to estimate potential changes in pedestrian injury risk. Between Tahoe City and Squaw Valley, there is a shared-use trail for pedestrians and cyclists; but north of Squaw Valley, SR 89 lacks a designated bicycle/pedestrian path, meaning that cyclists and pedestrians share the road with vehicle traffic. The Draft EIR rates the impact to pedestrian and cyclist infrastructure as less than significant, but this does not eliminate the risk of pedestrian or cyclist injury. The intersection of Cabin Creek Road and SR 89, which has turn lanes in both directions, is particularly important for pedestrian and cyclist injuries since all project related vehicles will be using this intersection. Having more vehicles cross over a bicycle/pedestrian route increases the chance of an incident occurring. According to the Draft EIR results, during Friday PM peak hour, there are approximately 20 vehicles turning onto Cabin Creek Road from both north and south bound directions on SR 89.[158] There are also an additional 45 vehicles that are turning onto SR 89 from Cabin Creek Road. Therefore, during peak hour, there are approximately 65 vehicles crossing a designated bike route at the SR 89 and Cabin Creek Road intersection. The project would add another 10 vehicle crossings during Friday afternoon peak hour (a 15% increase), and another 36 vehicles crossings throughout the day.

Potential Health Effect	Certainty	Magnitude	Summary Effect
Injuries and deaths due to traffic accidents	Unlikely	Low	
Reductions in physical activity due to increases in traffic	Unlikely	Low	

Duration & Distribution

Risk of traffic accidents would extend along the transportation routes used to supply fuel to the BEF. The risk would be concentrated on SR 89 closer to the facility and would be higher in the summer, as there would be very little project-related traffic in the winter months. Drivers and pedestrians that use these roadways would be at greatest risk. The risk of traffic collisions would remain throughout the construction and operations phase of the project.

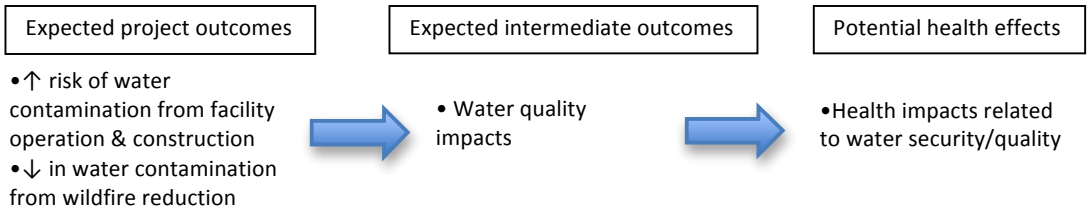
SUMMARY: The relative increase in project-related traffic and its associated risk to health is very small.

RECOMMENDATIONS

Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

- Before construction begins and for the life of the project, improve signage on SR 89 near Cabin Creek Road warning cyclists of project-related vehicles, and warning vehicles of the presence of a cyclist/pedestrian pathway. If future complaints are raised by community members regarding the safety of this intersection, traffic management plans should be revisited to scope additional mitigation strategies. This recommendation falls under the jurisdiction of the California Department of Transportation.

Section 6: Water Quality & Health



Health Effects of Water Quality

- Long-term exposure to contaminants in water can lead to detrimental health outcomes.[159]
- The largest physical impact to water quality following a wildfire burn is a change in stream sediment loads due to erosion and ash.[160] Increased stream sediment impacts water treatment operations and ecological health.[161,162]
- There is limited literature documenting impacts to the chemical composition of water following wildfire burns or prescribed burns; however, a few findings suggest water can be impacted by pollutants as a direct result of the fire as well as by the chemicals used to fight fires.[163,164] The U.S. Forest Service recently enacted restrictions on the use of aerially-applied fire retardant chemicals within certain distance of water courses to minimize the likelihood of negatively affecting water quality.[165]
- Nitrates have been found to exceed drinking water standards following wildfires.[166] Other studies examining water quality impacts found minimal increases in nitrogen-nitrate concentrations immediately following prescribed burns (0.02-0.05 ppm).[167,168]
- The health implications of phosphorous and mercury found in fire ash deposits have not been studied.[169]

Existing Local Conditions

Drinking water in the project area is obtained from the Martis Valley Groundwater Basin (MVGB). The MVGB supplies 13 potable wells that provide drinking water to the approximately 16,280 residents of Truckee.[170] All of the potable wells are treated with chlorine. The Northside treatment facility also removes arsenic; and the Hirshdale treatment plant removes excess levels of arsenic, iron, and manganese. In the 2010 Water Quality Report states that all water supplied to potable water customers complied with the State and Federal regulations.[171]

As stated in the Wildfire section, fire risk throughout the Lake Tahoe region is consistently rated, as moderate, high, and very high. Unfortunately, there is a lack of information characterizing the impacts of fires in the local area on water quality. In general, nitrates, phosphorous, ammonia, and mercury have been found to increase in streams and rivers following fires from ash and the use of fire retardants.[172,173,174]

Potential Health Effects Related to Water Quality Risks

The project has the potential to change or preserve water quality via three pathways:

1) A reduction in wildfires and open-pile burning;
2) Erosion and sedimentation impacts during construction; and
3) Water pollution from storm water runoff.

Since there is little information regarding the impact of forest fires on water quality and subsequent human health impacts, it is challenging to assess the changes to human health that would occur via this water quality pathway. It is known that up to 17,000 bone dry tons of forest-sourced biomass will be consumed by the proposed facility from the local and regional forested areas, and that this will reduce the number of required open-pile burns each year. In addition, removal of forest-sourced biomass could reduce wildfire impacts on water quality. This should help to improve water quality in the area, improving drinking water, recreational water, and the overall environment as related to watershed quality. However, the magnitude of this impact is unknown.

The second and third pathways were assessed in the Draft EIR. The Draft EIR identified that ground disturbance during construction may interrupt sediment load, and overflow the capacity of the existing storm water facilities.[175] As well, storm water could become polluted from groundwater runoff of chemicals found on site (oils, greases, petroleum hydrocarbons, nitrogen, phosphorous, heavy metals, pesticides, herbicides, and other landscape maintenance products).[176] Mitigation strategies have been developed to help reduce or eliminate the chances of contaminating storm water and flooding existing storm water facilities.[177] In particular, the site will be constructed in a way that minimizes the storm water runoff using best management practices, including for example, appropriate slope cuts and re-vegetation of cleared areas. All storm water will be collected, filtered, and contaminants trapped. Any facility-generated wastewater may be treated before it is released into the regional sewer system. These and other mitigation measures are detailed in the Draft EIR.

Since all drinking water is supplied via the regional water system and the 13 treated wells, there should be no impacts to human health. If mitigation measures proposed in the Draft EIR are followed, water quality will not be affected post high-runoff (e.g., winter snow melt).

The following hazardous materials will be stored on site: diesel fuel, hydraulic and gear oils, and potentially urea reagent. State regulations regarding the storage of hazardous materials will have to be followed, including the development of a spill prevention and clean-up plan that mitigates risks to human health if a spill should occur, as required by the Placer County Environmental Health Department.

Potential Health Effect	Certainty	Magnitude	Summary Effect
Health effects from storm water contamination	Unlikely	Low	
Health effects from increased sediment load and overflow of storm water	Unlikely	Low	
Health effects related to improved water quality resulting from reduced open pile burns and wildfire risks	Insufficient evidence	Insufficient evidence	Insufficient evidence

Duration & Distribution

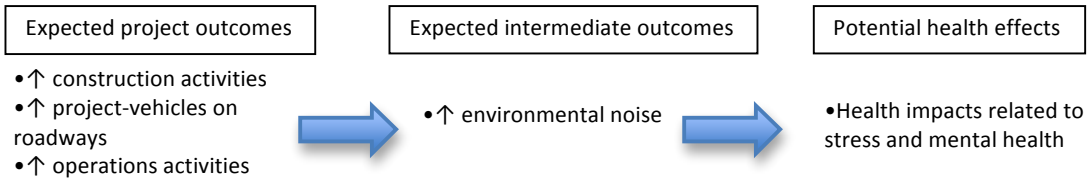
The risk of compromised water quality due to spills and air contaminants will remain throughout the duration of facility construction and operation. Potential water quality benefits that could result from a reduction in wildfire effects and open-pile burns would accrue throughout the project lifespan. Some people may be more vulnerable to drinking water contaminants than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, people who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be more vulnerable to contaminants in drinking water than the general population. Geographically, there is not one population group that is more at risk than another.

SUMMARY: The proposed biomass facility will pose minimal health risk in terms of water security and public health given mitigation measures in place.

RECOMMENDATIONS

- No Recommendations.

Section 7: Noise & Health



Health Effects of Noise

- Environmental noise ranging from 40 to 55 dBA is likely to lead to annoyance in a portion of a population. Levels that range between 40 and 60 dBA may interfere with sleep. Noise levels above this range (i.e., 65 to 70 dBA) have been associated with decreased school performance and ischemic heart disease.[178]
- Noise at night is of particular concern for health. Sleep disturbance and annoyance are the first impacts of nighttime noise and can lead to mental health disorders. Sleep disturbance may affect people's ability to cope with normal stresses in life and work productively.[179]
- Annoyance can affect people's perceived levels of happiness and can increase stress, which negatively affects mental well-being. Annoyance can also lead to an increased risk of cardiovascular disease.[180]
- Children are particularly susceptible to the impacts of noise. Low-level but chronic noise of moderate traffic can stress children and raise their blood pressure, heart rates, and levels of stress hormones.[181]
- Research has also found that children living in noisier neighborhoods had elevated blood pressure and heart rate reactivity when taking a reading test; the children also had higher self-reported stress scores in comparison to those from a less noisy neighborhood.[182]

Existing Local Conditions

Existing noise in the project area mainly results from vehicle traffic noise (on Cabin Creek Road and SR 89). Noise also comes from the existing operations near the project site, aircraft noise associated with the Tahoe Truckee airport, and to a much lesser degree, noises associated with commercial and residential land uses (e.g., lawn mowers, car doors slamming, etc.).[183]

For the purposes of the Draft EIR, an ambient noise survey was conducted on October 12, 2011. The survey took noise measurements at one location near the project site to determine existing noise levels. The receptor was located at the entrance of the project site and close to the temporary caretaker's residences (there are two near the proposed BEF) that are located to the north and south of Cabin Creek Road. The survey results indicated that daytime noise levels were 54.6 dB-L_{eq} and nighttime noise levels were at 48.7 dB-L_{eq}. L_{eq} is the 'equivalent continuous noise level', an average that takes into consideration noise fluctuations throughout a specified time period. See Table 12 for existing ambient noise levels.[184]

Table 12. Summary of existing ambient noise level measurements

Location	Start (Date/Time)	Stop (Date/Time)	dB						
			CNEL/Ldn	Daytime			Nighttime		
				Leq	Lmax	Lmin	Leq	Lmax	Leq
Site 1	October 12, 2011/12:00 pm	October 13, 2011/12:00 pm	56.5/56.4	54.6	84	66	48.7	69	25

Notes: dB = A-weighted decibels; CNEL= community noise equivalent level; Ldn = day-night noise level; Leq = energy-equivalent noise level; Lmax== Maximum noise level; Lmin = minimum noise level.
Site 1 corresponds to the location shown in Exhibit 11-1 of the Draft EIR.
Source: Monitoring performed by Ascent Environmental, Inc. October, 2011.

Vehicle traffic noise was also measured in the Draft EIR. This study took noise measurements from the three major roadways impacted by the project. The study found that the 60 dBA noise level, which is equivalent to normal speech, was reached at 27 feet from the center line of Cabin Creek Road, 193 feet from the center line on SR 89 around Squaw Valley Road, and 279 feet from the center line on SR 89 at the Placer County/Nevada County border. Sixty-five dBA were reached at 13 feet, 90 feet, and 129 feet from the middle of each of the respective roads.

There are two residences on or near the proposed BEF site: one will be removed prior to construction of the facility and the other residence is for the on-site County-hired caretaker. Other than those, the closest residences are located approximately 3,400 feet to the east of the facility, across SR 89 and on the west side of the Truckee River.

Potential Health Effects Related to Noise

During the construction phase, the loudest source of noise generally comes from site clearing and grading. During this time, equipment such as backhoes, bulldozers, loaders, graders and scrapers will be used.[185] Construction of the facility could last for approximately two 7-month periods (most construction occurring during the first 7-month period), and work would be performed during the hours of 6 a.m. to 8 p.m. during weekdays, and 8 a.m. to 8 p.m. on weekends.

Baseline results from the Draft EIR state that construction related activities would result in average noise levels of 85 dBA at 50 feet. This is roughly equivalent to the noise of a typical roadway or office building complex (or a food blender from 3 feet). At the closest receptor to the Project (caretaker residence), these noise levels could reach 53 dB-L_{eq} or 57 dB-L_{max}; this is roughly equivalent to the noise coming from a busy street location (or a hairdryer from 3 feet). Normal speech is at 60 to 65 dBA. Daytime noise regulations state that noise cannot exceed 55 dB-L_{eq} during daytime hours; however, because construction is taking place within regulated hours (6 a.m. to 8 p.m. on weekdays and 8 a.m. to 8 p.m. on weekends), noise generated from these activities is exempt from Placer County Noise Ordinance standards.

The main sources of noise generation during project operations will include unloading/loading of biomass fuel and biochar materials from the delivery trucks, moving fuel from storage areas into the processing plant, compacting biochar, and operating equipment. Estimated noise levels for these activities were calculated for the Draft EIR and are presented in Table 13.[186]

Table 13. Estimated noise levels for various on-site operations

Operations activity	Leq at 50 feet from source	Lmax at 50 feet from source
Fuel-delivery and biochar hauling related activities	60 dBA	85 dBA
Onsite fuel handling and storage-related activities	82 dBA	86 dBA
Mechanical equipment	74 dBA	N/A

Abbreviations: Leq – Equivalent noise level; Lmax – Maximum noise level; dBA – A-weighted decibels; N/A – not available

The closest receptor to the project site is a caretaker whose home is 775 feet to the northwest of the project site. The Draft EIR results estimate that noise would dissipate to a level of 50 dB-L_{eq} during the daytime and 46 dB-L_{eq} during the nighttime hours.[187] There is potential for health impacts for the on-site residents.

The impact of additional truck traffic during operations was also assessed in the Draft EIR.[188] It was estimated that facility-related vehicles would cause a net change of 0.8 dBA 100 feet from the center line on Cabin Creek Road. No net change was predicted for various sections of SR 89.[189] Since the noise ordinance deems anything over a 5 dBA change to be unacceptable, the increase in noise on Cabin Creek Road was determined to not be significant.

Potential Health Effect	Certainty	Magnitude	Summary Effect
Annoyance caused by daytime onsite construction noise	Unlikely	Low	
Annoyance caused by daytime onsite operations noise	Unlikely	Low	
Annoyance or sleep disturbance caused by nighttime operations	Unlikely	Low	
Annoyance caused by daytime vehicle traffic	Unlikely	Low	

Duration & Distribution

Noise generated by construction would most greatly impact those residents living adjacent to the project site. These impacts would be of short duration (approximately 14 months over 2 construction seasons). Operations noise will most greatly impact residents living on the project site, especially during nighttime hours, and these impacts would last the duration of operations. However there are no communities located very close to the proposed facility site.

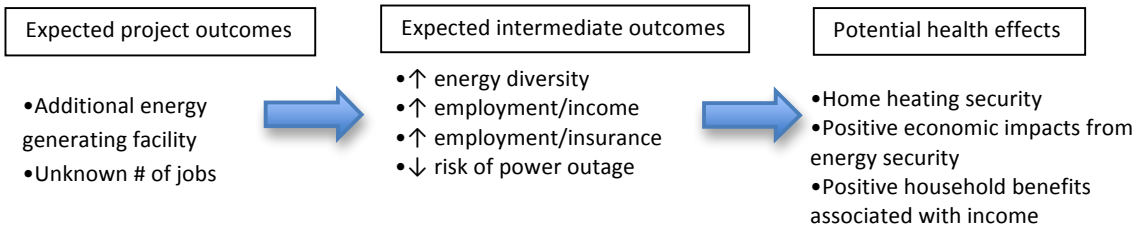
SUMMARY: Noise is not expected to impact health given the small impact the additional traffic will have on existing noise levels, and the remoteness of the project facility from the nearest households.

RECOMMENDATIONS

Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

- Develop strong communication channels between nearby community residents and the Project Manager of the biomass facility to ensure that any noise complaints are quickly and expediently resolved. Consider establishing a telephone number or email address for residents to lodge complaints about noise, with action plans in place to address these complaints. Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

Section 8: Energy and Economic Security & Health



Health Effects of Energy and Economic Security

- Energy systems that rely on a single fuel, single transmission line, single generating station, or single computer system are far more vulnerable to energy disruptions.[190]
- Local and renewable energy sources help to reduce pollution and emissions which are traditionally released in conventional energy sources[191]; reduce the dependence on imported energy sources; increase the flexibility of power systems; and contribute to the local economy through the creation of jobs.[192]
- Increased income for individuals/families may improve health through increases in the standard of living, reductions in stress, and opportunities for personal growth and social relationships.[193]
- Low income is associated with increased risk of low birth weight babies, injuries, violence, some cancers, and chronic disease.[194]
- Unemployment is associated with increased stress, depression, and anxiety, and contributes to cardiovascular disease.[195]
- Uninsured adults have less access to recommended care, receive poorer quality of care, and experience worse health outcomes than insured adults.[196]

Existing Local Conditions

Energy Power Supply

The California Pacific Electrical Company (CalPeco) operates a 60-kV transmission line originating on the eastern side of the Truckee River to the Eastern Regional Materials Recovery Facility and Transfer Station. This transmission line powers existing facilities, the Department of Public Works, and Tahoe Area Regional Transit facilities at the Eastern Regional Facility.[197]

Economic Baseline

Placer County and Truckee, CA each have a higher median household income compared to California as a whole, while Nevada County has a slightly lower median household income than California.[198] Nevada and Placer Counties, similar to the rest of the country and California, have experienced drastic increases in the unemployment rate since 2007. The unemployment rate of Truckee-Grass Valley is higher than the National average, but is overall better than the California average. In 2011, the unemployment rate for Truckee-Grass Valley was 10.6% (same as Nevada County, slightly lower than Placer County's 10.8%), compared to 11.7% for California (Bureau of Labor Statistics, 2011).[199] In 2009, Nevada County and California had similar percentage of uninsured populations (25.3% and 24.3%), but Placer County had a significantly lower uninsured rate of 15%.[200]

Potential Health Effects Related to Economic and Energy Security

The propose facility would produce 2 MW of electricity for distribution through Calpeco's electrical grid, and also satisfy onsite electrical needs during plant operation.[201] Overall, the facility would result in a net surplus of electricity of approximately 1.8 MW, powering 1,500 homes annually. The most valuable energy impact of the proposed BEF would be the addition of a renewable energy facility.[202] This facility could replace a more polluting backup-power source for the grid. During power outages, 2 MW diesel engines are used by Calpeco at their Kings Beach location to supply emergency stabilization power to their system. California Pacific Electric in Kings Beach operates six diesel generators. In 2008, they used these generators for a total of 42.8 hours; in 2009 for 339.6 hours; in 2010 for 75.9 hours, and in 2011 for 46.3 hours.[203] Due to the relatively small amount of electricity produced by this facility, the price of electricity would not change.[204]

The proposed facility will employ persons during construction and operation of the facility. The project would create up to 23 jobs during the construction phase. During facility operations, 5 year round full-time jobs with various shifts and 8 jobs in the field for collection, processing, and transportation of the biomass fuel are anticipated. Because of the limited number of construction positions and the construction's limited duration, the project would not be expected to result in substantial job or economic growth in the area.[205]

Potential Health Effect	Certainty	Magnitude	Summary Effect
Health effects related to increased energy security	Unlikely	Low	
Health effects related to increased income	Unlikely	Low	
Health effects related to increased medical access	Unlikely	Low	

Duration & Distribution

There is not enough data to determine if anyone would be differentially impacted by an additional energy generating facility and changes in energy security. The positive household income impacts would be limited to those that gain employment through the construction and operation of the proposed BEF.

SUMMARY: The project may have small and limited positive health effects related to energy and economic security.

RECOMMENDATIONS

Implementing the following recommendations could reduce negative health impacts and further improve positive health outcomes.

- Prioritize the hiring of local contractors for both the construction and operation of the facility, as feasible.

SUMMARY RECOMMENDATIONS

Air Quality and Health

- Develop a communications plan between residents and facility operators. Clear communication from facility operators and/or County staff describing facility emissions and emissions avoided from a reduction in open pile burning could ease community anxieties regarding the facility. Establishing a phone number and/or email address for local residents to voice comments and/or request information could maximize transparency regarding facility operations.
- The Placer County Air Pollution Control District typically performs unannounced on-site inspections at least once a year on these types of facilities. More frequent on-site inspections—for example, once during summer months and once during winter months—could ease community anxieties regarding emissions during winter months when an inversion layer is often present

Wildfires and Health

- Explore the feasibility of using residential wood waste as biomass fuel for facility, including materials from wildfire defensible space clearance around homes. This may facilitate defensible space activities near homes and buildings in high risk wildfire areas.

Greenhouse Gas Emissions and Health

No Recommendations

Traffic and Transportation and Health

- Before construction begins and for the life of the project, improve signage on SR 89 near Cabin Creek Road warning cyclists of project-related vehicles, and warning vehicles of the presence of a cyclist/pedestrian pathway. If future complaints are raised by community members regarding the safety of this intersection, traffic management plans should be revisited to scope additional mitigation strategies.

Water Quality and Health

No Recommendations

Noise and Health

- Develop strong communication channels between nearby community residents and the Project Manager of the biomass facility to ensure that any noise complaints are quickly and expediently resolved. Consider establishing a telephone number or email address for residents to lodge complaints about noise, with action plans in place to address these complaints.

Energy and Economic Security & Health

- Prioritize the hiring of local contractors for both the construction and operation of the facility, as feasible.

CONCLUSION

Sequoia Foundation (SF) analyzed the potential health impacts of a proposed biomass energy facility in Placer County. Based on community stakeholders' prioritization, SF analyzed health impacts associated with air quality, wildfires, greenhouse gas emissions, water quality, noise, and economic and energy security.

The most common health determinant cited by local residents and government officials was the impact this facility would have on local air quality in the Town of Truckee, Placer, and Nevada Counties. Residents expressed concerns regarding the offset of emissions from open pile burns—currently dispersed throughout the Lake Tahoe Region—to point-source emissions from the stationary biomass facility. To assess potential health impacts related to this concern, we considered a variety of evidence available.

- The use of woody biomass from the forest floor to fuel the proposed biomass facility will remove a portion of open pile burns in the Lake Tahoe Region. Open pile burns are a substantial contributor of particulate matter, nitrogen oxides, carbon monoxide, and reactive organic gases.
- The proposed biomass facility will produce air pollutants in its day-to-day operations, but the facility will process the woody biomass much more efficiently than open pile burns.
- According to air emissions assessment by the Placer County Air Pollution Control District, emissions from the construction and operation of the proposed facility will be below threshold levels of significance established by the CEQA; a Health Risk Assessment found that cancer and non-cancer health risks were also well below threshold levels of significance.

Given the large emissions reductions resulting from the diversion of woody biomass from open pile burns to the proposed biomass facility, and the minimal health risks documented in the HRA, it was determined that the changes in air emissions would result in a net reduction of health risks resulting from the proposed biomass facility.

The health impacts associated with reduced wildfires are overwhelmingly positive and will improve air quality, reduce physical injuries and home displacement, and could ease community anxieties regarding wildfires.

Other health impacts related to greenhouse gas emissions, water quality, noise, and economic and energy security are much more minor in comparison, and may be mixed in their directionality. Overall, these impacts are expected to be minor should they occur, and readily mitigated by establishing open communication channels with nearby residents.

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