

TRUNK SEWER SOUTH OF HIGHLAND PHASE 1 & 2 CONSTRUCTION AIR QUALITY ASSESSMENT

Santa Clara County, California

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Introduction

The purpose of this report is to address construction air quality impacts associated with the proposed Trunk Sewer South of Highland project in Santa Clara County, California. The air quality impacts would be associated with the demolition of the existing pavement and the construction of the new sewer trunk line. Air pollutant emissions associated with the construction of the project were predicted using models. In addition, the potential construction health risk impact to nearby sensitive receptors were evaluated. This analysis addresses those issues following the guidance provided by the Bay Area Air Quality Management District (BAAQMD).¹

Project Description

The project proposes the installation of approximately 6.6 miles of sewer trunk line that would extend from the termination of the previously constructed Harding Avenue segment of the relief trunk sewer located at the intersection of Harding Avenue and Highland Avenue in San Martin, southeast to the previously constructed City of Gilroy segment of the relief trunk sewer located on Renz Lane in Gilroy. The trunk sewer will consist of 36-inch diameter pipe installed by open trench and trenchless construction methods. The pipes will be installed at a depth that provides approximately 4 to 8 feet of cover, on average.

The majority of the sewer truck line alignment will be constructed within the Cities' road right-of-way by means of open trench construction. These sections using the road right-of-way would have construction activities lasting approximately one month. Where the sewer truck line alignment crosses the right-of-way other than that of local roads, such as the Union Pacific Railroad (UPRR) tracks, Miller Slough, Leavesley Road (State Route (S.R.) 152), Miller Slough Branch, and U.S. Highway (U.S. 101), trenchless construction methods, including microtunneling and horizontal directional drilling, would be used to avoid disturbance of the crossings. These sections using additional construction methods would have a longer construction schedule lasting several months.

Setting

The project is located in Santa Clara County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM₁₀), and fine particulate matter (PM_{2.5}).

Air Pollutants of Concern

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NO_x). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

¹ Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2017.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM₁₀) and fine particulate matter where particles have a diameter of 2.5 micrometers or less (PM_{2.5}). Elevated concentrations of PM₁₀ and PM_{2.5} are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic Air Contaminants

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs. The most recent Office of Environmental Health Hazard Assessment (OEHHA) risk assessment guidelines were published in February of 2015.² See *Attachment 1* for a detailed description of the community risk modeling methodology used in this assessment.

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, and elementary schools. This project would not introduce new sensitive receptors to the area. There are sections of the sewer trunk line alignment that are surrounded by residences and other sections that are not. The sections of the alignment that require microtunneling and longer periods of construction are approximately 20 to 200 feet from the nearest sensitive receptors.

² OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA and these significance thresholds were contained in the District's 2011 *CEQA Air Quality Guidelines*. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA. The thresholds were challenged through a series of court challenges and were mostly upheld. BAAQMD updated the *CEQA Air Quality Guidelines* in 2017 to include the latest significance thresholds that were used in this analysis are summarized in Table 1.

Table 1. Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
ROG	54	54	10
NO _x	54	54	10
PM ₁₀	82 (Exhaust)	82	15
PM _{2.5}	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	Single Sources Within 1,000-foot Zone of Influence	Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)	
Excess Cancer Risk	>10.0 per one million	>100 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual PM _{2.5}	>0.3 µg/m ³	>0.8 µg/m ³	

Air Quality Impacts and Mitigation Measures

Impact: **Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?**

The Bay Area is considered a non-attainment area for ground-level ozone and PM_{2.5} under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM₁₀ under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM₁₀, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NO_x), PM₁₀, and PM_{2.5} and apply to both construction period and operational period impacts.

The California Emissions Estimator Model (CalEEMod) Version 2016.3.2 was used to estimate emissions from construction and operation of the site assuming full build-out of the project. The project land use types and size, and anticipated construction schedule were input to CalEEMod. The model output from CalEEMod is included as *Attachment 2*.

Construction Period Emissions

Construction activities, particularly during grading, would temporarily generate fugitive dust in the form of PM₁₀ and PM_{2.5}. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices.*

CalEEMod provided annual emissions for construction and estimates emissions for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling, and vendor traffic. A construction build-out scenario, including equipment list and schedule, was based on applicant provided information. The proposed project was divided into several modeling scenarios; the open trenching pavement portion (majority of construction project), the open trenching no pavement portion, the microtunneling of the UPRR crossing portion, the microtunneling of the Miller Slough crossing portion, the microtunneling of the Leavesley Road (S.R. 152) crossing portion, the microtunneling of the Miller Slough Branch crossing portion, and the microtunneling of the U.S. 101 crossing portion. The proposed project land uses for each portion were input into CalEEMod in several modeling scenarios:

- Open Trenching Pavement: Inputs entered into this model included 5.74 acres and 250,054 square feet (sf) entered as “User Defined Industrial”. In addition, 5,201 cubic yards (cy) or 1,248 one-way truck trips for pavement demolition during the pavement demolition, 111,213-cy of soil import and 147,188-cy of soil export during the excavation phase, and 5,201-cy or 1,248 one-way truck trips for asphalt import during the pavement restoration phase were entered into the model. The provided construction schedule assumed that the open trenching pavement portion would be built out over a period of approximately five years, beginning in June 2020. Based on the schedule assumptions, there are an estimated 1,228 construction workdays for the open trenching pavement portion.
- Open Trenching No Pavement: Inputs entered into this model included 0.02 acres and 964.6-sf entered as “User Defined Industrial”. In addition, 429-cy of soil import and 568-cy of soil export during the excavation phase were entered into the model. The provided construction schedule assumed that the open trenching no pavement portion would be built out over a period of approximately one month but could be spread out over five years, beginning in June 2020. Based on the schedule assumptions, there are an estimated 8 construction workdays for the open trenching no pavement portion.

- Microtunneling at UPRR Crossing: Inputs entered into this model included 0.02 acres and 1,125-sf entered as “User Defined Industrial”. In addition, 425-cy or 102 one-way truck trips during site set-up, 27-cy or 6 one-way truck trips during the pavement demolition, 352-cy of soil import, 398-cy of soil export, and 4 one-way cement truck trips during the setup with shaft phase, and 4 one-way asphalt truck trips during the prelaunch phase were entered into the model. The provided construction schedule assumed that the microtunneling at the UPRR crossing portion would be built out over a period of approximately two months, beginning in June 2020. Based on the schedule assumptions, there are an estimated 37 construction workdays for the microtunneling at the UPRR crossing portion.
- Microtunneling at Miller Slough Crossing: Inputs entered into this model included 0.04 acres and 1,875-sf entered as “User Defined Industrial”. In addition, 902-cy or 216 one-way truck trips during site set-up, 27-cy or 6 one-way truck trips during the pavement demolition, 758-cy of soil import, 875-cy of soil export, and 4 one-way cement truck trips during the setup with shaft phase, and 4 one-way asphalt truck trips during the prelaunch phase were entered into the model. The provided construction schedule assumed that the microtunneling at the at Miller Slough crossing portion would be built out over a period of approximately four months, beginning in June 2020. Based on the schedule assumptions, there are an estimated 76 construction workdays for the microtunneling at the Miller Slough crossing portion.
- Microtunneling at Leavesley Road (S.R. 152) Crossing: Inputs entered into this model included 0.05 acres and 2,250-sf entered as “User Defined Industrial”. In addition, 580-cy or 139 one-way truck trips during site set-up, 27-cy or 6 one-way truck trips during the pavement demolition, 460-cy of soil import, 553-cy of soil export, and 4 one-way cement truck trips during the setup with shaft phase, and 4 one-way asphalt truck trips during the prelaunch phase were entered into the model. The provided construction schedule assumed that the microtunneling at the at S.R. 152 crossing portion would be built out over a period of approximately three months, beginning in July 2020. Based on the schedule assumptions, there are an estimated 68 construction workdays for the microtunneling at the S.R. 152 crossing portion.
- Microtunneling at Miller Slough Branch Crossing: Inputs entered into this model included 0.02 acres and 1,125-sf entered as “User Defined Industrial”. In addition, 665-cy or 160 one-way truck trips during site set-up, 27-cy or 6 one-way truck trips during the pavement demolition, 568-cy of soil import, 638-cy of soil export, and 4 one-way cement truck trips during the setup with shaft phase, and 4 one-way asphalt truck trips during the prelaunch phase were entered into the model. The provided construction schedule assumed that the microtunneling at the at Miller Slough Branch crossing portion would be built out over a period of approximately two months, beginning in August 2020. Based on the schedule assumptions, there are an estimated 40 construction workdays for the microtunneling at the Miller Slough Branch crossing portion.
- Microtunneling at U.S. 101 Crossing: Inputs entered into this model included 0.07 acres and 2,850-sf entered as “User Defined Industrial”. In addition, 745-cy or 179 one-way

truck trips during site set-up, 27-cy or 6 one-way truck trips during the pavement demolition, 541-cy of soil import, 718-cy of soil export, and 4 one-way cement truck trips during the setup with shaft phase, and 4 one-way asphalt truck trips during the prelaunch phase were entered into the model. The provided construction schedule assumed that the microtunneling at the at U.S. 101 crossing portion would be built out over a period of approximately three months, beginning in September 2020. Based on the schedule assumptions, there are an estimated 70 construction workdays for the microtunneling at the U.S. 101 crossing portion.

The design team could not accurately approximate the start/end dates of each construction portion, and that the dates given in the construction worksheet were estimates. However, the activities under the Open Trenching Pavement period would be spread out over the entire construction period. Therefore, emissions from the Open Trenching Pavement portion were totaled and then divided evenly over the five-year construction period. The other six scenarios were assumed to occur during the first year of construction.

The majority of the construction activities would occur during the first year of construction. Therefore, project construction emissions were compared yearly to BAAQMD's thresholds rather than over the entire construction period, which would underestimate emissions as it would be spread evenly over the entire five-year construction period. Average daily emissions per year were computed by dividing the total construction emissions by the number of days in a year. Table 2 shows average daily construction emissions of ROG, NO_x, PM₁₀ exhaust, and PM_{2.5} exhaust during each year of the construction of the project. As indicated in Table 2, the predicted daily NO_x emissions exceed the threshold of 54 pounds per average day. *Mitigation Measures AQ-1 and AQ-2 would reduce these emissions to a level of less-than-significant.*

Table 2. Construction Period Emissions - Unmitigated

Scenario	ROG	NOx	PM₁₀ Exhaust	PM_{2.5} Exhaust
Open trenching pavement construction emissions (tons)	2.88 tons	25.15 tons	1.28 tons	1.22 tons
Open trenching no pavement construction emissions (tons)	0.02 tons	0.17 tons	0.01 tons	0.01 tons
UPRR crossing construction emissions (tons)	0.04 tons	0.40 tons	0.02 tons	0.02 tons
Miller Slough crossing construction emissions (tons)	0.08 tons	0.70 tons	0.04 tons	0.04 tons
Leavesley Road (S.R. 152) crossing construction emissions (tons)	0.08 tons	0.67 tons	0.04 tons	0.04 tons
Miller Slough Branch crossing construction emissions (tons)	0.05 tons	0.44 tons	0.02 tons	0.02 tons
U.S. 101 crossing construction emissions (tons)	0.08 tons	0.75 tons	0.04 tons	0.04 tons
Total project construction emissions (tons)	3.23 tons	28.28 tons	1.45 tons	1.39 tons
2020 total project construction emissions (tons)	0.92 tons	8.16 tons	0.43 tons	0.41 tons
2021-2024 total project construction emissions (tons each year)	0.58 tons	5.03 tons	0.26 tons	0.24 tons
2020 Average daily emissions (pounds)¹	7.11 lbs./day	62.75 lbs./day	3.30 lbs./day	3.15 lbs./day
2021-2024 Average daily emissions (pounds each year)¹	3.69 lbs./day	32.24 lbs./day	1.64 lbs./day	1.57 lbs./day
<i>BAAQMD Thresholds (pounds per day)</i>	54 lbs./day	54 lbs./day	82 lbs./day	54 lbs./day
Exceed Threshold?	No	YES	No	No
Notes: ¹ Assumes 260 workdays per year.				

Mitigation Measure AQ-1: Include measures to control dust and exhaust during construction.

During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction to a less-than-significant level. Additional measures are identified to reduce construction equipment exhaust emissions. The contractor shall implement the following best management practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Mitigation Measure AQ-2: Use Construction equipment that has low diesel particulate matter exhaust and NOx emissions.

The project shall develop a plan demonstrating that the off-road equipment to be used in the construction project and hauling truck traffic would achieve a 20-percent NOx reduction compared to the CalEEMod modeled emissions used in this report. In addition, the plan would reduce diesel particulate matter exhaust emissions from microtunneling activities by 75 percent. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available. One feasible plan to achieve this reduction would include the following:

- During all Open Trenching Pavement and No Pavement portions, all diesel-powered off-road equipment, larger than 25 horsepower, operating on the site for more than two days continuously shall, at a minimum, meet U.S. EPA emissions standards for Tier 3 engines or equivalent.
- During all Microtunneling portions, all diesel-powered off-road equipment, larger than 25 horsepower, operating on the site for more than two days continuously shall, at a minimum, meet U.S. EPA particulate matter emissions standards for Tier 4 interim engines or equivalent.
- Alternatively, for all portions of construction, the use of equipment meeting U.S. EPA Tier 3 standards for particulate matter that are equipped with CARB-certified verifiable diesel emission control devices (VDECs) that altogether achieve an 85 percent

reduction in particulate matter exhaust or the use of equipment that includes electric or alternatively-fueled equipment (i.e., non-diesel) would meet this requirement.

Effectiveness of Mitigation Measures

Table 3 includes the modeled mitigated construction emissions. Implementation of *Mitigation Measure AQ-1* is considered to reduce NO_x emissions by 5 percent. Implementation of *Mitigation Measure AQ-2* using construction equipment meeting Tier 3 engine standards for Trenching portions and Tier 4 interim standards for Microtunneling portions would further reduce NO_x emissions from construction equipment by over 25 percent. This would reduce the NO_x emissions, such that the mitigated construction NO_x emissions from the project would be 40.8 pounds per day, which would not exceed the BAAQMD significance threshold. After implementation of these mitigation measures, the project would have a *less-than-significant* impact with respect to construction criteria pollutant emissions.

Table 3. Construction Period Emissions - Mitigated

Scenario	ROG	NO _x	PM ₁₀ Exhaust	PM _{2.5} Exhaust
Open trenching pavement construction emissions (tons)	1.09 tons	21.19 tons	1.26 tons	1.26 tons
Open trenching no pavement construction emissions (tons)	0.01 tons	0.13 tons	0.01 tons	0.01 tons
UPRR crossing construction emissions (tons)	0.01 tons	0.23 tons	<0.01 tons	<0.01 tons
Miller Slough crossing construction emissions (tons)	0.02 tons	0.39 tons	<0.01 tons	<0.01 tons
Leavesley Road (S.R. 152) crossing construction emissions (tons)	0.02 tons	0.37 tons	<0.01 tons	<0.01 tons
Miller Slough Branch crossing construction emissions (tons)	0.01 tons	0.25 tons	<0.01 tons	<0.01 tons
U.S. 101 crossing construction emissions (tons)	0.02 tons	0.42 tons	<0.01 tons	<0.01 tons
Total project construction emissions (tons)	1.18 tons	22.96 tons	1.28 tons	1.28 tons
2020 total project construction emissions (tons)	0.31 tons	6.01 tons	0.27 tons	0.27 tons
2021-2024 total project construction emissions (tons each year)	0.22 tons	4.24 tons	0.25 tons	0.25 tons
2020 Average daily emissions (pounds)¹	2.39 lbs./day	46.26 lbs./day	2.07 lbs./day	2.07 lbs./day
2021-2024 Average daily emissions (pounds each year)¹	1.67 lbs./day	32.59 lbs./day	1.94 lbs./day	1.94 lbs./day
<i>BAAQMD Thresholds (pounds per day)</i>	54 lbs./day	54 lbs./day	82 lbs./day	54 lbs./day
Exceed Threshold?	No	No	No	No
Notes: ¹ Assumes 260 workdays.				

Impact: Expose sensitive receptors to substantial pollutant concentrations?

Temporary project construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors. A construction health risk assessment was prepared to address the impacts the project would have on surrounding sensitive receptors.

Community risk impacts are addressed by predicting increased lifetime cancer risk, the increase in annual PM_{2.5} concentrations and computing the Hazard Index (HI) for non-cancer health risks. The methodology for computing community risks impacts is contained in *Attachment 1*.

Construction Community Health Risk Impacts

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. These exhaust air pollutant emissions would not be considered to contribute substantially to existing or projected air quality violations. Construction exhaust emissions may still pose health risks for sensitive receptors such as surrounding residents. The primary community risk impact issues associated with construction emissions are cancer risk and exposure to PM_{2.5}. Diesel exhaust poses both a potential health and nuisance impact to nearby receptors. A health risk assessment of the project construction activities was conducted that evaluated potential health effects to nearby sensitive receptors from construction emissions of DPM and PM_{2.5}.³ This assessment included dispersion modeling to predict the offsite and onsite concentrations resulting from project construction, so that lifetime cancer risks and non-cancer health effects could be evaluated.

The majority of the project's construction activities occur during the five-year Open Trenching Pavement portion while installing the new sewer trunk line. The trenching and installation would constantly be moving over the entire construction area and would only occur for approximately 30 days near any one receptor, except if near microtunneling sites. Microtunneling at the various crossings would occur for several months, along with the trenching and line installation. Much of this activity is near sensitive receptors. To analyze this effect, one of the microtunneling portions with the adjacent trenching was chosen to model as the worst-case scenario for assessing construction health risk impacts. The microtunneling crossing portion with the highest PM₁₀ exhaust emissions and the closest receptors to the construction activities was at the Miller Slough crossing. This analysis evaluated the impacts from the construction of the Miller Slough crossing and the adjacent Open Trenching Pavement portions that were 500 feet in each direction from the crossing.

Construction Emissions

The CalEEMod model provided total annual PM₁₀ exhaust emissions (assumed to be DPM) for the off-road construction equipment and for exhaust emissions from on-road vehicles. The on-road emissions are a result of haul truck travel during demolition and grading activities, worker travel, and vendor deliveries during construction. For the Open Trenching Pavement portion, the emissions were totaled and then averaged out over the five-year construction period. The average yearly emissions were then divided by the total excavation length of the project (33,700 feet) to

³ DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

get the emissions per foot ratio. The model included 500 feet of Open Trenching Pavement construction on each side of the microtunneling, so the PM₁₀ exhaust emissions for each Open Trenching Pavement portion were calculated to be 0.0038 tons/500-feet and the fugitive PM_{2.5} dust emissions for each portion were calculated to be 0.0003 tons/500-feet.

The Miller Slough crossing portion would only occur for four months during the first year on project construction. Therefore, the CalEEMod model's total annual PM₁₀ exhaust emissions and fugitive PM_{2.5} dust emissions were used. The annual emissions were divided evenly between the two portions of microtunneling. The emissions from all construction stages at each microtunneling site was 0.0192 tons for PM₁₀ exhaust and 0.0016 tons for fugitive PM_{2.5} dust emissions.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict concentrations of DPM and PM_{2.5} concentrations at existing sensitive receptors in the vicinity of the project construction area. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling these types of emission activities for CEQA projects.⁴ Emission sources for the construction site were grouped into two categories, exhaust emissions of DPM and fugitive PM_{2.5} dust emissions. The AERMOD modeling utilized four area sources to represent the on-site construction emissions, two area sources for DPM exhaust emissions and two area sources for fugitive PM_{2.5} dust emissions. For the exhaust emissions from construction equipment, an emission release height of 6 meters (20 feet) was used for the area sources. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive PM_{2.5} emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area sources. Emissions from vehicle travel around the project site were included in the modeled area sources. Construction emissions were modeled as occurring daily between 7:00 a.m. and 3:00 p.m., when most of the construction activity involving equipment usage would occur.

The modeling used a five-year data set (2013-2017) of hourly meteorological data from the San Martin Airport meteorological site that was prepared for use with the AERMOD model by BAAQMD. Annual DPM and PM_{2.5} concentrations from construction activities during the 2020 period were calculated using the model. DPM and PM_{2.5} concentrations were calculated at nearby sensitive receptors. Receptor heights of 1.5 meters (4.9 feet) was used to represent the breathing height on the first of nearby single-family residences. Receptors were placed evenly along the construction site, even if there were not actual receptors there, in order to evaluate the worst-case scenario that could be used for all portion of the project.

The maximum-modeled annual DPM and PM_{2.5} concentrations, which includes both the DPM and fugitive PM_{2.5} concentrations, were identified at nearby sensitive receptors (as shown in Figure 1) to find the maximally exposed individuals (MEIs). Using the maximum annual modeled DPM concentrations, the maximum increased cancer risks were calculated using BAAQMD recommended methods and exposure parameters described in *Attachment 1*. Non-cancer health hazards and maximum PM_{2.5} concentrations were also calculated and identified.

⁴ Bay Area Air Quality Management District (BAAQMD), 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0*. May.

Results of this assessment indicated that the cancer risk and PM_{2.5} concentration MEIs were located on the first floor (1.5 meters) of the receptors adjacent to the east of the northern microtunneling site. The maximum excess residential cancer risks for infant exposure at this location would exceed the BAAQMD single-source threshold of 10 in one million. Table 4 summarizes the maximum cancer risks, PM_{2.5} concentrations, and health hazard indexes for project related construction activities affecting the construction MEIs. *Attachment 3* to this report includes the emission calculations used for the construction area source modeling and the cancer risk calculations.

Figure 1. Project Construction Site and Locations of Off-Site Sensitive Receptors and TAC Impacts



Community Health Risk at Construction MEI

Table 4 reports the project community risk impacts. The project would have a *significant* impact with respect to community risk caused by project construction activities, since the maximum cancer risk is above the single-source thresholds of 10.0 per million for cancer risk. *Mitigation Measures AQ-1 and AQ-2 would reduce these impacts to a level of less-than-significant.*

Table 4. Impacts from Construction Risk at MEIs

Source		Cancer Risk (per million)	Annual PM _{2.5} (µg/m ³)	Hazard Index
Project Construction	Unmitigated	40.0 (infant)	0.25	0.05
	Mitigated	4.6 (infant)	0.06	0.01
BAAQMD Single-Source Threshold		>10.0	>0.3	>0.1
Above threshold?	Unmitigated	Yes	No	No
	Mitigated	No	No	No

Effectiveness of Mitigation Measures

Implementation of *Mitigation Measure AQ-1* is considered to reduce exhaust emissions by 5 percent and fugitive dust emissions by over 50 percent. Implementation of *Mitigation Measure AQ-2* using construction equipment meeting Tier 3 engine standards for Trenching portions and Tier 4 interim standards for Microtunneling portions would further reduce on-site diesel exhaust emissions from construction equipment by over 85 percent. This would reduce the cancer risk, such that the mitigated infant cancer risk from the project at the construction MEI would be 4.6 in one million, which would not exceed the BAAQMD significance threshold. After implementation of these mitigation measures, the project would have a *less-than-significant* impact with respect to community risk caused by construction activities.

Supporting Documentation

Attachment 1 is the methodology used to compute community risk impacts, including the methods to compute lifetime cancer risk from exposure to project emissions.

Attachment 2 includes the CalEEMod output for project construction emissions. Also included are any modeling assumptions.

Attachment 3 is the construction health risk assessment. AERMOD dispersion modeling files for this assessment, which are quite voluminous, are available upon request and would be provided in digital format

Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.⁵ These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.⁶ This HRA used the 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.⁷ Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency and duration of exposure. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD for residential exposures, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. For children at schools and daycare facilities, BAAQMD recommends using the 95th percentile breathing rates. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of

⁵ OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

⁶ CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

⁷ BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.

30 years for sources with long-term emissions (e.g., roadways). For workers, assumed to be adults, a 25-year exposure period is recommended by the BAAQMD.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

Functionally, cancer risk is calculated using the following parameters and formulas:

$$\text{Cancer Risk (per million)} = CPF \times \text{Inhalation Dose} \times ASF \times ED/AT \times FAH \times 10^6$$

Where:

CPF = Cancer potency factor (mg/kg-day)⁻¹

ASF = Age sensitivity factor for specified age group

ED = Exposure duration (years)

AT = Averaging time for lifetime cancer risk (years)

FAH = Fraction of time spent at home (unitless)

$$\text{Inhalation Dose} = C_{\text{air}} \times DBR \times A \times (EF/365) \times 10^{-6}$$

Where:

C_{air} = concentration in air (µg/m³)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

10⁻⁶ = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	Exposure Type →	Infant		Child		Adult
	Age Range →	3 rd Trimester	0<2	2 < 9	2 < 16	16 - 30
DPM Cancer Potency Factor (mg/kg-day) ⁻¹		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day) 80 th Percentile Rate		273	758	631	572	261
Daily Breathing Rate (L/kg-day) 95 th Percentile Rate		361	1,090	861	745	335
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Annual PM_{2.5} Concentrations

While not a TAC, fine particulate matter (PM_{2.5}) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for PM_{2.5} (project level and cumulative) are in terms of an increase in the annual average concentration. When considering PM_{2.5} impacts, the contribution from all sources of PM_{2.5} emissions should be included. For projects with potential impacts from nearby local roadways, the PM_{2.5} impacts should include those from vehicle exhaust emissions, PM_{2.5} generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Attachment 2: CalEEMod Modeling Output

Project Name:		Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, Pavement							
	Project Size:	41	Pipe Dia (in) external	33,700	Excavation Length (LF)				
		7.42	Typ Trench Width (ft)	13.3	Typical Excav. Depth, AVG (ft)				
	Construction Hours	7:00 AM am to		3:00 pm					
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments		
	Pavement Demolition	Start Date:	6/1/2020	Total phase:	168.50		Overall Import/Export Volumes	Typical Equipment Type & Load Factors	
		End Date:	1/21/2021					OFFROAD Equipment Type	HP
4	Concrete/Industrial Saws			8	168.50	8.0	Soil/fill hauling		Load Factor
1	Other Construction Equipment			8	168.50	8.0	Exported Volume (cy)	Aerial Lifts	62
2	Excavators			8	168.50	8.0	Imported Volume (cy)	Air Compressors	78
2	Dumpers/Tenders			8	168.50	8.0		Bore/Drill Rigs	205
2	Signal Boards			8	168.50	8.0		Cement and Mortar Mixers	9
1	Other General Industrial Equipment			8	168.50	8.0		Concrete/Industrial Saws	81
2	Generators/Electrical Combustion Engine/motors			8	168.50	8.0		Cranes	226
								Crushing/Proc. Equipment	85
								Dumpers/Tenders	16
								Excavators	162
	Excavation	Start Date:	6/2/2020	Total phase:	1,226.57		Any pavement demolished and hauled? (cy)		
		End Date:	2/12/2025				Asphalt import (CY)		
1	Other Construction Equipment			8	1,226.57	8.0			
2	Excavators			8	1,226.57	8.0			
2	Dumpers/Tenders			8	1,226.57	8.0			
2	Signal Boards			8	1,226.57	8.0			
1	Tractors/Loaders/Backhoes			4	1,226.57	4.0			
1	Other General Industrial Equipment			8	1,226.57	8.0			
1	Discharge Pumps (groundwater)			24	613.28	12.0			
2	Generators/Electrical Combustion Engine/motors			8	1,226.57	8.0			
	Pipe Installation incl. bedding, backfill, compaction	Start Date:	6/4/2020	Total phase:	526.56				
		End Date:	6/10/2022						
1	Other Construction Equipment			8	526.56	8.0			
2	Excavators			8	526.56	8.0			
2	Dumpers/Tenders			8	526.56	8.0			
2	Signal Boards			8	526.56	8.0			
1	Tractors/Loaders/Backhoes			4	526.56	4.0			
1	Other General Industrial Equipment			8	526.56	8.0			
1	Discharge Pumps (groundwater)			24	263.28	12.0			
2	Plate Compactors			8	526.56	8.0			
2	Generators/Electrical Combustion Engine/motors			8	526.56	8.0			
	Pavement Restoration	Start Date:	6/9/2020	Total phase:	67.40				
		End Date:	9/10/2020						
1	Other Construction Equipment			8	67.40	8.0			
2	Excavators			8	67.40	8.0			
2	Dumpers/Tenders			8	67.40	8.0			
2	Signal Boards			8	67.40	8.0			
1	Generators/Electrical Combustion Engine/motors			8	67.40	8.0			
1	Tractors/Loaders/Backhoes			4	67.40	4.0			
1	Other General Industrial Equipment			8	67.40	8.0			
1	Pavers			8	67.40	8.0			
1	Paving Equipment			8	67.40	8.0			
1	Rollers			8	67.40	8.0			
1	Surfacing Equipment (Pvmt striping)			8	67.40	8.0			
Equipment listed in this sheet is to provide an example of inputs It is assumed that water trucks would be used during grading				Add or subtract phases and equipment, as appropriate Modify horsepower or load factor, as appropriate					

Project Name:		Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, No Pavement						
Project Size:	41	Pipe Dia (in) external	130	Excavation Length (LF)				
	7.42	Typ Trench Width (ft)	13	Typical Excav. Depth, AVG (ft)				
				Complete ALL Portions in Yellow				
Construction Hours		7:00 AM	am to	3:00	pm			
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments	
Excavation		Start Date:	6/10/2020	Total phase:	3.00	Overall Import/Export Volumes		Typical Equipment Type & Load Factors
		End Date:	6/15/2020					OFFROAD Equipment Type
1	Other Construction Equipment			8	3.00	8.0	Exported Volume (cy)	Aerial Lifts
2	Excavators			8	5.00	8.0	568	Air Compressors
2	Dumpers/Tenders			8	3.00	8.0	Imported Volume (cy)	Bore/Drill Rigs
2	Signal Boards			8	5.00	8.0	429.01	Cement and Mortar Mixers
1	Tractors/Loaders/Backhoes			8	3.00	8.0		Concrete/Industrial Saws
1	Other General Industrial Equipment			8	5.00	8.0		Cranes
1	Discharge Pumps (groundwater)			24	3.00	24.0		Crushing/Proc. Equipment
2	Generators/Electrical Combustion Engine/motors			8	5.00	8.0		Dumpers/Tenders
Pipe Installation incl. bedding, backfill, compaction		Start Date:	6/12/2020	Total phase:	5.00			
		End Date:	6/19/2020					
1	Other Construction Equipment			8	5.00	8.0		
2	Excavators			8	5.00	8.0		
2	Dumpers/Tenders			8	5.00	8.0		
2	Signal Boards			8	5.00	8.0		
1	Tractors/Loaders/Backhoes			8	5.00	8.0		
1	Other General Industrial Equipment			8	5.00	8.0		
1	Discharge Pumps (groundwater)			24	5.00	24.0		
2	Plate Compactors			8	5.00	8.0		
2	Generators/Electrical Combustion Engine/motors			8	5.00	8.0		
							Any pavement demolished and hauled? (cy)	Excavators
							N	162
Equipment listed in this sheet is to provide an example of inputs				Add or subtract phases and equipment, as appropriate				0.38
It is assumed that water trucks would be used during grading				Modify horsepower or load factor, as appropriate				

Project Name:		Sewer Trunk South of Highland, Phase 2 - Microtunneling UPRR Crossing Monterey Hwy & Las Animas							
Project Size:	36	Pipe Dia (in)	121,958	Total Project Length (LF)					
	7.5	Typ Trench Width (ft)	3 to 8	Typical Depth of Cover (ft)					
	8	Crossing Cover (ft)	150	Trenchless Crossing Length (LF)					
	30' x 16' x 15'	Launch Pit (L'xW'xD')	18' x 14' x 12'	Receiving Pit (L'xW'xD')					
				Complete ALL Portions in Yellow					
Construction Hours		7:00 AM	am to	3:00 pm					
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments		
Site Set-up & Shaft Excavation		Start Date:	6/1/2020	Total phase:	4		Overall Import/Export Volumes		
		End Date:	6/5/2020						
1	Forklifts			8	4	8.0	Launch Shaft Volume (cy)		
1	Other Construction Equipment			8	4	8.0	267		
1	Cranes			4	4	4.0	Receiving Shaft Volume (cy)		
1	Excavators			8	4	8.0	112		
1	Dumpers/Tenders			8	4	8.0	Tunnel Volume (cy)		
2	Signal Boards			8	4	8.0	47		
1	Sweepers/Scrubbers			2	4	2.0	Hauling Volume (cy)		
1	Tractors/Loaders/Backhoes			8	4	8.0	425		
1	Other General Industrial Equipment			8	4	8.0	Any pavement demolished and hauled? (cy)		
							27		
Setup within Shaft		Start Date:	6/6/2020	Total phase:	4				
		End Date:	6/10/2020						
1	Other General Industrial Equipment			8	4	8.0	Soil Hauling Volume		
1	Tractors/Loaders/Backhoes			8	4	8.0	Export volume (cy)		
1	Cranes			4	4	4.0	398		
1	Forklifts			8	4	8.0	Import volume (cy)		
2	Signal Boards			8	4	8.0	352		
1	Dumpers/Tenders			8	4	8.0	Cement Trucks? _ 2_ Total Round-Trips		
1	Sweepers/Scrubbers			2	4	2.0	Liquid Propane (LPG)? (Y/N) _N_ Otherwise Assumed diesel		
1	Cement and Mortar Mixer			6	1	1.5	Or temporary line power? (Y/N) ____		
							otherwise, assume diesel generator		
Prelaunch		Start Date:	6/11/2020	Total phase:	2				
		End Date:	6/13/2020						
1	Forklifts			8	2	8.0	Asphalt? _2_ round trips?		
1	Cranes			4	2	4.0			
2	Signal Boards			8	2	8.0			
1	Generators/Electrical Combustion Engine/motors			4	2	4.0			
1	Sweepers/Scrubbers			2	2	2.0			
1	Other General Industrial Equipment			8	2	8.0			
1	Other Construction Equipment			8	2	8.0			
Microtunneling		Start Date:	6/14/2020	Total phase:	7.5				
		End Date:	6/21/2020						
1	Cranes			4	7.5	4.0			
3	Generators/Electrical Combustion Engine/motors			8	7.5	8.0			
1	Discharge Pumps (groundwater)			8	7.5	8.0			
1	Pump Boosters			8	7.5	8.0			
1	Slurry Tank			8	7.5	8.0			
1	Slurry circulating system pumps			8	7.5	8.0			
1	Cutting Wheel			8	7.5	8.0			
1	hydraulic jacking system			8	7.5	8.0			
1	Separation Plant			8	7.5	8.0			
1	Dumpers/Tenders			8	7.5	8.0			
1	Other Construction Equipment			8	3.75	4.0			
1	Sweepers/Scrubbers			2	7.5	2.0			
2	Signal Boards			8	7.5	8.0			
1	Welders			8	3.75	4.0			
Machine Recovery/Contact Grouting		Start Date:	6/22/2020	Total phase:	8				
		End Date:	6/30/2020						
1	Cranes			4	8	4.0			
1	Discharge Pumps (groundwater)			8	8	8.0			
1	Grout pumping system			8	8	8.0			
1	Forklifts			8	8	8.0			
1	Other Construction Equipment			8	8	8.0			
1	Cement and Mortar Mixers			8	8	8.0			
1	Sweepers/Scrubbers			2	8	2.0			
2	Signal Boards			8	8	8.0			
Shaft Restoration/Grouting/Paving UPRR		Start Date:	7/1/2020	Total phase:	15				
		End Date:	7/16/2020						
1	Cement and Mortar Mixers			8	2	1.1			
1	Pavers			8	2	1.1			
1	Paving Equipment			8	2	1.1			
1	Rollers			8	2	1.1			
1	Tractors/Loaders/Backhoes			8	15	8.0			
1	Dumpers/Tenders			8	15	8.0			
1	Forklifts			8	15	8.0			
1	Sweepers/Scrubbers			2	15	2.0			
2	Signal Boards			8	15	8.0			
1	Other Construction Equipment			8	15	8.0			
Equipment listed in this sheet is to provide an example of inputs				Add or subtract phases and equipment, as appropriate					
It is assumed that water trucks would be used during grading				Modify horsepower or load factor, as appropriate					

Typical Equipment Type & Load Factors		
OFFROAD Equipment Type	HP	Load Factor
Aerial Lifts	62	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	205	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	162	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	174	0.41
Off-Highway Tractors	122	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	171	0.42
Other General Industrial Equipment	150	0.34
Other Material Handling Equipment	167	0.4
Pavers	125	0.42
Paving Equipment	130	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.2
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	199	0.36
Scrapers	361	0.48
Signal Boards	6	0.82
Surfacing Equipment	253	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	80	0.5
Welders	46	0.45
MTBM Equipment Types		
Crane		
Cutter wheel/Cutting Wheel		
Electric Motors Electrical Combustion Engine		
Slurry circulating system pumps drills		
Discharge pumps		
Pump Boosters		
Hydraulic Transmission Lines		
Hydraulic Power Pumps		
Slurry Pumps		
Separation Plant		
Slurry Container		
Jacking Rig/System		
Auger Circulating System		
Pipe Lubrication System (Mixing Tank & Pump)		
Generators		
Hydraulic Power Packs		
Forklifts		
Concrete Mixers		

Project Name:		Sewer Trunk South of Highland, Phase 2 - Microtunneling Miller Slough Crossing at Murray Ave								
Project Size:	36 Pipe Dia (in)		121,958 Total Project Length (LF)							
	7.5 Typ Trench Width (ft)		3 to 8 Typical Depth of Cover (ft)							
	Approx. 20 @ pits		250 Trenchless Crossing Length (LF)							
	30' x 16' x 30'		Launch Pit (L'xW'xD')		18' x 14' x 27'		Receiving Pit (L'xW'xD')			
							Complete ALL Portions in Yellow			
Construction Hours		7:00 AM am to		3:00 pm						
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments			
Site Set-up & Shaft Excavation		Start Date:	6/26/2020	Total phase:	4		Overall Import/Export Volumes			
		End Date:	6/30/2020							
1	Forklifts			8	4	8.0	Launch Shaft Volume (cy)			
1	Other Construction Equipment			8	4	8.0	533			
1	Cranes			4	4	4.0	Receiving Shaft Volume (cy)			
1	Excavators			8	4	8.0	252			
1	Dumpers/Tenders			8	4	8.0	Tunnel Volume (cy)			
2	Signal Boards			8	4	8.0	116			
1	Sweepers/Scrubbers			2	4	2.0	Hauling Volume (cy)			
1	Tractors/Loaders/Backhoes			8	4	8.0	902			
1	Other General Industrial Equipment			8	4	8.0	Any pavement demolished and hauled? (cy)			
Setup within Shaft		Start Date:	7/1/2020	Total phase:	4		27			
		End Date:	7/5/2020							
1	Other General Industrial Equipment			8	4	8.0	Soil Hauling Volume			
1	Tractors/Loaders/Backhoes			8	4	8.0	Export volume (cy)			
1	Cranes			4	4	4.0	875			
1	Forklifts			8	4	8.0	Import volume (cy)			
2	Signal Boards			8	4	8.0	758			
1	Dumpers/Tenders			8	4	8.0	Cement Trucks? _ 2_ Total Round-Trips			
1	Sweepers/Scrubbers			2	4	2.0	Liquid Propane (LPG)? (Y/N) _N_ Otherwise Assumed diesel			
1	Cement and Mortar Mixer			6	1	1.5	Or temporary line power? (Y/N) ____			
Prelaunch		Start Date:	7/6/2020	Total phase:	2		otherwise, assume diesel generator			
		End Date:	7/8/2020							
1	Forklifts			8	2	8.0	Asphalt? _2_ round trips?			
1	Cranes			4	2	4.0				
2	Signal Boards			8	2	8.0				
1	Generators/Electrical Combustion Engine/motors			4	2	4.0				
1	Sweepers/Scrubbers			2	2	2.0				
1	Other General Industrial Equipment			8	2	8.0				
1	Other Construction Equipment			8	2	8.0				
Microtunneling		Start Date:	7/9/2020	Total phase:	12.5					
		End Date:	7/22/2020							
1	Cranes			4	12.5	4.0				
3	Generators/Electrical Combustion Engine/motors			8	12.5	8.0				
1	Discharge Pumps (groundwater)			8	12.5	8.0				
1	Pump Boosters			8	12.5	8.0				
1	Slurry Tank			8	12.5	8.0				
1	Slurry circulating system pumps			8	12.5	8.0				
1	Cutting Wheel			8	12.5	8.0				
1	hydraulic jacking system			8	12.5	8.0				
1	Separation Plant			8	12.5	8.0				
1	Dumpers/Tenders			8	12.5	8.0				
1	Other Construction Equipment			8	6	4.0				
1	Sweepers/Scrubbers			2	12.5	2.0				
2	Signal Boards			8	12.5	8.0				
1	Welders			8	6	4.0				
Machine Recovery/Contact Grouting		Start Date:	7/23/2020	Total phase:	8					
		End Date:	7/31/2020							
1	Cranes			4	8	4.0				
1	Discharge Pumps (groundwater)			8	8	8.0				
1	Grout pumping system			8	8	8.0				
1	Forklifts			8	8	8.0				
1	Other Construction Equipment			8	8	8.0				
1	Cement and Mortar Mixers			8	8	8.0				
1	Sweepers/Scrubbers			2	8	2.0				
2	Signal Boards			8	8	8.0				
Shaft Restoration/Grouting/Paving UPRR		Start Date:	8/1/2020	Total phase:	50					
		End Date:	9/20/2020							
1	Cement and Mortar Mixers			8	2	0.3				
1	Pavers			8	2	0.3				
1	Paving Equipment			8	2	0.3				
1	Rollers			8	2	0.3				
1	Tractors/Loaders/Backhoes			8	50	8.0				
1	Dumpers/Tenders			8	50	8.0				
1	Forklifts			8	50	8.0				
1	Sweepers/Scrubbers			2	50	2.0				
2	Signal Boards			8	50	8.0				
1	Other Construction Equipment			8	50	8.0				
Equipment listed in this sheet is to provide an example of inputs		Add or subtract phases and equipment, as appropriate								
It is assumed that water trucks would be used during grading		Modify horsepower or load factor, as appropriate								

Typical Equipment Type & Load Factors		
OFFROAD Equipment Type	HP	Load Factor
Aerial Lifts	62	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	205	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	162	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	174	0.41
Off-Highway Tractors	122	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	171	0.42
Other General Industrial Equipment	150	0.34
Other Material Handling Equipment	167	0.4
Pavers	125	0.42
Paving Equipment	130	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.2
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	199	0.36
Scrapers	361	0.48
Signal Boards	6	0.82
Surfacing Equipment	253	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	80	0.5
Welders	46	0.45
MTBM Equipment Types		
Crane		
Cutter wheel/Cutting Wheel		
Electric Motors Electrical Combustion Engine		
Slurry circulating system pumps drills		
Discharge pumps		
Pump Boosters		
Hydraulic Transmission Lines		
Hydraulic Power Pumps		
Slurry Pumps		
Separation Plant		
Slurry Container		
Jacking Rig/System		
Auger Circulating System		
Pipe Lubrication System (Mixing Tank & Pump)		
Generators		
Hydraulic Power Packs		
Forklifts		
Concrete Mixers		

Project Name:		Sewer Trunk South of Highland, Phase 2 - Microtunneling Leavesley Rd. (SR 152) Crossing at Murray Ave							
Project Size:	36	Pipe Dia (in)	121,958		Total Project Length (LF)				
	7.5	Typ Trench Width (ft)	3 to 8	Typical Depth of Cover (ft)					
	12	Crossing Cover (ft)	300		Trenchless Crossing Length (LF)				
	30' x 16' x 19'	Launch Pit (L'xW'xD')	18' x 14' x 16'	Receiving Pit (L'xW'xD')		Complete ALL Portions in Yellow			
Construction Hours		7:00 AM	am to	3:00	pm				
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments		
	Site Set-up & Shaft Excavation	Start Date:	7/27/2020	Total phase:	4		Overall Import/Export Volumes		
		End Date:	7/31/2020						
1	Forklifts			8	4	8.0	Launch Shaft Volume (cy)		
1	Other Construction Equipment			8	4	8.0	338		
1	Cranes			4	4	4.0	Receiving Shaft Volume (cy)		
1	Excavators			8	4	8.0	149		
1	Dumpers/Tenders			8	4	8.0	Tunnel Volume (cy)		
2	Signal Boards			8	4	8.0	93		
1	Sweepers/Scrubbers			2	4	2.0	Hauling Volume (cy)		
1	Tractors/Loaders/Backhoes			8	4	8.0	580		
1	Other General Industrial Equipment			8	4	8.0	Any pavement demolished and hauled? (cy)		
	Setup within Shaft	Start Date:	8/1/2020	Total phase:	4		27		
		End Date:	8/5/2020						
1	Other General Industrial Equipment			8	4	8.0	Soil Hauling Volume		
1	Tractors/Loaders/Backhoes			8	4	8.0	Export volume (cy)		
1	Cranes			4	4	4.0	553		
1	Forklifts			8	4	8.0	Import volume (cy)		
2	Signal Boards			8	4	8.0	460		
1	Dumpers/Tenders			8	4	8.0	Cement Trucks? 2, Total Round-Trips		
1	Sweepers/Scrubbers			2	4	2.0	Liquid Propane (LPG)? (Y/N) N, Otherwise Assumed diesel		
1	Cement and Mortar Mixer			6	1	1.5	Or temporary line power? (Y/N) _____		
	Prelaunch	Start Date:	8/6/2020	Total phase:	2		otherwise, assume diesel generator		
		End Date:	8/8/2020				Asphalt? 2, round trips?		
1	Forklifts			8	2	8.0			
1	Cranes			4	2	4.0			
2	Signal Boards			8	2	8.0			
1	Generators/Electrical Combustion Engine/motors			4	2	4.0			
1	Sweepers/Scrubbers			2	2	2.0			
1	Other General Industrial Equipment			8	2	8.0			
1	Other Construction Equipment			8	2	8.0			
	Microtunneling	Start Date:	8/9/2020	Total phase:	15				
		End Date:	8/24/2020						
1	Cranes			4	15	4.0			
3	Generators/Electrical Combustion Engine/motors			8	15	8.0			
1	Discharge Pumps (groundwater)			8	15	8.0			
1	Pump Boosters			8	15	8.0			
1	Slurry Tank			8	15	8.0			
1	Slurry circulating system pumps			8	15	8.0			
1	Cutting Wheel			8	15	8.0			
1	hydraulic jacking system			8	15	8.0			
1	Separation Plant			8	15	8.0			
1	Dumpers/Tenders			8	15	8.0			
1	Other Construction Equipment			8	8	4.0			
1	Sweepers/Scrubbers			2	15	2.0			
2	Signal Boards			8	15	8.0			
1	Welders			8	8	4.0			
	Machine Recovery/Contact Grouting	Start Date:	8/25/2020	Total phase:	8				
		End Date:	9/2/2020						
1	Cranes			4	8	4.0			
1	Discharge Pumps (groundwater)			8	8	8.0			
1	Grout pumping system			8	8	8.0			
1	Forklifts			8	8	8.0			
1	Other Construction Equipment			8	8	8.0			
1	Cement and Mortar Mixers			8	8	8.0			
1	Sweepers/Scrubbers			2	8	2.0			
2	Signal Boards			8	8	8.0			
	Shaft Restoration/Grouting/Paving UPRR	Start Date:	9/3/2020	Total phase:	40				
		End Date:	10/13/2020						
1	Cement and Mortar Mixers			8	2	0.4			
1	Pavers			8	2	0.4			
1	Paving Equipment			8	2	0.4			
1	Rollers			8	2	0.4			
1	Tractors/Loaders/Backhoes			8	40	8.0			
1	Dumpers/Tenders			8	40	8.0			
1	Forklifts			8	40	8.0			
1	Sweepers/Scrubbers			2	40	2.0			
2	Signal Boards			8	40	8.0			
1	Other Construction Equipment			8	40	8.0			
Equipment listed in this sheet is to provide an example of inputs				Add or subtract phases and equipment, as appropriate					
It is assumed that water trucks would be used during grading				Modify horsepower or load factor, as appropriate					

Typical Equipment Type & Load Factors		
OFFROAD Equipment Type	HP	Load Factor
Aerial Lifts	62	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	205	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	162	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	174	0.41
Off-Highway Tractors	122	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	171	0.42
Other General Industrial Equipment	150	0.34
Other Material Handling Equipment	167	0.4
Pavers	125	0.42
Paving Equipment	130	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.2
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	199	0.36
Scrapers	361	0.48
Signal Boards	6	0.82
Surfacing Equipment	253	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	80	0.5
Welders	46	0.45
MTBM Equipment Types		
Crane		
Cutter wheel/Cutting Wheel		
Electric Motors Electrical Combustion Engine		
Slurry circulating system pumps drills		
Discharge pumps		
Pump Boosters		
Hydraulic Transmission Lines		
Hydraulic Power Pumps		
Slurry Pumps		
Separation Plant		
Slurry Container		
Jacking Rig/System		
Auger Circulating System		
Pipe Lubrication System (Mixing Tank & Pump)		
Generators		
Hydraulic Power Packs		
Forklifts		
Concrete Mixers		

Project Name:		Sewer Trunk South of Highland, Phase 2 - Mill Slough Branch Crossing Chestnut St.							
Project Size:	36	Pipe Dia (in)	121,958	Total Project Length (LF)					
	7.5	Typ Trench Width (ft)	3 to 8	Typical Depth of Cover (ft)					
	16	Crossing Cover (ft)	150	Trenchless Crossing Length (LF)					
	30' x 16' x 23'	Launch Pit (L'xW'xD')	18' x 14' x 20'	Receiving Pit (L'xW'xD')					
				Complete ALL Portions in Yellow					
Construction Hours		7:00 AM	am to	3:00	pm				
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments		
Site Set-up & Shaft Excavation		Start Date:	8/25/2020	Total phase:	4		Overall Import/Export Volumes		
		End Date:	9/2/2020						
1	Forklifts			8	4	8.0	Launch Shaft Volume (cy)		
1	Other Construction Equipment			8	4	8.0	409		
1	Cranes			4	4	4.0	Receiving Shaft Volume (cy)		
1	Excavators			8	4	8.0	187		
1	Dumpers/Tenders			8	4	8.0	Tunnel Volume (cy)		
2	Signal Boards			8	4	8.0	70		
1	Sweepers/Scrubbers			2	4	2.0			
1	Tractors/Loaders/Backhoes			8	4	8.0	Hauling Volume (cy)		
1	Other General Industrial Equipment			8	4	8.0	665		
Setup within Shaft		Start Date:	9/3/2020	Total phase:	4		Any pavement demolished and hauled? (cy)		
		End Date:	9/7/2020				27		
1	Other General Industrial Equipment			8	4	8.0	Soil Hauling Volume		
1	Tractors/Loaders/Backhoes			8	4	8.0	Export volume (cy)		
1	Cranes			4	4	4.0	638		
1	Forklifts			8	4	8.0	Import volume (cy)		
2	Signal Boards			8	4	8.0	568		
1	Dumpers/Tenders			8	4	8.0	Cement Trucks? _2_ Total Round-Trips		
1	Sweepers/Scrubbers			2	4	2.0			
1	Cement and Mortar Mixer			6	1	1.5	Liquid Propane (LPG)? (Y/N) _N_ Otherwise Assumed diesel		
Prelaunch		Start Date:	9/8/2020	Total phase:	2		Or temporary line power? (Y/N) ____		
		End Date:	9/10/2020				otherwise, assume diesel generator		
1	Forklifts			8	2	8.0	Asphalt? _2_ round trips?		
1	Cranes			4	2	4.0			
2	Signal Boards			8	2	8.0			
1	Generators/Electrical Combustion Engine/motors			4	2	4.0			
1	Sweepers/Scrubbers			2	2	2.0			
1	Other General Industrial Equipment			8	2	8.0			
1	Other Construction Equipment			8	2	8.0			
Microtunneling		Start Date:	9/11/2020	Total phase:	7.5				
		End Date:	9/18/2020						
1	Cranes			4	7.5	4.0			
3	Generators/Electrical Combustion Engine/motors			8	7.5	8.0			
1	Discharge Pumps (groundwater)			8	7.5	8.0			
1	Pump Boosters			8	7.5	8.0			
1	Slurry Tank			8	7.5	8.0			
1	Slurry circulating system pumps			8	7.5	8.0			
1	Cutting Wheel			8	7.5	8.0			
1	hydraulic jacking system			8	7.5	8.0			
1	Separation Plant			8	7.5	8.0			
1	Dumpers/Tenders			8	7.5	8.0			
1	Other Construction Equipment			8	3.75	4.0			
1	Sweepers/Scrubbers			2	7.5	2.0			
2	Signal Boards			8	7.5	8.0			
1	Welders			8	3.75	4.0			
Machine Recovery/Contact Grouting		Start Date:	9/19/2020	Total phase:	8				
		End Date:	9/27/2020						
1	Cranes			4	8	4.0			
1	Discharge Pumps (groundwater)			8	8	8.0			
1	Grout pumping system			8	8	8.0			
1	Forklifts			8	8	8.0			
1	Other Construction Equipment			8	8	8.0			
1	Cement and Mortar Mixers			8	8	8.0			
1	Sweepers/Scrubbers			2	8	2.0			
2	Signal Boards			8	8	8.0			
Shaft Restoration/Grouting/Paving UPRR		Start Date:	9/28/2020	Total phase:	20				
		End Date:	10/18/2020						
1	Cement and Mortar Mixers			8	2	0.8			
1	Pavers			8	2	0.8			
1	Paving Equipment			8	2	0.8			
1	Rollers			8	2	0.8			
1	Tractors/Loaders/Backhoes			8	20	8.0			
1	Dumpers/Tenders			8	20	8.0			
1	Forklifts			8	20	8.0			
1	Sweepers/Scrubbers			2	20	2.0			
2	Signal Boards			8	20	8.0			
1	Other Construction Equipment			8	20	8.0			
Equipment listed in this sheet is to provide an example of inputs It is assumed that water trucks would be used during grading		Add or subtract phases and equipment, as appropriate Modify horsepower or load factor, as appropriate							

Typical Equipment Type & Load Factors		
OFFROAD Equipment Type	HP	Load Factor
Aerial Lifts	62	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	205	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	162	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	174	0.41
Off-Highway Tractors	122	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	171	0.42
Other General Industrial Equipment	150	0.34
Other Material Handling Equipment	167	0.4
Pavers	125	0.42
Paving Equipment	130	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.2
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	199	0.36
Scrapers	361	0.48
Signal Boards	6	0.82
Surfacing Equipment	253	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	80	0.5
Welders	46	0.45
MTBM Equipment Types		
Crane		
Cutter wheel/Cutting Wheel		
Electric Motors Electrical Combustion Engine		
Slurry circulating system pumps drills		
Discharge pumps		
Pump Boosters		
Hydraulic Transmission Lines		
Hydraulic Power Pumps		
Slurry Pumps		
Separation Plant		
Slurry Container		
Jacking Rig/System		
Auger Circulating System		
Pipe Lubrication System (Mixing Tank & Pump)		
Generators		
Hydraulic Power Packs		
Forklifts		
Concrete Mixers		

Project Name:		Sewer Trunk South of Highland, Phase 2 - Microtunneling Highway 101 Crossing E 7th St to Renz Ln.							
Project Size:	36	Pipe Dia (in)	121,958	Total Project Length (LF)					
	7.5	Typ Trench Width (ft)	3 to 8	Typical Depth of Cover (ft)					
	15	Crossing Cover (ft)	380	Trenchless Crossing Length (LF)					
	30' x 16' x 22'	Launch Pit (L'xW'xD')	18' x 14' x 19'	Receiving Pit (L'xW'xD')					
				Complete ALL Portions in Yellow					
Construction Hours		7:00 AM	am to	3:00 pm					
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments		
Site Set-up & Shaft Excavation		Start Date:	9/23/2020	Total phase:	4		Overall Import/Export Volumes		
		End Date:	9/27/2020						
1	Forklifts			8	4	8.0	Launch Shaft Volume (cy)		
1	Other Construction Equipment			8	4	8.0	391		
1	Cranes			4	4	4.0	Receiving Shaft Volume (cy)		
1	Excavators			8	4	8.0	177		
1	Dumpers/Tenders			8	4	8.0	Tunnel Volume (cy)		
2	Signal Boards			8	4	8.0	177		
1	Sweepers/Scrubbers			2	4	2.0	Hauling Volume (cy)		
1	Tractors/Loaders/Backhoes			8	4	8.0	745		
1	Other General Industrial Equipment			8	4	8.0	Any pavement demolished and hauled? (cy)		
							27		
Setup within Shaft		Start Date:	9/28/2020	Total phase:	4				
		End Date:	10/2/2020						
1	Other General Industrial Equipment			8	4	8.0	Soil Hauling Volume		
1	Tractors/Loaders/Backhoes			8	4	8.0	Export volume (cy)		
1	Cranes			4	4	4.0	718		
1	Forklifts			8	4	8.0	Import volume (cy)		
2	Signal Boards			8	4	8.0	541		
1	Dumpers/Tenders			8	4	8.0	Cement Trucks? _ 2 _ Total Round-Trips		
1	Sweepers/Scrubbers			2	4	2.0	Liquid Propane (LPG)? (Y/N) _ N _ Otherwise Assumed diesel		
1	Cement and Mortar Mixer			6	1	1.5	Or temporary line power? (Y/N) _ _ _		
		Start Date:	10/3/2020	Total phase:	2		otherwise, assume diesel generator		
		End Date:	10/5/2020						
1	Forklifts			8	2	8.0	Asphalt? _ 2 _ round trips?		
1	Cranes			4	2	4.0			
2	Signal Boards			8	2	8.0			
1	Generators/Electrical Combustion Engine/motors			4	2	4.0			
1	Sweepers/Scrubbers			2	2	2.0			
1	Other General Industrial Equipment			8	2	8.0			
1	Other Construction Equipment			8	2	8.0			
Microtunneling		Start Date:	10/6/2020	Total phase:	19				
		End Date:	10/25/2020						
1	Cranes			4	19	4.0			
3	Generators/Electrical Combustion Engine/motors			8	19	8.0			
1	Discharge Pumps (groundwater)			8	19	8.0			
1	Pump Boosters			8	19	8.0			
1	Slurry Tank			8	19	8.0			
1	Slurry circulating system pumps			8	19	8.0			
1	Cutting Wheel			8	19	8.0			
1	hydraulic jacking system			8	19	8.0			
1	Separation Plant			8	19	8.0			
1	Dumpers/Tenders			8	19	8.0			
1	Other Construction Equipment			8	19	4.0			
1	Sweepers/Scrubbers			2	19	2.0			
2	Signal Boards			8	19	8.0			
1	Welders			8	10	4.0			
Machine Recovery/Contact Grouting		Start Date:	10/26/2020	Total phase:	8				
		End Date:	11/3/2020						
1	Cranes			4	8	4.0			
1	Discharge Pumps (groundwater)			8	8	8.0			
1	Grout pumping system			8	8	8.0			
1	Forklifts			8	8	8.0			
1	Other Construction Equipment			8	8	8.0			
1	Cement and Mortar Mixers			8	8	8.0			
1	Sweepers/Scrubbers			2	8	2.0			
2	Signal Boards			8	8	8.0			
Shaft Restoration/Grouting/Paving UPRR		Start Date:	11/4/2020	Total phase:	40				
		End Date:	12/14/2020						
1	Cement and Mortar Mixers			8	2	0.4			
1	Pavers			8	2	0.4			
1	Paving Equipment			8	2	0.4			
1	Rollers			8	2	0.4			
1	Tractors/Loaders/Backhoes			8	40	8.0			
1	Dumpers/Tenders			8	40	8.0			
1	Forklifts			8	40	8.0			
1	Sweepers/Scrubbers			2	40	2.0			
2	Signal Boards			8	40	8.0			
1	Other Construction Equipment			8	40	8.0			
Equipment listed in this sheet is to provide an example of inputs		Add or subtract phases and equipment, as appropriate							
It is assumed that water trucks would be used during grading		Modify horsepower or load factor, as appropriate							

Typical Equipment Type & Load Factors		
OFFROAD Equipment Type	HP	Load Factor
Aerial Lifts	62	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	205	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	226	0.29
Crawler Tractors	208	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	162	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	174	0.41
Off-Highway Tractors	122	0.44
Off-Highway Trucks	400	0.38
Other Construction Equipment	171	0.42
Other General Industrial Equipment	150	0.34
Other Material Handling Equipment	167	0.4
Pavers	125	0.42
Paving Equipment	130	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.2
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	255	0.4
Rubber Tired Loaders	199	0.36
Scrapers	361	0.48
Signal Boards	6	0.82
Surfacing Equipment	253	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	80	0.5
Welders	46	0.45
MTBM Equipment Types		
Crane		
Cutter wheel/Cutting Wheel		
Electric Motors Electrical Combustion Engine		
Slurry circulating system pumps drills		
Discharge pumps		
Pump Boosters		
Hydraulic Transmission Lines		
Hydraulic Power Pumps		
Slurry Pumps		
Separation Plant		
Slurry Container		
Jacking Rig/System		
Auger Circulating System		
Pipe Lubrication System (Mixing Tank & Pump)		
Generators		
Hydraulic Power Packs		
Forklifts		
Concrete Mixers		

Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, Pavement - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, Pavement Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	5.74	User Defined Unit	5.74	250,054.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2026
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenching acreage

Construction Phase - Applicant provided construction worksheet

Off-road Equipment -

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Trips and VMT - Construction worksheet= 5,201cy pavement demo and asphalt import= 1,248 one way trips each

Demolition -

Grading - Construction Worksheet 147,188cy exported, 111,213cy imported

Energy Use -

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	20.00	169.00
tblConstructionPhase	NumDays	20.00	1,227.00
tblConstructionPhase	NumDays	20.00	68.00
tblGrading	AcresOfGrading	0.00	10.00
tblGrading	MaterialExported	0.00	258,188.00
tblGrading	MaterialImported	0.00	111,213.00
tblLandUse	LandUseSquareFeet	0.00	250,054.00
tblLandUse	LotAcreage	0.00	5.74
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	1,248.00
tblTripsAndVMT	HaulingTripNumber	46,175.00	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,248.00

2.0 Emissions Summary

2.1 Overall Construction
Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	1.0444	9.6032	8.6512	0.0159	0.1209	0.4985	0.6194	0.0291	0.4753	0.5044	0.0000	1,379.3258	1,379.3258	0.2490	0.0000	1,385.5499
2021	0.7278	6.2926	7.1553	0.0124	0.1040	0.3291	0.4331	0.0243	0.3149	0.3392	0.0000	1,057.6877	1,057.6877	0.1919	0.0000	1,062.4838
2022	0.4621	3.9076	5.0298	8.6800e-003	0.0731	0.1975	0.2705	0.0162	0.1896	0.2058	0.0000	743.4236	743.4236	0.1310	0.0000	746.6983
2023	0.3133	2.6138	3.6620	6.3100e-003	0.0571	0.1274	0.1846	0.0120	0.1227	0.1346	0.0000	542.4597	542.4597	0.0909	0.0000	544.7324
2024	0.2990	2.4656	3.6851	6.3500e-003	0.0574	0.1147	0.1720	0.0120	0.1103	0.1224	0.0000	545.7401	545.7401	0.0909	0.0000	548.0116
2025	0.0330	0.2678	0.4345	7.5000e-004	0.0299	0.0118	0.0416	4.7200e-003	0.0113	0.0160	0.0000	64.4718	64.4718	0.0106	0.0000	64.7378
Maximum	1.0444	9.6032	8.6512	0.0159	0.1209	0.4985	0.6194	0.0291	0.4753	0.5044	0.0000	1,379.3258	1,379.3258	0.2490	0.0000	1,385.5499

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3419	6.7087	9.2382	0.0159	0.1065	0.3741	0.4807	0.0262	0.3741	0.4003	0.0000	1,379.3243	1,379.3243	0.2490	0.0000	1,385.5485
2021	0.2670	5.1085	7.5598	0.0124	0.0896	0.3081	0.3977	0.0214	0.3081	0.3295	0.0000	1,057.6865	1,057.6865	0.1919	0.0000	1,062.4826
2022	0.1873	3.6327	5.3753	8.6800e-003	0.0587	0.2219	0.2806	0.0133	0.2219	0.2352	0.0000	743.4228	743.4228	0.1310	0.0000	746.6975
2023	0.1364	2.6972	3.9587	6.3100e-003	0.0427	0.1664	0.2091	9.0700e-003	0.1664	0.1755	0.0000	542.4591	542.4591	0.0909	0.0000	544.7317
2024	0.1369	2.7173	3.9836	6.3500e-003	0.0430	0.1677	0.2107	9.1300e-003	0.1677	0.1768	0.0000	545.7395	545.7395	0.0909	0.0000	548.0109
2025	0.0161	0.3215	0.4707	7.5000e-004	0.0155	0.0198	0.0353	1.8200e-003	0.0198	0.0217	0.0000	64.4717	64.4717	0.0106	0.0000	64.7377
Maximum	0.3419	6.7087	9.2382	0.0159	0.1065	0.3741	0.4807	0.0262	0.3741	0.4003	0.0000	1,379.3243	1,379.3243	0.2490	0.0000	1,385.5485

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	62.30	15.76	-6.88	0.00	19.54	1.62	6.23	17.67	-2.76	-1.25	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2020	8-31-2020	5.1491	3.4883
2	9-1-2020	11-30-2020	4.0816	2.6472
3	12-1-2020	2-28-2021	2.8579	1.9760
4	3-1-2021	5-31-2021	1.6533	1.2806
5	6-1-2021	8-31-2021	1.6528	1.2801
6	9-1-2021	11-30-2021	1.6358	1.2671
7	12-1-2021	2-28-2022	1.5088	1.2530
8	3-1-2022	5-31-2022	1.4827	1.2796
9	6-1-2022	8-31-2022	0.8782	0.7777
10	9-1-2022	11-30-2022	0.7962	0.7091
11	12-1-2022	2-28-2023	0.7460	0.7012
12	3-1-2023	5-31-2023	0.7399	0.7163
13	6-1-2023	8-31-2023	0.7397	0.7161

14	9-1-2023	11-30-2023	0.7320	0.7087
15	12-1-2023	2-29-2024	0.7019	0.7086
16	3-1-2024	5-31-2024	0.6935	0.7160
17	6-1-2024	8-31-2024	0.6933	0.7158
18	9-1-2024	11-30-2024	0.6861	0.7084
19	12-1-2024	2-28-2025	0.5321	0.5760
		Highest	5.1491	3.4883

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pavement Demolition	Demolition	6/1/2020	1/21/2021	5	169	
2	Excavation	Grading	6/2/2020	2/12/2025	5	1227	
3	Pipe Installation incl. Bedding, Backfill, Compaction	Trenching	6/4/2020	6/10/2022	5	527	
4	Pavement Restoration	Paving	6/9/2020	9/10/2020	5	68	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pavement Demolition	Concrete/Industrial Saws	4	8.00	81	0.73
Pavement Demolition	Dumpers/Tenders	2	8.00	16	0.38
Pavement Demolition	Excavators	2	8.00	158	0.38
Pavement Demolition	Generator Sets	2	8.00	84	0.74
Pavement Demolition	Other Construction Equipment	1	8.00	172	0.42
Pavement Demolition	Other General Industrial Equipment	1	8.00	88	0.34

Pavement Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Pavement Demolition	Signal Boards	2	8.00	6	0.82
Excavation	Dumpers/Tenders	2	8.00	16	0.38
Excavation	Excavators	2	8.00	158	0.38
Excavation	Generator Sets	2	8.00	84	0.74
Excavation	Graders	0	0.00	187	0.41
Excavation	Other Construction Equipment	1	8.00	172	0.42
Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Excavation	Pumps	1	12.00	84	0.74
Excavation	Rubber Tired Dozers	0	0.00	247	0.40
Excavation	Signal Boards	2	8.00	6	0.82
Excavation	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Pipe Installation incl. Bedding, Backfill, Compaction	Dumpers/Tenders	2	8.00	16	0.38
Pipe Installation incl. Bedding, Backfill, Compaction	Excavators	2	8.00	158	0.38
Pipe Installation incl. Bedding, Backfill, Compaction	Generator Sets	2	8.00	84	0.74
Pipe Installation incl. Bedding, Backfill, Compaction	Graders	0	0.00	187	0.41
Pipe Installation incl. Bedding, Backfill, Compaction	Other Construction Equipment	1	8.00	172	0.42
Pipe Installation incl. Bedding, Backfill, Compaction	Other General Industrial Equipment	1	8.00	88	0.34
Pipe Installation incl. Bedding, Backfill, Compaction	Plate Compactors	2	8.00	8	0.43
Pipe Installation incl. Bedding, Backfill, Compaction	Pressure Washers	1	12.00	13	0.30
Pipe Installation incl. Bedding, Backfill, Compaction	Rubber Tired Dozers	0	0.00	247	0.40
Pipe Installation incl. Bedding, Backfill, Compaction	Signal Boards	2	8.00	6	0.82
Pipe Installation incl. Bedding, Backfill, Compaction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Pavement Restoration	Cranes	0	0.00	231	0.29
Pavement Restoration	Dumpers/Tenders	2	8.00	16	0.38
Pavement Restoration	Excavators	2	8.00	158	0.38
Pavement Restoration	Forklifts	0	0.00	89	0.20
Pavement Restoration	Generator Sets	1	8.00	84	0.74
Pavement Restoration	Generator Sets	1	8.00	84	0.74
Pavement Restoration	Other Construction Equipment	1	8.00	172	0.42

Pavement Restoration	Other General Industrial Equipment	1	8.00	88	0.34
Pavement Restoration	Pavers	1	8.00	130	0.42
Pavement Restoration	Paving Equipment	1	8.00	132	0.36
Pavement Restoration	Rollers	1	8.00	80	0.38
Pavement Restoration	Signal Boards	2	8.00	6	0.82
Pavement Restoration	Surfacing Equipment	1	8.00	263	0.30
Pavement Restoration	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Pavement Restoration	Welders	0	0.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pavement Demolition	16	40.00	0.00	1,248.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Excavation	12	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Pipe Installation incl. Bedding, Backfill	14	35.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Pavement Restoration	15	38.00	0.00	1,248.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

- Use Cleaner Engines for Construction Equipment
- Use Soil Stabilizer
- Replace Ground Cover
- Water Exposed Area
- Reduce Vehicle Speed on Unpaved Roads

3.2 Pavement Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Category	tons/yr										MT/yr					
Off-Road	0.4705	4.3638	3.4012	5.9400e-003		0.2329	0.2329		0.2220	0.2220	0.0000	512.6514	512.6514	0.0961	0.0000	515.0547
Total	0.4705	4.3638	3.4012	5.9400e-003		0.2329	0.2329		0.2220	0.2220	0.0000	512.6514	512.6514	0.0961	0.0000	515.0547

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.7300e-003	0.1650	0.0338	4.5000e-004	0.0103	5.4000e-004	0.0109	2.8200e-003	5.1000e-004	3.3400e-003	0.0000	43.3688	43.3688	1.9800e-003	0.0000	43.4184
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0102	7.3500e-003	0.0771	2.3000e-004	0.0244	1.6000e-004	0.0246	6.5000e-003	1.5000e-004	6.6400e-003	0.0000	20.9486	20.9486	5.1000e-004	0.0000	20.9615
Total	0.0150	0.1724	0.1109	6.8000e-004	0.0348	7.0000e-004	0.0355	9.3200e-003	6.6000e-004	9.9800e-003	0.0000	64.3174	64.3174	2.4900e-003	0.0000	64.3798

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1272	2.6825	3.6276	5.9400e-003		0.1548	0.1548		0.1548	0.1548	0.0000	512.6508	512.6508	0.0961	0.0000	515.0541
Total	0.1272	2.6825	3.6276	5.9400e-003		0.1548	0.1548		0.1548	0.1548	0.0000	512.6508	512.6508	0.0961	0.0000	515.0541

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.7300e-003	0.1650	0.0338	4.5000e-004	0.0103	5.4000e-004	0.0109	2.8200e-003	5.1000e-004	3.3400e-003	0.0000	43.3688	43.3688	1.9800e-003	0.0000	43.4184
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0102	7.3500e-003	0.0771	2.3000e-004	0.0244	1.6000e-004	0.0246	6.5000e-003	1.5000e-004	6.6400e-003	0.0000	20.9486	20.9486	5.1000e-004	0.0000	20.9615
Total	0.0150	0.1724	0.1109	6.8000e-004	0.0348	7.0000e-004	0.0355	9.3200e-003	6.6000e-004	9.9800e-003	0.0000	64.3174	64.3174	2.4900e-003	0.0000	64.3798

3.2 Pavement Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0428	0.3954	0.3286	5.8000e-004		0.0205	0.0205		0.0195	0.0195	0.0000	49.9328	49.9328	9.2300e-003	0.0000	50.1636
Total	0.0428	0.3954	0.3286	5.8000e-004		0.0205	0.0205		0.0195	0.0195	0.0000	49.9328	49.9328	9.2300e-003	0.0000	50.1636

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.3000e-004	0.0148	3.2300e-003	4.0000e-005	8.1600e-003	5.0000e-005	8.2000e-003	2.0300e-003	4.0000e-005	2.0700e-003	0.0000	4.1706	4.1706	1.9000e-004	0.0000	4.1754
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.2000e-004	6.4000e-004	6.8600e-003	2.0000e-005	2.3800e-003	1.0000e-005	2.3900e-003	6.3000e-004	1.0000e-005	6.5000e-004	0.0000	1.9696	1.9696	4.0000e-005	0.0000	1.9708
Total	1.3500e-003	0.0155	0.0101	6.0000e-005	0.0105	6.0000e-005	0.0106	2.6600e-003	5.0000e-005	2.7200e-003	0.0000	6.1403	6.1403	2.3000e-004	0.0000	6.1461

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0124	0.2613	0.3533	5.8000e-004		0.0151	0.0151		0.0151	0.0151	0.0000	49.9328	49.9328	9.2300e-003	0.0000	50.1636
Total	0.0124	0.2613	0.3533	5.8000e-004		0.0151	0.0151		0.0151	0.0151	0.0000	49.9328	49.9328	9.2300e-003	0.0000	50.1636

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	4.3000e-004	0.0148	3.2300e-003	4.0000e-005	8.1600e-003	5.0000e-005	8.2000e-003	2.0300e-003	4.0000e-005	2.0700e-003	0.0000	4.1706	4.1706	1.9000e-004	0.0000	4.1754
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.2000e-004	6.4000e-004	6.8600e-003	2.0000e-005	2.3800e-003	1.0000e-005	2.3900e-003	6.3000e-004	1.0000e-005	6.5000e-004	0.0000	1.9696	1.9696	4.0000e-005	0.0000	1.9708
Total	1.3500e-003	0.0155	0.0101	6.0000e-005	0.0105	6.0000e-005	0.0106	2.6600e-003	5.0000e-005	2.7200e-003	0.0000	6.1403	6.1403	2.3000e-004	0.0000	6.1461

3.3 Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	3.7400e-003	0.0000	3.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2309	2.0777	2.1379	3.5600e-003		0.1147	0.1147		0.1102	0.1102	0.0000	305.2593	305.2593	0.0552	0.0000	306.6393
Total	0.2309	2.0777	2.1379	3.5600e-003	0.0262	0.1147	0.1409	3.7400e-003	0.1102	0.1140	0.0000	305.2593	305.2593	0.0552	0.0000	306.6393

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6200e-003	5.4800e-003	0.0574	1.7000e-004	0.0182	1.2000e-004	0.0183	4.8400e-003	1.1000e-004	4.9500e-003	0.0000	15.6094	15.6094	3.8000e-004	0.0000	15.6190

Total	7.6200e-003	5.4800e-003	0.0574	1.7000e-004	0.0182	1.2000e-004	0.0183	4.8400e-003	1.1000e-004	4.9500e-003	0.0000	15.6094	15.6094	3.8000e-004	0.0000	15.6190
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Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0741	1.5833	2.2851	3.5600e-003		0.0978	0.0978		0.0978	0.0978	0.0000	305.2589	305.2589	0.0552	0.0000	306.6390
Total	0.0741	1.5833	2.2851	3.5600e-003	0.0118	0.0978	0.1096	8.4000e-004	0.0978	0.0987	0.0000	305.2589	305.2589	0.0552	0.0000	306.6390

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6200e-003	5.4800e-003	0.0574	1.7000e-004	0.0182	1.2000e-004	0.0183	4.8400e-003	1.1000e-004	4.9500e-003	0.0000	15.6094	15.6094	3.8000e-004	0.0000	15.6190
Total	7.6200e-003	5.4800e-003	0.0574	1.7000e-004	0.0182	1.2000e-004	0.0183	4.8400e-003	1.1000e-004	4.9500e-003	0.0000	15.6094	15.6094	3.8000e-004	0.0000	15.6190

3.3 Excavation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	3.7400e-003	0.0000	3.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3565	3.1833	3.6262	6.0700e-003		0.1688	0.1688		0.1623	0.1623	0.0000	520.7287	520.7287	0.0928	0.0000	523.0488
Total	0.3565	3.1833	3.6262	6.0700e-003	0.0262	0.1688	0.1950	3.7400e-003	0.1623	0.1660	0.0000	520.7287	520.7287	0.0928	0.0000	523.0488

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0121	8.3500e-003	0.0896	2.8000e-004	0.0311	2.0000e-004	0.0313	8.2600e-003	1.8000e-004	8.4400e-003	0.0000	25.7036	25.7036	5.8000e-004	0.0000	25.7182
Total	0.0121	8.3500e-003	0.0896	2.8000e-004	0.0311	2.0000e-004	0.0313	8.2600e-003	1.8000e-004	8.4400e-003	0.0000	25.7036	25.7036	5.8000e-004	0.0000	25.7182

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1264	2.7008	3.8982	6.0700e-003		0.1669	0.1669		0.1669	0.1669	0.0000	520.7281	520.7281	0.0928	0.0000	523.0481
Total	0.1264	2.7008	3.8982	6.0700e-003	0.0118	0.1669	0.1787	8.4000e-004	0.1669	0.1677	0.0000	520.7281	520.7281	0.0928	0.0000	523.0481

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0121	8.3500e-003	0.0896	2.8000e-004	0.0311	2.0000e-004	0.0313	8.2600e-003	1.8000e-004	8.4400e-003	0.0000	25.7036	25.7036	5.8000e-004	0.0000	25.7182
Total	0.0121	8.3500e-003	0.0896	2.8000e-004	0.0311	2.0000e-004	0.0313	8.2600e-003	1.8000e-004	8.4400e-003	0.0000	25.7036	25.7036	5.8000e-004	0.0000	25.7182

3.3 Excavation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	3.7400e-003	0.0000	3.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3239	2.8409	3.5930	6.0500e-003		0.1444	0.1444		0.1390	0.1390	0.0000	518.6889	518.6889	0.0915	0.0000	520.9771
Total	0.3239	2.8409	3.5930	6.0500e-003	0.0262	0.1444	0.1706	3.7400e-003	0.1390	0.1428	0.0000	518.6889	518.6889	0.0915	0.0000	520.9771

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0112	7.4600e-003	0.0820	2.7000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.8000e-004	8.4000e-003	0.0000	24.6751	24.6751	5.2000e-004	0.0000	24.6881
Total	0.0112	7.4600e-003	0.0820	2.7000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.8000e-004	8.4000e-003	0.0000	24.6751	24.6751	5.2000e-004	0.0000	24.6881

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1259	2.6905	3.8832	6.0500e-003		0.1662	0.1662		0.1662	0.1662	0.0000	518.6883	518.6883	0.0915	0.0000	520.9765
Total	0.1259	2.6905	3.8832	6.0500e-003	0.0118	0.1662	0.1780	8.4000e-004	0.1662	0.1671	0.0000	518.6883	518.6883	0.0915	0.0000	520.9765

Mitigated Construction Off-Site

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0105	6.7100e-003	0.0755	2.6000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.7000e-004	8.4000e-003	0.0000	23.7378	23.7378	4.7000e-004	0.0000	23.7495
Total	0.0105	6.7100e-003	0.0755	2.6000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.7000e-004	8.4000e-003	0.0000	23.7378	23.7378	4.7000e-004	0.0000	23.7495

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1259	2.6905	3.8832	6.0500e-003		0.1662	0.1662		0.1662	0.1662	0.0000	518.7213	518.7213	0.0904	0.0000	520.9823
Total	0.1259	2.6905	3.8832	6.0500e-003	0.0118	0.1662	0.1780	8.4000e-004	0.1662	0.1671	0.0000	518.7213	518.7213	0.0904	0.0000	520.9823

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0105	6.7100e-003	0.0755	2.6000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.7000e-004	8.4000e-003	0.0000	23.7378	23.7378	4.7000e-004	0.0000	23.7495
Total	0.0105	6.7100e-003	0.0755	2.6000e-004	0.0309	1.9000e-004	0.0311	8.2300e-003	1.7000e-004	8.4000e-003	0.0000	23.7378	23.7378	4.7000e-004	0.0000	23.7495

3.3 Excavation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	3.7400e-003	0.0000	3.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2890	2.4595	3.6146	6.1000e-003		0.1145	0.1145		0.1102	0.1102	0.0000	522.7593	522.7593	0.0904	0.0000	525.0202
Total	0.2890	2.4595	3.6146	6.1000e-003	0.0262	0.1145	0.1407	3.7400e-003	0.1102	0.1139	0.0000	522.7593	522.7593	0.0904	0.0000	525.0202

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.9600e-003	6.1100e-003	0.0705	2.5000e-004	0.0312	1.8000e-004	0.0314	8.2900e-003	1.7000e-004	8.4600e-003	0.0000	22.9808	22.9808	4.3000e-004	0.0000	22.9914
Total	9.9600e-003	6.1100e-003	0.0705	2.5000e-004	0.0312	1.8000e-004	0.0314	8.2900e-003	1.7000e-004	8.4600e-003	0.0000	22.9808	22.9808	4.3000e-004	0.0000	22.9914

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1269	2.7112	3.9131	6.1000e-003		0.1675	0.1675		0.1675	0.1675	0.0000	522.7587	522.7587	0.0904	0.0000	525.0195
Total	0.1269	2.7112	3.9131	6.1000e-003	0.0118	0.1675	0.1793	8.4000e-004	0.1675	0.1684	0.0000	522.7587	522.7587	0.0904	0.0000	525.0195

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.9600e-003	6.1100e-003	0.0705	2.5000e-004	0.0312	1.8000e-004	0.0314	8.2900e-003	1.7000e-004	8.4600e-003	0.0000	22.9808	22.9808	4.3000e-004	0.0000	22.9914
Total	9.9600e-003	6.1100e-003	0.0705	2.5000e-004	0.0312	1.8000e-004	0.0314	8.2900e-003	1.7000e-004	8.4600e-003	0.0000	22.9808	22.9808	4.3000e-004	0.0000	22.9914

3.3 Excavation - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	3.7400e-003	0.0000	3.7400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Off-Road	0.0319	0.2672	0.4267	7.2000e-004		0.0117	0.0117		0.0113	0.0113	0.0000	61.8626	61.8626	0.0106	0.0000	62.1275
Total	0.0319	0.2672	0.4267	7.2000e-004	0.0262	0.0117	0.0379	3.7400e-003	0.0113	0.0150	0.0000	61.8626	61.8626	0.0106	0.0000	62.1275

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1100e-003	6.6000e-004	7.7300e-003	3.0000e-005	3.6900e-003	2.0000e-005	3.7100e-003	9.8000e-004	2.0000e-005	1.0000e-003	0.0000	2.6091	2.6091	5.0000e-005	0.0000	2.6103
Total	1.1100e-003	6.6000e-004	7.7300e-003	3.0000e-005	3.6900e-003	2.0000e-005	3.7100e-003	9.8000e-004	2.0000e-005	1.0000e-003	0.0000	2.6091	2.6091	5.0000e-005	0.0000	2.6103

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	8.4000e-004	0.0000	8.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.3208	0.4630	7.2000e-004		0.0198	0.0198		0.0198	0.0198	0.0000	61.8626	61.8626	0.0106	0.0000	62.1274
Total	0.0150	0.3208	0.4630	7.2000e-004	0.0118	0.0198	0.0316	8.4000e-004	0.0198	0.0207	0.0000	61.8626	61.8626	0.0106	0.0000	62.1274

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1100e-003	6.6000e-004	7.7300e-003	3.0000e-005	3.6900e-003	2.0000e-005	3.7100e-003	9.8000e-004	2.0000e-005	1.0000e-003	0.0000	2.6091	2.6091	5.0000e-005	0.0000	2.6103
Total	1.1100e-003	6.6000e-004	7.7300e-003	3.0000e-005	3.6900e-003	2.0000e-005	3.7100e-003	9.8000e-004	2.0000e-005	1.0000e-003	0.0000	2.6091	2.6091	5.0000e-005	0.0000	2.6103

3.4 Pipe Installation incl. Bedding, Backfill, Compaction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1911	1.7240	1.7432	2.9000e-003		0.0929	0.0929		0.0884	0.0884	0.0000	245.9984	245.9984	0.0516	0.0000	247.2872
Total	0.1911	1.7240	1.7432	2.9000e-003		0.0929	0.0929		0.0884	0.0884	0.0000	245.9984	245.9984	0.0516	0.0000	247.2872

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Worker	8.7800e-003	6.3100e-003	0.0661	2.0000e-004	0.0210	1.4000e-004	0.0211	5.5700e-003	1.2000e-004	5.7000e-003	0.0000	17.9730	17.9730	4.4000e-004	0.0000	17.9840
Total	8.7800e-003	6.3100e-003	0.0661	2.0000e-004	0.0210	1.4000e-004	0.0211	5.5700e-003	1.2000e-004	5.7000e-003	0.0000	17.9730	17.9730	4.4000e-004	0.0000	17.9840

3.4 Pipe Installation incl. Bedding, Backfill, Compaction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3011	2.6803	2.9964	5.0200e-003		0.1393	0.1393		0.1328	0.1328	0.0000	425.1947	425.1947	0.0883	0.0000	427.4024
Total	0.3011	2.6803	2.9964	5.0200e-003		0.1393	0.1393		0.1328	0.1328	0.0000	425.1947	425.1947	0.0883	0.0000	427.4024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0141	9.7400e-003	0.1045	3.3000e-004	0.0362	2.3000e-004	0.0365	9.6300e-003	2.1000e-004	9.8400e-003	0.0000	29.9876	29.9876	6.8000e-004	0.0000	30.0046
Total	0.0141	9.7400e-003	0.1045	3.3000e-004	0.0362	2.3000e-004	0.0365	9.6300e-003	2.1000e-004	9.8400e-003	0.0000	29.9876	29.9876	6.8000e-004	0.0000	30.0046

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1007	2.1128	3.1041	5.0200e-003		0.1257	0.1257		0.1257	0.1257	0.0000	425.1942	425.1942	0.0883	0.0000	427.4019
Total	0.1007	2.1128	3.1041	5.0200e-003		0.1257	0.1257		0.1257	0.1257	0.0000	425.1942	425.1942	0.0883	0.0000	427.4019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0141	9.7400e-003	0.1045	3.3000e-004	0.0362	2.3000e-004	0.0365	9.6300e-003	2.1000e-004	9.8400e-003	0.0000	29.9876	29.9876	6.8000e-004	0.0000	30.0046
Total	0.0141	9.7400e-003	0.1045	3.3000e-004	0.0362	2.3000e-004	0.0365	9.6300e-003	2.1000e-004	9.8400e-003	0.0000	29.9876	29.9876	6.8000e-004	0.0000	30.0046

3.4 Pipe Installation incl. Bedding, Backfill, Compaction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Category	tons/yr										MT/yr					
Off-Road	0.1212	1.0554	1.3124	2.2100e-003		0.0527	0.0527		0.0503	0.0503	0.0000	187.3267	187.3267	0.0387	0.0000	188.2934
Total	0.1212	1.0554	1.3124	2.2100e-003		0.0527	0.0527		0.0503	0.0503	0.0000	187.3267	187.3267	0.0387	0.0000	188.2934

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7900e-003	3.8500e-003	0.0423	1.4000e-004	0.0160	1.0000e-004	0.0161	4.2500e-003	9.0000e-005	4.3400e-003	0.0000	12.7330	12.7330	2.7000e-004	0.0000	12.7397
Total	5.7900e-003	3.8500e-003	0.0423	1.4000e-004	0.0160	1.0000e-004	0.0161	4.2500e-003	9.0000e-005	4.3400e-003	0.0000	12.7330	12.7330	2.7000e-004	0.0000	12.7397

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0444	0.9309	1.3677	2.2100e-003		0.0554	0.0554		0.0554	0.0554	0.0000	187.3264	187.3264	0.0387	0.0000	188.2932
Total	0.0444	0.9309	1.3677	2.2100e-003		0.0554	0.0554		0.0554	0.0554	0.0000	187.3264	187.3264	0.0387	0.0000	188.2932

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7900e-003	3.8500e-003	0.0423	1.4000e-004	0.0160	1.0000e-004	0.0161	4.2500e-003	9.0000e-005	4.3400e-003	0.0000	12.7330	12.7330	2.7000e-004	0.0000	12.7397
Total	5.7900e-003	3.8500e-003	0.0423	1.4000e-004	0.0160	1.0000e-004	0.0161	4.2500e-003	9.0000e-005	4.3400e-003	0.0000	12.7330	12.7330	2.7000e-004	0.0000	12.7397

3.5 Pavement Restoration - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1110	1.0695	1.0650	1.8600e-003		0.0564	0.0564		0.0531	0.0531	0.0000	161.1364	161.1364	0.0404	0.0000	162.1456
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.1110	1.0695	1.0650	1.8600e-003		0.0564	0.0564		0.0531	0.0531	0.0000	161.1364	161.1364	0.0404	0.0000	162.1456

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1900e-003	0.1811	0.0371	4.9000e-004	0.0106	5.9000e-004	0.0112	2.9100e-003	5.6000e-004	3.4700e-003	0.0000	47.5930	47.5930	2.1800e-003	0.0000	47.6474
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2900e-003	3.0800e-003	0.0323	1.0000e-004	0.0103	7.0000e-005	0.0103	2.7300e-003	6.0000e-005	2.7900e-003	0.0000	8.7875	8.7875	2.2000e-004	0.0000	8.7929
Total	9.4800e-003	0.1842	0.0694	5.9000e-004	0.0208	6.6000e-004	0.0215	5.6400e-003	6.2000e-004	6.2600e-003	0.0000	56.3805	56.3805	2.4000e-003	0.0000	56.4403

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0414	0.8523	1.2258	1.8600e-003		0.0473	0.0473		0.0473	0.0473	0.0000	161.1363	161.1363	0.0404	0.0000	162.1455
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0414	0.8523	1.2258	1.8600e-003		0.0473	0.0473		0.0473	0.0473	0.0000	161.1363	161.1363	0.0404	0.0000	162.1455

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	5.1900e-003	0.1811	0.0371	4.9000e-004	0.0106	5.9000e-004	0.0112	2.9100e-003	5.6000e-004	3.4700e-003	0.0000	47.5930	47.5930	2.1800e-003	0.0000	47.6474
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2900e-003	3.0800e-003	0.0323	1.0000e-004	0.0103	7.0000e-005	0.0103	2.7300e-003	6.0000e-005	2.7900e-003	0.0000	8.7875	8.7875	2.2000e-004	0.0000	8.7929
Total	9.4800e-003	0.1842	0.0694	5.9000e-004	0.0208	6.6000e-004	0.0215	5.6400e-003	6.2000e-004	6.2600e-003	0.0000	56.3805	56.3805	2.4000e-003	0.0000	56.4403

Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, No Pavement - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 1&2 - Open Trenching, No Pavement Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.02	User Defined Unit	0.02	964.60	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenching acreage

Construction Phase - Applicant provided construction worksheet

Off-road Equipment -

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Trips and VMT -

Demolition -

Grading - Construction Worksheet 568cy exported, 429cy imported

Energy Use -

Construction Off-road Equipment Mitigation - BMPs, Tier 3 Mitigation

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	2.00	4.00
tblGrading	MaterialExported	0.00	568.00
tblGrading	MaterialImported	0.00	429.00

tblLandUse	LandUseSquareFeet	0.00	964.60
tblLandUse	LotAcreage	0.00	0.02
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	125.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0196	0.1694	0.1790	3.1000e-004	1.3700e-003	9.4500e-003	0.0108	3.6000e-004	9.1300e-003	9.4900e-003	0.0000	26.1827	26.1827	4.1300e-003	0.0000	26.2859
Maximum	0.0196	0.1694	0.1790	3.1000e-004	1.3700e-003	9.4500e-003	0.0108	3.6000e-004	9.1300e-003	9.4900e-003	0.0000	26.1827	26.1827	4.1300e-003	0.0000	26.2859

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Year	tons/yr										MT/yr					
2020	6.5700e-003	0.1307	0.1898	3.1000e-004	1.3300e-003	8.2800e-003	9.6200e-003	3.5000e-004	8.2800e-003	8.6300e-003	0.0000	26.1827	26.1827	4.1300e-003	0.0000	26.2859
Maximum	6.5700e-003	0.1307	0.1898	3.1000e-004	1.3300e-003	8.2800e-003	9.6200e-003	3.5000e-004	8.2800e-003	8.6300e-003	0.0000	26.1827	26.1827	4.1300e-003	0.0000	26.2859

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	66.45	22.84	-5.99	0.00	2.92	12.38	11.09	2.78	9.31	9.06	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-10-2020	9-9-2020	0.1889	0.1373
		Highest	0.1889	0.1373

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Excavation	Grading	6/10/2020	6/15/2020	5	4	
2	Pipe Installation incl. Bedding, Backfill, Connection	Trenching	6/12/2020	6/19/2020	5	6	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Excavation	Concrete/Industrial Saws	0	0.00	81	0.73

Excavation	Dumpers/Tenders	2	8.00	16	0.38
Excavation	Excavators	2	8.00	158	0.38
Excavation	Generator Sets	2	8.00	84	0.74
Excavation	Other Construction Equipment	1	8.00	172	0.42
Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Excavation	Pumps	1	24.00	84	0.74
Excavation	Rubber Tired Dozers	0	0.00	247	0.40
Excavation	Signal Boards	2	8.00	6	0.82
Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipe Installation incl. Bedding, Backfill, Compaction	Cement and Mortar Mixers	0	0.00	9	0.56
Pipe Installation incl. Bedding, Backfill, Compaction	Dumpers/Tenders	2	8.00	16	0.38
Pipe Installation incl. Bedding, Backfill, Compaction	Excavators	2	8.00	158	0.38
Pipe Installation incl. Bedding, Backfill, Compaction	Generator Sets	2	8.00	84	0.74
Pipe Installation incl. Bedding, Backfill, Compaction	Other Construction Equipment	1	8.00	172	0.42
Pipe Installation incl. Bedding, Backfill, Compaction	Other General Industrial Equipment	1	8.00	88	0.34
Pipe Installation incl. Bedding, Backfill, Compaction	Pavers	0	0.00	130	0.42
Pipe Installation incl. Bedding, Backfill, Compaction	Plate Compactors	2	8.00	8	0.43
Pipe Installation incl. Bedding, Backfill, Compaction	Pumps	1	24.00	84	0.74
Pipe Installation incl. Bedding, Backfill, Compaction	Rollers	0	0.00	80	0.38
Pipe Installation incl. Bedding, Backfill, Compaction	Signal Boards	2	8.00	6	0.82
Pipe Installation incl. Bedding, Backfill, Compaction	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Excavation	12	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Pipe Installation incl. Bedding, Backfill	14	35.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.5200e-003	0.0670	0.0695	1.2000e-004		3.7500e-003	3.7500e-003		3.6300e-003	3.6300e-003	0.0000	9.9491	9.9491	1.6300e-003	0.0000	9.9899
Total	7.5200e-003	0.0670	0.0695	1.2000e-004	6.0000e-005	3.7500e-003	3.8100e-003	1.0000e-005	3.6300e-003	3.6400e-003	0.0000	9.9491	9.9491	1.6300e-003	0.0000	9.9899

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.5000e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4081	0.4081	1.0000e-005	0.0000	0.4083
Total	2.0000e-004	1.4000e-004	1.5000e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4081	0.4081	1.0000e-005	0.0000	0.4083

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4100e-003	0.0521	0.0743	1.2000e-004		3.3100e-003	3.3100e-003		3.3100e-003	3.3100e-003	0.0000	9.9491	9.9491	1.6300e-003	0.0000	9.9899
Total	2.4100e-003	0.0521	0.0743	1.2000e-004	3.0000e-005	3.3100e-003	3.3400e-003	0.0000	3.3100e-003	3.3100e-003	0.0000	9.9491	9.9491	1.6300e-003	0.0000	9.9899

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.5000e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4081	0.4081	1.0000e-005	0.0000	0.4083
Total	2.0000e-004	1.4000e-004	1.5000e-003	0.0000	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4081	0.4081	1.0000e-005	0.0000	0.4083

3.3 Pipe Installation incl. Bedding, Backfill, Compaction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0115	0.1020	0.1055	1.8000e-004		5.6900e-003	5.6900e-003		5.5000e-003	5.5000e-003	0.0000	15.1113	15.1113	2.4700e-003	0.0000	15.1731
Total	0.0115	0.1020	0.1055	1.8000e-004		5.6900e-003	5.6900e-003		5.5000e-003	5.5000e-003	0.0000	15.1113	15.1113	2.4700e-003	0.0000	15.1731

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.5000e-004	2.6300e-003	1.0000e-005	8.3000e-004	1.0000e-005	8.4000e-004	2.2000e-004	0.0000	2.3000e-004	0.0000	0.7142	0.7142	2.0000e-005	0.0000	0.7146
Total	3.5000e-004	2.5000e-004	2.6300e-003	1.0000e-005	8.3000e-004	1.0000e-005	8.4000e-004	2.2000e-004	0.0000	2.3000e-004	0.0000	0.7142	0.7142	2.0000e-005	0.0000	0.7146

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.6100e-003	0.0782	0.1114	1.8000e-004		4.9700e-003	4.9700e-003		4.9700e-003	4.9700e-003	0.0000	15.1113	15.1113	2.4700e-003	0.0000	15.1730

Total	3.6100e-003	0.0782	0.1114	1.8000e-004		4.9700e-003	4.9700e-003		4.9700e-003	4.9700e-003	0.0000	15.1113	15.1113	2.4700e-003	0.0000	15.1730
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Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.5000e-004	2.6300e-003	1.0000e-005	8.3000e-004	1.0000e-005	8.4000e-004	2.2000e-004	0.0000	2.3000e-004	0.0000	0.7142	0.7142	2.0000e-005	0.0000	0.7146
Total	3.5000e-004	2.5000e-004	2.6300e-003	1.0000e-005	8.3000e-004	1.0000e-005	8.4000e-004	2.2000e-004	0.0000	2.3000e-004	0.0000	0.7142	0.7142	2.0000e-005	0.0000	0.7146

Sewer Trunk South of Highland, Phase 2 - UPRR Crossing - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 2 - UPRR Crossing

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.02	User Defined Unit	0.02	1,125.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenchless acreage

Construction Phase - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Trips and VMT - 425cy hauling during site setup = 102 one-way trips, 27cy pavement demo during setup within shaft = 6 one-way trips, 4 one-way cement trips, 4 one-way concrete trips
Grading - Import 352cy export 398cy during setup within shaft phase

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	1.00	5.00
tblConstructionPhase	NumDays	2.00	4.00
tblConstructionPhase	NumDays	5.00	8.00
tblConstructionPhase	NumDays	5.00	15.00
tblGrading	AcresOfGrading	0.00	2.50
tblGrading	MaterialExported	0.00	398.00
tblGrading	MaterialImported	0.00	352.00
tblLandUse	LandUseSquareFeet	0.00	1,125.00
tblLandUse	LotAcreage	0.00	0.02
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	6.00	1.10
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	1.10
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	1.10
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	102.00
tblTripsAndVMT	HaulingTripNumber	94.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0447	0.4044	0.3627	6.6000e-004	7.1300e-003	0.0223	0.0294	1.6900e-003	0.0211	0.0228	0.0000	56.6692	56.6692	0.0103	0.0000	56.9263
Maximum	0.0447	0.4044	0.3627	6.6000e-004	7.1300e-003	0.0223	0.0294	1.6900e-003	0.0211	0.0228	0.0000	56.6692	56.6692	0.0103	0.0000	56.9263

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0118	0.2250	0.3729	6.6000e-004	6.3800e-003	1.2400e-003	7.6200e-003	1.5700e-003	1.2400e-003	2.8100e-003	0.0000	56.6691	56.6691	0.0103	0.0000	56.9262
Maximum	0.0118	0.2250	0.3729	6.6000e-004	6.3800e-003	1.2400e-003	7.6200e-003	1.5700e-003	1.2400e-003	2.8100e-003	0.0000	56.6691	56.6691	0.0103	0.0000	56.9262

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	73.71	44.36	-2.81	0.00	10.52	94.43	74.07	7.10	94.12	87.67	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2020	8-31-2020	0.4217	0.2206
		Highest	0.4217	0.2206

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Set-up & Shaft Excavation	Site Preparation	6/1/2020	6/5/2020	5	5	
2	Setup within Shaft	Grading	6/6/2020	6/11/2020	5	4	
3	Prelaunch	Trenching	6/11/2020	6/13/2020	5	2	
4	Microtunneling	Trenching	6/14/2020	6/24/2020	5	8	
5	Machine Recovery/Contact Grouting	Paving	6/22/2020	7/1/2020	5	8	
6	Shaft Restoration/Grouting/Paving	Paving	7/1/2020	7/21/2020	5	15	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Set-up & Shaft Excavation	Cranes	1	4.00	231	0.29
Site Set-up & Shaft Excavation	Dumpers/Tenders	1	8.00	16	0.38
Site Set-up & Shaft Excavation	Excavators	1	8.00	158	0.38
Site Set-up & Shaft Excavation	Forklifts	1	8.00	89	0.20
Site Set-up & Shaft Excavation	Graders	0	0.00	187	0.41
Site Set-up & Shaft Excavation	Other Construction Equipment	1	8.00	172	0.42
Site Set-up & Shaft Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Site Set-up & Shaft Excavation	Signal Boards	2	8.00	6	0.82
Site Set-up & Shaft Excavation	Sweepers/Scrubbers	1	2.00	64	0.46
Site Set-up & Shaft Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Setup within Shaft	Cement and Mortar Mixers	1	1.50	9	0.56
Setup within Shaft	Concrete/Industrial Saws	0	0.00	81	0.73
Setup within Shaft	Cranes	1	4.00	231	0.29
Setup within Shaft	Dumpers/Tenders	1	8.00	16	0.38
Setup within Shaft	Forklifts	1	8.00	89	0.20
Setup within Shaft	Other General Industrial Equipment	1	8.00	88	0.34
Setup within Shaft	Rubber Tired Dozers	0	0.00	247	0.40
Setup within Shaft	Signal Boards	2	8.00	6	0.82
Setup within Shaft	Sweepers/Scrubbers	1	2.00	64	0.46
Setup within Shaft	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Prelaunch	Cranes	1	4.00	231	0.29
Prelaunch	Forklifts	1	8.00	89	0.20

Prelaunch	Generator Sets	1	4.00	84	0.74
Prelaunch	Other Construction Equipment	1	8.00	172	0.42
Prelaunch	Other General Industrial Equipment	1	8.00	88	0.34
Prelaunch	Signal Boards	2	8.00	6	0.82
Prelaunch	Sweepers/Scrubbers	1	2.00	64	0.46
Prelaunch	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Cement and Mortar Mixers	0	0.00	9	0.56
Microtunneling	Cranes	1	4.00	231	0.29
Microtunneling	Dumpers/Tenders	1	8.00	16	0.38
Microtunneling	Generator Sets	3	8.00	84	0.74
Microtunneling	Other Construction Equipment	1	4.00	172	0.42
Microtunneling	Other General Industrial Equipment	4	8.00	88	0.34
Microtunneling	Pavers	0	0.00	130	0.42
Microtunneling	Pumps	3	8.00	84	0.74
Microtunneling	Rollers	0	0.00	80	0.38
Microtunneling	Signal Boards	2	8.00	6	0.82
Microtunneling	Sweepers/Scrubbers	1	2.00	64	0.46
Microtunneling	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Welders	1	4.00	46	0.45
Machine Recovery/Contact Grouting	Air Compressors	0	0.00	78	0.48
Machine Recovery/Contact Grouting	Cement and Mortar Mixers	1	8.00	9	0.56
Machine Recovery/Contact Grouting	Cranes	1	4.00	231	0.29
Machine Recovery/Contact Grouting	Forklifts	1	8.00	89	0.20
Machine Recovery/Contact Grouting	Other Construction Equipment	1	8.00	172	0.42
Machine Recovery/Contact Grouting	Pavers	0	0.00	130	0.42
Machine Recovery/Contact Grouting	Pumps	2	8.00	84	0.74
Machine Recovery/Contact Grouting	Rollers	0	0.00	80	0.38
Machine Recovery/Contact Grouting	Signal Boards	2	8.00	6	0.82
Machine Recovery/Contact Grouting	Sweepers/Scrubbers	1	2.00	64	0.46
Machine Recovery/Contact Grouting	Tractors/Loaders/Backhoes	0	0.00	97	0.37

Shaft Restoration/Grouting/Paving UPRR	Cement and Mortar Mixers	1	1.10	9	0.56
Shaft Restoration/Grouting/Paving UPRR	Dumpers/Tenders	1	8.00	16	0.38
Shaft Restoration/Grouting/Paving UPRR	Forklifts	1	8.00	89	0.20
Shaft Restoration/Grouting/Paving UPRR	Other Construction Equipment	1	8.00	172	0.42
Shaft Restoration/Grouting/Paving UPRR	Pavers	1	1.10	130	0.42
Shaft Restoration/Grouting/Paving UPRR	Paving Equipment	1	1.10	132	0.36
Shaft Restoration/Grouting/Paving UPRR	Rollers	1	1.10	80	0.38
Shaft Restoration/Grouting/Paving UPRR	Signal Boards	2	8.00	6	0.82
Shaft Restoration/Grouting/Paving UPRR	Sweepers/Scrubbers	1	2.00	64	0.46
Shaft Restoration/Grouting/Paving UPRR	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Set-up & Shaft Excavation	10	25.00	0.00	102.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Setup within Shaft	9	23.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Prelaunch	8	20.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Microtunneling	17	43.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Machine Recovery/Contact	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Shaft Restoration/Grouting/Paving	11	28.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Set-up & Shaft Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3300e-003	0.0000	1.3300e-003	1.4000e-004	0.0000	1.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5300e-003	0.0442	0.0381	6.0000e-005		2.4600e-003	2.4600e-003		2.2700e-003	2.2700e-003	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479
Total	4.5300e-003	0.0442	0.0381	6.0000e-005	1.3300e-003	2.4600e-003	3.7900e-003	1.4000e-004	2.2700e-003	2.4100e-003	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.2000e-004	0.0148	3.0300e-003	4.0000e-005	8.6000e-004	5.0000e-005	9.1000e-004	2.4000e-004	5.0000e-005	2.8000e-004	0.0000	3.8898	3.8898	1.8000e-004	0.0000	3.8943
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	1.5000e-004	1.5600e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4251	0.4251	1.0000e-005	0.0000	0.4254
Total	6.3000e-004	0.0150	4.5900e-003	4.0000e-005	1.3600e-003	5.0000e-005	1.4100e-003	3.7000e-004	5.0000e-005	4.1000e-004	0.0000	4.3149	4.3149	1.9000e-004	0.0000	4.3196

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					6.0000e-004	0.0000	6.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.1000e-004	0.0232	0.0403	6.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479
Total	9.1000e-004	0.0232	0.0403	6.0000e-005	6.0000e-004	1.2000e-004	7.2000e-004	3.0000e-005	1.2000e-004	1.5000e-004	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.2000e-004	0.0148	3.0300e-003	4.0000e-005	8.6000e-004	5.0000e-005	9.1000e-004	2.4000e-004	5.0000e-005	2.8000e-004	0.0000	3.8898	3.8898	1.8000e-004	0.0000	3.8943
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	1.5000e-004	1.5600e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4251	0.4251	1.0000e-005	0.0000	0.4254
Total	6.3000e-004	0.0150	4.5900e-003	4.0000e-005	1.3600e-003	5.0000e-005	1.4100e-003	3.7000e-004	5.0000e-005	4.1000e-004	0.0000	4.3149	4.3149	1.9000e-004	0.0000	4.3196

3.3 Setup within Shaft - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1600e-003	0.0202	0.0158	3.0000e-005		1.1800e-003	1.1800e-003		1.1000e-003	1.1000e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	2.1600e-003	0.0202	0.0158	3.0000e-005	4.0000e-005	1.1800e-003	1.2200e-003	1.0000e-005	1.1000e-003	1.1100e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5000e-004	8.5500e-003	0.0149	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	4.5000e-004	8.5500e-003	0.0149	3.0000e-005	2.0000e-005	6.0000e-005	8.0000e-005	0.0000	6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

3.4 Prelaunch - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361
Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361
Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888

3.5 Microtunneling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0172	0.1498	0.1429	2.4000e-004		8.8800e-003	8.8800e-003		8.5900e-003	8.5900e-003	0.0000	20.4441	20.4441	2.8200e-003	0.0000	20.5146
Total	0.0172	0.1498	0.1429	2.4000e-004		8.8800e-003	8.8800e-003		8.5900e-003	8.5900e-003	0.0000	20.4441	20.4441	2.8200e-003	0.0000	20.5146

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706
Total	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.3100e-003	0.0877	0.1491	2.4000e-004		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	20.4440	20.4440	2.8200e-003	0.0000	20.5145
Total	4.3100e-003	0.0877	0.1491	2.4000e-004		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	20.4440	20.4440	2.8200e-003	0.0000	20.5145

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706
Total	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706

3.6 Machine Recovery/Contact Grouting - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

3.7 Shaft Restoration/Grouting/Paving UPRR - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.0300e-003	0.0857	0.0749	1.1000e-004		4.8900e-003	4.8900e-003		4.5300e-003	4.5300e-003	0.0000	9.7122	9.7122	2.8900e-003	0.0000	9.7845
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	9.0300e-003	0.0857	0.0749	1.1000e-004		4.8900e-003	4.8900e-003		4.5300e-003	4.5300e-003	0.0000	9.7122	9.7122	2.8900e-003	0.0000	9.7845

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Worker	7.0000e-004	5.0000e-004	5.2600e-003	2.0000e-005	1.6700e-003	1.0000e-005	1.6800e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.4283	1.4283	4.0000e-005	0.0000	1.4292
Total	7.0000e-004	5.0000e-004	5.2600e-003	2.0000e-005	1.6700e-003	1.0000e-005	1.6800e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.4283	1.4283	4.0000e-005	0.0000	1.4292

Sewer Trunk South of Highland, Phase 2 - Miller Slough Crossing - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 2 - Miller Slough Crossing

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.04	User Defined Unit	0.04	1,875.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenchless acreage

Construction Phase - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Trips and VMT - 902cy hauling during site setup = 216 one-way trips, 27cy pavement demo during setup within shaft = 6 one-way trips, 4 one-way cement trips, 4 one-way carbonyl trips
Grading - Import 758cy export 875cy during setup within shaft phase

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	0.30
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.30
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.30
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	216.00
tblTripsAndVMT	HaulingTripNumber	204.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00

2.0 Emissions Summary

2.1 Overall Construction
Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0770	0.6958	0.6239	1.1300e-003	0.0129	0.0383	0.0511	3.2200e-003	0.0361	0.0394	0.0000	97.6350	97.6350	0.0182	0.0000	98.0891
Maximum	0.0770	0.6958	0.6239	1.1300e-003	0.0129	0.0383	0.0511	3.2200e-003	0.0361	0.0394	0.0000	97.6350	97.6350	0.0182	0.0000	98.0891

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0203	0.3857	0.6336	1.1300e-003	0.0121	2.1800e-003	0.0143	3.1000e-003	2.1700e-003	5.2700e-003	0.0000	97.6349	97.6349	0.0182	0.0000	98.0890
Maximum	0.0203	0.3857	0.6336	1.1300e-003	0.0121	2.1800e-003	0.0143	3.1000e-003	2.1700e-003	5.2700e-003	0.0000	97.6349	97.6349	0.0182	0.0000	98.0890

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	73.67	44.57	-1.56	0.00	5.99	94.30	72.10	3.73	94.00	86.61	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
4	6-25-2020	9-24-2020	0.7253	0.3854
5	9-25-2020	9-30-2020	0.0257	0.0121
		Highest	0.7253	0.3854

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Set-up & Shaft Excavation	Site Preparation	6/26/2020	7/1/2020	5	4	
2	Setup within Shaft	Grading	7/1/2020	7/6/2020	5	4	
3	Prelaunch	Trenching	7/6/2020	7/8/2020	5	3	

4	Microtunneling	Trenching	7/9/2020	7/27/2020	5	13
5	Machine Recovery/Contact Grouting	Paving	7/23/2020	8/3/2020	5	8
6	Shaft Restoration/Grouting/Paving	Paving	8/1/2020	10/9/2020	5	50

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Set-up & Shaft Excavation	Cranes	1	4.00	231	0.29
Site Set-up & Shaft Excavation	Dumpers/Tenders	1	8.00	16	0.38
Site Set-up & Shaft Excavation	Excavators	1	8.00	158	0.38
Site Set-up & Shaft Excavation	Forklifts	1	8.00	89	0.20
Site Set-up & Shaft Excavation	Graders	0	0.00	187	0.41
Site Set-up & Shaft Excavation	Other Construction Equipment	1	8.00	172	0.42
Site Set-up & Shaft Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Site Set-up & Shaft Excavation	Signal Boards	2	8.00	6	0.82
Site Set-up & Shaft Excavation	Sweepers/Scrubbers	1	2.00	64	0.46
Site Set-up & Shaft Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Setup within Shaft	Cement and Mortar Mixers	1	1.50	9	0.56
Setup within Shaft	Concrete/Industrial Saws	0	0.00	81	0.73
Setup within Shaft	Cranes	1	4.00	231	0.29
Setup within Shaft	Dumpers/Tenders	1	8.00	16	0.38
Setup within Shaft	Forklifts	1	8.00	89	0.20
Setup within Shaft	Other General Industrial Equipment	1	8.00	88	0.34
Setup within Shaft	Rubber Tired Dozers	0	0.00	247	0.40
Setup within Shaft	Signal Boards	2	8.00	6	0.82
Setup within Shaft	Sweepers/Scrubbers	1	2.00	64	0.46

Setup within Shaft	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Prelaunch	Cranes	1	4.00	231	0.29
Prelaunch	Forklifts	1	8.00	89	0.20
Prelaunch	Generator Sets	1	4.00	84	0.74
Prelaunch	Other Construction Equipment	1	8.00	172	0.42
Prelaunch	Other General Industrial Equipment	1	8.00	88	0.34
Prelaunch	Signal Boards	2	8.00	6	0.82
Prelaunch	Sweepers/Scrubbers	1	2.00	64	0.46
Prelaunch	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Cement and Mortar Mixers	0	0.00	9	0.56
Microtunneling	Cranes	1	4.00	231	0.29
Microtunneling	Dumpers/Tenders	1	8.00	16	0.38
Microtunneling	Generator Sets	3	8.00	84	0.74
Microtunneling	Other Construction Equipment	1	4.00	172	0.42
Microtunneling	Other General Industrial Equipment	4	8.00	88	0.34
Microtunneling	Pavers	0	0.00	130	0.42
Microtunneling	Pumps	3	8.00	84	0.74
Microtunneling	Rollers	0	0.00	80	0.38
Microtunneling	Signal Boards	2	8.00	6	0.82
Microtunneling	Sweepers/Scrubbers	1	2.00	64	0.46
Microtunneling	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Welders	1	4.00	46	0.45
Machine Recovery/Contact Grouting	Air Compressors	0	0.00	78	0.48
Machine Recovery/Contact Grouting	Cement and Mortar Mixers	1	8.00	9	0.56
Machine Recovery/Contact Grouting	Cranes	1	4.00	231	0.29
Machine Recovery/Contact Grouting	Forklifts	1	8.00	89	0.20
Machine Recovery/Contact Grouting	Other Construction Equipment	1	8.00	172	0.42
Machine Recovery/Contact Grouting	Pavers	0	0.00	130	0.42
Machine Recovery/Contact Grouting	Pumps	2	8.00	84	0.74
Machine Recovery/Contact Grouting	Rollers	0	0.00	80	0.38

Machine Recovery/Contact Grouting	Signal Boards	2	8.00	6	0.82
Machine Recovery/Contact Grouting	Sweepers/Scrubbers	1	2.00	64	0.46
Machine Recovery/Contact Grouting	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Shaft Restoration/Grouting/Paving	Cement and Mortar Mixers	1	0.30	9	0.56
UPRR	Dumpers/Tenders	1	8.00	16	0.38
Shaft Restoration/Grouting/Paving	Forklifts	1	8.00	89	0.20
UPRR	Other Construction Equipment	1	8.00	172	0.42
Shaft Restoration/Grouting/Paving	Pavers	1	0.30	130	0.42
UPRR	Paving Equipment	1	0.30	132	0.36
Shaft Restoration/Grouting/Paving	Rollers	1	0.30	80	0.38
UPRR	Signal Boards	2	8.00	6	0.82
Shaft Restoration/Grouting/Paving	Sweepers/Scrubbers	1	2.00	64	0.46
UPRR	Tractors/Loaders/Backhoes	1	8.00	97	0.37
UPRR					

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Set-up & Shaft Excavation	10	25.00	0.00	216.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Setup within Shaft	9	23.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Prelaunch	8	20.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Microtunneling	17	43.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Machine Recovery/Contact	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Shaft Restoration/Grouting/Paving	11	28.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

- Use Cleaner Engines for Construction Equipment
- Use Soil Stabilizer
- Replace Ground Cover
- Water Exposed Area
- Reduce Vehicle Speed on Unpaved Roads

3.2 Site Set-up & Shaft Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3300e-003	0.0000	1.3300e-003	1.4000e-004	0.0000	1.4000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.6200e-003	0.0353	0.0305	5.0000e-005		1.9700e-003	1.9700e-003		1.8200e-003	1.8200e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984
Total	3.6200e-003	0.0353	0.0305	5.0000e-005	1.3300e-003	1.9700e-003	3.3000e-003	1.4000e-004	1.8200e-003	1.9600e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.0000e-004	0.0313	6.4200e-003	9.0000e-005	1.8300e-003	1.0000e-004	1.9300e-003	5.0000e-004	1.0000e-004	6.0000e-004	0.0000	8.2373	8.2373	3.8000e-004	0.0000	8.2467
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	1.0700e-003	0.0315	7.6700e-003	9.0000e-005	2.2300e-003	1.0000e-004	2.3300e-003	6.1000e-004	1.0000e-004	7.1000e-004	0.0000	8.5773	8.5773	3.9000e-004	0.0000	8.5870

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0000e-004	0.0000	6.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3000e-004	0.0186	0.0322	5.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983
Total	7.3000e-004	0.0186	0.0322	5.0000e-005	6.0000e-004	1.0000e-004	7.0000e-004	3.0000e-005	1.0000e-004	1.3000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.0000e-004	0.0313	6.4200e-003	9.0000e-005	1.8300e-003	1.0000e-004	1.9300e-003	5.0000e-004	1.0000e-004	6.0000e-004	0.0000	8.2373	8.2373	3.8000e-004	0.0000	8.2467
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	1.0700e-003	0.0315	7.6700e-003	9.0000e-005	2.2300e-003	1.0000e-004	2.3300e-003	6.1000e-004	1.0000e-004	7.1000e-004	0.0000	8.5773	8.5773	3.9000e-004	0.0000	8.5870

3.3 Setup within Shaft - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.0000e-005	0.0000	9.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Off-Road	2.1600e-003	0.0202	0.0158	3.0000e-005		1.1800e-003	1.1800e-003		1.1000e-003	1.1000e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	2.1600e-003	0.0202	0.0158	3.0000e-005	9.0000e-005	1.1800e-003	1.2700e-003	1.0000e-005	1.1000e-003	1.1100e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5000e-004	8.5500e-003	0.0149	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	4.5000e-004	8.5500e-003	0.0149	3.0000e-005	4.0000e-005	6.0000e-005	1.0000e-004	0.0000	6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

3.4 Prelaunch - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.2200e-003	0.0216	0.0170	3.0000e-005		1.2200e-003	1.2200e-003		1.1400e-003	1.1400e-003	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915
Total	2.2200e-003	0.0216	0.0170	3.0000e-005		1.2200e-003	1.2200e-003		1.1400e-003	1.1400e-003	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Worker	1.0000e-004	7.0000e-005	7.5000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.2040	0.2040	1.0000e-005	0.0000	0.2042
Total	1.2000e-004	6.5000e-004	8.7000e-004	0.0000	2.7000e-004	0.0000	2.8000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.3566	0.3566	2.0000e-005	0.0000	0.3569

3.5 Microtunneling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0280	0.2435	0.2322	3.9000e-004		0.0144	0.0144		0.0140	0.0140	0.0000	33.2216	33.2216	4.5800e-003	0.0000	33.3362
Total	0.0280	0.2435	0.2322	3.9000e-004		0.0144	0.0144		0.0140	0.0140	0.0000	33.2216	33.2216	4.5800e-003	0.0000	33.3362

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.3000e-004	6.7000e-004	6.9900e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9010	1.9010	5.0000e-005	0.0000	1.9022
Total	9.3000e-004	6.7000e-004	6.9900e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9010	1.9010	5.0000e-005	0.0000	1.9022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.0100e-003	0.1424	0.2423	3.9000e-004		7.6000e-004	7.6000e-004		7.6000e-004	7.6000e-004	0.0000	33.2215	33.2215	4.5800e-003	0.0000	33.3361
Total	7.0100e-003	0.1424	0.2423	3.9000e-004		7.6000e-004	7.6000e-004		7.6000e-004	7.6000e-004	0.0000	33.2215	33.2215	4.5800e-003	0.0000	33.3361

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.3000e-004	6.7000e-004	6.9900e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9010	1.9010	5.0000e-005	0.0000	1.9022
Total	9.3000e-004	6.7000e-004	6.9900e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2300e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9010	1.9010	5.0000e-005	0.0000	1.9022

3.6 Machine Recovery/Contact Grouting - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Total	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
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Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

3.7 Shaft Restoration/Grouting/Paving UPRR - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0283	0.2671	0.2305	3.5000e-004		0.0153	0.0153		0.0142	0.0142	0.0000	29.7558	29.7558	8.8200e-003	0.0000	29.9764
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0283	0.2671	0.2305	3.5000e-004		0.0153	0.0153		0.0142	0.0142	0.0000	29.7558	29.7558	8.8200e-003	0.0000	29.9764

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3300e-003	1.6700e-003	0.0175	5.0000e-005	5.5500e-003	4.0000e-005	5.5900e-003	1.4800e-003	3.0000e-005	1.5100e-003	0.0000	4.7611	4.7611	1.2000e-004	0.0000	4.7640
Total	2.3300e-003	1.6700e-003	0.0175	5.0000e-005	5.5500e-003	4.0000e-005	5.5900e-003	1.4800e-003	3.0000e-005	1.5100e-003	0.0000	4.7611	4.7611	1.2000e-004	0.0000	4.7640

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.0600e-003	0.1327	0.2256	3.5000e-004		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	29.7557	29.7557	8.8200e-003	0.0000	29.9763
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	5.0600e-003	0.1327	0.2256	3.5000e-004		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	29.7557	29.7557	8.8200e-003	0.0000	29.9763

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3300e-003	1.6700e-003	0.0175	5.0000e-005	5.5500e-003	4.0000e-005	5.5900e-003	1.4800e-003	3.0000e-005	1.5100e-003	0.0000	4.7611	4.7611	1.2000e-004	0.0000	4.7640
Total	2.3300e-003	1.6700e-003	0.0175	5.0000e-005	5.5500e-003	4.0000e-005	5.5900e-003	1.4800e-003	3.0000e-005	1.5100e-003	0.0000	4.7611	4.7611	1.2000e-004	0.0000	4.7640

Sewer Trunk South of Highland, Phase 2 - Leavesley/SR 152 Crossing - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 2 - Leavesley/SR 152 Crossing Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.05	User Defined Unit	0.05	2,250.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenchless acreage

Construction Phase - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Trips and VMT - 580cy hauling during site setup = 139 one-way trips, 27cy pavement demo during setup within shaft = 6 one-way trips, 4 one-way cement trips, 4 one-way asphalt trips
Grading - Import 460cy export 553cy during setup within shaft phase

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
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tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	1.00	5.00
tblConstructionPhase	NumDays	2.00	4.00
tblConstructionPhase	NumDays	5.00	8.00
tblConstructionPhase	NumDays	5.00	40.00
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	MaterialExported	0.00	553.00
tblGrading	MaterialImported	0.00	460.00
tblLandUse	LandUseSquareFeet	0.00	2,250.00
tblLandUse	LotAcreage	0.00	0.05
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	6.00	0.40
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.40
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.40
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	139.00
tblTripsAndVMT	HaulingTripNumber	127.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0754	0.6719	0.6127	1.0900e-003	0.0104	0.0376	0.0479	2.7200e-003	0.0356	0.0383	0.0000	93.7272	93.7272	0.0172	0.0000	94.1558
Maximum	0.0754	0.6719	0.6127	1.0900e-003	0.0104	0.0376	0.0479	2.7200e-003	0.0356	0.0383	0.0000	93.7272	93.7272	0.0172	0.0000	94.1558

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0198	0.3721	0.6254	1.0900e-003	0.0102	2.1000e-003	0.0123	2.6900e-003	2.0900e-003	4.7800e-003	0.0000	93.7271	93.7271	0.0172	0.0000	94.1557
Maximum	0.0198	0.3721	0.6254	1.0900e-003	0.0102	2.1000e-003	0.0123	2.6900e-003	2.0900e-003	4.7800e-003	0.0000	93.7271	93.7271	0.0172	0.0000	94.1557

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	73.74	44.62	-2.07	0.00	1.74	94.41	74.35	1.10	94.12	87.52	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
4	6-25-2020	9-24-2020	0.5537	0.2950
5	9-25-2020	9-30-2020	0.0259	0.0123
		Highest	0.5537	0.2950

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Set-up & Shaft Excavation	Site Preparation	7/27/2020	7/31/2020	5	5	
2	Setup within Shaft	Grading	8/1/2020	8/6/2020	5	4	
3	Prelaunch	Trenching	8/6/2020	8/7/2020	5	2	
4	Microtunneling	Trenching	8/9/2020	8/28/2020	5	15	
5	Machine Recovery/Contact Grouting	Paving	8/25/2020	9/3/2020	5	8	

6	Shaft Restoration/Grouting/Paving	Paving	9/3/2020	10/28/2020	5	40	
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Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Set-up & Shaft Excavation	Cranes	1	4.00	231	0.29
Site Set-up & Shaft Excavation	Dumpers/Tenders	1	8.00	16	0.38
Site Set-up & Shaft Excavation	Excavators	1	8.00	158	0.38
Site Set-up & Shaft Excavation	Forklifts	1	8.00	89	0.20
Site Set-up & Shaft Excavation	Graders	0	0.00	187	0.41
Site Set-up & Shaft Excavation	Other Construction Equipment	1	8.00	172	0.42
Site Set-up & Shaft Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Site Set-up & Shaft Excavation	Signal Boards	2	8.00	6	0.82
Site Set-up & Shaft Excavation	Sweepers/Scrubbers	1	2.00	64	0.46
Site Set-up & Shaft Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Setup within Shaft	Cement and Mortar Mixers	1	1.50	9	0.56
Setup within Shaft	Concrete/Industrial Saws	0	0.00	81	0.73
Setup within Shaft	Cranes	1	4.00	231	0.29
Setup within Shaft	Dumpers/Tenders	1	8.00	16	0.38
Setup within Shaft	Forklifts	1	8.00	89	0.20
Setup within Shaft	Other General Industrial Equipment	1	8.00	88	0.34
Setup within Shaft	Rubber Tired Dozers	0	0.00	247	0.40
Setup within Shaft	Signal Boards	2	8.00	6	0.82
Setup within Shaft	Sweepers/Scrubbers	1	2.00	64	0.46
Setup within Shaft	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Prelaunch	Cranes	1	4.00	231	0.29

Prelaunch	Forklifts	1	8.00	89	0.20
Prelaunch	Generator Sets	1	4.00	84	0.74
Prelaunch	Other Construction Equipment	1	8.00	172	0.42
Prelaunch	Other General Industrial Equipment	1	8.00	88	0.34
Prelaunch	Signal Boards	2	8.00	6	0.82
Prelaunch	Sweepers/Scrubbers	1	2.00	64	0.46
Prelaunch	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Cement and Mortar Mixers	0	0.00	9	0.56
Microtunneling	Cranes	1	4.00	231	0.29
Microtunneling	Dumpers/Tenders	1	8.00	16	0.38
Microtunneling	Generator Sets	3	8.00	84	0.74
Microtunneling	Other Construction Equipment	1	4.00	172	0.42
Microtunneling	Other General Industrial Equipment	4	8.00	88	0.34
Microtunneling	Pavers	0	0.00	130	0.42
Microtunneling	Pumps	3	8.00	84	0.74
Microtunneling	Rollers	0	0.00	80	0.38
Microtunneling	Signal Boards	2	8.00	6	0.82
Microtunneling	Sweepers/Scrubbers	1	2.00	64	0.46
Microtunneling	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Welders	1	4.00	46	0.45
Machine Recovery/Contact Grouting	Air Compressors	0	0.00	78	0.48
Machine Recovery/Contact Grouting	Cement and Mortar Mixers	1	8.00	9	0.56
Machine Recovery/Contact Grouting	Cranes	1	4.00	231	0.29
Machine Recovery/Contact Grouting	Forklifts	1	8.00	89	0.20
Machine Recovery/Contact Grouting	Other Construction Equipment	1	8.00	172	0.42
Machine Recovery/Contact Grouting	Pavers	0	0.00	130	0.42
Machine Recovery/Contact Grouting	Pumps	2	8.00	84	0.74
Machine Recovery/Contact Grouting	Rollers	0	0.00	80	0.38
Machine Recovery/Contact Grouting	Signal Boards	2	8.00	6	0.82
Machine Recovery/Contact Grouting	Sweepers/Scrubbers	1	2.00	64	0.46

Machine Recovery/Contact Grouting UPRR	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Shaft Restoration/Grouting/Paving UPRR	Cement and Mortar Mixers	1	0.40	9	0.56
Shaft Restoration/Grouting/Paving UPRR	Dumpers/Tenders	1	8.00	16	0.38
Shaft Restoration/Grouting/Paving UPRR	Forklifts	1	8.00	89	0.20
Shaft Restoration/Grouting/Paving UPRR	Other Construction Equipment	1	8.00	172	0.42
Shaft Restoration/Grouting/Paving UPRR	Pavers	1	0.40	130	0.42
Shaft Restoration/Grouting/Paving UPRR	Paving Equipment	1	0.40	132	0.36
Shaft Restoration/Grouting/Paving UPRR	Rollers	1	0.40	80	0.38
Shaft Restoration/Grouting/Paving UPRR	Signal Boards	2	8.00	6	0.82
Shaft Restoration/Grouting/Paving UPRR	Sweepers/Scrubbers	1	2.00	64	0.46
Shaft Restoration/Grouting/Paving UPRR	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Set-up & Shaft Excavation	10	25.00	0.00	139.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Setup within Shaft	9	23.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Prelaunch	8	20.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Microtunneling	17	43.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Machine Recovery/Contact Shaft	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Restoration/Grouting/Paving	11	28.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Set-up & Shaft Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5300e-003	0.0442	0.0381	6.0000e-005		2.4600e-003	2.4600e-003		2.2700e-003	2.2700e-003	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479
Total	4.5300e-003	0.0442	0.0381	6.0000e-005	2.7000e-004	2.4600e-003	2.7300e-003	3.0000e-005	2.2700e-003	2.3000e-003	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.8000e-004	0.0202	4.1300e-003	5.0000e-005	1.1800e-003	7.0000e-005	1.2400e-003	3.2000e-004	6.0000e-005	3.9000e-004	0.0000	5.3008	5.3008	2.4000e-004	0.0000	5.3069
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	1.5000e-004	1.5600e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4251	0.4251	1.0000e-005	0.0000	0.4254
Total	7.9000e-004	0.0203	5.6900e-003	5.0000e-005	1.6800e-003	7.0000e-005	1.7400e-003	4.5000e-004	6.0000e-005	5.2000e-004	0.0000	5.7259	5.7259	2.5000e-004	0.0000	5.7322

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Category	tons/yr										MT/yr					
Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.1000e-004	0.0232	0.0403	6.0000e-005		1.2000e-004	1.2000e-004		1.2000e-004	1.2000e-004	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479
Total	9.1000e-004	0.0232	0.0403	6.0000e-005	1.2000e-004	1.2000e-004	2.4000e-004	1.0000e-005	1.2000e-004	1.3000e-004	0.0000	5.2078	5.2078	1.6100e-003	0.0000	5.2479

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.8000e-004	0.0202	4.1300e-003	5.0000e-005	1.1800e-003	7.0000e-005	1.2400e-003	3.2000e-004	6.0000e-005	3.9000e-004	0.0000	5.3008	5.3008	2.4000e-004	0.0000	5.3069
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1000e-004	1.5000e-004	1.5600e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4251	0.4251	1.0000e-005	0.0000	0.4254
Total	7.9000e-004	0.0203	5.6900e-003	5.0000e-005	1.6800e-003	7.0000e-005	1.7400e-003	4.5000e-004	6.0000e-005	5.2000e-004	0.0000	5.7259	5.7259	2.5000e-004	0.0000	5.7322

3.3 Setup within Shaft - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1600e-003	0.0202	0.0158	3.0000e-005		1.1800e-003	1.1800e-003		1.1000e-003	1.1000e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Total	2.1600e-003	0.0202	0.0158	3.0000e-005	6.0000e-005	1.1800e-003	1.2400e-003	1.0000e-005	1.1000e-003	1.1100e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
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Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5000e-004	8.5500e-003	0.0149	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	4.5000e-004	8.5500e-003	0.0149	3.0000e-005	3.0000e-005	6.0000e-005	9.0000e-005	0.0000	6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

3.4 Prelaunch - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361
Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361

Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888
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3.5 Microtunneling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0323	0.2810	0.2679	4.5000e-004		0.0167	0.0167		0.0161	0.0161	0.0000	38.3326	38.3326	5.2900e-003	0.0000	38.4648
Total	0.0323	0.2810	0.2679	4.5000e-004		0.0167	0.0167		0.0161	0.0161	0.0000	38.3326	38.3326	5.2900e-003	0.0000	38.4648

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	7.7000e-004	8.0700e-003	2.0000e-005	2.5600e-003	2.0000e-005	2.5700e-003	6.8000e-004	2.0000e-005	7.0000e-004	0.0000	2.1935	2.1935	5.0000e-005	0.0000	2.1948
Total	1.0700e-003	7.7000e-004	8.0700e-003	2.0000e-005	2.5600e-003	2.0000e-005	2.5700e-003	6.8000e-004	2.0000e-005	7.0000e-004	0.0000	2.1935	2.1935	5.0000e-005	0.0000	2.1948

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0900e-003	0.1643	0.2795	4.5000e-004		8.8000e-004	8.8000e-004		8.8000e-004	8.8000e-004	0.0000	38.3326	38.3326	5.2900e-003	0.0000	38.4647
Total	8.0900e-003	0.1643	0.2795	4.5000e-004		8.8000e-004	8.8000e-004		8.8000e-004	8.8000e-004	0.0000	38.3326	38.3326	5.2900e-003	0.0000	38.4647

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	7.7000e-004	8.0700e-003	2.0000e-005	2.5600e-003	2.0000e-005	2.5700e-003	6.8000e-004	2.0000e-005	7.0000e-004	0.0000	2.1935	2.1935	5.0000e-005	0.0000	2.1948
Total	1.0700e-003	7.7000e-004	8.0700e-003	2.0000e-005	2.5600e-003	2.0000e-005	2.5700e-003	6.8000e-004	2.0000e-005	7.0000e-004	0.0000	2.1935	2.1935	5.0000e-005	0.0000	2.1948

3.6 Machine Recovery/Contact Grouting - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Off-Road	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

3.7 Shaft Restoration/Grouting/Paving UPRR - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0228	0.2156	0.1863	2.8000e-004		0.0124	0.0124		0.0115	0.0115	0.0000	24.0664	24.0664	7.1400e-003	0.0000	24.2450
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0228	0.2156	0.1863	2.8000e-004		0.0124	0.0124		0.0115	0.0115	0.0000	24.0664	24.0664	7.1400e-003	0.0000	24.2450

Unmitigated Construction Off-Site

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.8600e-003	1.3400e-003	0.0140	4.0000e-005	4.4400e-003	3.0000e-005	4.4700e-003	1.1800e-003	3.0000e-005	1.2100e-003	0.0000	3.8088	3.8088	9.0000e-005	0.0000	3.8112
Total	1.8600e-003	1.3400e-003	0.0140	4.0000e-005	4.4400e-003	3.0000e-005	4.4700e-003	1.1800e-003	3.0000e-005	1.2100e-003	0.0000	3.8088	3.8088	9.0000e-005	0.0000	3.8112

Sewer Trunk South of Highland, Phase 2 - Miller Branch Crossing - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 2 - Miller Branch Crossing

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.02	User Defined Unit	0.02	1,125.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenchless acreage

Construction Phase - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Off-road Equipment - Applicant provided construction worksheet

Trips and VMT - 665cy hauling during site setup = 160 one-way trips, 27cy pavement demo during setup within shaft = 6 one-way trips, 4 one-way cement trips, 4 one-way carbonyl trips
Grading - Import 568cy export 638cy during setup within shaft phase

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	1.00	4.00
tblConstructionPhase	NumDays	2.00	4.00
tblConstructionPhase	NumDays	5.00	8.00
tblConstructionPhase	NumDays	5.00	20.00
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	MaterialExported	0.00	638.00
tblGrading	MaterialImported	0.00	568.00
tblLandUse	LandUseSquareFeet	0.00	1,125.00
tblLandUse	LotAcreage	0.00	0.02
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	6.00	0.80
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.80
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.80
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	160.00
tblTripsAndVMT	HaulingTripNumber	151.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00

2.0 Emissions Summary

2.1 Overall Construction
Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0478	0.4371	0.3862	7.1000e-004	7.1200e-003	0.0237	0.0308	1.8600e-003	0.0224	0.0243	0.0000	61.9352	61.9352	0.0111	0.0000	62.2133
Maximum	0.0478	0.4371	0.3862	7.1000e-004	7.1200e-003	0.0237	0.0308	1.8600e-003	0.0224	0.0243	0.0000	61.9352	61.9352	0.0111	0.0000	62.2133

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0127	0.2450	0.3956	7.1000e-004	6.9400e-003	1.3500e-003	8.2900e-003	1.8300e-003	1.3400e-003	3.1700e-003	0.0000	61.9351	61.9351	0.0111	0.0000	62.2133
Maximum	0.0127	0.2450	0.3956	7.1000e-004	6.9400e-003	1.3500e-003	8.2900e-003	1.8300e-003	1.3400e-003	3.1700e-003	0.0000	61.9351	61.9351	0.0111	0.0000	62.2133

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	73.48	43.95	-2.44	0.00	2.53	94.30	73.10	1.61	94.03	86.95	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-29-2020	9-30-2020	0.3897	0.2136
		Highest	0.3897	0.2136

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Set-up & Shaft Excavation	Site Preparation	8/29/2020	9/3/2020	5	4	
2	Setup within Shaft	Grading	9/3/2020	9/8/2020	5	4	
3	Prelaunch	Trenching	9/8/2020	9/10/2020	5	3	
4	Microtunneling	Trenching	9/11/2020	9/22/2020	5	8	
5	Machine Recovery/Contact Grouting	Paving	9/19/2020	9/30/2020	5	8	
6	Shaft Restoration/Grouting/Paving	Paving	9/28/2020	10/23/2020	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Set-up & Shaft Excavation	Cranes	1	4.00	231	0.29
Site Set-up & Shaft Excavation	Dumpers/Tenders	1	8.00	16	0.38
Site Set-up & Shaft Excavation	Excavators	1	8.00	158	0.38
Site Set-up & Shaft Excavation	Forklifts	1	8.00	89	0.20
Site Set-up & Shaft Excavation	Graders	0	0.00	187	0.41
Site Set-up & Shaft Excavation	Other Construction Equipment	1	8.00	172	0.42
Site Set-up & Shaft Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Site Set-up & Shaft Excavation	Signal Boards	2	8.00	6	0.82
Site Set-up & Shaft Excavation	Sweepers/Scrubbers	1	2.00	64	0.46
Site Set-up & Shaft Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Setup within Shaft	Cement and Mortar Mixers	1	1.50	9	0.56
Setup within Shaft	Concrete/Industrial Saws	0	0.00	81	0.73
Setup within Shaft	Cranes	1	4.00	231	0.29
Setup within Shaft	Dumpers/Tenders	1	8.00	16	0.38
Setup within Shaft	Forklifts	1	8.00	89	0.20
Setup within Shaft	Other General Industrial Equipment	1	8.00	88	0.34
Setup within Shaft	Rubber Tired Dozers	0	0.00	247	0.40
Setup within Shaft	Signal Boards	2	8.00	6	0.82
Setup within Shaft	Sweepers/Scrubbers	1	2.00	64	0.46
Setup within Shaft	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Prelaunch	Cranes	1	4.00	231	0.29
Prelaunch	Forklifts	1	8.00	89	0.20

Prelaunch	Generator Sets	1	4.00	84	0.74
Prelaunch	Other Construction Equipment	1	8.00	172	0.42
Prelaunch	Other General Industrial Equipment	1	8.00	88	0.34
Prelaunch	Signal Boards	2	8.00	6	0.82
Prelaunch	Sweepers/Scrubbers	1	2.00	64	0.46
Prelaunch	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Cement and Mortar Mixers	0	0.00	9	0.56
Microtunneling	Cranes	1	4.00	231	0.29
Microtunneling	Dumpers/Tenders	1	8.00	16	0.38
Microtunneling	Generator Sets	3	8.00	84	0.74
Microtunneling	Other Construction Equipment	1	4.00	172	0.42
Microtunneling	Other General Industrial Equipment	4	8.00	88	0.34
Microtunneling	Pavers	0	0.00	130	0.42
Microtunneling	Pumps	3	8.00	84	0.74
Microtunneling	Rollers	0	0.00	80	0.38
Microtunneling	Signal Boards	2	8.00	6	0.82
Microtunneling	Sweepers/Scrubbers	1	2.00	64	0.46
Microtunneling	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Welders	1	4.00	46	0.45
Machine Recovery/Contact Grouting	Air Compressors	0	0.00	78	0.48
Machine Recovery/Contact Grouting	Cement and Mortar Mixers	1	8.00	9	0.56
Machine Recovery/Contact Grouting	Cranes	1	4.00	231	0.29
Machine Recovery/Contact Grouting	Forklifts	1	8.00	89	0.20
Machine Recovery/Contact Grouting	Other Construction Equipment	1	8.00	172	0.42
Machine Recovery/Contact Grouting	Pavers	0	0.00	130	0.42
Machine Recovery/Contact Grouting	Pumps	2	8.00	84	0.74
Machine Recovery/Contact Grouting	Rollers	0	0.00	80	0.38
Machine Recovery/Contact Grouting	Signal Boards	2	8.00	6	0.82
Machine Recovery/Contact Grouting	Sweepers/Scrubbers	1	2.00	64	0.46
Machine Recovery/Contact Grouting	Tractors/Loaders/Backhoes	0	0.00	97	0.37

Shaft Restoration/Grouting/Paving UPRR	Cement and Mortar Mixers	1	0.80	9	0.56
Shaft Restoration/Grouting/Paving UPRR	Dumpers/Tenders	1	8.00	16	0.38
Shaft Restoration/Grouting/Paving UPRR	Forklifts	1	8.00	89	0.20
Shaft Restoration/Grouting/Paving UPRR	Other Construction Equipment	1	8.00	172	0.42
Shaft Restoration/Grouting/Paving UPRR	Pavers	1	0.80	130	0.42
Shaft Restoration/Grouting/Paving UPRR	Paving Equipment	1	0.80	132	0.36
Shaft Restoration/Grouting/Paving UPRR	Rollers	1	0.80	80	0.38
Shaft Restoration/Grouting/Paving UPRR	Signal Boards	2	8.00	6	0.82
Shaft Restoration/Grouting/Paving UPRR	Sweepers/Scrubbers	1	2.00	64	0.46
Shaft Restoration/Grouting/Paving UPRR	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Set-up & Shaft Excavation	10	25.00	0.00	160.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Setup within Shaft	9	23.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Prelaunch	8	20.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Microtunneling	17	43.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Machine Recovery/Contact	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Shaft Restoration/Grouting/Paving	11	28.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Set-up & Shaft Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.6200e-003	0.0353	0.0305	5.0000e-005		1.9700e-003	1.9700e-003		1.8200e-003	1.8200e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984
Total	3.6200e-003	0.0353	0.0305	5.0000e-005	2.7000e-004	1.9700e-003	2.2400e-003	3.0000e-005	1.8200e-003	1.8500e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.6000e-004	0.0232	4.7500e-003	6.0000e-005	1.3600e-003	8.0000e-005	1.4300e-003	3.7000e-004	7.0000e-005	4.5000e-004	0.0000	6.1017	6.1017	2.8000e-004	0.0000	6.1086
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	8.3000e-004	0.0233	6.0000e-003	6.0000e-005	1.7600e-003	8.0000e-005	1.8300e-003	4.8000e-004	7.0000e-005	5.6000e-004	0.0000	6.4417	6.4417	2.9000e-004	0.0000	6.4489

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3000e-004	0.0186	0.0322	5.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983
Total	7.3000e-004	0.0186	0.0322	5.0000e-005	1.2000e-004	1.0000e-004	2.2000e-004	1.0000e-005	1.0000e-004	1.1000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.6000e-004	0.0232	4.7500e-003	6.0000e-005	1.3600e-003	8.0000e-005	1.4300e-003	3.7000e-004	7.0000e-005	4.5000e-004	0.0000	6.1017	6.1017	2.8000e-004	0.0000	6.1086
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	8.3000e-004	0.0233	6.0000e-003	6.0000e-005	1.7600e-003	8.0000e-005	1.8300e-003	4.8000e-004	7.0000e-005	5.6000e-004	0.0000	6.4417	6.4417	2.9000e-004	0.0000	6.4489

3.3 Setup within Shaft - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.0000e-005	0.0000	7.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.1600e-003	0.0202	0.0158	3.0000e-005		1.1800e-003	1.1800e-003		1.1000e-003	1.1000e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	2.1600e-003	0.0202	0.0158	3.0000e-005	7.0000e-005	1.1800e-003	1.2500e-003	1.0000e-005	1.1000e-003	1.1100e-003	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.5000e-004	8.5500e-003	0.0149	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056
Total	4.5000e-004	8.5500e-003	0.0149	3.0000e-005	3.0000e-005	6.0000e-005	9.0000e-005	0.0000	6.0000e-005	6.0000e-005	0.0000	2.1896	2.1896	6.4000e-004	0.0000	2.2056

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.1000e-004	1.1500e-003	0.0000	3.6000e-004	0.0000	3.7000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3129	0.3129	1.0000e-005	0.0000	0.3131
Total	1.9000e-004	1.5600e-003	1.4500e-003	0.0000	4.4000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.3000e-004	0.0000	0.6942	0.6942	3.0000e-005	0.0000	0.6949

3.4 Prelaunch - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.2200e-003	0.0216	0.0170	3.0000e-005		1.2200e-003	1.2200e-003		1.1400e-003	1.1400e-003	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915
Total	2.2200e-003	0.0216	0.0170	3.0000e-005		1.2200e-003	1.2200e-003		1.1400e-003	1.1400e-003	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	7.0000e-005	7.5000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.2040	0.2040	1.0000e-005	0.0000	0.2042
Total	1.2000e-004	6.5000e-004	8.7000e-004	0.0000	2.7000e-004	0.0000	2.8000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.3566	0.3566	2.0000e-005	0.0000	0.3569

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.4000e-004	0.0103	0.0178	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915
Total	4.4000e-004	0.0103	0.0178	3.0000e-005		6.0000e-005	6.0000e-005		6.0000e-005	6.0000e-005	0.0000	2.3758	2.3758	6.3000e-004	0.0000	2.3915

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-004	7.0000e-005	7.5000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.2040	0.2040	1.0000e-005	0.0000	0.2042
Total	1.2000e-004	6.5000e-004	8.7000e-004	0.0000	2.7000e-004	0.0000	2.8000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.3566	0.3566	2.0000e-005	0.0000	0.3569

3.5 Microtunneling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0172	0.1498	0.1429	2.4000e-004		8.8800e-003	8.8800e-003		8.5900e-003	8.5900e-003	0.0000	20.4441	20.4441	2.8200e-003	0.0000	20.5146
Total	0.0172	0.1498	0.1429	2.4000e-004		8.8800e-003	8.8800e-003		8.5900e-003	8.5900e-003	0.0000	20.4441	20.4441	2.8200e-003	0.0000	20.5146

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706
Total	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.3100e-003	0.0877	0.1491	2.4000e-004		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	20.4440	20.4440	2.8200e-003	0.0000	20.5145
Total	4.3100e-003	0.0877	0.1491	2.4000e-004		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	20.4440	20.4440	2.8200e-003	0.0000	20.5145

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706
Total	5.7000e-004	4.1000e-004	4.3000e-003	1.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1699	1.1699	3.0000e-005	0.0000	1.1706

3.6 Machine Recovery/Contact Grouting - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

3.7 Shaft Restoration/Grouting/Paving UPRR - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0118	0.1115	0.0970	1.5000e-004		6.3800e-003	6.3800e-003		5.9000e-003	5.9000e-003	0.0000	12.5568	12.5568	3.7400e-003	0.0000	12.6502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0118	0.1115	0.0970	1.5000e-004		6.3800e-003	6.3800e-003		5.9000e-003	5.9000e-003	0.0000	12.5568	12.5568	3.7400e-003	0.0000	12.6502

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Worker	9.3000e-004	6.7000e-004	7.0100e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2400e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9044	1.9044	5.0000e-005	0.0000	1.9056
Total	9.3000e-004	6.7000e-004	7.0100e-003	2.0000e-005	2.2200e-003	1.0000e-005	2.2400e-003	5.9000e-004	1.0000e-005	6.0000e-004	0.0000	1.9044	1.9044	5.0000e-005	0.0000	1.9056

Sewer Trunk South of Highland, Phase 2 - US 101 Crossing - Santa Clara County, Annual

Sewer Trunk South of Highland, Phase 2 - US 101 Crossing

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	0.07	User Defined Unit	0.07	2,850.00	0

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	58
Climate Zone	4			Operational Year	2021
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MW hr)	290	CH4 Intensity (lb/MW hr)	0.029	N2O Intensity (lb/MW hr)	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - Trenchless acreage

Construction Phase - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Off-road Equipment - Applicant provided construcion worksheet

Trips and VMT - 745cy hauling during site setup = 179 one-way trips, 27cy pavement demo during setup within shaft = 6 one-way trips, 4 one-way cement trips, 4 one-way concrete trips
Grading - Import 541cy export 718cy during setup within shaft phase

Construction Off-road Equipment Mitigation - BMPs, Tier 4 Interim Mitigation

[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	1.00	4.00
tblConstructionPhase	NumDays	2.00	5.00
tblConstructionPhase	NumDays	5.00	8.00
tblConstructionPhase	NumDays	5.00	40.00
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	MaterialExported	0.00	718.00
tblGrading	MaterialImported	0.00	541.00
tblLandUse	LandUseSquareFeet	0.00	2,850.00
tblLandUse	LotAcreage	0.00	0.07
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	6.00	0.40
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.40
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	0.40
tblOffRoadEquipment	UsageHours	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	0.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblTripsAndVMT	HaulingTripNumber	0.00	179.00
tblTripsAndVMT	HaulingTripNumber	157.00	10.00
tblTripsAndVMT	HaulingTripNumber	0.00	4.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0841	0.7490	0.6838	1.2200e-003	0.0114	0.0418	0.0532	3.0000e-003	0.0397	0.0427	0.0000	105.5586	105.5586	0.0185	0.0000	106.0206
Maximum	0.0841	0.7490	0.6838	1.2200e-003	0.0114	0.0418	0.0532	3.0000e-003	0.0397	0.0427	0.0000	105.5586	105.5586	0.0185	0.0000	106.0206

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0223	0.4178	0.6989	1.2200e-003	0.0112	2.3500e-003	0.0136	2.9600e-003	2.3400e-003	5.3000e-003	0.0000	105.5584	105.5584	0.0185	0.0000	106.0205
Maximum	0.0223	0.4178	0.6989	1.2200e-003	0.0112	2.3500e-003	0.0136	2.9600e-003	2.3400e-003	5.3000e-003	0.0000	105.5584	105.5584	0.0185	0.0000	106.0205

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	73.45	44.22	-2.21	0.00	1.58	94.38	74.52	1.33	94.11	87.59	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-29-2020	9-30-2020	0.0828	0.0546
		Highest	0.0828	0.0546

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Set-up & Shaft Excavation	Site Preparation	9/23/2020	9/28/2020	5	4	
2	Setup within Shaft	Grading	9/28/2020	10/2/2020	5	5	
3	Prelaunch	Trenching	10/3/2020	10/6/2020	5	2	
4	Microtunneling	Trenching	10/6/2020	10/30/2020	5	19	
5	Machine Recovery/Contact Grouting	Paving	10/26/2020	11/4/2020	5	8	
6	Shaft Restoration/Grouting/Paving	Paving	11/4/2020	12/29/2020	5	40	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Set-up & Shaft Excavation	Cranes	1	4.00	231	0.29
Site Set-up & Shaft Excavation	Dumpers/Tenders	1	8.00	16	0.38
Site Set-up & Shaft Excavation	Excavators	1	8.00	158	0.38
Site Set-up & Shaft Excavation	Forklifts	1	8.00	89	0.20
Site Set-up & Shaft Excavation	Graders	0	0.00	187	0.41
Site Set-up & Shaft Excavation	Other Construction Equipment	1	8.00	172	0.42
Site Set-up & Shaft Excavation	Other General Industrial Equipment	1	8.00	88	0.34
Site Set-up & Shaft Excavation	Signal Boards	2	8.00	6	0.82
Site Set-up & Shaft Excavation	Sweepers/Scrubbers	1	2.00	64	0.46
Site Set-up & Shaft Excavation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Setup within Shaft	Cement and Mortar Mixers	1	1.50	9	0.56
Setup within Shaft	Concrete/Industrial Saws	0	0.00	81	0.73
Setup within Shaft	Cranes	1	4.00	231	0.29
Setup within Shaft	Dumpers/Tenders	1	8.00	16	0.38
Setup within Shaft	Forklifts	1	8.00	89	0.20
Setup within Shaft	Other General Industrial Equipment	1	8.00	88	0.34
Setup within Shaft	Rubber Tired Dozers	0	0.00	247	0.40
Setup within Shaft	Signal Boards	2	8.00	6	0.82
Setup within Shaft	Sweepers/Scrubbers	1	2.00	64	0.46
Setup within Shaft	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Prelaunch	Cranes	1	4.00	231	0.29
Prelaunch	Forklifts	1	8.00	89	0.20

Prelaunch	Generator Sets	1	4.00	84	0.74
Prelaunch	Other Construction Equipment	1	8.00	172	0.42
Prelaunch	Other General Industrial Equipment	1	8.00	88	0.34
Prelaunch	Signal Boards	2	8.00	6	0.82
Prelaunch	Sweepers/Scrubbers	1	2.00	64	0.46
Prelaunch	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Cement and Mortar Mixers	0	0.00	9	0.56
Microtunneling	Cranes	1	4.00	231	0.29
Microtunneling	Dumpers/Tenders	1	8.00	16	0.38
Microtunneling	Generator Sets	3	8.00	84	0.74
Microtunneling	Other Construction Equipment	1	4.00	172	0.42
Microtunneling	Other General Industrial Equipment	4	8.00	88	0.34
Microtunneling	Pavers	0	0.00	130	0.42
Microtunneling	Pumps	3	8.00	84	0.74
Microtunneling	Rollers	0	0.00	80	0.38
Microtunneling	Signal Boards	2	8.00	6	0.82
Microtunneling	Sweepers/Scrubbers	1	2.00	64	0.46
Microtunneling	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Microtunneling	Welders	1	4.00	46	0.45
Machine Recovery/Contact Grouting	Air Compressors	0	0.00	78	0.48
Machine Recovery/Contact Grouting	Cement and Mortar Mixers	1	8.00	9	0.56
Machine Recovery/Contact Grouting	Cranes	1	4.00	231	0.29
Machine Recovery/Contact Grouting	Forklifts	1	8.00	89	0.20
Machine Recovery/Contact Grouting	Other Construction Equipment	1	8.00	172	0.42
Machine Recovery/Contact Grouting	Pavers	0	0.00	130	0.42
Machine Recovery/Contact Grouting	Pumps	2	8.00	84	0.74
Machine Recovery/Contact Grouting	Rollers	0	0.00	80	0.38
Machine Recovery/Contact Grouting	Signal Boards	2	8.00	6	0.82
Machine Recovery/Contact Grouting	Sweepers/Scrubbers	1	2.00	64	0.46
Machine Recovery/Contact Grouting	Tractors/Loaders/Backhoes	0	0.00	97	0.37

Shaft Restoration/Grouting/Paving UPRR	Cement and Mortar Mixers	1	0.40	9	0.56
Shaft Restoration/Grouting/Paving UPRR	Dumpers/Tenders	1	8.00	16	0.38
Shaft Restoration/Grouting/Paving UPRR	Forklifts	1	8.00	89	0.20
Shaft Restoration/Grouting/Paving UPRR	Other Construction Equipment	1	8.00	172	0.42
Shaft Restoration/Grouting/Paving UPRR	Pavers	1	0.40	130	0.42
Shaft Restoration/Grouting/Paving UPRR	Paving Equipment	1	0.40	132	0.36
Shaft Restoration/Grouting/Paving UPRR	Rollers	1	0.40	80	0.38
Shaft Restoration/Grouting/Paving UPRR	Signal Boards	2	8.00	6	0.82
Shaft Restoration/Grouting/Paving UPRR	Sweepers/Scrubbers	1	2.00	64	0.46
Shaft Restoration/Grouting/Paving UPRR	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Set-up & Shaft Excavation	10	25.00	0.00	179.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Setup within Shaft	9	23.00	0.00	10.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Prelaunch	8	20.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Microtunneling	17	43.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Machine Recovery/Contact	9	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Shaft Restoration/Grouting/Paving	11	28.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Set-up & Shaft Excavation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.6200e-003	0.0353	0.0305	5.0000e-005		1.9700e-003	1.9700e-003		1.8200e-003	1.8200e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984
Total	3.6200e-003	0.0353	0.0305	5.0000e-005	2.7000e-004	1.9700e-003	2.2400e-003	3.0000e-005	1.8200e-003	1.8500e-003	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1984

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.4000e-004	0.0260	5.3200e-003	7.0000e-005	1.5200e-003	8.0000e-005	1.6000e-003	4.2000e-004	8.0000e-005	5.0000e-004	0.0000	6.8262	6.8262	3.1000e-004	0.0000	6.8340
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	9.1000e-004	0.0261	6.5700e-003	7.0000e-005	1.9200e-003	8.0000e-005	2.0000e-003	5.3000e-004	8.0000e-005	6.1000e-004	0.0000	7.1663	7.1663	3.2000e-004	0.0000	7.1743

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3000e-004	0.0186	0.0322	5.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983
Total	7.3000e-004	0.0186	0.0322	5.0000e-005	1.2000e-004	1.0000e-004	2.2000e-004	1.0000e-005	1.0000e-004	1.1000e-004	0.0000	4.1662	4.1662	1.2800e-003	0.0000	4.1983

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.4000e-004	0.0260	5.3200e-003	7.0000e-005	1.5200e-003	8.0000e-005	1.6000e-003	4.2000e-004	8.0000e-005	5.0000e-004	0.0000	6.8262	6.8262	3.1000e-004	0.0000	6.8340
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2500e-003	0.0000	4.0000e-004	0.0000	4.0000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3401	0.3401	1.0000e-005	0.0000	0.3403
Total	9.1000e-004	0.0261	6.5700e-003	7.0000e-005	1.9200e-003	8.0000e-005	2.0000e-003	5.3000e-004	8.0000e-005	6.1000e-004	0.0000	7.1663	7.1663	3.2000e-004	0.0000	7.1743

3.3 Setup within Shaft - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.0000e-005	0.0000	7.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.7100e-003	0.0252	0.0198	3.0000e-005		1.4800e-003	1.4800e-003		1.3700e-003	1.3700e-003	0.0000	2.7370	2.7370	8.0000e-004	0.0000	2.7570
Total	2.7100e-003	0.0252	0.0198	3.0000e-005	7.0000e-005	1.4800e-003	1.5500e-003	1.0000e-005	1.3700e-003	1.3800e-003	0.0000	2.7370	2.7370	8.0000e-004	0.0000	2.7570

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.4000e-004	1.4400e-003	0.0000	4.6000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.3911	0.3911	1.0000e-005	0.0000	0.3913
Total	2.3000e-004	1.5900e-003	1.7400e-003	0.0000	5.4000e-004	0.0000	5.5000e-004	1.4000e-004	0.0000	1.5000e-004	0.0000	0.7724	0.7724	3.0000e-005	0.0000	0.7731

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.6000e-004	0.0107	0.0187	3.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	2.7370	2.7370	8.0000e-004	0.0000	2.7570
Total	5.6000e-004	0.0107	0.0187	3.0000e-005	3.0000e-005	8.0000e-005	1.1000e-004	0.0000	8.0000e-005	8.0000e-005	0.0000	2.7370	2.7370	8.0000e-004	0.0000	2.7570

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.4500e-003	3.0000e-004	0.0000	8.0000e-005	0.0000	9.0000e-005	2.0000e-005	0.0000	3.0000e-005	0.0000	0.3814	0.3814	2.0000e-005	0.0000	0.3818
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.4000e-004	1.4400e-003	0.0000	4.6000e-004	0.0000	4.6000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.3911	0.3911	1.0000e-005	0.0000	0.3913
Total	2.3000e-004	1.5900e-003	1.7400e-003	0.0000	5.4000e-004	0.0000	5.5000e-004	1.4000e-004	0.0000	1.5000e-004	0.0000	0.7724	0.7724	3.0000e-005	0.0000	0.7731

3.4 Prelaunch - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	1.4800e-003	0.0144	0.0113	2.0000e-005		8.1000e-004	8.1000e-004		7.6000e-004	7.6000e-004	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361
Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943
Total	2.9000e-004	6.8300e-003	0.0119	2.0000e-005		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	1.5839	1.5839	4.2000e-004	0.0000	1.5943

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	5.8000e-004	1.2000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1525	0.1525	1.0000e-005	0.0000	0.1527
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	5.0000e-005	5.0000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1360	0.1360	0.0000	0.0000	0.1361
Total	9.0000e-005	6.3000e-004	6.2000e-004	0.0000	1.9000e-004	0.0000	2.0000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.2886	0.2886	1.0000e-005	0.0000	0.2888

3.5 Microtunneling - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0409	0.3559	0.3393	5.7000e-004		0.0211	0.0211		0.0204	0.0204	0.0000	48.5546	48.5546	6.7000e-003	0.0000	48.7221
Total	0.0409	0.3559	0.3393	5.7000e-004		0.0211	0.0211		0.0204	0.0204	0.0000	48.5546	48.5546	6.7000e-003	0.0000	48.7221

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	9.8000e-004	0.0102	3.0000e-005	3.2400e-003	2.0000e-005	3.2600e-003	8.6000e-004	2.0000e-005	8.8000e-004	0.0000	2.7784	2.7784	7.0000e-005	0.0000	2.7801
Total	1.3600e-003	9.8000e-004	0.0102	3.0000e-005	3.2400e-003	2.0000e-005	3.2600e-003	8.6000e-004	2.0000e-005	8.8000e-004	0.0000	2.7784	2.7784	7.0000e-005	0.0000	2.7801

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0103	0.2082	0.3541	5.7000e-004		1.1100e-003	1.1100e-003		1.1100e-003	1.1100e-003	0.0000	48.5546	48.5546	6.7000e-003	0.0000	48.7220
Total	0.0103	0.2082	0.3541	5.7000e-004		1.1100e-003	1.1100e-003		1.1100e-003	1.1100e-003	0.0000	48.5546	48.5546	6.7000e-003	0.0000	48.7220

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3600e-003	9.8000e-004	0.0102	3.0000e-005	3.2400e-003	2.0000e-005	3.2600e-003	8.6000e-004	2.0000e-005	8.8000e-004	0.0000	2.7784	2.7784	7.0000e-005	0.0000	2.7801
Total	1.3600e-003	9.8000e-004	0.0102	3.0000e-005	3.2400e-003	2.0000e-005	3.2600e-003	8.6000e-004	2.0000e-005	8.8000e-004	0.0000	2.7784	2.7784	7.0000e-005	0.0000	2.7801

3.6 Machine Recovery/Contact Grouting - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	7.8100e-003	0.0718	0.0612	1.1000e-004		3.9500e-003	3.9500e-003		3.7800e-003	3.7800e-003	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	1.6600e-003	0.0369	0.0640	1.1000e-004		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	9.0101	9.0101	1.6000e-003	0.0000	9.0502

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261
Total	3.1000e-004	2.2000e-004	2.3000e-003	1.0000e-005	7.3000e-004	0.0000	7.3000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6257	0.6257	2.0000e-005	0.0000	0.6261

3.7 Shaft Restoration/Grouting/Paving UPRR - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0228	0.2156	0.1863	2.8000e-004		0.0124	0.0124		0.0115	0.0115	0.0000	24.0664	24.0664	7.1400e-003	0.0000	24.2450
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0228	0.2156	0.1863	2.8000e-004		0.0124	0.0124		0.0115	0.0115	0.0000	24.0664	24.0664	7.1400e-003	0.0000	24.2450

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Worker	1.8600e-003	1.3400e-003	0.0140	4.0000e-005	4.4400e-003	3.0000e-005	4.4700e-003	1.1800e-003	3.0000e-005	1.2100e-003	0.0000	3.8088	3.8088	9.0000e-005	0.0000	3.8112
Total	1.8600e-003	1.3400e-003	0.0140	4.0000e-005	4.4400e-003	3.0000e-005	4.4700e-003	1.1800e-003	3.0000e-005	1.2100e-003	0.0000	3.8088	3.8088	9.0000e-005	0.0000	3.8112

Attachment 3 Construction Health Risk Calculations

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Trench North

DPM Emissions and Modeling Emission Rates - Unmitigated

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0032	CON_DPM	6.3	0.00217	2.73E-04	2320.1	1.18E-07

Construction Hours

hr/day =	8	(7am - 3pm)
days/yr =	365	
hours/year =	2920	

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Trench North

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0002	0.5	0.00017	2.10E-05	2,320.1	9.04E-09

Construction Hours

hr/day =	8	(7am - 3pm)
days/yr =	365	
hours/year =	2920	

DPM Emissions and Modeling Emission Rates - With Mitigation

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0031	CON_DPM	6.2	0.00213	2.68E-04	2320.1	1.16E-07

Construction Hours

hr/day =	8	(7am - 3pm)
days/yr =	365	
hours/year =	2920	

PM2.5 Fugitive Dust Emissions for Modeling - With Mitigation

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0002	0.4	0.00014	1.73E-05	2,320.1	7.44E-09

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Trench South

DPM Emissions and Modeling Emission Rates - Unmitigated

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0032	CON_DPM	6.3	0.00217	2.73E-04	2544.32	1.07E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Trench South

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0002	0.5	0.00017	2.10E-05	2,544.3	8.25E-09

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

DPM Emissions and Modeling Emission Rates - With Mitigation

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0031	CON_DPM	6.2	0.00213	2.68E-04	2544.32	1.06E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

PM2.5 Fugitive Dust Emissions for Modeling - With Mitigation

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0002	0.4	0.00014	1.73E-05	2,544.3	6.79E-09

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Micro North

DPM Emissions and Modeling Emission Rates - Unmitigated

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0192	CON_DPM	38.3	0.01312	1.65E-03	345.72	4.78E-06

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Micro North

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0016	3.2	0.00110	1.39E-04	345.7	4.02E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

DPM Emissions and Modeling Emission Rates - With Mitigation

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0011	CON_DPM	2.2	0.00075	9.41E-05	345.72	2.72E-07

Construction Hours

hr/day = 8 (7am - 3pm)
days/yr = 365
hours/year = 2920

PM2.5 Fugitive Dust Emissions for Modeling - With Mitigation

							PM2.5	
Construction			Area	PM2.5 Emissions			Modeled	Emission
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	Area (m ²)	Rate g/s/m ²
2020	Construction	CON_FUG	0.0016	3.1	0.00106	1.34E-04	345.7	3.87E-07

Construction Hours

hr/day = 8 (7am - 3pm)
days/yr = 365
hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Micro South

DPM Emissions and Modeling Emission Rates - Unmitigated

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0192	CON_DPM	38.3	0.01312	1.65E-03	622.26	2.66E-06

Construction Hours

hr/day = 8 (7am - 3pm)
days/yr = 365
hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Micro South

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0016	3.2	0.00110	1.39E-04	622.3	2.23E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

DPM Emissions and Modeling Emission Rates - With Mitigation

Construction		DPM	Area	DPM Emissions			Modeled Area	DPM Emission Rate
Year	Activity	(ton/year)	Source	(lb/yr)	(lb/hr)	(g/s)	(m ²)	(g/s/m ²)
2020	Construction	0.0011	CON_DPM	2.2	0.00075	9.41E-05	622.26	1.51E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

PM2.5 Fugitive Dust Emissions for Modeling - With Mitigation

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2020	Construction	CON_FUG	0.0016	3.1	0.00106	1.34E-04	622.3	2.15E-07

Construction Hours

hr/day = 8 (7am - 3pm)
 days/yr = 365
 hours/year = 2920

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA
- Construction Health Impact Summary

Maximum Impacts at MEI Location - Unmitigated

Emissions Year						
	Maximum Concentrations		Cancer Risk (per million)		Hazard Index	Maximum Annual PM2.5 Concentration
	Exhaust PM10/DPM	Fugitive PM2.5				
	(µg/m ³)	(µg/m ³)	Infant/Child	Adult	(-)	(µg/m ³)
2020	0.2251	0.0362	40.0	0.6	0.05	0.25

Maximum Impacts at MEI Location - With Mitigation

Emissions Year						
	Maximum Concentrations		Cancer Risk (per million)		Hazard Index	Maximum Annual PM2.5 Concentration
	Exhaust PM10/DPM	Fugitive PM2.5				
	(µg/m ³)	(µg/m ³)	Infant/Child	Adult	(-)	(µg/m ³)
2020	0.0260	0.0345	4.6	0.1	0.01	0.06

- Trenching Tier 3 Mitigation, Microtunneling Tier 4 Interim Mitigation

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Construction Impacts - Without Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor (mg/kg-day)⁻¹
 ASF = Age sensitivity factor for specified age group
 ED = Exposure duration (years)
 AT = Averaging time for lifetime cancer risk (years)
 FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10⁻⁶

Where: C_{air} = concentration in air (µg/m³)
 DBR = daily breathing rate (L/kg body weight-day)
 A = Inhalation absorption factor
 EF = Exposure frequency (days/year)
 10⁻⁶ = Conversion factor

Values

Age -> Parameter	Infant/Child				Adult
	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information			Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)
			DPM Conc (ug/m3)		Age Sensitivity Factor		Modeled		Age Sensitivity Factor	
			Year	Annual			DPM Conc (ug/m3)			
0	0.25	-0.25 - 0*	2020	0.2251	10	3.06	2020	0.2251	-	-
1	1	0 - 1	2020	0.2251	10	36.97	2020	0.2251	1	0.65
2	1	1 - 2	0	0.0000	10	0.00		0.0000	1	0.00
3	1	2 - 3	0	0.0000	3	0.00		0.0000	1	0.00
4	1	3 - 4	0	0.0000	3	0.00		0.0000	1	0.00
5	1	4 - 5	0	0.0000	3	0.00		0.0000	1	0.00
6	1	5 - 6	0	0.0000	3	0.00		0.0000	1	0.00
7	1	6 - 7	0	0.0000	3	0.00		0.0000	1	0.00
8	1	7 - 8	0	0.0000	3	0.00		0.0000	1	0.00
9	1	8 - 9	0	0.0000	3	0.00		0.0000	1	0.00
10	1	9 - 10	0	0.0000	3	0.00		0.0000	1	0.00
11	1	10 - 11	0	0.0000	3	0.00		0.0000	1	0.00
12	1	11 - 12	0	0.0000	3	0.00		0.0000	1	0.00
13	1	12 - 13	0	0.0000	3	0.00		0.0000	1	0.00
14	1	13 - 14	0	0.0000	3	0.00		0.0000	1	0.00
15	1	14 - 15	0	0.0000	3	0.00		0.0000	1	0.00
16	1	15 - 16	0	0.0000	3	0.00		0.0000	1	0.00
17	1	16-17	0	0.0000	1	0.00		0.0000	1	0.00
18	1	17-18	0	0.0000	1	0.00		0.0000	1	0.00
19	1	18-19	0	0.0000	1	0.00		0.0000	1	0.00
20	1	19-20	0	0.0000	1	0.00		0.0000	1	0.00
21	1	20-21	0	0.0000	1	0.00		0.0000	1	0.00
22	1	21-22	0	0.0000	1	0.00		0.0000	1	0.00
23	1	22-23	0	0.0000	1	0.00		0.0000	1	0.00
24	1	23-24	0	0.0000	1	0.00		0.0000	1	0.00
25	1	24-25	0	0.0000	1	0.00		0.0000	1	0.00
26	1	25-26	0	0.0000	1	0.00		0.0000	1	0.00
27	1	26-27	0	0.0000	1	0.00		0.0000	1	0.00
28	1	27-28	0	0.0000	1	0.00		0.0000	1	0.00
29	1	28-29	0	0.0000	1	0.00		0.0000	1	0.00
30	1	29-30	0	0.0000	1	0.00		0.0000	1	0.00
Total Increased Cancer Risk						40.0				0.65

* Third trimester of pregnancy

Maximum	
Fugitive	Total
PM2.5	PM2.5
0.0362	0.2510

SCRWA Trunk Line Trenching and Miller Slough Microtunneling, Gilroy, CA - Construction Impacts - With Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor (mg/kg-day)⁻¹

ASF = Age sensitivity factor for specified age group

ED = Exposure duration (years)

AT = Averaging time for lifetime cancer risk (years)

FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10⁻⁶

Where: C_{air} = concentration in air (µg/m³)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

10⁻⁶ = Conversion factor

Values

Age -> Parameter	Infant/Child				Adult
	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Infant/Child - Exposure Information				Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)	Maximum	
		Age	DPM Conc (ug/m3)		Sensitivity Factor		Modeled		Age Sensitivity Factor			
			Year	Annual			Year	Annual				
0	0.25	-0.25 - 0*	2020	0.0260	10	0.35	2020	0.0260	-	-	0.0345	0.0598
1	1	0 - 1	2020	0.0260	10	4.26	2020	0.0260	1	0.07		
2	1	1 - 2	0	0.0000	10	0.00		0.0000	1	0.00		
3	1	2 - 3	0	0.0000	3	0.00		0.0000	1	0.00		
4	1	3 - 4	0	0.0000	3	0.00		0.0000	1	0.00		
5	1	4 - 5	0	0.0000	3	0.00		0.0000	1	0.00		
6	1	5 - 6	0	0.0000	3	0.00		0.0000	1	0.00		
7	1	6 - 7	0	0.0000	3	0.00		0.0000	1	0.00		
8	1	7 - 8	0	0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9	0	0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10	0	0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11	0	0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12	0	0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13	0	0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14	0	0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15	0	0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16	0	0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17	0	0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18	0	0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19	0	0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20	0	0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21	0	0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22	0	0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23	0	0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24	0	0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25	0	0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26	0	0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27	0	0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28	0	0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29	0	0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30	0	0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						4.6				0.07		

* Third trimester of pregnancy