APPENDIX D

Air Quality Technical Report

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AIR QUALITY
TECHNICAL REPORT

NORTH HAIWEE DAM NO. 2 PROJECT

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1 Introduction

The Los Angeles Department of Water and Power (LADWP) is proposing the North Haiwee Dam No. 2 Project (Proposed Project) in the Owens Valley in unincorporated areas of Inyo County, California. Owens Valley is a part of the Great Basin Unified Air Pollution Control District (GBUAPCD). This air quality analysis was prepared to support the environmental review process and provide information regarding potential impacts associated with the construction and operation of the Proposed Project.

2 Project Description

LADWP proposes to improve the seismic reliability of the North Haiwee Reservoir (NHR), which is located in the Owens Valley, California, approximately 150 miles north of Los Angeles. LADWP has prepared this draft joint Environmental Impact Report/Environmental Assessment (EIR/EA) in cooperation with the Bureau of Land Management (BLM). The purpose of the Proposed Project is to construct North Haiwee Dam No. 2 (NHD2 or new Dam) to the north of North Haiwee Dam (NHD or existing Dam), which impounds NHR. Seismic studies have found that NHD would have potential to fail during a Maximum Credible Earthquake event, the largest possible earthquake which could happen. NHD2 would serve to improve the seismic reliability of NHR in the event that the existing Dam is damaged or breached by an earthquake event, thereby ensuring public health and safety and securing the City's water source. The Proposed Project would provide sufficient seismic reliability for NHR, maintain the function of an essential water conveyance infrastructure component for the City of Los Angeles, and protect local populations from a hazardous flooding event. The Proposed Project would also create a basin between NHD2 and NHD, allowing LADWP to divert water from the Los Angeles Aqueduct (LAA), through the basin, and through a notch in NHD into NHR.

This technical report includes the evaluation of the No Project Alternative, as well as two Build Alternatives: the Cement Deep Soil Mixing (CDSM) Alternative and the Excavate and Recompact Alternative. The Proposed Project consists of the following components, which are common to both Build Alternatives:

- Construction of the NHD2 components: NHD2, the east and west berms, and grading of the basin area between NHD and NHD2;
- Realignment of Cactus Flats Road;
- Realignment of the LAA and construction of the diversion structure and temporary bridge;
- Construction of the diversion channel and NHD modifications;
- Excavation of materials from Borrow Site 10[1]; and
- Purchase and hauling of materials from Borrow Site 15.

The differentiating component between the two Build Alternatives is the method of construction of the foundation of NHD2, which affects the timeline and construction efforts of the NHD2 components and use of Borrow Sites 10 and 15. Construction of the remaining Proposed Project components is the same between the two Build Alternatives, except for the timeline of the diversion channel and NHD modifications.

Refer to Chapter 1.0 Introduction and Chapter 2.0 Project Description and Alternatives of the Draft EIR/EA for the full description of the Proposed Project, including purpose and need, objectives,

[1] Borrow Site 10 refers to the LAA Excavation Area and Borrow Site 15 refers to the existing Mine in Keeler in the Draft EIR/EA.

regulatory requirements, alternatives, construction, and operations. Borrow Site 10 refers to the LAA Excavation Area and Borrow Site 15 refers to the existing mine in Keeler in the Draft EIR/EA.

3 Regulatory Framework

3.1 Federal

3.1.1 Criteria Pollutants

Individual air pollutants at certain concentrations may adversely affect human or animal health, reduce visibility, damage property, and reduce the productivity or vigor of crops and natural vegetation. Six air pollutants have been identified by the United States Environmental Protection Agency (USEPA) and the California Air Resources Board (CARB) as being of concern both on a nationwide and statewide level: ozone; carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); lead; and particulate matter (PM), which is subdivided into two classes based on particle size: PM equal to or less than 10 micrometers in diameter (PM10), and PM equal to or less than 2.5 micrometers in diameter (PM2.5). Because the air quality standards for these air pollutants are regulated using human health and environmentally based criteria, they are commonly referred to as "criteria air pollutants."

Ozone

Ozone is the principal component of smog and is formed in the atmosphere through a series of reactions involving reactive organic gases (ROG) and nitrogen oxides (NO_X) in the presence of sunlight. ROG and NO_X are called precursors of ozone. NO_X includes various combinations of nitrogen and oxygen, including nitric oxide (NO), NO_2, and others. Ozone is a principal cause of lung and eye irritation in the urban environment. Significant ozone concentrations are usually produced only in the summer, when atmospheric inversions are greatest and temperatures are high. ROG and NO_X emissions are both considered critical in ozone formation.

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Carbon Monoxide

CO is a colorless and odorless gas that, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. Relatively high concentrations are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. Even under most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within a relatively short distance (300 to 600 feet) of heavily traveled roadways. Vehicle traffic emissions can cause localized CO impacts, and severe vehicle congestion at major signalized intersections can generate elevated CO levels, called "hot spots," which can be hazardous to human receptors adjacent to the intersections.

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport. Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen in high altitudes.

Nitrogen Dioxide

NO_2 is a product of combustion and is generated in vehicles and in stationary sources, such as power plants and boilers. It is also formed when ozone reacts with NO in the atmosphere. As noted above, NO_2 is part of the NO_X family and is a principal contributor to ozone and smog generation.

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children, is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

Sulfur Dioxide

SO_2 is a combustion product, with the primary source being power plants and heavy industries that use coal or oil as fuel. SO_2 is also a product of diesel engine combustion. SO_2 in the atmosphere contributes to the formation of acid rain.

In asthmatics, increase in resistance to air flow as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2. Some population based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Lead is a highly toxic metal that may cause a range of human health effects. Previously, the lead used in gasoline anti-knock additives represented a major source of lead emissions to the atmosphere. USEPA began working to reduce lead emissions soon after its inception, issuing the first reduction standards in 1973. Lead emissions have significantly decreased due to the near elimination of leaded gasoline use.

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and a lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of lead on the respiratory system.

Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. PM is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Natural sources of PM include windblown dust and ocean spray. The size of PM is directly linked to the potential for causing health problems. USEPA is concerned about particles that are 10 micrometers in diameter or smaller because these particles generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. Health studies have shown a significant association between exposure to PM and premature death. Other important effects include aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems, such as heart attacks and irregular heartbeat (USEPA 2007). Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children. As previously discussed, USEPA groups particulate matter into two categories, which are described below.

PM2.5

Fine particles, such as those found in smoke and haze, are PM2.5. Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning, etc.) and certain industrial processes. PM2.5 is also formed through reactions of gases, such as SO_2 and NO_X, in the atmosphere. PM2.5 is the major cause of reduced visibility (haze) in California.

PM10

PM10 includes both fine and coarse dust particles; the fine particles are PM2.5. Coarse particles, such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter. Sources of coarse particles include crushing or grinding operations and dust from paved or unpaved roads. Control of PM10 is primarily achieved through the control of dust at construction and industrial sites, the cleaning of paved roads, and the wetting or paving of frequently used unpaved roads.

3.1.2 Air Quality Standards

Health-based air quality standards have been established for the above described criteria pollutants by USEPA at the national level and by CARB at the state level. These standards were established to protect the public with a margin of safety from adverse health impacts due to exposure to air pollution. California has also established standards for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. The most current monitoring station data and attainment designations for the Project Site are provided below. Table 1 presents the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS).

USEPA, under the provisions of the Clean Air Act (CAA), requires each state with regions that have not attained NAAQS to prepare a State Implementation Plan (SIP) detailing how these standards are to be met in each local area. The SIP is a legal agreement between each state and the federal government to commit resources to improving air quality. It serves as the template for conducting regional and project-level air quality analysis. The SIP is not a single document, but a compilation of new and previously submitted attainment plans, emissions reduction programs, district rules, state regulations, and federal controls.

TABLE 1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [a]	National Standards [b]	
		Concentration [c]	Primary [c,d]	Secondary [c,e]
Ozone	1 hour	0.09 ppm (180 μg/m^3)	–	Same as primary standard
	8 hours	0.070 ppm (137 μg/m^3)	0.070 ppm (147 μg/m^3)	
Respirable particulate matter (PM_{10})[f]	24 hours	50 μg/m^3	150 μg/m^3	Same as primary standard
	Annual arithmetic mean	20 μg/m^3	–	
Fine particulate matter ($PM_{2.5}$)[f]	24 hours	–	35 μg/m^3	Same as primary standard
	Annual arithmetic mean	12 μg/m^3	12 μg/m^3	15 μg/m
Carbon monoxide (CO)	8 hours	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
	8 hours (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
Nitrogen dioxide (NO_2)[g]	Annual arithmetic mean	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as primary standard
	1 hour	0.18 ppm (339 μg/m^3)	100 ppb (188 μg/m^3)	None
Sulfur dioxide (SO_2)[h]	Annual Arithmetic Mean	–	0.030 ppm (for certain areas)[h]	–
	24 hours	0.04 ppm (105 μg/m^3)	0.14 ppm (for certain areas)[h]	–
	3 hours	—	–	0.5 ppm (1,300 μg/m^3)
	1 hour	0.25 ppm (655 μg/m^3)	75 ppb (196 μg/m^3)	–
Lead[i,j]	30-day average	1.5 μg/m^3	–	–
	Calendar quarter	–	1.5 μg/m^3 (for certain areas)[j]	Same as primary standard
	Rolling 3-month average	–	0.15 μg/m^3	
Visibility-reducing particles[k]	8 hours	See Footnote j	No national standards	
Sulfates	24 hours	25 μg/m^3		
Hydrogen sulfide	1 hour	0.03 ppm (42 μg/m^3)		
Vinyl chloride[i]	24 hours	0.01 ppm (26 μg/m^3)		

Notes: mg/m^3 = milligrams per cubic meter; ppb = parts per billion; ppm = parts per million; μg/m^3 = micrograms per cubic meter

[a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standards.

[c] Concentration expressed first in the units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and reference pressure of 760 torr; (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect public welfare from any known or anticipated adverse

TABLE 1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [a]	National Standards [b]	
		Concentration [c]	Primary [c,d]	Secondary [c,e]

effects of a pollutant.

[f] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m3 to 12.0 µg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m3, as was the annual secondary standard of 15 µg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[g] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. California standards are in units of ppm. To directly compare the national 1-hour standard to the California standards the units can be converted from 100 ppb to 0.100 ppm.

[h] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical of 0.075 ppm.

[i] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[j] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standards are approved.

[k] In 1989, ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and the “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: CARB 2015a

3.1.3 General Conformity

General conformity requirements were adopted by Congress as part of the CAA Amendments and were implemented by USEPA regulations in the November 30, 1993 Federal Register (40 Code of Federal Regulations Sections 6, 51, and 93: “Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule”).

General conformity requires that all federal actions conform to the SIP as approved or promulgated by USEPA. The Proposed Project is therefore required to evaluate its construction emissions against the applicable General Conformity Rule thresholds of significance, which are called de minimis thresholds. The de minimis levels are based on the attainment/maintenance and nonattainment designations and classifications for the project area. If the emissions would exceed the de minimis levels, a formal air quality conformity determination is required.

The Proposed Project is located in the Great Basin Valleys Air Basin (GBVAB) and the Owens Valley PM10 Planning Area. Accordingly, the de minimis thresholds for the Proposed Project are presented below in Table 2. The GBVAB is attainment for ozone (NO_X and VOC), CO and PM2.5; therefore, there are no de minimis thresholds for these pollutants. The Owens Valley Planning Area, including the Project Site, is a serious nonattainment area for PM10.

TABLE 2
GENERAL CONFORMITY *DE MINIMIS* THRESHOLDS FOR PROJECTS IN THE GREAT BASIN VALLEYS AIR BASIN

Pollutant	Emission Threshold (tons per year)
CO	N/A[1]
NO_X	N/A[1]
VOC	N/A[1]
PM_{10}	70[2]
$PM_{2.5}$	N/A[1]

Notes:
CO = carbon monoxide; NO_X = oxides of nitrogen; $PM_{2.5}$ = fine particulate matter; PM_{10} = respirable particulate matter; VOC = volatile organic compound
1 The Great Basin Valleys Air Basin is attainment for ozone (NO_X and VOC), CO and PM2.5. Therefore, there are no de minimis thresholds for these pollutants.
2 The Owens Valley Planning Area, including the Project Site, is a serious nonattainment area for PM10.
Source: 40 Code of Federal Regulations 93 Section 153

3.1.4 Toxic Air Contaminants

In addition to criteria air pollutants, USEPA regulates hazardous air pollutants, also known as toxic air contaminants (TACs). TACs may be emitted by stationary, area, or mobile sources. Common stationary sources of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators, which are subject to local air district permit requirements. The other, often more significant, sources of TAC emissions are motor vehicles on freeways, high-volume roadways, or other areas with high numbers of diesel vehicles, such as distribution centers. Off-road mobile sources are also major contributors of TAC emissions and include construction equipment, ships, and trains.

TACs can be separated into carcinogens and noncarcinogens based on the nature of the effects associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which health impacts would not occur. Any exposure to a carcinogen poses some risk of contracting cancer. Noncarcinogens differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

3.2 State

CARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California CAA.

3.2.1 State Implementation Plan

CARB is the lead agency for developing the SIP in California. Local air districts and other agencies prepare Air Quality Attainment Plans or Air Quality Management Plans (AQMPs) and submit them to CARB for review, approval, and incorporation into the applicable SIP. CARB also maintains air quality monitoring stations throughout the state in conjunction with local air districts. Data collected at these stations are used by CARB to classify air basins as being in attainment or nonattainment with respect to each pollutant, and to monitor progress in attaining air quality standards.

The California CAA requires that each area exceeding the CAAQS for ozone, CO, SO_2, and NO_2 must develop a plan aimed at achieving those standards. The California Health and Safety Code Section 40914 requires air districts to design a plan that achieves an annual reduction in district-wide emissions of five percent or more, averaged every consecutive three-year period. To satisfy this requirement, the local air districts have to develop and implement air pollution reduction measures, which are described in their AQMPs, and outline strategies for achieving the CAAQS for any criteria pollutant for which the region is classified as nonattainment.

CARB has established emission standards for vehicles sold in California and for various types of equipment. California gasoline specifications are governed by both state and federal agencies. During the past decade, federal and state agencies have imposed numerous requirements on the production and sale of gasoline in California. CARB has also adopted control measures for diesel PM and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators).

3.2.2 Toxic Air Contaminants

Particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a TAC by CARB in 1998. Federal and state efforts to reduce diesel PM emissions have focused on the use of improved fuels, adding particulate filters to engines, and requiring the production of new-technology engines that emit fewer exhaust particulates.

Diesel engines tend to produce a much higher ratio of fine particulates than other types of internal combustion engines. The fine particles that make up diesel PM tend to penetrate deep into the lungs, and the rough surfaces of these particles makes it easy for them to bind with other toxins within the exhaust, thus increasing the hazards of particle inhalation. Long-term exposure to diesel PM is known to lead to chronic serious health problems including cardiovascular disease, cardiopulmonary disease, and lung cancer.

TACs in California are regulated primarily through the Tanner Air Toxics Act (Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act (Chapter 1252, Statutes of 1987). Assembly Bill 1807 sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before CARB can designate a substance as a TAC. The Air Toxics Hot Spots Information and Assessment Act requires that TAC emissions from stationary sources be quantified and compiled into an inventory according to criteria and guidelines developed by CARB, and if directed to do so by the local air district, a Health Risk Assessment (HRA) must be prepared to determine the potential health impacts of such emissions.

3.2.3 Great Basin Unified Air Pollution Control District

In Inyo County, the GBUAPCD is the agency responsible for protecting public health and welfare through the administration of federal and state air quality laws and policies. Included in the GBUAPCD's tasks are monitoring of air pollution, preparation of the SIP for the Owens Valley PM10 Planning Area, and promulgation of rules and regulations.

The GBUAPCD has adopted a series of SIPs that include strategies to attain the federal PM10 standard in the Owens Valley PM10 Planning Area. The GBUAPCD prepared and adopted a SIP in 1998 (1998 SIP), which was approved by USEPA in 1999. Subsequent SIP revisions were prepared in 2003 to address PM10 control requirements to reduce windblown dust from Owens Lake, and in 2008 to incorporate dust control provisions of the 2006 Settlement Agreement between the City of Los Angeles and the GBUAPCD (GBUAPCD 2016). According to the GBUAPCD, wind-blown dust from the dry bed of Owens Lake is the primary source of PM10 leading to the exceedance of the NAAQS for PM10 in the nonattainment area. Therefore, the focus of the SIP is on dust control measures for implementation on portions of the Owens Lake bed.

The GBUAPCD has developed the 2016 SIP in response to a finding by the USEPA that the Owens Valley PM10 Planning Area did not attain the 24-hour NAAQS for PM10 as required by the federal CAA. The 2016 SIP revision continues the commitment to attain the NAAQS by providing a control strategy to implement control measures on additional areas at Owens Lake, and to approve the use of new dust control measures to augment the existing Best Available Control Measures (BACM) that were available in the 2008 SIP. The 2016 SIP was adopted by the GBUAPCD on April 13, 2016.

The USEPA has established de minimis criteria of 5 micrograms per cubic meter (µg/m3) for source categories contributing to PM10 emissions in the Owens Valley PM10 Planning Area. If a source category contributes more than this level to measured ambient PM10 concentrations, then BACM or Best Available Control Technology (BACT) are required to be implemented for that source. At present, there are no PM10 sources in the Owens Valley PM10 Planning Area that meet the federal definition of a PM10 major source (GBUAPCD 2016). Additionally, the BACM/BACT requirement does not apply to mobile sources of emissions (GBUAPCD 2016).

GBUAPCD rules relevant to the Proposed Project include:

- District Rule 209-A: Requires new stationary sources with PM10 emissions greater than 250 pounds per day of total suspended particulates, or facility modifications of greater than 15 tons per year of PM10 to apply BACT to control PM emissions.
- District Rule 400: Limits visible emissions from any source, except those exempted under Rule 405, to less than Ringelmann 1 or 20 percent opacity.
- District Rule 401: Requires that reasonable precautions be taken to prevent visible particulate emissions from crossing the property boundary.
- District Rule 402: Prohibits sources of air pollution from causing a nuisance to the public or endangering public health and safety.

The Proposed Project is required to comply with these rules, and conformance will be incorporated into Project specifications and procedures.

3.3 Regional and Local

3.3.1 Inyo County

The Inyo County General Plan Safety Element (Inyo County, 2001) contains policies relevant to air quality. Goal AQ-1 of the Safety Element is to "provide good air quality for Inyo County to reduce impacts to human health and the economy." The following policies are applicable to the Proposed Project:

- Policy AQ-1.1: Regulations to Reduce PM10. Support the implementation of the State Implementation Plan and the agreement between GBUAPCD and the Los Angeles Department of Water and Power (LADWP) to reduce PM10.
    - Implementation Measure 1.0. Work with the LADWP and the GBUAPCD to reduce wind-raised dust from Owens Lake.
- Policy AQ-1.3: Dust Suppression During Construction. Require dust-suppression measures for grading activities.
    - Implementation Measure 4.0. The County shall require contractors to implement dust suppression measures during excavation, grading, and site preparation activities. Techniques may include, but are not limited to the following:
        - site watering or application of dust suppressants,
        - phasing or extension of grading operations,

- covering of stockpiles, suspension of grading activities during high wind periods (typically winds greater than 25 miles per hour), and
- revegetation of graded site.

3.3.2 Odor

Odors are considered an air quality issue both at the local level (e.g., odor from wastewater treatment) and at the regional level (e.g., smoke from wildfires). Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and is subjective. Some individuals have the ability to smell minute quantities of specific substances while others may not have the same sensitivity, but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person (e.g., from a fast-food restaurant or bakery) may be perfectly acceptable to another. Unfamiliar odors may be more easily detected and likely to cause complaints than familiar ones.

Several examples of common land use types that generate substantial odors include wastewater treatment plants, landfills, composting/green waste facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting/coating operations, rendering plants, and food packaging plants.

Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, the organic gases that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

4 Existing Conditions

4.1 Great Basin Valleys Air Basin

Ambient air pollutant concentrations in the GBVAB are measured at air quality monitoring stations operated by CARB and the GBUAPCD. The closest and most representative GBUAPCD air quality monitoring station to the Project Site is the Olancha monitoring station, approximately 0.5 mile north of the Project Site. However, that monitoring station only has PM10 concentration data available. Therefore, the Keeler-Cerro Gordo Road monitoring station, which is closest to Borrow Site 15 and has data available, was used for PM2.5 concentrations. No monitoring stations in the Owens Valley PM10 Planning Area have data available for ozone, CO, NO_2, or SO_2. Table 3 presents the most recent PM10 and PM2.5 data over the past three years from the Olancha and Keeler-Cerro Gordo monitoring stations as a summary of the exceedances of standards and the highest pollutant levels recorded. These concentrations represent the existing, or baseline conditions, for the Proposed Project.

As shown in Table 3, ambient air concentrations of PM10 and PM2.5 have exceeded NAAQS and CAAQS on three or more days each year for the past three years. Monitoring data for other criteria air pollutants is not available from these or any other monitoring stations in the vicinity of the Proposed Project.

TABLE 3
AMBIENT AIR QUALITY SUMMARY – KEELER-CERRO GORDO ROAD MONITORING STATION

Pollutant Standards	2013	2014	2015
Particulate Matter (PM_{10})			
National maximum 24-hour concentration (μg/m^3)	276.0	309.0	384.6
State maximum 24-hour concentration (μg/m^3)	*	*	*
State annual average concentration (μg/m^3)	*	*	*
Measured Number of Days Standard Exceeded NAAQS 24-hour (>150 μg/m^3)	6	3	3
CAAQS 24-hour (>50 μg/m^3)	*	*	*
Particulate Matter ($PM_{2.5}$)			
National maximum 24-hour concentration (μg/m^3)	93.6	161.0	130.2
State maximum 24-hour concentration (μg/m^3)	127.8	161.0	130.2
National annual average concentration (μg/m^3)	7.8	7.8	6.7
State annual average concentration (μg/m^3)	*	7.9	*
Measured Number of Days Standard Exceeded NAAQS 24-hour (>35 μg/m^3)	8	7	3

Notes: *Insufficient data to determine the value.
μg/m^3 = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CAAQS = California Ambient Air Quality Standards
Source: CARB 2015b.

4.2 Attainment Status

Both USEPA and CARB use ambient air quality monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify the areas with air quality problems and initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. An “attainment” designation for an area signifies that pollutant concentrations did not exceed the established standard. In most cases, areas designated or redesignated as attainment must develop and implement maintenance plans, which are designed to ensure continued compliance with the standard.

In contrast to attainment, a “nonattainment” designation indicates that a pollutant concentration has exceeded the established standard. Nonattainment may differ in severity. To identify the severity of the problem and the extent of planning and actions required to meet the standard, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe, extreme).

Finally, an unclassified designation indicates that insufficient data exist to determine attainment or nonattainment. In addition, the California designations include a subcategory of nonattainment-transitional, which is given to nonattainment areas that are progressing and nearing attainment.

High levels of PM10 are recognized as an air quality challenge within the GBVAB. Due to recurring exceedances of the NAAQS and CAAQS for PM10, the air basin has been divided into distinct planning areas, including the Mono Basin, Mammoth Lakes, Owens Lake, and Coso Junction. The Proposed Project is within the Owens Valley PM10 Planning Area of the GBVAB. As shown in Table 4, the GBVAB and Owens Valley PM10 Planning Area are designated as Unclassified/Attainment for all criteria air pollutants for the NAAQS except PM10, for which it is nonattainment. The GBVAB meets the CAAQS for all criteria air pollutants except ozone and PM10. The GBVAB is currently classified as a state nonattainment area for ozone and PM10.

TABLE 4
GREAT BASIN VALLEYS AIR BASIN ATTAINMENT DESIGNATIONS

Pollutant	State	Federal
Ozone*	Nonattainment	Unclassified/Attainment
Carbon Monoxide	Unclassified/Attainment	Unclassified/Attainment
Nitrogen Dioxide	Attainment	Unclassified/Attainment
Sulfur Dioxide	Attainment	N/D
PM10	Nonattainment	Nonattainment (Owens Valley/Mono Basin) Unclassified/Attainment
PM2.5	Attainment	Unclassified/Attainment
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified/Attainment	N/A
Visibility Reducing Particles	Unclassified	N/A
Lead	Attainment	Unclassified/Attainment

Notes: N/A = not applicable; no standard; N/D = No Designation; PM = Particulate Matter
* The portion of GBVAB in Alpine County is Unclassified for the ozone CAAQS.
Source: CARB 2015c

4.2.1 Sensitive Receptors

Some members of the population are especially sensitive to air pollutant emissions and should be given special consideration when evaluating air quality impacts from projects. These include children, the elderly, people with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Air quality regulators typically define sensitive receptors as schools, hospitals, resident care facilities, day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality.

Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to pollutants present. Recreational land uses are considered moderately sensitive to air pollution. Exercise places a high demand on respiratory functions, which can be impaired by air pollution even though exposure periods during exercise are generally short. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent as the majority of the workers tend to stay indoors most of the time.

The nearest off-site sensitive receptor is the single-family residence located approximately 600 feet north of the Project Site, on the Butterworth Ranch land that is adjacent to the Project Site. There are no sensitive receptors within close proximity to Borrow Site15. Although recreationists such as hikers and campers do access the Inyo National Forest west of the Project Site, the nearest trail heads are within the borders of the United States Forest Service land, more than three miles west of the Project Site. However, the Project Site contains an existing residential property owned by LADWP within which the reservoir keeper and family reside. This property serves as a long-term home for the family, and they spend a majority of their time on the property. Therefore, the existing on-site residents represent the nearest sensitive receptors with the potential to be impacted as a result of construction of the Proposed Project.

5 Methodology

Construction-related exhaust emissions for the Proposed Project were estimated for construction worker commutes, haul trucks, and the use of off-road equipment. Construction-related emissions for the Proposed Project were estimated using emission factors from the CARB's OFFROAD and EMFAC 2014 inventory models (CARB 2013). Construction emissions from the operation of diesel-fueled off-road equipment were estimated by multiplying daily usage (i.e., hours per day) and total days of construction by OFFROAD equipment-specific emission factors. Emissions from on-road motor vehicles were estimated using vehicle trips, vehicle miles traveled, and EMFAC2014 mobile source emission factors. The emission factors represent the fleet-wide average emission factors within Inyo County. Grading, material loading, and travel on paved and unpaved roads would generate fugitive dust (PM10) emissions. The CDSM Alternative would also require a portable cement grout batch plant onsite to batch cement grout for the mixing rigs and would be an additional source of fugitive dust emissions. Fugitive dust emissions were estimated using the USEPA's Compilation of Air Pollutant Factors (AP-42) and based on vehicle miles traveled, material loading, and hours of operation.

Since the GBUAPCD has not developed quantitative significance thresholds for projects under the California Environmental Quality Act (CEQA), guidance from the South Coast Air Quality Management District (SCAQMD) was used to assess regional and localized emissions. Localized emissions of air pollutants were assessed in accordance with the SCAQMD's local significance thresholds (LST) guidance (SCAQMD 2008). SCAQMD recommends that lead agencies perform project-specific air quality modeling for projects larger than five acres. Since the Project Site is larger than five acres, peak daily localized emissions were estimated using dispersion modeling in general accordance with the SCAQMD guidance. Air dispersion modeling was conducted to examine maximum short-term impacts at the reservoir keeper residence adjacent to NHD.

USEPA recommends the use of the American Meteorological Society/USEPA Regulatory Model (AERMOD) modeling system for use in modeling multi-source emissions which was used for this analysis (USEPA 2004). AERMOD can account for plume downwash, stack tip downwash, and point, area, and volume sources. AERMOD also has the ability to simulate impacts at both flat and complex terrain receptors.

A HRA was performed to evaluate the emissions of TACs during construction activities and their effects on nearby receptors, including the reservoir keeper residence. The HRA was performed in accordance with the new Air Toxics Hot Spots Program Guidance Manual for the Preparation of Risk Assessments (SRP Draft) developed by the Office of Environmental Health Hazard Assessment for conducting HRAs in California under the Air Toxics "Hot Spots" Program, as well as methodologies from the Health Risk Assessments for Proposed Land Use Projects (California Air Pollution Control Officers Association 2009).

The construction-related HRA was performed using the USEPA regulatory model AERMOD (Version 15181), which estimates both short-term and long-term average ambient concentrations at receptor locations to produce exposure estimates, and the files imported into the Hotspots Analysis and Reporting Program (HARP2) modeling system (CARB 2015d). Excess lifetime cancer risks and chronic noncancer hazard index (HI) were estimated for a maximally exposed individual at an existing residential receptor (MEIR) and maximally exposed individual at an existing occupational worker receptor (MEIW).

Operation of the Proposed Project would be generally similar to existing conditions. As such, the Proposed Project would not substantially increase the generation or use of on-road motor vehicles or off-road equipment relative to existing conditions. Thus, operational impacts of the Proposed Project are evaluated qualitatively, and no operational emissions were estimated.

5.1 CEQA Thresholds of Significance

According to CEQA Significance Determination Thresholds, a significant impact related to air quality would occur if implementation of the Proposed Project would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,
- result in cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emission which exceed quantitative thresholds for ozone precursors),
- expose sensitive receptors to substantial pollutant concentrations, or
- create objectionable odors affecting a substantial number of people.

As stated in Appendix G of the CEQA Guidelines, the significance criteria established by the applicable air quality management board or air pollution control district may be relied on to make the impact determinations for specific program elements. GBUAPCD has not developed quantitative significance thresholds for CEQA projects. However, the SCAQMD has established recommended screening level thresholds of significance for regional pollutant emissions. The thresholds recommended by SCAQMD are considered conservative for use in making determinations of potential air quality impacts. Therefore, the SCAQMD screening thresholds of significance for regional pollutant emissions were used to analyze the impacts of the Proposed Project. The screening level thresholds are shown in Table 5.

TABLE 5
REGIONAL POLLUTANT EMISSION SCREENING LEVEL THRESHOLDS OF SIGNIFICANCE

Mass Daily Thresholds [a]		
Pollutant	**Construction**	**Operation**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
CO	550 lbs/day	550 lbs/day
Toxic Air Contaminants (TACs) and Odor Thresholds		
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Hazard Index ≥ 1.0 (project increment)	
Ambient Air Quality for Criteria Pollutants		
NO_2 1-hour average annual average	Project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state) 0.03 ppm (state) & 0.053 ppm (federal)	
PM10 24-hour average annual arithmetic average	 10.4 $\mu g/m^3$ (construction)[c] & 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$	
PM2.5 24-hour average	 10.4 $\mu g/m^3$ (construction)[c] & 2.5 $\mu g/m^3$ (operation)	
CO 1-hour average 8-hour average	Project is significant if it causes or contributes to an exceedance of the following attainment standards: 20 ppm (state) 9.0 ppm (state/federal)	

Notes: lbs/day = pounds per day; ppm = parts per million; $\mu g/m^3$ = microgram per cubic meter; ≥ = greater than or equal to
[a] Source: SCAQMD, 2015.

This analysis does not directly evaluate lead or SO_X because little to no quantifiable and foreseeable emissions of these substances would be generated by the Proposed Project. Lead emissions have significantly decreased due to the near elimination of leaded fuel use. On- and off-road diesel fuel used in California must meet low sulfur standards established by CARB; thus, SO_X emissions due to diesel exhaust are assumed to be minimal.

5.2 NEPA Thresholds

General conformity de minimis thresholds are appropriate thresholds to be used for determining NEPA significance. A NEPA air quality significance analysis differs from the General Conformity analysis in that all project criteria pollutant emissions are considered: emissions for pollutants where the area has attained the NAAQS as well as emissions for pollutants where the region is currently designated as a nonattainment or maintenance area. Therefore, in the SDAB, project attainment emissions of volatile organic compounds (VOC), NO_X, CO, and PM2.5, would be considered for impact significance under NEPA for air quality in addition to PM10 considered under General Conformity.

6 Impact Analysis

AQ-1: *The Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan. The impact would be less than significant.*

Construction

CDSM Alternative

Air quality plans describe air pollution control strategies to be implemented by a city, county, or regional air district. The primary purpose of an air quality plan is to bring an area that does not attain federal and state air quality standards into compliance with those standards pursuant to the requirements of the federal CAA and California CAA. Projects that are consistent with the assumptions and control measures used in development of the applicable air quality plan are considered to not conflict with or obstruct the attainment of the air quality levels identified in the plan.

As previously discussed, the most recently approved SIP was adopted by GBUAPCD on April 13, 2016. Both the 2016 SIP and its predecessor, the 2008 SIP, focus on dust control measures for implementation on portions of the Owens Lake bed. While not significant sources of PM10 in the nonattainment area, other sources such as construction, mining, hauling, and general transportation are also addressed. Where construction-related fugitive PM10 emissions are a contributor to the non-attainment problem, the regional PM10 emissions analysis must consider construction-related fugitive PM10 emissions.

Consistency with the SIP is based on whether the Proposed Project would exceed the estimated air basin emissions used as the basis of the SIP. Construction of the Proposed Project would involve the use of off-road equipment, haul trucks, and worker commute trips. Assumptions for off-road equipment emissions in SIP were developed based on hours of activity and equipment population reported to CARB for rule compliance. The Proposed Project would not increase the assumptions for off-road equipment use in the SIP. The design features of the Proposed Project also include fugitive dust control measures consistent with GBUAPCD Rule 401 and the SIP. Therefore, while the Proposed Project would generate criteria pollutant emissions, the approach to exhaust and fugitive dust emission control measures would be consistent with the air quality plan.

The Proposed Project does not involve any uses that would increase population beyond that considered in the Inyo County General Plan or the SIP. The Proposed Project does not include the construction of new residential or commercial buildings; therefore, it would not directly increase population or regional employment.

Because the Proposed Project would be consistent with the assumptions regarding equipment activity and emissions in the SIP and existing planning documents, it is expected that the intensity of construction and operational emissions associated with the Proposed Project would have been accounted for in the SIP. Because the Proposed Project would comply with all construction-related GBUAPCD rules and regulations, and would not construct a land use that would result in a net increase in long-term operational emissions, the Proposed Project would not conflict with or obstruct implementation of the applicable air quality plan. The impact would be less than significant.

Excavate and Recompact Alternative

Similar to the CDSM Alternative, the Excavate and Recompact Alternative would be consistent with the assumptions regarding equipment activity and emissions in the SIP and existing planning documents. Construction activities associated with Excavate and Recompact Alternative would also comply with all GBUAPCD rules and regulations, and would not construct a land use that would result in a net increase in long-term operational emissions. Therefore, the Excavate and Recompact Alternative would not conflict with or obstruct implementation of the applicable air quality plan. The impact would be less than significant.

Operation

CDSM and Excavate and Recompact Alternatives

The Proposed Project is not anticipated to generate new vehicle trips during operations. The required maintenance of NHD2 would be similar to existing maintenance of the existing dam. The NHR reservoir keeper whose residence is adjacent to NHD would remain on site and would be the primary person responsible for monitoring the new Dam, LAA Realignment, and basin, along with the existing NHD, LAA, and NHR. Therefore, impacts related to conflict with or obstruct implementation of the applicable air quality plan would be less than significant.

AQ-2: *The Proposed Project would violate an air quality standard or contribute substantially to an existing or projected air quality violation. The impact would be significant, requiring mitigation.*

Construction

CDSM Alternative

Construction emissions are described as “short-term” or temporary in duration; however, they have the potential to represent a significant impact with respect to air quality. Construction of the Proposed Project would result in the temporary generation of VOC, NO_X, CO, PM10, and PM2.5 emissions. VOC, NO_X, and CO emissions are primarily associated with mobile equipment exhaust, including off-road construction equipment and on-road motor vehicles. Fugitive PM dust emissions are primarily associated with site preparation, and vary as a function of parameters such as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled by construction vehicles on- and off-site. Earthmoving and material handling operations are the primary sources of fugitive PM dust emissions from the Proposed Project’s construction activities.

Construction of the Proposed Project would commence in 2018 and is expected to last approximately five years. Construction of the Proposed Project would occur in overlapping phases, including the Cactus Flats Road Realignment, the LAA Realignment, Basin improvements (Notch, Diversion Channel, and Slope Protection), and construction of NHD2 utilizing its associated borrow sites.

As shown in Table 6, construction emissions for the Proposed Project would result in maximum daily emissions of approximately 126 pounds of VOC, 1,049 pounds of NO_X, 671 pounds of CO, 286 pounds of PM10, and 97 pounds of PM2.5. The emission estimates include fugitive dust control requirements consistent with GBUAPCD rules and regulations, and which are not considered mitigation for the purposes of this analysis. Additional modeling assumptions and details are provided in Appendix A.

TABLE 6
ESTIMATED MAXIMUM DAILY CONSTRUCTION EMISSIONS FOR THE CDSM ALTERNATIVE

	VOC	NO_X	CO	PM10 [1,2]	PM2.5[1]
2018	10.75	109.36	60.96	16.01	10.38
2019	26.79	266.62	158.58	118.64	30.78
2020	125.83	1,048.81	670.91	285.73	97.31
2021	125.58	1,042.10	668.17	225.90	90.21
2022	100.27	822.03	517.87	225.90	72.59
2023	99.04	782.19	512.32	167.09	66.53
Maximum Daily Construction Emissions (lbs/day)	125.83	1,048.81	670.91	285.73	97.31
Threshold of Significance (lbs/day)	75	100	550	150	55
Significant Impact?	**YES**	**YES**	**YES**	**YES**	**YES**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
[2] Fugitive dust emissions were reduced based on watering two times per day.
[3] Additional details on the emissions for each calendar year are included in Appendix A.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; PM10 = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2017

As shown in Table 6, construction-related emissions of VOC, NO_X, CO, PM10, and PM2.5 would exceed the thresholds of significance. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. The impact would be significant. Implementation of mitigation measures (MMs) AQ-A through AQ-D would be required.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the Proposed Project. Table 7 summarizes the projected annual emissions associated with construction of the Proposed Project.

The annual emissions estimates shown in Table 7 include emission reductions associated with MMs AQ-A through AQ-D discussed in Chapter 7 of this report. The federal agency can take measures to reduce emissions, and the changes must be state or federally enforceable to guarantee that emissions would be below de minimis levels. Based on CEQA provisions in 14 California Code of Regulations Section 15091(a)(1), MMs must be incorporated into the Proposed Project. For the purposes of the NEPA and General Conformity applicability analysis, MMs required by CEQA are considered design features of the Proposed Project. This is not considered “mitigation” under the General Conformity Rule. The Proposed Project assumes that MMs would be implemented to meet CEQA requirements. As shown in Table 7, the annual emissions would not exceed any de minimis levels. Therefore, temporary emissions associated with the Proposed Project would conform to the SIP, and a formal conformity analysis would not be required.

TABLE 7
GENERAL CONFORMITY - ESTIMATED ANNUAL CONSTRUCTION EMISSIONS FOR THE CDSM ALTERNATIVE

	VOC	NO_X	CO	PM10 [1]	PM2.5[1]
2018	1.29	13.12	7.31	1.92	1.25
2019	2.25	22.32	13.29	8.97	2.50
2020	15.42	121.71	82.95	27.97	11.54
2021	14.91	111.64	78.31	27.23	10.52
2022	13.99	103.72	72.90	28.07	9.89
2023	4.28	33.43	22.66	7.55	3.32
Maximum Annual Construction Emissions (tons/year)	15.42	121.71	82.95	28.07	11.54
Threshold of Significance (tons/year)	N/A	N/A	N/A	70	N/A
Significant Impact?	**No**	**No**	**No**	**No**	**No**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_2 = sulfur dioxide; PM10 = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2017

Excavate and Recompact Alternative

Under the Excavate and Recompact Alternative, construction of the Proposed Project would commence in 2018 and is expected to last approximately five and a half years. The construction schedule and heavy-duty off-road equipment use for the Cactus Road Realignment and LAA Realignment were assumed to be consistent with the CDSM Alternative. The NHD2 and Basin Improvements (Notch, Diversion Channel, and Slope Protection) phases would be constructed as they would under the CDSM Alternative; however, the off-road equipment, haul truck trips, and/or schedule for those construction phases would vary from the CDSM Alternative. As shown in Table 8, construction emissions for the Proposed Project would result in maximum daily emissions of approximately 127 pounds of VOC, 1,062 pounds of NO_X, 677 pounds of CO, 238 pounds of PM10, and 95 pounds of PM2.5. The emission estimates include fugitive dust control requirements consistent with GBUAPCD rules and regulations, and are not considered mitigation for the purposes of this analysis. Additional modeling assumptions and details are provided in Appendix A.

TABLE 8
ESTIMATED MAXIMUM DAILY CONSTRUCTION EMISSIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	VOC	NO_X	CO	PM10 [1,2]	PM2.5 [1]
2018	10.75	109.36	60.96	16.01	10.38
2019	26.54	259.91	155.84	35.58	23.69
2020	127.29	1,061.58	676.68	237.79	94.73
2021	127.29	1,061.58	676.68	237.79	94.73
2022	98.28	720.41	511.33	82.48	58.80
2023	98.28	720.41	511.33	82.48	58.80
2024	14.91	152.98	84.15	18.26	12.03
Maximum Daily Construction Emissions (lbs/day)	127.29	1,061.58	676.68	237.79	94.73
Threshold of Significance (lbs/day)	75	100	550	150	55
Significant Impact?	**YES**	**YES**	**YES**	**YES**	**YES**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
[2] Fugitive dust emissions were reduced based on watering two times per day.
[3] Additional details on the emissions for each calendar year are included in Appendix A.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; PM_{10} = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2017

As shown in Table 8, construction-related emissions of VOC, NO_X, CO, PM10, and PM2.5 would exceed the thresholds of significance. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. The impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

Similar to the CDSM Alternative, the General Conformity applicability and NEPA analyses for the Excavate and Recompact Alternative are based on estimates of the total direct and indirect net emissions from construction activities. Table 9 summarizes the projected annual emissions associated with construction of the Proposed Project.

TABLE 9
GENERAL CONFORMITY - ESTIMATED ANNUAL CONSTRUCTION EMISSIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	VOC	NO_X	CO	PM10 [1]	PM2.5 [1]
2018	1.29	13.12	7.31	1.92	1.25
2019	2.23	21.83	13.09	2.99	1.99
2020	15.71	127.04	84.31	22.19	11.16
2021	15.29	118.95	79.93	21.78	10.20
2022	14.15	103.74	73.63	11.88	8.47
2023	11.09	82.74	57.95	9.87	6.92
2024	0.32	3.29	1.81	0.64	0.38
Maximum Annual Construction Emissions (tons/year)	15.71	127.04	84.31	22.19	11.16
Threshold of Significance (tons//year)	N/A	N/A	N/A	70	N/A
Significant Impact?	**No**	**No**	**No**	**No**	**No**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_2 = sulfur dioxide; PM10 = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2017

As shown in Table 9, the estimated emissions associated with the Excavate and Recompact Alternative would be less than the General Conformity de minimis thresholds. Therefore, temporary emissions associated with the Excavate and Recompact Alternative would conform to the SIP, and a formal conformity analysis would not be required.

Operation

CDSM and Excavate and Recompact Alternatives

Operation of the Proposed Project would be generally similar to existing conditions. As such, the Proposed Project would not substantially increase emissions from the use of on-road motor vehicles or off-road equipment relative to existing conditions. Therefore, operational emissions would not violate an ambient air quality standard or contribute substantially to an existing violation. This impact would be less than significant.

AQ-3: *The Proposed Project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). The impact would be significant, requiring mitigation.*

Construction

CDSM Alternative

The cumulative analysis focuses on whether a specific project would result in cumulatively considerable contribution of emissions to the region. Per CEQA Guidelines Section 15064(h)(4), the existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the Proposed Project's incremental effects are cumulatively considerable.

The GBVAB is considered a nonattainment area for ozone (CAAQS) and PM (CAAQS and NAAQS). As discussed earlier, the Proposed Project would result in the generation of VOC, NO_X, CO, PM10, and PM2.5 emissions at levels that exceed the recommended emissions thresholds for construction activities. These thresholds are designed to identify those projects that would result in significant levels of air pollution, and that would assist the region in attaining the applicable state and federal ambient air quality standards. When a project exceeds these significance thresholds, it is considered to impede attainment and maintenance of ambient air quality standards.

Because the Proposed Project would exceed the project-level air quality significance thresholds for criteria pollutant emissions, the Proposed Project's construction emissions would have a cumulatively considerable contribution to the region's air quality. Therefore, the cumulative impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

Excavate and Recompact Alternative

Similar to the CDSM Alternative, the Excavate and Recompact Alternative would exceed the project-level air quality significance thresholds for criteria pollutant emissions. Therefore, construction emissions for the Excavate and Recompact Alternative would have a cumulatively considerable contribution to the region's air quality. The cumulative impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

Operation

CDSM and Excavate and Recompact Alternatives

Operation of the Proposed Project would be generally similar to existing conditions. As such, the Proposed Project would not substantially increase emissions from the use of on-road motor vehicles or off-road equipment relative to existing conditions. Therefore, operational emissions would not have a cumulatively considerable contribution to the region's air quality. The cumulative impact would be less than significant.

AQ-4: *The Proposed Project would expose sensitive receptors to substantial pollutant concentrations. The impact would be significant, requiring mitigation.*

Construction

CDSM Alternative

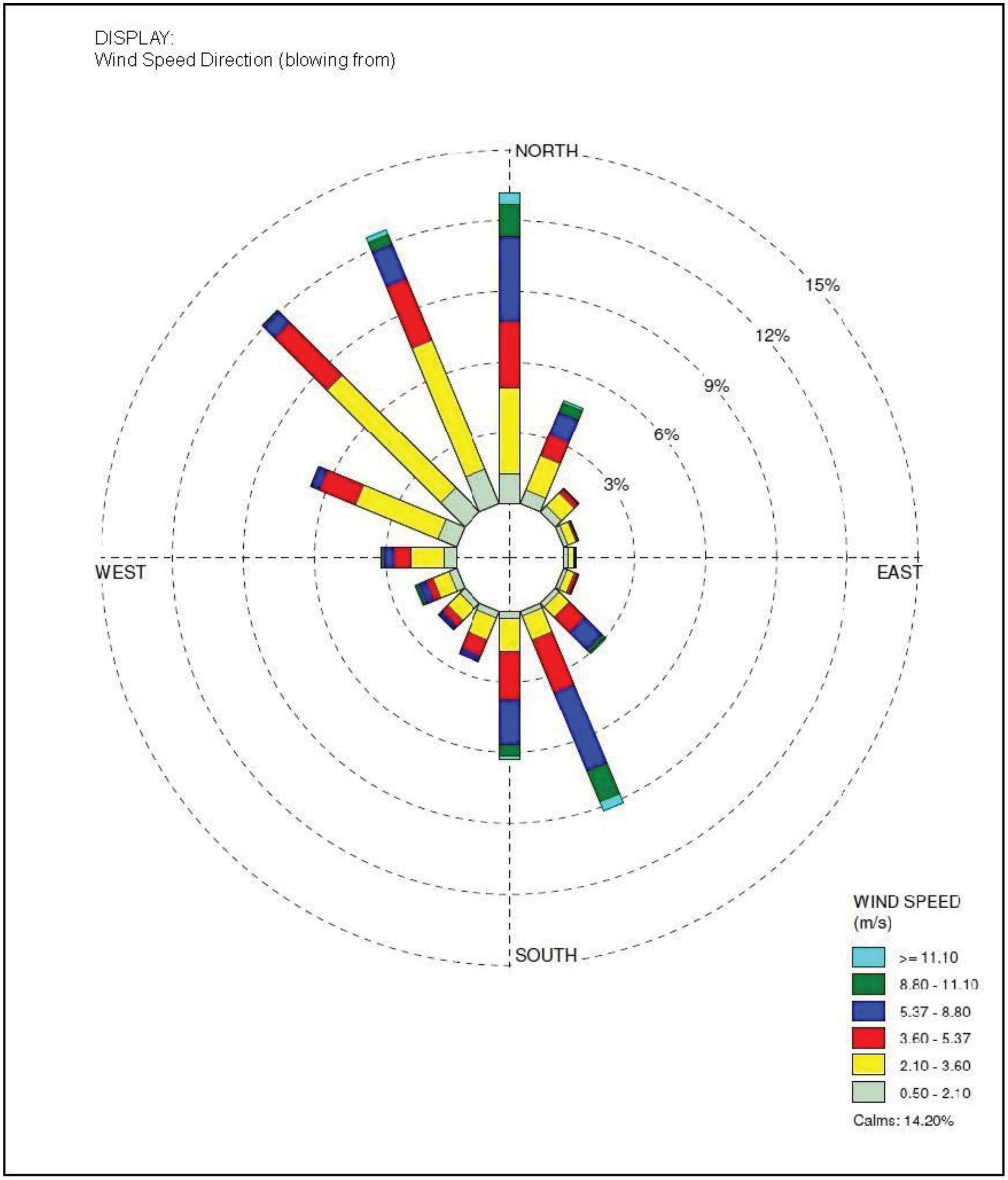
As previously discussed, localized emissions of criteria air pollutants and precursors were assessed in accordance with SCAQMD's LST guidance. The nearest off-site sensitive receptor is the single-family residence located approximately 600 feet north of the Project Site, on the Butterworth Ranch land that is adjacent to the Project Site. The Project Site also contains an existing residential property owned by LADWP within which the reservoir keeper and family reside.

As previously discussed, AERMOD was used for this analysis. AERMOD is a refined dispersion model for simple and complex terrain for receptors within 50 km of a modeled source. The AERMOD modeling system consists of two preprocessors and the dispersion model. AERMET is the meteorological preprocessor component and AERMAP is the terrain pre-processor component that characterizes the terrain and generates receptor elevations along with critical hill heights for those receptors (USEPA, 2011). AERMOD was run with default model options in the CONTROL pathway. The version numbers of the AERMOD model and pre-processors that were used include:

- AERMAP Version 11103
- AERMOD Version 15181

Meteorological data from the Bishop Airport site was used in this analysis (CARB, 2015e). As shown in Figure 1, the Bishop wind rose plot the dominant wind directions from the north to south and from the northwest to the southeast. These are believed to be driven in large part by terrain on the east and west side of the station that funnels wind through Owens Valley. The meteorological data, listed below, was processed with AERMET (Version 14134) with the USEPA default option. The meteorological data and wind rose provide information and assumptions for how pollutants generated by the Proposed Project could be concentrated and dispersed throughout Project Site and surrounding areas.

AERMET requires specification of site characteristics including surface roughness, albedo, and Bowen ratio. These parameters were developed according to the guidance provided by USEPA in the most recent revision of the AERMOD Implementation Guide (USEPA 2015).



Start Date: 1/1/2009 - 00:00
End Date: 1/2/2014 - 23:59
Calm Winds: 14.20%
AVG. Wind Speed: 3.83 m/s
Total Count:41,228 hrs.

SCALE: AS SHOWN

Figure 1

Bishop Airport Wind Rose Plot 2009-2013

The AERMOD Implementation Guide provides the following recommendations for determining the site characteristics:

1. The determination of the surface roughness length should be based on an inverse distance weighted geometric mean for a default upwind distance of one kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Bowen ratio should be based on a simple un-weighted geometric mean (i.e., no direction or distance dependency) for a representative domain, with a default domain defined by a 10-kilometer by 10-kilometer region centered on the measurement site.
3. The determination of the albedo should be based on a simple un-weighted arithmetic mean (i.e., no direction or distance dependency) for the same representative domain as defined for Bowen ratio, with a default domain defined by a 10-kilometer by 10-kilometer region centered on the measurement site.

GBUAPCD provided the data for the analysis, which included surface roughness, albedo, and Bowen ratio.

Emission Sources

The emission sources used in AERMOD followed the SCAQMD's Final Localized Significance Threshold Methodology. Construction of the Proposed Project is comprised of the following emission sources:

- Volume Sources (tailpipe emissions from off-road construction equipment)
  - The analysis assumed that emissions from the off-road construction equipment are best characterized by volume sources. The release height is assumed to be five meters per volume source. This represents the mid-range of the expected plume rise from frequently used construction equipment during daytime atmospheric conditions.
- Area Sources (fugitive dust from earthmoving activities)
  - Fugitive dust emissions are treated as a ground-based polygon area source covering the extent of each construction zone. An initial vertical dimension of one meter is assumed to represent vertical spread of the emissions.
- Road Sources (heavy-duty haul truck emissions)
  - Emissions from on-road vehicles are also characterized by volume sources. The release height is assumed to be 5.18 meters per volume source (Truck Height of 6.1 meters x 1.7 = 10.36 meters / 2 = 5.18 meter release height) based on Haul Road Workgroup Guidance (USEPA, 2012).

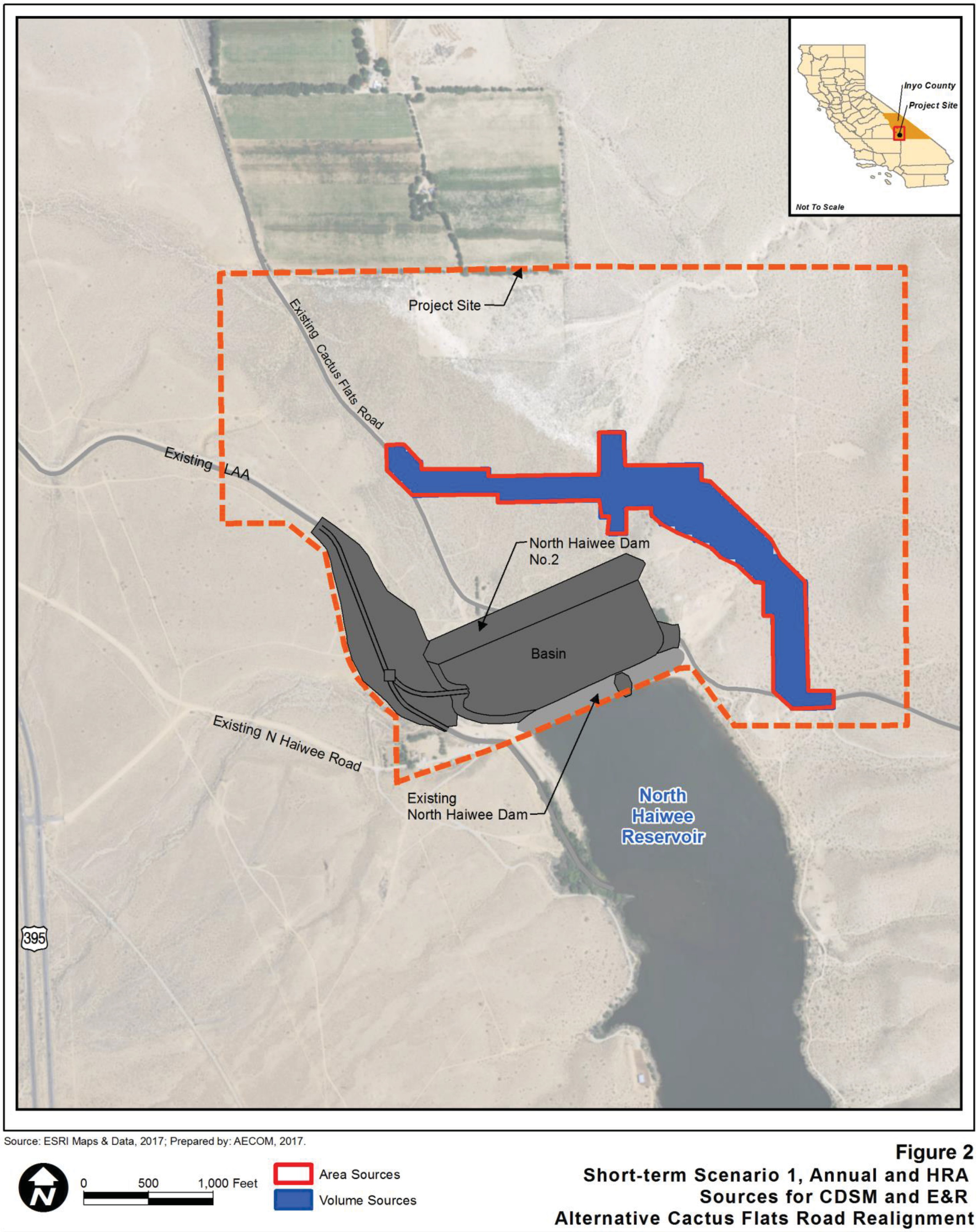
All emissions sources were assumed to take place from Monday through Saturday between 6:30 a.m. and 4:30 p.m. as a conservative estimate as the Cactus Flats Road Realignment and haul trucks traveling to and from Borrow Site 15 will occur on Monday through Friday only. For the purposes of dispersion modeling to estimate maximum daily emission concentrations, the Proposed Project has been divided into six phases based on the construction schedule and overlapping activities:

- Construction activities for the Cactus Flats Road Realignment (Scenario 1) as shown in Figure 2;
- Concurrent construction activities for LAA Realignment and Borrow Site 10 (Scenario 2) as shown in Figure 3;
- Concurrent construction activities for LAA Realignment, Material Processing and Processed Material Storage Area, NHD2, and Borrow Site 10 (Scenario 3) as shown in Figure 4;

- Concurrent construction activities for LAA Realignment, NHD2, and Material Processing and Processed Material Storage Area (Scenario 4) as shown in Figure 5;
- Concurrent construction activities for NHD2, Material Processing and Processed Material Storage Area, and Borrow Site 15 (Scenario 5) as shown in Figure 6; and
- Concurrent construction activities for the Basin (Slope Protection and Notch) and the Diversion Channel (Scenario 6) as shown in Figure 7.

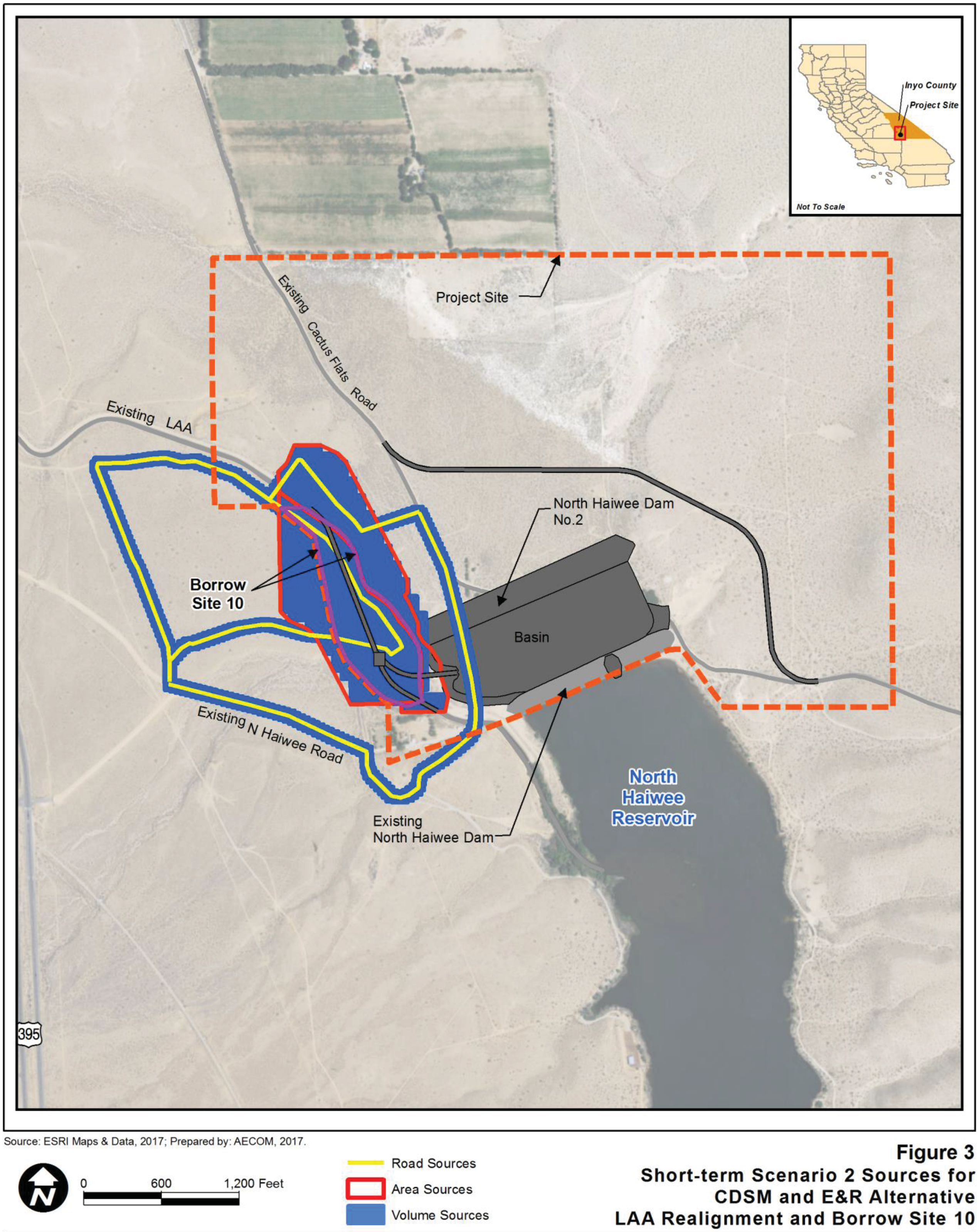
These scenarios were used to model maximum daily concentrations of NO_X, CO, PM10 and PM2.5. There are no applicable localized thresholds for VOC emissions. In addition to the daily thresholds, NO_X and PM10 have average annual thresholds that must be estimates for construction activities. As discussed earlier, construction activities would occur over six calendar years from 2018 through 2023. The emissions sources over those years are illustrated in Figures 2, 4, 6, and 8 through 10.

As shown in Figure 11, receptors were placed over areas immediately adjacent to the Project Site, haul routes, and borrow sites including residences, commercial, and industrial buildings. Receptor locations are off-site locations where persons may be exposed to the emissions from Project activities. Receptor locations include residential, commercial, and industrial land use areas; and any other areas where persons can be situated for an hour or longer at a time. For the purposes of a CEQA analysis, the SCAQMD considers a sensitive receptor to be a location such as residence, hospital, convalescent facility where it is possible that an individual could remain for 24 hours. Commercial and industrial facilities are not included in the definition of sensitive receptor because employees do not typically remain onsite for a full 24 hours. Receptor elevations and hill heights were assigned using USEPA AERMAP and digital terrain elevations from the National Elevation Dataset. The National Elevation Dataset was developed by the United States Geological Survey and provides terrain elevations with 1-meter vertical resolution and 10-meter horizontal resolution based on a Universal Transverse Mercator coordinate system. For each receptor location, the terrain elevation was set to the elevation for the closest National Elevation Dataset grid point. Lakes Environmental software was used for assigning elevations to various receptors and hill heights.



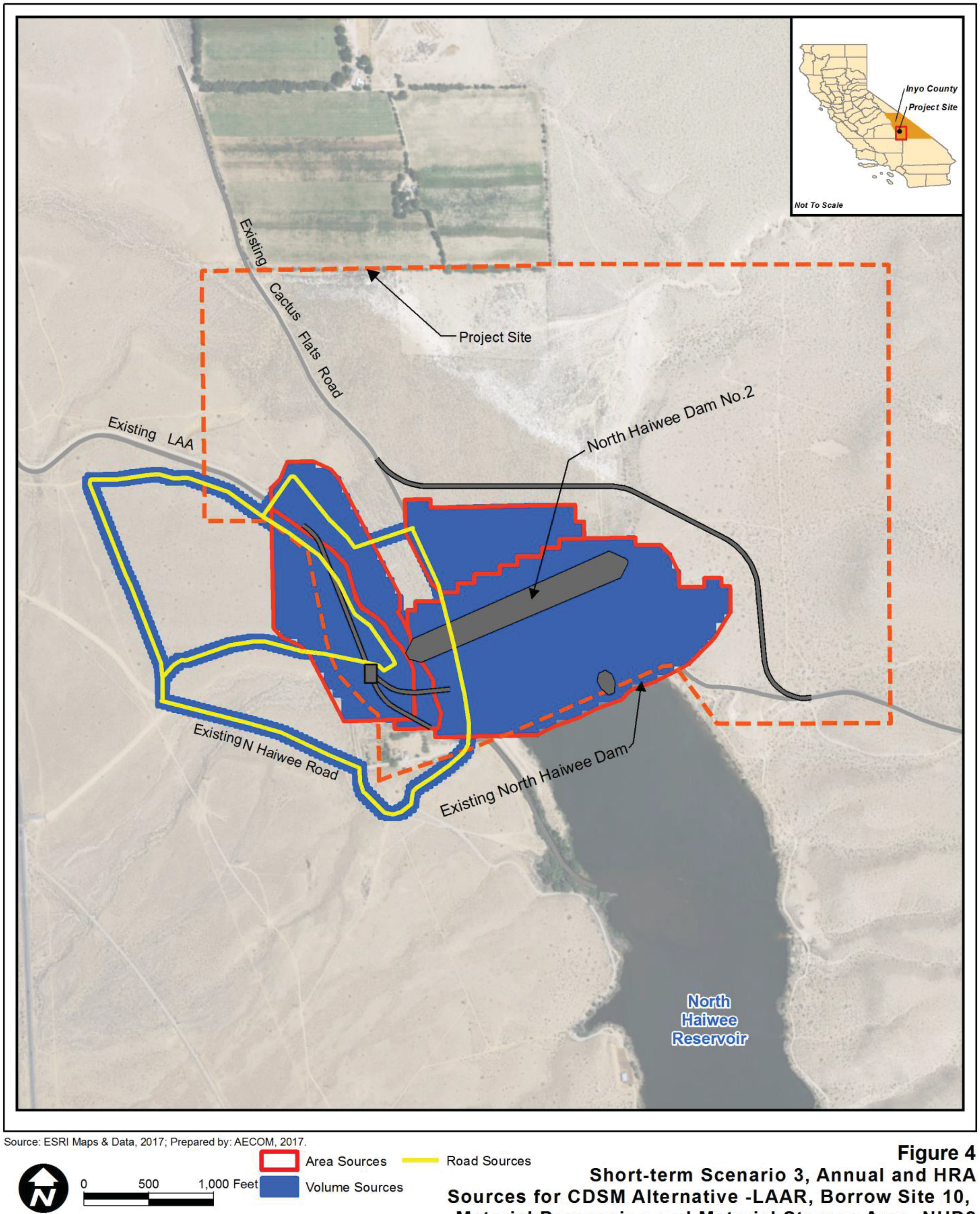
Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 2
Short-term Scenario 1, Annual and HRA Sources for CDSM and E&R Alternative Cactus Flats Road Realignment



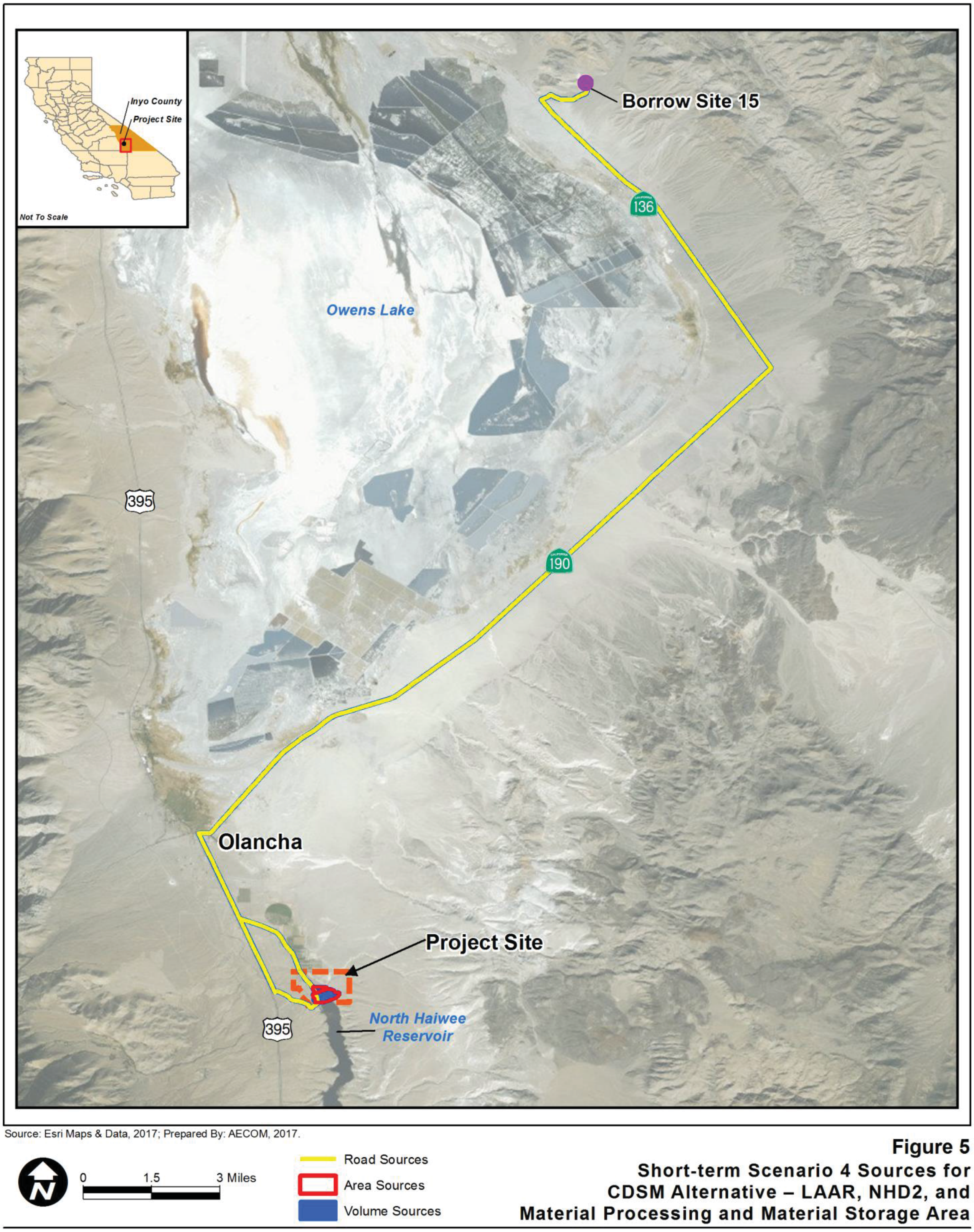
Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 3
Short-term Scenario 2 Sources for CDSM and E&R Alternative LAA Realignment and Borrow Site 10



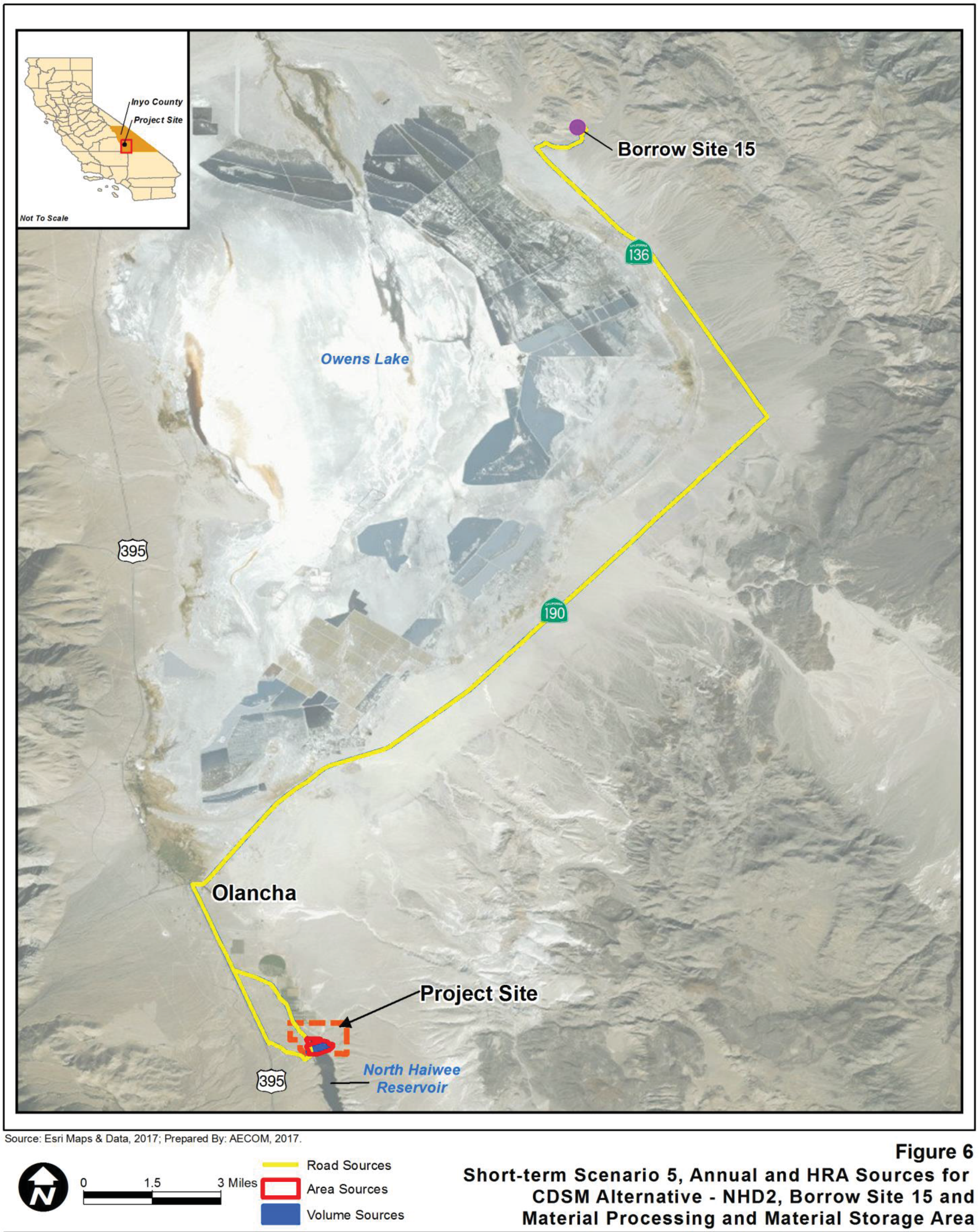
Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 4
Short-term Scenario 3, Annual and HRA Sources for CDSM Alternative -LAAR, Borrow Site 10, Material Processing and Material Storage Area, NHD2



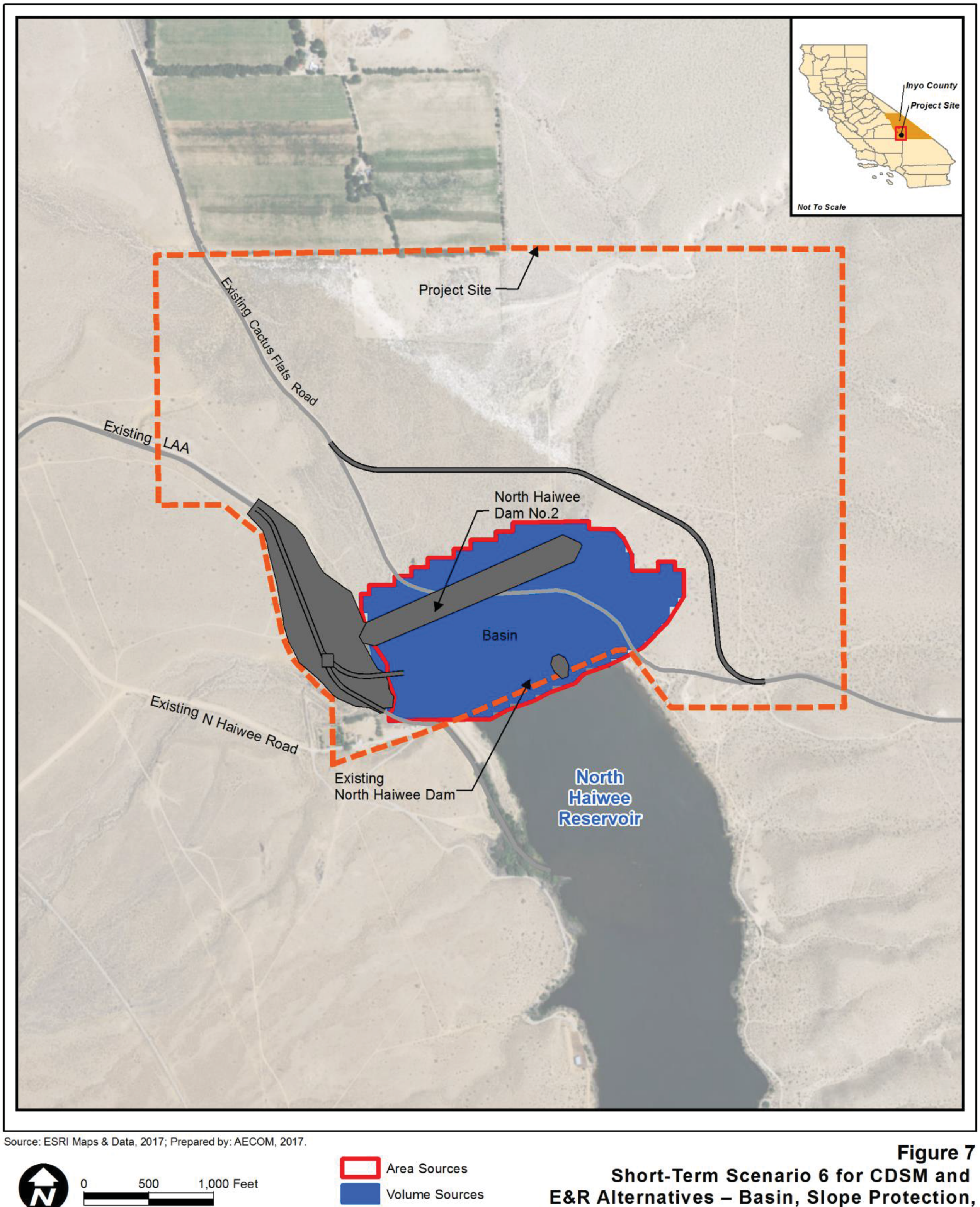
Source: Esri Maps & Data, 2017; Prepared By: AECOM, 2017.

Figure 5
Short-term Scenario 4 Sources for CDSM Alternative – LAAR, NHD2, and Material Processing and Material Storage Area



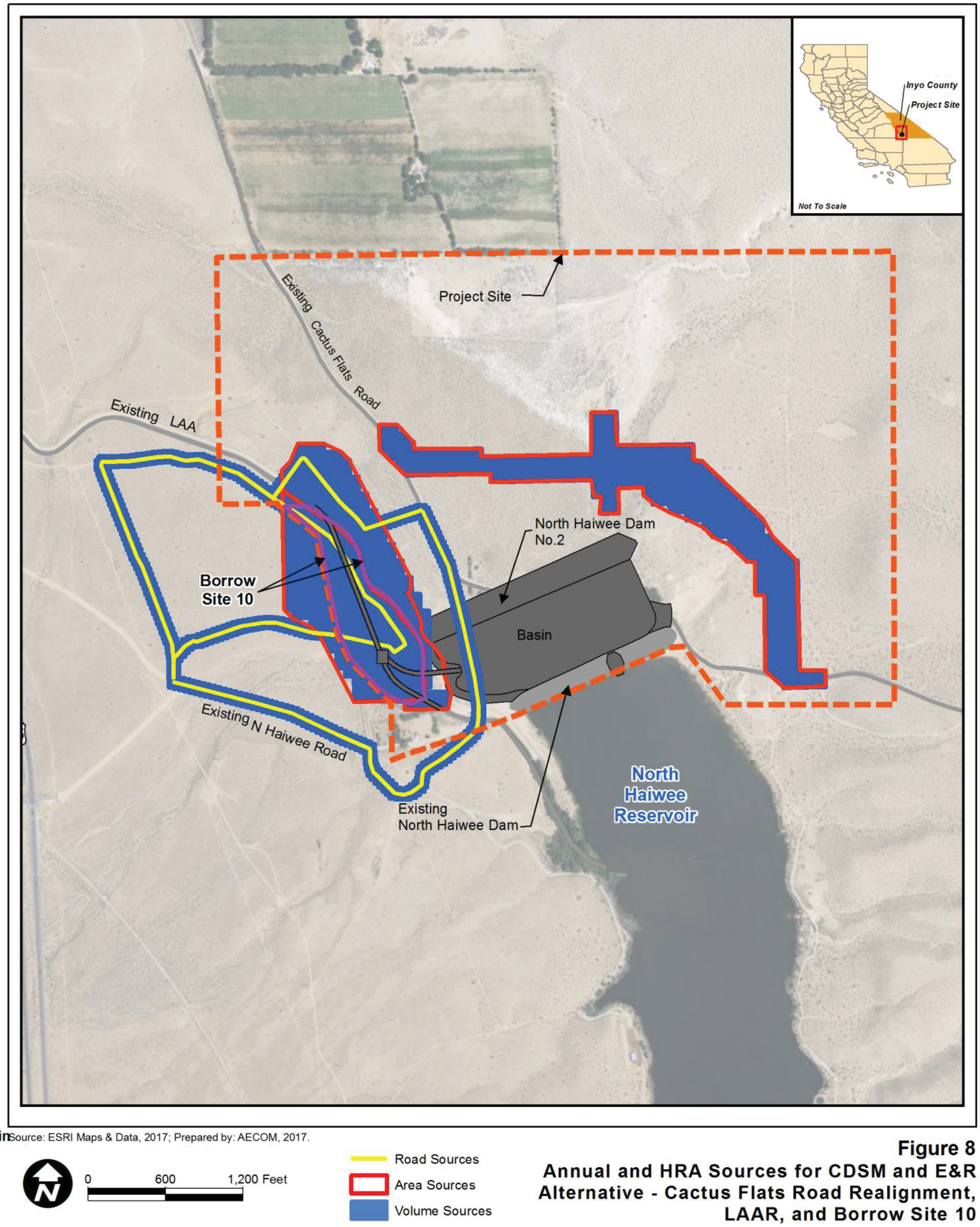
Source: Esri Maps & Data, 2017; Prepared By: AECOM, 2017.

Figure 6
Short-term Scenario 5, Annual and HRA Sources for CDSM Alternative - NHD2, Borrow Site 15 and Material Processing and Material Storage Area



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 7
Short-Term Scenario 6 for CDSM and E&R Alternatives – Basin, Slope Protection, Notch and Diversion Channel

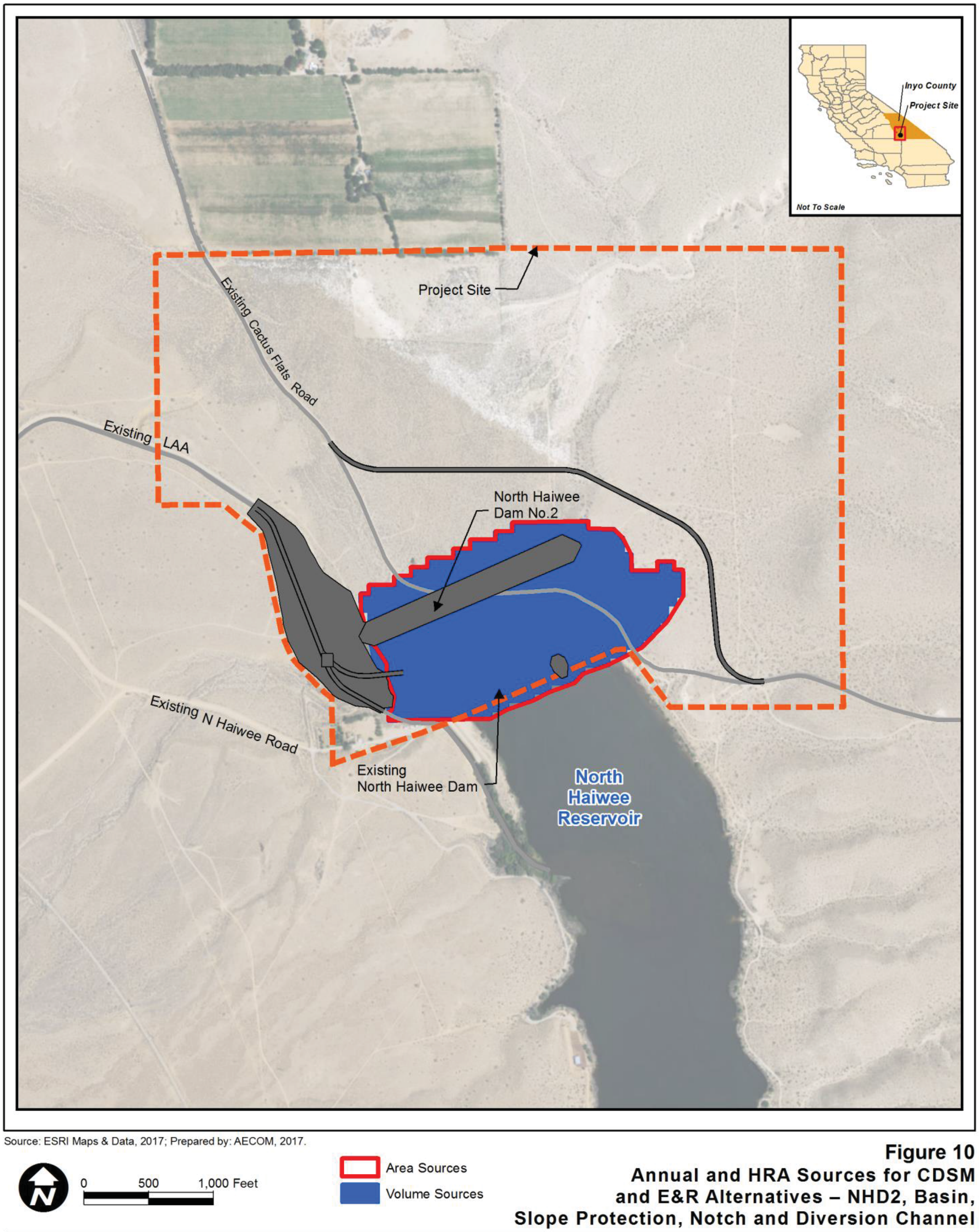


Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 8
Annual and HRA Sources for CDSM and E&R Alternative - Cactus Flats Road Realignment, LAAR, and Borrow Site 10

Source: Esri Maps & Data, 2017; Prepared By: AECOM, 2017.

Figure 9
Annual and HRA Sources for CDSM Alternative - LAAR, Borrow Site 15, Material Processing and Material Storage Area, NHD2



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 10
Annual and HRA Sources for CDSM and E&R Alternatives – NHD2, Basin, Slope Protection, Notch and Diversion Channel

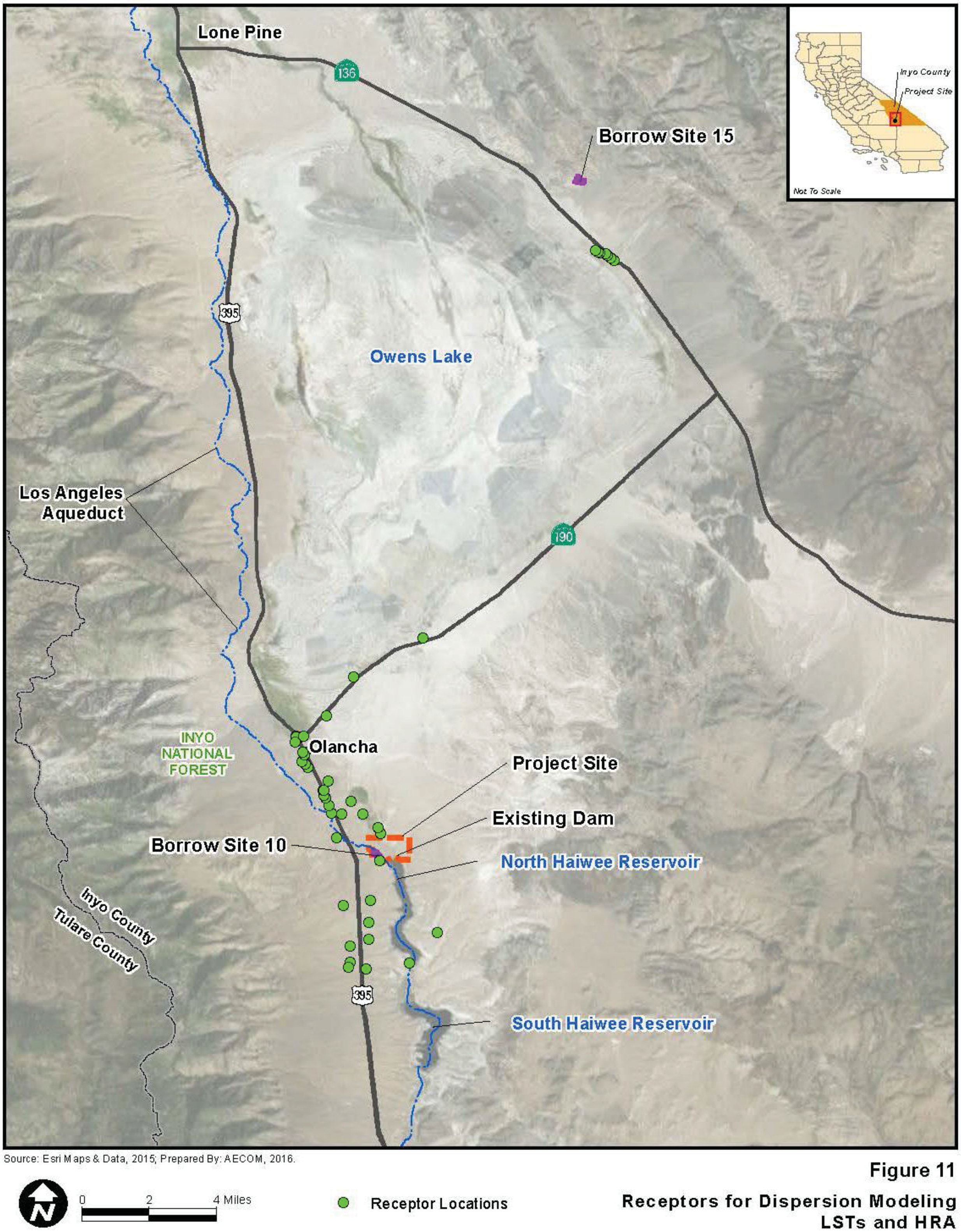


Figure 11

Receptors for Dispersion Modeling LSTs and HRA

Table 10 presents the maximum unmitigated localized modeled concentrations during a single day of construction that may potentially impact the reservoir keeper residence and nearby receptors. Table 11 presents the maximum unmitigated localized modeled concentrations during a single year of construction that may potentially impact the reservoir keeper residence and nearby receptors.

TABLE 10
MAXIMUM DAILY LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE CDSM ALTERNATIVE

	CO		NO_2 (1)	PM10	PM2.5
	Averaging Time				
	1-Hour	8-Hour	1-Hour	24-Hour	
Scenario 1					
Maximum Modeled Concentration (μg/m^3)	---	---	---	1.31	0.88
Maximum Modeled Concentration (ppmv)	0.060	0.010	0.063	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**
Scenario 2					
Maximum Modeled Concentration (μg/m^3)	---	---	---	27.94	12.04
Maximum Modeled Concentration (ppmv)	0.525	0.137	0.464	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 3					
Maximum Modeled Concentration (μg/m^3)	---	---	---	38.20	16.96
Maximum Modeled Concentration (ppmv)	1.308	0.252	0.933	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 4					
Maximum Modeled Concentration (μg/m^3)	---	---	---	22.27	16.56
Maximum Modeled Concentration (ppmv)	1.303	0.228	0.928	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 5					
Maximum Modeled Concentration (μg/m^3)	---	---	---	22.17	15.04
Maximum Modeled Concentration (ppmv)	1.284	0.217	0.911	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 6					
Maximum Modeled Concentration (μg/m^3)	---	---	---	4.40	3.91
Maximum Modeled Concentration (ppmv)	0.384	0.077	0.377	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**No**	**No**

Note: EPA default NO_X to NO_2 conversion rates of 0.8 (1-hour NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2017

TABLE 11
MAXIMUM ANNUAL LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE CDSM ALTERNATIVE

	NO_2 (1) (ppmv)	PM10 $\mu g/m^3$
2018	4.27E-05	0.01
2019	2.51E-04	0.12
2020	1.88E-04	0.19
2021	9.32E-05	0.15
2022	3.01E-05	0.15
2023	4.64E-05	0.12
Maximum Modeled Concentration ($\mu g/m^3$)	--	0.19
Maximum Modeled Concentration (ppmv)	2.51E-04	--
LST Threshold	0.03	1.0 $\mu g/m^3$
Significant Impact?	**No**	**No**

Note: EPA default NO_X to NO_2 conversion rates of 0.75 (Annual NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2016

As shown in Tables 10 and 11, modeled daily concentrations during construction scenarios 2 through 6 would exceed the LST for NO_X, and scenarios 2 through 5 would exceed the LSTs for PM10 and PM2.5 emissions at the reservoir keeper residence. As shown in Figure 12, there are seven additional locations that exceed the 1-hour NO_2, PM10, or PM2.5 daily threshold. Therefore, construction emissions could expose sensitive receptors to substantial pollutant concentrations. The impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

Health Risk Assessment

The greatest potential for TAC emissions would be related to diesel particulate matter (diesel PM) emissions associated with heavy-duty construction equipment operations and metals associated with the concrete batch plant. Heavy-duty construction equipment would operate during the five-year construction period and would cease following buildout of the Proposed Project. The HRA was performed to evaluate the emissions of TACs during construction activities and their effects on nearby receptors, including the reservoir keeper residence and receptors along the haul routes and borrow sites.

The HRA was performed using the USEPA regulatory model AERMOD (version 15181) and the concentration files imported into the Hotspots Analysis and Reporting Program (HARP2 Version 16217) modeling system. Excess lifetime cancer risks, chronic noncancer HI, and acute HI were estimated as part of the HRA. The estimated excess lifetime cancer risks, chronic noncancer HI, and acute HI were compared to the thresholds for significance for TACs for a maximally exposed individual at the MEIR and the MEIW.

The estimated cancer risk was based on the annual average diesel PM and metals concentration, inhalation potency factor, and default estimates of breathing rate, body weight, and exposure period calculated by HARP2. In addition to the potential cancer risk, diesel PM and metals may result in chronic non-cancer health impacts. There is no acute risk threshold for diesel PM but there are acute thresholds for several of the metal compounds. The exposure level is the concentration below which no adverse non-cancer health effects are anticipated.

Table 12 shows the maximum cancer risk, chronic HI, and acute HI for construction of the Proposed Project. The maximum cancer risk due to unmitigated construction emissions was determined to be 98.0 in 1 million for the reservoir keeper residence, and 1.4 in 1 million for the Worker. The maximum chronic HI was determined to be 0.049 for the MEIW and 0.049 for the MEIR. The maximum acute HI was determined to be 0.011.

TABLE 12
MAXIMUM CONSTRUCTION HEALTH IMPACTS FOR OFF-SITE RECEPTORS FOR THE CDSM ALTERNATIVE

Receptor Type	Maximum Cancer Risk (per million)	Maximum Chronic HI	Maximum Acute HI
MEIR	98.0	0.049	0.011
MEIW	1.4	0.049	
Threshold of Significance	10	1.0	1.0
Significant Impact?	**YES**	**No**	**No**

Notes: HI= Hazard Index; MEIR = Maximally Exposed Individual Resident; MEIW = Maximally Exposed Individual Worker
Source: Estimated by AECOM in 2016

As shown in Table 12, the maximum health risk for one residential receptor (the reservoir keeper residence) would exceed 10 in 1 million. Therefore, the construction of the Proposed Project could expose a sensitive receptor to substantial pollutant concentrations that would result in a health risk. The impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

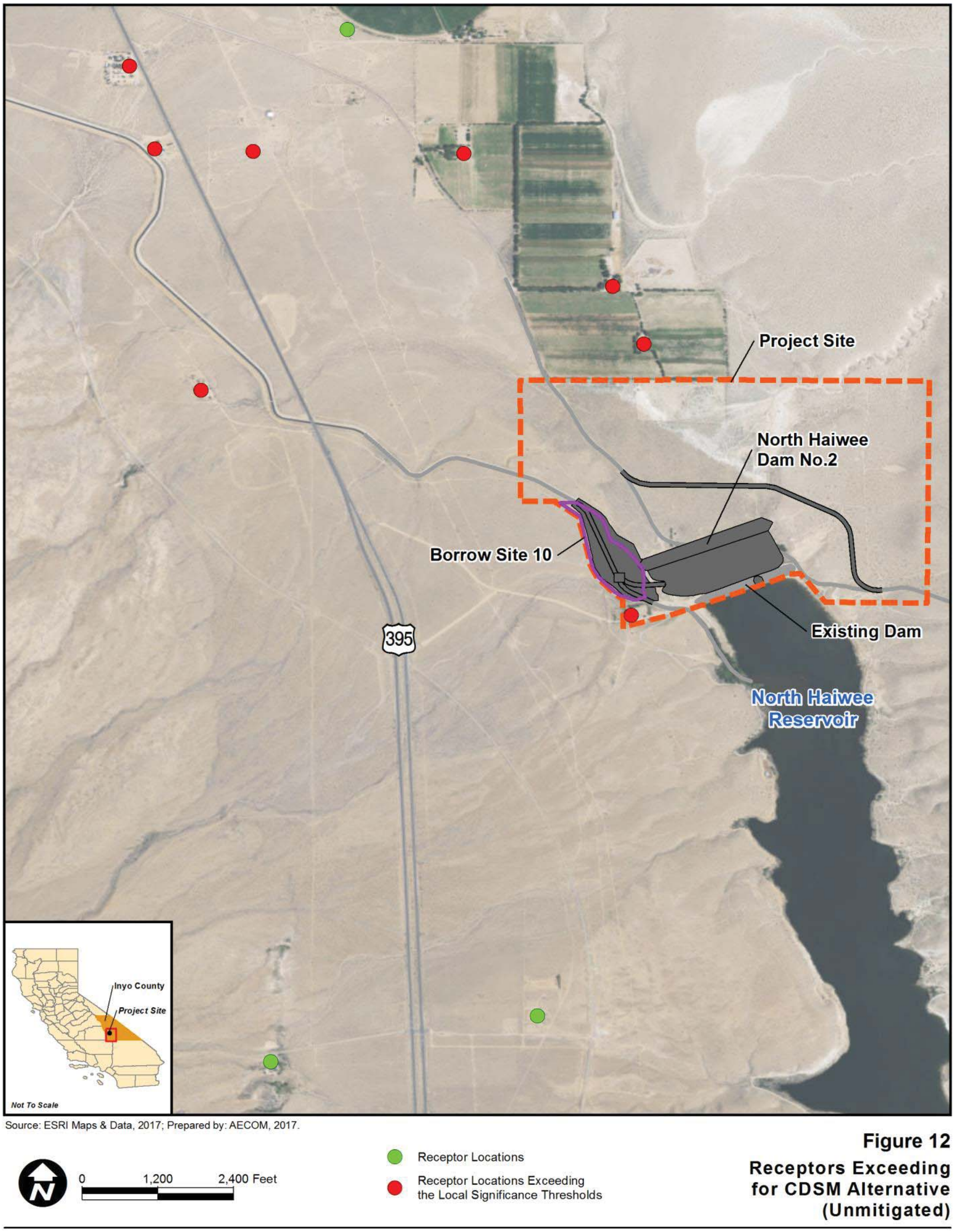


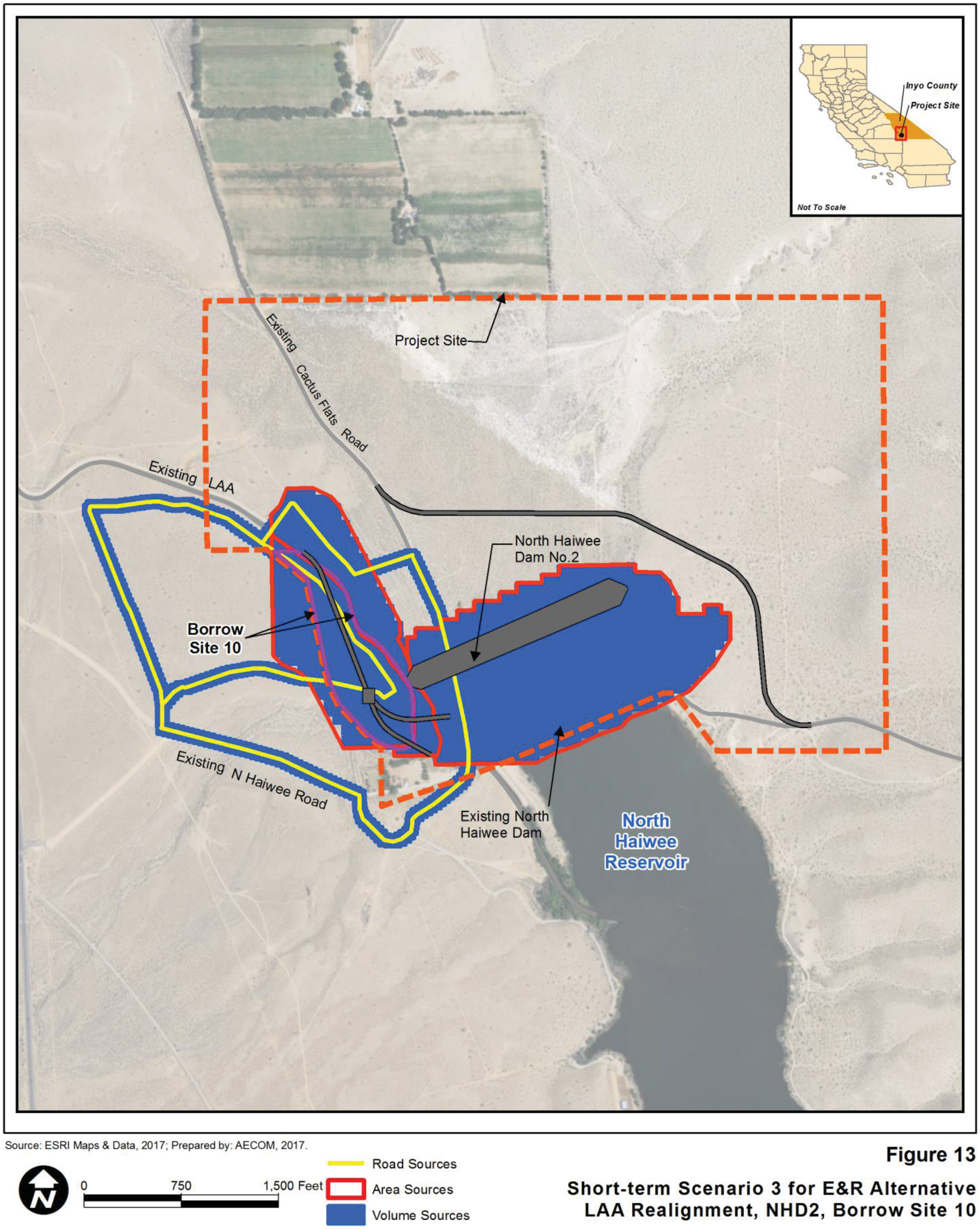
Figure 12
Receptors Exceeding for CDSM Alternative (Unmitigated)

Excavate and Recompact Alternative

Similar to the CDSM Alternative, emission concentrations and health risks were estimated using the same meteorological data, receptor locations and source assumptions. For the purposes of dispersion modeling to estimate maximum daily emission concentrations, the Excavate and Recompact Alternative has been divided into six phases based on the construction schedule and overlapping activities:

- Construction activities for the Cactus Flats Road Realignment (Scenario 1) as shown in Figure 2;
- Concurrent construction activities for the LAA Realignment and Borrow Site 10 (Scenario 2) as shown in Figure 3;
- Concurrent construction activities for the LAA Realignment, NHD2, and Borrow Site 10 (Scenario 3) as shown in Figure 13;
- Concurrent construction activities for the LAA Realignment, NHD2, and Borrow Site 15 (Scenario 4) as shown in Figure 14;
- Construction activities for NHD2 (Scenario 5) as shown in Figure 15; and
- Concurrent construction activities for the Basin (Slope Protection and Notch) and the Diversion Channel (Scenario 6) as shown in Figure 7.

These scenarios were used to model maximum daily concentrations of NO_x, CO, PM10 and PM2.5. In addition to the daily thresholds, NO_x and PM10 have average annual thresholds that must be estimates for construction activities. As discussed earlier, construction activities would occur over seven calendar years from 2018 through 2024. The emissions sources over those years are illustrated in Figures 2, 8, 10, and 16 through 20.



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 13

Short-term Scenario 3 for E&R Alternative LAA Realignment, NHD2, Borrow Site 10

Source: Esri Maps & Data, 2015; Prepared By: AECOM, 2016.

Figure 14

Short-term Scenario 4 for E&R Alternative LAA Realignment, NHD2, Borrow Site 15

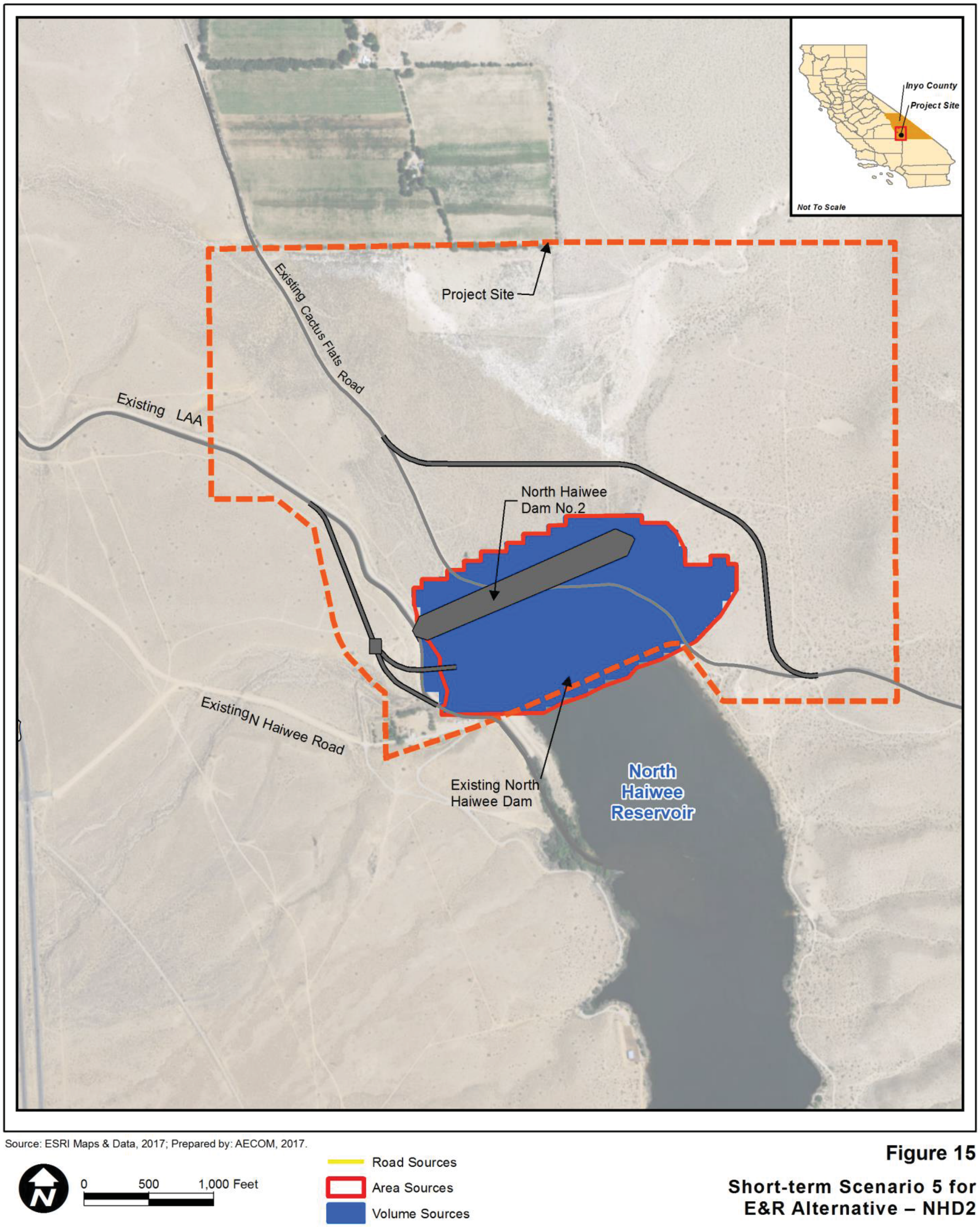
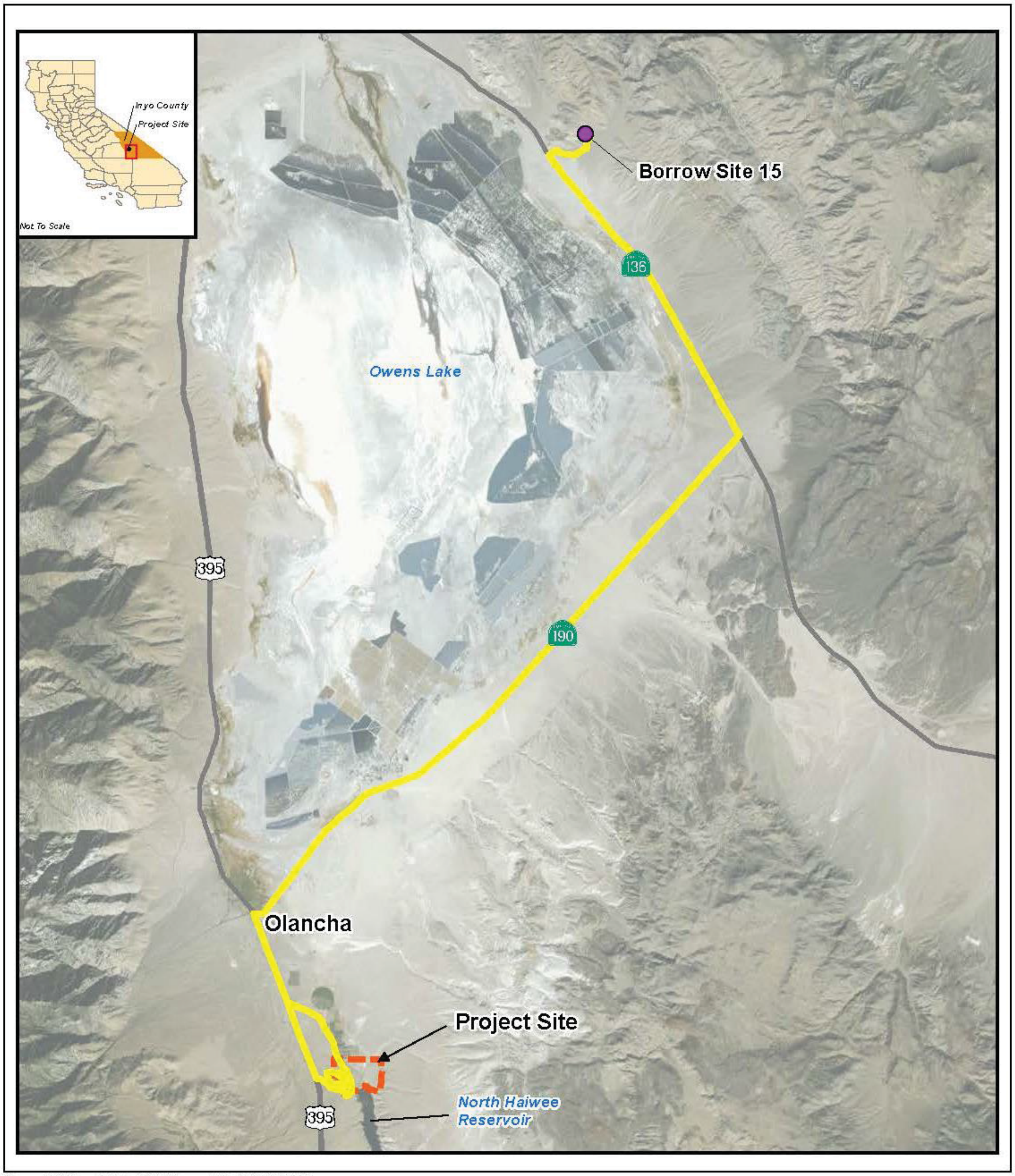


Figure 15

Short-term Scenario 5 for E&R Alternative – NHD2

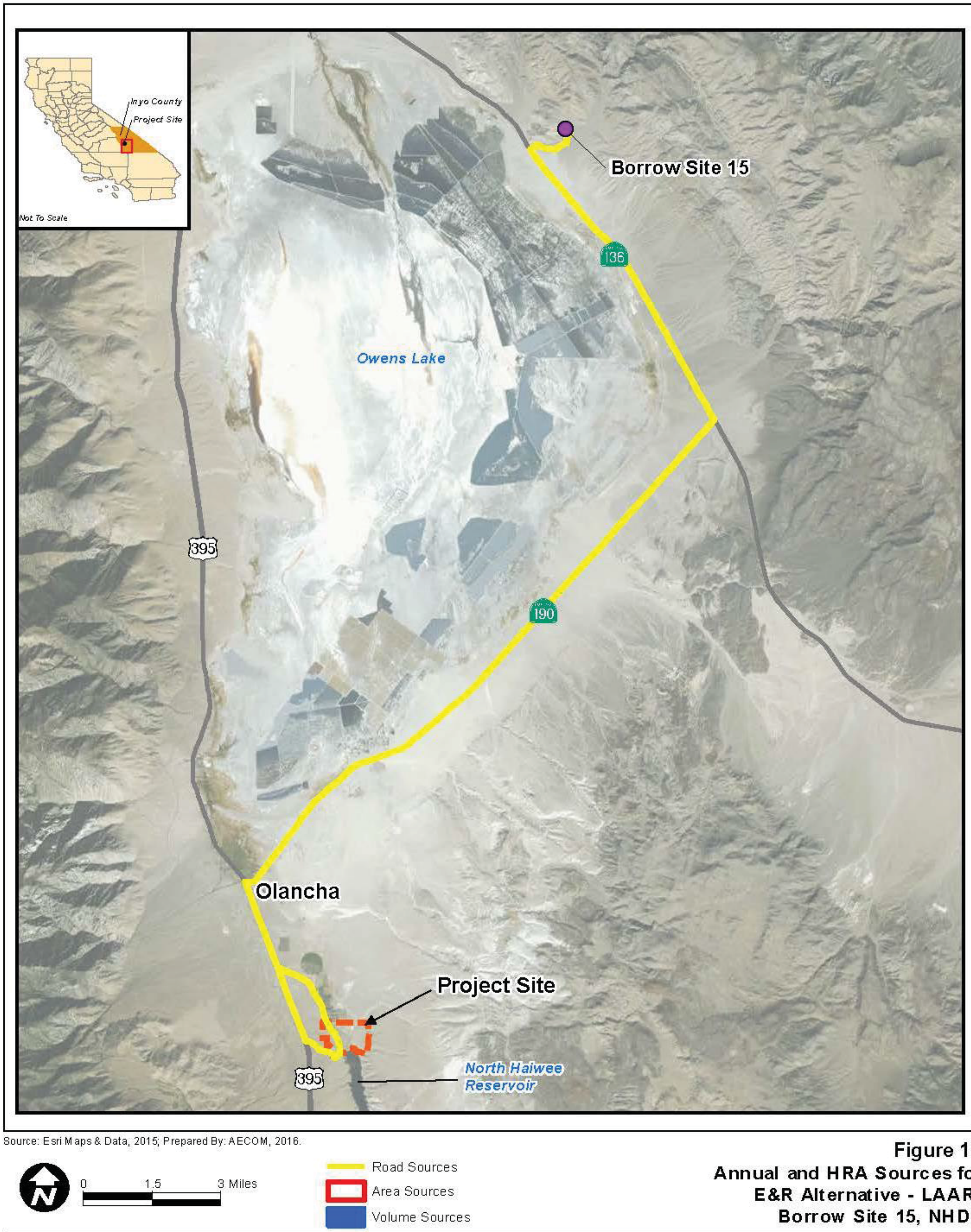


Source: Esri Maps & Data, 2015; Prepared By: AECOM, 2016.

0 1.5 3 Miles

Road Sources
Area Sources
Volume Sources

Figure 16
Annual and HRA Sources for E&R Alternative - LAAR, Borrow Site 10, Borrow Site 15, NHD2



Source: Esri Maps & Data, 2015; Prepared By: AECOM, 2016.

Figure 17
Annual and HRA Sources for E&R Alternative - LAAR, Borrow Site 15, NHD2

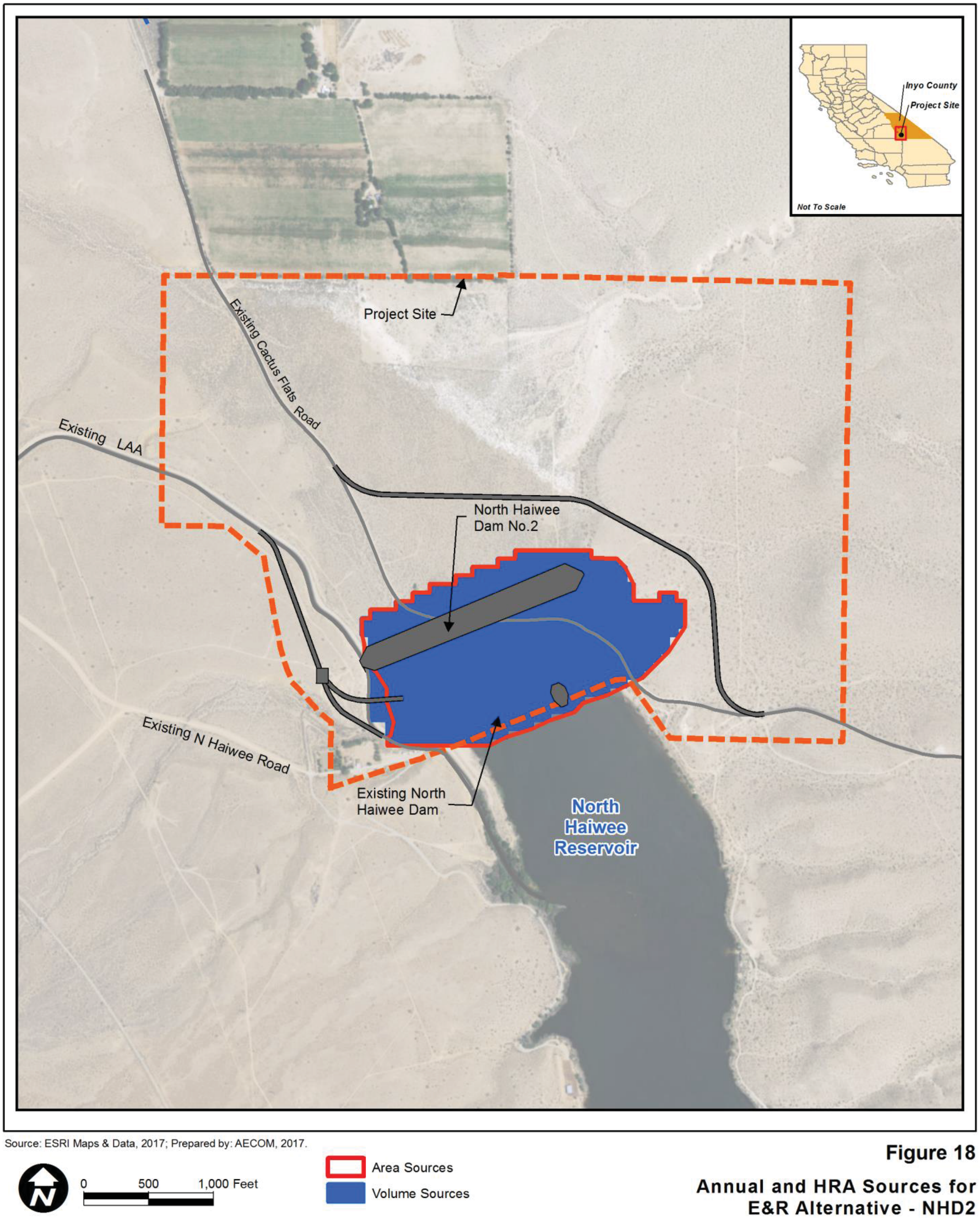
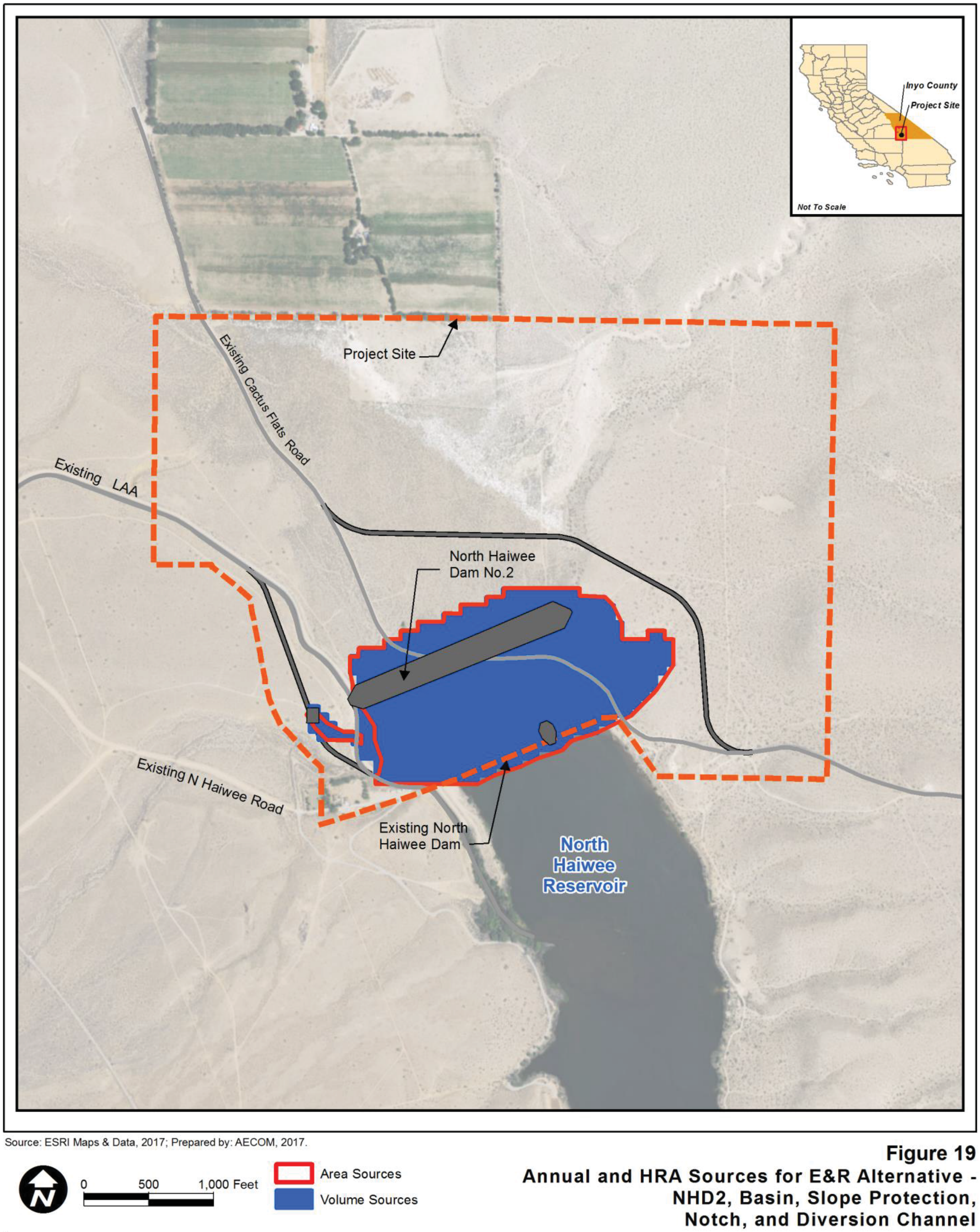


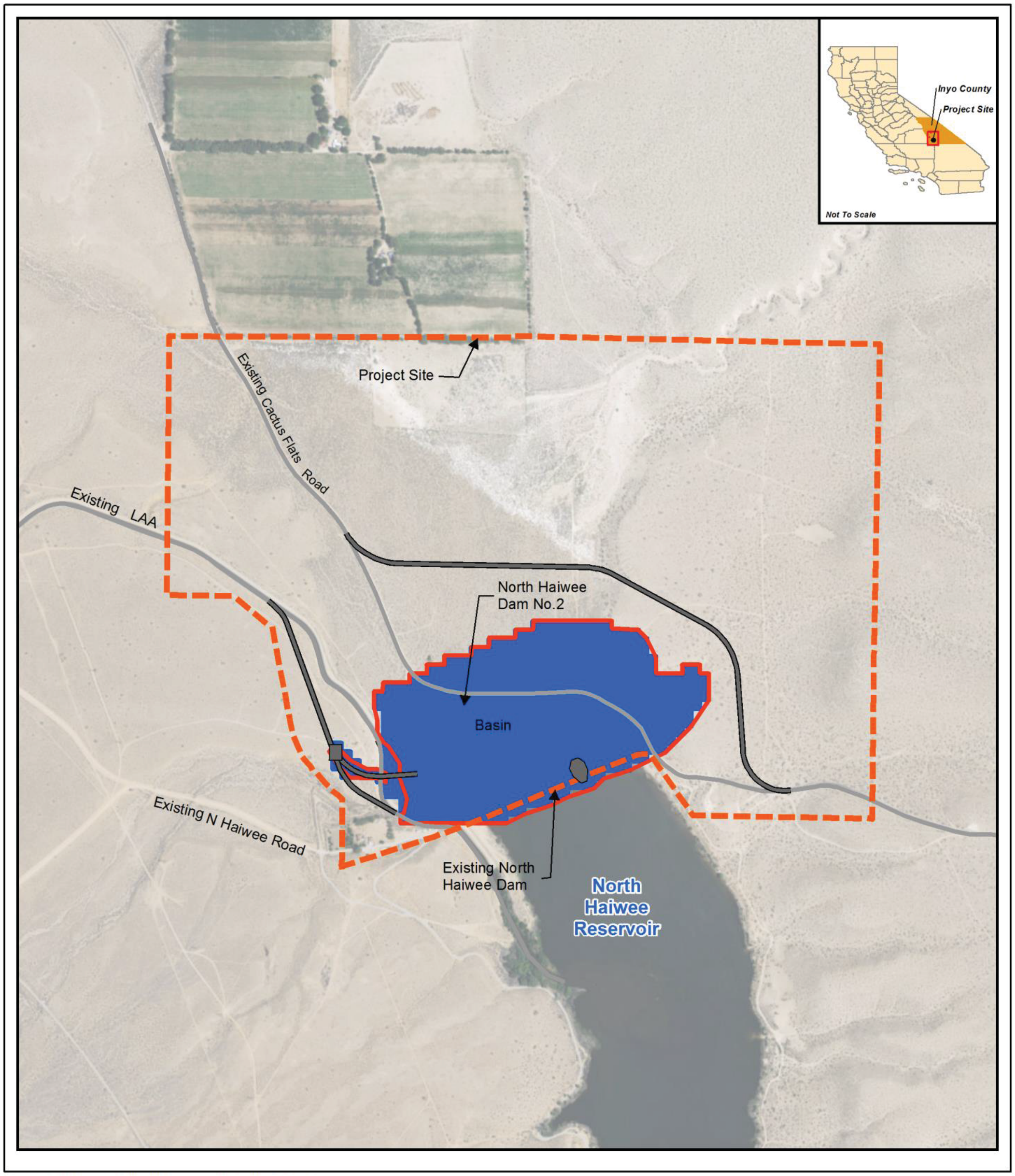
Figure 18

Annual and HRA Sources for E&R Alternative - NHD2



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 19
Annual and HRA Sources for E&R Alternative - NHD2, Basin, Slope Protection, Notch, and Diversion Channel



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

0 500 1,000 Feet

Area Sources
Volume Sources

Figure 20

Annual and HRA Sources for E&R Alternative - Basin, Slope Protection, Notch, and Diversion Channel

Table 13 presents the maximum unmitigated localized modeled concentrations during a single day of construction that may potentially impact the reservoir keeper residence and nearby receptors.

TABLE 13
MAXIMUM DAILY LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	CO		NO_2(1)	PM10	PM2.5
	Averaging Time				
	1-Hour	8-Hour	1-Hour	24-Hour	
Scenario 1					
Maximum Modeled Concentration (μg/m^3)	---	---	---	1.31	0.88
Maximum Modeled Concentration (ppmv)	0.060	0.010	0.063	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**
Scenario 2					
Maximum Modeled Concentration (μg/m^3)	---	---	---	24.64	11.76
Maximum Modeled Concentration (ppmv)	0.525	0.137	0.463	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 3					
Maximum Modeled Concentration (μg/m^3)	---	---	---	31.63	16.95
Maximum Modeled Concentration (ppmv)	1.308	0.251	0.932	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 4					
Maximum Modeled Concentration (μg/m^3)	---	---	---	27.49	18.76
Maximum Modeled Concentration (ppmv)	1.336	0.225	0.962	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 5					
Maximum Modeled Concentration (μg/m^3)	---	---	---	19.79	14.94
Maximum Modeled Concentration (ppmv)	1.284	0.216	0.910	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**YES**
Scenario 6					
Maximum Modeled Concentration (μg/m^3)	---	---	---	4.40	3.91
Maximum Modeled Concentration (ppmv)	0.384	0.077	0.377	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**No**	**No**

Note: EPA default NO_X to NO_2 conversion rates of 0.8 (1-hour NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2017

Table 14 presents the maximum unmitigated localized modeled concentrations during a single year of construction that may potentially impact the reservoir keeper residence and nearby receptors.

TABLE 14
MAXIMUM ANNUAL LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	NO_2(1) (ppmv)	PM10 μg/m^3
2018	4.27E-05	0.01
2019	2.28E-04	0.10
2020	6.20E-04	0.27
2021	5.95E-04	0.26
2022	5.25E-04	0.14
2023	4.19E-04	0.12
2024	1.65E-05	0.01
Maximum Modeled Concentration (μg/m^3)	--	0.27

TABLE 14
MAXIMUM ANNUAL LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	NO_2[(1)] (ppmv)	**PM10** $\mu g/m^3$
Maximum Modeled Concentration (ppmv)	6.20E-04	--
LST Threshold	0.03	1.0 $\mu g/m^3$
Significant Impact?	**No**	**No**

Note: EPA default NO_X to NO2 conversion rates of 0.75 (Annual NO2) applied to modeled NO_X concentrations.
Source: Estimated by AECOM in 2016

As shown in Tables 13 and 14, modeled daily concentrations during construction scenarios 2 through 6 would exceed the LST for NO_X, and scenarios 2 through 5 would exceed the LSTs for PM10 and PM2.5 emissions at the reservoir keeper residence. As shown in Figure 21, there are eight additional locations that exceed the 1-hour NO_2, PM10, or PM2.5 daily threshold. Therefore, construction emissions could expose sensitive receptors to substantial pollutant concentrations. The impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.

Health Risk Assessment

Similar to the CDSM Alternative, the estimated cancer risk was based on the annual average diesel PM concentration, inhalation potency factor, and default estimates of breathing rate, body weight, and exposure period calculated by HARP2. In addition to the potential cancer risk, diesel PM may result in chronic noncancer health impacts. The exposure level is the concentration below which no adverse noncancer health effects are anticipated.

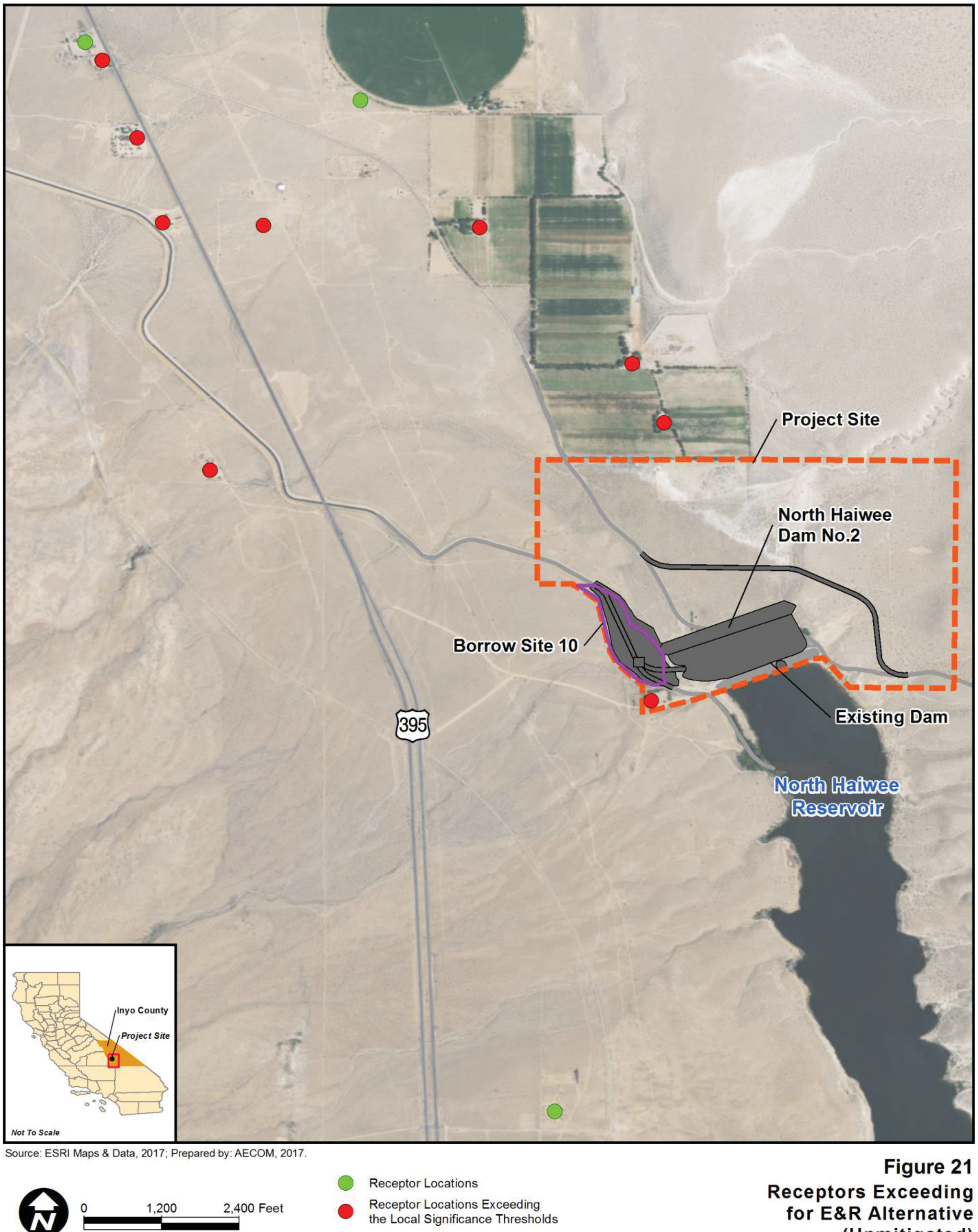
Table 15 shows the maximum cancer risk and chronic HI for construction of the Excavate and Recompact Alternative. The maximum cancer risk due to unmitigated construction emissions was determined to be 255.2 in 1 million for the reservoir keeper residence, and 3.7 in 1 million for the Worker. The maximum chronic HI was determined to be 0.123 for the MEIW and 0.123 for the MEIR.

TABLE 15
MAXIMUM CONSTRUCTION HEALTH IMPACTS FOR OFF-SITE RECEPTORS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

Receptor Type	**Maximum Cancer Risk (per million)**	**Maximum Chronic HI**	**Maximum Acute HI**
MEIR	255.2	0.123	0
MEIW	3.7	0.123	
Threshold of Significance	10	1.0	1.0
Significant Impact?	**YES**	**No**	**No**

Notes: HI= Hazard Index; MEIR = Maximally Exposed Individual Resident; MEIW = Maximally Exposed Individual Worker
Source: Estimated by AECOM in 2016

As shown in Table 15, the maximum health risk for the residential receptor (reservoir keeper residence) would exceed 10 in 1 million, as would two additional residential receptors to the northwest of the Project. Therefore, the construction of the Excavate and Recompact Alternative could expose sensitive receptors to substantial pollutant concentrations that would result in a health risk. The impact would be significant. Implementation of MMs AQ-A through AQ-D would be required.



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 21
Receptors Exceeding for E&R Alternative (Unmitigated)

Operation

CDSM and Excavate and Recompact Alternatives

Operation of the Proposed Project would be generally similar to existing conditions. As such, the Proposed Project would not substantially increase emissions from the use of on-road motor vehicles or off-road equipment relative to existing conditions. Therefore, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations that would result in a health risk. This impact would be less than significant.

AQ-5: *The Proposed Project would not create objectionable odors affecting a substantial number of people. The impact would be less than significant.*

Construction

CDSM Alternative

Sources that may emit odors during construction activities include exhaust from diesel construction equipment and heavy-duty trucks, which could be considered offensive to some individuals. Odors from these sources would be localized and generally confined to the immediate area surrounding the Project Site. The Proposed Project would use typical construction techniques, and the odors would be typical of most construction sites and temporary in nature. After construction of the Proposed Project, all construction-related odors would cease. Operation of the Proposed Project would not be expected to add any new odor sources. As a result, the Proposed Project would not create objectionable odors affecting a substantial number of people. The impact would be less than significant.

Excavate and Recompact Alternative

Similar to the CDSM Alternative, the Excavate and Recompact Alternative would use typical construction techniques, and the odors would be typical of most construction sites and temporary in nature. As a result, the Excavate and Recompact Alternative would not create objectionable odors affecting a substantial number of people. The impact would be less than significant.

Operation

CDSM and Excavate and Recompact Alternatives

Operation of the Proposed Project would be generally similar to existing conditions. As such, the Proposed Project would not create objectionable odors affecting a substantial number of people. No impact would occur.

6.1 Cumulative Impacts

By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development within the GBVAB, and this regional impact is cumulative rather than being attributable to any one source. A project’s emissions may be individually limited, but cumulatively considerable when taken in combination with past, present, and future development projects. The thresholds of significance are relevant to whether a project’s individual emissions would result in a cumulatively considerable incremental contribution to the existing cumulative air quality conditions. As discussed in AQ-3 and AQ-4, the Proposed Project would exceed the project-level air quality significance thresholds for criteria pollutant emissions. Therefore, the Proposed Project’s construction emissions would have a cumulatively considerable contribution to the region’s air quality.

7 Mitigation Measures

AQ-A. The construction contractor shall use off-road construction diesel engines that meet, at a minimum, the Tier 4 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Tier 3 engines will be allowed on a case-by-case basis when the contractor has documented that no Tier 4 equipment, or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms.

AQ-B. The construction contractor shall implement activity management (e.g. rescheduling activities to avoid overlap of construction phase).

AQ-C. The construction contractor shall minimize idling time by shutting equipment off when not in use or reducing the time of idling to no more than five minutes (5-minute limit is required by the State Airborne Toxics Control Measure [Title 13, sections 2449 and 2485 of the California Code of Regulations]), and provide clear signage that posts this requirement for workers at the entrances to the Project Site.

AQ-D. The construction contractor shall maintain construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

8 CEQA Significance Conclusions

8.1 CDSM Alternative

Implementation of MMs AQ-A through AQ-D would ensure construction activities associated with the construction of the Proposed Project would minimize criteria pollutant emissions. MM AQ-A requires engines in diesel-fueled construction equipment above 50 horsepower to meet Tier 4 emission standards. Emission standards for diesel off-road equipment are based on the engine model year. Implementation of these standards, referred to as Tier 1 emission standards, became effective in 1996. The more stringent Tier 2 and Tier 3 emission standards became effective between 2001 and 2008, with the effective date dependent on engine horsepower. Tier 4 interim standard became effective between 2008 and 2012, and Tier 4 final standards became effective in 2014 and 2015.

The OFFROAD model used in the analysis contains ranges of tier engines and uses average fleet data to develop emission factors for a given calendar year. Because the earliest year for construction of the Proposed Project would be 2018, and the requirements for production of Tier 3 and earlier engines have been in effect for over 10 years, it is reasonable to assume that most, if not all, off-road construction equipment would meet Tier 3 emission standards without the application of MM AQ-A. Based on the improvements in emissions standards required by CARB, off-road construction equipment with Tier 4 engines would result in an additional 20 percent reduction in VOC emissions, 91 percent reduction in NO_X emissions, and 95 percent reduction in PM10 emissions from the use of Tier 3 equipment (SCAQMD 2014). Table 16 shows the mitigated emissions for construction activities in 2018 through 2023.

TABLE 16
MITIGATED DAILY CONSTRUCTION EMISSIONS FOR THE CDSM ALTERNATIVE

	VOC	NO_X	CO	PM10 [1,2]	PM2.5 [1]
2018	2.19	20.46	79.57	11.10	5.88
2019	4.63	49.87	167.61	106.99	20.00
2020	21.79	351.25	707.01	241.70	55.50
2021	21.54	344.55	704.27	193.52	48.40
2022	18.40	341.22	544.95	193.52	41.56
2023	17.17	301.38	539.40	134.71	35.50
Maximum Daily Construction Emissions (lbs/day)	21.79	351.25	707.01	241.70	55.50
Threshold of Significance (lbs/day)	75	100	550	150	55
Significant Impact?	**No**	**YES**	**YES**	**YES**	**YES**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
[2] Fugitive dust emissions were reduced based on watering two times per day.
[3] Additional details on the emissions for each calendar year are included in Appendix A.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; PM10 = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2016

As shown in Table 16, implementation of MMs AQ-A through AQ-D would reduce significant impacts of VOC to a less than significant level. However, mitigated NO_X, CO, PM10, and PM2.5 emissions would continue to exceed the recommended thresholds of significance. The impact would be significant and unavoidable.

As discussed earlier, the Proposed Project would also result in significant localized emissions of NO_2, PM10, and PM2.5. Table 17 presents the mitigated localized modeled concentrations during a single day of construction that may potentially impact nearby receptors. Table 18 presents the mitigated localized modeled concentrations during a single year of construction that may potentially impact nearby receptors.

TABLE 17
MITIGATED DAILY LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE CDSM ALTERNATIVE

	CO		NO_2 [(1)]	PM10	PM2.5
	Averaging Time				
	1-Hour	8-Hour	1-Hour	24-Hour	
Scenario 1					
Maximum Modeled Concentration (μg/m^3)	---	---	---	0.92	0.52
Maximum Modeled Concentration (ppmv)	0.076	0.013	0.008	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**
Scenario 2					
Maximum Modeled Concentration (μg/m^3)	---	---	---	22.72	7.21
Maximum Modeled Concentration (ppmv)	0.513	0.134	0.065	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**No**	**YES**	**No**
Scenario 3					
Maximum Modeled Concentration (μg/m^3)	---	---	---	29.31	8.56
Maximum Modeled Concentration (ppmv)	1.302	0.250	0.248	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**No**
Scenario 4					

TABLE 17
MITIGATED DAILY LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE CDSM ALTERNATIVE

	CO		NO_2 (1)	PM10	PM2.5
	Averaging Time				
	1-Hour	8-Hour	1-Hour	24-Hour	
Maximum Modeled Concentration (μg/m^3)	---	---	---	24.50	8.14
Maximum Modeled Concentration (ppmv)	1.297	0.226	0.247	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**No**
Scenario 5					
Maximum Modeled Concentration (μg/m^3)	---	---	---	17.52	5.87
Maximum Modeled Concentration (ppmv)	1.279	0.216	0.245	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**No**
Scenario 6					
Maximum Modeled Concentration (μg/m^3)	---	---	---	2.83	1.58
Maximum Modeled Concentration (ppmv)	0.396	0.079	0.034	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 μg/m^3	10.4 μg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**

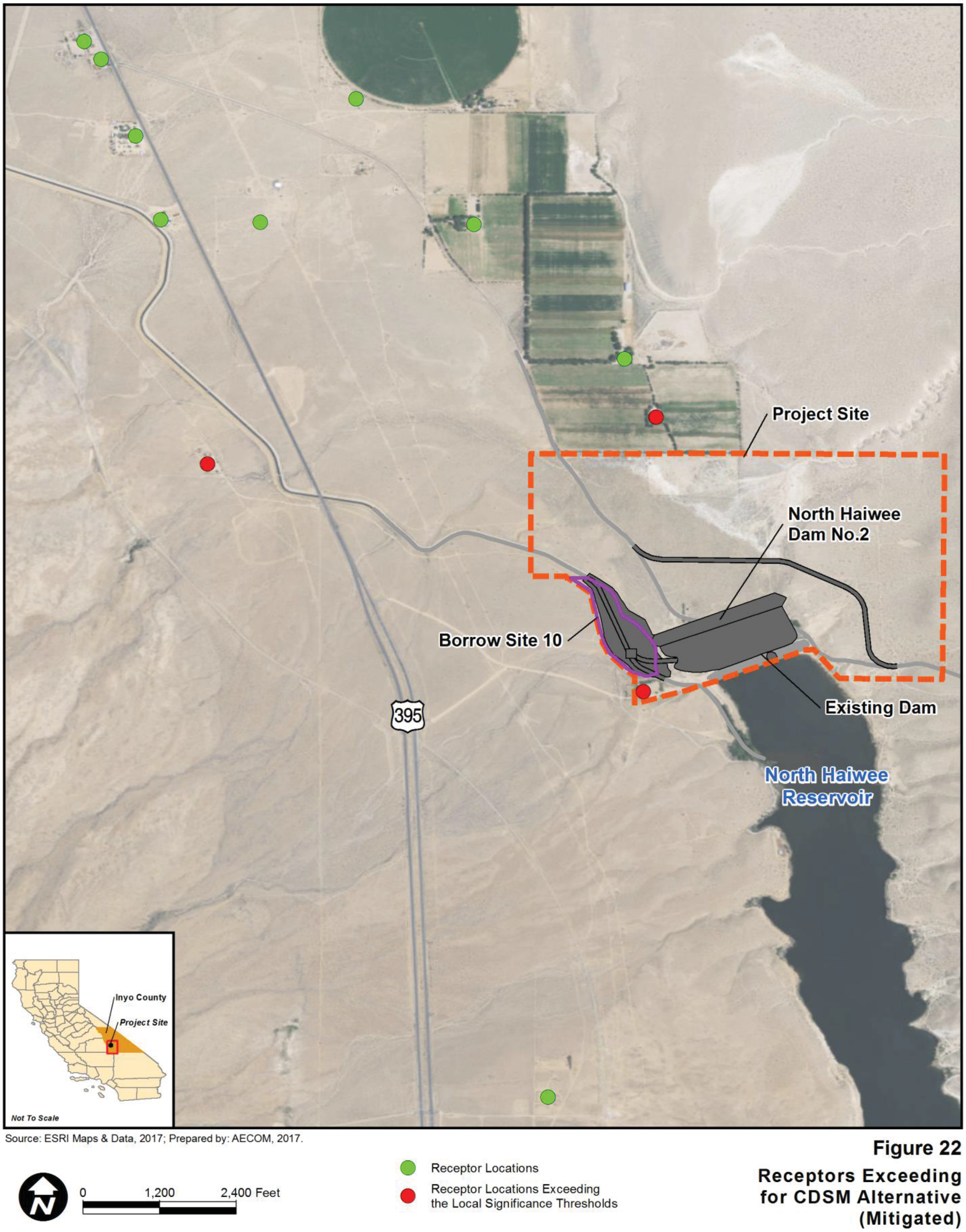
Notes:
[1] USEPA default NO_X to NO_2 conversion rates of 0.8 (1-hour NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2016

As shown in Tables 17 and 18, modeled daily concentrations during construction scenarios 2 through 5 at the reservoir keeper residence, scenarios 3, 4 and 5 at residential receptor 1438 Cactus Flats Road, and scenarios 3 and 4 on the LAA would continue to exceed the LST for PM10 emissions. The modeled daily concentrations during construction scenarios 3 through 5 would continue to exceed the LST for NO_X. Figure 22 shows the locations that exceed the LSTs based on the modeled daily concentrations with mitigated emission factors for the CDSM Alternative. The impact would be significant and unavoidable.

TABLE 18
MITIGATED ANNUAL LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE CDSM ALTERNATIVE

	NO_2 (1) ppmv	PM10 μg/m^3
2018	5.76E-06	0.01
2019	3.39E-05	0.09
2020	2.50E-05	0.17
2021	1.54E-05	0.14
2022	3.10E-04	0.15
2023	4.64E-05	0.12
Maximum Modeled Concentration (μg/m^3)	--	0.17
Maximum Modeled Concentration (ppmv)	3.10E-04	--
LST Threshold	0.03	1.0 μg/m^3
Significant Impact?	**No**	**No**

Notes:
[1] USEPA default NO_X to NO_2 conversion rates of 0.75 (Annual NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2016



Source: ESRI Maps & Data, 2017; Prepared by: AECOM, 2017.

Figure 22

Receptors Exceeding for CDSM Alternative (Mitigated)

Table 19 shows the maximum cancer risk, chronic HI, and acute HI for construction of the Proposed Project. The mitigated cancer risk was determined to be 5.0 in 1 million for the MEIR and 0.07 in 1 million for the MEIW. The maximum chronic HI was determined to be 0.003 for the MEIR and 0.003 for the MEIW. The maximum acute HI was determined to be 0.011 for the maximum receptor.

TABLE 19
MITIGATED HEALTH IMPACTS FOR THE CDSM ALTERNATIVE

Receptor Type	Maximum Cancer Risk (per million)	Maximum Chronic HI	Maximum Acute HI
MEIR	5.0	0.003	0.011
MEIW	0.07	0.003	
Threshold of Significance	10	1.0	1.0
Significant Impact?	**No**	**No**	**No**

Notes: HI= Hazard Index; MEIR = Maximally Exposed Individual Resident; MEIW = Maximally Exposed Individual Worker
Source: Estimated by AECOM in 2016

As shown in Table 19, the mitigated health risk for the MEIR and MEIW would not exceed 10 in 1 million. Therefore, mitigated emissions for the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations that would result in a health risk. The impact would less than significant with mitigation.

8.2 Excavate and Recompact Alternative

Table 20 shows the mitigated emissions for the Excavate and Recompact Alternative construction activities in 2018 through 2024.

TABLE 20
MITIGATED DAILY CONSTRUCTION EMISSIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	VOC	NO_X	CO	PM10 [1,2]	PM2.5 [1]
2018	2.19	20.46	79.57	11.10	5.88
2019	4.59	48.13	168.29	83.55	19.99
2020	21.26	345.64	686.53	191.98	51.34
2021	21.26	345.64	686.53	191.98	51.34
2022	14.41	221.21	512.16	48.32	26.19
2023	14.41	221.21	512.16	48.32	26.19
2024	2.83	25.68	100.17	11.83	6.13
Maximum Daily Construction Emissions (lbs/day)	21.26	345.64	686.53	191.98	51.34
Threshold of Significance (lbs/day)	75	100	550	150	55
Significant Impact?	**No**	**YES**	**YES**	**YES**	**No**

Notes: [1] PM10 emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
[2] Fugitive dust emissions were reduced based on watering two times per day.
[3] Additional details on the emissions for each calendar year are included in Appendix A.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; PM10 = suspended PM; PM2.5 = fine PM
Source: Estimated by AECOM in 2016

As shown in Table 20, implementation of MMs AQ-A through AQ-D would reduce significant impacts of VOC and PM2.5 to a less than significant level. However, mitigated NO_X, CO, and PM10 emissions would continue to exceed the recommended thresholds of significance. The impact would be significant and unavoidable.

As discussed earlier, the Excavate and Recompact Alternative would also result in significant localized emissions of NO_2, PM10, and PM2.5. Table 21 presents the mitigated localized modeled concentrations during a single day of construction that may potentially impact nearby receptors. Table 22 presents the mitigated localized modeled concentrations during a single year of construction that may potentially impact nearby receptors.

TABLE 21
MITIGATED DAILY LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

	CO		NO_2 [(1)]	PM10	PM10
	Averaging Time				
	1-Hour	8-Hour	1-Hour	24-Hour	
Scenario 1					
Maximum Modeled Concentration (µg/m^3)	---	---	---	0.92	0.52
Maximum Modeled Concentration (ppmv)	0.076	0.013	0.008	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**
Scenario 2					
Maximum Modeled Concentration (µg/m^3)	---	---	---	19.36	6.93
Maximum Modeled Concentration (ppmv)	0.513	0.134	0.064	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**No**	**YES**	**No**
Scenario 3					
Maximum Modeled Concentration (µg/m^3)	---	---	---	23.11	7.48
Maximum Modeled Concentration (ppmv)	1.258	0.242	0.248	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**No**
Scenario 4					
Maximum Modeled Concentration (µg/m^3)	---	---	---	16.73	8.51
Maximum Modeled Concentration (ppmv)	1.253	0.211	0.252	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**YES**	**YES**	**No**
Scenario 5					
Maximum Modeled Concentration (µg/m^3)	---	---	---	10.23	5.79
Maximum Modeled Concentration (ppmv)	1.279	0.216	0.245	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**YES**	**No**	**No**
Scenario 6					
Maximum Modeled Concentration (µg/m^3)	---	---	---	2.83	1.58
Maximum Modeled Concentration (ppmv)	0.396	0.079	0.034	---	---
LST Threshold	20 ppm	9 ppm	0.18 ppm	10.4 µg/m^3	10.4 µg/m^3
Significant Impact?	**No**	**No**	**No**	**No**	**No**

Notes:
[1] USEPA default NO_X to NO_2 conversion rates of 0.8 (1-hour NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2016

TABLE 22
MITIGATED ANNUAL LOCALIZED CONSTRUCTION MODELED CONCENTRATIONS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

YEAR	NO_2[(1)] ppmv	PM10 µg/m^3
2018	5.74E-06	0.01
2019	3.15E-05	0.07
2020	1.43E-04	0.19
2021	1.62E-04	0.24
2022	1.39E-04	0.08
2023	1.07E-04	0.06
2024	5.21E-06	0.003
Maximum Modeled Concentration (µg/m^3)	--	0.24
Maximum Modeled Concentration (ppmv)	1.39E-04	--
LST Threshold	0.03	1.0 µg/m^3
Significant Impact?	**No**	**No**

Notes:
[1] USEPA default NO_X to NO_2 conversion rates of 0.8 (1-hour NO_2) applied to modeled NO_x concentrations.
Source: Estimated by AECOM in 2016

As shown in Tables 21 and 22, modeled daily concentrations during construction scenarios 2 through 5 would continue to exceed the LSTs for PM10 emissions; scenarios 3 through 5 for NO_X emissions at the reservoir keeper residence; and for PM10 for scenario 4 at the receptor located at 2045 US-395 even with implementation of MMs AQ-A through AQ-D. Figure 23 shows the locations that exceed the LSTs based on the modeled daily concentrations with mitigated emission factors for the Excavate and Recompact Alternative. The impact would be significant and unavoidable.

Table 23 shows the maximum cancer risk and chronic HI for construction of the Excavate and Recompact Alternative. The mitigated cancer risk was determined to be 9.7 in 1 million for the MEIR and 0.14 in 1 million for the MEIW. The maximum chronic HI was determined to be 0.004 for the MEIR and 0.004 for the MEIW.

TABLE 23
MITIGATED HEALTH IMPACTS FOR THE EXCAVATE AND RECOMPACT ALTERNATIVE

Receptor Type	Maximum Cancer Risk (per million)	Maximum Chronic HI
MEIR	9.7	0.004
MEIW	0.14	0.004
Threshold of Significance	10	1.0
Significant Impact?	**No**	**No**

Notes: HI= Hazard Index; MEIR = Maximally Exposed Individual Resident; MEIW = Maximally Exposed Individual Worker
Source: Estimated by AECOM in 2016

As shown in Table 23, the mitigated health risk for the MEIR and MEIW would not exceed 10 in 1 million. Therefore, mitigated emissions for the Excavate and Recompact Alternative would not expose sensitive receptors to substantial pollutant concentrations that would result in a health risk. The impact would less than significant with mitigation.

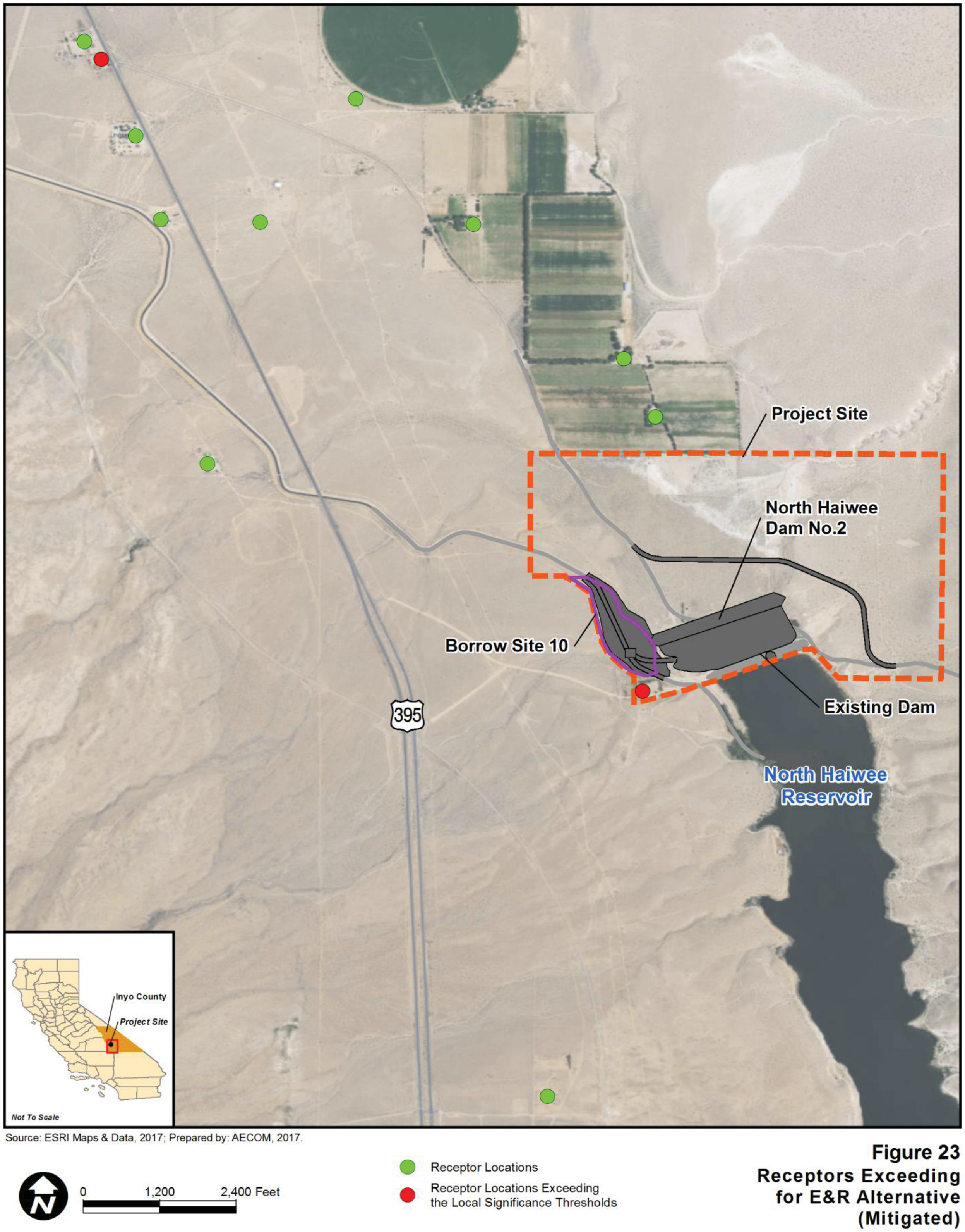


Figure 23
Receptors Exceeding for E&R Alternative (Mitigated)

9 NEPA Impacts Summary

The Proposed Project would not result in a substantial adverse effect related to criteria pollutant emissions.

10 References

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11 List of Abbreviations and Acronyms

$\mu g/m^3$	micrograms per cubic meter
AERMOD	American Meteorological Society/United States Environmental Protection Agency Regulatory Model
AQMP	Air Quality Attainment Plans or Air Quality Management Plans
ARB	California Air Resources Board
BACM	Best Available Control Measures
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CDSM	Cement Deep Soil Mixing
CEQA	California Environmental Quality Act
CO	carbon monoxide
E&R	Excavate and Recompact
GBUAPCD	Great Basin Unified Air Pollution Control District
GBVAB	Great Basin Valleys Air Basin
HARP2	Hotspots Analysis and Reporting Program
HI	hazard index
HRA	health risk assessment
LAA	Los Angeles Aqueduct
LAAR	Los Angeles Aqueduct Realignment
LADWP	Los Angeles Department of Water and Power
lbs	pounds
LST	local significance thresholds
MEIR	maximally exposed individual resident
MEIW	maximally exposed individual worker
mg/m3	milligrams per cubic meter
MM	mitigation measure
NAAQS	National Ambient Air Quality Standards
NHD	North Haiwee Dam
NHD2	proposed North Haiwee Dam 2 or new Dam
NHR	North Haiwee Reservoir
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
PM	particulate matter
PM10	particulate matter with size equal to or less than 10 micrometers in diameter
PM2.5	particulate matter with size equal to or less than 2.5 micrometers in diameter
ppb	parts per billion
ppm	parts per million
ppmv	parts per million by volume
Project Site	Location of the proposed NHD2, Material Processing and Material Storage Area, Cactus Flats Road Realignment, LAA Realignment, and Borrow Site 10
Proposed Project	North Haiwee Dam No. 2 Project
ROG	reactive organic gases

SCAQMD	South Coast Air Quality Management District
SIP	State Implementation Plan
SO_2	sulfur dioxide
TAC	toxic air contaminant
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

12 Preparer Qualifications

12.1 AECOM

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APPENDIX A
EMISSION CALCULATIONS

Excavate and Recompact Alternative
Construction Emissions Summary

	Maximum Daily Emissions (lbs/day)				
Construction Phase/Source	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
2018					
Cactus Flats Road Realignment	10.75	109.36	60.96	16.01	10.38
Maximum Daily	**10.75**	**109.36**	**60.96**	**16.01**	**10.38**
2019					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 10	0.22	4.97	3.42	59.62	5.17
Maximum Daily	**26.54**	**259.91**	**155.84**	**35.58**	**23.69**
2020					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 10	0.22	4.97	3.42	59.62	5.17
Borrow Site 15	2.47	81.25	9.51	119.73	12.24
NHD2	98.28	720.41	511.33	82.48	58.80
Maximum Daily	**127.29**	**1,061.58**	**676.68**	**237.79**	**94.73**
2021					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 15	2.47	81.25	9.51	119.73	12.24
NHD2	98.28	720.41	511.33	82.48	58.80
Maximum Daily	**127.29**	**1,061.58**	**676.68**	**237.79**	**94.73**
2022					
NHD2	98.28	720.41	511.33	82.48	58.80
Maximum Daily	**98.28**	**720.41**	**511.33**	**82.48**	**58.80**
2023					
NHD2	98.28	720.41	511.33	82.48	58.80
Basin	14.91	152.98	84.15	18.26	12.03
Maximum Daily	**98.28**	**720.41**	**511.33**	**82.48**	**58.80**
2024					
Basin	14.91	152.98	84.15	18.26	12.03
Maximum Daily	**14.91**	**152.98**	**84.15**	**18.26**	**12.03**

Annual Emissions (tons/year)					Metric Tons
VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
2018					
1.29	13.12	7.31	1.92	1.25	1,769
1.29	**13.12**	**7.31**	**1.92**	**1.25**	**1,769**
2019					
2.23	21.83	13.09	2.99	1.99	2,432
0.02	0.36	0.25	4.29	0.37	122
2.23	**21.83**	**13.09**	**2.99**	**1.99**	**2,432**
2020					
3.82	37.43	22.44	5.12	3.41	4,170
0.01	0.24	0.16	2.86	0.25	81
0.09	2.93	0.34	4.31	0.44	607
11.79	86.45	61.36	9.90	7.06	9,831
15.71	**127.04**	**84.31**	**22.19**	**11.16**	**14,689**
2021					
0.96	9.36	5.61	1.28	0.85	1,042
0.18	5.85	0.68	8.62	0.88	1,214
14.15	103.74	73.63	11.88	8.47	11,798
15.29	**118.95**	**79.93**	**21.78**	**10.20**	**14,054**
2022					
14.15	103.74	73.63	11.88	8.47	11,798
14.15	**103.74**	**73.63**	**11.88**	**8.47**	**11,798**
2023					
10.61	77.80	55.22	8.91	6.35	8,848
0.48	4.93	2.72	0.96	0.57	631
11.09	**82.74**	**57.95**	**9.87**	**6.92**	**9,479**
2024					
0.32	3.29	1.81	0.64	0.38	421
0.32	**3.29**	**1.81**	**0.64**	**0.38**	**421**

54,642.32
1,821

	Total Emissons by Construction Phase (Tons)					Metric Tons
	VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Cactus Flats Road Realignment	1.29	13.12	7.31	1.92	1.25	1,769.26
LAA Realignment	7.01	68.62	41.14	9.39	6.25	7,644.63
Borrow Site 10	0.03	0.60	0.41	7.15	0.62	202.68
Borrow Site 15	0.27	8.78	1.03	12.93	1.32	1,821.36
NHD2	50.71	371.73	263.85	42.56	30.34	42,274.48
Basin	0.80	8.22	4.54	1.60	0.96	1,051.51

	2018	2019	2020	2021	2022	2023	2024	Total Months
Cactus Flats Road Realignment	10							10
LAA Realignment		7	12	3				22
Borrow Site 10		6	4					10
Borrow Site 15			3	6				9
NHD2			10	12	12	9		43
Basin						3	2	5

	2018	2019	2020	2021	2022	2023	2024	Total Percentage
Cactus Flats Road Realignment	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
LAA Realignment	0.00	0.32	0.55	0.14	0.00	0.00	0.00	1.00
Borrow Site 10	0.00	0.60	0.40	0.00	0.00	0.00	0.00	1.00
Borrow Site 15	0.00	0.00	0.33	0.67	0.00	0.00	0.00	1.00
NHD2	0.00	0.00	0.23	0.28	0.28	0.21	0.00	1.00
Basin	0.00	0.00	0.00	0.00	0.00	0.60	0.40	1.00
E&R Alternative								

Excavate and Recompact Alternative
Mitigated Construction Emissions Summary

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
2018											
Cactus Flats Road Realignment	2.19	20.46	79.57	11.10	5.88	0.26	2.46	9.55	0.04	0.04	1,794.95
Maximum Daily	**2.19**	**20.46**	**79.57**	**11.10**	**5.88**	**0.26**	**2.46**	**9.55**	**0.04**	**0.04**	**1,794.95**
2019											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.37	3.63	13.85	0.06	0.05	2,465.30
Borrow Site 10	0.22	4.97	3.42	59.62	7.09	0.02	0.36	0.25	4.29	0.37	121.61
Maximum Daily	**4.59**	**48.13**	**168.29**	**83.55**	**19.99**	**0.38**	**3.98**	**14.10**	**4.35**	**0.42**	**2,586.90**
2020											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.63	6.22	23.74	0.10	0.08	4,226.22
Borrow Site 10	0.22	4.97	3.42	59.62	5.17	0.01	0.24	0.16	2.86	0.25	81.07
Borrow Site 15	2.47	81.25	9.51	119.73	12.24	0.09	2.93	0.34	4.31	0.44	607.12
NHD2	14.41	221.21	512.16	48.32	26.19	1.73	26.55	61.46	0.20	0.18	9,922.22
Maximum Daily	**21.26**	**345.64**	**686.53**	**191.98**	**51.34**	**2.46**	**35.93**	**85.71**	**7.47**	**0.95**	**14,836.63**
2021											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.16	1.55	5.94	0.02	0.02	1,056.56
Borrow Site 15	2.47	81.25	9.51	119.73	12.24	0.18	5.85	0.68	8.62	0.88	1,214.24
NHD2	14.41	221.21	512.16	48.32	26.19	2.08	31.85	73.75	0.24	0.21	11,906.66
Maximum Daily	**21.26**	**345.64**	**686.53**	**191.98**	**51.34**	**2.41**	**39.26**	**80.37**	**8.88**	**1.12**	**14,177.46**
2022											
NHD2	14.41	221.21	512.16	48.32	26.19	2.08	31.85	73.75	0.24	0.21	11,906.66
Maximum Daily	**14.41**	**221.21**	**512.16**	**48.32**	**26.19**	**2.08**	**31.85**	**73.75**	**0.24**	**0.21**	**11,906.66**
2023											
NHD2	14.41	221.21	512.16	48.32	26.19	1.56	23.89	55.31	0.18	0.16	8,930.00
Basin	2.83	25.68	100.17	11.83	6.13	0.09	0.86	3.25	0.02	0.01	639.56
Maximum Daily	**14.41**	**221.21**	**512.16**	**48.32**	**26.19**	**1.65**	**24.75**	**58.57**	**0.20**	**0.17**	**9,569.56**
2024											
Basin	2.83	25.68	100.17	11.83	6.13	0.06	0.57	2.17	0.01	0.01	426.37
Maximum Daily	**2.83**	**25.68**	**100.17**	**11.83**	**6.13**	**0.06**	**0.57**	**2.17**	**0.01**	**0.01**	**426.37**

	Total Emissons by Construction Phase (Tons)					Metric Tons
	VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Cactus Flats Road Realignment	0.26	2.46	9.55	0.04	0.04	1,794.95
LAA Realignment	1.16	11.40	43.52	0.18	0.15	7,748.08
Borrow Site 10	0.03	0.60	0.41	7.15	0.62	202.68
Borrow Site 15	0.27	8.78	1.03	12.93	1.32	1,821.36
NHD2	7.44	114.15	264.27	0.85	0.77	42,665.54
Basin	0.15	1.44	5.42	0.03	0.02	1,065.94

	2018	2019	2020	2021	2022	2023	2024	Total Months
Cactus Flats Road Realignment	10							10
LAA Realignment		7	12	3				22
Borrow Site 10		6	4					10
Borrow Site 15			3	6				9
NHD2			10	12	12	9		43
Basin						3	2	5

	2017	2018	2019	2020	2021	2022	2023	Total Percentage
Cactus Flats Road Realignment	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
LAA Realignment	0.00	0.32	0.55	0.14	0.00	0.00	0.00	1.00
Borrow Site 10	0.00	0.60	0.40	0.00	0.00	0.00	0.00	1.00
Borrow Site 15	0.00	0.00	0.33	0.67	0.00	0.00	0.00	1.00
NHD2	0.00	0.00	0.23	0.28	0.28	0.21	0.00	1.00
Basin	0.00	0.00	0.00	0.00	0.00	0.60	0.40	1.00

Cement Deep Soil Mixing Alternative
Construction Emissions Summary

	Maximum Daily Emissions (lbs/day)				
Construction Phase/Source	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
2018					
Cactus Flats Road Realignment	10.75	109.36	60.96	16.01	10.38
Maximum Daily	**10.75**	**109.36**	**60.96**	**16.01**	**10.38**
2019					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 10	0.25	6.70	2.74	83.06	7.09
Maximum Daily	**26.79**	**266.62**	**158.58**	**118.64**	**30.78**
2020					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 10	0.25	6.70	2.74	83.06	7.09
NHD2	99.04	782.19	512.32	167.09	66.53
Maximum Daily	**125.83**	**1,048.81**	**670.91**	**285.73**	**97.31**
2021					
LAA Realignment	26.54	259.91	155.84	35.58	23.69
Borrow Site 15	1.23	39.84	5.54	58.82	6.06
NHD2	99.04	782.19	512.32	167.09	66.53
Maximum Daily	**125.58**	**1,042.10**	**668.17**	**225.90**	**90.21**
2022					
NHD2	99.04	782.19	512.32	167.09	66.53
Borrow Site 15	1.23	39.84	5.54	58.82	6.06
Maximum Daily	**100.27**	**822.03**	**517.87**	**225.90**	**72.59**
2023					
NHD2	99.04	782.19	512.32	167.09	66.53
Basin	14.91	152.98	84.15	18.26	12.03
Maximum Daily	**99.04**	**782.19**	**512.32**	**167.09**	**66.53**

Cement Deep Soil Mixing Alternative
Construction Emissions Summary

	Annual Emissions (tons/year)					Metric Tons
	VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
2018						
	1.29	13.12	7.31	1.92	1.25	1,769
	1.29	**13.12**	**7.31**	**1.92**	**1.25**	**1,769**
2019						
	2.23	21.83	13.09	2.99	1.99	2,432
	0.02	0.48	0.20	5.98	0.51	133
	2.25	**22.32**	**13.29**	**8.97**	**2.50**	**2,565**
2020						
	3.82	37.43	22.44	5.12	3.41	4,170
	0.01	0.24	0.10	2.99	0.26	66
	11.59	84.04	60.41	19.86	7.88	10,308
	15.42	**121.71**	**82.95**	**27.97**	**11.54**	**14,544**
2021						
	0.96	9.36	5.61	1.28	0.85	1,042
	0.04	1.43	0.20	2.12	0.22	305
	13.91	100.85	72.50	23.83	9.45	12,369
	14.91	**111.64**	**78.31**	**27.23**	**10.52**	**13,716**
2022						
	13.91	100.85	72.50	23.83	9.45	12,369
	0.09	2.87	0.40	4.23	0.44	610
	13.99	**103.72**	**72.90**	**28.07**	**9.89**	**12,979**
2023						
	3.48	25.21	18.12	5.96	2.36	3,092
	0.80	8.22	4.54	1.60	0.96	1,052
	4.28	**33.43**	**22.66**	**7.55**	**3.32**	**4,144**
						49,717
						1,657

	Total Emissons by Construction Phase (Tons)					Metric Tons
	VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Cactus Flats Road Realignment	1.29	13.12	7.31	1.92	1.25	1,769.26
LAA Realignment	7.01	68.62	41.14	9.39	6.25	7,644.63
Borrow Site 10	0.03	0.72	0.30	8.97	0.77	199.09
Borrow Site 15	0.13	4.30	0.60	6.35	0.65	915.07
NHD2	42.88	310.95	223.53	73.48	29.15	38,137.77
Basin	0.80	8.22	4.54	1.60	0.96	1,051.51

	2018	2019	2020	2021	2022	2023	Total Months
Cactus Flats Road Realignment	10						10
LAA Realignment		7	12	3			22
Borrow Site 10		6	3				9
Borrow Site 15				3	6		9
NHD2			10	12	12	3	37
Basin						5	5

	2018	2019	2020	2021	2022	2023	Total Percentage
Cactus Flats Road Realignment	1.00	0.00	0.00	0.00	0.00	0.00	1.00
LAA Realignment	0.00	0.32	0.55	0.14	0.00	0.00	1.00
Borrow Site 10	0.00	0.67	0.33	0.00	0.00	0.00	1.00
Borrow Site 15	0.00	0.00	0.00	0.33	0.67	0.00	1.00
NHD2	0.00	0.00	0.27	0.32	0.32	0.08	1.00
Basin	0.00	0.00	0.00	0.00	0.00	1.00	1.00

Cement Deep Soil Mixing Alternative
Mitigated Construction Emissions Summary

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
2018											
Cactus Flats Road Realignment	2.19	20.46	79.57	11.10	5.88	0.26	2.46	9.55	1.33	0.71	1,794.95
Maximum Daily	**2.19**	**20.46**	**79.57**	**11.10**	**5.88**	**0.26**	**2.46**	**9.55**	**1.33**	**0.71**	**1,794.95**
2019											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.37	3.63	13.85	2.01	1.08	2,465.30
Borrow Site 10	0.25	6.70	2.74	83.06	7.09	0.02	0.48	0.20	5.98	0.51	132.73
Maximum Daily	**4.63**	**49.87**	**167.61**	**106.99**	**20.00**	**0.39**	**4.11**	**14.05**	**7.99**	**1.59**	**2,598.03**
2020											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.63	6.22	23.74	3.45	1.86	4,226.22
Borrow Site 10	0.25	6.70	2.74	83.06	7.09	0.01	0.24	0.10	2.99	0.26	66.36
NHD2	17.17	301.38	539.40	134.71	35.50	1.76	26.34	63.66	15.97	4.15	10,395.46
Maximum Daily	**21.79**	**351.25**	**707.01**	**241.70**	**55.50**	**2.40**	**32.80**	**87.50**	**22.41**	**6.27**	**14,688.05**
2021											
LAA Realignment	4.38	43.17	164.87	23.93	12.91	0.16	1.55	5.94	0.86	0.46	1,056.56
Borrow Site 15	1.23	39.84	5.54	58.82	6.06	0.04	1.43	0.20	2.12	0.22	305.02
NHD2	17.17	301.38	539.40	134.71	35.50	2.12	31.61	76.40	19.17	4.98	12,474.55
Maximum Daily	**21.54**	**344.55**	**704.27**	**193.52**	**48.40**	**2.32**	**34.60**	**82.53**	**22.15**	**5.67**	**13,836.13**
2022											
NHD2	17.17	301.38	539.40	134.71	35.50	2.12	31.61	76.40	19.17	4.98	12,474.55
Borrow Site 15	1.23	39.84	5.54	58.82	6.06	0.09	2.87	0.40	4.23	0.44	610.05
Maximum Daily	**18.40**	**341.22**	**544.95**	**193.52**	**41.56**	**2.21**	**34.48**	**76.80**	**23.40**	**5.42**	**13,084.60**
2023											
NHD2	17.17	301.38	539.40	134.71	35.50	0.53	7.90	19.10	4.79	1.25	3,118.64
Basin	2.83	25.68	100.17	11.83	6.13	0.15	1.44	5.42	1.25	0.64	615.83
Maximum Daily	**17.17**	**301.38**	**539.40**	**134.71**	**35.50**	**0.68**	**9.34**	**24.52**	**6.04**	**1.89**	**3,734.46**

	Total Emissons by Construction Phase (Tons)					Metric Tons
	VOC	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**CO_2e**
Cactus Flats Road Realignment	0.26	2.46	9.55	1.33	0.71	1,794.95
LAA Realignment	1.16	11.40	43.52	6.32	3.41	7,748.08
Borrow Site 10	0.03	0.72	0.30	8.97	0.77	199.09
Borrow Site 15	0.13	4.30	0.60	6.35	0.65	915.07
NHD2	6.53	97.47	235.56	59.10	15.37	38,463.19
Basin	0.15	1.44	5.42	1.25	0.64	615.83

	2018	2019	2020	2021	2022	2023	Total Months
Cactus Flats Road Realignment	10						10
LAA Realignment		7	12	3			22
Borrow Site 10		6	3				9
Borrow Site 15				3	6		9
NHD2			10	12	12	3	37
Basin						5	5

	2018	2019	2020	2021	2022	2023	Total Percentage
Cactus Flats Road Realignment	1.00	0.00	0.00	0.00	0.00	0.00	1.00
LAA Realignment	0.00	0.32	0.55	0.14	0.00	0.00	1.00
Borrow Site 10	0.00	0.67	0.33	0.00	0.00	0.00	1.00
Borrow Site 15	0.00	0.00	0.00	0.33	0.67	0.00	1.00
NHD2	0.00	0.00	0.27	0.32	0.32	0.08	1.00
Basin	0.00	0.00	0.00	0.00	0.00	1.00	1.00

Fugitive Dust Summary

Construction Activity/Year	Construction Days	Daily Emissions PM_{10} (lbs/day)	Daily Emissions $PM_{2.5}$ (lbs/day)	Total Emissions PM_{10} (tons)	Total Emissions $PM_{2.5}$ (tons)
Cactus Flats Road Realignment	240	10.73	5.58	1.29	0.67
LAA Realignment	528	23.27	12.34	6.14	3.26
ERA - NHD2	1032	46.67	24.70	24.08	12.75
ERA - Borrow Site 10	240	59.42	5.07	7.13	0.61
ERA - Borrow Site 15	216	118.13	11.36	12.76	1.23
CDSM - NHD2	888	131.38	33.05	58.33	14.68
CDSM - Borrow Site 10	216	82.85	6.99	8.95	0.76
CDSM - Borrow Site 15	216	58.00	5.61	6.26	0.61
Basin	216	11.33	5.72	1.22	0.62

Note: Estimates include emission reductions associated with the fugitive dust control measures.

Haiwee Dam

Fugitive Dust - Truck Loading Emissions

					Unmitigated		Mitigated		Unmitigated		Mitigated	
Construction Phase/Subphase	Work Days	Total Materials Moved (cy)	Total Materials Moved (tons)	Daily Materials Moved (tons/day)	Daily PM_{10} (lbs/day)	Daily $PM_{2.5}$ (lbs/day)	Daily PM_{10} (lbs/day)	Daily $PM_{2.5}$ (lbs/day)	PM_{10} (tons)	$PM_{2.5}$ (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
CDSM - Borrow Site 10	216	311,000	393,156	1,820.17	0.21	0.03	0.08	0.01	0.02	0.00	0.01	0.00
CDSM - Borrow Site 15	216	107,000	238,343	1,103.44	0.13	0.02	0.05	0.01	0.01	0.00	0.01	0.00
ERA - Borrow Site 10	240	343,000	433,609	1,806.70	0.21	0.03	0.08	0.01	0.03	0.00	0.01	0.00
ERA- Borrow Site 15	216	107,000	238,343	1,103.44	0.13	0.02	0.05	0.01	0.01	0.00	0.01	0.00
CDSM - NHD2	888	418,000	528,421	595.07	0.07	0.01	0.03	0.00	0.03	0.00	0.01	0.00
ERA - NHD2	1032	450,000	568,875	551.24	0.06	0.01	0.03	0.00	0.03	0.00	0.01	0.00
Basin	120	22,000	27,812	231.76	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00

Earthwork Fugitive Particulate Matter Emissions - Bulldozing, Scraping and Grading

						Unmitigated		Mitigated		Unmitigated		Mitigated	
Activity	Equipment	Daily Activity Level	Total Activity Level	PM10 Emission Factor (lb/activity)	PM2.5 Emission Factor (lb/activity)	PM10 (lb/day)	PM2.5 (lb/day)	Daily PM_{10} (lbs/day)	Daily $PM_{2.5}$ (lbs/day)	PM_{10} (tons)	$PM_{2.5}$ (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
Cactus Flats Road Realignment	4	8.0	32.0	0.753	0.415	24.09	13.27	9.64	5.31	2.89	1.59	1.16	0.64
LAA Realignment	9	8.0	72.0	0.753	0.415	54.20	29.87	21.68	11.95	14.31	7.88	5.72	3.15
ERA - NHD2	18	8.0	144.0	0.753	0.415	108.40	59.73	43.36	23.89	55.93	30.82	22.37	12.33
CDSM - NHD2	14	8.0	112.0	0.753	0.415	84.31	46.46	33.72	18.58	37.43	20.63	14.97	8.25
Basin	4	8.0	32.0	0.753	0.415	24.09	13.27	9.64	5.31	1.45	0.80	0.58	0.32

Rule 403 Control Measures	0.6	percent reduction
Work Days Per Week	6	
Work Days Per Month	24	

Paved Roads Fugitive Dust Emissions

Paved Roads	100%

	Vehicle Type	No.	Miles Per Day	Paved Road Dust Emissions (lbs/day) PM10	PM2.5	Paved Road Dust Emissions (tons) PM10
Cactus Flats Road Realignment	Truck	3	150	0.62	0.15	0.074
LAA Realignment	Truck	4	200	0.83	0.20	0.218
ERA - NHD2	Truck	12	600	2.48	0.61	1.278
ERA - Borrow Site 10	Truck	57	-	-	-	-
ERA - Borrow Site 15	Truck	45	2,216	9.14	2.24	0.99
CDSM - NHD2	Truck	29	4,118	16.99	4.17	7.545
CDSM - Borrow Site 10	Truck	80	-	-	-	-
CDSM - Borrow Site 15	Truck	22	1,083	4.47	1.10	0.483
Basin	Truck	5	250	1.03	0.25	0.06

	Vehicle Type	No.	Miles Per Day	PM10	PM2.5
Cactus Flats Road Realignment	Worker	22	739	0.48	0.12
LAA Realignment	Worker	35	1,176	0.76	0.19
ERA - NHD2	Worker	37	1,243	0.80	0.20
ERA - Borrow Site 10	Worker	33	1109	0.72	0.18
ERA - Borrow Site 15	Worker	8	269	0.17	0.04
CDSM - NHD2	Worker	37	1,243	0.80	0.20
CDSM - Borrow Site 10	Worker	23	773	0.50	0.12
CDSM - Borrow Site 15	Worker	14	470	0.30	0.07
Basin	Worker	30	1008	0.65	0.16

Paved Road Dust $EF_{DUST} = [(k(sL)^{0.91} \times (W)^{1.02}](1 - P/4N))$

Source: AP-42 Section 13.2.1 (Paved Roads) - http://www.epa.gov/ttnchie1/ap42/ch13/final/c13s0201.pdf

Variable	Value	Description
k (PM10)	0.0022	particle size multiplier for particle size rangeand units of interest (lb/VMT)
k (PM2.5)	0.00054	particle size multiplier for particle size rangeand units of interest (lb/VMT)
sL	0.1	road surface silt loading (g/m^2)
W	2.4	average weight (tons) of vehicles (2.4 tons)
W	14.75	haul truck tons
P	30	number of "wet" days with at least 0.254 mm of precipitation during the averaging period
N	365	number of days in averaging period

Pickup and Worker

EF (PM10)	0.00064747	lb/VMT
EF (PM2.5)	0.00015893	lb/VMT

Haul Truck

EF (PM10)	0.00412642	lb/VMT
EF (PM2.5)	0.00101285	lb/VMT

Fugitive Dust - Unpaved Roads

	Daily On-Site Construction Motor Vehicle Fugitive Particulate Matter Emissions													
					Silt Loading (g/m^2)/ Silt Content (%)[a]		Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emissions (lb/day)[c]			Controlled Emissions (lb/day)[e]		Controlled Emissions (tons)
	Vehicle Type	No.	Mi/Veh-Day	Surface Type		Vehicle Weight (tons)	PM10	PM2.5	PM10	PM2.5	Control Efficiency[d]	PM10	PM2.5	PM10
CDSM - Borrow Site 10	Truck	80	2.45	Unpaved	5	25	2.17	0.18	425.1	35.4	81%	82.3	6.9	8.9
CDSM - Borrow Site 15	Truck	22	5.77	Unpaved	5	25	2.17	0.18	274.8	22.9	81%	53.2	4.4	5.7
ERA - Borrow Site 10	Truck	57	2.45	Unpaved	5	25	2.17	0.18	302.9	25.2	81%	58.6	4.9	7.0
ERA - Borrow Site 15	Truck	45	5.77	Unpaved	5	25	2.17	0.18	562.1	46.8	81%	108.8	9.1	11.7

Note: Totals may not match sum of individual values because of rounding.

[a] Unpaved surface silt content from SCAQMD CEQA Handbook, (1993) Table A9-9-D-1 for city and county roads

[b] Equations:

EF (unpaved) = k_u $(s/12)^a$ $(W/3)^b$ Ref: AP-42, Section 13.2.2, "Unpaved Roads," November 2006

Constants:

k_u =	1.8	(Particle size multiplier for PM)
	0.15	(Particle size multiplier for PM2.5)
a =	1	for PM10
	1	for PM2.5
b =	0.5	for PM10
	0.5	for PM2.5

[c] Uncontrolled emissions [lb/day] = Emission factor [lb/mi] x Number x Daily miles traveled [mi/vehicle-day]

[d] Control efficiency from watering unpaved road twice a day (55%) and limiting maximum speed to 15 mph (57%), from Table XI-A, Mitigation Measure Examples, Fugitive Dust from Construction & Demolition, http://www.aqmd.gov/ceqa/handbook/mitigation/fugitive/MM_fugitive.html

[e] Controlled emissions [lb/day] = Uncontrolled emissions [lb/day] x (1 - Control efficiency [%])

CDSM - Concrete Batch Plant - PM-10 Emissions

Maximum Quantity of Concrete Produced (yd/yr) =	71,456
Days of Operation per Year =	48

Composition of Concrete

Material	lb/yd	ton/yr
Cement	491	90,450
Water	167	5,967
Total Concrete Material Required	4,024	96,417

[167 = 20 gal/yd X 8.34 lb/gal]

Emissions from Concrete Batching

*water spray efficiency 70%

Process	lb/ton	controlled lb/ton	lb/yr	PM10 lb/day	PM10 tpy	PM2.5 lb/day	PM2.5 tpy
Cement delivery to Silo (controlled)		0.00034	3.08E+01				
Central Mix loading (controlled)		0.0048	4.34E+02				
PM10 Emissions from Concrete Batching (lb/yr) =			464.91	9.686	0.232	4.164846	0.10

Emissions from Unpaved Roads	PM10	PM2.5	PM10 lb/day	PM10 tpy	PM2.5 lb/day	PM2.5 tpy
Emission Factor of Unpaved Roads (lb/VMT) =	2.17	0.18				
# VMT/yr	7,968	7,968				
Abatement Efficiency (%) =	81	81				
PM10 Emissions from Unpaved Roads (lb/yr) =	3,285.21	272.51	68.442	1.643	5.677	0.136

Emissions from Storage Piles	PM10	PM2.5	PM10 lb/day	PM10 tpy	PM2.5 lb/day	PM2.5 tpy
Emission Factor of Storage Piles (lb/acre/day)	1.7	0.255				
Area of Storage Piles (acres) =	1	1				
# Days Storage Piles Exist =	48	48				
PM10 Emissions from Storage Piles (lb/yr) =	81.6	12.24	1.700	0.041	0.255	0.006

		PM10 lb/day	PM10 tpy	PM2.5 lb/day	PM2.5 tpy
Total PM10 Emissions (lb/yr) =	3831.72	79.827	1.916	10.097	0.242
Total PM10 Emissions (TPY) =	1.92				
Total PM2.5 Emissions (lb/yr) =	484.66				
Total PM2.5 Emissions (TPY) =	0.24				

Fugitive Dust Emission Factors

Truck Loading Fugitive Dust Emission Factors

$EF_D = k \times (0.0032) \times ((U/5)^{1.3})/((M/2)^{1.4})$

Variable	Amount	Units	
EF (PM_{10})	0.0001	lb/ton	
EF ($PM_{2.5}$)	0.00002	lb/ton	
k (PM_{10})	0.35	factor	
k ($PM_{2.5}$)	0.053	factor	
U (mean wind speed)	3.83	miles/hr	Consistent with Air Quality Report (Figure 1. Bishop Wind Rose)
M (moisture content)	7.90	percent	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
Soil density (CalEEMod default)	1.26	tons/cy	
Rip rap density	2.23	tons/cy	
Derrick/Grouted stone density	1.96	tons/cy	

E (lbs) = EF (lb/ton) x TP (tons)

Bulldozing, Scraping and Grading

PM10 Emission Factor [lb/hr] = 0.75 x (silt content [%])$^{1.5}$ / (moisture)$^{1.4}$

PM2.5 Emission Factor [lb/hr] = 0.60 x (silt content [%])$^{1.2}$ / (moisture)$^{1.3}$

Reference: AP-42, Table 11.9-1, July 1998

Parameter	Value	Basis
Silt Content	6.9	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
Moisture	7.9	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations

PM10 Emission Factor	0.75	lb/hr
PM2.5 Emission Factor	0.41	lb/hr

Emissions [pounds per day] = Controlled emission factor [pounds per hour] x Bulldozing, scraping or grading time [hours/day]

Cactus Flats Road Improvements

Equipment Category	Equipment Type	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	CO2	CH4	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Excavators >251 and <500	Excavator - 3.5 CY	2	8	396	240	0.93	10.88	6.05	0.35	0.32	2,596.17	0.81	0.11	1.31	0.73	0.04	0.04	311.54	0.10	285.97
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	2	8	230	240	1.05	10.64	4.76	0.44	0.40	1,503.35	0.47	0.13	1.28	0.57	0.05	0.05	180.40	0.06	165.60
Other Construction Equipment >26 and <50	Vibrator	2	8	50	240	0.87	3.90	4.10	0.33	0.31	406.63	0.13	0.10	0.47	0.49	0.04	0.04	48.80	0.02	44.79
Graders >121 and <175	Grader	2	8	135	240	1.29	12.90	7.24	0.72	0.67	971.09	0.30	0.15	1.55	0.87	0.09	0.08	116.53	0.04	106.97
Paving Equipment >121 and <175	Asphalt Paver - 130 hp	1	8	130	240	0.23	2.62	2.50	0.13	0.12	403.79	0.13	0.03	0.31	0.30	0.02	0.01	48.46	0.02	44.48
Rollers >51 and <120	Pneumatic Wheel Roller 12 Ton	1	8	100	240	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.04	0.37	0.29	0.03	0.02	39.59	0.01	36.34
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	240	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.04	0.37	0.29	0.03	0.02	39.59	0.01	36.34
Rollers >51 and <120	Vibratory Roller 25 Ton	1	8	100	240	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.04	0.37	0.29	0.03	0.02	39.59	0.01	36.34
Off-Highway Trucks >176 and <250	3,000 gal water truck	2	8	230	240	1.05	10.64	4.76	0.44	0.40	1,503.35	0.47	0.13	1.28	0.57	0.05	0.05	180.40	0.06	165.60
Tractors/Loaders/Backhoes >51 and <120	Front End Loader	2	8	93	240	0.51	5.04	4.48	0.36	0.33	599.76	0.19	0.06	0.61	0.54	0.04	0.04	71.97	0.02	66.06
Rubber Tired Dozers > 176 and <250	Crawler Dozer	2	8	200	240	1.89	20.34	7.09	0.99	0.91	1,392.99	0.43	0.23	2.44	0.85	0.12	0.11	167.16	0.05	153.44
Off-Highway Tractors >501 and <750	Truck Tractor, 6x4, 450 H.P.	1	8	450	240	0.68	7.56	3.91	0.28	0.26	1,711.78	0.53	0.08	0.91	0.47	0.03	0.03	205.41	0.06	188.56
Off-Highway Tractors >501 and <750	Truck Tractor, 6x4, 380 H.P.	2	8	380	240	1.15	12.77	6.60	0.48	0.44	2,891.00	0.90	0.14	1.53	0.79	0.06	0.05	346.92	0.11	318.45
Total						**10.62**	**106.65**	**58.74**	**5.16**	**4.74**	**14,969.56**	**4.66**	**1.27**	**12.80**	**7.05**	**0.62**	**0.57**	**1,796.35**	**0.56**	**1,648.93**

On Road Construction Emissions

	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	22	16.8	739	240	177,408	0.05	0.25	1.95	0.08	0.03	545	0.05	0.01	0.03	0.23	0.01	0.00	65.42	0.01	59.67
Concrete/Asphalt Truck Trips	3	25	150	240	36,000	0.07	2.46	0.27	0.05	0.03	555	0.00	0.01	0.30	0.03	0.01	0.00	66.66	0.00	60.66
Total						**0.13**	**2.71**	**2.22**	**0.12**	**0.06**	**1,100.63**	**0.05**	**0.02**	**0.33**	**0.27**	**0.01**	**0.01**	**132.08**	**0.01**	**120.34**

Notes:
Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

Total	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**10.75**	**109.36**	**60.96**	**5.28**	**4.80**	**16,070.19**	**4.71**								
Maximum Annual Emissions								**1.29**	**13.12**	**7.31**	**0.63**	**0.58**	**1,928.42**	**0.56**	**1,769.26**

LAA Realignment

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Cranes >251 and <500	Crawler Crane	1	8	375	528	0.71	8.89	6.11	0.36	0.33	941.54	0.29	0.19	2.35	1.61	0.09	0.09	248.57	0.08	228.17
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	8	8	230	528	4.20	42.55	19.03	1.74	1.60	6,013.41	1.87	1.11	11.23	5.02	0.46	0.42	1,587.54	0.49	1,457.25
Off-Highway Trucks >176 and <250	3,000 gal water truck	3	8	230	528	1.58	15.96	7.14	0.65	0.60	2,255.03	0.70	0.42	4.21	1.88	0.17	0.16	595.33	0.19	546.47
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	528	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.09	0.82	0.64	0.06	0.05	87.09	0.03	79.94
Other Construction Equipment >121 and <175	Hammer, Diesel, 22k ft-lb	1	8	175	528	0.57	6.16	4.23	0.32	0.30	632.59	0.20	0.15	1.63	1.12	0.09	0.08	167.00	0.05	153.30
Excavators >251 and <500	Hydraulic Excavator, 396 HP	2	8	396	528	0.93	10.88	6.05	0.35	0.32	2,596.17	0.81	0.24	2.87	1.60	0.09	0.09	685.39	0.21	629.14
Concrete/Industrial Saws >26 and <50	Concrete Saw	3	8	50	528	1.99	8.68	9.20	0.53	0.53	1,097.53	0.18	0.53	2.29	2.43	0.14	0.14	289.75	0.05	264.88
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	528	0.12	1.51	1.73	0.07	0.07	259.90	0.08	0.03	0.40	0.46	0.02	0.02	68.61	0.02	62.98
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	528	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.07	0.67	0.59	0.05	0.04	79.17	0.02	72.67
Rubber Tired Dozers > 176 and <250	Crawler Dozer	4	8	200	528	3.78	40.68	14.17	1.98	1.82	2,785.99	0.87	1.00	10.74	3.74	0.52	0.48	735.50	0.23	675.14
Air Compressors >26 and <50	Jack Hammer	2	8	50	528	1.10	3.98	4.60	0.28	0.28	481.11	0.10	0.29	1.05	1.22	0.07	0.07	127.01	0.03	116.25
Generator Sets >26 and <50	Generators	3	8	50	528	1.75	8.55	8.19	0.50	0.50	1,112.56	0.16	0.46	2.26	2.16	0.13	0.13	293.72	0.04	268.34
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	2	8	232	528	0.86	10.89	6.23	0.39	0.36	1,695.73	0.53	0.23	2.87	1.64	0.10	0.10	447.67	0.14	410.93
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	3	8	365	528	3.42	42.34	26.22	1.67	1.54	4,549.47	1.42	0.90	11.18	6.92	0.44	0.41	1,201.06	0.37	1,102.49
Other Construction Equipment >121 and <175	Vibratory soil compactor	5	8	131	528	2.12	23.07	15.83	1.21	1.12	2,367.68	0.74	0.56	6.09	4.18	0.32	0.29	625.07	0.19	573.77
Graders >121 and <175	Grader, 30,000 lbs.	2	8	145	528	1.39	13.85	7.78	0.78	0.72	1,043.02	0.32	0.37	3.66	2.05	0.21	0.19	275.36	0.09	252.76
Tractors/Loaders/Backhoes >51 and <120	Front End Loader	5	8	93	528	1.28	12.61	11.20	0.89	0.82	1,499.39	0.47	0.34	3.33	2.96	0.24	0.22	395.84	0.12	363.35
Total						**26.36**	**256.23**	**152.38**	**12.13**	**11.27**	**29,960.88**	**8.92**	**6.96**	**67.65**	**40.23**	**3.20**	**2.97**	**7,909.67**	**2.36**	**7,257.84**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	35	16.8	1,176	528	620,928	0.08	0.40	3.11	0.12	0.05	867	0.07	0.02	0.11	0.82	0.03	0.01	228.97	0.02	208.85
Concrete/Asphalt Truck Trips	4	25	200	528	105,600	0.10	3.28	0.36	0.06	0.04	741	0.00	0.03	0.87	0.09	0.02	0.01	195.53	0.00	177.94
Total						**0.18**	**3.68**	**3.46**	**0.18**	**0.09**	**1,607.92**	**0.08**	**0.05**	**0.97**	**0.91**	**0.05**	**0.02**	**424.49**	**0.02**	**386.80**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**26.54**	**259.91**	**155.84**	**12.32**	**11.35**	**31,568.81**	**9.00**								
Maximum Annual Emissions								**7.01**	**68.62**	**41.14**	**3.25**	**3.00**	**8,334.16**	**2.38**	**7,644.63**

Excavate and Recompact Alternative
NHD2

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	CO2	CH4	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	1032	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.13	1.30	1.16	0.09	0.08	154.74	0.05	142.04
Cranes >176 and <250	Crane	1	8	240	1032	0.59	7.09	2.62	0.31	0.28	603.22	0.19	0.31	3.66	1.35	0.16	0.15	311.26	0.10	285.72
Rubber Tired Dozers > 176 and <250	Crawler Dozer	4	8	200	1032	3.78	40.68	14.17	1.98	1.82	2,785.99	0.87	1.95	20.99	7.31	1.02	0.94	1,437.57	0.45	1,319.59
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	8	8	230	1032	4.20	42.55	19.03	1.74	1.60	6,013.41	1.87	2.17	21.96	9.82	0.90	0.83	3,102.92	0.97	2,848.27
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	10	8	365	1032	11.41	141.14	87.39	5.56	5.12	15,164.91	4.72	5.89	72.83	45.09	2.87	2.64	7,825.09	2.44	7,182.91
Excavators >251 and <500	Hydraulic Excavator, 396 HP	2	8	396	1032	0.93	10.88	6.05	0.35	0.32	2,596.17	0.81	0.48	5.62	3.12	0.18	0.17	1,339.62	0.42	1,229.69
Graders >176 and <250	Motor Grader	4	8	200	1032	2.22	30.49	8.19	0.99	0.91	2,866.04	0.89	1.15	15.73	4.23	0.51	0.47	1,478.87	0.46	1,357.50
Off-Highway Trucks >176 and <250	Off-Highway Trucks	5	8	230	1032	2.63	26.60	11.89	1.09	1.00	3,758.38	1.17	1.35	13.72	6.14	0.56	0.52	1,939.33	0.60	1,780.17
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	1032	0.12	1.51	1.73	0.07	0.07	259.90	0.08	0.06	0.78	0.89	0.04	0.03	134.11	0.04	123.10
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	4	8	232	1032	1.72	21.77	12.46	0.79	0.72	3,391.45	1.06	0.89	11.23	6.43	0.41	0.37	1,749.99	0.54	1,606.37
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	1032	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.17	1.61	1.25	0.11	0.10	170.22	0.05	156.25
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	3	8	93	1032	0.77	7.56	6.72	0.54	0.49	899.63	0.28	0.39	3.90	3.47	0.28	0.25	464.21	0.14	426.11
Tractors/Loaders/Backhoes >121 and <175	Front End Loader 5 CY	2	8	150	1032	0.58	6.20	6.14	0.31	0.29	951.01	0.30	0.30	3.20	3.17	0.16	0.15	490.72	0.15	450.45
Bore/Drill Rigs >121 and <175	Truck mounted drill rig	1	8	145	1032	0.26	3.01	3.79	0.13	0.12	633.04	0.20	0.13	1.55	1.95	0.07	0.06	326.65	0.10	299.84
Generator Sets >26 and <50	Generators	2	8	50	1032	1.17	5.70	5.46	0.33	0.33	741.71	0.10	0.60	2.94	2.82	0.17	0.17	382.72	0.05	349.65
Other Construction Equipment >51 and <120	Vibrating screen	5	8	100	1032	2.21	20.15	14.07	1.54	1.42	1,814.91	0.56	1.14	10.40	7.26	0.80	0.73	936.50	0.29	859.64
Other Construction Equipment >121 and <175	Vibratory soil compactor	8	8	131	1032	3.39	36.91	25.33	1.94	1.79	3,788.28	1.18	1.75	19.05	13.07	1.00	0.92	1,954.75	0.61	1,794.33
Off-Highway Trucks >176 and <250	3,000 gal water truck	8	8	230	1032	4.20	42.55	19.03	1.74	1.60	6,013.41	1.87	2.17	21.96	9.82	0.90	0.83	3,102.92	0.97	2,848.27
Pumps >26 and <50	Submersible pump	30	24	50	1032	57.15	259.71	258.24	15.68	15.68	33,376.88	5.11	29.49	134.01	133.25	8.09	8.09	17,222.47	2.64	15,739.63
Total						**97.90**	**710.15**	**506.98**	**35.49**	**33.94**	**86,288.12**	**21.46**	**50.51**	**366.44**	**261.60**	**18.31**	**17.51**	**44,524.67**	**11.07**	**40,799.53**

On Road Construction Emissions

	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	37	16.8	1,243	1,032	1,282,982	0.09	0.42	3.28	0.13	0.05	917	0.08	0.04	0.22	1.69	0.07	0.03	473.10	0.04	431.54
Concrete/Asphalt Truck Trips	12	25	600	1,032	619,200	0.30	9.84	1.07	0.19	0.11	2,222	0.01	0.15	5.08	0.55	0.10	0.05	1,146.50	0.00	1,043.40
Total						**0.38**	**10.26**	**4.35**	**0.32**	**0.16**	**3,138.75**	**0.08**	**0.20**	**5.29**	**2.24**	**0.16**	**0.08**	**1,619.59**	**0.04**	**1,474.94**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

Total	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**98.28**	**720.41**	**511.33**	**35.81**	**34.10**	**89,426.87**	**21.54**								
Maximum Annual Emissions								**50.71**	**371.73**	**263.85**	**18.48**	**17.59**	**46,144.26**	**11.11**	**42,274.48**

Cement Deep Soil Mixing Alternative
NHD2

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <12(	Backhoe Loade	1	8	93	888	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.11	1.12	0.99	0.08	0.07	133.15	0.04	122.22
Cranes >176 and <25(	Crane	1	8	240	888	0.59	7.09	2.62	0.31	0.28	603.22	0.19	0.26	3.15	1.16	0.14	0.13	267.83	0.08	245.85
Rubber Tired Dozers > 176 and <25(	Crawler Dozer	4	8	200	888	3.78	40.68	14.17	1.98	1.82	2,785.99	0.87	1.68	18.06	6.29	0.88	0.81	1,236.98	0.39	1,135.46
Off-Highway Trucks >176 and <25(	Dump Truck (12 CY)	4	8	230	888	2.10	21.28	9.52	0.87	0.80	3,006.71	0.94	0.93	9.45	4.22	0.39	0.36	1,334.98	0.42	1,225.42
Scrapers >251 and <50(	Elevating scraper, 23 C.Y	6	8	365	888	6.84	84.69	52.43	3.34	3.07	9,098.94	2.83	3.04	37.60	23.28	1.48	1.36	4,039.93	1.26	3,708.39
Excavators >251 and <50(	Hydraulic Excavator, 396 HF	1	8	396	888	0.46	5.44	3.02	0.18	0.16	1,298.09	0.40	0.21	2.42	1.34	0.08	0.07	576.35	0.18	529.05
Graders >176 and <25(	Motor Grader	4	8	200	888	2.22	30.49	8.19	0.99	0.91	2,866.04	0.89	0.99	13.54	3.64	0.44	0.40	1,272.52	0.40	1,168.08
Rough Terrain Forklifts >51 and <12(	Rough terrain forklif	1	8	75	888	0.12	1.51	1.73	0.07	0.07	259.90	0.08	0.05	0.67	0.77	0.03	0.03	115.40	0.04	105.93
Other Construction Equipment >251 and <50(	Soil compactor, 232 HF	4	8	232	888	1.72	21.77	12.46	0.79	0.72	3,391.45	1.06	0.77	9.67	5.53	0.35	0.32	1,505.81	0.47	1,382.23
Rollers >51 and <12(	Tandem vibratory roller, 10 to	1	8	100	888	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.14	1.38	1.07	0.10	0.09	146.47	0.05	134.45
Tractors/Loaders/Backhoes >51 and <12(	Front End Loader 3 CY	3	8	93	888	0.77	7.56	6.72	0.54	0.49	899.63	0.28	0.34	3.36	2.98	0.24	0.22	399.44	0.12	366.66
Tractors/Loaders/Backhoes >121 and <17	Front End Loader 5 CY	2	8	150	888	0.58	6.20	6.14	0.31	0.29	951.01	0.30	0.26	2.75	2.73	0.14	0.13	422.25	0.13	387.59
Bore/Drill Rigs >121 and <175	Truck mounted drill rig	1	8	145	888	0.26	3.01	3.79	0.13	0.12	633.04	0.20	0.12	1.34	1.68	0.06	0.05	281.07	0.09	258.00
Generator Sets >26 and <5(	Generators	2	8	50	888	1.17	5.70	5.46	0.33	0.33	741.71	0.10	0.52	2.53	2.42	0.15	0.15	329.32	0.05	300.86
Other Construction Equipment >51 and <12(	Vibrating screer	2	8	100	888	0.89	8.06	5.63	0.62	0.57	725.97	0.23	0.39	3.58	2.50	0.27	0.25	322.33	0.10	295.88
Other Construction Equipment >121 and <17	Vibratory soil compacto	6	8	131	888	2.54	27.69	19.00	1.46	1.34	2,841.21	0.88	1.13	12.29	8.44	0.65	0.60	1,261.50	0.39	1,157.97
Off-Highway Trucks >176 and <25(	3,000 gal water truck	8	8	230	888	4.20	42.55	19.03	1.74	1.60	6,013.41	1.87	1.87	18.89	8.45	0.77	0.71	2,669.96	0.83	2,450.84
Pumps >26 and <5(	Submersible pump	30	24	50	888	57.15	259.71	258.24	15.68	15.68	33,376.88	5.11	25.37	115.31	114.66	6.96	6.96	14,819.33	2.27	13,543.40
Off-Highway Trucks >251 and <50(	Articulated end dump trucks (for CDSM	6	8	481	888	5.55	59.77	30.16	2.18	2.01	9,545.46	2.97	2.46	26.54	13.39	0.97	0.89	4,238.18	1.32	3,890.36
Pumps >251 and <50(	Cement pump (for CDSM)	2	8	450	888	2.65	27.49	12.23	0.83	0.83	6,675.38	0.23	1.18	12.20	5.43	0.37	0.37	2,963.87	0.10	2,699.78
Bore/Drill Rigs >121 and <175	Drill rig with multiaxis mixing augers (for CDSM	2	8	145	888	0.52	6.03	7.57	0.26	0.24	1,266.08	0.39	0.23	2.68	3.36	0.12	0.11	562.14	0.17	516.01
Tractors/Loaders/Backhoes >121 and <17	Loader (for CDSM)	2	8	150	888	0.58	6.20	6.14	0.31	0.29	951.01	0.30	0.26	2.75	2.73	0.14	0.13	422.25	0.13	387.59
Tractors/Loaders/Backhoes >121 and <17	Track mounted backhoe (for CDSM	2	8	150	888	0.58	6.20	6.14	0.31	0.29	951.01	0.30	0.26	2.75	2.73	0.14	0.13	422.25	0.13	387.59
Bore/Drill Rigs >121 and <175	Track mounted drill rig for coring (for CDSM	1	8	145	888	0.26	3.01	3.79	0.13	0.12	633.04	0.20	0.12	1.34	1.68	0.06	0.05	281.07	0.09	258.00
Total						**96.12**	**687.76**	**498.85**	**33.76**	**32.41**	**90,144.93**	**20.81**	**42.68**	**305.37**	**221.49**	**14.99**	**14.39**	**40,024.35**	**9.24**	**36,657.60**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	37	16.8	1,243	888	1,103,962	0.09	0.42	3.28	0.13	0.05	917	0.08	0.04	0.19	1.46	0.06	0.02	407.08	0.03	371.33
Truck Trips	16 6	0.5	166	48	7,968	0.08	2.72	0.29	0.05	0.03	615	0.00	0.00	0.07	0.01	0.00	0.00	14.75	0.00	13.43
Concrete Truck Trips	2 9	25	1,450	312	452,400	0.72	23.77	2.58	0.46	0.26	5,370	0.02	0.11	3.71	0.40	0.07	0.04	837.65	0.00	762.33
Cement Truck Trips	2 9	71	4,118	48	197,664	2.04	67.51	7.32	1.31	0.73	15,250	0.05	0.05	1.62	0.18	0.03	0.02	365.99	0.00	333.08
Total						**2.92**	**94.43**	**13.47**	**1.95**	**1.07**	**22,150.76**	**0.14**	**0.20**	**5.58**	**2.04**	**0.16**	**0.08**	**1,625.48**	**0.04**	**1,480.16**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round tri

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**99.04**	**782.19**	**512.32**	**35.71**	**33.47**	**112,295.69**	**20.95**								
Maximum Annual Emissions								**42.88**	**310.95**	**223.53**	**15.15**	**14.47**	**41,649.83**	**9.28**	**38,137.77**

Slope Protection

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	CO2	CH4	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	120	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.02	0.15	0.13	0.01	0.01	17.99	0.01	16.52
Rollers >51 and <120	Vibratory Roller 25 Ton	1	8	100	120	0.32	3.12	2.42	0.21	0.20	329.88	0.10	0.02	0.19	0.15	0.01	0.01	19.79	0.01	18.17
Rubber Tired Dozers > 176 and <250	Crawler Dozer	1	8	200	120	0.94	10.17	3.54	0.49	0.45	696.50	0.22	0.06	0.61	0.21	0.03	0.03	41.79	0.01	38.36
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	4	8	230	120	2.10	21.28	9.52	0.87	0.80	3,006.71	0.94	0.13	1.28	0.57	0.05	0.05	180.40	0.06	165.60
Excavators >251 and <500	Hydraulic Excavator, 396 HP	1	8	396	120	0.46	5.44	3.02	0.18	0.16	1,298.09	0.40	0.03	0.33	0.18	0.01	0.01	77.89	0.02	71.49
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	120	0.12	1.51	1.73	0.07	0.07	259.90	0.08	0.01	0.09	0.10	0.00	0.00	15.59	0.00	14.31
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	1	8	232	120	0.43	5.44	3.12	0.20	0.18	847.86	0.26	0.03	0.33	0.19	0.01	0.01	50.87	0.02	46.70
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	1	8	93	120	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.02	0.15	0.13	0.01	0.01	17.99	0.01	16.52
Tractors/Loaders/Backhoes >121 and <175	Front End Loader 5 CY	1	8	150	120	0.29	3.10	3.07	0.16	0.14	475.50	0.15	0.02	0.19	0.18	0.01	0.01	28.53	0.01	26.19
Generator Sets >26 and <50	Generators	1	8	50	120	0.58	2.85	2.73	0.17	0.17	370.85	0.05	0.04	0.17	0.16	0.01	0.01	22.25	0.00	20.33
Off-Highway Trucks >176 and <250	3,000 gal water truck	2	8	230	120	1.05	10.64	4.76	0.44	0.40	1,503.35	0.47	0.06	0.64	0.29	0.03	0.02	90.20	0.03	82.80
Total						**6.81**	**68.58**	**38.39**	**3.14**	**2.90**	**9,388.41**	**2.86**	**0.41**	**4.12**	**2.30**	**0.19**	**0.17**	**563.30**	**0.17**	**516.98**

On Road Construction Emissions

	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	30	16.8	1,008	120	120,960	0.07	0.34	2.66	0.10	0.04	743	0.06	0.00	0.02	0.16	0.01	0.00	44.60	0.00	40.69
Concrete/Asphalt Truck Trips	5	25	250	120	30,000	0.12	4.10	0.44	0.08	0.04	926	0.00	0.01	0.25	0.03	0.00	0.00	55.55	0.00	50.55
Total						**0.19**	**4.44**	**3.11**	**0.18**	**0.09**	**1,669.18**	**0.07**	**0.01**	**0.27**	**0.19**	**0.01**	**0.01**	**100.15**	**0.00**	**91.24**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

Total	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**7.01**	**73.03**	**41.49**	**3.32**	**2.99**	**11,057.59**	**2.93**								
Maximum Annual Emissions								**0.42**	**4.38**	**2.49**	**0.20**	**0.18**	**663.46**	**0.18**	**608.22**

Diversion Channel

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	CO2	CH4	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Other Construction Equipment >26 and <50	Vibrator	2	8	50	96	0.87	3.90	4.10	0.33	0.31	406.63	0.13	0.04	0.19	0.20	0.02	0.01	19.52	0.01	17.92
Graders >121 and <175	Grader	1	8	135	96	0.65	6.45	3.62	0.36	0.33	485.54	0.15	0.03	0.31	0.17	0.02	0.02	23.31	0.01	21.39
Rubber Tired Dozers > 176 and <250	Crawler Dozer	1	8	200	96	0.94	10.17	3.54	0.49	0.45	696.50	0.22	0.05	0.49	0.17	0.02	0.02	33.43	0.01	30.69
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	5	8	230	96	2.63	26.60	11.89	1.09	1.00	3,758.38	1.17	0.13	1.28	0.57	0.05	0.05	180.40	0.06	165.60
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	1	8	365	96	1.14	14.11	8.74	0.56	0.51	1,516.49	0.47	0.05	0.68	0.42	0.03	0.02	72.79	0.02	66.82
Excavators >251 and <500	Hydraulic Excavator, 396 HP	1	8	396	96	0.46	5.44	3.02	0.18	0.16	1,298.09	0.40	0.02	0.26	0.15	0.01	0.01	62.31	0.02	57.19
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	1	8	232	96	0.43	5.44	3.12	0.20	0.18	847.86	0.26	0.02	0.26	0.15	0.01	0.01	40.70	0.01	37.36
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	1	8	93	96	0.26	2.52	2.24	0.18	0.16	299.88	0.09	0.01	0.12	0.11	0.01	0.01	14.39	0.00	13.21
Off-Highway Trucks >176 and <250	3,000 gal water truck	1	8	230	96	0.53	5.32	2.38	0.22	0.20	751.68	0.23	0.03	0.26	0.11	0.01	0.01	36.08	0.01	33.12
Total						**7.90**	**79.96**	**42.66**	**3.60**	**3.32**	**10,061.05**	**3.13**	**0.38**	**3.84**	**2.05**	**0.17**	**0.16**	**482.93**	**0.15**	**443.30**

On Road Construction Emissions

	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	-	16.8	-	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Concrete/Asphalt Truck Trips	-	25	-	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total						**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Note: Worker and truck trips included with Slope Protection phase.

Total	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**7.90**	**79.96**	**42.66**	**3.60**	**3.32**	**10,061.05**	**3.13**								
Maximum Annual Emissions								**0.38**	**3.84**	**2.05**	**0.17**	**0.16**	**482.93**	**0.15**	**443.30**

Excavate and Recompact Alternative
Borrow Site 10

On Road Construction Emissions

	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	33	16.8	1,109	240	266,112	0.08	0.38	2.93	0.11	0.05	0.01	0.05	0.35	0.01	0.01	98.13	0.01	89.51
Truck Trips	57	2.45	280	240	67,158	0.14	4.59	0.50	0.09	0.05	0.02	0.55	0.06	0.01	0.01	124.35	0.00	113.17
Total						**0.22**	**4.97**	**3.42**	**0.20**	**0.10**	**0.03**	**0.60**	**0.41**	**0.02**	**0.01**	**222.48**	**0.01**	**202.68**

Note: Construction equipment included with LAA Relignment.

Excavate and Recompact Alternative
Borrow Site 15

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	8	16.8	269	216	58,061	0.02	0.09	0.71	0.03	0.01	0.00	0.01	0.08	0.00	0.00	21.41	0.00	19.53
Truck Trips	45	55.00	4,950	216	1,069,286	2.45	81.16	8.80	1.58	0.88	0.26	8.77	0.95	0.17	0.09	1,979.87	0.01	1,801.83
Total						**2.47**	**81.25**	**9.51**	**1.60**	**0.89**	**0.27**	**8.78**	**1.03**	**0.17**	**0.10**	**2,001.28**	**0.01**	1,821.36

Note: Assumes a total of 44 workers per day.

Cement Deep Soil Mixing Alternative
Borrow Site 10

On Road Construction Emissions

	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	23	16.8	773	216	166,925	0.05	0.26	2.04	0.08	0.03	0.01	0.03	0.22	0.01	0.00	61.55	0.01	56.15
Truck Trips	80	2.45	393	216	84,831	0.19	6.44	0.70	0.12	0.07	0.02	0.70	0.08	0.01	0.01	157.07	0.00	142.95
Total						**0.25**	**6.70**	**2.74**	**0.20**	**0.10**	**0.03**	**0.72**	**0.30**	**0.02**	**0.01**	**218.62**	**0.01**	**199.09**

Note: Construction equipment included with LAA Relignment.

Cement Deep Soil Mixing Alternative
Borrow Site 15
On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	14	16.8	470	216	101,606	0.03	0.16	1.24	0.05	0.02	0.00	0.02	0.13	0.01	0.00	37.47	0.00	34.18
Truck Trips	22	55.00	2,420	216	522,762	1.20	39.68	4.30	0.77	0.43	0.13	4.29	0.46	0.08	0.05	967.93	0.00	880.90
Total						**1.23**	**39.84**	**5.54**	**0.82**	**0.45**	**0.13**	**4.30**	**0.60**	**0.09**	**0.05**	**1,005.40**	**0.01**	915.07

Note: Assumes a total of 44 workers per day.

Cactus Flats Road Improvements
Mitigated Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Category	Equipment Type	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Excavators >251 and <500	Excavator - 3.5 CY	2	8	396	240	0.32	1.38	11.68	0.04	0.04	2,637.08	0.81	0.04	0.17	1.40	0.01	0.01	316.45	0.10	290.44
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	2	8	230	240	0.18	0.80	6.78	0.02	0.02	1,525.42	0.47	0.02	0.10	0.81	0.00	0.00	183.05	0.06	168.01
Other Construction Equipment >26 and <50	Vibrator	2	8	50	240	0.09	2.04	3.04	0.01	0.01	413.34	0.13	0.01	0.24	0.36	0.00	0.00	49.60	0.02	45.52
Graders >121 and <175	Grader	2	8	135	240	0.12	0.51	7.22	0.02	0.02	989.38	0.30	0.01	0.06	0.87	0.00	0.00	118.73	0.04	108.97
Paving Equipment >121 and <175	Asphalt Paver - 130 hp	1	8	130	240	0.05	0.21	3.05	0.01	0.01	410.35	0.13	0.01	0.03	0.37	0.00	0.00	49.24	0.02	45.19
Rollers >51 and <120	Pneumatic Wheel Roller 12 Ton	1	8	100	240	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.01	0.22	0.30	0.00	0.00	40.22	0.01	36.92
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	240	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.01	0.22	0.30	0.00	0.00	40.22	0.01	36.92
Rollers >51 and <120	Vibratory Roller 25 Ton	1	8	100	240	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.01	0.22	0.30	0.00	0.00	40.22	0.01	36.92
Off-Highway Trucks >176 and <250	3,000 gal water truck	2	8	230	240	0.18	0.80	6.78	0.02	0.02	1,525.42	0.47	0.02	0.10	0.81	0.00	0.00	183.05	0.06	168.01
Tractors/Loaders/Backhoes >51 and <120	Front End Loader	2	8	93	240	0.15	3.33	4.49	0.01	0.01	610.28	0.19	0.02	0.40	0.54	0.00	0.00	73.23	0.02	67.21
Rubber Tired Dozers > 176 and <250	Crawler Dozer	2	8	200	240	0.17	0.73	6.21	0.02	0.02	1,415.33	0.43	0.02	0.09	0.74	0.00	0.00	169.84	0.05	155.88
Off-Highway Tractors >501 and <750	Truck Tractor, 6x4, 450 H.P.	1	8	450	240	0.21	0.91	7.68	0.03	0.03	1,737.74	0.53	0.03	0.11	0.92	0.00	0.00	208.53	0.06	191.39
Off-Highway Tractors >501 and <750	Truck Tractor, 6x4, 380 H.P.	2	8	380	240	0.35	1.53	12.98	0.05	0.05	2,934.86	0.90	0.04	0.18	1.56	0.01	0.01	352.18	0.11	323.24
Total						**2.06**	**17.75**	**77.35**	**0.24**	**0.24**	**15,204.83**	**4.66**	**0.25**	**2.13**	**9.28**	**0.03**	**0.03**	**1,824.58**	**0.56**	**1,674.61**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Daily Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	22	16.8	739	240	177,408	0.05	0.25	1.95	0.08	0.03	545	0.05	0.01	0.03	0.23	0.01	0.00	65.42	0.01	59.67
Concrete/Asphalt Truck Trips	3	25	150	240	36,000	0.07	2.46	0.27	0.05	0.03	555	0.00	0.01	0.30	0.03	0.01	0.00	66.66	0.00	60.66
Total						**0.13**	**2.71**	**2.22**	**0.12**	**0.06**	**1,100.63**	**0.05**	**0.02**	**0.33**	**0.27**	**0.01**	**0.01**	**132.08**	**0.01**	**120.34**

Notes:
Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**2.19**	**20.46**	**79.57**	**0.37**	**0.30**	**16,305.46**	**4.71**								
Maximum Annual Emissions								**0.26**	**2.46**	**9.55**	**0.04**	**0.04**	**1,956.65**	**0.56**	**1,794.95**

LAA Realignment
Mitigated Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Cranes >251 and <500	Crawler Crane	1	8	375	528	0.12	0.50	4.22	0.02	0.02	956.02	0.29	0.03	0.13	1.11	0.00	0.00	252.39	0.08	231.64
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	8	8	230	528	0.74	3.21	27.13	0.10	0.10	6,101.69	1.87	0.20	0.85	7.16	0.03	0.03	1,610.85	0.49	1,478.45
Off-Highway Trucks >176 and <250	3,000 gal water truck	3	8	230	528	0.28	1.20	10.17	0.04	0.04	2,288.13	0.70	0.07	0.32	2.69	0.01	0.01	604.07	0.19	554.42
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	528	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.02	0.48	0.65	0.00	0.00	88.49	0.03	81.22
Other Construction Equipment >121 and <175	Hammer, Diesel, 22k ft-lb	1	8	175	528	0.08	0.34	4.80	0.01	0.01	642.88	0.20	0.02	0.09	1.27	0.00	0.00	169.72	0.05	155.77
Excavators >251 and <500	Hydraulic Excavator, 396 HP	2	8	396	528	0.32	1.38	11.68	0.04	0.04	2,637.08	0.81	0.08	0.36	3.08	0.01	0.01	696.19	0.21	638.97
Concrete/Industrial Saws >26 and <50	Concrete Saw	3	8	50	528	0.23	5.31	7.92	0.02	0.02	1,097.53	0.20	0.06	1.40	2.09	0.00	0.00	289.75	0.05	265.05
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	528	0.06	1.45	1.96	0.00	0.00	264.11	0.08	0.02	0.38	0.52	0.00	0.00	69.73	0.02	64.00
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	528	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.02	0.44	0.59	0.00	0.00	80.56	0.02	73.94
Rubber Tired Dozers > 176 and <250	Crawler Dozer	4	8	200	528	0.34	1.47	12.42	0.05	0.05	2,830.65	0.87	0.09	0.39	3.28	0.01	0.01	747.29	0.23	685.87
Air Compressors >26 and <50	Jack Hammer	2	8	50	528	0.10	2.33	3.47	0.01	0.01	481.11	0.11	0.03	0.61	0.92	0.00	0.00	127.01	0.03	116.34
Generator Sets >26 and <50	Generators	3	8	50	528	0.23	5.38	8.03	0.02	0.02	1,112.56	0.18	0.06	1.42	2.12	0.00	0.00	293.72	0.05	268.48
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	2	8	232	528	0.21	0.89	7.56	0.03	0.03	1,722.43	0.53	0.05	0.24	2.00	0.01	0.01	454.72	0.14	417.35
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	3	8	365	528	0.56	2.41	20.39	0.07	0.07	4,620.70	1.42	0.15	0.64	5.38	0.02	0.02	1,219.86	0.37	1,119.60
Other Construction Equipment >121 and <175	Vibratory soil compactor	5	8	131	528	0.29	1.26	17.95	0.04	0.04	2,406.23	0.74	0.08	0.33	4.74	0.01	0.01	635.24	0.19	583.03
Graders >121 and <175	Grader, 30,000 lbs.	2	8	145	528	0.13	0.55	7.76	0.02	0.02	1,062.67	0.33	0.03	0.14	2.05	0.00	0.00	280.54	0.09	257.49
Tractors/Loaders/Backhoes >51 and <120	Front End Loader	5	8	93	528	0.36	8.31	11.23	0.02	0.02	1,525.70	0.47	0.10	2.19	2.96	0.01	0.01	402.79	0.12	369.68
Total						**4.20**	**39.49**	**161.41**	**0.48**	**0.48**	**30,389.85**	**8.98**	**1.11**	**10.42**	**42.61**	**0.13**	**0.13**	**8,022.92**	**2.37**	**7,361.28**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	35	16.8	1,176	528	620,928	0.08	0.40	3.11	0.12	0.05	867	0.07	0.02	0.11	0.82	0.03	0.01	228.97	0.02	208.85
Concrete/Asphalt Truck Trips	4	25	200	528	105,600	0.10	3.28	0.36	0.06	0.04	741	0.00	0.03	0.87	0.09	0.02	0.01	195.53	0.00	177.94
Total						**0.18**	**3.68**	**3.46**	**0.18**	**0.09**	**1,607.92**	**0.08**	**0.05**	**0.97**	**0.91**	**0.05**	**0.02**	**424.49**	**0.02**	**386.80**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**4.38**	**43.17**	**164.87**	**0.67**	**0.57**	**31,997.77**	**9.06**								
Maximum Annual Emissions								**1.16**	**11.40**	**43.52**	**0.18**	**0.15**	**8,447.41**	**2.39**	**7,748.08**

Excavate and Recompact Alternative
NHD2
Mitigated Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	1032	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.04	0.86	1.16	0.00	0.00	157.45	0.05	144.51
Cranes >176 and <250	Crane	1	8	240	1032	0.07	0.32	2.70	0.01	0.01	613.00	0.19	0.04	0.16	1.39	0.01	0.01	316.31	0.10	290.31
Rubber Tired Dozers > 176 and <250	Crawler Dozer	4	8	200	1032	0.34	1.47	12.42	0.05	0.05	2,830.65	0.87	0.17	0.76	6.41	0.02	0.02	1,460.62	0.45	1,340.57
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	8	8	230	1032	0.74	3.21	27.13	0.10	0.10	6,101.69	1.87	0.38	1.65	14.00	0.05	0.05	3,148.47	0.96	2,889.69
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	10	8	365	1032	1.85	8.03	67.98	0.25	0.25	15,402.33	4.72	0.96	4.15	35.08	0.13	0.13	7,947.60	2.43	7,294.36
Excavators >251 and <500	Hydraulic Excavator, 396 HP	2	8	396	1032	0.32	1.38	11.68	0.04	0.04	2,637.08	0.81	0.16	0.71	6.03	0.02	0.02	1,360.73	0.42	1,248.89
Graders >176 and <250	Motor Grader	4	8	200	1032	0.35	1.50	12.73	0.05	0.05	2,914.46	0.89	0.18	0.78	6.57	0.02	0.02	1,503.86	0.46	1,380.26
Off-Highway Trucks >176 and <250	Off-Highway Trucks	5	8	230	1032	0.46	2.00	16.96	0.06	0.06	3,813.56	1.17	0.24	1.03	8.75	0.03	0.03	1,967.79	0.60	1,806.06
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	1032	0.06	1.45	1.96	0.00	0.00	264.11	0.08	0.03	0.75	1.01	0.00	0.00	136.28	0.04	125.08
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	4	8	232	1032	0.41	1.79	15.12	0.05	0.05	3,444.86	1.06	0.21	0.92	7.80	0.03	0.03	1,777.55	0.54	1,631.44
Rollers >51 and <120	Tandem vibratory roller, 10 ton	1	8	100	1032	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.04	0.95	1.28	0.00	0.00	172.97	0.05	158.75
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	3	8	93	1032	0.22	4.99	6.74	0.01	0.01	915.42	0.28	0.11	2.57	3.48	0.01	0.01	472.36	0.14	433.53
Tractors/Loaders/Backhoes >121 and <175	Front End Loader 5 CY	2	8	150	1032	0.12	0.51	7.24	0.02	0.02	966.93	0.30	0.06	0.26	3.74	0.01	0.01	498.94	0.15	457.93
Bore/Drill Rigs >121 and <175	Truck mounted drill rig	1	8	145	1032	0.08	0.33	4.73	0.01	0.01	644.16	0.20	0.04	0.17	2.44	0.01	0.01	332.39	0.10	305.07
Generator Sets >26 and <50	Generators	2	8	50	1032	0.16	3.59	5.35	0.01	0.01	741.71	0.12	0.08	1.85	2.76	0.01	0.01	382.72	0.06	349.84
Other Construction Equipment >51 and <120	Vibrating screen	5	8	100	1032	0.44	10.15	13.70	0.03	0.03	1,842.19	0.56	0.23	5.24	7.07	0.02	0.02	950.57	0.29	872.44
Other Construction Equipment >121 and <175	Vibratory soil compactor	8	8	131	1032	0.47	2.02	28.72	0.06	0.06	3,849.96	1.18	0.24	1.04	14.82	0.03	0.03	1,986.58	0.61	1,823.30
Off-Highway Trucks >176 and <250	3,000 gal water truck	8	8	230	1032	0.74	3.21	27.13	0.10	0.10	6,101.69	1.87	0.38	1.65	14.00	0.05	0.05	3,148.47	0.96	2,889.69
Pumps >26 and <50	Submersible pump	30	24	50	1032	7.05	161.51	240.80	0.47	0.47	33,376.88	5.81	3.64	83.34	124.25	0.24	0.24	17,222.47	3.00	15,748.89
Total						**14.03**	**210.95**	**507.81**	**1.33**	**1.33**	**87,101.04**	**22.17**	**7.24**	**108.85**	**262.03**	**0.69**	**0.69**	**44,944.14**	**11.44**	**41,190.60**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	37	16.8	1,243	1,032	1,282,982	0.09	0.42	3.28	0.13	0.05	917	0.08	0.04	0.22	1.69	0.07	0.03	473.10	0.04	431.54
Concrete/Asphalt Truck Trips	12	25	600	1,032	619,200	0.30	9.84	1.07	0.19	0.11	2,222	0.01	0.15	5.08	0.55	0.10	0.05	1,146.50	0.00	1,043.40
Total						**0.38**	**10.26**	**4.35**	**0.32**	**0.16**	**3,138.75**	**0.08**	**0.20**	**5.29**	**2.24**	**0.16**	**0.08**	**1,619.59**	**0.04**	**1,474.94**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**14.41**	**221.21**	**512.16**	**1.65**	**1.49**	**90,239.79**	**22.25**								
Maximum Annual Emissions								**7.44**	**114.15**	**264.27**	**0.85**	**0.77**	**46,563.73**	**11.48**	**42,665.54**

Cement Deep Soil Mixing Alternative
NHD2
Mitigated Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <12(	Backhoe Loade	1	8	93	888	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.03	0.74	1.00	0.00	0.00	135.48	0.04	124.35
Cranes >176 and <25(	Crane	1	8	240	888	0.07	0.32	2.70	0.01	0.01	613.00	0.19	0.03	0.14	1.20	0.00	0.00	272.17	0.08	249.80
Rubber Tired Dozers > 176 and <25(	Crawler Doze	4	8	200	888	0.34	1.47	12.42	0.05	0.05	2,830.65	0.87	0.15	0.65	5.51	0.02	0.02	1,256.81	0.39	1,153.51
Off-Highway Trucks >176 and <25(	Dump Truck (12 CY)	4	8	230	888	0.37	1.60	13.56	0.05	0.05	3,050.84	0.93	0.16	0.71	6.02	0.02	0.02	1,354.57	0.42	1,243.24
Scrapers >251 and <50(	Elevating scraper, 23 C.Y	6	8	365	888	1.11	4.82	40.79	0.15	0.15	9,241.40	2.83	0.49	2.14	18.11	0.07	0.07	4,103.18	1.26	3,765.92
Excavators >251 and <50(	Hydraulic Excavator, 396 HF	1	8	396	888	0.16	0.69	5.84	0.02	0.02	1,318.54	0.40	0.07	0.31	2.59	0.01	0.01	585.43	0.18	537.31
Graders >176 and <25(	Motor Grade	4	8	200	888	0.35	1.50	12.73	0.05	0.05	2,914.46	0.89	0.15	0.67	5.65	0.02	0.02	1,294.02	0.40	1,187.66
Rough Terrain Forklifts >51 and <12(	Rough terrain forklif	1	8	75	888	0.06	1.45	1.96	0.00	0.00	264.11	0.08	0.03	0.64	0.87	0.00	0.00	117.27	0.04	107.63
Other Construction Equipment >251 and <50(	Soil compactor, 232 HF	4	8	232	888	0.41	1.79	15.12	0.05	0.05	3,444.86	1.06	0.18	0.79	6.71	0.02	0.02	1,529.52	0.47	1,403.80
Rollers >51 and <12(	Tandem vibratory roller, 10 to	1	8	100	888	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.04	0.82	1.10	0.00	0.00	148.83	0.05	136.60
Tractors/Loaders/Backhoes >51 and <12(	Front End Loader 3 CY	3	8	93	888	0.22	4.99	6.74	0.01	0.01	915.42	0.28	0.10	2.21	2.99	0.01	0.01	406.45	0.12	373.04
Tractors/Loaders/Backhoes >121 and <17!	Front End Loader 5 CY	2	8	150	888	0.12	0.51	7.24	0.02	0.02	966.93	0.30	0.05	0.23	3.22	0.01	0.01	429.32	0.13	394.03
Bore/Drill Rigs >121 and <175	Truck mounted drill ric	1	8	145	888	0.08	0.33	4.73	0.01	0.01	644.16	0.20	0.03	0.15	2.10	0.00	0.00	286.01	0.09	262.50
Generator Sets >26 and <5(	Generators	2	8	50	888	0.16	3.59	5.35	0.01	0.01	741.71	0.12	0.07	1.59	2.38	0.00	0.00	329.32	0.05	301.02
Other Construction Equipment >51 and <12(	Vibrating screen	2	8	100	888	0.18	4.06	5.48	0.01	0.01	736.88	0.23	0.08	1.80	2.43	0.01	0.01	327.17	0.10	300.28
Other Construction Equipment >121 and <17!	Vibratory soil compacto	6	8	131	888	0.35	1.51	21.54	0.05	0.05	2,887.47	0.88	0.16	0.67	9.56	0.02	0.02	1,282.04	0.39	1,176.67
Off-Highway Trucks >176 and <25(	3,000 gal water truck	8	8	230	888	0.74	3.21	27.13	0.10	0.10	6,101.69	1.87	0.33	1.42	12.05	0.04	0.04	2,709.15	0.83	2,486.48
Pumps >26 and <5(	Submersible pump	30	24	50	888	7.05	161.51	240.80	0.47	0.47	33,376.88	5.81	3.13	71.71	106.91	0.21	0.21	14,819.33	2.58	13,551.37
Off-Highway Trucks >251 and <50(	Articulated end dump trucks (for CDSM	6	8	481	888	1.16	5.03	42.55	0.15	0.15	9,698.86	2.97	0.52	2.23	18.89	0.07	0.07	4,306.29	1.32	3,952.34
Pumps >251 and <50(	Cement pump (for CDSM)	2	8	450	888	0.70	3.05	25.84	0.09	0.09	6,675.38	0.25	0.31	1.36	11.47	0.04	0.04	2,963.87	0.11	2,699.91
Bore/Drill Rigs >121 and <175	Drill rig with multiaxis mixing augers (for CDSM	2	8	145	888	0.15	0.66	9.46	0.02	0.02	1,288.32	0.39	0.07	0.30	4.20	0.01	0.01	572.02	0.18	525.00
Tractors/Loaders/Backhoes >121 and <17!	Loader (for CDSM)	2	8	150	888	0.12	0.51	7.24	0.02	0.02	966.93	0.30	0.05	0.23	3.22	0.01	0.01	429.32	0.13	394.03
Tractors/Loaders/Backhoes >121 and <17!	Track mounted backhoe (for CDSM	2	8	150	888	0.12	0.51	7.24	0.02	0.02	966.93	0.30	0.05	0.23	3.22	0.01	0.01	429.32	0.13	394.03
Bore/Drill Rigs >121 and <175	Track mounted drill rig for coring (for CDSM	1	8	145	888	0.08	0.33	4.73	0.01	0.01	644.16	0.20	0.03	0.15	2.10	0.00	0.00	286.01	0.09	262.50
Total						**14.24**	**206.95**	**525.93**	**1.38**	**1.38**	**90,929.96**	**21.54**	**6.32**	**91.89**	**233.51**	**0.61**	**0.61**	**40,372.90**	**9.56**	**36,983.03**

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	37	16.8	1,243	888	1,103,962	0.09	0.42	3.28	0.13	0.05	917	0.08	0.04	0.19	1.46	0.06	0.02	407.08	0.03	371.33
Truck Trips	16 6	0.5	166	48	7,968	0.08	2.72	0.29	0.05	0.03	615	0.00	0.00	0.07	0.01	0.00	0.00	14.75	0.00	13.43
Concrete Truck Trips	2 9	25	1,450	312	452,400	0.72	23.77	2.58	0.46	0.26	5,370	0.02	0.11	3.71	0.40	0.07	0.04	837.65	0.00	762.33
Cement Truck Trips	2 9	71	4,118	48	197,664	2.04	67.51	7.32	1.31	0.73	15,250	0.05	0.05	1.62	0.18	0.03	0.02	365.99	0.00	333.08
Total						**2.92**	**94.43**	**13.47**	**1.95**	**1.07**	**22,150.76**	**0.14**	**0.20**	**5.58**	**2.04**	**0.16**	**0.08**	**1,625.48**	**0.04**	**1,480.16**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round tri

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**17.17**	**301.38**	**539.40**	**3.33**	**2.45**	**113,080.71**	**21.68**								
Maximum Annual Emissions								**6.53**	**97.47**	**235.56**	**0.77**	**0.69**	**41,998.38**	**9.60**	**38,463.19**

Slope Protection
Mitigated Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	CO2	CH4	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes >51 and <120	Backhoe Loader	1	8	93	120	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.00	0.10	0.13	0.00	0.00	18.31	0.01	16.80
Rollers >51 and <120	Vibratory Roller 25 Ton	1	8	100	120	0.08	1.84	2.48	0.01	0.01	335.21	0.10	0.00	0.11	0.15	0.00	0.00	20.11	0.01	18.46
Rubber Tired Dozers > 176 and <250	Crawler Dozer	1	8	200	120	0.08	0.37	3.10	0.01	0.01	707.66	0.22	0.01	0.02	0.19	0.00	0.00	42.46	0.01	38.97
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	4	8	230	120	0.37	1.60	13.56	0.05	0.05	3,050.84	0.93	0.02	0.10	0.81	0.00	0.00	183.05	0.06	168.01
Excavators >251 and <500	Hydraulic Excavator, 396 HP	1	8	396	120	0.16	0.69	5.84	0.02	0.02	1,318.54	0.40	0.01	0.04	0.35	0.00	0.00	79.11	0.02	72.61
Rough Terrain Forklifts >51 and <120	Rough terrain forklift	1	8	75	120	0.06	1.45	1.96	0.00	0.00	264.11	0.08	0.00	0.09	0.12	0.00	0.00	15.85	0.00	14.54
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	1	8	232	120	0.10	0.45	3.78	0.01	0.01	861.22	0.26	0.01	0.03	0.23	0.00	0.00	51.67	0.02	47.43
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	1	8	93	120	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.00	0.10	0.13	0.00	0.00	18.31	0.01	16.80
Tractors/Loaders/Backhoes >121 and <175	Front End Loader 5 CY	1	8	150	120	0.06	0.25	3.62	0.01	0.01	483.47	0.15	0.00	0.02	0.22	0.00	0.00	29.01	0.01	26.62
Generator Sets >26 and <50	Generators	1	8	50	120	0.08	1.79	2.68	0.01	0.01	370.85	0.06	0.00	0.11	0.16	0.00	0.00	22.25	0.00	20.34
Off-Highway Trucks >176 and <250	3,000 gal water truck	2	8	230	120	0.18	0.80	6.78	0.02	0.02	1,525.42	0.47	0.01	0.05	0.41	0.00	0.00	91.53	0.03	84.00
Total						**1.33**	**12.57**	**48.30**	**0.15**	**0.15**	**9,527.61**	**2.86**	**0.08**	**0.75**	**2.90**	**0.01**	**0.01**	**571.66**	**0.17**	**524.59**
										64.10										

On Road Construction Emissions

						Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	30	16.8	1,008	120	120,960	0.07	0.34	2.66	0.10	0.04	743	0.06	0.00	0.02	0.16	0.01	0.00	44.60	0.00	40.69
Concrete/Asphalt Truck Trips	5	25	250	120	30,000	0.12	4.10	0.44	0.08	0.04	926	0.00	0.01	0.25	0.03	0.00	0.00	55.55	0.00	50.55
Total						**0.19**	**4.44**	**3.11**	**0.18**	**0.09**	**1,669.18**	**0.07**	**0.01**	**0.27**	**0.19**	**0.01**	**0.01**	**100.15**	**0.00**	**91.24**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

	Emissions Summary (lbs/day)							Emissions Summary (tons per phase)							
Total	VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**1.52**	**17.01**	**51.40**	**0.34**	**0.24**	**11,196.79**	**2.93**								
Maximum Annual Emissions								**0.09**	**1.02**	**3.08**	**0.02**	**0.01**	**671.81**	**0.18**	**615.83**

Diversion Channel
Mitigated Emissions

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	CO2	CH4	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Other Construction Equipment >26 and <50	Vibrator	2	8	50	96	0.09	2.04	3.04	0.01	0.01	413.34	0.13	0.00	0.10	0.15	0.00	0.00	19.84	0.01	18.21
Graders >121 and <175	Grader	1	8	135	96	0.06	0.25	3.61	0.01	0.01	494.69	0.15	0.00	0.01	0.17	0.00	0.00	23.75	0.01	21.79
Rubber Tired Dozers > 176 and <250	Crawler Dozer	1	8	200	96	0.08	0.37	3.10	0.01	0.01	707.66	0.22	0.00	0.02	0.15	0.00	0.00	33.97	0.01	31.18
Off-Highway Trucks >176 and <250	Dump Truck (12 CY)	5	8	230	96	0.46	2.00	16.96	0.06	0.06	3,813.56	1.17	0.02	0.10	0.81	0.00	0.00	183.05	0.06	168.01
Scrapers >251 and <500	Elevating scraper, 23 C.Y.	1	8	365	96	0.19	0.80	6.80	0.02	0.02	1,540.23	0.47	0.01	0.04	0.33	0.00	0.00	73.93	0.02	67.85
Excavators >251 and <500	Hydraulic Excavator, 396 HP	1	8	396	96	0.16	0.69	5.84	0.02	0.02	1,318.54	0.40	0.01	0.03	0.28	0.00	0.00	63.29	0.02	58.09
Other Construction Equipment >251 and <500	Soil compactor, 232 HP	1	8	232	96	0.10	0.45	3.78	0.01	0.01	861.22	0.26	0.00	0.02	0.18	0.00	0.00	41.34	0.01	37.94
Tractors/Loaders/Backhoes >51 and <120	Front End Loader 3 CY	1	8	93	96	0.07	1.66	2.25	0.00	0.00	305.14	0.09	0.00	0.08	0.11	0.00	0.00	14.65	0.00	13.44
Off-Highway Trucks >176 and <250	3,000 gal water truck	1	8	230	96	0.09	0.40	3.39	0.01	0.01	762.71	0.23	0.00	0.02	0.16	0.00	0.00	36.61	0.01	33.60
Total						**1.31**	**8.67**	**48.76**	**0.16**	**0.16**	**10,217.09**	**3.13**	**0.06**	**0.42**	**2.34**	**0.01**	**0.01**	**490.42**	**0.15**	**450.11**

On Road Construction Emissions

	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	-	16.8	-	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Concrete/Asphalt Truck Trips	-	25	-	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total						**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Concrete and haul trucks assumed to haul material from Keeler at a distance of approximately 25 miles (50 miles round trip).

Total	Emissions Summary (lbs/day) VOC	NO_x	CO	PM10	PM2.5	CO2	CH_4	Emissions Summary (tons per phase) VOC	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**1.31**	**8.67**	**48.76**	**0.16**	**0.16**	**10,217.09**	**3.13**								
Maximum Annual Emissions								**0.06**	**0.42**	**2.34**	**0.01**	**0.01**	**490.42**	**0.15**	**450.11**

Equipment Type	Year	Low HP	High HP	TOG (g/bhp-hr)	ROG (g/bhp-hr)	CO (g/bhp-hr)	NOX (g/bhp-hr)	SO2 (g/bhp-hr)	PM10 (g/bhp-hr)	PM2.5 (g/bhp-hr)	CO2 (g/bhp-hr)	CH4 (g/bhp-hr)	Load Factor
Aerial Lifts	2017	6	15	0.248829	0.2091	3.16913	3.46956	0.0054	0.0789	0.0726	554.2451	0.1698	0.31
Aerial Lifts	2017	16	25	0.248829	0.2091	3.16913	3.46956	0.0054	0.0789	0.0726	554.2451	0.1698	0.31
Aerial Lifts	2017	26	50	0.248829	0.2091	3.16913	3.46956	0.0054	0.0789	0.0726	554.2451	0.1698	0.31
Aerial Lifts	2017	51	120	0.169799	0.1427	3.18429	2.36368	0.0049	0.0834	0.0768	498.3428	0.1527	0.31
Aerial Lifts	2017	251	500	0.292438	0.2457	0.99722	4.6577	0.0049	0.1046	0.0962	498.2798	0.1527	0.31
Aerial Lifts	2017	501	750	32.148	0.239	1.059	2.68	0.005	0.079	0.079	568.299	0.021	0.31
Air Compressors	2017	6	15	2.05	0.786	3.599	4.887	0.008	0.272	0.272	568.299	0.07	0.48
Air Compressors	2017	16	25	4.327	0.83	2.564	4.729	0.007	0.243	0.243	568.299	0.074	0.48
Air Compressors >26 and <50	2017	26	50	11.908	1.481	5.604	4.871	0.007	0.371	0.371	568.299	0.133	0.48
Air Compressors	2017	51	120	11.385	0.671	3.772	4.412	0.006	0.35	0.35	568.299	0.06	0.48
Air Compressors	2017	121	175	15.244	0.477	3.207	3.627	0.006	0.194	0.194	568.299	0.043	0.48
Air Compressors	2017	176	250	16.09	0.339	1.162	3.163	0.006	0.098	0.098	568.299	0.03	0.48
Air Compressors	2017	251	500	26.901	0.321	1.123	2.755	0.005	0.092	0.092	568.299	0.029	0.48
Air Compressors	2017	501	750	41.87	0.323	1.123	2.845	0.005	0.094	0.094	568.299	0.029	0.48
Air Compressors	2017	751	1000	63.572	0.362	1.246	4.583	0.005	0.121	0.121	568.299	0.032	0.48
Bore/Drill Rigs	2017	6	15	0.957137	0.8043	4.65158	5.06335	0.0055	0.3508	0.3227	563.9173	0.1728	0.5
Bore/Drill Rigs	2017	16	25	0.957137	0.8043	4.65158	5.06335	0.0055	0.3508	0.3227	563.9173	0.1728	0.5
Bore/Drill Rigs	2017	26	50	0.957137	0.8043	4.65158	5.06335	0.0055	0.3508	0.3227	563.9173	0.1728	0.5
Bore/Drill Rigs	2017	51	120	0.354597	0.298	3.33142	3.68536	0.0047	0.2111	0.1942	485.322	0.1487	0.5
Bore/Drill Rigs >121 and <175	2017	121	175	0.290928	0.2445	3.0013	2.98245	0.0049	0.1313	0.1208	503.7704	0.1544	0.5
Bore/Drill Rigs	2017	176	250	0.20647	0.1735	1.1021	2.5215	0.0048	0.0725	0.0667	494.1381	0.1514	0.5
Bore/Drill Rigs	2017	251	500	0.197407	0.1659	1.11891	2.36747	0.0048	0.0723	0.0665	489.4612	0.15	0.5
Bore/Drill Rigs	2017	501	750	0.184153	0.1547	1.13653	2.15656	0.0049	0.0715	0.0658	505.1248	0.1548	0.5
Bore/Drill Rigs	2017	751	1000	0.143503	0.1206	0.97127	3.02051	0.0049	0.0599	0.0551	498.1225	0.1526	0.5
Cement and Mortar Mixers	2017	6	15	1.075	0.661	3.469	4.145	0.008	0.165	0.165	568.299	0.059	0.56
Cement and Mortar Mixers	2017	16	25	3.466	0.767	2.466	4.567	0.007	0.216	0.216	568.299	0.069	0.56
Concrete/Industrial Saws	2017	16	25	1.532	0.685	2.34	4.332	0.007	0.161	0.161	568.299	0.061	0.73
Concrete/Industrial Saws >26 and <50	2017	26	50	4.816	1.175	4.894	4.652	0.007	0.313	0.313	568.299	0.106	0.73
Concrete/Industrial Saws	2017	51	120	5.61	0.557	3.595	4.086	0.006	0.294	0.294	568.299	0.05	0.73
Concrete/Industrial Saws	2017	121	175	8.602	0.395	3.073	3.316	0.006	0.165	0.165	568.299	0.035	0.73
Cranes	2017	26	50	2.585562	2.1726	7.40804	6.14479	0.0053	0.6199	0.5703	546.7815	0.1675	0.29
Cranes	2017	51	120	1.304913	1.0965	4.71022	9.15389	0.0048	0.6777	0.6235	495.7534	0.1519	0.29
Cranes	2017	121	175	0.828528	0.6962	3.78744	7.36009	0.0049	0.3974	0.3656	501.093	0.1535	0.29
Cranes >176 and <250	2017	176	250	0.667136	0.5606	2.38452	6.65526	0.0049	0.2967	0.273	499.3721	0.153	0.29
Cranes >251 and <500	2017	251	500	0.488095	0.4101	3.54746	5.23184	0.0049	0.2124	0.1954	498.439	0.1527	0.29
Cranes	2017	501	750	0.34114	0.2867	1.63305	4.1579	0.0049	0.1471	0.1353	497.1865	0.1523	0.29
Cranes	2017	1001	9999	0.181003	0.1521	0.97429	2.32212	0.0049	0.0575	0.0529	498.2798	0.1527	0.29
Crawler Tractors	2017	26	50	2.926516	2.4591	8.00596	6.20834	0.0053	0.7116	0.6547	544.6762	0.1669	0.43
Crawler Tractors	2017	51	120	1.010844	0.8494	4.17611	7.141	0.0049	0.6036	0.5553	503.2791	0.1542	0.43
Crawler Tractors	2017	121	175	0.731209	0.6144	3.48322	6.55188	0.0049	0.3636	0.3345	498.1245	0.1526	0.43
Crawler Tractors	2017	176	250	0.511144	0.4295	1.7418	5.75969	0.0049	0.2199	0.2023	499.832	0.1531	0.43
Crawler Tractors	2017	251	500	0.458057	0.3849	2.6349	5.02932	0.0049	0.1946	0.1791	502.422	0.1539	0.43
Crawler Tractors	2017	501	750	0.386074	0.3244	1.5221	4.36108	0.0049	0.1597	0.1469	499.1046	0.1529	0.43
Crawler Tractors	2017	751	1000	0.578206	0.4859	2.10018	7.53226	0.0049	0.2233	0.2055	501.8777	0.1538	0.43
Crushing/Proc. Equipment	2017	26	50	3.684	1.402	5.623	4.827	0.007	0.354	0.354	568.299	0.126	0.78
Crushing/Proc. Equipment	2017	51	120	3.216	0.647	3.791	4.244	0.006	0.33	0.33	568.299	0.058	0.78
Crushing/Proc. Equipment	2017	121	175	4.681	0.468	3.236	3.45	0.006	0.185	0.185	568.299	0.042	0.78
Crushing/Proc. Equipment	2017	176	250	4.974	0.34	1.16	2.987	0.006	0.094	0.094	568.299	0.03	0.78
Crushing/Proc. Equipment	2017	251	500	7.242	0.324	1.118	2.602	0.005	0.088	0.088	568.299	0.029	0.78
Crushing/Proc. Equipment	2017	501	750	11.359	0.323	1.114	2.664	0.005	0.088	0.088	568.299	0.029	0.78
Crushing/Proc. Equipment	2017	1001	9999	29.544	0.378	1.231	4.423	0.005	0.117	0.117	568.299	0.034	0.78
Dumpers/Tenders	2017	16	25	0.821	0.687	2.34	4.362	0.007	0.171	0.171	568.299	0.062	0.38
Excavators	2017	16	25	0.91741	0.7709	4.88904	4.67818	0.0054	0.3319	0.3053	554.9101	0.17	0.38
Excavators	2017	26	50	0.91741	0.7709	4.88904	4.67818	0.0054	0.3319	0.3053	554.9101	0.17	0.38
Excavators	2017	51	120	0.523542	0.4399	3.63939	4.37952	0.0048	0.3103	0.2855	493.409	0.1512	0.38
Excavators	2017	121	175	0.397029	0.3336	3.15091	3.69967	0.0049	0.182	0.1675	498.5222	0.1527	0.38
Excavators	2017	176	250	0.293543	0.2467	1.24911	3.31872	0.0049	0.1051	0.0967	498.4364	0.1527	0.38
Excavators >251 and <500	2017	251	500	0.237788	0.1998	1.19852	2.50715	0.0049	0.0811	0.0746	496.8098	0.1522	0.38
Excavators	2017	501	750	0.249769	0.2099	1.22803	2.71934	0.0048	0.0899	0.0827	494.5496	0.1515	0.38
Forklifts	2017	26	50	2.026819	1.7031	6.67251	5.45035	0.0054	0.5355	0.4927	554.6769	0.17	0.2
Forklifts	2017	51	120	0.799635	0.6719	3.97881	5.81772	0.0049	0.48	0.4416	497.7245	0.1525	0.2
Forklifts	2017	121	175	0.604568	0.508	3.45188	5.36215	0.0049	0.2937	0.2702	498.3344	0.1527	0.2
Forklifts	2017	176	250	0.589964	0.4957	2.0923	5.75116	0.0049	0.2518	0.2316	499.6213	0.1531	0.2
Forklifts	2017	251	500	0.401897	0.3377	2.50803	3.7797	0.0049	0.1613	0.1484	499.927	0.1532	0.2
Generator Sets	2017	6	15	1.857	0.699	3.599	4.847	0.008	0.25	0.25	568.299	0.063	0.74
Generator Sets	2017	16	25	3.476	0.757	2.564	4.729	0.007	0.233	0.233	568.299	0.068	0.74
Generator Sets >26 and <50	2017	26	50	8.107	1.017	4.292	4.522	0.007	0.285	0.285	568.299	0.091	0.74
Generator Sets	2017	51	120	10.557	0.52	3.442	4.072	0.006	0.274	0.274	568.299	0.046	0.74
Generator Sets	2017	121	175	13.162	0.356	2.931	3.347	0.006	0.151	0.151	568.299	0.032	0.74
Generator Sets	2017	176	250	13.548	0.245	1.063	2.91	0.006	0.081	0.081	568.299	0.022	0.74
Generator Sets	2017	251	500	19.649	0.224	1.048	2.579	0.005	0.076	0.076	568.299	0.02	0.74
Generator Sets	2017	501	750	32.544	0.23	1.048	2.66	0.005	0.077	0.077	568.299	0.02	0.74
Generator Sets	2017	1001	9999	82.27	0.301	1.161	4.293	0.005	0.104	0.104	568.299	0.027	0.74
Graders	2017	26	50	3.5783	3.0068	8.97826	6.423	0.005	0.8434	0.776	520.0747	0.1593	0.41
Graders	2017	51	120	1.385767	1.1644	4.81041	9.19125	0.0048	0.7585	0.6978	495.9186	0.1519	0.41
Graders >121 and <175	2017	121	175	0.901	0.7571	3.84518	7.66265	0.0049	0.4304	0.396	506.7478	0.1553	0.41
Graders >176 and <250	2017	176	250	0.471391	0.3961	1.44905	5.52488	0.0049	0.1802	0.1658	503.8022	0.1544	0.41
Graders	2017	251	500	0.397706	0.3342	1.70747	3.55709	0.0049	0.1393	0.1282	498.5996	0.1528	0.41
Graders	2017	501	750	15.127	0.372	1.323	2.835	0.005	0.1	0.1	568.299	0.033	0.41
Off-Highway Tractors	2017	51	120	0.697857	0.5864	3.90108	5.31726	0.0049	0.4229	0.389	501.2453	0.1536	0.44
Off-Highway Tractors	2017	121	175	0.423504	0.3559	3.2589	4.02594	0.0049	0.2049	0.1885	499.2446	0.153	0.44
Off-Highway Tractors	2017	176	250	0.389773	0.3275	1.403	4.38216	0.0049	0.1511	0.139	496.4983	0.1521	0.44
Off-Highway Tractors >501 and <750	2017	501	750	0.294592	0.2475	1.14456	3.32351	0.0049	0.1118	0.1029	497.6181	0.1525	0.44
Off-Highway Tractors	2017	751	1000	0.140776	0.1183	0.98542	2.33951	0.0049	0.0588	0.0541	498.2798	0.1527	0.44
Off-Highway Trucks	2017	121	175	0.525186	0.4413	3.43636	4.23649	0.0048	0.2334	0.2147	495.924	0.152	0.38
Off-Highway Trucks >176 and <250	2017	176	250	0.496493	0.4172	1.75281	4.36785	0.0048	0.1887	0.1736	494.7935	0.1516	0.38
Off-Highway Trucks >251 and <500	2017	251	500	0.387096	0.3253	1.74773	3.66841	0.0049	0.1362	0.1253	501.4368	0.1536	0.38
Off-Highway Trucks	2017	501	750	0.468516	0.3937	2.35644	4.25656	0.0049	0.1702	0.1566	500.1987	0.1533	0.38
Off-Highway Trucks	2017	751	1000	0.430867	0.362	1.54555	5.65254	0.0049	0.1591	0.1463	497.1154	0.1523	0.38

Equipment Type	Year	Low HP	High HP	TOG (g/bhp-hr)	ROG (g/bhp-hr)	CO (g/bhp-hr)	NOX (g/bhp-hr)	SO2 (g/bhp-hr)	PM10 (g/bhp-hr)	PM2.5 (g/bhp-hr)	CO2 (g/bhp-hr)	CH4 (g/bhp-hr)	Load Factor
Other Construction Equipment	2017	6	15	1.480652	1.2442	5.65509	5.42066	0.0054	0.4774	0.4392	558.0007	0.171	0.42
Other Construction Equipment	2017	16	25	1.480652	1.2442	5.65509	5.42066	0.0054	0.4774	0.4392	558.0007	0.171	0.42
Other Construction Equipment >26 and <5	2017	26	50	1.480652	1.2442	5.65509	5.42066	0.0054	0.4774	0.4392	558.0007	0.171	0.42
Other Construction Equipment >51 and <1	2017	51	120	0.804436	0.6759	3.88542	6.06955	0.0049	0.4749	0.4369	497.3832	0.1524	0.42
Other Construction Equipment >121 and <	2017	121	175	0.595557	0.5004	3.33767	5.49424	0.0048	0.2903	0.2671	495.9311	0.152	0.42
Other Construction Equipment >251 and <	2017	251	500	0.3449	0.2898	2.12114	3.77706	0.0049	0.1382	0.1272	501.1295	0.1535	0.42
Other General Industrial Equipment	2017	6	15	1.605819	1.3493	6.17923	5.27694	0.0054	0.4793	0.4409	555.4081	0.1702	0.34
Other General Industrial Equipment	2017	16	25	1.605819	1.3493	6.17923	5.27694	0.0054	0.4793	0.4409	555.4081	0.1702	0.34
Other General Industrial Equipment	2017	26	50	1.605819	1.3493	6.17923	5.27694	0.0054	0.4793	0.4409	555.4081	0.1702	0.34
Other General Industrial Equipment	2017	51	120	0.785454	0.66	3.99811	5.72138	0.0048	0.4705	0.4328	496.1109	0.152	0.34
Other General Industrial Equipment	2017	121	175	0.520155	0.4371	3.39928	4.53359	0.0049	0.2495	0.2296	498.0641	0.1526	0.34
Other General Industrial Equipment	2017	176	250	0.489435	0.4113	1.78	5.02246	0.0049	0.199	0.183	499.5133	0.153	0.34
Other General Industrial Equipment	2017	251	500	0.397215	0.3338	2.36453	3.9491	0.0049	0.152	0.1399	499.2028	0.153	0.34
Other General Industrial Equipment	2017	501	750	0.260833	0.2192	1.48016	2.59187	0.0049	0.0862	0.0793	499.7673	0.1531	0.34
Other General Industrial Equipment	2017	751	1000	0.29828	0.2506	1.05719	4.7865	0.0049	0.1145	0.1053	498.2798	0.1527	0.34
Other Material Handling Equipment	2017	26	50	1.922269	1.6152	6.63527	5.57447	0.0054	0.5458	0.5022	552.8037	0.1694	0.4
Other Material Handling Equipment	2017	51	120	0.580499	0.4878	3.75788	4.56113	0.0049	0.3412	0.3139	499.8989	0.1532	0.4
Other Material Handling Equipment	2017	121	175	0.508007	0.4269	3.35117	4.48809	0.0049	0.2379	0.2189	498.4537	0.1527	0.4
Other Material Handling Equipment	2017	176	250	0.42771	0.3594	1.51249	4.70454	0.0049	0.163	0.15	497.6755	0.1525	0.4
Other Material Handling Equipment	2017	251	500	0.386945	0.3251	1.86256	3.9709	0.0049	0.1535	0.1413	496.4249	0.1521	0.4
Other Material Handling Equipment	2017	1001	9999	0.201109	0.169	1.01029	3.52015	0.0049	0.0722	0.0665	498.2798	0.1527	0.4
Pavers	2017	16	25	2.059621	1.7307	6.19932	5.43675	0.0054	0.5396	0.4965	556.4528	0.1705	0.42
Pavers	2017	26	50	2.059621	1.7307	6.19932	5.43675	0.0054	0.5396	0.4965	556.4528	0.1705	0.42
Pavers	2017	51	120	0.744072	0.6252	3.75882	5.69243	0.0048	0.4374	0.4024	495.9253	0.152	0.42
Pavers	2017	121	175	0.462819	0.3889	3.06282	4.35312	0.0049	0.2142	0.1971	498.967	0.1529	0.42
Pavers	2017	176	250	0.247933	0.2083	1.03652	3.80866	0.0049	0.0997	0.0918	499.5617	0.1531	0.42
Pavers	2017	251	500	0.199578	0.1677	0.97942	2.48674	0.0048	0.0874	0.0805	491.7843	0.1507	0.42
Paving Equipment	2017	16	25	1.102141	0.9261	4.80403	4.72756	0.0054	0.3592	0.3305	548.6481	0.1681	0.36
Paving Equipment	2017	26	50	1.102141	0.9261	4.80403	4.72756	0.0054	0.3592	0.3305	548.6481	0.1681	0.36
Paving Equipment	2017	51	120	0.670017	0.563	3.74146	5.20745	0.0049	0.3905	0.3593	500.1649	0.1532	0.36
Paving Equipment >121 and <175	2017	121	175	0.407568	0.3425	3.07321	3.89633	0.0049	0.1946	0.1791	497.148	0.1523	0.36
Paving Equipment	2017	176	250	0.342633	0.2879	1.333	4.12109	0.0049	0.1415	0.1302	498.7323	0.1528	0.36
Plate Compactors	2017	6	15	0.79	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.43
Pressure Washers	2017	6	15	1.927	0.699	3.599	4.847	0.008	0.25	0.25	568.299	0.063	0.3
Pressure Washers	2017	16	25	3.053	0.757	2.564	4.729	0.007	0.233	0.233	568.299	0.068	0.3
Pressure Washers	2017	26	50	6.126	0.76	3.632	4.355	0.007	0.24	0.24	568.299	0.068	0.3
Pressure Washers	2017	51	120	6.031	0.444	3.283	3.888	0.006	0.233	0.233	568.3	0.04	0.3
Pressure Washers	2017	121	175	22.349	0.346	2.91	3.349	0.006	0.149	0.149	568.299	0.031	0.3
Pressure Washers	2017	176	250	8.288	0.102	0.986	0.317	0.006	0.009	0.009	568.299	0.009	0.3
Pumps	2017	6	15	1.713	0.786	3.599	4.887	0.008	0.272	0.272	568.299	0.07	0.74
Pumps	2017	16	25	4.745	0.83	2.564	4.729	0.007	0.243	0.243	568.299	0.074	0.74
Pumps >26 and <50	2017	26	50	11.12	1.104	4.514	4.578	0.007	0.301	0.301	568.299	0.099	0.74
Pumps	2017	51	120	12.49	0.546	3.495	4.134	0.006	0.287	0.287	568.299	0.049	0.74
Pumps	2017	121	175	15.466	0.376	2.975	3.4	0.006	0.159	0.159	568.299	0.033	0.74
Pumps	2017	176	250	15.375	0.26	1.08	2.958	0.006	0.084	0.084	568.299	0.023	0.74
Pumps >251 and <500	2017	251	500	24.243	0.239	1.062	2.613	0.005	0.079	0.079	568.299	0.021	0.74
Pumps	2017	501	750	40.958	0.244	1.062	2.695	0.005	0.08	0.08	568.299	0.022	0.74
Pumps	2017	1001	9999	124.604	0.313	1.177	4.343	0.005	0.106	0.106	568.299	0.028	0.74
Rollers	2017	6	15	1.425352	1.1977	5.14727	5.09771	0.0054	0.4357	0.4008	555.0199	0.1701	0.38
Rollers	2017	16	25	1.425352	1.1977	5.14727	5.09771	0.0054	0.4357	0.4008	555.0199	0.1701	0.38
Rollers	2017	26	50	1.425352	1.1977	5.14727	5.09771	0.0054	0.4357	0.4008	555.0199	0.1701	0.38
Rollers >51 and <120	2017	51	120	0.690109	0.5799	3.71315	5.4114	0.0049	0.3921	0.3607	500.1525	0.1532	0.38
Rollers	2017	121	175	0.373471	0.3138	2.98069	3.87384	0.0049	0.1804	0.1659	497.9088	0.1526	0.38
Rollers	2017	176	250	0.326364	0.2742	1.40849	3.92097	0.0049	0.1294	0.1191	499.7021	0.1531	0.38
Rollers	2017	251	500	0.353236	0.2968	2.68487	3.84047	0.0049	0.1501	0.1381	505.8318	0.155	0.38
Rough Terrain Forklifts	2017	26	50	1.318488	1.1079	4.83344	4.90253	0.0054	0.3821	0.3515	554.6234	0.1699	0.4
Rough Terrain Forklifts >51 and <120	2017	51	120	0.322506	0.271	3.31778	3.41759	0.0049	0.1816	0.1671	499.1682	0.1529	0.4
Rough Terrain Forklifts	2017	121	175	0.231401	0.1944	2.86636	2.90167	0.0049	0.1121	0.1031	497.7766	0.1525	0.4
Rough Terrain Forklifts	2017	176	250	0.175965	0.1479	1.02362	2.47389	0.0049	0.0592	0.0544	499.0007	0.1529	0.4
Rough Terrain Forklifts	2017	251	500	0.216551	0.182	0.96636	3.56771	0.0048	0.0792	0.0728	493.3362	0.1512	0.4
Rubber Tired Dozers > 121 and <175	2017	121	175	1.074198	0.9026	4.14895	9.12915	0.0049	0.5248	0.4828	499.4096	0.153	0.4
Rubber Tired Dozers > 176 and <250	2017	176	250	0.840865	0.7066	2.65514	7.67081	0.0049	0.3755	0.3454	501.5475	0.1537	0.4
Rubber Tired Dozers	2017	251	500	0.787455	0.6617	5.52569	7.33345	0.0049	0.3407	0.3134	505.8493	0.155	0.4
Rubber Tired Dozers	2017	501	750	0.625767	0.5258	2.76746	7.17226	0.0049	0.2601	0.2393	499.3665	0.153	0.4
Rubber Tired Dozers	2017	751	1000	9.018	0.602	2.56	6.013	0.005	0.195	0.195	568.299	0.054	0.4
Rubber Tired Loaders	2017	16	25	2.32856	1.9566	7.65953	5.95377	0.0054	0.6328	0.5822	553.5831	0.1696	0.36
Rubber Tired Loaders	2017	26	50	2.32856	1.9566	7.65953	5.95377	0.0054	0.6328	0.5822	553.5831	0.1696	0.36
Rubber Tired Loaders	2017	51	120	0.900842	0.757	4.17083	6.23569	0.0048	0.5296	0.4872	491.8531	0.1507	0.36
Rubber Tired Loaders	2017	121	175	0.620654	0.5215	3.5175	5.19525	0.0049	0.2895	0.2663	497.3533	0.1524	0.36
Rubber Tired Loaders	2017	176	250	0.443532	0.3727	1.4172	4.75473	0.0048	0.162	0.149	495.9499	0.152	0.36
Rubber Tired Loaders	2017	251	500	0.439436	0.3692	2.06046	4.25314	0.0048	0.1603	0.1475	492.2764	0.1508	0.36
Rubber Tired Loaders	2017	501	750	0.436922	0.3671	1.70044	4.05049	0.0047	0.1599	0.1471	484.3661	0.1484	0.36
Rubber Tired Loaders	2017	751	1000	0.493245	0.4145	1.45641	6.55319	0.0049	0.1918	0.1765	496.8966	0.1522	0.36
Scrapers	2017	51	120	0.896722	0.7535	4.20744	7.17946	0.005	0.551	0.5069	511.1123	0.1566	0.48
Scrapers	2017	121	175	0.748819	0.6292	3.70478	6.67066	0.0049	0.3594	0.3306	505.3309	0.1548	0.48
Scrapers	2017	176	250	0.74607	0.6269	2.64676	7.39867	0.0048	0.3327	0.306	494.5231	0.1515	0.48
Scrapers >251 and <500	2017	251	500	0.505877	0.4251	3.33699	5.33951	0.0049	0.2143	0.1971	498.4571	0.1527	0.48
Scrapers	2017	501	750	0.386598	0.3248	2.29479	4.21648	0.0049	0.1558	0.1433	498.6929	0.1528	0.48
Signal Boards	2017	6	15	1.04	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.82
Signal Boards	2017	26	50	10.695	1.158	4.785	4.59	0.007	0.306	0.306	568.299	0.104	0.82
Signal Boards	2017	51	120	11.32	0.553	3.566	4.059	0.006	0.29	0.29	568.299	0.049	0.82
Signal Boards	2017	121	175	15.322	0.388	3.044	3.305	0.006	0.161	0.161	568.299	0.035	0.82
Signal Boards	2017	176	250	17.83	0.33	1.323	3.452	0.007	0.101	0.101	686.695	0.029	0.82
Skid Steer Loaders	2017	16	25	0.676461	0.5684	3.91907	4.11272	0.0054	0.2175	0.2001	556.7144	0.1706	0.37
Skid Steer Loaders	2017	26	50	0.676461	0.5684	3.91907	4.11272	0.0054	0.2175	0.2001	556.7144	0.1706	0.37
Skid Steer Loaders	2017	51	120	0.303772	0.2553	3.31863	3.28618	0.0049	0.1766	0.1625	498.3256	0.1527	0.37

Equipment Type	Year	Low HP	High HP	TOG (g/bhp-hr)	ROG (g/bhp-hr)	CO (g/bhp-hr)	NOX (g/bhp-hr)	SO2 (g/bhp-hr)	PM10 (g/bhp-hr)	PM2.5 (g/bhp-hr)	CO2 (g/bhp-hr)	CH4 (g/bhp-hr)	Load Factor
Surfacing Equipment	2017	26	50	1.10469	0.9282	4.60324	5.0643	0.0055	0.3651	0.3359	564.4772	0.173	0.3
Surfacing Equipment	2017	51	120	0.604716	0.5081	3.55587	4.94212	0.0049	0.3373	0.3103	498.36	0.1527	0.3
Surfacing Equipment	2017	121	175	0.541755	0.4552	3.00273	5.39296	0.0049	0.2638	0.2427	496.2741	0.1521	0.3
Surfacing Equipment	2017	176	250	0.325463	0.2735	1.3431	4.46793	0.0049	0.1291	0.1187	501.8465	0.1538	0.3
Surfacing Equipment	2017	251	500	0.242435	0.2037	1.3962	3.10636	0.0049	0.1026	0.0944	496.885	0.1522	0.3
Surfacing Equipment	2017	501	750	0.190932	0.1604	1.00272	2.76955	0.0049	0.0904	0.0832	499.7117	0.1531	0.3
Sweepers/Scrubbers	2017	6	15	2.037349	1.7119	6.7185	5.62558	0.0054	0.5817	0.5352	554.5133	0.1699	0.46
Sweepers/Scrubbers	2017	16	25	2.037349	1.7119	6.7185	5.62558	0.0054	0.5817	0.5352	554.5133	0.1699	0.46
Sweepers/Scrubbers	2017	26	50	2.037349	1.7119	6.7185	5.62558	0.0054	0.5817	0.5352	554.5133	0.1699	0.46
Sweepers/Scrubbers	2017	51	120	0.857444	0.7205	4.01005	6.0202	0.0049	0.5202	0.4786	500.4555	0.1533	0.46
Sweepers/Scrubbers	2017	121	175	0.845582	0.7105	3.78429	7.42433	0.0049	0.3946	0.363	499.4066	0.153	0.46
Sweepers/Scrubbers	2017	176	250	0.610026	0.5126	2.08973	6.50894	0.0048	0.2642	0.2431	496.2444	0.152	0.46
Tractors/Loaders/Backhoes	2017	16	25	1.421071	1.1941	5.68921	5.10958	0.0053	0.4331	0.3985	544.9286	0.167	0.37
Tractors/Loaders/Backhoes	2017	26	50	1.421071	1.1941	5.68921	5.10958	0.0053	0.4331	0.3985	544.9286	0.167	0.37
Tractors/Loaders/Backhoes >51 and <120	2017	51	120	0.595595	0.5005	3.7818	4.8087	0.0049	0.3616	0.3327	502.7952	0.1541	0.37
Tractors/Loaders/Backhoes >121 and <175	2017	121	175	0.420865	0.3536	3.19961	3.87876	0.0048	0.1973	0.1815	493.912	0.1513	0.37
Tractors/Loaders/Backhoes	2017	176	250	0.346619	0.2913	1.30369	4.04062	0.0049	0.1318	0.1213	496.8449	0.1522	0.37
Tractors/Loaders/Backhoes	2017	251	500	0.323689	0.272	1.73851	3.48988	0.0049	0.122	0.1123	497.1129	0.1523	0.37
Tractors/Loaders/Backhoes	2017	501	750	0.35268	0.2963	1.64567	3.86196	0.0048	0.1394	0.1283	492.9529	0.151	0.37
Trenchers	2017	6	15	1.367315	1.1489	5.19682	5.16614	0.0054	0.4488	0.4129	557.4601	0.1708	0.5
Trenchers	2017	16	25	1.367315	1.1489	5.19682	5.16614	0.0054	0.4488	0.4129	557.4601	0.1708	0.5
Trenchers	2017	26	50	1.367315	1.1489	5.19682	5.16614	0.0054	0.4488	0.4129	557.4601	0.1708	0.5
Trenchers	2017	51	120	0.906302	0.7615	3.96827	6.67876	0.0049	0.5232	0.4813	501.9916	0.1538	0.5
Trenchers	2017	121	175	0.638299	0.5363	3.43391	5.92725	0.0048	0.3003	0.2763	493.7642	0.1513	0.5
Trenchers	2017	176	250	0.577948	0.4856	2.03655	6.19428	0.0049	0.2501	0.2301	499.2281	0.153	0.5
Trenchers	2017	251	500	0.315778	0.2653	1.96603	3.44157	0.0049	0.1289	0.1186	497.0197	0.1523	0.5
Trenchers	2017	501	750	0.135465	0.1138	0.97168	1.42958	0.0049	0.0457	0.0421	501.1831	0.1536	0.5
Welders	2017	6	15	1.973	0.786	3.599	4.887	0.008	0.272	0.272	568.299	0.07	0.45
Welders	2017	16	25	3.785	0.83	2.564	4.729	0.007	0.243	0.243	568.299	0.074	0.45
Welders	2017	26	50	14.392	1.372	5.239	4.768	0.007	0.35	0.35	568.299	0.123	0.45
Welders	2017	51	120	10.06	0.63	3.675	4.328	0.006	0.332	0.332	568.299	0.056	0.45
Welders	2017	121	175	17.561	0.442	3.124	3.562	0.006	0.183	0.183	568.299	0.039	0.45
Welders	2017	176	250	14.942	0.31	1.133	3.105	0.006	0.094	0.094	568.299	0.028	0.45
Welders	2017	251	500	19.705	0.29	1.102	2.713	0.005	0.088	0.088	568.299	0.026	0.45

	Low HP	High HP	ROG (g/bhp-hr)	CO (g/bhp-hr)	NOX (g/bhp-hr)	PM10 (g/bhp-hr)	PM2.5 (g/bhp-hr)
Tier 4	25	49	0.12	4.1	2.75	0.008	0.008
Tier 4	50	74	0.12	3.7	2.74	0.008	0.008
Tier 4	75	119	0.06	3.7	0.26	0.008	0.008
Tier 4	120	174	0.06	3.7	0.26	0.008	0.008
Tier 4	175	299	0.06	2.2	0.26	0.008	0.008
Tier 4	300	599	0.06	2.2	0.26	0.008	0.008
Tier 4	600	750	0.06	2.2	0.26	0.008	0.008
Tier 4	751	2000	0.06	2.6	2.24	0.016	0.016

Great Valley Air Basin 2018 On-Road Emission Factors

VEH	FUEL	MDLYR	SPEED (Miles/hr)	POP (Vehicles)	VMT (Miles/day)	Percent VMT	TRIPS (Trips/day)	ROG_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)	PM10_Total (gms/mile)	PM2_5_Total (gms/mile)	CH4 (gms/mile)	N2O (gms/mile)
LDA	GAS	AllMYr	AllSpeeds	36,884	1,405,274	66.44%	231,517	0.023	0.918	0.104	302.194	0.047	0.019		
LDA	DSL	AllMYr	AllSpeeds	391	15,146	0.72%	2,386	0.033	0.351	0.222	288.299	0.063	0.036		
LDT1	GAS	AllMYr	AllSpeeds	4,575	128,707	6.09%	26,660	0.103	3.507	0.419	363.115	0.049	0.021		
LDT1	DSL	AllMYr	AllSpeeds	9.02720448	155	0.01%	44	0.180	1.256	1.278	385.737	0.179	0.147		
LDT2	GAS	AllMYr	AllSpeeds	15,669	564,983	26.71%	97,612	0.037	1.402	0.218	412.231	0.047	0.019		
LDT2	DSL	AllMYr	AllSpeeds	18.845346	828	0.04%	120	0.024	0.205	0.139	363.377	0.054	0.027		
Total				57,547	2,115,092		358,339								
Average								0.032	1.200	0.155	335.225	0.047	0.020	0.028	0.037

Source: EMFAC 2014

VEH	FUEL	MDLYR	SPEED (Miles/hr)	POP (Vehicles)	VMT (Miles/day)	TRIPS (Trips/day)	ROG_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)	PM10_Total (gms/mile)	PM2_5_Total (gms/mile)	CH4 (gms/mile)	N2O (gms/mile)
T7 tractor	DSL	AllMYr	AllSpeeds	102	12,214	0	0.225	0.808	7.452	1683.253	0.145	0.080	0.0051	0.0048

Source: EMFAC 2014

APPENDIX B
SHORT-TERM DISPERSION MODELING EMISSION RATES

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Short Term LST Modeling **Monday-Saturday 6:30AM - 4:30PM (Hour Ending 7 to Hour Ending 17, 11 hours/day)**

Scenario 1 - Cactus Flats Road Realignment (unmitigated)																				Model Inputs							
Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
CFRR	CFRR001-CFRR294	294	123510.3	106.65	58.74	9.64	5.16	14.79	5.31	4.74	10.05	9.70	5.34	0.88	0.47	1.34	0.48	0.43	0.91	4.155E-03	2.289E-03	8.936E-07	2.009E-04	-	4.924E-07	1.848E-04	-

Scenario 1 - Cactus Flats Road Realignment (mitigated)																				Model Inputs							
Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
CFRR	CFRR001-CFRR294	294	123510.3	17.75	77.35	9.64	0.24	9.88	5.31	0.24	5.55	1.61	7.03	0.88	0.02	0.90	0.48	0.02	0.50	6.916E-04	3.014E-03	8.936E-07	9.484E-06	-	4.924E-07	9.484E-06	-

Scenario 2 - CDSM - LA Aqueduct Realignment, Borrow Site 10 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	91.67	54.51	21.68	4.34	26.02	11.95	4.03	15.98	8.33	4.96	1.97	0.39	2.37	1.09	0.37	1.45	8.268E-03	4.917E-03	4.278E-06	3.914E-04	-	2.357E-06	3.635E-04	-
Borrow Site 10	BR10001-BR10228	228	89887.9	164.57	97.87	0.08	7.79	7.88	0.01	7.24	7.25	14.96	8.90	0.01	0.71	0.72	0.00	0.66	0.66	8.268E-03	4.917E-03	1.074E-08	3.914E-04	-	1.626E-09	3.635E-04	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.73	0.19	22.16	0.03	22.19	1.85	0.02	1.87	0.16	0.02	2.01	0.00	2.02	0.17	0.00	0.17	2.365E-04	2.563E-05	-	-	3.026E-03	-	-	2.543E-04
North Haiwee Road Loop Us	NHRLS	113	-	2.32	0.25	29.60	0.04	29.65	2.47	0.02	2.49	0.21	0.02	2.69	0.00	2.70	0.22	0.00	0.23	2.348E-04	2.546E-05	-	-	3.005E-03	-	-	2.526E-04
North Haiwee Road Loop Us	NHRLN	116	-	2.39	0.26	30.51	0.05	30.55	2.54	0.03	2.57	0.22	0.02	2.77	0.00	2.78	0.23	0.00	0.23	2.358E-04	2.556E-05	-	-	3.017E-03	-	-	2.536E-04

Scenario 2 - CDSM - LA Aqueduct Realignment, Borrow Site 10 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	14.13	57.74	21.68	0.17	21.85	11.95	0.17	12.12	1.28	5.25	1.97	0.02	1.99	1.09	0.02	1.10	1.274E-03	5.208E-03	4.278E-06	1.558E-05	-	2.357E-06	1.558E-05	-
Borrow Site 10	BR10001-BR10228	228	89887.9	25.36	103.66	0.08	0.31	0.39	0.01	0.31	0.32	2.31	9.42	0.01	0.03	0.04	0.00	0.03	0.03	1.274E-03	5.208E-03	1.074E-08	1.558E-05	-	1.626E-09	1.558E-05	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.73	0.19	22.16	0.03	22.19	1.85	0.02	1.87	0.16	0.02	2.01	0.00	2.02	0.17	0.00	0.17	2.365E-04	2.563E-05	-	-	3.026E-03	-	-	0.00
North Haiwee Road Loop Us	NHRLS	113	-	2.32	0.25	29.60	0.04	29.65	2.47	0.02	2.49	0.21	0.02	2.69	0.00	2.70	0.22	0.00	0.23	2.348E-04	2.546E-05	-	-	3.005E-03	-	-	0.00
North Haiwee Road Loop Us	NHRLN	116	-	2.39	0.26	30.51	0.05	30.55	2.54	0.03	2.57	0.22	0.02	2.77	0.00	2.78	0.23	0.00	0.23	2.358E-04	2.556E-05	-	-	3.017E-03	-	-	2.536E-04

Scenario 2 - E&R - LA Aqueduct Realignment, Borrow Site 10 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	91.67	54.51	21.68	4.34	26.02	11.95	4.03	15.98	8.33	4.96	1.97	0.39	2.37	1.09	0.37	1.45	8.268E-03	4.917E-03	4.278E-06	3.914E-04	-	2.357E-06	3.635E-04	-
Borrow Site 10	BR10001-BR10228	228	89887.9	164.57	97.87	0.08	7.79	7.87	0.01	7.24	7.25	14.96	8.90	0.01	0.71	0.72	0.00	0.66	0.66	8.268E-03	4.917E-03	1.066E-08	3.914E-04	-	1.614E-09	3.635E-04	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.24	0.13	15.79	0.02	15.81	1.32	0.01	1.33	0.11	0.01	1.44	0.00	1.44	0.12	0.00	0.12	1.685E-04	1.826E-05	-	-	2.156E-03	-	-	1.812E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.65	0.18	21.09	0.03	21.12	1.76	0.02	1.78	0.15	0.02	1.92	0.00	1.92	0.16	0.00	0.16	1.673E-04	1.814E-05	-	-	2.141E-03	-	-	1.800E-04
North Haiwee Road Loop Us	NHRLN	116	-	1.70	0.18	21.74	0.03	21.77	1.81	0.02	1.83	0.15	0.02	1.98	0.00	1.98	0.16	0.00	0.17	1.680E-04	1.821E-05	-	-	2.150E-03	-	-	1.807E-04

Scenario 2 - E&R - LA Aqueduct Realignment, Borrow Site 10 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	14.13	57.74	21.68	0.17	21.85	11.95	0.17	12.12	1.28	5.25	1.97	0.02	1.99	1.09	0.02	1.10	1.274E-03	5.208E-03	4.278E-06	1.558E-05	-	2.357E-06	1.558E-05	-
Borrow Site 10	BR10001-BR10228	228	89887.9	25.36	103.66	0.08	0.31	0.39	0.01	0.31	0.32	2.31	9.42	0.01	0.03	0.04	0.00	0.03	0.03	1.274E-03	5.208E-03	1.066E-08	1.558E-05	-	1.614E-09	1.558E-05	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.24	0.13	15.79	0.02	15.81	1.32	0.01	1.33	0.11	0.01	1.44	0.00	1.44	0.12	0.00	0.12	1.685E-04	1.826E-05	-	-	2.156E-03	-	-	1.812E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.65	0.18	21.09	0.03	21.12	1.76	0.02	1.78	0.15	0.02	1.92	0.00	1.92	0.16	0.00	0.16	1.673E-04	1.814E-05	-	-	2.141E-03	-	-	1.800E-04
North Haiwee Road Loop Us	NHRLN	116	-	1.70	0.18	21.74	0.03	21.77	1.81	0.02	1.83	0.15	0.02	1.98	0.00	1.98	0.16	0.00	0.17	1.680E-04	1.821E-05	-	-	2.150E-03	-	-	1.807E-04

Scenario 3 - CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Material Processing/Batch Plant, Borrow Site 10 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	256.2336	152.3826	21.67951	12.1309	33.81041	11.94669	11.26551	23.2122	23.294	13.853	1.971	1.103	3.074	1.086	1.024	2.110	2.311E-02	1.374E-02	4.2777E-06	1.094E-03	-	2.35727E-06	1.016E-03	-
NHD2	NHD2001-NHD2599	599	241725.9	687.76	498.85	33.75	33.76	67.50911	18.59	32.41	50.9937	62.524	45.350	3.068	3.069	6.137	1.690	2.946	4.636	1.315E-02	9.539E-03	1.5993E-06	6.455E-04	-	8.80795E-07	6.197E-04	-
Borrow Site 10	BR10001-BR10228	228	89887.9	164.57	97.87	0.08	7.79	7.87538	0.01	7.24	7.25	14.961	8.897	0.008	0.708	0.716	0.001	0.658	0.659	8.268E-03	4.917E-03	1.0738E-08	3.914E-04	-	1.62601E-09	3.635E-04	-
Material Processing and Cor	MAPT001-MAPT141	141	57377.6	137.55	99.77	79.83	6.75	86.57906	10.10	6.48	16.58	12.505	9.070	7.257	0.614	7.871	0.918	0.589	1.507	1.117E-02	8.105E-03	1.5936E-05	5.485E-04	-	2.01567E-06	5.265E-04	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.73	0.19	22.16	0.03	22.19	1.85	0.02	1.87	0.16	0.02	2.01	0.00	2.02	0.17	0.00	0.17	2.365E-04	2.563E-05	-	-	3.026E-03	-	-	2.543E-04
North Haiwee Road Loop Us	NHRLS	113	-	2.32	0.25	29.60	0.04	29.65	2.47	0.02	2.49	0.21	0.02	2.69	0.00	2.70	0.22	0.00	0.23	2.348E-04	2.546E-05	-	-	3.005E-03	-	-	2.526E-04
North Haiwee Road Loop Us	NHRLN	116	-	2.39	0.26	30.51	0.05	30.55	2.54	0.03	2.57	0.22	0.02	2.77	0.00	2.78	0.23	0.00	0.23	2.358E-04	2.556E-05	-	-	3.017E-03	-	-	2.536E-04

Scenario 3 - CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Material Processing/Batch Plant, Borrow Site 10 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	39.49	161.41	21.68	0.48	22.16	11.95	0.48	12.43	3.59	14.67	1.97	0.04	2.01	1.09	0.04	1.13	3.562E-03	1.456E-02	4.278E-06	4.355E-05	-	2.357E-06	4.355E-05	-
NHD2	NHD2001-NHD2599	599	241725.9	206.95	525.93	33.75	1.38	35.13	18.59	1.38	19.97	18.81	47.81	3.07	0.13	3.19	1.69	0.13	1.82	3.957E-03	1.006E-02	1.599E-06	2.635E-05	-	8.808E-07	2.635E-05	-
Borrow Site 10	BR10001-BR10228	228	89887.9	25.36	103.66	0.08	0.31	0.39	0.01	0.31	0.32	2.31	9.42	0.01	0.03	0.04	0.00	0.03	0.03	1.274E-03	5.208E-03	1.074E-08	1.558E-05	-	1.626E-09	1.558E-05	-
Material Processing and Cor	MAPT001-MAPT141	141	57377.6	41.39	105.19	79.83	0.28	80.10	10.10	0.28	10.37	3.76	9.56	7.26	0.03	7.28	0.92	0.03	0.94	3.362E-03	8.545E-03	1.594E-05	2.239E-05	-	2.016E-06	2.239E-05	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.73	0.19	22.16	0.03	22.19	1.85	0.02	1.87	0.16	0.02	2.01	0.00	2.02	0.17	0.00	0.17	2.365E-04	2.563E-05	-	-	3.026E-03	-	-	2.543E-04
North Haiwee Road Loop Us	NHRLS	113	-	2.32	0.25	29.60	0.04	29.65	2.47	0.02	2.49	0.21	0.02	2.69	0.00	2.70	0.22	0.00	0.23	2.348E-04	2.546E-05	-	-	3.005E-03	-	-	2.526E-04
North Haiwee Road Loop Used By 10	NHRLN	116	-	2.39	0.26	30.51	0.05	30.55	2.54	0.03	2.57	0.22	0.02	2.77	0.00	2.78	0.23	0.00	0.23	2.358E-04	2.556E-05	-	-	3.017E-03	-	-	2.536E-04

Scenario 3 - E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	256.23	152.38	21.68	12.13	33.81041	11.95	11.27	23.2122	23.294	13.853	1.971	1.103	3.074	1.086	1.024	2.110	2.311E-02	1.374E-02	4.2777E-06	1.094E-03	-	2.35727E-06	1.016E-03	-
NHD2	NHD2001-NHD2599	599	241725.9	710.15	506.98	43.38	35.49	78.87818	23.90	33.94	57.83281	64.559	46.089	3.944	3.227	7.171	2.172	3.085	5.258	1.358E-02	9.695E-03	2.0558E-06	6.787E-04	-	1.13238E-06	6.489E-04	-
Borrow Site 10	BR10001-BR10228	228	89887.9	164.57	97.87	0.08	7.79	7.874757	0.01	7.24	7.25	14.961	8.897	0.008	0.708	0.716	0.001	0.658	0.659	8.268E-03	4.917E-03	1.0658E-08	3.914E-04	-	1.61399E-09	3.635E-04	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.24	0.13	15.79	0.02	15.81	1.32	0.01	1.33	0.11	0.01	1.44	0.00	1.44	0.12	0.00	0.12	1.685E-04	1.826E-05	-	-	2.156E-03	-	-	1.812E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.65	0.18	21.09	0.03	21.12	1.76	0.02	1.78	0.15	0.02	1.92	0.00	1.92	0.16	0.00	0.16	1.673E-04	1.814E-05	-	-	2.141E-03	-	-	1.800E-04
North Haiwee Road Loop Us	NHRLN	116	-	1.70	0.18	21.74	0.03	21.77	1.81	0.02	1.83	0.15	0.02	1.98	0.00	1.98	0.16	0.00	0.17	1.680E-04	1.821E-05	-	-	2.150E-03	-	-	1.807E-04

Scenario 3 - E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	39.49	161.41	21.68	0.48	22.16	11.95	0.48	12.43	3.59	14.67	1.97	0.04	2.01	1.09	0.04	1.13	3.562E-03	1.456E-02	4.278E-06	4.355E-05	-	2.357E-06	4.355E-05	-
NHD2	NHD2001-NHD2599	599	241725.9	210.95	507.81	43.38	1.33	44.72	23.90	1.33	25.23	19.18	46.16	3.94	0.12	4.07	2.17	0.12	2.29	4.034E-03	9.711E-03	2.056E-06	2.547E-05	-	1.132E-06	2.547E-05	-
Borrow Site 10	BR10001-BR10228	228	89887.9	25.36	103.66	0.08	0.31	0.39	0.01	0.31	0.32	2.31	9.42	0.01	0.03	0.04	0.00	0.03	0.03	1.274E-03	5.208E-03	1.066E-08	1.558E-05	-	1.614E-09	1.558E-05	-
Inner North Haiwee Road Lo	INNHRL	84	-	1.24	0.13	15.79	0.02	15.81	1.32	0.01	1.33	0.11	0.01	1.44	0.00	1.44	0.12	0.00	0.12	1.685E-04	1.826E-05	-	-	2.156E-03	-	-	1.812E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.65	0.18	21.09	0.03	21.12	1.76	0.02	1.78	0.15	0.02	1.92	0.00	1.92	0.16	0.00	0.16	1.673E-04	1.814E-05	-	-	2.141E-03	-	-	1.800E-04
North Haiwee Road Loop Used By 10	NHRLN	116	-	1.70	0.18	21.74	0.03	21.77	1.81	0.02	1.83	0.15	0.02	1.98	0.00	1.98	0.16	0.00	0.17	1.680E-04	1.821E-05	-	-	2.150E-03	-	-	1.807E-04

Scenario 4 - CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Material Processing/Batch Plant (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	256.23	152.38	21.68	12.13	33.81041	11.95	11.27	23.2122	23.294	13.853	1.971	1.103	3.074	1.086	1.024	2.110	2.311E-02	1.374E-02	4.2777E-06	1.094E-03	-	2.35727E-06	1.016E-03	-
NHD2	NHD2001-NHD2599	599	241725.9	687.76	498.85	33.75	33.76	67.50911	18.59	32.41	50.9937	62.524	45.350	3.068	3.069	6.137	1.690	2.946	4.636	1.315E-02	9.539E-03	1.5993E-06	6.455E-04	-	8.80795E-07	6.197E-04	-
Material Processing and Concrete Batch Plant	MAPT001-MAPT141	141	57377.6	137.55	99.77	79.83	6.75	86.57906	10.10	6.48	16.5782	12.505	9.070	7.257	0.614	7.871	0.918	0.589	1.507	1.117E-02	8.105E-03	1.5936E-05	5.485E-04	-	2.01567E-06	5.265E-04	-

Scenario 4 - CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Material Processing/Batch Plant (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	39.49	161.41	21.68	0.48	22.16	11.95	0.48	12.43	3.59	14.67	1.97	0.04	2.01	1.09	0.04	1.13	3.562E-03	1.456E-02	4.278E-06	4.355E-05	-	2.357E-06	4.355E-05	-
NHD2	NHD2001-NHD2599	599	241725.9	206.95	525.93	33.75	1.38	35.13	18.59	1.38	19.97	18.81	47.81	3.07	0.13	3.19	1.69	0.13	1.82	3.957E-03	1.006E-02	1.599E-06	2.635E-05	-	8.808E-07	2.635E-05	-
Material Processing and Concrete Batch Plant	MAPT001-MAPT141	141	57377.6	41.39	105.19	79.83	0.28	80.10	10.10	0.28	10.37	3.76	9.56	7.26	0.03	7.28	0.92	0.03	0.94	3.362E-03	8.545E-03	1.594E-05	2.239E-05	-	2.016E-06	2.239E-05	-

Scenario 4 - E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 15 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	256.23	152.38	21.68	12.13	33.81041	11.95	11.27	23.2122	23.294	13.853	1.971	1.103	3.074	1.086	1.024	2.110	2.311E-02	1.374E-02	4.2777E-06	1.094E-03	-	2.35727E-06	1.016E-03	-
NHD2	NHD2001-NHD2599	599	241725.9	710.15	506.98	43.38	35.49	78.88	23.90	33.94	57.83	64.56	46.09	3.94	3.23	7.17	2.17	3.09	5.26	1.358E-02	9.695E-03	2.056E-06	6.787E-04	1.508E-03	1.132E-06	6.489E-04	1.106E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Co	NHRLCT	48	-	0.56	0.06	7.13	0.01	7.14	0.59	0.01	0.60	0.05	0.01	0.65	0.00	0.65	0.05	0.00	0.05	1.331E-04	1.443E-05	-	2.584E-06	1.703E-03	-	1.435E-06	1.431E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.30	0.14	16.65	0.03	16.68	1.39	0.01	1.40	0.12	0.01	1.51	0.00	1.52	0.13	0.00	0.13	1.321E-04	1.432E-05	-	2.565E-06	1.690E-03	-	1.425E-06	1.421E-04
Loop extending out past the	EXIT	277	-	3.14	0.34	40.08	0.06	40.14	3.34	0.03	3.37	0.29	0.03	3.64	0.01	3.65	0.30	0.00	0.31	1.297E-04	1.406E-05	-	2.518E-06	1.660E-03	-	1.399E-06	1.395E-04
RT 395 from RT 190 intersec	395U	243	-	5.93	0.64	0.75	0.12	0.86	0.18	0.06	0.25	0.54	0.06	0.07	0.01	0.08	0.02	0.01	0.02	2.796E-04	3.031E-05	-	5.428E-06	4.061E-05	-	3.015E-06	1.165E-05
RT 395 from Northern Const	395M	249	-	2.54	0.28	0.32	0.05	0.37	0.08	0.03	0.11	0.23	0.03	0.03	0.00	0.03	0.01	0.00	0.01	1.168E-04	1.266E-05	-	2.267E-06	1.696E-05	-	1.259E-06	4.866E-06
Route 136	R136	850	-	21.20	2.30	2.67	0.41	3.08	0.65	0.23	0.88	1.93	0.21	0.24	0.04	0.28	0.06	0.02	0.08	2.857E-04	3.097E-05	-	5.547E-06	4.150E-05	-	3.081E-06	1.191E-05
Route 190	RT190	1723	-	42.98	4.66	5.41	0.83	6.24	1.33	0.46	1.79	3.91	0.42	0.49	0.08	0.57	0.12	0.04	0.16	2.857E-04	3.097E-05	-	5.546E-06	4.150E-05	-	3.081E-06	1.191E-05
Borrow Site 15 Route	BR15	110	-	3.51	0.38	44.91	0.07	44.98	3.74	0.04	3.78	0.32	0.03	4.08	0.01	4.09	0.34	0.00	0.34	3.660E-04	3.967E-05	-	7.105E-06	4.683E-03	-	3.947E-06	3.936E-04

Scenario 4 - E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
LAAR	LAAR001-LAAR127	127	58050.5	39.49	161.41	21.68	0.48	22.16	11.95	0.48	12.43	3.59	14.67	1.97	0.04	2.01	1.09	0.04	1.13	3.562E-03	1.456E-02	4.278E-06	4.355E-05	1.999E-03	2.357E-06	4.355E-05	1.121E-03
NHD2	NHD2001-NHD2599	599	241725.9	210.95	507.81	43.38	1.33	44.72	23.90	1.33	25.23	19.18	46.16	3.94	0.12	4.07	2.17	0.12	2.29	4.034E-03	9.711E-03	2.056E-06	2.547E-05	8.551E-04	1.132E-06	2.547E-05	4.824E-04
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Co	NHRLCT	48	-	0.56	0.06	7.13	0.01	7.14	0.59	0.01	0.60	0.05	0.01	0.65	0.00	0.65	0.05	0.00	0.05	1.331E-04	1.443E-05	-	0.00	1.703E-03	-	0.00	1.431E-04
North Haiwee Road Loop Us	NHRLS	113	-	1.30	0.14	16.65	0.03	16.68	1.39	0.01	1.40	0.12	0.01	1.51	0.00	1.52	0.13	0.00	0.13	1.321E-04	1.432E-05	-	0.00	1.690E-03	-	0.00	1.421E-04
Loop extending out past the	EXIT	277	-	3.14	0.34	40.08	0.06	40.14	3.34	0.03	3.37	0.29	0.03	3.64	0.01	3.65	0.30	0.00	0.31	1.297E-04	1.406E-05	-	0.00	1.660E-03	-	0.00	1.395E-04
RT 395 from RT 190 intersec	395U	243	-	5.93	0.64	0.75	0.12	0.86	0.18	0.06	0.25	0.54	0.06	0.07	0.01	0.08	0.02	0.01	0.02	2.796E-04	3.031E-05	-	0.00	4.061E-05	-	0.00	1.165E-05
RT 395 from Northern Const	395M	249	-	2.54	0.28	0.32	0.05	0.37	0.08	0.03	0.11	0.23	0.03	0.03	0.00	0.03	0.01	0.00	0.01	1.168E-04	1.266E-05	-	0.00	1.696E-05	-	0.00	4.866E-06
Route 136	R136	850	-	21.20	2.30	2.67	0.41	3.08	0.65	0.23	0.88	1.93	0.21	0.24	0.04	0.28	0.06	0.02	0.08	2.857E-04	3.097E-05	-	0.00	4.150E-05	-	0.00	1.191E-05
Route 190	RT190	1723	-	42.98	4.66	5.41	0.83	6.24	1.33	0.46	1.79	3.91	0.42	0.49	0.08	0.57	0.12	0.04	0.16	2.857E-04	3.097E-05	-	0.00	4.150E-05	-	0.00	1.191E-05
Borrow Site 15 Route	BR15	110	-	3.51	0.38	44.91	0.07	44.98	3.74	0.04	3.78	0.32	0.03	4.08	0.01	4.09	0.34	0.00	0.34	3.660E-04	3.967E-05	-	0.00	4.683E-03	-	0.00	3.936E-04

Scenario 5 - CDSM - New Haiwee Dam 2, Material Processing/Batch Plant, Borrow Site 15 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
NHD2	NHD2001-NHD2599	599	241725.9	687.76	498.85	33.75	33.76	67.51	18.59	32.41	50.99	62.52	45.35	3.07	3.07	6.14	1.69	2.95	4.64	1.315E-02	9.539E-03	1.599E-06	6.455E-04	1.291E-03	8.808E-07	6.197E-04	9.751E-04
Material Processing and Concrete Batch Plant	MAPT001-MAPT141	141	57377.6	137.55	99.77	79.83	6.75	86.58	10.10	6.48	16.58	12.50	9.07	7.26	0.61	7.87	0.92	0.59	1.51	1.117E-02	8.105E-03	1.594E-05	5.485E-04	7.033E-03	2.016E-06	5.265E-04	1.347E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Co	NHRLCT	48	-	0.27	0.03	3.48	0.01	3.49	0.29	0.00	0.29	0.02	0.00	0.32	0.00	0.32	0.03	0.00	0.03	6.507E-05	7.053E-06	-	1.263E-06	8.326E-04	-	7.016E-07	6.998E-05
North Haiwee Road Loop Us	NHRLS	113	-	0.64	0.07	8.14	0.01	8.15	0.68	0.01	0.69	0.06	0.01	0.74	0.00	0.74	0.06	0.00	0.06	6.458E-05	7.000E-06	-	1.254E-06	8.264E-04	-	6.964E-07	6.946E-05
Loop extending out past the	EXIT	277	-	1.53	0.17	19.59	0.03	19.62	1.63	0.02	1.65	0.14	0.02	1.78	0.00	1.78	0.15	0.00	0.15	6.341E-05	6.873E-06	-	1.231E-06	8.114E-04	-	6.838E-07	6.820E-05
RT 395 from RT 190 intersec	395U	243	-	2.90	0.31	4.34	0.06	4.40	0.36	0.03	0.39	0.26	0.03	0.39	0.01	0.40	0.03	0.00	0.04	1.367E-04	1.482E-05	-	2.654E-06	2.073E-04	-	1.474E-06	1.853E-05
RT 395 from Northern Const	395M	249	-	1.24	0.13	1.86	0.02	1.88	0.15	0.01	0.17	0.11	0.01	0.17	0.00	0.17	0.01	0.00	0.02	5.708E-05	6.187E-06	-	1.108E-06	8.657E-05	-	6.156E-07	7.737E-06
Route 136	R136	850	-	10.37	1.12	15.52	0.20	15.72	1.29	0.11	1.40	0.94	0.10	1.41	0.02	1.43	0.12	0.01	0.13	1.397E-04	1.514E-05	-	2.712E-06	2.118E-04	-	1.506E-06	1.893E-05
Route 190	RT190	1723	-	21.01	2.28	31.45	0.41	31.86	2.62	0.23	2.85	1.91	0.21	2.86	0.04	2.90	0.24	0.02	0.26	1.397E-04	1.514E-05	-	2.712E-06	2.118E-04	-	1.506E-06	1.893E-05
Borrow Site 15 Route	BR15	110	-	1.72	0.19	21.95	0.03	21.99	1.83	0.02	1.85	0.16	0.02	2.00	0.00	2.00	0.17	0.00	0.17	1.789E-04	1.939E-05	-	3.474E-06	2.290E-03	-	1.930E-06	1.924E-04

Scenario 5 - CDSM - New Haiwee Dam 2, Material Processing/Batch Plant, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
NHD2	NHD2001-NHD2599	599	241725.9	206.95	525.93	33.75	1.38	35.13	18.59	1.38	19.97	18.81	47.81	3.07	0.13	3.19	1.69	0.13	1.82	3.957E-03	1.006E-02	1.599E-06	2.635E-05	6.718E-04	8.808E-07	2.635E-05	3.818E-04
Material Processing and Concrete Batch Plant	MAPT001-MAPT141	141	57377.6	41.39	105.19	79.83	0.28	80.10	10.10	0.28	10.37	3.76	9.56	7.26	0.03	7.28	0.92	0.03	0.94	3.362E-03	8.545E-03	1.594E-05	2.239E-05	6.507E-03	2.016E-06	2.239E-05	8.426E-04
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Co	NHRLCT	48	-	0.27	0.03	3.48	0.01	3.49	0.29	0.00	0.29	0.02	0.00	0.32	0.00	0.32	0.03	0.00	0.03	6.507E-05	7.053E-06	-	1.263E-06	8.326E-04	-	7.016E-07	6.998E-05
North Haiwee Road Loop Us	NHRLS	113	-	0.64	0.07	8.14	0.01	8.15	0.68	0.01	0.69	0.06	0.01	0.74	0.00	0.74	0.06	0.00	0.06	6.458E-05	7.000E-06	-	1.254E-06	8.264E-04	-	6.964E-07	6.946E-05
Loop extending out past the	EXIT	277	-	1.53	0.17	19.59	0.03	19.62	1.63	0.02	1.65	0.14	0.02	1.78	0.00	1.78	0.15	0.00	0.15	6.341E-05	6.873E-06	-	1.231E-06	8.114E-04	-	6.838E-07	6.820E-05
RT 395 from RT 190 intersec	395U	243	-	2.90	0.31	4.34	0.06	4.40	0.36	0.03	0.39	0.26	0.03	0.39	0.01	0.40	0.03	0.00	0.04	1.367E-04	1.482E-05	-	2.654E-06	2.073E-04	-	1.474E-06	1.853E-05
RT 395 from Northern Const	395M	249	-	1.24	0.13	1.86	0.02	1.88	0.15	0.01	0.17	0.11	0.01	0.17	0.00	0.17	0.01	0.00	0.02	5.708E-05	6.187E-06	-	1.108E-06	8.657E-05	-	6.156E-07	7.737E-06
Route 136	R136	850	-	10.37	1.12	15.52	0.20	15.72	1.29	0.11	1.40	0.94	0.10	1.41	0.02	1.43	0.12	0.01	0.13	1.397E-04	1.514E-05	-	2.712E-06	2.118E-04	-	1.506E-06	1.893E-05
Route 190	RT190	1723	-	21.01	2.28	31.45	0.41	31.86	2.62	0.23	2.85	1.91	0.21	2.86	0.04	2.90	0.24	0.02	0.26	1.397E-04	1.514E-05	-	2.712E-06	2.118E-04	-	1.506E-06	1.893E-05
Borrow Site 15 Route	BR15	110	-	1.72	0.19	21.95	0.03	21.99	1.83	0.02	1.85	0.16	0.02	2.00	0.00	2.00	0.17	0.00	0.17	1.789E-04	1.939E-05	-	3.474E-06	2.290E-03	-	1.930E-06	1.924E-04

Scenario 5 - E&R - New Haiwee Dam 2 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
NHD2	NHD2001-NHD2599	599	241725.9	710.15	506.98	43.38	35.49	78.88	23.90	33.94	57.83	64.56	46.09	3.94	3.23	7.17	2.17	3.09	5.26	1.358E-02	9.695E-03	2.056E-06	6.787E-04	1.508E-03	1.132E-06	6.489E-04	1.106E-03

Scenario 5 - E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
NHD2	NHD2001-NHD2599	599	241725.9	210.95	507.81	43.38	1.33	44.72	23.90	1.33	25.23	19.18	46.16	3.94	0.12	4.07	2.17	0.12	2.29	4.034E-03	9.711E-03	2.056E-06	2.547E-05	8.551E-04	1.132E-06	2.547E-05	4.824E-04

Scenario 6 - Basin (Slope Protection, Notch and Diversion Channel (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
Slope Protection	NHD2001-NHD2599	599	241725.9	68.58	38.39	9.50	3.14	12.64	5.23	2.90	8.13	6.23	3.49	0.86	0.29	1.15	0.48	0.26	0.74	1.311E-03	7.340E-04	4.504E-07	6.003E-05	2.418E-04	2.480E-07	5.548E-05	1.556E-04
Diversion	BASIN001-BASIN011	11	3594.2	79.96	42.66	0.14	3.60	3.75	0.08	3.32	3.39	7.27	3.88	0.01	0.33	0.34	0.01	0.30	0.31	8.326E-02	4.442E-02	4.504E-07	3.753E-03	3.900E-03	2.480E-07	3.453E-03	3.534E-03

Scenario 6 - Basin (Slope Protection, Notch and Diversion Channel (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (lb/day)	CO (lb/day)	PM10 Dust (lb/day)	PM10 Exhaust (lb/day)	PM10 Total (lb/day)	PM2.5 Dust (lb/day)	PM2.5 Exhaust (lb/day)	PM2.5 Total (lb/day)	NOx (lb/hr)	CO (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Dust (lb/hr)	PM2.5 Exhaust (lb/hr)	Total PM2.5 (lb/hr)	NOx (g/s/vol)	CO (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	Total PM2.5 (g/s/vol)
Slope Protection	NHD2001-NHD2599	599	241725.9	12.57	48.30	9.50	0.15	9.66	5.23	0.15	5.39	1.14	4.39	0.86	0.01	0.88	0.48	0.01	0.49	2.404E-04	9.235E-04	4.504E-07	2.918E-06	1.847E-04	2.480E-07	2.918E-06	1.030E-04
Diversion	BASIN001-BASIN011	11	3594.2	8.665578	48.76375	0.14	0.16	0.30	0.08	0.16	0.24	0.79	4.43	0.01	0.01	0.03	0.01	0.01	0.02	9.023E-03	5.078E-02	4.504E-07	1.703E-04	3.175E-04	2.480E-07	1.703E-04	2.514E-04

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APPENDIX C
ANNUAL DISPERSION MODELING
EMISSION RATES

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Annual LST Modeling | **Monday-Saturday 6:30AM - 4:30PM (Hour Ending 7 to Hour Ending 17, 11 hours/day)** | **3432** | **hrs/year**

2017 CDSM - Cactus Flats Road Realignment (unmitigated)														**Model Inputs**							
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	7.92	0.58	0.38	0.96	0.35	4.62	0.34	0.22	0.56	0.20	1.978E-03	3.437E-07	9.418E-05	-		8.665E-05	693.9209	3.401E-03

2017 CDSM - Cactus Flats Road Realignment (mitigated)																					
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	1.07	0.58	0.01	0.59	0.01	0.62	0.34	0.01	0.35	0.01	2.660E-04	3.437E-07	3.648E-06	-		3.648E-06	29.21161	3.401E-03

2017 E&R- Cactus Flats Road Realignment (unmitigated)														**Model Inputs**							
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	7.92	0.58	0.38	0.96	0.35	4.62	0.34	0.22	0.56	0.20	1.978E-03	3.437E-07	9.418E-05	-		8.665E-05	693.9209	3.401E-03

2017 E&R- Cactus Flats Road Realignment (mitigated)																					
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	1.07	0.58	0.01	0.59	0.01	0.62	0.34	0.01	0.35	0.01	2.660E-04	3.437E-07	3.648E-06	-		3.648E-06	29.21161	3.401E-03

2018 CDSM - Cactus Flats Road Realignment, LA Aqueduct Realignment, Borrow Site 10 (unmitigated)																	Model Inputs				
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	7.92	0.58	0.38	0.96	0.35	4.62	0.34	0.22	0.56	0.20	1.978E-03	3.437E-07	9.418E-05	-	2.063E-07	8.665E-05	693.9209	3.401E-03
LAAR	LAAR001-LAAR127	127	58050.5	8.95	1.82	0.43	2.26	0.40	5.22	1.06	0.25	1.31	0.23	5.176E-03	2.303E-06	2.512E-04	-	5.100E-07	2.331E-04	806.49	7.874E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	33.68	0.01	1.63	1.64	1.52	19.63	0.01	0.95	0.96	0.88	1.085E-02	7.434E-09	5.263E-04	-	1.239E-06	4.885E-04	3033.636	4.386E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.13	1.60	0.00	1.60	0.00	0.08	0.93	0.00	0.93	0.00	1.163E-04	-	2.446E-06	1.397E-03	-	1.490E-06	3.408276	1.190E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.18	2.13	0.00	2.14	0.00	0.10	1.24	0.00	1.24	0.00	1.155E-04	-	2.429E-06	1.387E-03	-	1.479E-06	4.553124	8.850E-03
North Haiwee Road Loop Used By 1	NHRLN	116	-	0.18	2.20	0.00	2.20	0.00	0.11	1.28	0.00	1.28	0.00	1.159E-04	-	2.438E-06	1.393E-03	-	1.485E-06	4.692466	8.621E-03

2018 CDSM - Cactus Flats Road Realignment, LA Aqueduct Realignment, Borrow Site 10 (mitigated)																					
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	1.07	0.58	0.015	0.59	0.015	0.62	0.34	0.01	0.35	0.01	2.660E-04	3.437E-07	3.648E-06	-	8.683E-09	1.140E-07	29.21161	3.401E-03
LAAR	LAAR001-LAAR127	127	58050.5	1.19	1.82	0.01	1.84	0.01	0.69	1.06	0.01	1.07	0.01	6.861E-04	2.303E-06	8.389E-06	-	1.835E-08	6.806E-07	29.01921	7.874E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	4.46	0.01	0.05	0.06	0.05	2.60	0.01	0.03	0.04	0.03	1.437E-03	7.434E-09	1.758E-05	-	4.458E-08	7.944E-07	109.1566	4.386E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.13	1.60	0.00	1.60	0.00	0.08	0.93	0.00	0.93	0.00	1.163E-04	-	2.446E-06	1.397E-03	-	1.744E-07	3.408276	1.190E-02
North Haiwee Road Loop Used By 10 and 15	NHRLS	113	-	0.18	2.13	0.00	2.14	0.00	0.10	1.24	0.00	1.24	0.00	1.155E-04	-	2.429E-06	1.387E-03	-	1.288E-07	4.553124	8.850E-03
North Haiwee Road Loop Used By 10	NHRLN	116	-	0.18	2.20	0.00	2.20	0.00	0.11	1.28	0.00	1.28	0.00	1.159E-04	-	2.438E-06	1.393E-03	-	1.259E-07	4.692466	8.621E-03

2018 E&R - Cactus Flats Road Realignment, LA Aqueduct Realignment, Borrow Site 10 (unmitigated)																	Model Inputs				
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	7.92	0.58	0.38	0.96	0.35	4.62	0.34	0.22	0.56	0.20	1.978E-03	3.437E-07	9.418E-05	-	2.063E-07	8.665E-05	693.9209	3.401E-03
LAAR	LAAR001-LAAR127	127	58050.5	8.95	1.82	0.43	2.26	0.40	5.22	1.06	0.25	1.31	0.23	5.176E-03	2.303E-06	2.512E-04	-	5.100E-07	2.331E-04	806.49	7.874E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	30.31	0.01	1.47	1.48	1.37	17.66	0.00	0.86	0.86	0.80	9.761E-03	4.919E-09	4.737E-04	-	1.115E-06	4.396E-04	2730.273	4.386E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.09	1.14	0.00	1.14	0.00	0.06	0.66	0.00	0.66	0.00	8.286E-05	-	1.743E-06	9.954E-04	-	1.061E-06	2.428397	1.190E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.13	1.52	0.00	1.52	0.00	0.07	0.88	0.00	0.89	0.00	8.229E-05	-	1.730E-06	9.884E-04	-	1.054E-06	3.244101	8.850E-03
North Haiwee Road Loop Used By 1	NHRLN	116	-	0.13	1.57	0.00	1.57	0.00	0.08	0.91	0.00	0.91	0.00	8.261E-05	-	1.737E-06	9.923E-04	-	1.058E-06	3.343382	8.621E-03

2018 E&R - Cactus Flats Road Realignment, LA Aqueduct Realignment, Borrow Site 10 (mitigated)																					
Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
CFRR	CFRR001-CFRR294	294	123510.3	1.07	0.58	0.01	0.59	0.01	0.62	0.34	0.01	0.35	0.01	2.660E-04	3.437E-07	3.648E-06	-	8.683E-09	3.648E-06	29.21161	3.401E-03
LAAR	LAAR001-LAAR127	127	58050.5	1.19	1.82	0.01	1.84	0.01	0.69	1.06	0.01	1.07	0.01	6.861E-04	2.303E-06	8.389E-06	-	1.835E-08	8.389E-06	29.01921	7.874E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	4.02	0.01	0.05	0.06	0.05	2.34	0.00	0.03	0.03	0.03	1.294E-03	4.919E-09	1.582E-05	-	4.012E-08	1.582E-05	98.24096	4.386E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.09	1.14	0.00	1.14	0.00	0.06	0.66	0.00	0.66	0.00	8.286E-05	-	1.743E-06	9.954E-04	-	1.061E-06	2.428397	1.190E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.13	1.52	0.00	1.52	0.00	0.07	0.88	0.00	0.89	0.00	8.229E-05	-	1.730E-06	9.884E-04	-	1.054E-06	3.244101	8.850E-03
North Haiwee Road Loop Used By 1	NHRLN	116	-	0.13	1.57	0.00	1.57	0.00	0.08	0.91	0.00	0.91	0.00	8.261E-05	-	1.737E-06	9.923E-04	-	1.058E-06	3.343382	8.621E-03

2019 CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
LAAR	LAAR001-LAAR127	127	58050.5	15.35	3.12	0.74	3.87	0.69	8.94	1.82	0.43	2.25	0.40	8.873E-03	3.949E-06	4.306E-04	-		3.997E-04	1382.554	7.874E-03
NHD2	NHD2001-NHD2599	599	241725.9	3.68	4.05	0.11	4.16	0.11	2.15	2.36	0.06	2.43	0.06	4.515E-04	1.230E-06	1.365E-05	-		1.365E-05	222.7087	1.669E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	16.84	0.01	0.35	0.36	0.33	9.81	0.01	0.20	0.21	0.19	5.423E-03	7.434E-09	1.130E-04	-		1.048E-04	651.113	4.386E-03
Material Processing and Concrete	MAPT001-MAPT141	141	57377.6	0.74	1.92	0.02	1.94	0.02	0.43	1.12	0.01	1.13	0.01	3.836E-04	2.452E-06	1.160E-05	-		1.160E-05	44.54174	7.092E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.07	0.80	0.00	0.80	0.00	0.04	0.46	0.00	0.47	0.00	5.815E-05	-	-	6.985E-04	-	7.448E-07	1.704138	1.190E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.09	1.07	0.00	1.07	0.00	0.05	0.62	0.00	0.62	0.00	5.775E-05	-	-	6.936E-04	-	7.396E-07	2.276562	8.850E-03
North Haiwee Road Loop Used By 1	NHRLN	116	-	0.09	1.10	0.00	1.10	0.00	0.05	0.64	0.00	0.64	0.00	5.797E-05	-	-	6.964E-04	-	7.426E-07	2.346233	8.621E-03

2019 CDSM - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
LAAR	LAAR001-LAAR127	127	58050.5	2.03	3.12	0.02	3.15	0.02	1.19	1.82	0.01	1.83	0.01	1.176E-03	3.949E-06	1.438E-05	-		1.438E-05	49.74722	7.874E-03
NHD2	NHD2001-NHD2599	599	241725.9	0.37	4.05	0.01	4.06	0.01	0.21	2.36	0.01	2.37	0.01	4.492E-05	1.230E-06	1.382E-06	-		1.382E-06	22.55278	1.669E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	2.23	0.01	0.03	0.04	0.03	1.30	0.01	0.02	0.02	0.02	7.187E-04	7.434E-09	8.788E-06	-		8.788E-06	54.57831	4.386E-03
Material Processing and Concrete E	MAPT001-MAPT141	141	57377.6	0.07	1.92	0.00	1.94	0.00	0.04	1.12	0.00	1.13	0.00	3.817E-05	2.452E-06	1.174E-06	-		1.174E-06	4.510556	7.092E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.07	0.80	0.00	0.80	0.00	0.04	0.46	0.00	0.47	0.00	5.815E-05	-	-	6.985E-04	-	7.448E-07	1.704138	1.190E-02
North Haiwee Road Loop Used By 10 and 15	NHRLS	113	-	0.09	1.07	0.00	1.07	0.00	0.05	0.62	0.00	0.62	0.00	5.775E-05	-	-	6.936E-04	-	7.396E-07	2.276562	8.850E-03
North Haiwee Road Loop Used By 10	NHRLN	116	-	0.09	1.10	0.00	1.10	0.00	0.05	0.64	0.00	0.64	0.00	5.797E-05	-	-	6.964E-04	-	7.426E-07	2.346233	8.621E-03

2019 E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10, Borrow Site 15 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
LAAR	LAAR001-LAAR127	127	58050.5	15.35	3.12	0.74	3.87	0.69	8.94	1.82	0.43	2.25	0.40	8.873E-03	3.949E-06	4.306E-04	-		3.997E-04	1382.554	7.874E-03
NHD2	NHD2001-NHD2599	599	241725.9	95.70	5.21	4.98	10.18	4.75	55.77	3.03	2.90	5.94	2.77	1.173E-02	1.581E-06	6.103E-04	-		5.827E-04	9507.205	1.669E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	20.21	0.00	0.98	0.98	0.91	11.78	0.00	0.57	0.57	0.53	6.507E-03	3.280E-09	3.158E-04	-	7.434E-07	2.931E-04	1820.182	4.386E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borrow Site 15 Route	BR15	110	-	0.13	1.62	0.00	1.62	0.00	0.08	0.94	0.00	0.94	0.00	9.000E-05	-	1.893E-06	1.081E-03	-	1.153E-06	3.453763	9.091E-03
Route 136	R136	850	-	0.81	0.10	0.02	0.11	0.01	0.47	0.06	0.01	0.07	0.01	7.025E-05	-	1.477E-06	9.775E-06	-	8.998E-07	20.83375	1.176E-03
Route 190	RT190	1723	-	1.65	0.19	0.03	0.23	0.02	0.96	0.11	0.02	0.13	0.01	7.025E-05	-	1.477E-06	9.774E-06	-	8.998E-07	42.22949	5.804E-04
RT 395 from RT 190 intersection	395U	243	-	0.23	0.03	0.00	0.03	0.00	0.13	0.02	0.00	0.02	0.00	6.875E-05	-	1.446E-06	9.565E-06	-	8.806E-07	5.828405	4.115E-03
RT 395 from Northern	395M	207	-	0.10	0.01	0.00	0.01	0.00	0.06	0.01	0.00	0.01	0.00	3.454E-05	-	7.262E-07	4.805E-06	-	4.423E-07	2.494104	4.831E-03
Loop extending out past the	EXIT	272	-	0.12	1.44	0.00	1.45	0.00	0.07	0.84	0.00	0.84	0.00	3.248E-05	-	6.830E-07	3.901E-04	-	4.160E-07	3.082134	3.676E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.06	0.76	0.00	0.76	0.00	0.04	0.44	0.00	0.44	0.00	5.524E-05	-	1.162E-06	6.636E-04	-	7.076E-07	1.618931	1.190E-02
North Haiwee Road Loop Used By 10	NHRLN	116	-	0.09	1.04	0.00	1.05	0.00	0.05	0.61	0.00	0.61	0.00	5.508E-05	-	1.158E-06	6.616E-04	-	7.054E-07	2.228921	8.621E-03
North Haiwee Road Loop Connector to 395	NHRCT	48	-	0.02	0.26	0.00	0.26	0.00	0.01	0.15	0.00	0.15	0.00	3.273E-05	-	6.882E-07	3.931E-04	-	4.192E-07	0.548029	2.083E-02
North Haiwee Road Loop Used By 10	NHRLS	113	-	0.13	1.61	0.00	1.61	0.00	0.08	0.94	0.00	0.94	0.00	8.734E-05	-	1.837E-06	1.049E-03	-	1.119E-06	3.4433	8.850E-03

2019 E&R - LA Aqueduct Realignment, New Haiwee Dam 2, Borrow Site 10, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m^2)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m^2)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
LAAR	LAAR001-LAAR127	127	58050.5	2.03	3.12	0.02	3.15	0.02	1.19	1.82	0.01	1.83	0.01	1.176E-03	3.949E-06	1.438E-05	-		1.438E-05	49.74722	7.874E-03
NHD2	NHD2001-NHD2599	599	241725.9	25.31	5.21	0.16	5.37	0.16	14.75	3.03	0.09	3.13	0.09	3.103E-03	1.581E-06	1.959E-05	-		1.959E-05	319.6338	1.669E-03
Borrow Site 10	BR10001-BR10228	228	89887.9	2.68	0.00	0.03	0.04	0.03	1.56	0.00	0.02	0.02	0.02	8.625E-04	3.280E-09	1.055E-05	-	2.675E-08	1.055E-05	65.49397	4.386E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Borrow Site 15 Route	BR15	110	-	0.13	1.62	0.00	1.62	0.00	0.08	0.94	0.00	0.94	0.00	9.000E-05	-	1.893E-06	1.081E-03	-	1.153E-06	3.453763	9.091E-03
Route 136	R136	850	-	0.81	0.10	0.02	0.11	0.01	0.47	0.06	0.01	0.07	0.01	7.025E-05	-	1.477E-06	9.775E-06	-	8.998E-07	20.83375	1.176E-03
Route 190	RT190	1723	-	1.65	0.19	0.03	0.23	0.02	0.96	0.11	0.02	0.13	0.01	7.025E-05	-	1.477E-06	9.774E-06	-	8.998E-07	42.22949	5.804E-04
RT 395 from RT 190 intersection to	395U	243	-	0.23	0.03	0.00	0.03	0.00	0.13	0.02	0.00	0.02	0.00	6.875E-05	-	1.446E-06	9.565E-06	-	8.806E-07	5.828405	4.115E-03
RT 395 from Northern Construction	395M	207	-	0.10	0.01	0.00	0.01	0.00	0.06	0.01	0.00	0.01	0.00	3.454E-05	-	7.262E-07	4.805E-06	-	4.423E-07	2.494104	4.831E-03
Loop extending out past the Ranch	EXIT	272	-	0.12	1.44	0.00	1.45	0.00	0.07	0.84	0.00	0.84	0.00	3.248E-05	-	6.830E-07	3.901E-04	-	4.160E-07	3.082134	3.676E-03
Inner North Haiwee Road Loop	INNHRL	84	-	0.06	0.76	0.00	0.76	0.00	0.04	0.44	0.00	0.44	0.00	5.524E-05	-	1.162E-06	6.636E-04	-	7.076E-07	1.618931	1.190E-02
Inner North Haiwee Road Loop	INNHRL	85	-	0.09	1.04	0.00	1.05	0.00	0.05	0.61	0.00	0.61	0.00	7.516E-05	-	1.581E-06	9.028E-04	-	9.627E-07	2.228921	1.176E-02
North Haiwee Road Loop Connector to 395	NHRCT	48	-	0.02	0.26	0.00	0.26	0.00	0.01	0.15	0.00	0.15	0.00	3.273E-05	-	6.882E-07	3.931E-04	-	4.192E-07	0.548029	2.083E-02
North Haiwee Road Loop Used By 10	NHRLS	113	-	0.13	1.61	0.00	1.61	0.00	0.08	0.94	0.00	0.94	0.00	8.734E-05	-	1.837E-06	1.049E-03	-	1.119E-06	3.4433	8.850E-03

2020 CDSM - New Haiwee Dam 2, LAAR, Borrow Site 15 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	4.42	4.86	0.13	4.99	0.13	2.58	2.83	0.08	2.91	0.08	5.418E-04	1.476E-06	1.638E-05	-		1.638E-05	267.2504	1.669E-03
LAAR	LAAR001-LAAR127	127	58050.5	10.73	0.78	0.52	1.30	0.48	6.25	0.45	0.30	0.76	0.28	6.201E-03	9.872E-07	3.009E-04	-		2.793E-04	966.1551	7.874E-03
Material Processing and Concrete E	MAPT001-MAPT141	141	57377.6	0.88	1.92	0.03	1.94	0.03	0.52	1.12	0.02	1.13	0.02	4.603E-04	2.452E-06	1.392E-05	-		1.392E-05	53.45009	7.092E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.01	0.13	0.00	0.13	0.00	0.01	0.07	0.00	0.07	0.00	1.600E-05	-	3.364E-07	1.922E-04	-	2.049E-07	0.267925	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.02	0.29	0.00	0.29	0.00	0.01	0.17	0.00	0.17	0.00	1.588E-05	-	3.339E-07	1.908E-04	-	2.034E-07	0.626055	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.06	0.71	0.00	0.71	0.00	0.03	0.41	0.00	0.41	0.00	1.559E-05	-	3.279E-07	1.873E-04	-	1.997E-07	1.506821	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.11	0.0131	0.00	0.02	0.00	0.06	0.01	0.00	0.01	0.00	3.361E-05	-	7.068E-07	4.676E-06	-	4.305E-07	2.849442	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.05	0.0056	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	1.404E-05	-	2.952E-07	1.953E-06	-	1.798E-07	1.21934	4.016E-03
Route 136	R136	850	-	0.40	0.0470	0.01	0.06	0.01	0.23	0.03	0.00	0.03	0.00	3.435E-05	-	7.223E-07	4.779E-06	-	4.399E-07	10.18539	1.176E-03
Route 190	RT190	1723	-	0.81	0.0952	0.02	0.11	0.01	0.47	0.06	0.01	0.07	0.01	3.435E-05	-	7.222E-07	4.779E-06	-	4.399E-07	20.64553	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.07	0.79	0.00	0.79	0.00	0.04	0.46	0.00	0.46	0.00	4.400E-05	-	9.252E-07	5.285E-04	-	5.635E-07	1.688506	9.091E-03

2020 CDSM - New Haiwee Dam 2, LAAR, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m^2)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust	PM10 Total	PM2.5 Exhaust	NOx (lb/hr)	PM10 Dust	PM10 Exhaust	Total PM10	PM2.5 Exhaust	NOx (g/s/vol)	PM10 Dust ($g/s/m^2$)	PM10 Exhaust	Total PM10 (g/s/vol)	PM2.5 Dust ($g/s/m^2$)	PM2.5 Exhaust	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	0.44	4.86	0.01	4.87	0.01	0.26	2.83	0.01	2.84	0.01	5.391E-05	1.476E-06	1.659E-06	-		1.659E-06	27.06333	1.669E-03
LAAR	LAAR001-LAAR127	127	58050.5	1.42	0.78	0.02	0.80	0.02	0.83	0.45	0.01	0.46	0.01	8.219E-04	9.872E-07	1.005E-05	-		1.005E-05	34.7643	7.874E-03
Material Processing and Concrete E	MAPT001-MAPT141	141	57377.6	0.09	1.92	0.00	1.94	0.00	0.05	1.12	0.00	1.13	0.00	4.580E-05	2.452E-06	1.409E-06	-		1.409E-06	5.412667	7.092E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.01	0.13	0.00	0.13	0.00	0.01	0.07	0.00	0.07	0.00	1.600E-05	-	3.364E-07	1.922E-04	-	2.049E-07	0.267925	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.02	0.29	0.00	0.29	0.00	0.01	0.17	0.00	0.17	0.00	1.588E-05	-	3.339E-07	1.908E-04	-	2.034E-07	0.626055	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.06	0.71	0.00	0.71	0.00	0.03	0.41	0.00	0.41	0.00	1.559E-05	-	3.279E-07	1.873E-04	-	1.997E-07	1.506821	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.11	0.01	0.00	0.02	0.00	0.06	0.01	0.00	0.01	0.00	3.361E-05	-	7.068E-07	4.676E-06	-	4.305E-07	2.849442	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.05	0.01	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	1.404E-05	-	2.952E-07	1.953E-06	-	1.798E-07	1.21934	4.016E-03
Route 136	R136	850	-	0.40	0.05	0.01	0.06	0.01	0.23	0.03	0.00	0.03	0.00	3.435E-05	-	7.223E-07	4.779E-06	-	4.399E-07	10.18539	1.176E-03
Route 190	RT190	1723	-	0.81	0.10	0.02	0.11	0.01	0.47	0.06	0.01	0.07	0.01	3.435E-05	-	7.222E-07	4.779E-06	-	4.399E-07	20.64553	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.07	0.79	0.00	0.79	0.00	0.04	0.46	0.00	0.46	0.00	4.400E-05	-	9.252E-07	5.285E-04	-	5.635E-07	1.688506	9.091E-03

2020 E&R- New Haiwee Dam 2, LAAR, Borrow Site 15(unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust	PM10 Total	PM2.5 Exhaust	NOx (lb/hr)	PM10 Dust	PM10 Exhaust	Total PM10	PM2.5 Exhaust	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	114.84	6.25	5.97	12.22	5.70	66.92	3.64	3.48	7.12	3.32	1.408E-02	1.898E-06	7.324E-04	-		6.992E-04	11408.65	1.669E-03
LAAR	LAAR001-LAAR127	127	58050.5	10.73	0.78	0.52	1.30	0.48	6.25	0.45	0.30	0.76	0.28	6.201E-03	9.872E-07	3.009E-04	-		2.793E-04	966.1551	7.874E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.04	0.51	0.00	0.51	0.00	0.02	0.30	0.00	0.30	0.00	6.545E-05	-	1.376E-06	7.862E-04	-	8.383E-07	1.096058	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.10	1.20	0.00	1.20	0.00	0.06	0.70	0.00	0.70	0.00	6.497E-05	-	1.366E-06	7.804E-04	-	8.321E-07	2.561132	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.24	2.89	0.01	2.89	0.00	0.14	1.68	0.00	1.68	0.00	6.379E-05	-	1.341E-06	7.662E-04	-	8.170E-07	6.164267	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.46	0.0537	0.01	0.06	0.01	0.27	0.03	0.01	0.04	0.00	1.375E-04	-	2.891E-06	1.913E-05	-	1.761E-06	11.65681	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.19	0.0230	0.00	0.03	0.00	0.11	0.01	0.00	0.02	0.00	5.742E-05	-	1.207E-06	7.989E-06	-	7.355E-07	4.988208	4.016E-03
Route 136	R136	850	-	1.63	0.1921	0.03	0.23	0.02	0.95	0.11	0.02	0.13	0.01	1.405E-04	-	2.955E-06	1.955E-05	-	1.800E-06	41.6675	1.176E-03
Route 190	RT190	1723	-	3.30	0.3894	0.07	0.46	0.04	1.92	0.23	0.04	0.27	0.02	1.405E-04	-	2.955E-06	1.955E-05	-	1.800E-06	84.45898	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.27	3.23	0.01	3.24	0.00	0.16	1.88	0.00	1.89	0.00	1.800E-04	-	3.785E-06	2.162E-03	-	2.305E-06	6.907525	9.091E-03

2020 E&R - New Haiwee Dam 2, LAAR, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust	PM10 Total	PM2.5 Exhaust	NOx (lb/hr)	PM10 Dust	PM10 Exhaust	Total PM10	PM2.5 Exhaust	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	30.38	6.25	0.19	6.44	0.19	17.70	3.64	0.11	3.75	0.11	3.724E-03	1.898E-06	2.351E-05	-		2.351E-05	383.5606	1.669E-03
LAAR	LAAR001-LAAR127	127	58050.5	2.91	0.78	0.04	0.82	0.04	1.70	0.45	0.02	0.48	0.02	1.682E-03	9.872E-07	2.057E-05	-		2.057E-05	71.14554	7.874E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.04	0.51	0.00	0.51	0.00	0.02	0.30	0.00	0.30	0.00	6.545E-05	-	1.376E-06	7.862E-04	-	8.383E-07	1.096058	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.10	1.20	0.00	1.20	0.00	0.06	0.70	0.00	0.70	0.00	6.497E-05	-	1.366E-06	7.804E-04	-	8.321E-07	2.561132	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.24	2.89	0.01	2.89	0.00	0.14	1.68	0.00	1.68	0.00	6.379E-05	-	1.341E-06	7.662E-04	-	8.170E-07	6.164267	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.46	0.05	0.01	0.06	0.01	0.27	0.03	0.01	0.04	0.00	1.375E-04	-	2.891E-06	1.913E-05	-	1.761E-06	11.65681	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.19	0.02	0.00	0.03	0.00	0.11	0.01	0.00	0.02	0.00	5.742E-05	-	1.207E-06	7.989E-06	-	7.355E-07	4.988208	4.016E-03
Route 136	R136	850	-	1.63	0.19	0.03	0.23	0.02	0.95	0.11	0.02	0.13	0.01	1.405E-04	-	2.955E-06	1.955E-05	-	1.800E-06	41.6675	1.176E-03
Route 190	RT190	1723	-	3.30	0.39	0.07	0.46	0.04	1.92	0.226925	0.040404	0.27	0.02	1.405E-04	-	2.955E-06	1.955E-05	-	1.800E-06	84.45898	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.27	3.23	0.01	3.24	0.00	0.16	1.884244	0.003304	1.89	0.00	1.800E-04	-	3.785E-06	2.162E-03	-	2.305E-06	6.907525	9.091E-03

2021 CDSM - New Haiwee Dam 2, Borrow Site 15 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust	PM10 Total	PM2.5 Exhaust	NOx (lb/hr)	PM10 Dust	PM10 Exhaust	Total PM10	PM2.5 Exhaust	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	4.42	4.86	0.13	4.99	0.13	2.58	2.83	0.08	2.91	0.08	5.418E-04	1.476E-06	1.638E-05	-		1.638E-05	267.2504	1.669E-03
Material Processing and Concrete E	MAPT001-MAPT141	141	57377.6	0.88	1.92	0.03	1.94	0.03	0.52	1.12	0.02	1.13	0.02	4.603E-04	2.452E-06	1.392E-05	-		1.392E-05	53.45009	7.092E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.02	0.25	0.00	0.25	0.00	0.01	0.15	0.00	0.15	0.00	3.200E-05	-	6.729E-07	3.844E-04	-	4.098E-07	0.535851	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.05	0.59	0.00	0.59	0.00	0.03	0.34	0.00	0.34	0.00	3.176E-05	-	6.679E-07	3.815E-04	-	4.068E-07	1.252109	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.12	1.41	0.00	1.41	0.00	0.07	0.82	0.00	0.82	0.00	3.118E-05	-	6.558E-07	3.746E-04	-	3.994E-07	3.013642	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.22	0.0263	0.00	0.03	0.00	0.13	0.02	0.00	0.02	0.00	6.722E-05	-	1.414E-06	9.353E-06	-	8.610E-07	5.698885	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.10	0.0112	0.00	0.01	0.00	0.06	0.01	0.00	0.01	0.00	2.807E-05	-	5.903E-07	3.906E-06	-	3.596E-07	2.438679	4.016E-03
Route 136	R136	850	-	0.80	0.0939	0.02	0.11	0.01	0.46	0.05	0.01	0.06	0.01	6.869E-05	-	1.445E-06	9.558E-06	-	8.798E-07	20.37078	1.176E-03
Route 190	RT190	1723	-	1.61	0.1904	0.03	0.22	0.02	0.94	0.11	0.02	0.13	0.01	6.869E-05	-	1.444E-06	9.557E-06	-	8.798E-07	41.29106	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.13	1.58	0.00	1.58	0.00	0.08	0.92	0.00	0.92	0.00	8.800E-05	-	1.850E-06	1.057E-03	-	1.127E-06	3.377012	9.091E-03

2021 CDSM - New Haiwee Dam 2, Borrow Site 15 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	0.44	4.86	0.01	4.87	0.01	0.26	2.83	0.01	2.84	0.01	5.391E-05	1.476E-06	1.659E-06	-		1.659E-06	27.06333	1.669E-03
Material Processing and Concrete E	MAPT001-MAPT141	141	57377.6	0.09	1.92	0.00	1.94	0.00	0.05	1.12	0.00	1.13	0.00	4.580E-05	2.452E-06	1.409E-06	-		1.409E-06	5.412667	7.092E-03
Borrow Site 15	No equipment added for project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Haiwee Road Loop Connecto	NHRLCT	48	-	0.02	0.25	0.00	0.25	0.00	0.01	0.15	0.00	0.15	0.00	3.200E-05	-	6.729E-07	3.844E-04	-	4.098E-07	0.535851	2.083E-02
North Haiwee Road Loop Used By 1	NHRLS	113	-	0.05	0.59	0.00	0.59	0.00	0.03	0.34	0.00	0.34	0.00	3.176E-05	-	6.679E-07	3.815E-04	-	4.068E-07	1.252109	8.850E-03
Loop extending out past the Ranch	EXIT	277	-	0.12	1.41	0.00	1.41	0.00	0.07	0.82	0.00	0.82	0.00	3.118E-05	-	6.558E-07	3.746E-04	-	3.994E-07	3.013642	3.610E-03
RT 395 from RT 190 intersection to construction site exit	395U	243	-	0.22	0.03	0.00	0.03	0.00	0.13	0.02	0.00	0.02	0.00	6.722E-05	-	1.414E-06	9.353E-06	-	8.610E-07	5.698885	4.115E-03
RT 395 from Northern Construction Site Exit to 395I	395M	249	-	0.10	0.01	0.00	0.01	0.00	0.06	0.01	0.00	0.01	0.00	2.807E-05	-	5.903E-07	3.906E-06	-	3.596E-07	2.438679	4.016E-03
Route 136	R136	850	-	0.80	0.09	0.02	0.11	0.01	0.46	0.05	0.01	0.06	0.01	6.869E-05	-	1.445E-06	9.558E-06	-	8.798E-07	20.37078	1.176E-03
Route 190	RT190	1723	-	1.61	0.19	0.03	0.22	0.02	0.94	0.11	0.02	0.13	0.01	6.869E-05	-	1.444E-06	9.557E-06	-	8.798E-07	41.29106	5.804E-04
Borrow Site 15 Route	BR15	110	-	0.13	1.58	0.00	1.58	0.00	0.08	0.92	0.00	0.92	0.00	8.800E-05	-	1.850E-06	1.057E-03	-	1.127E-06	3.377012	9.091E-03

2021 E&R - New Haiwee Dam 2 (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	114.84	6.25	5.97	12.22	5.70	66.92	3.64	3.48	7.12	3.32	1.408E-02	1.898E-06	7.324E-04	-		6.992E-04	11408.65	1.669E-03

2021 E&R - New Haiwee Dam 2 (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2	NHD2001-NHD2599	599	241725.9	30.38	6.25	0.19	6.44	0.19	17.70	3.64	0.11	3.75	0.11	3.724E-03	1.898E-06	2.351E-05	-		2.351E-05	383.5606	1.669E-03

2022 CDSM - New Haiwee Dam 2, Basin (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	6.05	1.79	0.27	2.05	0.25	3.52	1.04	0.16	1.20	0.15	7.414E-04	5.42297945E-07	3.281E-05	-		3.062E-05	499.6716	1.669E-03
Material Processing and Concrete B	MAPT001-MAPT141	141	57377.6	1.21	0.48	0.05	0.53	0.05	0.70	0.28	0.03	0.31	0.03	6.299E-04	6.12920650E-07	2.788E-05	-		2.602E-05	99.93433	7.092E-03
Diversion		11	3594.2	4.57	0.01	0.21	0.22	0.19	2.67	0.00	0.12	0.13	0.11	3.053E-02	1.732E-07	1.404E-03	-		1.292E-03	387.1106	9.091E-02

2022 CDSM - New Haiwee Dam 2, Basin (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	0.86	1.79	0.01	1.80	0.01	0.50	1.04	0.01	1.05	0.01	1.059E-04	5.423E-07	1.537E-06	-		1.537E-06	25.07964	1.669E-03
Material Processing and Concrete B	MAPT001-MAPT141	141	57377.6	0.17	0.48	0.00	0.48	0.00	0.10	0.28	0.00	0.28	0.00	9.000E-05	6.129E-07	1.306E-06	-		1.306E-06	5.015928	7.092E-03
Diversion	BASIN001-BASIN011	11	3594.2	0.42	0.01	0.01	0.02	0.01	0.24	0.00	0.00	0.01	0.00	2.776E-03	1.732E-07	5.241E-05	-		5.241E-05	15.70269	9.091E-02

2022 E&R- New Haiwee Dam 2, Basin (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	89.10	5.03	4.62	9.65	4.41	51.92	2.93	2.69	5.62	2.57	1.092E-02	1.527176E-06	5.665E-04	-		5.403E-04	8816.2	1.669E-03
Diversion		11	3594.2	2.74	0.01	0.13	0.13	0.12	1.60	0.00	0.07	0.08	0.07	1.832E-02	1.039E-07	8.426E-04	-		7.752E-04	232.2663	9.091E-02

2022 E&R- New Haiwee Dam 2, Basin (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	23.24	5.03	0.14	5.17	0.14	13.54	2.93	0.08	3.01	0.08	2.848E-03	1.527E-06	1.763E-05	-		1.763E-05	287.6704	1.669E-03
Diversion	BASIN001-BASIN011	11	3594.2	0.25	0.01	0.00	0.01	0.00	0.15	0.00	0.00	0.01	0.00	1.666E-03	1.039E-07	3.144E-05	-		3.144E-05	9.421616	9.091E-02

2023 E&R - Basin (unmitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
Diversion		11	3594.2	1.83	0.00	0.08	0.09	0.08	1.07	0.00	0.05	0.05	0.05	1.221E-02	6.929E-08	5.618E-04	-		5.168E-04	154.8442	9.091E-02
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	1.98	0.23	0.09	0.32	4.36	1.15	0.13	0.05	0.19	2.54	2.424E-04	6.929E-08	1.149E-05	-		5.350E-04	8729.628	1.669E-03

2023 E&R - Basin (mitigated)

Sources	IDs	# of Volumes	Dust Area (m²)	NOx (tons/yr)	PM10 Dust (tons/yr)	PM10 Exhaust (tons/yr)	PM10 Total (tons/yr)	PM2.5 Exhaust (tons/yr)	NOx (lb/hr)	PM10 Dust (lb/hr)	PM10 Exhaust (lb/hr)	Total PM10 (lb/hr)	PM2.5 Exhaust (lb/hr)	NOx (g/s/vol)	PM10 Dust (g/s/m²)	PM10 Exhaust (g/s/vol)	Total PM10 (g/s/vol)	PM2.5 Dust (g/s/m²)	PM2.5 Exhaust (g/s/vol)	lb/yr	1 g/s
Diversion	BASIN001-BASIN011	11	3594.2	0.94	0.00	0.00	0.01	0.00	0.55	0.00	0.00	0.00	0.00	6.250E-03	6.929E-08	2.096E-05	-		2.096E-05	6.281078	9.091E-02
NHD2 + Slope Protection	NHD2001-NHD2599	599	241725.9	0.30	0.23	0.00	0.23	0.00	0.18	0.13	0.00	0.14	0.00	3.698E-05	6.929E-08	4.490E-07	-		4.490E-07	7.325522	1.669E-03

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