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SBO-01

Mr. James Ozouf, PE
City of Murrieta
1 Town Square
Murrieta, CA 92562

Subject: Air Quality, Greenhouse Gas Emissions, and Energy Impact Assessment for the Construction of the Murrieta Hot Springs Road Improvements Project, City of Murrieta, CA

Dear Mr. Ozouf:

HELIX Environmental Planning, Inc. (HELIX) has assessed air quality, greenhouse gas (GHG) emissions, and energy consumption impacts associated with the construction of the proposed Murrieta Hot Springs Road Improvements Project (project). In addition, the analysis also addresses impacts to sensitive receptors from exposure to toxic air contaminants (TACs) and contains a Climate Action Plan (CAP) consistency evaluation. This letter summarizes the findings of the air quality and GHG emissions assessment.

PROJECT DESCRIPTION

The 15-acre project site is located along Murrieta Hot Springs Road, from the intersection of Margarita Road to the intersection of Winchester Road in the City of Murrieta (City) in Riverside County (County). The project proposes to improve Murrieta Hot Springs Road and includes widening the road from a four-lane roadway to a six-lane roadway between Via Princesa to Winchester Road. Additional improvements include installation of a curbed median between Margarita Road and Winchester Road (with the exception of the intersections); installation of bicycle lanes along Murrieta Hot Springs Road in both directions; construction of curbs, gutters, catch basins, storm drains, and sidewalks along the majority of the alignment and both sides of the roadway; and improvement of curb access ramps at project intersections. To accommodate the roadway widening and improvements, a retaining wall would be constructed along the northern edge of Murrieta Hot Springs Road adjacent to the Ridgeway community and along the southern edge of Murrieta Hot Springs Road adjacent to residences located near Calle De Lago. Additionally, power poles, dry utilities, and fire hydrants will require relocation along the entire alignment.

Construction would commence as early as the first quarter of 2020 and require approximately 11 months to complete. During the grading phase, the project would grade approximately 190,000 square feet and cut 16,630 cubic yards (CY) and fill 2,030 CY, yielding a net export of approximately 14,600 CY. Potential staging areas include the vacant lot between Del Haven and

Winchester Road, the vacant lot adjacent to the southwest corner of the intersection of Via Princesa and Murrieta Hot Springs Road, and the vacant lot adjacent to the southwest corner of the intersection of Margarita Road and Murrieta Hot Springs Road. Construction design features would be in accordance with South Coast Air Quality Management District (SCAQMD) Rule 403 Fugitive Dust Control Practices; requiring the use of an on-site water truck to wet down active grading areas and roads at least twice daily, 12 percent moisture content to unpaved roads, and limiting vehicle speeds to 15 miles per hour.

AIR QUALITY

Setting

The project site is in the South Coast Air Basin (SCAB), which consists of all or part of four counties: Los Angeles, San Bernardino, Riverside, and Orange. The SCAQMD is responsible for implementing emissions standards and other requirements of federal and state laws in the SCAB.

Ambient air quality is described in terms of compliance with state and national standards, and the levels of air pollutant concentrations considered safe, to protect the public health and welfare. These standards are designed to protect people most sensitive to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. The U.S. Environmental Protection Agency (USEPA), the federal agency that administers the Federal Clean Air Act of 1970, as amended in 1990, has established national ambient air quality standards for several air pollution constituents. As permitted by the Clean Air Act, California has adopted more stringent air emissions standards and expanded the number of regulated air constituents.

The California Air Resources Board (CARB) is required to designate areas of the state as attainment, nonattainment, or unclassified for the ambient air quality standards. An “attainment” designation for an area signifies that pollutant concentrations do not violate the standard for that pollutant in that area. A “nonattainment” designation indicates that a pollutant concentration violated the standard at least once. The air quality attainment status of the SCAB is shown in Table 1, *South Coast Air Basin – Attainment Status*.

Table 1
SOUTH COAST AIR BASIN – ATTAINMENT STATUS

Pollutant	Federal Attainment Status	State of California Attainment Status
1-hour Ozone (O ₃)	(No federal standard)	Nonattainment
8-hour Ozone (O ₃)	Extreme Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment (Maintenance)	Attainment
Respirable Particulate Matter (PM ₁₀)	Attainment (Maintenance)	Nonattainment
Fine Particulate Matter (PM _{2.5})	Serious Nonattainment	Nonattainment
Nitrogen Dioxide (NO ₂)	Attainment (Maintenance)	Attainment
Sulfur Dioxide (SO ₂)	Attainment	Attainment
Lead (Pb)	Attainment	Attainment
Sulfates	(No federal standard)	Attainment
Hydrogen Sulfide	(No federal standard)	Attainment
Visibility	(No federal standard)	Attainment

Source: SCAQMD 2016

The SCAB is currently in nonattainment for federal and/or state ozone (O₃), suspended particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}) standards. Concentrations of all other pollutants meet state and federal standards.

Ozone is not emitted directly into the environment but is generated from complex chemical reactions between reactive organic gases (ROG), or non-methane hydrocarbons, and oxides of nitrogen (NO_x) that occur in the presence of sunlight. PM₁₀ and PM_{2.5} arise from a variety of sources, including road dust, diesel exhaust, fuel combustion, tire and brake wear, construction operations and windblown dust.

As required by the California Clean Air Act, SCAQMD has published various air quality planning documents to address requirements to bring the District into compliance with the federal and state ambient air quality standards. The Air Quality Attainment Plans are incorporated into the State Implementation Plan, which is subsequently submitted to the USEPA.

As a regional agency, the SCAQMD works directly with the Southern California Association of Governments (SCAG), County transportation commissions, and local governments, and cooperates actively with all federal and state government agencies. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary. The SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. It has responded to this requirement by preparing a sequence of Air Quality Management Plans (AQMPs).

Significance Criteria

The following significance thresholds are based on Appendix G of the state CEQA Guidelines. A significant impact is identified if the project would result in any of the following:

- (1) Conflict with or obstruct implementation of the applicable air quality plan;
- (2) Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- (3) Expose sensitive receptors to substantial pollutant concentrations;
- (4) Result in a cumulatively-considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative standards for ozone precursors); or
- (5) Create objectionable odors affecting a substantial number of people.

Appendix G of the State CEQA Guidelines states that the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. The SCAQMD has established significance thresholds to assess the regional and localized impacts of project-related air pollutant emissions. The significance thresholds are updated, as needed, to appropriately represent the most current technical information and attainment status in the SCAB. Table 2, *SCAQMD Air Quality Significance Thresholds*, presents the most current significance thresholds, including regional daily thresholds for short-term construction and long-term operational emissions; maximum incremental cancer risk and hazard indices for TACs; and maximum ambient

concentrations for exposure of sensitive receptors to localized pollutants. A project with daily emission rates, risk values, or concentrations below these thresholds is generally considered to have a less than significant effect on air quality.

Table 2
SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS

Pollutant	Construction	Operation
Mass Daily Thresholds (lbs/day)		
VOC	75	55
NO _x	100	55
CO	550	550
PM ₁₀	150	150
PM _{2.5}	55	55
SO _x	150	150
Lead	3	3
Toxic Air Contaminants		
TACs	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)	
Ambient Air Quality for Criteria Pollutants		
NO ₂	1-hour average ≥ 0.18 ppm Annual average ≥ 0.03 ppm	
CO	1-hour average ≥ 20.0 ppm (state) 8-hour average ≥ 9.0 ppm (state/federal)	
PM ₁₀	24-hour average ≥ 10.4 µg/m ³ (construction) 24-hour average ≥ 2.5 µg/m ³ (operation) Annual average ≥ 1.0 µg/m ³	
PM _{2.5}	24-hour average ≥ 10.4 µg/m ³ (construction) 24-hour average ≥ 2.5 µg/m ³ (operation)	
SO ₂	24-hour average ≥ 25 µg/m ³	

Source: SCAQMD 2019

SCAQMD = South Coast Air Quality Management District; lbs/day = pounds per day; VOC = volatile organic compound; NO_x = nitrogen oxides; CO = carbon monoxide; PM₁₀ = respirable particulate matter with a diameter of 10 microns or less; PM_{2.5} = fine particulate matter with a diameter of 2.5 microns or less; SO_x = sulfur oxides; TACs = toxic air contaminants; NO₂ = nitrogen dioxide; ppm = parts per million; SO₂ = sulfur dioxide; µg/m³ = micrograms per cubic meter

Project Air Quality Analysis

(1) Conflict with or obstruct implementation of the applicable air quality plan?

Less than Significant Impact. SCAG is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties, and addresses regional issues relating to transportation, economy, community development, and environment. With regard to air quality planning, SCAG has prepared the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), a long-range transportation plan that uses growth forecasts to project trends out over a 20-year period to identify regional transportation strategies to address mobility needs. These growth forecasts form the basis for the land use and transportation control portions of the AQMP. These documents are utilized in the preparation of the air quality forecasts and consistency analysis included

in the AQMP. Both the RTP/SCS and AQMP are based, in part, on projections originating with County and City General Plans.¹

The two principal criteria for determining conformance to the AQMP are:

1. Whether the project would result in an increase in the frequency or severity of existing air quality violations; cause or contribute to new violations; or delay timely attainment of air quality standards; and
2. Whether the project would exceed the assumptions in the AQMP.

With respect to the first criterion, the analyses presented below demonstrate that the project would not generate short-term or long-term emissions that could potentially cause an increase in the frequency or severity of existing air quality violations; cause or contribute to new violations; or delay timely attainment of air quality standards.

With respect to the second criterion, the proposed project is improving and widening a roadway and would not result in population or employment increases and, therefore, would not exceed the growth projection assumptions in the AQMP. In addition, the proposed project would install bicycle lanes along both sides of Murrieta Hot Springs Road and sidewalks along the majority of the alignment and both sides of the roadway. These improvements support General Plan Climate Action Strategy (CAS) 3, Transportation and Mobility, through the following CAP measures:

CIR 8 – Development, expansion, and maintenance of a network of bicycle, pedestrian, and multi-use trails that allows residents to travel between parks, schools, neighborhoods, and other major destinations without driving; and

AQ 5 – Air quality is improved through an efficient circulation system, reduced traffic congestion, and reduced vehicle miles traveled (City 2011a).

Because the project is consistent with the City's General Plan, pursuant to SCAQMD guidelines, the proposed project is considered consistent with the region's AQMP. As such, proposed project-related emissions are accounted for in the AQMP, which is crafted to bring the basin into attainment for all criteria pollutants. Accordingly, the proposed project would be consistent with the projections in the AQMP, thus resulting in a less than significant impact.

(2) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Construction Emissions

Less than Significant Impact. The project's construction emissions were estimated using the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Roadway Construction Emissions Model, version 9.0 (SMAQMD 2018). This model utilizes 2017 EMFAC factors and OFFROAD factors to calculate vehicle exhaust and fugitive dust emissions. Fugitive dust emissions are calculated estimating the

¹ SCAG serves as the federally designated metropolitan planning organization for the southern California region.

maximum area (acres) of land disturbed daily. Roadway widening construction would disturb a total of 4.36 acres over approximately 11 months (242 working days).

Project-specific input was based on general project information, assumptions provided by the project applicant, and default model settings to estimate reasonably conservative conditions. A detailed list of equipment associated with each phase of the project is provided in Appendix A.

Construction activities include site preparation, demolition of existing roadway, grading, installation of drainage and utilities, retaining walls, and paving. For a conservative analysis, construction of the project is anticipated to commence as early as Spring 2021 and be completed by Winter 2021. Emission estimates assume the use of water trucks, yielding a 50 percent control of fugitive dust from watering and associated dust control measures.

The emissions generated from construction activities include:

- Dust (including PM₁₀ and PM_{2.5}) primarily from fugitive sources such as soil disturbance and vehicle travel over unpaved surfaces; and
- Combustion emissions of air pollutants (including ROG, NO_x, PM₁₀, PM_{2.5}, carbon monoxide [CO], and sulfur oxides [SO_x]), primarily from operation of heavy off-road equipment.

The results of the calculations for project construction are shown in Table 3, *Maximum Daily Construction Emissions*. The data are presented as the maximum anticipated daily emissions for comparison with the SCAQMD thresholds. As shown in the table, construction emissions would not exceed SCAQMD thresholds and impacts would be less than significant.

Table 3
MAXIMUM DAILY CONSTRUCTION EMISSIONS

Phase	Pollutant Emissions (lbs/day)					
	ROG	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}
Site Preparation/Land Clearing	3	27	25	<0.5	11	3
Grading/Excavation	6	64	46	<0.5	13	5
Underground Drainage/Utilities	4	35	34	<0.5	12	4
Paving	2	16	18	<0.5	1	1
Maximum Daily Emissions	6	64	46	<0.5	13	5
<i>SCAQMD Thresholds</i>	<i>75</i>	<i>100</i>	<i>550</i>	<i>150</i>	<i>150</i>	<i>55</i>
<i>Significant Impact?</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>

Source: SMAQMD Roadway Construction Model (output data is provided in Attachment A); SCAQMD 2019

lbs/day = pounds per day; ROG = reactive organic gas; NO_x = nitrogen oxides; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = respirable particulate matter with a diameter of 10 microns or less; PM_{2.5} = fine particulate matter with a diameter of 2.5 microns or less; SCAQMD = South Coast Air Quality Management District

Operational Emissions

The project proposes widening and improving an existing roadway and would only generate emissions during construction. Therefore, operational air pollutant emissions would not be generated and no impacts would occur.

(3) Expose sensitive receptors to substantial pollutant concentrations?

Criteria Pollutants

Less than Significant Impact. The localized effects from the on-site portion of daily construction emissions were evaluated at sensitive receptor locations potentially impacted by the project according to the SCAQMD's Localized Significance Thresholds (LSTs) method (SCAQMD 2009). LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard; they are developed based on the ambient concentrations of that pollutant for each source receptor area (SRA). The LST methodology is recommended to be limited to projects of five acres or less and to avoid the need for complex dispersion modeling. For projects that exceed five acres, such as the proposed project, the five-acre LST look-up values can be used as a screening tool to determine which pollutants require detailed analysis (Sun 2017). This approach is conservative as it assumes that all on-site emissions would occur within a five-acre area and over-predicts potential localized impacts (i.e., more pollutant emissions occurring within a smaller area and within closer proximity to potential sensitive receptors). If a project exceeds the LST look up values, then the SCAQMD recommends that project-specific localized air quality modeling be performed.

The project is in SRA 26, Temecula Valley, and sensitive receptors are located within 25 meters along the 1-mile project site. Therefore, the LSTs being applied to the project are based on SRA 26, receptors located within 25 meters, and a disturbed area not to exceed 5 acres. Consistent with the LST guidelines, when quantifying mass emissions for localized analysis, only emissions that occur on-site are considered. Emissions related to off-site delivery/haul truck activity and construction worker trips are not considered in the evaluation of construction-related localized impacts, as these do not contribute to emissions generated on a project site. As shown in Table 4, *Maximum Localized Daily Construction Emissions*, localized emissions for all criteria pollutants would remain below their respective SCAQMD LSTs. Therefore, impacts would be a less than significant.

Table 4
MAXIMUM LOCALIZED DAILY CONSTRUCTION EMISSIONS

Phase	Pollutant Emissions (lbs/day)			
	NO _x	CO	PM ₁₀	PM _{2.5}
Site Preparation/Land Clearing	26.89	24.13	11.28	3.29
Grading/Excavation	62.60	43.48	12.67	4.54
Underground Drainage/Utilities	34.24	31.81	11.76	3.76
Paving	14.79	16.59	0.82	0.76
Maximum Daily Emissions	62.60	43.48	12.67	4.54
<i>SCAQMD LST</i>	<i>371</i>	<i>1,965</i>	<i>13</i>	<i>8</i>
Significant Impact?	No	No	No	No

Source: SMAQMD Roadway Construction Model (output data is provided in Attachment A); SCAQMD 2009
lbs/day = pounds per day; NO_x = nitrogen oxides; CO = carbon monoxide; PM₁₀ = respirable particulate matter with a diameter of 10 microns or less; PM_{2.5} = fine particulate matter with a diameter of 2.5 microns or less;
SCAQMD = South Coast Air Quality Management District; LST = Localized Significance Threshold

Toxic Air Contaminants

The greatest potential for TAC emissions during construction would be related to diesel particulate matter associated with heavy equipment operations during earth-moving activities. The SCAQMD does not consider diesel-related cancer risks from construction equipment to be an issue due to the short-term nature of construction activities. Construction activities associated with the proposed project would be sporadic, transitory, and short term in nature; lasting approximately eleven months. The assessment of cancer risk is typically based on a 30-year exposure period. Because exposure to diesel exhaust would be well below the 30-year exposure period, construction of the proposed project is not anticipated to result in an elevated cancer risk to exposed persons. As such, project-emission impacts during construction would be less than significant.

(4) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

Less than Significant Impact. In accordance with CEQA Guidelines Section 15064(h)(3), the SCAQMD's approach for assessing cumulative impacts is based on the AQMP forecasts of attainment of ambient air quality standards in accordance with the requirements of the federal and State Clean Air Acts. If a project is not consistent with the AQMP, which is intended to bring the SCAB into attainment for all criteria pollutants, that project can be considered cumulatively considerable. Additionally, if the mass regional emissions calculated for a project exceed the applicable SCAQMD daily significance thresholds that are designed to assist the region in attaining the applicable state and national ambient air quality standards, that project can be considered cumulatively considerable. As demonstrated in Table 3, project construction emissions would be consistent with the AQMP, and no operational emissions would occur. Therefore, emissions would not be cumulatively considerable.

For two or more projects within close proximity, that is, defined as 1,640 feet (500 meters²) or less from the same sensitive receptor, a local cumulative analysis must be performed. The on-site emissions from the related project must be added to the background concentration, which is then summed with the proposed project emissions for comparison to the SCAQMD LSTs or State and federal AAQS. If the related projects combine with the proposed project to result in an exceedance of the ambient standards, the project is considered cumulatively significant.

If approved, the proposed Sky Canyon Retail Center Project (Sky Canyon), located at the vacant lot northeast of the intersection of Highway 79 and Willows Avenue, could have a construction schedule that overlaps with the proposed project. Sensitive receptors that would be within 500 meters of both projects are residences located south of the easternmost length of the proposed project and west of Sky Canyon. If both projects are approved, construction could potentially overlap for the duration of the proposed project's construction schedule. However, due to the location of the two proposed projects, it would be impossible for the identified sensitive receptors to be downwind of both projects at the same time. That is, to be affected by the proposed project, the wind would have to be blowing from the north, and to be affected by Sky Canyon, the wind would have to be blowing from the east. Additionally, as detailed in Table 4, localized construction emissions would fall below the SCAQMD regional significance

² 500 meters is the greatest distance identified by the SCAQMD in their LST methodology.

thresholds. Therefore, emissions would not be cumulatively considerable, and impacts would be less than significant.

(5) Create objectionable odors affecting a substantial number of people?

Less than Significant Impact. The project could produce odors during proposed construction activities resulting from heavy diesel equipment exhaust and application of asphalt; however, standard construction practices would minimize the odor emissions and their associated impacts. The increase of construction odors would be minimal, as vehicle exhaust is already prevalent in the area due to its proximity to Highway 79 and Interstate 215. Furthermore, any odors emitted during construction would be temporary, short-term, and intermittent in nature, and would cease upon the completion of the respective phase of construction. Therefore, odor impacts from construction of the project would be less than significant due to the duration of exposure.

The project proposes widening and improvement of an existing roadway. Therefore, there would be no change to the existing operational odors, resulting in no impact.

GREENHOUSE GAS EMISSIONS

Setting

Greenhouse gases, as defined under California's Assembly Bill (AB) 32, include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF₆). AB 32, the California Global Warming Solutions Act of 2006, recognizes that California is a source of substantial amounts of GHG emissions. The statute states that:

Global warming poses a serious threat to the economic wellbeing, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

In order to help avert these potential consequences, AB 32 established a State goal of reducing GHG emissions to 1990 levels by the year 2020, which is a reduction of approximately 16 percent from forecasted emission levels, with further reductions to follow. In addition, AB 32 required CARB to develop a Scoping Plan to help the State achieve the targeted GHG emission reductions. In 2015, Executive Order (EO) B-30-15 established a California GHG emission reduction target of 40 percent below 1990 levels by 2030. The EO aligns California's GHG emission reduction targets with those of leading international governments, including the 28 nation European Union. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in AB 32. As a follow-up to AB 32 and in response to EO-B-30-15, Senate Bill (SB) 32 was passed by the California legislature in 2016 to codify the EO's California GHG emission reduction target of 40 percent below 1990 levels by 2030. The most recent update to the Scoping Plan was adopted in December 2017 and establishes a proposed framework for California to meet the EO-B-30-15 reduction target (CARB 2017).

Significance Criteria

Given the relatively small levels of emissions generated by a typical development in relationship to the total amount of GHG emissions generated on a national or global basis, individual development projects are not expected to result in significant, direct impacts with respect to climate change. However, given the magnitude of the impact of GHG emissions on the global climate, GHG emissions from new development could result in significant, cumulative impacts with respect to climate change. Thus, the potential for a significant GHG emissions impact is limited to cumulative impacts.

According to Appendix G of the CEQA Guidelines, a project would have a significant environmental impact if it would:

- (1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- (2) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

There are no established federal, state, or local quantitative thresholds applicable to the project to determine the quantity of GHG emissions that may have a significant effect on the environment. CARB, the SCAQMD, and various cities and agencies have proposed, or adopted on an interim basis, thresholds of significance that require the implementation of GHG emission reduction measures. For the proposed project, the most appropriate screening threshold for determining GHG emissions is the SCAQMD proposed Tier 3 screening threshold (SCAQMD 2010). Therefore, a significant impact would occur if the proposed project would exceed the SCAQMD proposed Tier 3 screening threshold of 3,000 metric tons (MT) of carbon dioxide equivalent (CO₂e) per year.

In addition, a significant impact would occur if the project is inconsistent with the City's CAP. Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the CAP would have a less than significant impact on climate change (City 2011b). The following should be considered when determining consistency with the City CAP:

- Extent to which the project supports or includes applicable strategies and measures or advances the actions identified in the CAP;
- Consistency with the Murrieta General Plan Update population growth projections, which are the basis of the GHG emissions inventory projections;
- Consistency with the emission reduction targets set by the CAP; and
- Extent to which the project would interfere with implementation of CAP strategies, measures, or actions.

The seven Climate Action Strategies identified in the CAP to reduce GHG emissions are as follows:

CAS 1 – Community Involvement Strategy is intended to foster a sense of ownership of the ideas and actions to be carried out within the City;

CAS 2 – Land Use and Community Vision Strategy encourages changes in the land use pattern to enable residents to reduce dependence on personal automobiles for transportation;

CAS 3 – Transportation and Mobility Strategy identifies opportunities to improve mobility through walking, cycling, and transit use to decrease automobile trips;

CAS 4 – Energy Use and Conservation Strategy recommends ways to increase energy efficiency in existing buildings, enhance energy performance for new construction, and increase use of renewable energy;

CAS 5 – Water Use and Efficiency Strategy is intended to conserve water through efficient use and conservation;

CAS 6 – Waste Reduction and Recycling Strategy intends to increase waste diversion, reduce consumption of materials that would otherwise end up in landfills, and increase recycling; and

CAS 7 – Open Space Strategy expands the utilization of open spaces for habitat, storm water management, soil retention, air filtration and cooling, aesthetic and economic value, local food security, increased and improved parks, preservation, and to create new open spaces.

Project Greenhouse Gas Emissions Analysis

- (1) *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

Construction Emissions

Less than Significant Impact. Construction GHG emissions are generated by vehicle engine exhaust from construction equipment, on-road hauling trucks, and worker commuting trips. Construction GHG emissions were calculated by using SMAQMD Roadway Construction Emissions Model Version 9.0. Input details and output are provided in Attachment A. The estimated construction GHG emissions for the project are shown in Table 5, *Total Estimated Greenhouse Gas Emissions for the Proposed Project*. For construction emissions, SCAQMD recommends that the emissions be amortized (i.e., averaged) over 30 years and added to operational emissions. Averaged over 30 years, the proposed construction activities would contribute approximately 18 MT CO₂e emissions per year. Therefore, the proposed project would generate GHG emissions below the SCAQMD threshold and impacts would be less than significant.

Table 5
TOTAL ESTIMATED GREENHOUSE GAS EMISSIONS FOR THE PROPOSED PROJECT

Construction Emissions	CO₂e (MT)
Site Preparation/Land Clearing	48
Grading/Excavation	153
Underground Drainage/Utilities	255
Paving	88
Total Emissions	544
Amortized Emissions	18
<i>SCAQMD Threshold</i>	<i>3,000</i>
Significant Impact?	No

Source: SMAQMD Roadway Construction Model (output data is provided in Attachment A); SCAQMD 2010 CO₂e: carbon dioxide equivalent; MT: metric tons; SCAQMD = South Coast Air Quality Management District

Operation Emissions

The project proposes the widening and improvement of an existing roadway and would only generate emissions during construction. Therefore, operational air pollutant emissions would have no impact.

(2) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less than Significant Impact.

State Plans, Policies, and Regulations

There are numerous State plans, policies, and regulations adopted for the purpose of reducing GHG emissions. The principal overall State plan and policy is AB 32, the California Global Warming Solutions Act of 2006. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 32 would require further reductions of 40 percent below 1990 levels by 2030. Statewide plans and regulations such as GHG emissions standards for vehicles (AB 1493), the low carbon fuel standard, and regulations requiring an increasing fraction of electricity to be generated from renewable sources are being implemented at the statewide level; as such, compliance at the project level is not addressed. Therefore, the proposed project does not conflict with State plans, policies, and regulations.

CAP Consistency Evaluation

Project consistency with the City's CAP is described below:

- *Extent to which the project supports or includes applicable strategies and measures or advances the actions identified in the CAP*

As described in the air quality analysis above, the project would support and promote CAS 3, Transportation and Mobility, by providing roadway improvements that would include installation of bicycle lanes and pedestrian sidewalks, and by widening the roadway to improve circulation and reduce traffic. The applicable CAP measures include:

CIR 8 – Development, expansion, and maintenance of a network of bicycle, pedestrian, and multi-use trails that allows residents to travel between parks, schools, neighborhoods, and other major destinations without driving; and

AQ 5 – Air quality is improved through an efficient circulation system, reduced traffic congestion, and reduced vehicle miles traveled (City 2011a).

With these improvements, the proposed project would decrease vehicle miles traveled and reduce time spent in traffic, thus generating fewer GHG emissions and supporting the CAP. Additionally, the project would not conflict with the remaining CAS: CAS 1 – Community Involvement; CAS 2 – Land Use and Community Vision; CAS 4 – Energy Use and Conservation; CAS 5 – Water Use and Efficiency; CAS 6 – Waste Reduction and Recycling; and CAS 7 – Open Space.

- *Consistency with the Murrieta General Plan Update population growth projections*

The proposed project would not result in an increase to population or employment and, therefore, would be consistent with the growth projections used in the GHG emissions inventory projections.

- *Consistency with the emission reduction targets set by the CAP*

The City's emission reduction targets were set at a level which demonstrates consistency with State targets and provides feasibility for the majority of projects to achieve. Therefore, consistent with the CARB Scoping Plan and AB 32 goals, the City chose a reduction target of 15 percent below current (2009 baseline) emissions levels by 2020. As such, if the proposed General Plan 2035 can reduce its GHG emissions by 15 percent below 2009 levels by 2020, a less than significant impact would result (City 2011b). The seven CAS, listed above, are devised to assist the City in reaching its reduction target. Therefore, because the proposed project would support CAS 3, and would not interfere with any of the identified CAS, it would be considered consistent with the City's emission reduction targets.

Additionally, as previously discussed, the project's increase in GHG emissions from construction activities would not exceed the SCAQMD screening threshold, which was crafted to comply with the reduction goals of AB 32.

- *Extent to which the project would interfere with implementation of CAP strategies, measures, or actions*

As demonstrated in the above responses, the project would be consistent with, and not interfere with CAP strategies, measures, or actions.

Therefore, the project would be consistent with the City's CAP and implementation of the proposed project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. This would represent a less than significant impact.

ENERGY

Setting

Energy usage is typically quantified using the British thermal unit (Btu) and large quantities of energy are often reported as million Btu (MBtu). As a point of reference, the approximate amounts of energy contained in common energy sources are: gasoline – 0.124 MBTU per gallon; and diesel – 0.139 MBtu per gallon.

Total energy usage in California was approximately 7,881,000 MBtu in 2017, which equates to an average of 200 million BTU per capita (US Energy Information Administration 2019). Electricity and natural gas in California are generally consumed by stationary users such as residences and commercial and industrial facilities, whereas petroleum consumption is generally accounted for by transportation- and construction-related energy use. In 2019, taxable diesel fuel sales in California accounted for approximately 3.1 billion gallons of diesel (California Department of Tax and Fee Administration 2020).

Significance Criteria

The following significance thresholds are based on Appendix G of the state CEQA Guidelines. A significant impact is identified if the project would:

- (1) Result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or
- (2) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Project Energy Analysis

- (1) Result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?*

Less than Significant Impact. The project would involve the consumption of energy resources during construction. Construction of the project is estimated to last approximately nine months during which time diesel and gasoline fuel is anticipated to be the primary energy consumed. It is not anticipated that the project would require significant use of natural gas or electricity (from the electrical grid) during construction. As a result, natural gas and electricity use during construction would be temporary and a negligible portion of the total construction energy. Diesel and gasoline fuel consumption would be associated with heavy-duty equipment, haul trucks involved in the transport of soil and construction materials, and workers commuting to and from the site.

The project's estimated construction energy consumption was calculated using: off-road equipment types, horsepower, count and hours from the SMAQMD Road Construction Emissions Model version 9.0 (described in the air quality analysis, above); off-road fuel consumption factors from the CARB OFFROAD2017- ORION Web Database version 1.0.1; and on-road fuel consumption factors from the CARB EMFAC2107 Web Database version 1.0.2 (SMAQMD 2018; CARB 2020a; CARB 2020b). The estimated fuel and total energy consumed during project construction is shown in Table 6, *Construction*

Energy Consumption. The full construction energy consumption calculations are included as Attachment B to this report.

Table 6
CONSTRUCTION ENERGY CONSUMPTION

Phase	Fuel (gallons)		Total (MBtu)
	Diesel	Gasoline	
Grubbing/Land Clearing	2,313	217	348
Grading/Excavation	6,143	1,022	980
Drainage/Utilities/Sub-Grade	9,383	1,858	1,535
Paving	3,896	929	657
Construction Total	21,735	4,025	3,520

Source: SMAQMD Roadway Construction Emissions Model; CARB OFFROAD2017- ORION Web Database; and CARB EMFAC2107 Web Database (complete calculations are provided in Attachment B).

Note: Totals may not sum due to rounding.

MBtu = million British thermal units

The total petroleum consumption would be temporary and would cease upon completion of project implementation, would be typical of similar roadway construction projects, and would not require the development of new energy resources and distribution infrastructure. Once operational, the project would not result in any energy usage beyond the energy usage of the road segment without implementation of the project. Based on these considerations, the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources and the impact would be less than significant.

(2) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less than Significant Impact. Federal and state agencies regulate energy use and consumption through various means and programs. Federal and state agencies influence and regulate transportation energy consumption through the establishment and enforcement of fuel economy standards for automobiles and light trucks, funding of energy-related research and development projects, and funding for transportation infrastructure improvements.

There are no state or local plans for renewable energy or energy efficiency directly applicable to the construction energy consumption from a roadway improvement project. However, a project's energy consumption is closely related to a project's GHG emissions. As described in the GHG emissions analysis, above, the project's amortized GHG construction emissions would not exceed the SCAQMD threshold, and the project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs, including the City's CAP. Therefore, the project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency and the impact would be less than significant.

SUMMARY

As described above, construction emissions of criteria pollutants would be below SCAQMD thresholds and would be consistent with the AQMP, and sensitive receptors would not be exposed to substantial concentrations of TACs or odors. Thus, impacts to air quality would be less than significant and no

mitigation measures would be required. Construction GHG emissions would be below SCAQMD thresholds and the project would be consistent with the City's CAP and would not conflict with applicable plans or policies. Therefore, impacts would be less than significant in regard to GHG emissions. Construction of the project would not require the development of new energy resources and distribution infrastructure. Construction of the project would not result inefficient or unnecessary consumption of energy resources, or conflict with plans for renewable energy or energy efficiency. Once operational, the project would not result in any increases of energy consumption. Therefore, impacts would be less than significant regarding energy consumption.

Sincerely,



Victor Ortiz
Senior Air Quality Specialist

Attachments:

- Attachment A: SMAQMD Roadway Construction Model Output
- Attachment B: Construction Energy Consumption Calculations

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Attachment A


SMAQMD Roadway Construction Model Output

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> SBO-01 Roadway Improvements																			
Project Phases (Pounds)		ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	Exhaust (lbs/day)	PM10 (lbs/day)	Fugitive Dust (lbs/day)	PM2.5 (lbs/day)	Exhaust (lbs/day)	PM2.5 (lbs/day)	Fugitive Dust (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)		
Grubbing/Land Clearing		2.78	24.94	27.27	11.32	1.32	10.00	3.30	1.22	2.08	0.05	4,766.12	1.09	0.07	0.07	4,813.84			
Grading/Excavation		5.76	46.09	64.24	12.81	2.81	10.00	4.60	2.52	2.08	0.10	10,092.58	2.79	0.22	0.22	10,227.96			
Drainage/Utilities/Sub-Grade		3.69	33.50	34.70	11.84	1.84	10.00	3.79	1.71	2.08	0.07	6,321.62	1.24	0.09	0.09	6,378.13			
Paving		1.60	18.09	16.27	0.92	0.92	0.00	0.80	0.80	0.00	0.04	3,467.76	0.75	0.15	0.15	3,530.84			
Maximum (pounds/day)		5.76	46.09	64.24	12.81	2.81	10.00	4.60	2.52	2.08	0.10	10,092.58	2.79	0.22	0.22	10,227.96			
Total (tons/construction project)		0.33	3.01	3.33	0.88	0.17	0.72	0.30	0.15	0.15	0.01	592.47	0.13	0.01	0.01	599.45			
Notes: Project Start Year -> Project Length (months) -> Total Project Area (acres) -> Maximum Area Disturbed/Day (acres) -> Water Truck Used? ->		2021 9 15 1 Yes																	
		Total Material Imported/Exported Volume (yd³/day)			Daily VMT (miles/day)														
		Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck												
		Grubbing/Land Clearing	0	0	0	0	280	40											
		Grading/Excavation	60	0	160	0	880	40											
Drainage/Utilities/Sub-Grade	0	0	0	0	600	40													
Paving	0	100	0	150	480	40													
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.																			
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.																			
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.																			
Total Emission Estimates by Phase for -> SBO-01 Roadway Improvements																			
Project Phases		ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	PM10 (tons/phase)	Exhaust (tons/phase)	PM10 (tons/phase)	Fugitive Dust (tons/phase)	PM2.5 (tons/phase)	Exhaust (tons/phase)	PM2.5 (tons/phase)	Fugitive Dust (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)		
(Tons for all except CO2e. Metric tonnes for CO2e)																			
Grubbing/Land Clearing		0.03	0.27	0.30	0.12	0.01	0.11	0.04	0.01	0.02	0.00	52.43	0.01	0.00	0.00	48.04			
Grading/Excavation		0.10	0.76	1.06	0.21	0.05	0.17	0.08	0.04	0.03	0.00	166.53	0.05	0.00	0.00	153.10			
Drainage/Utilities/Sub-Grade		0.16	1.47	1.53	0.52	0.08	0.44	0.17	0.08	0.09	0.00	278.15	0.05	0.00	0.00	254.59			
Paving		0.04	0.50	0.45	0.03	0.03	0.00	0.02	0.02	0.00	0.00	95.36	0.02	0.00	0.00	88.09			
Maximum (tons/phase)		0.16	1.47	1.53	0.52	0.08	0.44	0.17	0.08	0.09	0.00	278.15	0.05	0.00	0.00	254.59			
Total (tons/construction project)		0.33	3.01	3.33	0.88	0.17	0.72	0.30	0.15	0.15	0.01	592.47	0.13	0.01	0.01	543.82			
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.																			
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.																			
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.																			
The CO2e emissions are reported as metric tons per phase.																			

Road Construction Emissions Model
Data Entry Worksheet
Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

Version 9.0.0



Input Type

Project Name: SBO-01 Roadway Improvements

Construction Start Year: 2021

Project Type: 2

Project Construction Time: 9.00 months
Working Days per Month: 22.00

Predominant Soil/Site Type: Enter 1, 2, or 3
(for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22): 1

Project Length: 1.00 mile
Total Project Area: 15.00 acres
Maximum Area Disturbed/Day: 1.00 acre
Water Trucks Used?: 1

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

Enter a Year between 2014 and 2040 (inclusive)

1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway.
2) Road Widening : Project to add a new lane to an existing roadway
3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane.
4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction

months
days (assume 22 if unknown)

1) Sand Gravel : Use for quaternary deposits (Delta/West County)
2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the lone formation (Scott Road, Rancho Murietta)
3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murietta)

mile
acres
acre
1: Yes
2: No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd ³) (assume 20 if unknown)	Import Volume (yd ³ /day)	Export Volume (yd ³ /day)
Soil	Grubbing/Land Clearing			
	Grading/Excavation	20.00		60.33
	Drainage/Utilities/Sub-Grade			
	Paving			
Asphalt	Grubbing/Land Clearing			
	Grading/Excavation			
	Drainage/Utilities/Sub-Grade			
	Paving	20.00	100.00	

Mitigation Options

On-road Fleet Emissions Mitigation

Off-road Equipment Emissions Mitigation

Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer.
Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (<http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/Mitigation>).
Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing	1.00	0.90		1/1/2021
Grading/Excavation	1.50	3.60		2/1/2021
Drainage/Utilities/Sub-Grade	4.00	3.15		3/19/2021
Paving	2.50	1.35		7/19/2021
Totals (Months)		9		

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions		User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
User Input						
Miles/round trip: Grubbing/Land Clearing		30.00	30.00		0	0.00
Miles/round trip: Grading/Excavation		40.00	30.00		4	160.00
Miles/round trip: Drainage/Utilities/Sub-Grade			30.00		0	0.00
Miles/round trip: Paving			30.00		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.15	0.01	1.11	0.04	0.02	0.01	627.63	0.00	0.10	657.04
Tons per const. Period - Grading/Excavation	0.00	0.00	0.02	0.00	0.00	0.00	10.36	0.00	0.00	10.84
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.02	0.00	0.00	0.00	10.36	0.00	0.00	10.84

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions		User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
User Input						
Miles/round trip: Grubbing/Land Clearing			30.00		0	0.00
Miles/round trip: Grading/Excavation			30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade			30.00		0	0.00
Miles/round trip: Paving			30.00		5	150.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.01	0.14	1.05	0.04	0.02	0.01	588.40	0.00	0.09	615.98
Tons per const. Period - Paving	0.00	0.00	0.03	0.00	0.00	0.00	16.18	0.00	0.00	16.94
Total tons per construction project	0.00	0.00	0.03	0.00	0.00	0.00	16.18	0.00	0.00	16.94

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions		User Override of Worker Commute Default Values									
User Input		Default Values		Calculated	Calculated						
		20		Daily Trips	Daily VMT						
Miles/ one-way trip		20									
One-way trips/day		2									
No. of employees: Grubbing/Land Clearing		7	14		280.00						
No. of employees: Grading/Excavation		22	44		880.00						
No. of employees: Drainage/Utilities/Sub-Grade		15	30		600.00						
No. of employees: Paving		12	24		480.00						
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Grubbing/Land Clearing (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28	
Grading/Excavation (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28	
Drainage/Utilities/Sub-Grade (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28	
Paving (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28	
Grubbing/Land Clearing (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39	
Grading/Excavation (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39	
Drainage/Utilities/Sub-Grade (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39	
Paving (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39	
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Pounds per day - Grubbing/Land Clearing	0.05	0.77	0.07	0.03	0.01	0.00	212.00	0.01	0.01	213.92	
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	2.33	0.00	0.00	2.35	
Pounds per day - Grading/Excavation	0.15	2.42	0.22	0.09	0.04	0.01	666.29	0.02	0.02	672.33	
Tons per const. Period - Grading/Excavation	0.00	0.04	0.00	0.00	0.00	0.00	10.99	0.00	0.00	11.09	
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.65	0.15	0.06	0.03	0.00	454.29	0.01	0.01	458.41	
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.07	0.01	0.00	0.00	0.00	19.99	0.00	0.00	20.17	
Pounds per day - Paving	0.08	1.32	0.12	0.05	0.02	0.00	363.43	0.01	0.01	366.73	
Tons per const. Period - Paving	0.00	0.04	0.00	0.00	0.00	0.00	9.99	0.00	0.00	10.08	
Total tons per construction project	0.01	0.16	0.01	0.01	0.00	0.00	43.31	0.00	0.00	43.70	

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions													
User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT					
Grubbing/Land Clearing - Exhaust		1		5	5	8.00	8.00	40.00					
Grading/Excavation - Exhaust		1		5	5	8.00	8.00	40.00					
Drainage/Utilities/Subgrade		1		5	5	8.00	8.00	40.00					
Paving		1		5	5	8.00	8.00	40.00					

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.73	0.00	0.00	1.81
Pounds per day - Grading/Excavation	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Grading/Excavation	0.00	0.00	0.01	0.00	0.00	0.00	2.59	0.00	0.00	2.71
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.01	0.00	0.00	0.00	6.90	0.00	0.00	7.23
Pounds per day - Paving	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	4.31	0.00	0.00	4.52
Total tons per construction project	0.00	0.00	0.03	0.00	0.00	0.00	15.53	0.00	0.00	16.26

Note: Fugitive dust default values can be overridden in cells D183 through D185.

Fugitive Dust		User Override of Max Acreage Disturbed/Day		Default Maximum Acreage/Day		PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing				1.00		10.00	0.11	2.08	0.02
Fugitive Dust - Grading/Excavation				1.00		10.00	0.17	2.08	0.03
Fugitive Dust - Drainage/Utilities/Subgrade				1.00		10.00	0.44	2.08	0.09

Data Entry Worksheet

Grading/Excavation	Default	Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
	Number of Vehicles	Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
Override of Default Number of Vehicles	Program-estimate													
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Crawler Tractors	0.55	2.44	6.97	0.26	0.24	0.01	760.36	0.25	0.01	768.56
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Excavators	0.46	6.54	4.31	0.21	0.19	0.01	1,000.38	0.32	0.01	1,011.17
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2		Model Default Tier	Graders	0.91	3.53	11.85	0.38	0.35	0.01	1,283.37	0.42	0.01	1,297.19
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2		Model Default Tier	Rollers	0.38	3.76	3.85	0.24	0.22	0.01	508.18	0.16	0.00	513.65
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Rubber Tired Loaders	0.34	1.60	3.86	0.13	0.12	0.01	605.23	0.20	0.01	611.76
	2		Model Default Tier	Scrapers	1.86	14.01	21.41	0.83	0.77	0.03	2,935.83	0.95	0.03	2,967.48
			Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Sweepers/Scrubbers	0.23	1.95	2.08	0.15	0.14	0.00	246.18	0.08	0.00	248.63
	4		Model Default Tier	Tractor/Loaders/Backhoes	0.75	9.04	7.58	0.45	0.41	0.01	1,203.60	0.39	0.01	1,216.56
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment					If non-default vehicles are used, please provide information in "Non-default Off-road Equipment" tab									
	Number of Vehicles		Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation			pounds per day	5.59	43.48	62.60	2.67	2.46	0.09	8,641.75	2.77	0.08	8,734.33
	Grading/Excavation			tons per phase	0.09	0.72	1.03	0.04	0.04	0.00	142.59	0.05	0.00	144.12

Data Entry Worksheet

Paving	Default		Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
	Number of Vehicles	Override of	Default												
	Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier												
Override of Default Number of Vehicles					Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
				Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other General Industrial Equip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Other Material Handling Equip	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1			Model Default Tier	Pavers	0.25	2.90	2.60	0.13	0.12	0.00	455.06	0.15	459.97	459.97
	1			Model Default Tier	Paving Equipment	0.19	2.54	1.94	0.10	0.09	0.00	394.46	0.13	398.71	398.71
				Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2			Model Default Tier	Rollers	0.38	3.76	3.85	0.24	0.22	0.01	508.18	0.16	513.65	513.65
				Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2			Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	99.13	99.13
				Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3			Model Default Tier	Tractors/Loaders/Backhoes	0.56	6.78	5.69	0.34	0.31	0.01	902.70	0.29	912.42	912.42
				Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment															
If non-default vehicles are used, please provide information in "Non-default Off-road Equipment" tab															
Number of Vehicles		Equipment Tier		Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving				pounds per day	1.49	16.59	14.79	0.82	0.76	0.02	2,359.02	0.74	0.02	2,383.88	2,383.88
Paving				tons per phase	0.04	0.46	0.41	0.02	0.02	0.00	64.87	0.02	0.00	65.56	65.56
Total Emissions all Phases (tons per construction period) ==>					0.32	2.84	3.24	0.16	0.15	0.01	507.09	0.13	0.00	511.71	511.71

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		231		8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89		8
Generator Sets		84		8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130		8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET

Attachment B

Construction Energy Consumption Calculations

Construction Energy Use

Off-Road Construction Equipment Energy Use													
Phase	Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total kBtu	
Grubbing/Land Clearing	Near-Term Construction (2021 to 2024)												
	Concrete/Industrial Saws	Diesel	81	0.73	2	8.0	22	0.0151464	0.89561	14.330	315.3	43,820	
	Crawler Tractors	Diesel	212	0.43	1	8.0	22	0.0221662	2.02067	16.165	355.6	49,434	
	Excavators	Diesel	158	0.38	2	8.0	22	0.0197641	1.18664	18.986	417.7	58,060	
	Rubber Tired Loaders	Diesel	203	0.36	1	8.0	22	0.0186692	1.36434	10.915	240.1	33,377	
	Signal Boards	Diesel	6	0.82	2	8.0	22	0.0196533	0.09669	1.547	34.0	4,731	
	Skid Steer Loaders	Diesel	65	0.37	1	8.0	22	0.0190568	0.45832	3.667	80.7	11,212	
	Sweeper/Scrubbers	Diesel	64	0.46	1	8.0	22	0.0236511	0.69629	5.570	122.5	17,034	
	Tractors/Loaders/Backhoes	Diesel	97	0.37	1	8.0	22	0.0191052	0.68569	5.485	120.7	16,775	
Grading/Excavation	Grubbing/Land Clearing Subtotal											1,686.6	234,443
	Crawler Tractors	Diesel	212	0.43	1	8.0	33	0.0221662	2.02067	16.165	533.5	74,151	
	Excavators	Diesel	158	0.38	2	8.0	33	0.0197641	1.18664	18.986	626.5	87,090	
	Graders	Diesel	187	0.41	2	8.0	33	0.0211523	1.62175	25.948	856.3	119,023	
	Rollers	Diesel	80	0.38	2	8.0	33	0.0194120	0.59012	9.442	311.6	43,310	
	Rubber Tired Loaders	Diesel	203	0.36	1	8.0	33	0.0186692	1.36434	10.915	360.2	50,066	
	Scrapers	Diesel	367	0.48	2	8.0	33	0.0249847	4.40131	70.421	2,323.9	323,021	
	Signal Boards	Diesel	6	0.82	2	8.0	33	0.0196533	0.09669	1.547	51.1	7,097	
	Sweeper/Scrubbers	Diesel	64	0.46	1	8.0	33	0.0236511	0.69629	5.570	183.8	25,551	
Drainage/Utilities/Sub-Grade	Tractors/Loaders/Backhoes	Diesel	97	0.37	4	8.0	33	0.0191052	0.68569	21.942	724.1	100,648	
	Grading/Excavation Subtotal											5,970.9	829,956
	Air Compressors	Diesel	78	0.48	1	8.0	88	0.0151464	0.56708	4.537	399.2	55,492	
	Bore/Drill Rigs	Diesel	221	0.5	1	8.0	88	0.0258104	2.85205	22.816	2,007.8	279,090	
	Concrete/Industrial Saws	Diesel	81	0.73	1	8.0	88	0.0151464	0.89561	7.165	630.5	87,641	
	Generator Sets	Diesel	84	0.74	1	8.0	88	0.0151464	0.94150	7.532	662.8	92,132	
	Graders	Diesel	187	0.41	1	8.0	88	0.0211523	1.62175	12.974	1,141.7	158,698	
	Plate Compactors	Diesel	8	0.43	1	8.0	88	0.0196533	0.06761	0.541	47.6	6,616	
	Pumps	Diesel	84	0.74	1	8.0	88	0.0151464	0.94150	7.532	662.8	92,132	
Paving	Rough Terrain Forklifts	Diesel	100	0.4	1	8.0	88	0.0208141	0.83256	6.660	586.1	81,471	
	Signal Boards	Diesel	6	0.82	2	8.0	88	0.0196533	0.09669	1.547	136.1	18,924	
	Sweeper/Scrubbers	Diesel	64	0.46	1	8.0	88	0.0236511	0.69629	5.570	490.2	68,136	
	Tractors/Loaders/Backhoes	Diesel	97	0.37	3	8.0	88	0.0191052	0.68569	16.456	1,448.2	201,295	
	Trenchers	Diesel	78	0.5	1	8.0	88	0.0260309	1.01521	8.122	714.7	99,344	
	Drainage/Utilities/Sub-Grade Subtotal											8,927.8	1,240,971
	Pavers	Diesel	130	0.42	1	8.0	55	0.0215252	1.17527	9.402	517.1	71,880	
	Paving Equipment	Diesel	132	0.36	1	8.0	55	0.0183336	0.87121	6.970	383.3	53,283	
	Rollers	Diesel	80	0.38	2	8.0	55	0.0194120	0.59012	9.442	519.3	72,184	
Paving Subtotal	Signal Boards	Diesel	6	0.82	2	8.0	55	0.0196533	0.09669	1.547	85.1	11,828	
	Tractors/Loaders/Backhoes	Diesel	97	0.37	3	8.0	55	0.0191052	0.68569	16.456	905.1	125,810	
	Paving Subtotal											2,410.0	334,984
Project Construction Off-Road Total								18,995.4		2,640,354			

On-Road Construction Energy Use												
Phase	Trip Type (Fleet Mix)	Trips (1-way)	Distance (miles)		Work Days	Total VMT	gallons diesel/VMT		Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu
Near-Term Construction (2021 to 2024)												
Grubbing/Land Clearing	Worker (LDA, LDT1, LDT2)	14	20		22	6,160	0.0001611		0.99	0.035181679	216.7	27,011
	Hauling (HHDT)	8	20		22	3,520	0.1458163		513.3	-	-	71,345
Grading/Excavation	Worker (LDA, LDT1, LDT2)	44	20		33	29,040	0.0001611		4.7	0.035181679	1,021.7	127,338
Drainage/Utilities/Sub-Grade	Worker (LDA, LDT1, LDT2)	30	20		88	52,800	0.0001611		8.5	0.035181679	1,857.6	231,524
Paving	Worker (LDA, LDT1, LDT2)	24	20		55	26,400	0.0001611		4.3	0.035181679	928.8	115,762
	Hauling (HHDT)	10	15		55	8,250	0.1458163		1,203.0	-	-	167,215
Project Construction On-Road Total						126,170			1,734.7		4,024.8	740,195

Water Truck Energy Use												
Location	Trip Type (Fleet Mix)	Trips (1-way)	Distance (miles)		Work Days	Total VMT	gallons diesel/VMT		Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu
Near-Term Construction (2021 to 2024)												
On-site (10 mph)	HHDT	10	1		198	1,980	0.0698785		138.4	-	-	19,232
Off-site (on-road average speed)	HHDT	10	3		198	5,940	0.1458163		866.1	-	-	120,395
Project Water Truck Total						7,920			1004.5		0.0	139,627

Project Construction Energy By Phase				
Phase	Days	Gallons Diesel	Gallons Gas	kBtu
Grubbing/Land Clearing	22	2,313	217	348,313
Grading/Excavation	33	6,143	1,022	980,565
Drainage/Utilities/Sub-Grade	88	9,383	1,858	1,534,551
Paving	55	3,896	929	656,746
Project Construction Total		21,735	4,025	3,520,176

Project Construction Energy By Source			
Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	18,995	-	2,640,354
On-Road Construction Traffic	1,735	4,025	740,195
Water Trucks	1,005	-	139,627
Project Construction Total	21,735	4,025	3,520,176

Notes:

- Off-road equipment types, horsepower, count and hours from Road Construction Emissions Model Version 9.0.0. <http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools>.
- Off-road fuel consumption factors from CARB OFFROAD2017- ORION Web Database, for Riverside county, aggregate model years for 2020. <https://www.arb.ca.gov/orion/>
- On-road trip distances from SMAQMD Road Construction Emissions Model Version 9.0.0.
- On-road fuel consumption factors weighted average for fleet mix from CARB EMFAC2107 Web Database, for Riverside county, aggregate model years for 2020, aggregate speeds. <https://www.arb.ca.gov/emfac/2017/>.
- 1 Gallon of diesel = 139 kBtu; 1 gallon of gasoline = 124 kBtu.

OFFROAD2017 (v1.0.1) Emissions Inventory

Region Type: County

Region: Riverside

Calendar Year: 2020

Scenario: All Adopted Rules - Exhaust

Vehicle Classification: OFFROAD2017 Equipment Types

Units: Emissions: tons/day, Fuel Consumption: gallons/year, Activity: hours/year, HP-Hours: HP-hours/year

Region	CalYr	VehClass	Mdlyr	HP_Bin	Fuel	Fuel_gpy	Total_Activity_hpy	Total_Population	Horsepower_Hours_hhpy	Gallons/hp-hour
Riverside	2020	ConstMin - Bore/Drill Rigs	Aggregated	300	Diesel	66888.29	12535.53	39.33	2591525.92	0.02581039
Riverside	2020	ConstMin - Crawler Tractors	Aggregated	300	Diesel	338472.40	73829.18	172.47	15269734.16	0.02216623
Riverside	2020	ConstMin - Excavators	Aggregated	175	Diesel	720267.94	249598.47	432.14	36443279.41	0.01976408
Riverside	2020	ConstMin - Graders	Aggregated	300	Diesel	928670.58	202564.07	272.93	43903999.68	0.02115230
Riverside	2020	ConstMin - Pavers	Aggregated	175	Diesel	95464.91	28116.97	74.69	4435037.83	0.02152516
Riverside	2020	ConstMin - Paving Equipment	Aggregated	175	Diesel	40602.92	15297.54	34.01	2214674.91	0.01833358
Riverside	2020	ConstMin - Rollers	Aggregated	100	Diesel	229914.51	135763.36	419.16	11843962.14	0.01941196
Riverside	2020	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	581193.81	290462.62	1050.10	27923141.73	0.02081405
Riverside	2020	ConstMin - Rubber Tired Loaders	Aggregated	300	Diesel	1776121.51	451941.84	429.60	95136490.27	0.01866919
Riverside	2020	ConstMin - Scrapers	Aggregated	600	Diesel	3273160.80	310550.92	662.82	131006547.30	0.02498471
Riverside	2020	ConstMin - Skid Steer Loaders	Aggregated	75	Diesel	581880.01	433336.18	1243.54	30533939.43	0.01905683
Riverside	2020	ConstMin - Sweepers/Scrubbers	Aggregated	75	Diesel	18508.92	10801.39	18.93	782581.16	0.02365112
Riverside	2020	ConstMin - Tractors/Loaders/Backhoes	Aggregated	100	Diesel	3521715.92	2217206.23	3618.93	184332817.79	0.01910520
Riverside	2020	ConstMin - Trenchers	Aggregated	100	Diesel	51561.40	23610.19	72.78	1980773.89	0.02603094
Riverside	2020	Industrial - Other General Industrial Equipment	Aggregated	25	Diesel	4.98	10.13	0.05	253.36	0.01965334
Riverside	2020	Portable Equipment - Non-Rental Compressor	Aggregated	100	Diesel	51789.62	39787.45	101.05	3419259.69	0.01514644
Riverside	2020	Portable Equipment - Non-Rental Generator	Aggregated	100	Diesel	216396.35	144712.32	110.16	14286942.15	0.01514644
Riverside	2020	Portable Equipment - Non-Rental Other Portable Equip	Aggregated	100	Diesel	77738.07	55917.41	182.32	5132430.66	0.01514644
Riverside	2020	Portable Equipment - Non-Rental Pump	Aggregated	100	Diesel	37589.65	26292.75	85.54	2481747.76	0.01514644

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: RIVERSIDE

Calendar Year: 2020

Season: Annual

Vehicle Classification: EMFAC2007 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

2020 Construction Fleet Fuel Consumption								
Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	Fuel Consumption (1000 Gal.)	Gallons/VMT
Worker (LDA, LDT1, LDT2)								
RIVERSIDE	2020	LDA	Aggregated	Aggregated	DSL	264687.76	5.321149244	
RIVERSIDE	2020	LDT1	Aggregated	Aggregated	DSL	1016.7365	0.040093804	
RIVERSIDE	2020	LDT2	Aggregated	Aggregated	DSL	51585.182	1.40092881	
				Diesel Total		317289.68	6.762171858	0.000161104
RIVERSIDE	2020	LDA	Aggregated	Aggregated	GAS	29235242	963.6714084	
RIVERSIDE	2020	LDT1	Aggregated	Aggregated	GAS	2948932.8	114.713676	
RIVERSIDE	2020	LDT2	Aggregated	Aggregated	GAS	9472449.7	398.3276907	
				Gas Total		41656625	1476.712775	0.035181679
				Total VMT		41973914		
Water Truck (HHDT)								
RIVERSIDE	2020	HHDT	Aggregated	Aggregated	DSL	3741870.8	545.6256403	0.145816268
RIVERSIDE	2020	HHDT	Aggregated	10	DSL	2197.0558	0.153526957	0.069878496
Hauling (HHDT)								
RIVERSIDE	2020	HHDT	Aggregated	Aggregated	DSL	3741870.8	545.6256403	0.145816268