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Chapter 3: Analyzing Construction Emissions

Analyzing Construction Emissions

3.1. Assessing Construction Impacts for Criteria Pollutants and GHG

Construction emissions are generated from activities associated during the construction phase of a project. Construction activities are typically short-term or temporary in duration. These activities include the operation of heavy on-road and off-road equipment for soil hauling and material delivery or soil disturbance, grading, moving, piling construction materials, open storage piles and both active and inactive disturbed surface areas. The emissions of criteria air pollutants and GHG may occur as a result of these related activities. Sometimes a project's construction-related emissions can have a significant impact with respect to air quality and/or global climate change.

The use of heavy equipment and earth moving operations during project construction can generate fugitive dust along with engine combustion emissions which may have substantial temporary impacts on local air quality. Particulate matter with a particle size that is less than ten microns in size (PM₁₀) can come from fugitive dust sources including open fields, roadways, storage piles, earthwork, etc. Fugitive dust emissions results from land clearing, demolition, ground excavation, cut and fill operations and equipment traffic usage on temporary roads at the construction site.



Most construction equipment uses diesel-fueled engines. Diesel exhaust is an emission source that can have a significant effect on health. In July 1999, the CARB listed diesel particulate matter (DPM) from diesel exhaust as a toxic air contaminant, with both chronic and carcinogenic public health risks. In addition to DPM, diesel exhaust also includes emissions of criteria pollutant such as NO_x and ROG as well as GHG. Emissions are most significant with the use of large, diesel-fueled scrapers, loaders, bulldozers, haul trucks, compressors, generators and other heavy equipment. Emissions from both fugitive dust and/or combustion sources can vary substantially day-to-day depending on the level of activity, the specific type of operation, moisture content of soil, use of dust suppressants and the prevailing weather conditions.

3.2. Determining Project Construction Emissions

When calculating emissions for construction activities (NO_x, ROG, DPM, GHG and fugitive PM), specific information about each activity and/or phase of the construction project is needed. Information required for calculating construction emissions, which requires increasingly detailed information to produce more accurate results, is described below.

The project specific information for calculating the construction emissions are listed but not limited to:

- Duration (years) of the entire project's construction period (starting and ending year)
- Proposed construction phases (demolition, site preparation, etc.),
- Duration (days) of each construction phase if available,
- Daily disturbed acreage,
- Quantities of soil imported/exported if proposed,
- Size of units being demolished if proposed,

- Types of off-road/construction equipment,
- Detailed equipment operation information if possible (horsepower, loading factors, daily operation hours, engine manufacturer year, etc.),
- Trips and VMT from construction workers, and
- Assumption and emission rates applied for dust from material movement, on-road fugitive dust, and architectural paint application.

Please note that the developer can use the model's default settings (discussed in the following section) to calculate the project-related construction impacts without knowing the exact construction duration of each phase along with the equipment fleet involved in the project.

3.3. Estimating Project Construction Emissions

For proposed land use development projects, the District recommends using the latest version of **California Emission Estimator Model** (CalEEMod) modeling analysis tools to quantify construction-related criteria air pollutants and GHG emissions. CalEEMod includes the CARB's OFFROAD 2011 and U.S. EPA AP-42 emission factors for calculating construction related emissions. It provides an estimation of construction related combustion and fugitive dust emissions based on the project's proposed construction activities and the modeling outputs including peak daily emissions of ROG, NOx, PM, and annual GHG emissions.

CalEEMod has default construction phases and a construction list which are from the construction site survey data developed by the South Coast Air Quality Management District (SCAQMD) to provide user-friendly functionality when there is no detail project-specific information available. The user can overwrite the CalEEMod default values to get a more accurate emission estimation if there is project-specific information available. Modeling results with all assumptions, estimates, and calculation methods should be provided to the District for the review of the project.

If the proposed project includes soil importing/exporting or demolition activities, the user needs to select the necessary phases to calculate off-site hauling trips with the associated emissions. Quantities of the soil imported/exported or the size of the unit for demolition will need to be entered into the model. In addition, the trip length associated with the construction workers or hauling trucks will need to be entered into the model. This hauling component is an important step and is often overlooked resulting in an under-estimation of emissions. If the hauling fleet is unknown at the time of modeling, the default settings can be used with it notated in the CEQA document. [APPENDIX B](#) summarizes the District's modeling recommendations for the project's CalEEMOD analysis.

- ✓ For further information on CalEEMod visit: <http://www.caleemod.com>
- ✓ [APPENDIX B: PCAPCD Tips for Using CalEEMod](#)

As described previously, CalEEMod is recommended to quantify a project's related construction emissions. However, CalEEMod may not be suitable to estimate linear construction projects such as the construction of a new roadway, road widening, a roadway overpass, levee, or pipeline. The District recommends the use of the most recent version of the [Roadway Construction Emissions Model](#) developed by Sacramento Metropolitan Air Quality Management District (SMAQMD). The Roadway Construction Emissions Model is a spreadsheet-based model that is able to use basic project information (e.g., total construction months, project type, total project area) to estimate exhaust emissions from heavy-duty construction equipment, haul trucks, and worker commute trips associated with linear construction projects, as well as fugitive dust. Users shall refer to the Instructions worksheet in the Roadway Construction Emissions Mode.

- ✓ SMAQMD Roadway Construction Emission Model
<http://www.airquality.org/residents/ceqa-land-use-planning/ceqa-guidance-tools>

3.4. Diesel Idling Restrictions for Construction Phases

The CARB and local jurisdictions recognize the public health risk reductions that can be realized by idling limitations for on-road and off-road equipment. The following summarizes the special idling restriction requirements from CARB and local jurisdictions for construction activity, including the use of both on-road (i.e., dump truck) and off-road (i.e., backhoe) equipment:

Idling Restriction Requirements from state agency and local jurisdictions

- Off-road diesel equipment shall comply with the five minute idling restriction identified in Section 2449(d)(3) of the CARB's In-Use Off-Road Diesel regulation:
www.arb.ca.gov/regact/2007/ordiesl07/frool.pdf. 📄 (pdf)
- The following local jurisdictions have specific code requirements to limit an off-road equipment operator to not cause or allow an off-road piece of equipment to idle at any location for more than five consecutive minutes:
 - [City of Auburn](#), City Municipal Code Section 71.78
 - [City of Lincoln](#), City Code of Ordinance Section 10.14
 - [Placer County](#), Code Section 10.14

3.5. Disposal of Vegetation by Burning During Construction

During construction, if the disposal of vegetation is to be by burning, it may only take place with a District burn permit issued under the conditions set forth in Rule 304 - Land Development Smoke Management. While the rule provides for this type of burning, in most cases for development projects the burning of vegetation may not be approved, dependent upon the availability of alternatives to burning, site location, and/or the distance to sensitive receptors. Vegetation can be removed to a disposal or a composting site, such as a landfill, or can be chipped and used on site.



If the burning of vegetation is proposed for a project during construction, the modeling analysis should include these emissions along with any mitigation of potentially significant impacts associated with this activity.

3.6. Permits for Construction

Portable equipment and engines 50 horsepower (hp) or greater, used during construction activities, require either a registration certificate issued by CARB, based on the [California Statewide Portable Equipment Registration Program \(PERP\)](#) or a District permit to operate. The following is a partial list of equipment that may require a permit:

- Power screens, conveyors, diesel engines, and/or crushers;
- Portable generators and equipment with engines that are 50 hp or greater;
- Construction related internal combustion engines;
- Unconfined abrasive blasting operations;
- Concrete batch plants;

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- Rock and pavement crushing;
- Tub grinders;
- Trommel screens; and,
- Asphalt batch plants.

More information regarding the CARB and the District's PERP permit can be found at the following websites:

- ✓ For CARB PERP information visit: <https://www.arb.ca.gov/portable/portable.htm>
- ✓ For PCAPCD PERP information visit: <http://www.placerair.org/perppermittinandregistration>

3.7. Significance Thresholds for Project-Level Construction Emissions

Table 3-1 shows the significance thresholds adopted by the District's Board of Directors on October 13, 2016 for a project's related construction criteria pollutants and GHG emissions (as shown in Table 2-1 and 2-3). Please note that the thresholds for criteria pollutants are daily emissions (pounds per day) and the threshold for GHG is annual emissions (metric tons per year).

| Construction Phase Project-Level | | | |
|-------------------------------------|-----------|-----------|---------------------------|
| ROG | NOx | PM10 | GHG |
| (lbs/day) | (lbs/day) | (lbs/day) | (MT CO ₂ e/yr) |
| 82 | 82 | 82 | 10,000 |

3.8. Steps in Determining Significance for Construction Emissions

The following steps should be considered when determining the significance of construction related criteria pollutants and GHG emissions.

Step 1: Emissions Quantification

The project's CEQA document should identify its analytical methodology for estimating the project's related construction emissions. The District recommends using the most current version of CalEEMod to quantify construction emissions for proposed land use development projects. APPENDIX B summarizes the District's modeling recommendations for the project's CalEEMod analysis.

Step 2: Comparison of Unmitigated Construction Emissions with the District's Significance Thresholds

Following the quantification of the project-related construction emissions, the maximum daily emissions for each criteria pollutant and annual emissions for GHG should be compared with the applicable thresholds of significance. For instance, with respect to PM₁₀ and PM_{2.5}, compare the total amount of emissions from both the exhaust and fugitive sources with the applicable thresholds of significance. If the construction-related emissions have been quantified using multiple models or model runs, calculate the criteria air pollutants and GHG from each where the said activities would overlap. In those cases where the exact timing of the construction activities is not known, the conservative approach would be to calculate any phases that could potentially overlap. At this step, the project-related construction emissions should consider all the state and federal rules and regulations.

If the maximum daily criteria pollutant emissions and annual GHG emissions do not exceed any of the significance thresholds presented in Table 3-1, the project would result in a less-than-significant impact to air quality (for construction impacts). If any pollutant would exceed its corresponding threshold, the proposed project would result in a significant impact to air quality and would require mitigation measures for emission reductions.

Step 3: Identification of Mitigation Measures and Emission Reductions

For all proposed projects, the District recommends the implementation of all applicable mitigation measures and compliance with the District and local jurisdiction's Rules and Regulations associated with construction activity. APPENDIX A contains the related District's rules and regulations. Mitigation measures can be included from the following sources:

- special commitment within the Project Description,
- recommended measures within the CEQA-compliant environmental document, and
- regulatory measures as required by the District and local jurisdictions.

Please note that any commentments made within the project's design features that serve to mitigate impacts should be fully evaluated within the related impact analysis and mitigation discussion, to ensure that the feature does in fact mitigate the project's potential adverse impacts²³. The inclusion of mitigation measures within the environmental document will result in those measures being included as conditions of approval during the entitlement phase of project approval, which may also include a mitigation monitoring reporting plan (MMRP). In addition, it is at the lead agency's discretion as to whether that the local jurisdiction's rules and regulations are reflected within the project related emissions, either before or after mitigation, in the modeling analysis for the project's construction impacts.

- ✓ APPENDIX A: PCAPCD Rules and Regulations
- ✓ APPENDIX C: PCAPCD Recommended Construction mitigation measures

Step 4: Impact Significance Determination

The project's CEQA document should include the total daily emissions for ROG and NOx and annual emissions for GHG in order to evaluate whether it exceeds the significance threshold. The project's mitigated emissions will need to be identified. If the implementation of the mitigation measures reduces all construction related criteria air pollutants and GHG emissions to the level below thresholds, the impact to air quality and GHG impacts would then be mitigated to a less than significant level. If any criteria air pollutant or GHG emissions still exceeds its corresponding thresholds after mitigation implementation, the project's related construction impact would remain significant and unavoidable.

Figure 3-1 summarizes the steps recommended by the District in determining potential significance of construction impacts from criteria pollutants and GHGs.

²³ Trisha Lee Lotus v. Department of Transportation (2014) 223 Cal. App. 4th 645

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Figure 3-1: Steps in Determining Potential Significance of Construction Impacts

3.9. Dust Control Plan

Fugitive dust is particulate matter discharged into the atmosphere from construction activities. Examples of dust sources are excavating and trenching, drilling, boring, earthmoving and grading operations, pavement or masonry cutting operations, brush clearing, travel on unpaved roads inside and/or outside construction sites, and wind-blown dust from uncovered graded areas and storage piles. District [Rule 228, Fugitive Dust](#) establishes the minimum dust mitigation and control requirements along with the standards to be met from the activities that generate fugitive dust. Rule 228's minimum dust mitigation and control requirements must be used for all construction and grading activities.

In addition to Rule 228, the District may recommend that lead agencies require land use projects to prepare a dust control plan (DCP) if a land use project proposes to disturb an area greater than one acre. A DCP should identify the fugitive dust sources at the construction site and describe all of the dust control measures to be implemented before, during, and after any dust generating activities for the duration of a land use project. If a DCP is required for a land use project it must be submitted to and approved by the District prior to any construction activities.

The District has developed a dust control plan application which can be filled out online. Completion of the DCP application and subsequent approval by the District satisfies the mitigation requirements for a dust control plan. Failure to submit and implement the plan is subject to enforcement through the Conditions of Approval.

- ✓ District Rule 228 Fugitive Dust can be downloaded from <http://www.placerair.org/rules>
- ✓ District Dust Control Requirements: <http://www.placerair.org/dustcontrolrequirements>
- ✓ District Dust Control Plan on-line form: <http://www.placerair.org/dustcontrolrequirements/dustcontrolform>

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