# Environment | Planning | Development Solutions, Inc.

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| To: | Konnie Dobreva |
| From: | Alex J. Garber |
| Date: | 3/18/2021 |
| Re: | Air Quality, Energy, and Greenhouse Gas Impact Analysis for the Yorba Villas Residential Project |

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This technical memorandum presents an analysis of the Air Quality and greenhouse gas (GHG) impact for the proposed Yorba Villas Residential project, located on the northwest corner of Francis Avenue and Yorba Avenue in the County of San Bernardino. The project proposes the construction of 45 single family homes with a pocket park on a 13.35-acre site. The parcel on the corner of Francis and Yorba Avenue (the southeastern most portion of the project site) was developed with a single-family residence; a guest cottage, swimming pool, storage shed, mobile home, bird cage area, and a horse stable, but in 2018 the owner demolished all structures, and the site is currently an empty lot. The project site is shown in Figure 1 Project Site. To support the CEQA document for the proposed project, this report analyzes the proposed project's construction and operational impacts to air quality (emission of criterial pollutants) emissions using the California Emissions Estimator Model (CalEEMod) land use emission model.

**Summary of Air Quality, Energy and GHG Impact**

Air Quality:

The project's maximum daily emissions (regional and local) for construction and operation of the project would not exceed SCAQMD's regional thresholds of significance. In addition, all construction activities would comply with applicable SCAQMD rules and regulations, including Rule 403 to minimize fugitive PM dust emissions. Projects that do not exceed the regional thresholds are assumed to not have a significant impact on a project level and cumulative level. Therefore, the proposed project would have less than significant Air Quality impacts.

Energy:

The project's energy consumption for construction does not have any unusual characteristics and is not less efficient compared with other similar construction sites. The operation of the project is also similar to other residential projects and would comply with Title 24 as well as all applicable city business and energy codes and ordinances.

GHG:

Finally, the proposed project's net GHG emissions of 821 $MTCO_2e$ per year are below the SCAQMD Significance threshold of 3,000 $MTCO_2e$ per year for residential projects. Therefore, the project has a less then significant impact on GHG emissions.

## Air Quality Impact Tables

Regional Emissions

The SCAQMD has adopted maximum daily emission thresholds[1] (pounds/day) for the criteria pollutants during construction and operation of a project. While incremental regional air quality impacts of an individual project are generally very small and difficult to measure, SCAQMDs regional maximum emission thresholds set standards to reduce the burden of SCAQMD to attain and maintain ambient air quality standards. The regional thresholds apply to the criteria pollutants mentioned above and can be found in Table 1: *Regional Construction Emissions Estimates* and Table 2: *Regional Operational Emissions Estimates* along with the CalEEMod projects emissions. These emission thresholds include the project emissions generated both from onsite sources (such as off-road construction equipment and fugitive dust) and offsite sources (vehicle travel leaving and arriving to the site). As can be seen in Table 1 and Table 2, the project would have less then significant regional air quality impacts.

**Table 1. Regional Construction Emission Estimates**

| Construction Activity | Maximum Daily Regional Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROG | $NO_x$ | CO | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ |
| 2021 | | | | | | |
| Site Prep | 4.0 | 40.6 | 21.9 | 0.0 | 9.3 | 5.8 |
| Grading | 4.3 | 46.5 | 31.7 | 0.1 | 5.6 | 3.3 |
| Building Construction | 2.6 | 20.5 | 22.0 | 0.0 | 2.2 | 1.3 |
| Maximum Daily Emissions | 4.3 | 46.5 | 31.7 | 0.1 | 9.3 | 5.8 |
| 2022 | | | | | | |
| Building Construction | 2.3 | 18.4 | 21.6 | 0.0 | 2.1 | 1.1 |
| Paving | 1.7 | 11.2 | 15.2 | 0.0 | 0.7 | 0.6 |
| Architectural Coating | 28.2 | 1.9 | 3.2 | 0.0 | 0.3 | 0.2 |
| Maximum Daily Emissions | 28.2 | 18.4 | 21.6 | 0.0 | 2.1 | 1.1 |
| Maximum Daily Emission 2021-2022 | 28.2 | 45.5 | 31.7 | 0.1 | 9.3 | 5.8 |
| SCAQMD Significance Thresholds | 75 | 100 | 550 | 150 | 150 | 55 |
| **Threshold Exceeded?** | **No** | **No** | **No** | **No** | **No** | **No** |

**Table 2. Regional Operational Emission Estimates**

| Operational Activity | Maximum Daily Regional Emissions (pounds/day) | | | | | |
|---|---|---|---|---|---|---|
| | ROG | $NO_x$ | CO | $SO_x$ | $PM_{10}$ | $PM_{2.5}$ |
| Area | 2.0 | 0.8 | 4.0 | 0.0 | 0.1 | 0.1 |
| Energy | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 |
| Mobile | 1.1 | 3.1 | 11.2 | 0.0 | 3.1 | 0.9 |
| Total Project Operational Emissions | 3.1 | 4.2 | 15.3 | 0.0 | 3.2 | 1.0 |
| SCAQMD Significance Thresholds | 55 | 55 | 550 | 150 | 150 | 55 |
| **Threshold Exceeded?** | **No** | **No** | **No** | **No** | **No** | **No** |

[1] SCAQMD April 2019. Found on 9/3/2020 at http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf

Local Emissions

Localized significance thresholds (LSTs) were also adopted by the SCAQMD due to project-related construction or operational air emissions having the potential to exceed the state and national air quality standards in the project vicinity, while not exceeding the regional emission significance thresholds adopted by the SCAQMD. These thresholds set the maximum rates of daily construction or operational emissions from a project site that would not exceed a national or State ambient air quality standard[2]. The differences between regional thresholds and LSTs are as follows:

1. Regional thresholds include all sources of project construction and operational emissions generated from onsite and offsite emission sources whereas the LSTs only consider the emissions generated from onsite emission sources.
2. LSTs only apply to CO, $NO_x$, $PM_{10}$, and $PM_{2.5}$, while regional thresholds include both ROG and $SO_x$.
3. Regional Thresholds apply to emission sources located anywhere within the SCAQMD whereas the LSTs are location dependent and also depend on the size of the project, and emission location relative to the nearest sensitive receptor.

A sensitive receptor is defined as an individual who is most susceptible to negative health affects when exposed to air pollutants including children, the elderly, and adults with chronic health issues. Such receptors include residences, schools, elderly care centers, and hospitals. SCAQMD provides screening look up tables (Appendix C of the SCAQMD 2008 Final Localized Significance Threshold Methodology)[3] for projects that disturb less than or equal to 5 acres in size in a day. These tables were created to easily determine if the daily emissions of $NO_x$, CO, $PM_{10}$, and $PM_{2.5}$ from a project could result in a significant impact to the local air quality. The thresholds are determined by:

- Source receptor area (SRA), the geographic area within the SCAQMD that can act as both a source of emissions and a receptor of emission impacts (project is located within SRA 33, Southwest San Bernardino Valley),
- Size of the project,
- Distance to the nearest sensitive receptor.

The phase with the most significant impact is the site preparation phase, which would grade 3.5 acres per day, so 3.5 acres were used for the look up tables. The thresholds between 2 acres and 5 acres from Appendix C were interpolated as the tables give thresholds for 2-acre and 5-acre sites. Distance to the nearest sensitive receptor also determines the emission thresholds. The sensitive receptors closest to the project include residential homes across Yorba Avenue and Francis Avenue and on the project boundary, about 20 feet, to the west and north. These receptors (distance from the project property line to the residential structure) are less than the minimum distance provided in the lookup tables (25 meters). Therefore, 25 meters (82 feet) was used. Table 3: *Localized Construction Emission Estimates* shows the thresholds and estimated maximum daily construction emissions for the proposed project. As seen in Table 3, the proposed project has a less then significant localized construction air quality impact.

[2] SCAQMD 2008: Final Localized Significance Threshold Methodology. Referenced on 9/3/2020 at http://www.aqmd.gov/docs/defaultsource/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf

[3] SCAQMD 2008: Final Localized Significance Threshold Methodology Appendix C. Referenced on 9/16/2020 at http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf?sfvrsn=2

The LSTs for Operation are determined by the size of the project site and the distance to the nearest sensitive receptor. The proposed project is 13.35 acres; therefore, the LST look up tables would not be appropriate. According to the LST methodology, LSTs would apply to the project's stationary sources. Projects that attract mobile sources that spend long periods queuing and idling at the site, for example transfer facilities or warehouse buildings, would possibly exceed the operational localized significance thresholds. The proposed project does not attract these types of mobile sources, as there is not an expectation of vehicles idling or queueing for long periods. Therefore, due to the lack of significant stationary source emissions, no localized significance threshold for the proposed project's operation is needed.

**Table 3. Localized Construction Emission Estimates**

| Construction Activity | Maximum Daily Regional Emissions (pounds/day) | | | |
|---|---|---|---|---|
| | $NO_x$ | CO | $PM_{10}$ | $PM_{2.5}$ |
| 2021 | | | | |
| Site Prep | 40.5 | 21.2 | 9.1 | 5.8 |
| Grading | 46.4 | 30.9 | 5.4 | 3.2 |
| Building Construction | 18.7 | 17.7 | 1.0 | 1.0 |
| Maximum Daily Emissions | 46.4 | 30.9 | 9.1 | 5.8 |
| 2022 | | | | |
| Building Construction | 16.8 | 17.4 | 0.9 | 0.8 |
| Paving | 11.1 | 14.6 | 0.6 | 0.5 |
| Architectural Coating | 1.9 | 2.4 | 0.1 | 0.1 |
| Maximum Daily Emissions | 16.8 | 17.4 | 0.9 | 0.8 |
| Maximum Daily Emission 2021-2022 | 46.4 | 30.9 | 9.1 | 5.8 |
| SCAQMD Significance Thresholds | 220 | 1,713 | 11 | 7 |
| **Threshold Exceeded?** | **No** | **No** | **No** | **No** |

**Energy**

The State CEQA Guidelines do not have specific thresholds for Energy consumption. Rather, the question in Appendix G: VI Energy (a) asks, "[Does the proposed project] Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation?". Therefore, for the purpose of this analysis, a significant impact would occur if:

- The Project design and/or location encourages wasteful, inefficient, and unnecessary consumption of energy, especially fossil fuels such as coal, natural gas, and petroleum, as well as the use of fuel by vehicles anticipated to travel to and from the project.

The following assumptions were used to calculate the energy consumption of the proposed project:

- The project's construction and operational energy consumption would be provided by Southern California Edison Company.
- Construction equipment fuel consumption derived from ARB Offroad2017 emission model
- Fuel Consumption from vehicle travel derived from ARB EMFAC2017 emission model
- Electrical and natural gas usage derived from the CalEEMod model

Construction

Electricity and Natural Gas Usage:

Due to the project size and the fact that construction is temporary, the electricity used would be substantially less than that required for project operation and would have a negligible contribution to the project's overall energy consumption. The electric power used would be for as-necessary lighting and electronic equipment such as computers inside temporary construction trailers. Natural Gas is not anticipated to be needed for construction activities. Any consumption of natural gas would be minor and negligible in comparison to the operation of the proposed project.

Petroleum Fuel Usage:

The construction equipment associated with construction activities (off-road/heavy duty vehicles) would rely on diesel fuel as would vendor and haul trucks involved in delivering building materials and removing the demolition debris from the project site. Construction workers would travel to and from the project site throughout the duration of construction, and for a conservative analysis it is assumed that construction workers would travel in gasoline-powered passenger vehicles.

Table 4: Construction Equipment Fuel Usage, used the total fuel consumption and horsepower-hour data contained within the ARB OffRoad2017 emission model for specific types of diesel construction equipment. It should be noted that the total fuel consumption is a conservative analysis and would likely overstate the amount of fuel usage, as specific construction equipment is not expected to operate during the duration of the construction activity (i.e. crane). Table 5: Estimate Project Vehicle Fuel Usage, summarizes the project's construction vehicle fuel usage based on vehicle miles traveled and fuel usage factors contained in the ARB EMFAC2017. The trips included are worker vehicles, vendor vehicles, and haul vehicles. Table 6: Total Construction Fuel Usage, shows the overall fuel consumption for construction of the proposed project.

## Table 4. Construction Equipment Fuel Usage

| Activity | Equipment | Number | Hours per day | Horse-power | Load Factor | Days of Construction | Total Horsepower-hours | Fuel Rate (gal/hp-hr) | Fuel Use (gallons) |
|---|---|---|---|---|---|---|---|---|---|
| Site Preparation | Rubber Tired Dozers | 3 | 8 | 247 | 0.40 | 10 | 23,712 | 0.020584 | 488 |
| | Tractors/Loaders/Backhoes | 4 | 8 | 97 | 0.37 | 10 | 11,485 | 0.019134 | 220 |
| Grading | Excavators | 2 | 8 | 158 | 0.38 | 30 | 28,819 | 0.019863 | 572 |
| | Graders | 1 | 8 | 187 | 0.41 | 30 | 18,401 | 0.021158 | 389 |
| | Rubber Tired Dozers | 1 | 8 | 255 | 0.40 | 30 | 24,480 | 0.020584 | 504 |
| | Scrapers | 2 | 8 | 367 | 0.48 | 30 | 84,557 | 0.024981 | 2,112 |
| | Tractors/Loaders/Backhoes | 2 | 8 | 97 | 0.37 | 30 | 17,227 | 0.019134 | 330 |
| Model Building Construction | Cranes | 1 | 8 | 231 | 0.29 | 300 | 160,776 | 0.014890 | 2,394 |
| | Forklifts | 3 | 8 | 89 | 0.20 | 300 | 128,160 | 0.010445 | 1,339 |
| | Generator Sets | 1 | 8 | 84 | 0.74 | 300 | 149,184 | 0.042345 | 6,317 |
| | Tractors/Loaders/Backhoes | 3 | 8 | 97 | 0.37 | 300 | 258,408 | 0.019134 | 4,944 |
| | Welders | 1 | 8 | 46 | 0.45 | 300 | 49,680 | 0.025847 | 1,284 |
| Paving | Pavers | 2 | 8 | 130 | 0.42 | 20 | 17,472 | 0.021519 | 376 |
| | Paving Equipment | 2 | 8 | 132 | 0.36 | 20 | 15,206 | 0.018476 | 281 |
| | Rollers | 2 | 8 | 80 | 0.38 | 20 | 9,728 | 0.019841 | 193 |
| Model Architectural Coating | Air Compressors | 1 | 8 | 78 | 0.48 | 20 | 5,990 | 0.027617 | 165 |
| | | | | | | | | Total | 21,854 |

**Table 5. Estimated Project Vehicle Fuel Usage**

| Construction Source | Number | VMT | Fuel Rate | Gallons of Diesel Fuel | Gallons of Gasoline Fuel |
|---|---|---|---|---|---|
| Vendor Trucks | 15 | 31,050 | 8.43 | 3,683 | 0 |
| Worker Vehicles | 172 | 458,346 | 27.43 | 0 | 16,710 |
| Total | | | | 3,683 | 16,710 |

**Table 6. Total Construction Fuel Usage**

| Construction Source | Gallons of Diesel Fuel | Gallons of Gasoline Fuel |
|---|---|---|
| Construction Vehicles | 3,683 | 16,710 |
| Off-road Construction Equipment | 21,854 | 0 |
| Total | 25,537 | 16,710 |

Operation

The operation of the proposed project would consume electricity, natural gas, and petroleum. The net energy consumption can be found in table 7: Project Annual Operational Energy Requirements, below. Electricity and Natural Gas consumption were found in the Annual CalEEMod Output Sheets in Appendix A. The gasoline consumption rates utilize the same assumptions that were used for the worker vehicles.

**Table 7. Project Annual Operational Energy Requirements**

| Operational Source | Energy Usage | |
|---|---|---|
| **Electricity (Kilowatt-Hours)** | | |
| Project | 392,242 | |
| **Natural Gas (Thousands British Thermal Units)** | | |
| Project | 1,376,830 | |
| **Petroleum (gasoline) Consumption** | | |
| | Annual VMT | Gallons of Gasoline Fuel |
| Project | 1,4342,52 | 52,288 |

Conclusion

The proposed project has no unusual characteristics that would make the construction fuel and energy consumption associated with construction of the project less efficient compared with other similar construction sites throughout the state. The consumption would also be temporary and localized. Operation of the 45 single family residential units would comply with all the energy efficiency requirements under Title 24 and all applicable city business and energy codes ordinances. Therefore, the construction and operation of the project would result in a less than significant impact for inefficient, wasteful, or unnecessary energy use, and no mitigation would be required.

**Greenhouse gas**

SCAQMD has convened a Greenhouse Gas Emissions (GHG) CEQA Significance Threshold Working Group to help lead agencies determine significance thresholds for GHG emissions when SCAQMD is not the lead agency. The last working group was held September 2010 (Meeting No. 15)[4] and proposed a tiered approach, equivalent to the existing consistency determination requirements in CEQA Guidelines Sections

[4] SCAQMD 2010. Minutes of the GHG CEQA Significance Threshold Stakeholder Working Group #15. Referenced on 9/21/2020 at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-15/ghg-meeting-15-minutes.pdf

15064(h)(3), 15125(d), or 15152(a). The most recent proposal issued in Meeting No. 15 uses a tiered approach, Tier 1 to Tier 5, to evaluate potential GHG impacts from various uses. This assessment will apply the Tier 3: Numerical Screening Thresholds approach. Tier three consists of screening values, which the lead agency can choose, but must be consistent with all projects within its jurisdiction. A project's construction emissions are averaged over 30 years and are added to the project's operational emissions. If a project's emissions are below one of the following screening thresholds, then the project impact would be is less than significant:

- Option 1: All land use types: 3,000 MT $CO_2e$ per year
- Option 2: Based on land use type: residential: 3,500 MT $CO_2e$ per year; commercial: 1,400 MT $CO_2e$ per year; or mixed use: 3,000 MT $CO_2e$ per year

Executive Order S-3-05's year 2050 goal is the basis of SCAQMD' draft Tier 3 screening level thresholds. The objective of the Executive Order is to contribute to capping worldwide $CO_2$ concentrations at 450 ppm, stabilizing global climate change. The County of San Bernardino utilizes option 1, and therefore the threshold is 3,000 MT $CO_2e$ per year.

The project's construction GHG emissions are shown in Table 8: Project Construction GHG Emissions, and the overall construction and operational emissions are shown in Table 9: Project Total GHG Emissions. These emissions were calculated using the CalEEMod Model. The Construction emissions are amortized over 30 years. As shown in Table 9, the project GHG emissions are 821 MT $CO_2e$ per year, below the 3,000 MT $CO_2e$ per year. Therefore, the project would have a less than significant GHG impact.

**Table 8. Project Construction GHG Emissions**

| Activity | Annual GHG Emissions ($MTCO_2e$) |
|---|---|
| 2021 | 381 |
| 2022 | 313 |
| Total Emissions | 694 |
| Total Emissions Amortized Over 30 Years | 21 |

**Table 9. Project Total GHG Emissions**

| Activity | Annual GHG Emissions ($MTCO_2e$) |
|---|---|
| Project Operational Emissions | |
| Area | 12 |
| Energy | 169 |
| Mobile | 572 |
| Waste | 27 |
| Water | 20 |
| Total Project Gross Operation Emissions | 800 |
| Project Construction Emissions | 21 |
| Total Emissions | 821 |
| Significance Threshold | 3,000 |
| **Threshold Exceeded?** | **No** |

**Figure 1: Project Site**