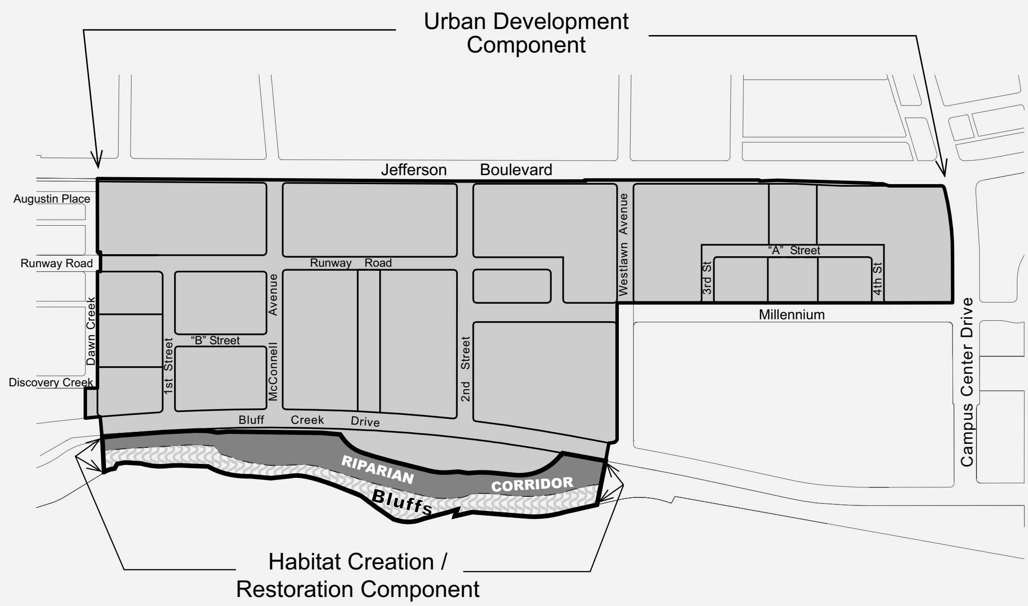
Draft Environmental Impact Report

(DEIR)

Village at Playa Vista



Volume VII

Technical Appendix E

E. Air Quality

City of Los Angeles/EIR No. ENV-2002-6129-EIR

2003

State Clearinghouse No. 2002111065

Printed on Recycled Paper

DRAFT

ENVIRONMENTAL IMPACT REPORT (EIR)

VILLAGE AT PLAYA VISTA

TECHNICAL APPENDICES

VOLUME VII

APPENDIX E:

AIR QUALITY TECHNICAL APPENDIX

City of Los Angeles
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AIR QUALITY TECHNICAL APPENDIX

CONSTRUCTION AND OPERATIONAL EMISSION CALCULATION METHODOLOGIES

INTRODUCTION

The air quality analysis evaluates air emissions attributable to the Project's construction and post-construction (e.g., operational) activities. Construction-related activities, which generate various pollutants include site preparation, travel by construction workers to and from the site, delivery and hauling of construction materials to and from the site, fuel combustion by on-site construction equipment, the application of architectural coatings and other building materials that release pollutants, and the Project's proposed off-site roadway improvements. Types of activities addressed in the post-construction analysis include the consumption of electricity and natural gas for site activity and the operation of on-road vehicles. Miscellaneous area sources were also considered in the operations analysis, including among other sources, consumer/commercial solvent usage, landscaping equipment, architectural and automotive coatings, restaurant charbroilers, forklifts, and emergency generators.

The analyses of both construction and operational activities include analyses of regional emissions. An analysis of the potential impacts on ambient particulate concentrations (PM_{10}), NO_2, CO, and air toxics from Project-related construction activities was also conducted. For post-construction operations, the analysis addresses local area concentrations of a specific pollutant, carbon monoxide (CO), generated by mobile sources. The modeling techniques, factors, and assumptions for each analysis are discussed in the following sections below.

CONSTRUCTION

The Proposed Project would be developed over a period of approximately five to six years in a number of subphases. The Applicant anticipates that construction would commence before the end of 2004 and conclude in Summer 2010. In addition, off-site roadway improvements discussed in Section 4.K, Traffic and Circulation, of the Draft EIR would also occur during this time frame.

Larger infrastructure improvements, such as the construction of McConnell Avenue, Westlawn Avenue and Bluff Creek Drive within the Project Site, would occur during site preparation activities, as would implementation of the Project's Habitat Creation/Restoration Component. More localized infrastructure improvements associated with the Project, such as local streets, utility services, and park space, would be constructed simultaneously with the specific portions of the Project that these improvements support. It is anticipated that overall site preparation activities may continue in some areas of the Project while more localized infrastructure and building construction has commenced in other portions of the Project.

Construction Regional Impacts

Construction emissions for the Proposed Project are based on both current emission factor data and the magnitude of Project development. The total amount of construction, the duration of construction and the intensity of construction activity could have a substantial effect upon the amount of construction emissions, concentrations and the resulting impacts occurring at any one time. As such, the emission forecasts provided reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction is occurring in a relatively intensive manner. Construction emissions are based on a conservative construction scenario, where on-site construction and all of the off-site roadway improvements would occur concurrently. Because of these conservative assumptions, actual emissions, in all probability, would be less than those forecasted.

Construction of the Proposed Project and the project's proposed off-site roadway improvements would generate pollutant emissions from the following activities: (1) site-preparation operations (grading and related activities); (2) travel by construction workers to and from the Project site; (3) delivery and hauling of construction materials and supplies to and from the Project site; (4) fuel combustion by on-site construction equipment; (5) paving operations; and (6) the application of architectural coatings and other building materials that release reactive organic compounds (ROC).

In order to ensure that the maximum potential air quality impacts of the proposed Project would be addressed, construction emissions were calculated on a worst-case daily basis by month of activity over the entire five- to six-year duration. Off-site roadway improvement information was provided by the Project's engineer, as well as on-site site preparation and infrastructure information (e.g., square footage of demolition, clearing and grubbing, and asphalt paving; cubic yards of earthwork; and linear feet of utilities), which are included in Appendix E-1. Equipment mixes and the amount of activity per day were calculated using the subphasing schedule and crew size/daily output data provided in RSMeans Heavy Construction Cost Estimator.

Given the size of the Project, a development unit scenario was developed for both residential and commercial development. The scenarios included construction requirements (heavy-duty construction equipment, deliveries, architectural coatings, etc.) for structure excavation, foundation, building erection, and finishing for development of a 175,000-square foot office development and 150 residential units over a 12-month duration. These unit scenarios were then scheduled over the construction duration, based on the amount of residential and office development absorbed for each subphase.

On-Site Sources

As discussed above, the Proposed Project would be developed over a period of approximately five to six years in a number of subphases. Therefore, models such as California Air Resources Board's (ARB) URBEMIS2002 model would not be sophisticated enough to adequately address the construction activities.[1] Consequently, a comprehensive spreadsheet methodology was developed and is discussed in detail below.

Exhaust Emissions from Construction Equipment

All construction equipment would be diesel-powered and would operate simultaneously for 10 hours per day and approximately 50 minutes per hour. Heavy-duty construction equipment exhaust emissions were calculated based on the required equipment, as discussed above, and emission factors from ARB's URBEMIS2002. The URBEMIS2002 emission equation for a piece of equipment is as follows:

Exhaust Emissions (lbs/day) = EF x HP x LF x T x N x U **EQ. 1**

where

EF = Emission Factor for air contaminant in lbs/HP-hr (CEQA Table A9-8-B)
HP = Horse power rating of equipment
LF = Load Factor given as a percentage
T = Hours of construction equipment operation in hours/day
N = Number of pieces of equipment
U = Usage Factor (%)

Source: ARB, URBEMIS2002, May 2003.

The emissions factor is based on the construction year and on the average life expectancy of the equipment type. Pounds per brake horsepower per hour emissions and average equipment life expectancy are from Appendix B of the ARB's off-road model.

Fugitive Dust (PM_{10}) Emissions

PM_{10} emissions generated during the construction phase are generally classified into three major categories: demolition, site preparation and general construction. Demolition and site preparation include the use of heavy-duty construction equipment for excavation, material removal,

[1] *URBEMIS is an approved SCAQMD model for calculation of emissions for land use development projects.*

backfill, grading, dredging, filling and slab pouring/paving. General construction activities entail the handling and transport of construction materials and the application of architectural coatings.

Although PM_{10} emissions from construction activities are temporary, they may have a significant impact on local air quality. PM_{10} emissions often vary substantially from day to day, depending on the level of activity at the construction site, the specific operations, and the prevailing meteorological conditions. The following methodologies provide the predictive emission equations, emission factors, and default values used to calculate PM_{10} emissions for construction activities associated with Project construction.

Emissions from Material Handling Activities

$EM = K\ (0.0032)\ (U / 5)^{1.3} / (M / 2)^{1.4}\ (I)$ **EQ. 2**

where

EM = PM_{10} emissions in lbs/day
K = Particle size multiplier (dimensionless)
U = Mean wind speed in mph
M = Soil moisture content given as a percentage
I = Dirt handled or stockpiled in storage piles in tons per day

Source: AP42, Section 13.2.4-3, January 1995

Emissions from Equipment/Vehicle Travel on Unpaved Roads

$EM = K\ (S / 12)^{0.8}\ (W/ 3)^{0.4} / (M / 0.2)^{0.3}\ (VMT)$ **EQ. 3**

where

EM = PM_{10} emissions in lbs/day
K = Constant (lb/VMT)
S = Surface material silt content (%)
W = Mean vehicle weight in tons
M = Surface material moisture content (%)
VMT = Vehicle miles traveled per day

Source: AP-42, Section 13.2.2, USEPA, September 1998.

Emissions from Motor Grading

$EM = 0.051\ (S)^{2.0}\ (0.6)\ (VMT)$ **EQ. 4**

where,

EM = PM_{10} emissions in lbs/day
S = mean vehicle speed (miles per hour)
VMT = Vehicle miles traveled per day

Source: AP42, Section 11.9-1, July 1998.

Emissions from Bulldozing

$EM = (s)^{1.5} / (M)^{1.4} (0.75)$ **EQ. 5**

where

EM = PM_{10} emissions in lbs/hr

s = Material silt content (%)

M = Material moisture content (%)

Source: AP42, Section 11.9-1, July 1998

Table 1 on page 6 provides the default values used in the above equations to estimate PM_{10} emissions generated during construction activities. Daily output rates (e.g., quantity of material processed, loaded/unloaded, excavated, compacted, etc.) were based on data provided in RSMeans Heavy Construction Cost Estimator. Specific assumptions by activity are provided in Appendix E-1. Control of fugitive dust emissions is based on approved URBEMIS fugitive dust control efficiencies (e.g., watering haul roads three times daily, water exposed surfaces to keep soil moist at all time, etc.).

Reactive Organic Compound (ROC) Emissions

Construction-related activities, which generate ROC emissions primarily, include asphalt paving and the application of architectural coatings and other building materials. Emissions from these activities were calculated based on methodologies provided in URBEMIS2002.

Construction Worker Travel/Delivery and Hauling of Construction Materials

Vehicular daily construction emissions entail all emissions generated outside the Project's boundaries from worker and material transport trips. Emissions associated with material transport trips were estimated based on the quantity of material required for construction

Work crew sizes were estimated from construction contractor experience and used to estimate emissions associated with construction workers traveling to and from the work site. An average vehicle ridership of one was conservatively assumed. Emissions from vehicles transporting material and construction personnel to and from the site were estimated using the EMFAC2002 computer program for all construction years (2004-2010).

Table 1

DEFAULT VALUES USED TO ESTIMATE PM_{10} EMISSIONS FROM PROJECT CONSTRUCTION

Variable	Value	Unit	Reference
Soil Silt Content, s	7.5	%	ASTM Test Method Default
Soil Moisture Content, M or H	15	%	SCAQMD 1993 *CEQA Air Quality Handbook*
Soil Density	2,700	lbs/cy	Site Soil Study
Mean Wind Speed, U or G	3.43	mph	A Climatological Air Quality Profile, Table XIII, SCAQMD, December 1981
Mean Vehicle Speed, S			
Grader	5	mph	Assumption

Source: PCR Services Corporation, 2003.

Off-Site Sources

A number of off-site roadway improvements will be implemented as part of the Proposed Project. Pollutant emissions attributable to the improvements were estimated using ARB's URBEMIS2002 model. Emissions for the regional construction air quality analysis were compiled using the URBEMIS2002 emissions inventory model. The URBEMIS2002 model separates the construction process into three phases. The first phase is building demolition with emissions resulting from demolition dust, debris haul truck trips, equipment exhaust, and worker commute exhaust. The second phase of construction is site grading with emissions resulting from fugitive dust, soil haul truck trips, equipment exhaust, and worker commute exhaust. The third phase is subdivided into building equipment, architectural coating, and asphalt. Emissions from the third phase of construction include equipment exhaust from building construction and asphalt paving, and ROG emissions from architectural coating and asphalt paving. Equipment exhaust emissions were determined using URBEMIS2002 default values for horsepower and load factor but adjusted to account for ten hours of operation per day. Modeling outputs are provided in Appendix E-1, Construction Regional Emissions Construction Activities.

Local Criteria Pollutant Construction Impacts

While the SCAQMD *CEQA Air Quality Handbook* (*CEQA Handbook*, 1993), does not provide any localized thresholds, the SCAQMD currently recommends a threshold for localized PM_{10} and, in addition, is proposing localized significance thresholds (LST) for NO_2 and CO in its draft document titled "SCAQMD Localized Significance Threshold Methodology for CEQA Evaluations," June 19, 2003. As this Guidance has not been adopted, the following is provided for informational purposes only, but is primarily based on the Guidance.

Based on the SCAQMD's guidance, in addition to a localized PM_{10} analysis, an evaluation of localized NO_2 and CO air quality concentrations was conducted. The analysis evaluated whether Project-related construction emissions would cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard based on the future conditions with the Project (i.e., adding the Project's incremental concentration to the maximum ambient concentrations of that pollutant over the last three years of monitoring data at the relevant monitoring station).

The emissions of concern from construction activities are NO_X and CO combustion emissions from construction equipment[2] and fugitive PM_{10} dust from construction site preparation activities. LSTs are derived using one of three methodologies depending upon the attainment status of the pollutant. For attainment pollutants, nitrogen dioxide (NO_2) and CO[3], the mass rate LSTs are derived using an air quality dispersion model to back-calculate the emissions per day that would cause or contribute to a violation of any AAQS for a particular Source Receptor Area (SRA). The most stringent standard for NO_2 is the 1-hour state standard of 25 parts per hundred million (pphm); and for CO it is the 1-hour and 8-hour state standards of nine parts per million (ppm) and 20 ppm, respectively.

LSTs are developed based upon the size or total area of the emissions source, the ambient air quality[4] in each SRA in which the emission source is located, and the distance to the sensitive receptor. LSTs for NO_2 and CO are derived by adding the incremental emission impacts from the Project activity to the peak background NO_2 and CO concentrations and comparing the total concentration to the most stringent ambient air quality standards. Background criteria pollutant concentrations are represented by the highest measured pollutant concentration in the last three years at the air quality monitoring station nearest to the Proposed Project site.

Construction PM_{10} LSTs are developed using a dispersion model to back-calculate the emissions necessary to exceed a concentration equivalent to 50 micrograms per cubic meter ($\mu g/m^3$) averaged over five hours, which is the control requirement in SCAQMD Rule 403. The equivalent concentration for developing PM_{10} LSTs is 10.4 $\mu g/m^3$, which is a 24-hour average.

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2 *Construction equipment also emits PM_{10}, but for simplicity these emissions should be combined with the fugitive PM_{10} dust when using the LST procedures provided below.*

3 *Although the District has not been designated as in attainment with the CO ambient air quality standards, it has not exceeded any CO ambient air quality standards for the last two years. Therefore, for developing LSTs, the attainment pollutant approach is applicable.*

4 *Ambient air quality information is based on the pollutant concentrations measured at the SCAQMD's monitoring stations in or near the specified SRA.*

Technical Approach

The models used to derive the mass rate LSTs are briefly described, including adjustments to the model, which attempt to incorporate more realistic parameters into the modeling results.

Model

The U.S. EPA 1998 Guideline on Air Quality Models (GAQM) specifies the use of the U.S. EPA Industrial Source Complex Short Term (ISCST) model for computing downwind pollutant concentrations from area and volume sources such as construction activity. Version 3 of the U.S. EPA approved air quality model called Industrial Source Complex (i.e., ISC3) was used to develop pollutant concentrations from PM_{10}, NO_2, and CO. Important model options employed include: urban dispersion parameters (i.e., URBAN) and no calm wind processing (i.e., NOCALM). All other model options assumed the model default values.

Source Treatment

Exhaust emissions from construction equipment were treated as a set of elevated volume sources. These volume sources are shown in Figure 1 on page 10. The number and dimensions of the volume sources for each analyzed source are shown in Appendix E-2. The release height was assumed to be five meters. This represents the mid-range of the expected plume rise from frequently used construction equipment during daytime atmospheric conditions. All construction exhaust emissions were assumed to take place over the ten-hour period between 7 A.M. to 5 P.M. The ISCST3 simulations for PM_{10} impacts were based on the dispersion of the actual emission rates assigned to the relative emission sources and are provided in Appendix E-2 of this technical report. Emission rates used to determine impacts related to gaseous emissions were made by developing unit emission rates specified for each source (i.e., 1.0 gram per second). Results of these analyses along with actual emission rates for each source were then used to determine impacts. The ISCST3 dispersion model allows the use of variable emissions for such sources, those typical of construction activities. For the Proposed Project simulations, the time variable sources were assigned unit emissions for hours 0800 to 1800 or between 7:00 A.M. and 5:00 P.M. of each day and zero emissions for the remaining 14 hours.

Given the varied periods of interest several different averaging periods were used in the model runs to determine impacts. Table 2 on page 11 presents the averaging period runs, and the relative analyses in which they were used.

Fugitive dust emissions were treated as a ground-based area source with the dimension of the working area analyzed. An initial vertical dimension of one meter was assumed to represent the

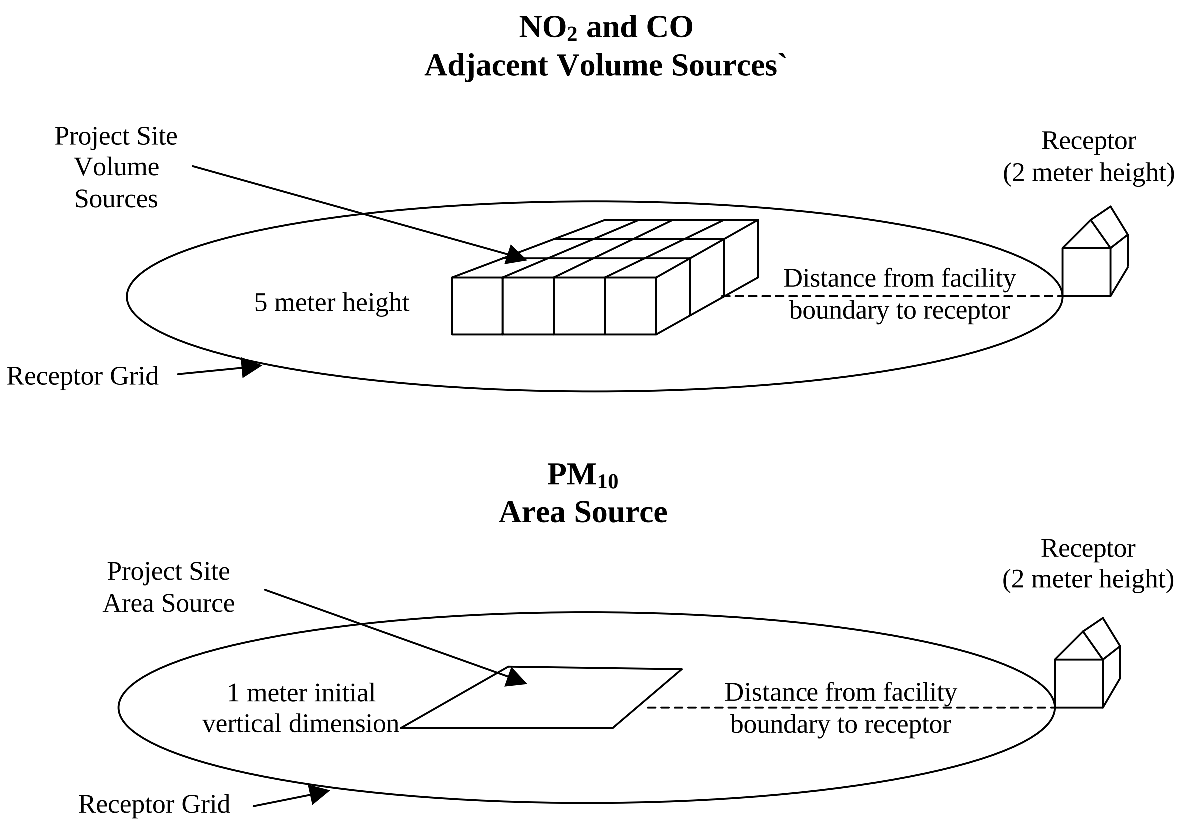

Figure 1. Volume and Area Sources (Source: SCAQMD, 2003)

Table 2

AVERAGING PERIODS

Pollutant	1-Hour	8-Hour	24-hour
Carbon Monoxide	X	X	
Nitrogen Dioxide	X		
PM_{10}			X

Source: PCR Services Corporation, 2003.

initial vertical spread of the emissions. Based on this assumption, the initial vertical dimension resulted in a vertical concentration profile that closely matched the vertical profile observed by DRI[5], as shown in Figure 2 on page 12. As with the construction equipment, all the fugitive dust emissions are assumed to be emitted over the ten-hour period, 7 A.M. to 5 P.M. Area sources are illustrated in Figure 1 on page 10.

Receptor Grid

A number of discrete receptors were used to represent sensitive receptors in the Project's vicinity. All receptors were placed within the breathing zone at 2 meters above ground level. The ground level was developed using digital terrain data to represent the varying topography in the Project's vicinity.

Meteorology

For modeling purposes, the SCAQMD uses 1981 meteorological data (i.e., hourly winds, temperature, atmospheric stability, and mixing heights) from 35 sites in the District. The 1981 meteorological data are used because this data set represents the most complete and comprehensive data set currently compiled. These data are available at the SCAQMD's Web site (www.aqmd.gov/metdata) and is in a format that can be directly read by ISC3. The ISCST model was run using the SCAQMD mandated 1981 meteorological data from the West Los Angeles Monitoring Station.

[5] *Desert Research Institute, "Final Effectiveness Demonstration of Fugitive Dust Control Methods for Public Unpaved Roads and Unpaved Shoulders on Paved Roads," DRI Document No. 685-5200.1F1, prepared for CARB CRPAQS, December 31, 1996.*

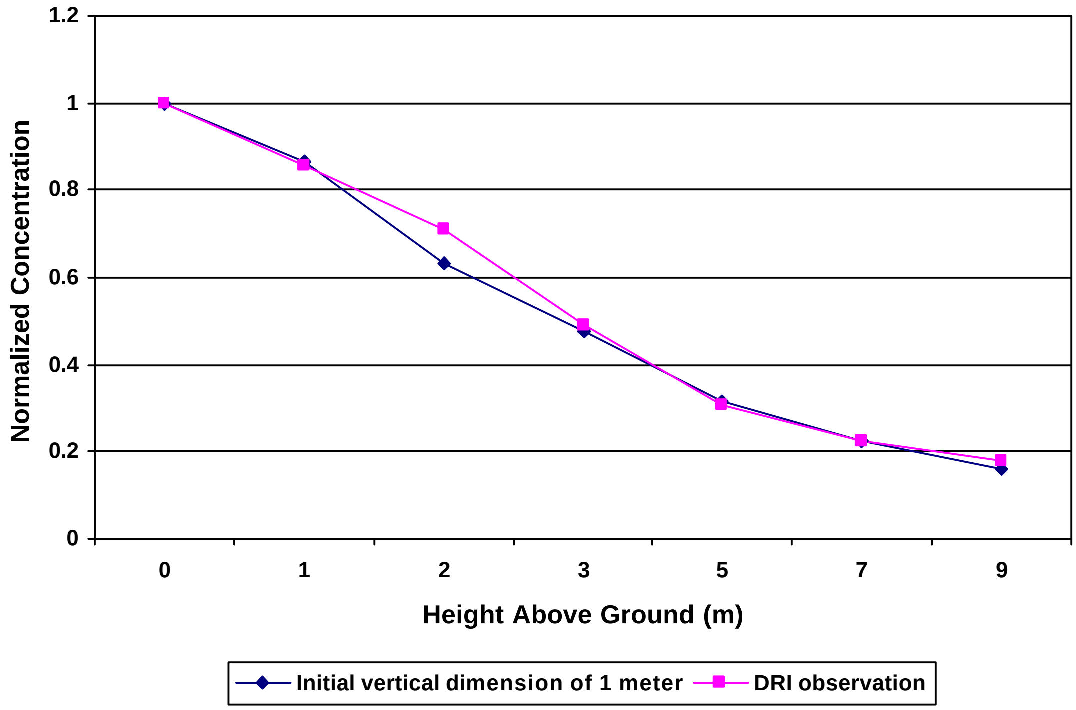

Figure 2. Comparison of Vertical Concentration Profiles (Source: SCAQMD, 2003)

Background CO and NO_2 Air Quality

To determine whether or not construction activities create significant adverse localized air quality impacts, the emissions contribution from the Project was added to ambient concentrations and the total was then compared to the most stringent applicable state and/or federal ambient air quality standards for CO and NO_2. In order to be able to make this determination, it is necessary to know the background concentrations in the vicinity of the Proposed Project site. The modeled incremental impacts from Project activities are added to the background values to estimate the peak impacts downwind of the activities. Peak 1-hour CO and NO_2, and peak 8-hour CO concentrations for the three-year period were used to identify the worst-case background concentrations.

PM_{10} Air Quality

PM_{10} impacts were treated differently than CO and NO_2 since, as mentioned earlier, nearly the entire District exceeds the state or federal PM_{10} standards. Therefore, the incremental PM_{10} impacts from construction were derived based on the change in concentration threshold of 10.4 $\mu g/m^3$ (24-hour average), which is comparable to the requirement in paragraph (d)(4) in SCAQMD Rule 403, which prohibits fugitive dust concentrations beyond a project's boundary that exceed 50 $\mu g/m^3$ (averaged over five hours). Because the entire District is nonattainment for PM_{10}, determining background PM_{10} concentrations is unnecessary.

NO_2-to-NO_X Ratio

Combustion processes occurring from equipment yield NO_X emissions. The two principal NO_X species are nitric oxide (NO) and nitrogen dioxide (NO_2), with the vast majority (95 percent) of the NO_X emissions being comprised of NO. Adverse health effects are associated with NO_2, not NO. NO is converted to NO_2 by several processes, the two most important of these being: (1) the reaction of NO with ozone; and (2) the photochemical reaction of NO with hydrocarbon radical species. Destruction of NO_2 occurs with its photodissociation into NO and molecular oxygen.

NO_X emissions are simulated in the air quality dispersion model, and the NO_2 conversion rate is treated by an NO_2-to-NO_X ratio, which is a function of downwind distance. Initially, it is assumed that only 5 percent of the emitted NO_X is NO_2. At 500 meters downwind, 100 percent conversion of NO-to-NO_2 is assumed. The assumed NO_2-to-NO_X ratios between those distances are presented in Figure 3 on page 15. The NO_2 conversion rates are adapted from work by Arellano et al.[6]

[6] *Arellano, J.V., A.M. Talmon, and P.J.H. Builtjes, "A Chemically Reactive Plume Model for the NO-NO_2-O_3 System,"* Atmospheric Environment *24A, 2237-2246*

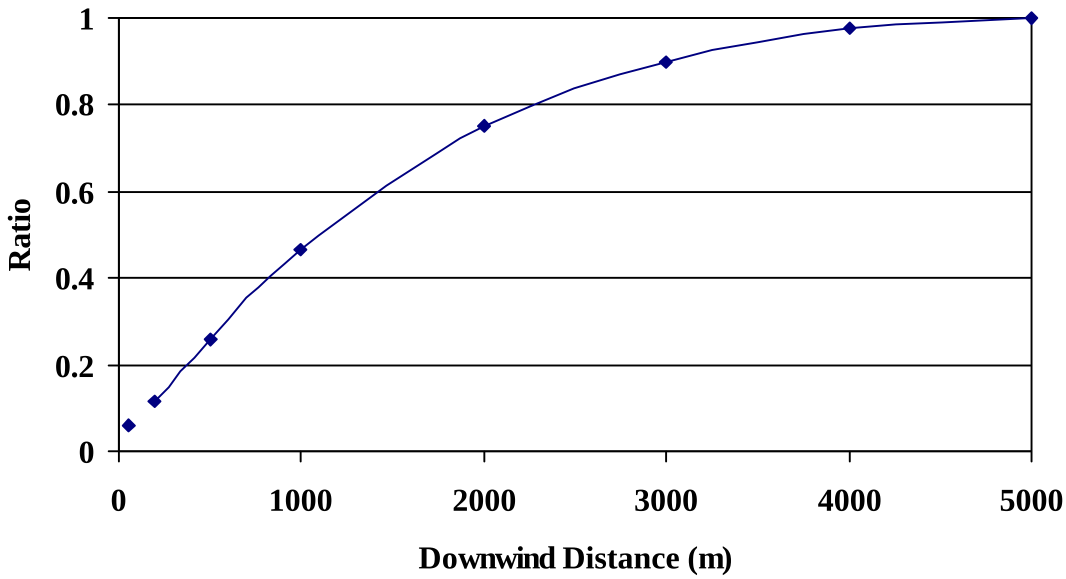

Figure 3. NO_2-to-NO_X Ratio as a Function of Downwind Distance

Air Dispersion Modeling

The emissions established above for the Project site and the seven off-site roadway improvements that require earthwork activities were input into the ISCST model for analysis of the potential combined impacts of grading activity on the identified schools, residences, rest homes, and childcare facilities.

PM_{10} emissions were calculated based on the construction activity levels outlined above. It was determined that the worst-case emissions would occur in the grading/site preparation phase due to grading, excavating, and filling/compacting operations. Emissions were then calculated for these activities for the Project area and the off-site roadway improvements.

Local Toxic Air Pollutant Construction Impacts

The greatest potential for toxic air contaminant (TAC) emissions would be related to diesel particulate emissions associated with heavy equipment operations during grading and excavation activities. According to the SCAQMD's methodology, health effects from carcinogenic air toxics are usually described in terms of individual cancer risk. "Individual Cancer Risk" is the likelihood that a person exposed to concentrations of TACs over a 70-year lifetime will contract cancer, based on the use of standard risk-assessment methodology. An assessment of diesel particulate emissions was conducted to assess this potential risk using the same assumptions used for localized impact analysis discussed above. As such, the analysis includes all diesel exhaust emissions associated with on-site heavy equipment and haul trucks that would occur over the construction period. The ISCST3 simulations for diesel particulate impacts were based on the dispersion of the actual emission rates assigned to the relative emission sources and potential impacts are provided in Appendix E-2 of this technical report.

OPERATIONS

Regional Operations Impacts

Air pollutant emissions associated with occupancy and operation of the Proposed Project would be generated by stationary sources (e.g., the consumption of electricity and natural gas), mobile sources (e.g., the operation of on-road vehicles), and area sources (e.g., among other things, landscaping equipment, consumer/commercial solvent usage, architectural and automotive coatings, restaurant charbroilers, emergency generators, and forklifts).

Stationary Sources

To estimate the daily emissions from electricity consumption, the gross square footage for each type of land use (or the number of units for residential land uses), the electricity usage rate, and emission factors for criteria pollutants have been determined. Electricity usage rates and emission factors were obtained from the *CEQA Handbook* and were used in the following equation:

Emissions from Electricity Consumption

$E = \{([F \times G] / 365) / 1000\} \times H$ **EQ. 6**

where
E = Emissions of criteria pollutants in lbs/day
F = Gross square foot of each type of land use or number of units for residential uses
G = Electricity usage rate to determine annual usage in kWh/sq.ft./yr or kWh/unit/yr
H = Emission factors for criteria pollutants in pounds per megawatt-hours

Source: CEQA Handbook; Tables A9-11, A9-11-A, and A9-11-B; SCAQMD, 1993.

The electricity usage rates and emission factors vary by land use and by pollutant, respectively. Although electricity generation would not occur on the Project site, it would occur somewhere in the region, and, therefore, the associated emissions are included in the operational emissions analysis.

Emissions from natural gas consumption are determined in a similar manner as emissions from electricity usage. Natural gas consumption rates and emission factors were obtained from the *CEQA Handbook* and were used in the following equation:

Emissions from Natural Gas Usage

$E = \{([F \times G] / 30) / 1{,}000{,}000\} \times H$ **EQ. 7**

where
E = Emissions of criteria pollutants in lbs/day
F = Gross square foot of each type of land use or number of units for residential uses
G = Natural gas usage rate to determine daily usage
H = Emission factors for criteria pollutants in pounds per million cubic feet

Source: CEQA Handbook; Tables A9-11, A9-11-A, and A9-11-B; SCAQMD, 1993.

The natural gas consumption rates and emission factors vary by land use and by pollutant, respectively. The daily emissions obtained using the above equation account for natural gas used for space heating, water heating, cooking and other miscellaneous gas fired sources.

Mobile Sources

Emissions modeled in the regional on-road air quality analysis were compiled using the URBEMIS2002 emission inventory model. This computer model projects emission rates for motor vehicles based on a desired year of analysis, a projected vehicle fleet mix, projected vehicle speeds, and whether these emissions are projected to occur during the summer or the winter months and other factors. These emissions were calculated using the projected ambient temperature range. Mobile source emissions from motor vehicles were estimated using URBEMIS2002. Average daily trips for each area and the ratio of internal to external trips were provided in the Project's Traffic Study (see Appendix K). It was assumed that internal trips would have a trip length of 0.5 miles and external trips would have trip lengths equal to the default values provided in URBEMIS2002. Table 3 on page 19 provides the input parameters used in the URBEMIS2002 runs. The URBEMIS2002 output files are included in Appendix E-3.

URBEMIS2002 output is provided as daily emissions of criteria pollutants. The emission rates for CO, NO_X, and ROC are obtained at temperatures of 60, 75, and 85 degrees Fahrenheit, respectively. The selected temperatures are identified in Table A9-5-J of the *CEQA Handbook*. PM_{10} and SO_X emissions are independent of temperature.

Miscellaneous Area Sources

As no direct methodology exists for evaluating emissions from landscaping activities, the emissions were evaluated based on landscaped acreage and the lawn and garden equipment requirements. The total landscaped acreage for each area was assumed to be the active recreation acreage plus 50 percent of the developed acreage. The factor of 50 percent was applied to developed acreage based on average lot coverage restrictions. It was assumed that each landscaped area will be maintained twice weekly and that the lawn/garden equipment would be used for 3 minutes to cover 100 square feet. These factors were used along with the landscaped acreage to determine the number of equipment required for the Project.

The lawn and garden engine population for the Project was assumed to have the same composition and emissions predicted by the 2005 California statewide engine population (Table K-2, Gasoline Engine Population, Fuel Consumption, and Associated Emissions, Statewide 2005). The emissions from the predicted statewide engine population were scaled down based on the ratio of engines required for the Project to total engines statewide and were reported in pounds per day.

Miscellaneous area sources evaluated for the operational emissions analysis include consumer/commercial solvent usage, automotive and architectural coatings, emergency generators, forklifts, and restaurant charbroilers. Emissions from these sources were estimated using emission

Table 3

URBEMIS 2001 INPUT PARAMETERS USED TO ESTIMATE EMISSIONS FROM MOBILE SOURCES

Variable	Value	Unit	Reference
Air Basin	South Coast	—	Based on Project location
Average Daily Trips	24,220	trips/day	Traffic Study (Appendix K)
Vehicle Fleet Mix	LDA = 56.1 LDT (< 3750 lbs) = 15.1 LDT (3751 – 5750 lbs) = 15.6 MDT = 6.9 LHDT (8504 – 10000) = 1.0 LHDT (10001 – 14000) = 0.3 MHDT = 1.0 HHDT = 0.8 Urban Bus = 0.1 School Bus = 0.2 Motorcycle = 1.6 Motor Home = 1.3	%	Defaults for URBEMIS2002
Target Year	2010		Projected buildout year
Trip Percentages	Default values	%	Defaults for URBEMIS2002
Trip Lengths	0.5 or default	miles	0.5 for internal trips, default for external trips
Trip Speeds	Default values	mph	Defaults for URBEMIS2002
Temperature	60,75 and 85	degrees Fahrenheit	Analysis temperatures for CO, NOx, and ROG, respectively.
Variable Starts	Default values	%	Defaults for URBEMIS2002
Road Dust	Default values	%	Defaults for URBEMIS2002

Source:

factors from EPA's AP-42, URBEMIS2002, from SCAQMD research, and from the *CEQA Handbook*.

Daily emissions for commercial/consumer solvent usage were based on AP-42 Section 4.10. The emission factor for non-methane volatile organic compounds (VOC) is 0.0252 lb/day per capita and includes emissions from aerosol products, household products, toiletries, rubbing compounds, windshield washing, polishes and waxes, nonindustrial adhesives, space deodorant, moth control, and laundry detergent. This emission factor was multiplied by the projected average household size of 2.20 persons (Section IV-J, Population, Housing and Employment of the Village at Playa Vista EIR) and the number of residential units projected to be built in each area. VOC emissions were scaled by 69 percent to generate daily emissions of Reactive Organic Compounds (ROC) since 31 percent of the VOC released in the commercial/consumer products in considered nonreactive under EPA policy (AP-42 Section 4.10).

Daily emissions for automotive and architectural coatings were based on AP-42 Section 4.2.1 and were calculated in the same manner as those for commercial/consumer solvent usage. The emission factors for non-methane VOC are 0.006 lb/day per capita for automobile refinishing and 0.013 lb/day per capita for architectural coatings. All VOC emissions were assumed to be ROC.

Daily emissions for emergency generators were based on AP-42 Section 3.4. The emission factors for stationary diesel engines are listed in Table 4 on page 21.

It was assumed that each diesel generator would have 350-horsepower and would operate for 500 hours per year (*Calculating Potential to Emit for Emergency Generators*, EPA, September 1995). The number of generators required for the Village at Playa Vista was estimated based on the level of development and assumed to be three. The emission factors were multiplied by the horsepower rating, the number of required generators, and 500 hours per year to obtain emissions in lb/day for each pollutant.

As the Project may include various commercial uses, it was assumed that forklifts would likely be used on-site. Because it is not known whether diesel or gas forklifts would be used, or what horsepower they would have, it was assumed that one of each type of forklift specified in SCAQMD's *CEQA Handbook* (Table A-9-8-A) would be used on-site. Emission factors for these forklifts are listed below in Table 5 on page 22.

The total number of forklifts and the number of hours per day that the forklift would operate was estimated based on the level of development for each area. The emission factors were multiplied by the number of required forklifts and the number of hours per day to obtain emissions in lb/day for each pollutant.

Emissions for restaurant charbroilers were estimated using data from research conducted for the SCAQMD (Further Development of Emission Test Methods and Development of Emission Factors for Various Commercial Cooking Operations, Research conducted at the University of California College of Engineering – Center for Environmental Research and Technology, 1997). The reported emission factors are 32.67 lbs. PM/1,000 lbs. of meat cooked and 3.94 lbs. VOC/1,000 lbs. of meat cooked. For conservative emissions estimates, it was assumed that VOC is equivalent to ROC and PM is equivalent to PM_{10}. It was also assumed that 166 pounds of meat were cooked per day per restaurant, based on "Burger King Fast Facts for the 90's" (www.burgerking.com/company/facts90s.htm). The number of restaurants with charbroilers was estimated based on the retail square footage proposed for The Village at Playa Vista. It was estimated that The Village at Playa Vista would have four restaurants of this type. The emission factors were multiplied by thousands of pounds of meat cooked per day and by the number of restaurants to obtain emissions in lb/day for ROC and PM_{10}.

Table 4

EMISSION FACTORS FOR LARGE STATIONARY DIESEL ENGINES (LB/HP-HR)

CO	ROC	NO_X	PM_{10}	SO_X
0.0055	0.00064 [a]	0.024	0.057	0.012 [b]

[a] *Based on a factor of 91 percent for nonmethane organics applied to the emission factor for TOC.*
[b] *Assumes that sulfur in fuel oil is 1.5 percent.*

Source: CEQA Handbook Table A9-8-A

Summary for Operational Emissions

Emissions from stationary sources and mobile sources (from vehicles), as well as miscellaneous area sources, were summed to determine total daily emissions. These totals were then compared to SCAQMD significance thresholds.

Local Impacts

Due to the number of daily trips generated by the Project and the prevalence of congested roadways in the Project vicinity, Project-related traffic during this operational phase could have the potential to cause local area impacts. An analysis at selected intersections was performed to determine the potential for the creation of CO hot spots attributable to Project-related increases in traffic volumes. The analysis considered peak-hour traffic volumes associated with buildout of the Project, as this represents the worst-case scenario. Local area CO concentrations were projected using the CALINE4 traffic pollutant dispersion model. The analysis of CO impacts followed the protocol recommended by the California Department of Transportation and published in the document titled *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol), December 1997. The methodology is also consistent with CO impact evaluation procedures presented in the SCAQMD's *CEQA Air Quality Handbook.*

Intersections with the highest potential for CO hotspot formation were selected for analysis based on intersection traffic volumes, poor Levels of Service (LOS), high Project-related traffic volumes, and the proximity of the intersections to sensitive receptors. A poor LOS occurs when the intersection is functioning near or above capacity and is represented by the ratings "D," "E," and "F."

The CALINE4 model determines CO concentrations attributable to vehicular traffic. In the first analysis, emissions from traffic attributable to the full development of the Village at Playa Vista, without mitigation, were evaluated against a baseline condition that did not involve emissions from traffic generated by the Project. The Project was also analyzed under the assumption that the suggested mitigation measures would be implemented by 2010.

Table 5

EMISSION FACTORS FOR FORKLIFTS (LB/HR)

Type of Forklift	Horsepower	CO	ROC	NO_X	PM_{10}
Gas	50	14.00	0.500	0.018	0.003
Gas	175	43.97	1.530	0.920	0.123
Diesel	50	0.18	0.053	0.441	0.031
Diesel	175	0.52	0.170	1.540	0.093

Several input parameters are required for the CALINE4 model, including traffic volumes, emission factors, roadway coordinates, receptor coordinates, wind speed and direction, stability class, mixing height, surface roughness, and temperature. The methodology used to obtain each of these parameters is discussed below.

Traffic volumes for the A.M. and P.M. peak hours were obtained from the Village at Playa Vista Transportation Plan EIR, provided by Kaku Associates (see Appendix K). The EMFAC7F model was used to obtain emission factors for the vehicle fleet based on the desired year of analysis (the year of Project buildout), the vehicle type distribution, and the percentages of vehicles in cold start and hot start mode. Cold/hot start percentages were determined based on *CEQA Handbook* Table A9-5-M for the Project, and Table A9-5-M-1 for the "no project" scenario. Selected cold/hot start percentages were 45/55 for the Project and 15/5 for the "no project" scenario. Because traffic volumes for the "Project" scenario also include "no project" traffic, cold/hot starts were scaled to 16/6 based on "Project" vs. "no project" traffic volumes with the following equation:

Adjustment of Cold and Hot Start Percentages for the "Project" Scenario

$$\% C_A = [V_P (\% C_P) + V_N (\% C_N)] / V_T \qquad \textbf{EQ. 9}$$

where

$\% C_A$ = Adjusted percent cold starts for the "Project" scenario
V_P = Project only volumes (= total or "Project" volumes –"no project" volumes)
$\% C_P$ = Percent cold start for the Project from CEQA Table A9-5-M
V_N = "No project" volumes, or future "background" volumes
$\% C_N$ = Percent cold start for "no project" from CEQA Table A9-5-M-1
V_T = Total or "Project" volumes (= "no project" volumes + Project-related traffic)

The same equation was used to adjust the hot start percent for the "Project" scenario.

The vehicle fleet for the "Project" and "no project" condition was assumed to have the same distribution as recommended in the CO Protocol: 69 percent light duty autos, 19.4 percent light duty trucks, 6.4 percent medium duty trucks, 1.2 percent heavy duty gas trucks, 3.6 percent heavy duty diesel trucks, 0 percent buses, and 0.4 percent motorcycles. The vehicle fleet percentages, the cold/hot start percentages, and the Project buildout year were input into the EMFAC7F model to produce two sets of emission factors ("Project" and "no project") for the vehicle fleet.

Vehicle travel speeds were assigned to the selected intersections based on Tables B.9 and B.10 of the CO Protocol and ranged from 25 to 35 miles per hour. These speeds were then adjusted as recommended in the CO Protocol based on percent red time, which is a function of vehicles per hour per lane. The adjusted speed was used to select the appropriate emission factors for vehicles approaching and departing the intersection.

Lane and receptor geometry were drawn using Canvas 5.0 in order to determine the coordinates for each intersection. Lanes were assumed to be 15 feet in width and receptors were placed 10 and 23 feet from the roadways, at each corner of the intersection, as recommended in the CO Protocol.

Worst-case atmospheric conditions were selected for input into the CALINE4 model including a wind speed of 1.0 meter/second, worst-case wind direction (a model option), and a stability class of "F" (very stable). A standard mixing height of 1,000 meters, a surface roughness of 321, and temperature of 15.6 degrees Celsius (60 degrees Fahrenheit) were also used as inputs to represent conditions in the vicinity of the Project.

The CALINE4 model generates results of CO concentrations averaged over a 1-hour time period for each of the eight receptors. Eight-hour concentrations are calculated by converting 1-hour concentrations to 8-hour equivalents, using the conversion protocol recommended by the CO Protocol. The conversion factor is obtained from Table B.15 of the CO Protocol.

Future local CO concentrations are then determined by adding the CALINE4 results to a predicted background concentration. 2010 ambient concentrations were determined from predicted CO concentration tables provided by the CARB.[7] The forecasted background concentrations were 4.4 ppm for the 1-hour averaging period and 2.8 ppm for the 8-hour averaging period.

The final step in the local CO analysis is the comparison of the future local CO concentrations to State and National Ambient Air Quality Standards (AAQS). State and National AAQS for 1-hour averaging periods are 20 ppm and 35 ppm, respectively. Both the State and National AAQS for 8-hour averaging periods is 9 ppm. If no significant impacts were identified for

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[7] *http://www.aqmd.gov/ceqa/hdbk (CO Concentrations for Hotspot Analysis – West Los Angeles Monitoring Station).*

the intersections with the highest potential for CO hotspot formation, it was assumed that no significant impacts would occur at any other locations in the study area.