Appendix C
Air Quality Technical Report

This page intentionally left blank.

Air Quality Technical Report

Heritage Fields
Irvine, California

Prepared for:
Heritage Fields El Toro, LLC
Aliso Viejo, California

Prepared by:
ENVIRON International Corporation
San Francisco, California

Date:
June 2012

Contents

List of Acronyms

AAQS	Ambient Air Quality Standard
CalEEMod	California Emission Estimator Model
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEUS	Commercial End-Use Survey
CO	carbon monoxide
DU	dwelling unit
EIR	Environmental Impact Report
ft	feet
lb	pound
LST	localized significance thresholds
NOx	nitrogen oxides
NO_2	nitrogen dioxide
$PM_{2.5}$	fine particulate matter less than 2.5 μm in diameter
PM_{10}	coarse particulate matter less than 10 μm in diameter
RASS	Residential Appliance Saturation Survey
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SO_2	sulfur dioxide
USEPA	United States Environmental Protection Agency
VMT	vehicle miles travelled
VOC	volatile organic compound
yr	year

Executive Summary

Heritage Fields El Toro, LLC (Heritage Fields) is proposing modifications (2012 Modified Project) to the mixed-use development located in Irvine, California that has already been approved (2011 Approved Project) by the City of Irvine (City) on the Proposed Project Site. This report quantifies and then compares the impacts on air quality associated with the 2012 Modified Project to those associated with the 2011 Approved Project, and determines the significance of those impacts.

The 2011 Approved Project refers to the development currently approved within Existing PAs 30 and 51 analyzed in the 2011 Certified EIR (consisting of the 2003 OCGP EIR, the 8 addenda, and the 2011 SEIR that was certified by the City on August 30, 2011). That development includes 4,894 residential units and 6,585,594 square feet of non-residential uses, including the Great Park.

The term "Proposed Project Site" refers to and encompasses; 1) the Heritage Fields Development, also known as the Great Park Neighborhoods, consisting of nine existing Development Districts[1]; 2) an 11 acre parcel currently owned by the Transportation Corridor Agencies (TCA) located adjacent to the SR-133 Freeway between Trabuco Road and Irvine Boulevard(the "TCA Property"); 3) Lot D, Lot E, and Lot F as depicted on 2nd Amended Vesting Tentative Tract Map 17008 currently zoned 3.2 Transit Oriented Development within Districts 2 and 3 (together, the "City Parcels"); and 4) 132 acres owned by the City, referred to as the Wildlife Corridor, together with a portion of the Great Park known as the "Sports Park District," all of which are located within the areas designated as Existing “Planning Area (PA) 30” and Existing “PA 51” in the City's General Plan, northeast of the freeway junction of Interstate 5 (I-5) and Interstate 405 (I-405), within the City.

The 2012 Modified Project changes the 2011 Approved Project as follows:

- Combines Existing PAs 30 and 51, and the approximately 11 acres between the current western boundary of Existing PA 51 and SR-133 between Trabuco Road and Irvine Boulevard currently owned by Transportation Corridor Agency (TCA), into a single PA, Combined PA 51;
- Rezones property in Districts 2, 3, and 6 from 3.2 Transit Oriented Development, 4.3 Vehicle Related Commercial, and 5.4 B General Industrial to 8.1 Trails and Transit Oriented Development.
- Rezones 13-acres in District 6 (formerly District 9) from its current 1.1 Agriculture zoning to 1.4 Preservation.
- Rezones the City Parcels from 3.2 Transit Oriented Development to 8.1 Trails and Transit Oriented District.

[1] Development District 9 will be merged into Development District 6 as part of the 2012 Modified Project, reducing the number of Development Districts to eight.

- Relocates the 132 acre Wildlife Corridor within District 5 adjacent to the Borrego Canyon Wash.

- Zones the approximately 11 acres between the current western boundary of Existing PA 51 and SR-133 between Trabuco Road and Irvine Boulevard, currently owned by TCA to 8.1 TTOD.

- Amends the Master Plan of Arterial Highways, Figure B-1, to eliminate the extension of Rockfield Boulevard from the eastern project boundary to Marine Way once the Orange County Transportation Authority (OCTA) has approved this proposed amendment to the countywide Master Plan of Arterial Highways.

- Amends the General Plan and Zoning Ordinance to allow the following:

    - 3,412 multi-use residential units within Combined PA 51, in addition to the 4,894 units already allocated in Districts 1 North, 1 South, 4, 7, and 8.

    - Modify non-residential uses to allow:

        - 3,364,000 square feet of Medical and Science

        - 1,318,200 square feet of Multi-Use. The Modified Project includes an option to convert up to 535,000 square feet of the proposed Multi-Use intensity to residential intensity for up to an additional 889 dwelling units within District 6 and Lot 48 of 2nd Amended VTTM 17008, subject to a vehicle trip limit.

        - 220,000 square feet of Community Commercial

- Grants, pursuant to State law, up to 1,194 additional DB units (35% of 3,412) plus any additional Density Bonus (DB) units associated with the optional conversion and granted pursuant to State law.

- Encourages Accessory Retail within Combined PA 51, as defined in the City of Irvine Zoning Code.

The 2012 Modified Project consists of 4,606 dwelling units (3,412 base units and 1,194 DB units). The 2012 Modified Project also includes the option to convert up to 535,000 square feet of Multi-Use to up to 889 base units and 311 DB units, granted pursuant to State law. These are in addition to the already approved 4,894 dwelling units.

The 2012 Modified Project includes two options for the “Main Street” development along Trabuco Road east of “O” Street. Option 1, which was studied in the 2011 SEIR, includes Community Commercial and Multi-Use north of Trabuco Road with Residential south of Trabuco in District 1 South. Option 2 will study Residential north of Trabuco Road with Community Commercial, Multi-Use, and Residential south of Trabuco Road in District 1 South. Both options

will include a 2,600 student high school in District 5. The 2012 Modified Project also proposes to Modify Objective B-1 to identify locations where LOS E is acceptable.

The 2012 Modified Project also includes implementation of recreational facilities in the previously approved Sports Park District of the Orange County Great Park (Great Park).

The 2012 Modified Project incorporates the Mitigation Measures recommended by the 2011 Certified EIR and adopted by the City in the Mitigation Monitoring and Reporting Program. It also incorporates the Project Design Features described in the 2011 Certified EIR.

The 2012 Modified Project also proposes to implement a portion of the 2011 Approved Project's Great Park uses, including athletic fields and facilities. However, because these uses have previously been analyzed in the 2011 Certified EIR and approved as part of the 2011 Approved Project, their implementation as part of the 2012 Modified Project is not a change to the 2011 Approved Project and therefore will not result in any impacts that have not been previously analyzed in the 2011 Certified EIR. For this reason, the air quality emissions from the Great Park are not analyzed again in this report.

Like the 2011 Approved Project, the 2012 Modified Project will result in both one-time criteria pollutant emissions associated with the construction and annual criteria pollutant emissions associated with the operation of the development. This report calculates the inventory of emissions that would result from the 2011 Approved Project as currently entitled and the inventory of emissions that would result from the 2012 Modified Project. In order to allow for a correct comparison, emissions associated with the Great Park are have been removed from the 2011 Approved Project's emissions inventory, since the 2012 Modified Project does not propose any changes to the 2011 Approved Project's Great Park land uses. The construction emissions are associated with off-road equipment, on-road vehicles, fugitive dust, asphalt off-gassing, and architectural coating. Operational emissions are associated with mobile sources, natural gas energy use, landscaping equipment, fireplaces, architectural coating, and consumer products.

The South Coast Air Quality Management District (SCAQMD) has set several numeric significance thresholds for air quality impacts. The SCAQMD has adopted mass daily emissions thresholds for construction and for operation. In addition, SCAQMD requires that construction projects not adversely impact the local air quality. For construction emissions from large projects such as the 2011 Approved Project and the 2012 Modified Project, the determination of whether a construction project adversely impacts local air quality is based on incremental concentrations predicted using air dispersion modeling. This report evaluates the significance of the 2012 Modified Project's construction and operational emissions in comparison to those of the 2011 Approved Project based on these three numeric thresholds.

Table ES-1 and ES-2 reports the operational criteria pollutant emissions for the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion). The emissions are presented by emission source category as calculated in CalEEMod, SCAQMD's new software for estimating emissions for CEQA purposes. As seen in Table ES-1, like the 2011 Approved Project, the 2012 Modified Project's (without optional conversion) operational mass criteria pollutant emissions of VOC, NO_X, CO and $PM_{2.5}$ result in significant and

unavoidable impacts , but its emissions of SO_2 and PM_{10} result in less than significant impacts. As seen in Table ES-2, like the 2011 Approved Project, the 2012 Modified Project's (with optional conversion) operational mass criteria pollutant emissions of VOC, NO_X, CO and $PM_{2.5}$ result in significant and unavoidable impacts , but its emissions of SO_2 and PM_{10} result in less than significant impacts.

The construction emissions for the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion) have not been analyzed again. The emissions from the off-road equipment would be approximately the same for the 2012 Modified Project as for the 2011 Approved Project; merely changing the type of certain of the buildings and increasing density primarily through vertical construction[2] would result in little additional off-road construction equipment at the site, and the amount of time and off-road equipment required for site preparation and grading is assumed to remain the same.[3] Total emissions associated with worker and materials transportation to the site may be higher, due to the larger amount of vertical construction proposed for the 2012 Modified Project. This has the potential to result in a longer vertical construction period but is not expected to change maximum daily and annual construction mass criteria pollutant emissions. Accordingly, this potential increase in construction transportation emissions is not expected to change the results of the assessment. While approximately 11 acres have been added between the western boundary of Existing PA 51 and SR-133 between Trabuco Road and Irvine Blvd, the addition of these acres is also not expected to change the construction emission estimates since the maximum daily construction emissions is not expected to increase. Therefore, with the approval of the 2012 Modified Project, the maximum daily and annual construction mass criteria pollutant emissions and resulting impacts would be the same as the 2011 Approved Project's maximum daily and annual construction mass criteria pollutant emissions and resulting impacts. Because the Main Street options do not result in changes in land use or traffic assumptions[4], their emissions are equivalent. Therefore, no distinctions for these two options are made in this report.

[2] In the context of this evaluation, "vertical construction" refers to the construction of the building structure as opposed to "horizontal construction" which is related to activities such as demolition and site preparation.
[3] Information was provided by Heritage Fields to ENVIRON.
[4] Urban Crossroads, 2012. Heritage Fields Project 2012 GPA/ZC Traffic impact Analysis.

Table ES-1: Summary Comparison of Operational CAP Emissions, 2011 Approved Project and 2012 Modified Project without Optional Conversion, Heritage Fields, Irvine, CA

Category[1]	Annual Emissions Associated with Project[2]											
	VOC		CO		SO_2		NO_X		PM_{10}		$PM_{2.5}$	
	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project
	tons/year											
Area	56	78	54	104	0	0	0.61	1.20	0.52	1.0	0.52	1.0
Natural Gas Use	1.3	1.8	6.6	8.5	0.06	0.10	11	16	0.88	1.3	0.88	1.3
Traffic	49	52	393	417	1.5	1.6	69	68	13	14	8.5	8.9
Total	107	132	453	529	1.6	1.7	81	85	14	16	9.9	11
Category[1]	**Daily Maximum Emissions Associated with Project[2]**											
	VOC		CO		SO_2		NO_X		PM_{10}		$PM_{2.5}$	
	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project
	maximum lb/day											
Area	315	442	294	571	0.01	0.03	3.4	6.5	7.5	14	7.4	14.4
Natural Gas Use	7.0	10	36	47	0.36	0.55	61	87	4.8	6.9	4.8	6.9
Traffic	303	326	2,399	2,569	9.6	10	425	435	79	84	52	55
Total	625	779	2,729	3,187	10	11	489	529	91	105	64	76
Mass Daily Threshold	55		550		150		55		150		55	
Exceed Threshold	**YES**	**YES**	**YES**	**YES**	NO	NO	**YES**	**YES**	NO	NO	**YES**	YES

Notes:
1. All operational categories presented in the previous operational tables and are relevant to standards.
2. Emissions estimated using CalEEMod or methodologies described in the text.
3. The Main Street options do not result in changes in land use or traffic assumptions, their emissions are equivalent. Therefore, no distinctions for these two options are made in this table.
4. GPN – Great Park Neighborhoods

Table ES-2: Summary Comparison of Operational CAP Emissions, 2011 Approved Project and 2012 Modified Project with Optional Conversion, Heritage Fields, Irvine CA

Category[1]	Annual Emissions Associated with Project[2]											
	VOC		CO		SO_2		NO_X		PM_{10}		$PM_{2.5}$	
	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project
	tons/year											
Area	56	82	54	117	0	0	0.61	1.3	0.52	1.1	0.52	1.1
Natural Gas Use	1.3	2.0	6.6	8.9	0.06	0.11	11	17	0.88	1.4	0.88	1.4
Traffic	49	52	393	417	1.5	1.6	69	68	13	14	8.5	8.9
Total	107	136	453	543	1.6	1.7	81	87	14	16	9.9	11
Category[1]	Daily Maximum Emissions Associated with Project[2]											
	VOC		CO		SO_2		NO_X		PM_{10}		$PM_{2.5}$	
	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project	2011 Approved Project (GPN)	2012 Modified Project
	maximum lb/day											
Area	315	464	294	643	0.01	0.04	3.4	7.4	7.5	16	7.4	16
Natural Gas Use	7.0	11	36	49	0.36	0.59	61	93	4.8	7.5	4.8	7.5
Traffic	303	326	2,399	2,569	9.6	10	425	435	79	84	52	55
Total	625	801	2,729	3,261	10	11	489	536	91	108	64	79
Mass Daily Threshold	55		550		150		55		150		55	
Exceed Threshold	**YES**	**YES**	**YES**	**YES**	NO	NO	**YES**	**YES**	NO	NO	**YES**	YES

Notes:
1. All operational categories presented in the previous operational tables and are relevant to standards.
2. Emissions estimated using CalEEMod or methodologies described in the text.
3. The Main Street options do not result in changes in land use or traffic assumptions, their emissions are equivalent. Therefore, no distinctions for these two options are made in this table.
4. GPN – Great Park Neighborhoods.

1 Introduction

Heritage Fields is proposing modifications (2012 Modified Project) to the mixed-use development in Irvine, California that has already been approved (2011 Approved Project) by the City of Irvine (City) on the Proposed Project Site. This report compares the air quality emissions associated with the 2012 Modified Project (with and without optional conversion) to those associated with the 2011 Approved Project, excepting those emissions associated with the Orange County Great Park (Great Park), and determines their significance. All references in this report to emissions associated with the 2011 Approved Project exclude those emissions associated with the Great Park, since the 2012 Modified Project does not propose any changes to the 2011 Approved Project's Great Park uses.

Criteria pollutants are those chemicals that have ambient air quality standards (AAQS), and their precursors, which include carbon monoxide (CO), nitrogen oxides (NOx), Volatile Organic Compounds (VOC), sulfur dioxide (SO_2), coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$). There are other state and federal criteria pollutants, such as lead (state and federal) and hydrogen sulfide (state, only), that are not relevant to this analysis because they will not be emitted by the land uses included in either the 2011 Approved Project or the 2012 Modified Project.

Pollutant	Averaging Time	California Standard	Federal Primary Standard
Ozone (O_3)	1 hour	0.09 ppm	*
	8 hours	0.070 ppm	0.075 ppm
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm
	8 hours	9.0 ppm	9 ppm
Nitrogen Dioxide (NO_2)	Annual Average	0.030 ppm	0.053 ppm
	1 hour	0.18 ppm	0.100 ppm
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	0.075 ppm
	24 hours	0.04 ppm	*
Suspended Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	*
	24 hours	50 µg/m^3	150 µg/m^3
Suspended Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	15.0 µg/m^3
	24 hours	*	35 µg/m^3
Lead (Pb)	Monthly	1.5 µg/m^3	*
	Quarterly	*	1.5 µg/m^3
	3-Month Average	*	0.15 µg/m^3

Notes:
Source: California standards as listed on CARB website. Available at: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm. Accessed: February, 2012.
Federal Standards as listed on USEPA website. Available at: http://epa.gov/air/criteria.html. Accessed: February, 2012. ppm: parts per million; µg/m3: micrograms per cubic meter
* Standard has not been established for this pollutant/duration by this entity.

Like the 2011 Approved Project, the 2012 Modified Project will result in both one-time criteria pollutant emissions associated with the construction and annual criteria pollutant emissions associated with the operation of the development.

The construction emissions are those associated with off-road equipment, on-road vehicles, fugitive dust, asphalt off-gassing, and architectural coating. With approval of the 2012 Modified Project, the construction maximum daily and annual criteria pollutant emissions and resulting concentrations would be approximately the same as for the 2011 Approved Project, as described in Section 2 of this report. Accordingly, construction emissions and concentrations are not calculated again in this report.

This report provides the inventory of operational emissions that would result from the 2011 Approved Project and the inventory of emissions that would result from the 2012 Modified Project. Occupants of mixed-use developments use natural gas in buildings, are commonly transported in motor vehicles, use landscape equipment, use fireplaces, use consumer products, and paint the buildings all of which directly emit criteria pollutants. Accordingly, operational emissions are associated with mobile sources, natural gas energy use, landscaping equipment, fireplaces, architectural coating, and consumer products.

The estimated number of dwelling units by type and the sizes and types of non-residential land-uses are shown in Table 1a and Table 1b (with optional conversion). Some land uses have been combined such as the 50,000 square feet of public facilities is combined with the strip mall. The term automobile care center is generically used to represent any number of automobile repair, sales, etc land uses.

2 Criteria Pollutant Emissions Inventories

This section describes the methodology that was used to develop the criteria pollutant emissions inventories associated with the 2011 Approved Project and the 2012 Modified Project. These inventories consider three categories of criteria pollutant emissions: mobile sources, area sources, and construction sources. Area sources consist of natural gas energy use associated with residential buildings and non-residential buildings, fireplaces, landscaping equipment, consumer products and architectural coatings. Construction sources include off-road vehicles, on-road vehicles associated with worker, vendor, and hauling trips, and architectural coating, and asphalt off-gassing.

2.1 Overall Methodology For Calculating Mass Emissions

Consistent with the SCAQMD guidelines contained in its CEQA Air Quality Handbook and updates on SCAQMD's CEQA website, ENVIRON estimated criteria pollutant emissions during construction and operation and then compared them with the mass daily thresholds. This section reviews the methodologies used to calculate the emissions forming the basis of this mass emission comparison.

ENVIRON primarily utilized the California Emission Estimator Model version 2011.1.1 (CalEEMod) to assist in estimating the mass criteria pollutant emissions associated with the 2011 Approved Project and the 2012 Modified Project. CalEEMod is a statewide program designed to calculate both criteria and greenhouse gas emissions from development projects in California. This model was developed under the auspices of SCAQMD in collaboration with other California air districts regarding default data assumptions. CalEEMod is currently supported by SCAQMD for use in quantifying the emissions associated with development projects undergoing environmental review such as the CEQA process.[5] CalEEMod utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available. These models and default estimates use sources such as the United States Environmental Protection Agency (USEPA) AP-42 emission factors,[6] California Air Resources Board (CARB) on-road and off-road equipment emission models such as the EMission FACtor model (EMFAC) and the Offroad Emissions Inventory Program model (OFFROAD), and studies commissioned by California agencies such as the California Energy Commission (CEC) and CalRecycle.

ENVIRON used Orange County CalEEMod defaults in the model runs unless otherwise noted in the methodology description below. Details regarding the specific methodologies used by CalEEMod can be found in the CalEEMod User's Guide and associated appendices.[7] The CalEEMod output files are provided for reference in Appendix A to this report.

[5] See www.caleemod.com.
[6] The USEPA maintains a compilation of Air Pollutant Emission Factors and process information for several air pollution source categories. The data is based on source test data, material balance studies, and engineering estimates. More information is available at http://www.epa.gov/ttnchie1/ap42/
[7] Available at: http://www.caleemod.com/ under User's Guide.

2.2 Construction Emissions

As noted above, construction criteria pollutant mass emissions and concentrations were not calculated for this report because, with the approval of the 2012 Modified Project, the maximum daily and annual onsite construction emissions would be approximately the same as for the 2011 Approved Project, which were calculated in the 2011 Certified EIR. The maximum daily construction emissions for the 2011 Approved Project occurred during the grading and site preparation phases. While the 2012 Modified Project may require additional vertical construction[8], the amount of site preparation and grading construction for the 2012 Modified Project that could occur on a given day is not expected to be any greater than estimated for the 2011 Approved Project. Therefore, the maximum daily construction emissions for the 2012 Modified Project are not expected to be any greater than estimated for the 2011 Approved Project. Merely changing the type of buildings and increasing density primarily through vertical construction[9] would not change the maximum daily construction emissions for the 2012 Modified Project. The anticipated amount of off-road construction equipment at the site, and the amount of time the off-road equipment would operate per day are assumed to remain approximately the same.[10] The 2012 Modified Project has the potential to result in a longer vertical construction period, but is not expected to change maximum daily and onsite annual construction mass criteria pollutant emissions. The additional vertical construction may require additional worker and materials transportation if the construction schedule were to be compressed due to market requirements. Even if this were the case, however, the maximum daily emissions are more likely to be driven by the activity during the site preparation and grading phases. Thus, the emissions from the transportation of these additional workers and materials during vertical construction would not lead to a change in the maximum daily emissions. While approximately 11 acres have been added to the Proposed Project Site between the western boundary of Existing PA 51 and SR-133 between Trabuco Road and Irvine Blvd, the addition of these acres is also not expected to change the construction emission estimates; since the incremental increase in area for construction is small and the maximum daily site preparation and grading activity is not expected to exceed what was estimated for the 2011 Approved Project . Therefore, with the approval of the 2012 Modified Project, the construction criteria pollutant emissions and resulting impacts would be the same as the 2011 Approved Project's construction criteria pollutant emissions, and the 2012 Modified Project's resulting impacts would be the same as those for the 2011 Approved Project reported in the 2011 Certified EIR. Therefore, the incremental change in maximum daily and annual onsite construction criteria pollutant emissions would be zero.

2.3 Operational Emissions

Emissions from mobile sources, natural gas energy use in buildings, and other area sources would occur every year after build out. This section outlines the operational criteria pollutant

[8] In the context of this evaluation, “vertical construction” refers to the construction of the building structure as opposed to “horizontal construction” which is related to activities such as demolition and site preparation.

[9] Id.

[10] Information was provided by Heritage Fields to ENVIRON.

emissions associated with the 2011 Approved Project and the 2012 Modified Project Options. Because the Main Street options do not result in changes in land use or traffic assumptions, their emissions are equivalent. Therefore, no distinctions for these two options are made in this report.

2.3.1 Area Sources

The area source emissions included in this analysis result from landscaping equipment such as lawn mowers, hearths, consumer products and architectural coatings. Criteria pollutant emissions due to natural gas combustion in buildings, except for hearths, are also area sources but are excluded from this section since they are considered in the emissions associated with energy use consistent with the classifications used in CalEEMod.

The criteria pollutant emissions generated by the 2011 Approved Project and the 2012 Modified Project Options were calculated using CalEEMod defaults, based upon the land uses that will be included in each project, except as noted below.

- All fireplaces were assumed to be natural gas, based on SCAQMD Rule 445[11].
- 4,350 dwelling units in the 2011 Approved Project, 8,444 dwelling units in the 2012 Modified Project, and 9,511 dwelling units in the 2012 Modified Project with optional conversion were assumed to contain fireplaces.[12]
- The landscape-related emissions for the 2012 Modified Project (with and without optional conversion) were reduced by 28%, to account for the type of development and the amount landscaping therein planned by Heritage Fields.[13]

The resultant criteria pollutant emissions are shown in Table 2a and 2b with supporting information in Appendix A to this report.

2.3.2 Building Energy Use

Criteria pollutants are emitted as a result of activities in buildings for which natural gas is typically used as an energy source. Combustion of any type of fuel emits criteria pollutants directly into the atmosphere; when this occurs in a building, this is a direct emission source associated with that building. The land-use types used with CalEEMod are the same as indicated in Table 1. Unless otherwise noted, CalEEMod default parameters were used. For both residential and non-residential land-uses, climate zone 8 which best represents the city of Irvine was selected based on the CalEEMod forecast climate zone map.

Because older buildings tend to be less energy efficient, and the majority of the buildings in the survey were constructed before 2001, the RASS and CEUS data likely overestimate energy use for a 2001 Title 24-compliant building. This is relevant since CalEEMod uses adjusted estimates of building energy use based on the RASS and CEUS survey data. Therefore, to

[11] Electrical fireplaces if incorporated instead of natural gas fireplaces will result in decreased criteria pollutant emissions compared to a similar sized natural gas fireplace.
[12] Information provided by Heritage Fields to ENVIRON.
[13] This estimate is based on the reduced area available for landscaping.

account for updates since the 2001 Title 24 standards, CalEEMod uses the percentage reductions for each end use category taken directly from the CEC's "Impact Analysis for 2005 Energy Efficiency Standards"[14] and "Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings"[15] reports were applied to the RASS dataset for improvements from 2001 to 2005, and 2005 to 2008, respectively. The resulting 2008 numbers were then used as the energy intensities for both the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion). The emissions for both projects also reflect the developer's commitment to build homes and non-residential buildings that are 15% more energy efficient than the 2008 Title 24 part 6 building code. The Energy Commission's 2013 Energy Efficiency Standards, which take effect on January 1, 2014, are 25 percent more efficient than the 2008 Title 24 standards for residential construction and 30 percent more efficient for nonresidential construction. If this new standard were incorporated into this analysis, the estimated emissions would be lower.

Table 3a and 3b summarizes the total natural gas use, and total criteria pollutant emissions from that usage based on the CalEEMod output.

2.3.3 Mobile Source Emissions

The mobile source emissions will result from the typical daily operation of motor vehicles by residents and visitors.

ENVIRON estimated traffic emissions using the trip rates specified in the traffic study[16] and CalEEMod default inputs for trip lengths, trip purpose, and trip type for the land uses listed in Table 1. ENVIRON used a the fleet mix distribution for the land uses that is derived from both Southern California Association of Government's traffic model validation and ITE truck trip information as outlined in Appendix A. The fleet mix that was used preserved the Orange County fleet mix ratio of passenger vehicles. Light-heavy duty, medium-heavy duty and heavy duty vehicles were assigned as truck trips according to the SCAG model validation data, where available. In the absence of a distribution of these classes, equal weighting between these three classes was assumed. The following mitigation measures based on information provided by Heritage Fields were considered for both the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion):

- Density of approximately 9.6 dwelling units per acre to 11 dwelling units per acre.
- Proposed Project Site will have a density of intersections per square mile similar to that of the 2011 Approved Project.

[14] California Energy Commission. 2003. Impact Analysis: 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings. Available at: http://www.energy.ca.gov/title24/2005standards/archive/rulemaking/documents/2003-07-11_400-03-014.PDF

[15] California Energy Commission. 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings. Available at: http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/2007-11-07_IMPACT_ANALYSIS.PDF

[16] The total K-8 needs will be 2000 students, as evaluated in this study. Some land uses have been combined but trip rates were weighted to utilize the most appropriate land use match in CalEEMod. The 50,000 square feet of public facilities was combined with the land use subtype 'strip mall', agriculture was added to 'city parks', and 'other asphalt surfaces' represent the road and parking lot acreage estimates.

- Proposed Project Site is located no more than 2 miles from downtown or job center
- Proposed Project Site is located no more than 4 miles from transit center
- 2011 Approved Project will include 544 below market rate units, the 2012 Modified Project will include up to an additional 512 below market rate units and the 2012 Modified Project with Optional Conversion will have up to an additional 645 such units..
- Both projects will have connecting pedestrian and bike paths both on the Proposed Project Site and off-site.

ENVIRON utilized the methods discussed in the California Air Pollution Control Officer Association's (CAPCOA) publication entitled "Quantifying Greenhouse Gas Mitigation Measures" (August 2010)[17] to estimate the reduction in VMT for the mitigation measures included in the 2012 Modified Project and 2011 Approved Projects as project design features or mitigation measures assuming a compact infill project setting. The 2011 Approved Project was considered a compact infill development and the 2012 Modified Project will further improve the job-housing balance in the region by increasing the amount of residential units while at the same time reducing the amount of non-residential uses; as a result, the 2012 Modified Project reduces the 2011 Approved Project's significant impact on the jobs/housing balance to less than significant.[18] The 2012 Modified Project is also expected to maintain characteristics typical of compact infill development, as described above, and similar to those in the 2011 Approved Project. The CAPCOA publication methods use the inputs for trip rates, trip lengths, and criteria describing the mitigation and project design features to estimate the vehicle miles traveled (VMT) and the associated emissions. Based on this level of mitigation, the 2012 Modified Project and 2011 Approved Projects could result in over 30% reduction in VMT based on the caps for compact infill. However, according to the CAPCOA Manual, a limited number of case studies in Southern California described as compact infill, show slightly lower levels of observed mitigation. Therefore, to be conservative, it was assumed that there would be only a 25% reduction in VMT, which is within the range observed in Southern California. ENVIRON used urban trip lengths in the model, as the development will be located near an urban area. ENVIRON used 2030 as the build out year to estimate vehicle emissions.

The resultant mobile source criteria pollutant emissions are reported in Table 4a and 4b with supporting information provided in Appendix A to this report.

2.4 Operational Emissions Summary

The overall summary of operational criteria pollutant emissions are shown in Table 5a and 5b. According to Table 5a and 5b, the operational emissions for the 2012 Modified Project (with and without optional conversion) exceed the SCAQMD's thresholds for VOC, NO_X, CO and $PM_{2.5}$. The operational emissions for the 2012 Modified Project (with and without optional conversion) do not exceed the SCAQMD's thresholds for SO_2 and $PM_{2.5}$. Therefore, the level of the impacts predicted for the 2012 Modified Project (with and without optional conversion) are the same.

[17] This publication can be found at http://www.capcoa.org.

[18] See Section 5.09 of the DSSEIR.

3 Localized Significant Thresholds Analysis - Construction

The SCAQMD's localized significance thresholds (LST) methodology was developed to ensure that a development project would not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standards or an increase of PM emissions in excess of the control requirement in Rule 403.[19] SCAQMD recommends that construction projects larger than 5 acres model the CO, NOx, PM_{10} and $PM_{2.5}$ emissions to determine if they are below the applicable ambient air quality thresholds.

For pollutants in an attainment area (the SoCAB is classified as an attainment area for NO_2 and CO), SCAQMD suggests that the background concentrations be determined and added to the results of the air dispersion modeling to determine if ambient air standards would be violated.[20] For pollutants in a non-attainment area (the SoCAB is classified as a non-attainment area for PM_{10} and $PM_{2.5}$), SCAQMD has determined that concentrations estimated using the modeling guidance provided by SCAQMD to be below 10.4 $\mu g/m^3$ in a 24-hour averaging period will result in a less-than-significant impact as discussed in their LST guidance.

As noted above, this modeling was not conducted for this report because, with the approval of the 2012 Modified Project (with and without optional conversion), the construction concentrations would be approximately the same as the concentrations for the 2011 Approved Project calculated in the 2011 Certified EIR. Merely changing the type of buildings and increasing density primarily through vertical construction[21] would not change the maximum daily construction emissions for the 2012 Modified Project. The anticipated amount of off-road construction equipment at the site, and the amount of time the off-road equipment would operate per day are assumed to remain approximately the same.[22] The 2012 Modified Project has the potential to result in a longer vertical construction period, but this is not expected to change the maximum daily or onsite annual construction mass criteria pollutant emissions. The increased vertical construction period may result in an increase in offsite construction transportation emissions, but it is not expected to change the results of the assessment (i.e., the maximum daily construction emissions or the onsite annual emissions) as discussed above. While approximately 11 acres have been added between the western boundary of Existing PA 51 and SR-133 between Trabuco Road and Irvine Blvd, the addition of these acres is also not expected to meaningfully change the conclusions of the previous construction LST evaluation; since the maximum onsite construction daily emissions on any given day is not expected to increase. Furthermore, since the modeling evaluation for the 2011 Approved Project included receptors at the boundary of the construction areas, the location of the additional 11 acres is not likely to influence the location of the maximum impacted receptors. Therefore, with the approval of the 2012 Modified Project (with and without optional conversion), the construction

[19] SCAQMD. 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/ceqa/handbook/lst/lst.html.
[20] SCAQMD. 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/ceqa/handbook/lst/lst.html.
[21] In the context of this evaluation, "vertical construction" refers to the construction of the building structure as opposed to "horizontal construction" which is related to activities such as demolition and site preparation.
[22] Information was provided by Heritage Fields to ENVIRON.

concentrations and resulting impacts would be less than significant, as the 2011 Approved Project's construction concentrations and resulting impacts were.

The SCAQMD's LST methodology does not require that an evaluation of localized impacts for operational emissions be performed since neither the 2011 Approved Project nor the 2012 Modified Project (with and without optional conversion) includes any of the land uses that require an LST analysis to be performed.[23] The primary emissions from operational activities that would require an LST analysis include, but are not limited to NOx and CO combustion emissions from stationary sources such as flares and turbines, and/or significant on-site mobile sources such as earth-moving equipment.

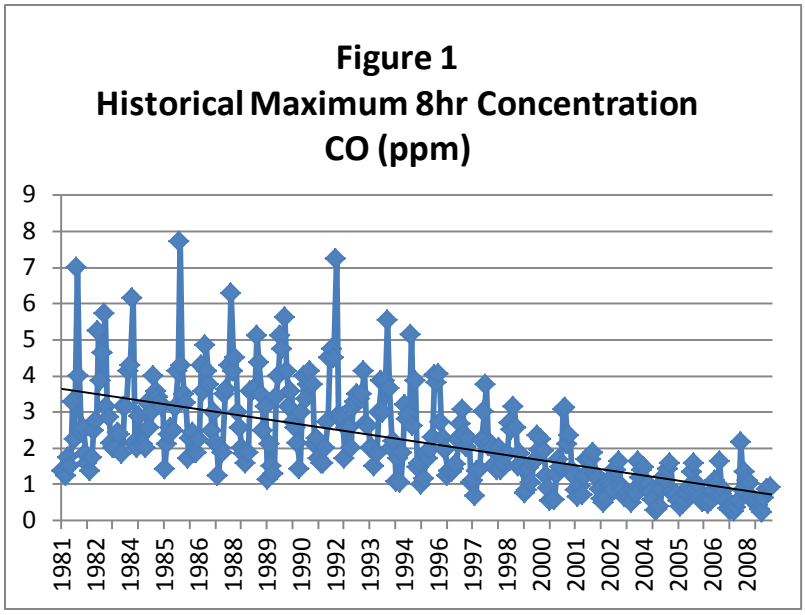
[23] SCAQMD. 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/ceqa/handbook/lst/lst.html.[24] USEPA. 2000. Air Quality Criteria for Carbon Monoxide. EPA 600/P-099/001F. June.

4 CO Hotspot Analysis

ENVIRON determined that a carbon monoxide (CO) "hot spots" analysis is not needed to determine whether the change in the level of service (LOS) of an intersection in the 2012 Modified Project would have the potential to result in exceedances of the California or National Ambient Air Quality Standards (CAAQS or NAAQS).

It has long been recognized that CO exceedances are caused by vehicular emissions[24], primarily when idling at intersections[25,26]. Accordingly, vehicle emissions standards have become increasingly more stringent. Before the first vehicle emission regulations, cars in the 1950's were typically emitting about 87 grams of CO per mile[27]. Since the first regulation of CO emissions from vehicles (model year 1966) in California, vehicle CO emissions for light duty vehicles have decreased by 96% due to the lowering of the vehicle CO emission standards.[28,29] for automobiles, Furthermore, new cold weather CO standards have been implemented, effective for the 1996 model year[30]. Currently, the CO standard in California is a maximum of 3.4 grams/mile for passenger cars (with provisions for certain cars to emit even less).[31] With the turnover of older vehicles, introduction of cleaner fuels and implementation of control technology on industrial facilities, CO concentrations in the SCAQMD have steadily declined as is shown in Figure 1.[32] Figure 1 is based on historical data from the El Toro monitoring station for the period from 1981 to 2000 and the Mission Viejo monitoring station for the period from 2000 to 2008.

[24] USEPA. 2000. Air Quality Criteria for Carbon Monoxide. EPA 600/P-099/001F. June.
[25] SCAQMD. 1993. CEQA Air Quality Handbook. Section 4.5. April.
[26] SCAQMD. 2003. Air Quality Management Plan. August.
[27] USEPA. http://yosemite.epa.gov/R10/airpage.nsf/webpage/Milestones+in+Auto+Emissions+Control
[28] National Academy Board on Energy and Environmental Systems. 2008. Review of the 21st Century Truck Partnership. Appendix D: Vehicle Emission Regulations [excerpt from http://books.nap.edu/openbook.php?record_id=12258&page=107]
[29] Kavanagh, Jason. 2008. Untangling U.S. Vehicle Emissions Regulations. http://www.edmunds.com/car-technology/untangling-us-vehicle-emissions-regulations-pg2.html.
[30] Title 13. California Code of Regulations. Section 1960.1(f)(2) [for 50,000 mile half-life]
[31] http://www.arb.ca.gov/msprog/levprog/cleandoc/ldtps_clean_complete_warranty_12-10.pdf
[32] http://www.arb.ca.gov/adam/



Accordingly, with the steadily decreasing CO emissions from vehicles, even very busy intersections do not result in exceedances of the CO standard.

The analysis prepared for CO attainment in the SoCAB by the SCAQMD can be used to assist in evaluating the potential for CO exceedances in the South Coast Air Basin. CO attainment was thoroughly analyzed as part of the SCAQMD's 2003 Air Quality Management Plan (2003 AQMP) and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan).[33] As discussed in the 1992 CO Plan, peak carbon monoxide concentrations in the SoCAB are due to unusual meteorological and topographical conditions, and not due to the impact of particular intersections. Considering the region's unique meteorological conditions and the increasingly stringent CO emissions standards, CO modeling was performed as part of 1992 CO Plan and subsequent plan updates and air quality management plans.

In the 1992 CO Plan, a CO hot spot analysis was conducted for four busy intersections in Los Angeles at the peak morning and afternoon time periods. The intersections evaluated included: Long Beach Blvd. and Imperial Highway (Lynwood); Wilshire Blvd. and Veteran Ave. (Westwood); Sunset Blvd. and Highland Ave. (Hollywood); and La Cienega Blvd. and Century Blvd. (Inglewood). These analyses did not predict a violation of CO standards. The busiest intersection evaluated was that at Wilshire Blvd. and Veteran Ave., which has a daily traffic volume of approximately 100,000 vehicles per day. The 2003 AQMP estimated that the 1-hour concentration for this intersection was 4.6 ppm, which indicates that the most stringent 1-hour CO standard (20.0 ppm) would likely not be exceeded until the daily traffic at the intersection exceeded more than 400,000 vehicles per day.[34] The Los Angeles County Metropolitan Transportation Authority evaluated the LOS in the vicinity of the Wilshire Blvd./Veteran Ave.

[33] SCAQMD. 1992. Federal Attainment Plan for Carbon Monoxide.

[34] Based on the ratio of the CO standard (20.0 ppm) and the modeled value (4.6 ppm).

intersection[35] and found it to be Level E at peak morning traffic and Level F at peak afternoon traffic[36]. At buildout of the 2012 Modified Project, the highest average daily trips on a segment of road would be 83,200 for Bake Parkway, between Rockfield Boulevard and Marine Way, which is lower than the daily trip volumes studied by SCAQMD. At buildout of the 2012 Modified Project, the highest average daily trips at an intersection would be approximately 120,604 at the Jamboree Road and Barranca Parkway intersection[37], which is below the daily traffic volumes that would be expected to generate CO exceedances as evaluated in the 2003 AQMP. This daily trip estimate is based on the peak hour conditions of the intersection. There is no reason unique to SoCAB meteorology to conclude that the CO concentrations at the Jamboree Road and Barranca Parkway intersection would exceed the 1-hour COs standard if modeled in detail, based on the studies undertaken for the 2003 AQMP.

[35] The Metropolitan Transportation Authority measured traffic volumes and calculated the LOS for the intersection Wilshire Blvd/ Sepulveda Ave. which is a block west along Wilshire Blvd., still east of Highway 405.

[36] Metropolitan Transportation Authority. 2004. Congestion Management Program for Los Angeles County. Exhibit 2-6 and Appendix A. July 22.

[37] Urban Crossroads, 2012. *Heritage Fields Project 2012 GPA/ZC Traffic Impact Analysis. Appendix 8.5*

5 Summary of Results

For construction, the impacts from the mass daily criteria pollutant emissions are the same for the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion). The 2012 Modified Project (with and without optional conversion) would result in less than significant impacts for SO_2, and significant impacts for VOC, NOx, CO, $PM_{2.5}$ and PM_{10}. Also, according to the LST analysis, all would not result in a significant impact on localized air quality.

For operations, the significance levels of the impacts from the mass daily criteria pollutant emissions would result in significant and unavoidable impacts for VOC, NO_X, CO and $PM_{2.5}$, and less than significant impacts for PM_{10} and SO_2..

According to the CO hotspots analysis, the 2012 Modified Project (with and without optional conversion) would result in less than significant impacts since none of the intersections would have traffic volumes greater than that studied for the SCAQMD AQMP according to according to the *Heritage Fields Project 2012 GPA/ZC Traffic Impact Analysis* . At buildout, the highest average daily trip figure would be 83,200 for Bake Parkway south of Rockfield Boulevard, which is less than the values studied by SCAQMD.