

*Appendix D*  
*Greenhouse Gas (“GHG”) Technical Report*

## *Appendices*

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Climate Change &  
Greenhouse Gas Emission  
Technical Report  
**Heritage Fields**  
Irvine, California

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Date:  
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## List of Acronyms

AB 32	Assembly Bill 32
CalEEMod	California Emission Estimator Model
CARB	California Air Resources Board
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CEUS	Commercial End-Use Survey
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	CO <sub>2</sub> equivalents
DU	dwelling unit
EIR	Environmental Impact Report
GHG	greenhouse gas
GWP	global warming potential
lb	pound
LCFS	Low Carbon Fuel Standard
LDA	light duty automobiles
MDV	medium duty truck
MT	metric tons
MT/SP/YR	metric tons of CO <sub>2</sub> e per service population per year
MWh	megawatt hour
N <sub>2</sub> O	nitrous oxide
RASS	Residential Appliance Saturation Survey
RPS	Renewable Portfolio Standards
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
USEPA	United States Environmental Protection Agency
VMT	vehicle miles travelled
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 greenhouse gas (GHG) emissions associated with the 2012 Modified Project to those associated with the 2011 Approved Project, and determines the significance of the impacts from those emissions using numeric thresholds chosen by the City as the lead agency.

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<sup>1</sup>; 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.

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<sup>1</sup> 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.

- Rezones the City Parcels from 3.2 Transit Oriented Development to 8.1 Trails and Transit Oriented District.
- 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 2<sup>nd</sup> 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 GHG 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 and annual GHG emissions associated with the construction and operation of the development. This report provides 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 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 uses.

The GHG emissions inventories consider eight sources of emissions: energy use associated with residential and non-residential buildings, mobile sources, area sources, solid waste, water and wastewater, construction, and vegetation changes. The ongoing operational emissions consist of the first six categories, while the one-time emissions are associated with the construction and vegetation changes. This report includes the direct emissions associated with the development as well as the indirect emissions that may result from the development. These indirect emissions are associated with electricity generation, the embodied energy used in supplying potable water, and emissions associated with solid waste disposal. The electrical power for both the 2011 Approved Project and the 2012 Modified Project will be supplied to the Proposed Project Site by Southern California Edison (SCE). Accordingly, indirect GHG emissions from electricity usage associated with both projects are calculated using the SCE carbon-intensity factors adjusted for mandated renewable energy requirements. For the reasons discussed below, however, construction emissions are not analyzed again in this report.

At this time, there are no adopted thresholds that govern the determination of the significance of either the 2011 Approved Project's or the 2012 Modified Project's GHG emissions. The South Coast Air Quality Management District (SCAQMD) has not adopted a significance threshold for

GHG emissions for development projects<sup>2</sup> or a methodology for quantifying GHG emissions. However, the current draft thresholds released by SCAQMD for discussion purposes in September of 2010 include the option of using an efficiency metric based on the metric tons (MT) of GHG emissions per year per "service population." Service population is defined as the sum of the residential population and employees; a development's GHG emissions are divided by the service population to yield a GHG efficiency metric that is presented in terms of "metric tons of CO<sub>2</sub>e per service population per year" (MT/SP/YR) figure. The draft SCAQMD GHG thresholds are based on the California Air Resources Board's interpretations of AB 32's requirements. This report will use the SCAQMD's draft efficiency metric to inform its significance determinations. Finally, since no threshold of significance has been adopted for construction GHG emissions, consistent with methods used by the SCAQMD in their draft guidelines, the one-time construction and vegetation change GHG emissions are annualized, added to the operational GHG emissions and then compared to the SCAQMD's draft efficiency metric<sup>3</sup>.

Table ES-1 reports and compares the annual operational GHG emissions for the 2011 Approved Project and the 2012 Modified Project and the 2012 Modified Project's Conversion Scenario. The emissions are presented by emission source category as calculated in CalEEMod, SCAQMD's new program for estimating emissions for CEQA purposes. As Table ES-1 reports, the 2012 Modified Project's GHG emissions result in an efficiency metric of approximately 4.41 MT/SP/YR, or 4.47 MT/SP/YR if the amortized one-time emissions are included. The 2012 Modified Project's GHG emissions (with optional conversion) result in an efficiency metric of approximately 4.30 MT/SP/YR, or 4.36 MT/SP/YR if the amortized one-time emissions are included. These figures are below the 4.8 MT/SP/YR draft CEQA significance threshold proposed by SCAQMD.<sup>4</sup> Because the Main Street options do not result in changes in land use or traffic assumptions<sup>5</sup>, their emissions are equivalent. Therefore, no distinctions for these two options are made in this report.

The construction GHG emissions for the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion) have not been analyzed again. Emissions from off-road equipment for the 2012 Modified Project would be approximately the same as estimated for the 2011 Approved Project, as the amount of land that would need to be graded and paved would be similar, and most off-road equipment used during construction is associated with grading and paving. Offsite emissions associated with worker transportation and materials transportation to

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<sup>2</sup> SCAQMD has adopted interim significance thresholds for industrial sources of 10,000 metric tons of carbon dioxide equivalents per year. The Board adopted these December 5, 2008.

<sup>3</sup> This approach to one-time construction and vegetation change GHG emissions is based on the GHG Threshold Working Group Meeting #13 Minutes from August 26, 2009. Available at: <http://www.aqmd.gov/ceqa/handbook/GHG/2009/aug26mtg/wkqp13minutes.pdf>

<sup>4</sup> The numerical value for the SCAQMD efficiency metric did not incorporate state-wide solid waste or construction emissions; therefore using this metric for a comparison including solid waste and construction emissions is conservative.

<sup>5</sup> Urban Crossroads, 2012. Heritage Fields Project 2012 GPA/ZC Traffic impact Analysis.

the site may be higher, due to the larger amount of vertical construction<sup>6</sup> proposed for the 2012 Modified Project. The 2012 Modified Project has the potential to result in a longer vertical construction period. This potential increase in offsite construction transportation emissions is not expected to change the results of the assessment. With the approval of the 2012 Modified Project, the construction emissions would be approximately the same as for the 2011 Approved Project, which were calculated in the 2011 Certified EIR. Merely changing the type of certain of the buildings and increasing density primarily through vertical construction would result in little additional construction equipment at the site.<sup>7</sup> 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 total construction emission estimates since the incremental increase in area for construction is small.<sup>8</sup>

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<sup>6</sup> 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.

<sup>7</sup> Information was provided by Heritage Fields to ENVIRON.

<sup>8</sup> The additional 11 acres is less than 1% of the total acreage in the Project as provided by Heritage Fields.

<b>Table ES-1 Summary Comparison of Operational GHG Emissions For 2011 Approved Project and 2012 Modified Project (With and Without Optional Conversion) Heritage Fields, Irvine, California</b>			
<b>Category<sup>1</sup></b>	<b>CO<sub>2</sub>e Emissions<sup>2</sup></b>		
	<b>2011 Approved Project (GPN)</b>	<b>2012 Modified Project</b>	<b>2012 Modified Project w/Optional Conversion</b>
	<b>MT/yr</b>		
<b>Area</b>	3,242	6,294	7,089
<b>Energy Use</b>	31,023	41,345	42,009
<b>Water Use</b>	3,063	3,027	3,197
<b>Waste Disposed</b>	3,020	4,005	4,122
<b>Traffic</b>	103,538	107,735	107,735
<b>Total</b>	<b>143,886</b>	<b>162,406</b>	<b>164,152</b>
<b>Service Population<sup>3</sup></b>	32,275	36,829	38,176
<b>Emissions per Service Population</b>	<b>4.46</b>	<b>4.41</b>	<b>4.30</b>
<b>Construction Amortized<sup>4</sup></b>	3,214	3,214	3,214
<b>Vegetation Amortized<sup>4,5</sup></b>	-527	-952	-952
<b>Emissions per Service Population with Amortized<sup>6</sup></b>	<b>4.54</b>	<b>4.47</b>	<b>4.36</b>

Notes:

- All operational categories for which CalEEMod calculates emissions.
- Emissions as described in previous tables. CO<sub>2</sub>e includes CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions, weighted by their respective global warming potentials.
- Service population includes residents and workers. For the 2011 Approved Project, this also includes commuting higher education students associated with a project.
- One-time emissions were amortized over a 30 year period.
- A net sequestration of carbon results in a decrease (or negative) CO<sub>2</sub>e. The number of trees for the 2012 Modified Project Optional Conversion was conservatively assumed to be the same as that in the 2012 Modified Project.
- The Main Street options do not result in changes in land use or traffic assumptions, therefore their emissions are equivalent. Therefore, no distinctions for these two options are made in this table.

Abbreviations:  
 CalEEMod - CALifornia Emissions Estimator MODel  
 CH<sub>4</sub> - methane  
 CO<sub>2</sub> - carbon dioxide  
 CO<sub>2</sub>e - carbon dioxide equivalents  
 GHG - greenhouse gases  
 GPN - Great Park Neighborhoods  
 MT - metric tons  
 N<sub>2</sub>O - nitrogen dioxide  
 yr - year

## 1 Introduction

This report compares the greenhouse gas emissions (GHG) associated with the 2012 Modified Project to those associated with the 2011 Approved Project, and determines the significance of the impacts from those emissions.

The GHG emissions inventories include both ongoing, operational emissions and emissions associated with the one-time construction and land-use changes. The inventories include both direct emissions and indirect emissions, such as those associated with electricity use. This report discusses the regulatory developments related to GHG emissions and provides an estimate of emissions that would result from the 2012 Modified Project as compared to the 2011 Approved Project.

The estimated number of dwelling units by type of unit and the sizes and types of non-residential land-uses are shown in Table 1. Occupants of mixed-use developments use electricity, heat their buildings and water (typically with natural gas), consume drinking water, generate wastewater and solid waste, and are commonly transported in motor vehicles, all of which are activities that directly or indirectly emit GHGs. The principal GHGs resulting from such activities are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). CO<sub>2</sub> is considered the most important GHG, due primarily to the large quantity of emissions produced by fossil fuel combustion, especially during the generation of electricity and powering of motor vehicles. CH<sub>4</sub> and N<sub>2</sub>O are also emitted by fossil fuel combustion, though their emissions are much smaller than CO<sub>2</sub>.

The effect that each of these gases can have on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates the predicted contribution of a gas to global warming relative to the predicted contribution by the same mass of CO<sub>2</sub>. CH<sub>4</sub> and N<sub>2</sub>O are substantially more potent as GHGs than CO<sub>2</sub>. GHG emissions are typically reported in terms of metric tons (i.e., 1000's of kilograms) of CO<sub>2</sub> equivalents (CO<sub>2</sub>e). CO<sub>2</sub>e are calculated as the product of the mass emitted of a given GHG and its specific GWP. While CH<sub>4</sub> and N<sub>2</sub>O have much higher GWPs than CO<sub>2</sub>, CO<sub>2</sub> is emitted in significantly higher quantities such that it accounts for the majority of GHG emissions in CO<sub>2</sub>e, both from mixed-use developments and human activity in general.

## 2 Regulatory Environment for the GHG Inventory

The climate change regulatory setting – federal, state and local – is complex and rapidly evolving. This section identifies key legislation, executive orders, and seminal court cases related to climate change germane to this GHG emissions report.

### 2.1 California Legislation

California has enacted several pieces of legislation that relates to GHG emissions and climate change, much of which sets aggressive goals for GHG reductions within the state. The California Natural Resources Agency adopted amendments to the regulations adopted under the California Environmental Quality Act (CEQA), the Guidelines for California Environmental Quality Act (CEQA Guidelines), which address the specific obligations of public agencies when analyzing GHG emissions under CEQA to determine a project's effects on the environment. However, neither a threshold of significance nor any specific mitigation measures are included or provided in these CEQA Guideline amendments.

#### 2.1.1 Assembly Bill 32 (Statewide GHG Reductions)

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires the California Air Resources Board (CARB) to develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed to set a statewide GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill sets a timeline for adopting a scoping plan for achieving GHG reductions in a technologically and economically feasible manner.

The heart of the bill is the requirement that statewide GHG emissions be reduced to 1990 levels by 2020. As determined by CARB, California must reduce GHG emissions to a level that is approximately 28.4% below CARB's year 2020 "business-as-usual" GHG emission predictions to achieve this goal. The bill requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions. Key AB 32 milestones are as follows:

June 30, 2007—Identification of discrete early action greenhouse gas emissions reduction measures. On June 21, 2007, CARB satisfied this requirement by approving three early action measures. These were later supplemented by adding six other discrete early action measures.

January 1, 2008—Identification of the 1990 baseline GHG emissions level and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions. On December 6, 2007, CARB approved a statewide limit on GHG emissions levels for the year 2020 consistent with the determined 1990 baseline.

January 1, 2009—Adoption of a scoping plan for achieving GHG emission reductions. On October 15, 2008, CARB issued a "discussion draft" Scoping Plan entitled "Climate Change Draft Scoping Plan: A Framework for Change" (Draft Scoping Plan). CARB adopted the Draft Scoping Plan at its December 11, 2008 meeting.

January 1, 2010—Adoption and enforcement of regulations to implement the "discrete" actions.

January 1, 2011—Adoption of GHG emissions limits and reduction measures by regulation.

January 1, 2012—GHG emissions limits and reduction measures adopted in 2011 become enforceable.

### **2.1.2 Executive Order S-3-05 (Statewide GHG Targets)**

California Executive Order S-03-05 (June 1, 2005) mandates a reduction of GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050. Although the 2020 target is the core of AB 32, and has effectively been incorporated into AB 32, the 2050 target remains the goal of the Executive Order, only.

### **2.1.3 Senate Bill 375 (Land Use Planning)**

SB 375 provides for a new planning process to coordinate land use planning and regional transportation plans and funding priorities in order to help California meet the GHG reduction goals established in AB 32. SB 375 requires regional transportation plans, developed by Metropolitan Planning Organizations (MPOs), including the Southern California Association of Governments (SCAG), to incorporate a "sustainable communities strategy" in their regional transportation plans that will achieve GHG emission reduction targets set by CARB. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit oriented development. SB 375 will be implemented over the next several years.

SB 375 is similar to the Regional Blueprint Planning Program, established by the California Department of Transportation, which provides discretionary grants to fund regional transportation and land use plans voluntarily developed by MPOs working in cooperation with Council of Governments. On April 4, 2012, the Regional Council of SCAG adopted the 2012-2035 Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS).

### **2.1.4 Energy Conservation Standards**

Energy Conservation Standards for new residential and non-residential buildings were adopted by the California Energy Resources Conservation and Development Commission in June 1977 and most recently revised in 2008 (Title 24, Part 6 of the California Code of Regulations [CCF]).<sup>9</sup> Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. The 2006 Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608), dated December 2006, were adopted by the California Energy Commission on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally-regulated appliances and non-federally regulated appliances. While these regulations are now often seen as "business as usual," they do exceed the standards imposed by any other states and reduce GHG emissions by reducing energy demand.

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (Title 24, California Code of

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<sup>9</sup> Although new building energy efficiency standards were adopted in April 2008, these standards did not go into effect until 2009.

Regulations). Part 11 established voluntary standards, some of which became mandatory in the 2010 edition of the Code, on planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants.

On May 31, 2012, the California Energy Commission adopted the 2013 Energy Efficiency Standards, which take effect on January 1, 2014, and which are 25 percent more efficient than the 2008 Title 24 standards for residential construction and 30 percent more efficient for nonresidential construction.

### **2.1.5 Senate Bill 97 (CEQA Guidelines)**

SB 97 required that the California Natural Resource Agency (CNRA) coordinate on the preparation of amendments to the CEQA Guidelines regarding feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions. Pursuant to SB 97, CNRA adopted CEQA Guidelines amendments on December 30, 2009. The amendments were approved by the Office of Administrative Law on February 16, 2010, and became effective on March 18, 2010.

With respect to the significance assessment, newly added CEQA Guidelines section 15064.4, subdivision (b), provides:

A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

- (1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
- (2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;
- (3) The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The new CEQA Guidelines do not include or recommend any particular threshold of significance; instead, they leave that decision to the discretion of the lead agency. However, with respect to adopting thresholds of significance, newly added CEQA Guidelines section 15064.7 subdivision (c) provides:[A] lead agency may consider thresholds of significance previously adopted or recommended by other public agencies

or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence.

The new CEQA Guidelines also do not suggest or recommend the use of any specific GHG emission mitigation measures. Instead, newly added CEQA Guidelines section 15126.4 subdivision (c), provides that lead agencies shall consider feasible means, supported by substantial evidence and subject to monitoring or reporting, of mitigating the significant effects of greenhouse gas emissions. Mitigation measures may include the following, among others:

- (1) Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision;
- (2) Reductions in emissions resulting from a project through implementation of project features, project design, or other measures, such as those described in Appendix F;
- (3) Off-site measures, including offsets that are not otherwise required, to mitigate a project's emissions;
- (4) Measures that sequester greenhouse gases;
- (5) In the case of the adoption of a plan, such as a general plan, long range development plan, or plans for the reduction of greenhouse gas emissions, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.

The Guidelines apply retroactively to any incomplete environmental impact report, negative declaration, mitigated negative declaration, or other related document.<sup>10</sup>

Among other things, CNRA noted in its Public Notice for these changes that the impacts of GHG emissions should be considered in the context of a cumulative impact, rather than a project impact. The Public Notice states:

"While the Proposed Amendments do not foreclose the possibility that a single project may result in greenhouse gas emissions with a direct impact on the environment, the evidence before [CNRA] indicates that in most cases, the impact will be cumulative. Therefore, the Proposed Amendments emphasize that the analysis of greenhouse gas emissions should center on whether a project's incremental contribution of greenhouse gas emissions is cumulatively considerable."

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<sup>10</sup> Senate Bill No. 97. CHAPTER 185. An act to add Section 21083.05 to, and to add and repeal Section 21097 of, the Public Resources Code, relating to the California Environmental Quality Act.  
[http://www.opr.ca.gov/ceqa/pdfs/SB\\_97\\_bill\\_20070824\\_chaptered.pdf](http://www.opr.ca.gov/ceqa/pdfs/SB_97_bill_20070824_chaptered.pdf)

## 2.2 Local Air Quality Management District (SCAQMD) Guidance

On December 5, 2008, the SCAQMD Governing Board adopted its staff proposal for an interim CEQA GHG significance threshold for projects where the SCAQMD is the lead agency. As to all other projects, where the SCAQMD is not the lead agency, the Board has, to date, adopted thresholds only for industrial (stationary source) projects.<sup>11</sup> The SCAQMD has not yet adopted any significance thresholds for new residential/commercial development projects, but has over the last few years proposed several draft thresholds<sup>12</sup>. To assist interested parties in assessing the significance of GHG emissions from new residential/commercial development projects under CEQA, SCAQMD staff has been working on developing thresholds together with the SCAQMD's GHG CEQA Significance Thresholds Working Group. To achieve its policy objective of capturing 90% of GHG emissions from new residential/commercial development projects and implementing a "fair share" approach to reducing emission increases from each new residential/commercial development sector, SCAQMD staff has proposed combining performance standards and screening thresholds. According to the presentation given at the September 28<sup>th</sup>, 2010 GHG CEQA Significance Working Group meeting, the last Working Group meeting prior to the date of this report, SCAQMD staff proposed a draft threshold for 2020 of 4.8 MT/SP/YR for mixed use developments such as the 2011 Approved Project and 2012 Modified Project.<sup>13</sup> Since the goal of AB 32 is to return to 1990 GHG emission levels by 2020, the basis for this threshold is the statewide emission inventory for 1990 based on "land use" related sectors divided by the statewide service population. These land use related sectors currently used do not include solid waste landfill emissions or construction emissions. However, to be consistent with SCAQMD's intent to include solid waste and amortized construction into the efficiency metric, this threshold has been conservatively used. If the solid waste and construction emissions were included, the efficiency metric would be higher.

## 2.3 City of Irvine

The City of Irvine adopted the California Green Building Codes (CalGreen Title 24 part 11) which requires new buildings to incorporate several mandatory measures aimed at reducing the environmental impact of buildings<sup>14</sup>. This includes features that will reduce GHG emissions through enhanced energy and water efficiency.

The City of Irvine adopted on July 8, 2008 an energy plan which has four goals.<sup>15</sup> The first goal is to achieve 100% community participation in its energy plan. The second goal is to improve building energy use by 30%. The third goal is to transition to renewable energy. The final goal is to reduce GHG emissions to 1990 levels by 2020.

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<sup>11</sup> <http://www.aqmd.gov/hb/2008/December/081231a.htm>

<sup>12</sup> <http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html>

<sup>13</sup> <http://www.aqmd.gov/ceqa/handbook/GHG/2010/sept28mtg/sept29.html>

<sup>14</sup> <http://www.cityofirvine.us/programs/green-building/>

<sup>15</sup> <http://www.cityofirvine.us/assets/downloads/CityofIrvineEnergyPlan20080624.pdf>

## 2.4 Impact of Regulatory Developments on the Project's GHG Inventory

Promulgated regulations that will affect the both the 2011 Approved Project's and the 2012 Modified Project's emissions are accounted for in the inventories provided by this report. In particular, the Pavley Standards, Low Carbon Fuel Standards and the Renewable Portfolio Standards (RPS) will be in effect at the anticipated time of build out, and therefore are accounted for in the emission calculations. This section provides an overview of the impact of these three rules on the GHG inventories presented in this report.

### 2.4.1 Renewable Power Requirements

A major component of California's Renewable Energy Program is the Renewable Portfolio Standards (RPS) established under Senate Bills (SBs) 1078 (Sher), 107 (Simitian), and most recently, SB 2X (Simitian). Under the first two RPS standards, certain retail sellers of electricity are required to increase the amount of renewable energy each year by at least 1% in order to reach at least 20% by December 31, 2010.<sup>16</sup> The third, most recent bill requires 33% renewable content in electricity to be 33% by 2020<sup>17</sup>. Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered to be "carbon neutral." For purposes of this analysis, ENVIRON assumes that the production of electricity from these renewable sources does not produce any net emissions of CO<sub>2</sub> or other GHGs.

As noted above, indirect GHG emissions are associated with electricity use, as the electricity used in a building is typically generated offsite at a power plant. As stated previously, development at the Proposed Project Site would be supplied power by SCE. The 2007 SCE carbon-intensity factor is presented in Table 2 in pounds (lbs) of CO<sub>2</sub>e per megawatt hour (MWh).<sup>18</sup> This emission factor (631 lb/MWh) is used in this report, which takes into account the mix of energy sources used to generate electricity for SCE,<sup>19</sup> and the relative carbon intensities of these sources. As shown in Table 2, SCE's 2007 mix of energy sources contains some portion of renewable sources<sup>20</sup>. Table 2 shows ENVIRON's adjustments of the 2007 emission factor to this 33% goal. The resultant carbon intensity factor of 488 lb/MWh was used for all of the scenarios. ENVIRON did not change the values for N<sub>2</sub>O and CH<sub>4</sub> emissions as these are based on E-Grid values for the region and do not reflect specific utility information.

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<sup>16</sup> 2002 Senate Bill 1078 and 2006 Senate Bill 107.

<sup>17</sup> 2011 Extraordinary Session Senate Bill 2

<sup>18</sup> California Climate Action Registry (CCAR) Database. MID PUP Report. 2007..

<sup>19</sup> Natural gas, nuclear, coal, wind, solar, biogas, biomass, hydropower, and geothermal.

<sup>20</sup> According to SCE, their renewable portfolio percentage for 2010 was 19.4% showing that they were on track to achieve the 2010 requirement of 20%. Therefore it is reasonable to assume that they will continue to increase their renewable portfolio to meet the 2020 requirement of 33%.

<http://www.sce.com/PowerandEnvironment/Renewables/default.htm>

## 2.4.2 Vehicle Emissions Standards/Improved Fuel Economy

The two regulatory measures considered in this section are the vehicle GHG emission standards enacted under AB 1493 (Pavley I) and the Low Carbon Fuel Standard (LCFS). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light duty auto – medium duty vehicle [LDA-MDV]) from 2009 through 2016 and is anticipated to reduce GHG emissions from passenger vehicles by 30% in 2016. The LCFS requires a reduction of 2.5% in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10% by 2020.<sup>21</sup>

For on-road vehicle CO<sub>2</sub> emissions, CalEEMod, the model used to develop the GHG emission inventory,<sup>22</sup> applies Pavley I and LCFS reductions to the appropriate vehicle classes for scenario years 2011 and after based on CARB's EMFAC model and associated post-processors.<sup>23</sup>

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<sup>21</sup> CARB's user guide for the Pavley I + Low Carbon Fuel Standard Postprocessor provides more detail. Available at: <http://www.arb.ca.gov/cc/sb375/tools/pavleylcf-postprocessor-userguide.pdf>, accessed August 2010.

<sup>22</sup> The California Emission Estimator Model (CalEEMod) is a comprehensive statewide model that estimates the GHG and criteria pollutant emissions from land use development projects.

<sup>23</sup> Adapted from page 14 of the CalEEMod User's Guide, Appendix A. "Calculation Details". Available at: [www.caleemod.com](http://www.caleemod.com)

### 3 GHG Emissions Inventories

This section describes the methodology that was used to develop the GHG emissions inventories associated with the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion). 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. These inventories consider eight categories of GHG emissions: energy use associated with residential buildings and non-residential buildings, mobile sources, area sources, solid waste, water and wastewater, construction, and vegetation changes. Electrical power will be supplied to the Proposed Project Site by SCE. Accordingly, indirect GHG emissions from electricity usage are calculated using the SCE carbon-intensity factors adjusted for mandated renewable energy requirements, as described earlier. Legislation and rules regarding climate change, as well as the scientific understanding of the extent to which different activities emit GHGs, continue to evolve; as such, the inventories in this report are a reflection of the guidance and knowledge currently available.

#### 3.1 Overall Calculation Methodology

ENVIRON quantified GHG emissions to evaluate whether the 2011 Approved Project and the 2012 Modified Project have reduced or mitigated their GHG emissions sufficiently so as to result in an emissions level below the SCAQMD's draft proposed efficiency metric of 4.8 MT/SP/YR. This section outlines the methodologies used to calculate the emissions from each Project.

ENVIRON primarily utilized the California Emission Estimator Model version 2011.1.1 (CalEEMod)<sup>24</sup> to assist in quantifying the GHG emissions in the inventories presented in this report for the 2011 Approved Project and the 2012 Modified Project. CalEEMod is a statewide program designed to calculate both criteria and GHG emissions from development projects in California. This model was developed under the auspices of the SCAQMD and received input from other California air districts, and is currently supported by SCAQMD for use in quantifying the emissions associated with development projects undergoing environmental review.<sup>25</sup> 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,<sup>26</sup> CARB's 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. With respect to the estimation of GHG emissions, CalEEMod is not only more current than URBEMIS 9.2.4, but it also includes all of the GHG emission source categories required for a comprehensive GHG impacts analysis and updated vehicle emission factors that incorporate recent regulations such as Pavley I and the LCFS,

<sup>24</sup> Available at: <http://www.caleemod.com/>

<sup>25</sup> <http://www.aqmd.gov/ceqa/models.html>

<sup>26</sup> 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/>

discussed above, and incorporates state-of-the-science methods for quantifying mitigation and project design features not available in URBEMIS 9.2.4.<sup>27</sup>

ENVIRON used Orange County CalEEMod defaults in the model runs unless otherwise noted in the methodology descriptions below. Details regarding the specific methodologies used by CalEEMod can be found in the CalEEMod User's Guide and associated appendices.<sup>28</sup> The CalEEMod output files are provided for reference in Appendix A to this report.

### **3.2 One-Time Emissions**

One-time emissions are those emission that are not re-occurring over the life of the project. This includes emissions associated with construction and emissions associated with land use changes. These are both described in this section.

#### **3.2.1 Construction Emissions**

The emissions from the off-road equipment would be approximately the same for the 2012 Modified Project as for the 2011 Approved Project, which were calculated in the 2011 Certified EIR. Merely changing the type of certain of the buildings and increasing density primarily through vertical construction<sup>29</sup> would result in little additional off-road construction equipment at the site, and the amount of time and resources required for site preparation and grading is assumed to remain the same.<sup>30</sup> Emissions associated with worker transportation and materials transportation to the site may be higher, due to the larger amount of vertical construction proposed for the 2012 Modified Project. 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 total construction emission estimates since the incremental increase in area for construction is small.<sup>31</sup> Therefore, with the approval of the 2012 Modified Project, the construction GHG emissions and resulting impacts would be similar to the 2011 Approved Project's construction emissions and resulting impacts, but may be slightly higher due to a potential increase in transportation emissions.

#### **3.2.2 Vegetation Changes**

Permanent vegetation changes that occur as a result of project development constitute a one-time change in the carbon sequestration capacity of a project site. For the purposes of this analysis, we have assumed that the 2012 Modified Project incorporates landscaping and a plant palette that will foster carbon sequestration within the Proposed Project Site that is comparable to the landscaping and plant palette that was already incorporated into the 2011 Approved

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<sup>27</sup> See the Frequently Asked Questions (FAQs) available at [www.caleemod.com](http://www.caleemod.com) for a list of differences between CalEEMod and URBEMIS.

<sup>28</sup> Available at: <http://www.caleemod.com>.

<sup>29</sup> 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.

<sup>30</sup> Information was provided by Heritage Fields to ENVIRON.

<sup>31</sup> The additional 11 acres is less than 1% of the total acreage in the Project as provided by Heritage Fields.

Project. Based on assumption, ENVIRON estimates that approximately 18,000 additional trees will be included as part of the 2012 Modified Project. These changes also result in a net increase in carbon sequestration capacity because of the net new trees that will be planted at the Proposed Project Site outside of the park.<sup>32</sup> Consequently, vegetation change results in a GHG emissions offset. The 2012 Modified Project with optional conversion is likely to include even more trees, but this analysis conservatively assumes the same number of trees are planted.

Sequestration quantities were calculated assuming that 40,340 net new trees would be planted as part of the 2012 Modified Project based on the assumption stated above. Since the exact species of trees to be planted is not known at this time, the miscellaneous tree type was selected which represents an average of several tree species. The change in vegetation at the Proposed Project Site results in a one-time net sequestration of 28,561 MT of CO<sub>2</sub>e emissions for the 2012 Modified Project (with and without optional conversion). The CalEEMod input parameters are summarized in Appendix A to this report. Table 3 reports the change in the GHG emissions associated with the change in the Proposed Project Site's carbon sequestration resulting from the 2012 Modified Project (with and without optional conversion) as compared to the 2011 Approved Project.

### 3.3 Annual Operational Emissions

Emissions from mobile and area sources and indirect emissions from energy and water use, wastewater, as well as waste management, would occur every year after build out. This section outlines the operational GHG emissions associated with the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion). 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.

#### 3.3.1 Area Sources

The area source GHG emissions included in this analysis result from landscaping-related fuel combustion sources, such as lawn mowers, and from natural gas fireplaces.<sup>33</sup> There are no substantial direct GHG emissions associated with consumer products and architectural coating. GHG emissions due to natural gas combustion in buildings other than from fireplaces are excluded from this section since they are included in the emissions associated with energy use.

The GHG emissions for the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion) were calculated using CalEEMod defaults based upon the land uses that will be part of these developments, except as noted below.

- All fireplaces were assumed to be natural gas, based on SCAQMD Rule 44534.

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<sup>32</sup> CalEEMod User's Guide Appendix A pages 42-43.

<sup>33</sup> Wood-burning fireplaces and stoves are banned in the South Coast Air District as of March 9, 2009. Rule 445.

<sup>34</sup> Electrical fireplaces if incorporated instead of natural gas fireplaces will in general result in decreased GHG emissions compared to a similar sized natural gas fireplace.

- 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.<sup>35</sup>
- The landscape-related emissions for the 2012 Modified Project (with and without optional conversion) were reduced by 28% from the CalEEMod default assumptions, to account for the type of development and the amount landscaping therein planned by Heritage Fields.<sup>36</sup>

The resulting GHG emissions are shown in Table 4; supporting information is contained in Appendix A to this report.

### 3.3.2 Buildings Energy Use

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO<sub>2</sub> and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. As discussed earlier, Table 2 lists the emission factors for electricity used in this analysis. The land use categories used with CalEEMod are the same as those listed in Table 1. Unless otherwise noted, CalEEMod default parameters were used. For both residential and non-residential land uses, climate zone 8 was selected based on the CEC forecast climate zone map shown in CalEEMod's User's Guide. Project emissions have been calculated using a SCE emission factor that accounts for the 33% RPS required by 2020, as discussed earlier.

To calculate the building energy input parameters shown in Table 5 (e.g., electricity, and natural gas), ENVIRON utilized default values for the land uses provided in CalEEMod, which are based on the CEC Residential Appliance Saturation Survey (RASS) and the California Commercial End Use Survey (CEUS).<sup>37</sup> Because older buildings tend to be less energy efficient, and because the majority of the buildings in the RASS and CEUS datasets 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 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"<sup>38</sup> and "Impact Analysis 2008 Update to the California Energy Efficiency Standards

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<sup>35</sup> Information was provided by Heritage Fields to ENVIRON.

<sup>36</sup> This estimate is based on the reduced area available for landscaping.

<sup>37</sup> A detailed explanation how the RASS and CEUS data was processed for use in CalEEMod is available in CalEEMod User's Guide Appendix E pages 27-32.

<sup>38</sup> 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](http://www.energy.ca.gov/title24/2005standards/archive/rulemaking/documents/2003-07-11_400-03-014.PDF)

for Residential and Nonresidential Buildings<sup>39</sup> 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 2012 Modified Project's (with and without optional conversion) GHG emissions also reflect Heritage Fields' commitment to build homes and non-residential buildings that are 15% more energy efficient than the 2008 Title 24 part 6 building code. These project design features were also incorporated into the 2011 Approved Project. As discussed above, 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 5 summarizes the total electricity use, total natural gas use, and total GHG emissions relating to building energy use based on the CalEEMod output.

### 3.3.3 Water Supply, Treatment and Distribution

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water.

ENVIRON utilized the information contained in the utilities section of the SSEIR to estimate the indoor and outdoor water use as well as the amount of reclaimed water.<sup>40</sup> It was assumed that the difference between the potable water supply and the amount of waste water represented the potable outdoor water supply. The reclaimed water was assumed to be used outdoors. In addition, ENVIRON assumed average embodied energy<sup>41</sup> for Southern California based on analyses by the California Energy Commission, which serve as the defaults in CalEEMod. ENVIRON set the wastewater treatment plant type to 100% aerobic waste water treatment<sup>42</sup> consistent with the types of treatment utilized in the Irvine Ranch Water District (IRWD) plants. IRWD water treatment plants include treatment of wastewater that can be recycled for use in non-potable applications such as irrigation of landscape. Professionally managed landscape areas generally include all commercial land uses and any residential land use where the landscaping will be under the control of a home owner's association. Because Heritage Fields has committed to install pipes that will enable all professionally managed landscaped areas to utilize recycled water, adjustments to account for this recycled water use were considered; based on information provided in the utility section for reclaimed water usage. The use of recycled water reduces the embodied energy associated with each project's water use since it is

<sup>39</sup> 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](http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/2007-11-07_IMPACT_ANALYSIS.PDF)

<sup>40</sup> RBF, 2012.

<sup>41</sup> Embodied energy refers to the amount of energy that was used in delivering water to the specific land use.

<sup>42</sup> Aerobic wastewater treatment refers to wastewater treatment processes that are based on aerobic digestion or in the presence of oxygen.

less energy intensive to supply as compared to fresh potable water. Project design features that are included in the 2011 Approved Project and the 2012 Modified Project (with and without optional conversion) include the use of smart irrigation control devices and low flow fixtures as required by Title 24 part 11 and PDF 4-3 re: low-flow fixtures meeting the requirements of the CA Green Building Code.<sup>43</sup>

The resulting water GHG emissions are shown in Table 6; supporting information is contained in Appendix A to this report.

### 3.3.4 Solid Waste

The residential and non-residential land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. CalEEMod's solid waste module determines the GHG emissions associated with the disposal of solid waste into landfills, in quantities that are based upon land use type according to waste disposal studies conducted by CalRecycle. For this module, it was assumed that 100% of the waste is sent to landfills with landfill gas capture. GHG emissions associated with other waste diversion are not considered, because it is generally assumed that these diversions do not result in any appreciable amounts of GHG emissions when operated effectively<sup>44</sup>. These waste diversion alternatives may however result in differences in life-cycle emissions of GHGs, but it is not appropriate to combine life-cycle emissions for only one category of emissions<sup>45</sup>.

The resulting solid waste GHG emissions are reported in Table 7, and the supporting information is included in Appendix A to this report.

### 3.3.5 Mobile Source Emissions

GHG emissions will also result from mobile sources associated with both developments. These mobile source emissions will result from the typical daily operation of motor vehicles by residents, visitors, employees, and customers. ENVIRON estimated traffic emissions using the trip rates specified in the traffic study<sup>46</sup> and CalEEMod default inputs for trip lengths, trip purpose, and trip type for the land uses listed in Table 1. ENVIRON used a fleet mix distribution for the land uses that is derived from both SCAG's traffic model validation and ITE truck trip

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<sup>43</sup> Information was provided by Heritage Fields to ENVIRON.

<sup>44</sup> CARB. 2010. Local Government Operations Protocol. Chapter 9.4

<sup>45</sup> This inventory represents scope 1 and 2 emission categories. A life-cycle analysis of waste diversion would be a scope 3 inventory. CARB's Local Government Operations Protocol Version 1.1 (May 2010) clearly states that scope 3 emissions should not be combined with scope 1 and 2 emissions.

<sup>46</sup> 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 space 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.

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-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 for the 2011 Approved Project.
- 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 centers.
- 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.
- Project 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)<sup>47</sup> 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.<sup>48</sup> 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 methods in the CAPCOA publication 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 GHG emissions. Based on this level of mitigation, the 2012 Modified Project (with and without optional conversion) 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

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<sup>47</sup> This publication can be found at <http://www.capcoa.org>.

<sup>48</sup> See Section 5.09 of the DSSEIR.

was assumed that there was 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 resulting mobile source GHG emissions are reported in Table 8 and the supporting information is provided in Appendix A to this report.

### **3.4 Emissions Summary**

The summary of annual operational GHG emissions is reported in Table 9. The operational GHG emissions for the 2011 Approved Project total 143,886 MT per year, and those for the 2012 Modified Project (with and without optional conversion) total 162,406 MT per year and 164,152 MT per year, respectively. The estimated service population for the 2012 Modified Project (without optional conversion) totals 36,829, including an employment population of 13,101, a resident population of 23,728. The estimated service population for the 2012 Modified Project (with optional conversion) totals 38,176, including an employment population of 11,497, a resident population of 26,679. Dividing the total operational GHG emissions by the service population results in an efficiency metric of 4.41 MT/SP/YR for the 2012 Modified Project (without optional conversion), 4.30 MT/SP/YR for the 2012 Modified Project (with optional conversion) and 4.46 MT/SP/YR for the 2011 Approved Project (Great Park Neighborhoods only). The Main Street options do not result in any changes in land use or traffic assumptions and thus would have the same efficiency metrics.

In a discussion of SCAQMD GHG Thresholds during the August 2009 Working Group meeting, SCAQMD indicated that one-time emissions such as vegetation changes and construction emissions should be amortized over 30 years and combined with annual operational emissions.<sup>49</sup> If the 96,412 MT of construction emissions and net decrease of 28,561 MT due to vegetation sequestration are amortized over 30 years and combined with the annual operational emissions, in the 2012 Modified Project (without optional conversion) would yield an efficiency metric of 4.47 MT/SP/YR, and the 2012 Modified Project (with optional conversion) would yield an efficiency metric of 4.36 MT/SP/YR. If the construction transportation emissions are slightly higher, as indicated earlier, the total efficiency metric would not change substantially. The 2011 Approved Project (Great Park Neighborhoods) would yield an efficiency metric of 4.54 MT/SP/YR. As noted earlier, this is a conservative use of the SCAQMD efficiency metric, as it was developed without incorporating amortized construction emissions.

The 2012 Modified Project efficiency metrics are lower than the SCAQMD draft efficiency threshold of 4.8 MT/SP/YR for 2020. The efficiency metrics for the 2012 Modified Project (with and without optional conversion) result from the project design features incorporated into the 2012 Modified Project.

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<sup>49</sup> This approach is based on the methodology utilized during GHG Threshold Working Group Meeting #13 on August 26, 2009. The Minutes of this meeting are available at:

<http://www.aqmd.gov/ceqa/handbook/GHG/2009/aug26mtg/wkqp13minutes.pdf>.

## 4 Determination of Significance

Based on Appendix G to the CEQA Guidelines, the City has determined that a project's GHG emissions would normally have a significant effect on the environment if the project would (1) generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment or (2) conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

Since no numeric threshold for determining the significance of construction or operational GHG emissions from a residential/commercial development project has been adopted by any state agency or by the SCAQMD, the City has determined that it will evaluate the significance of the GHG emissions resulting from the 2012 Modified Project (with and without optional conversion) as reported in Table 9 using the SCAQMD's draft efficiency metric threshold for 2020 of 4.8 MT of CO<sub>2</sub>e per SP per year. This efficiency metric is derived from average reductions needed to be consistent with AB 32.<sup>50</sup> As Table 9 reports, the 2012 Modified Project's (with and without optional conversion) annual operational GHG emissions are estimated to be 4.41 MT/SP/YR and 4.30 MT/SP/YR, respectively, each of which is less than the SCAQMD's draft efficiency metric. Thus, using the SCAQMD draft efficiency metric as a numeric threshold, the 2012 Modified Project (with and without optional conversion) would have less than significant operational GHG emission impacts.

As Table 9 further reports, adding the annualized one-time construction emissions and vegetation changes to each 2012 Modified Project's (with and without optional conversion) annualized operational emissions yields an efficiency metric of 4.47 MT/SP/YR and 4.36 MT/SP/YR, respectively. As was true for the annualized operational emissions, the efficiency metric for each 2012 Modified Project (with and without optional conversion) is below the SCAQMD's draft threshold. Under this analysis, the 2012 Modified Project (with and without optional conversion) would have less than significant GHG emission impacts.

As noted earlier, climate change impacts are interpreted by the OPR to be cumulative in nature, only, as no typical single project can result in emissions of such a magnitude that it, in and of itself will be significant on project basis. Therefore, using these numeric thresholds, the 2012 Modified Project (with and without optional conversion) would result in less than significant cumulative impacts on global climate change.

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<sup>50</sup> GHG Threshold Working Group Meeting #13 on August 26, 2009. The Minutes of this meeting are available at: <http://www.aqmd.gov/ceqa/handbook/GHG/2009/aug26mtg/wkqp13minutes.pdf>

## 5 Conclusion

This report provides the inventories of the GHG emissions that would result from approving the 2012 Modified Project (with and without optional conversion). The 2012 Modified Project (with and without optional conversion) would result in one-time and in annual GHG emissions. The 2012 Modified Project (with and without optional conversion) total GHG emissions totals are judged against the SCAQMD's most recently proposed 2020 efficiency metric of 4.8 MT/SP/YR, which is based on the reductions necessary to meet the goals of AB 32. The 2012 Modified Project's (with and without optional conversion) project design features, along with improved vehicle fuel efficiency and cleaner electricity generation, enable each 2012 Modified Project (with and without optional conversion) to fall below this efficiency metric. Based on this numeric threshold, the 2012 Modified Project's (with and without optional conversion) GHG emissions would have a less than significant cumulative impact on global climate change.