Tables

Table 1 Land Uses **Great Park Neighborhoods** Heritage Fields Irvine, California

			Size ²			Acreage ²		
Land Use Category	Land Use Subtype ¹	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional conversion	Size Metric	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional conversion
Commercial	Office Park	75	1,282	747	1000sqft	5.8	150	49
Commercial	Research & Development	2,600	3,364	3,364	1000sqft	194	237	237
Educational	Day-Care Center	11	11	11	1000sqft	7.5	7.5	7.5
Educational	K-8 Schools	2,000	2,000	2,000	Student	26	26	26
Educational	High School	-	2,600	2,600	Student	-	40	40
Educational	Place of Worship	25	25	25	1000sqft	7.5	7.5	7.5
Educational	University/College (4Yr)	7,741	-	-	Student	149	-	-
Recreational	Exposition	708	-	-	1000sqft	358	-	-
Recreational	City Park	60	100	100	Acre	60	100	100
Recreational	Golf Course	150	-	-	Acre	150	-	-
Residential	Apartments Low Rise	544	1,056	1,189	Dwelling Unit	23	45	52
Residential	Condo/Townhouse	1,609	5,086	5,842	Dwelling Unit	120	400	456
Residential	Single Family Housing	2,741	3,358	3,669	Dwelling Unit	366	432	476
Retail	Automobile Care Center	102	-	-	1000sqft	32	-	-
Retail	Strip Mall	350	220	220	1000sqft	35	25	25

Notes:

1. Land uses as available in CalEEMod. When an exact mapping of a land use provided by Heritage Fields was not available in CalEEMod, a land use with similar emission characteristics was chosen. For example, the multi-use non-residential land use was called 'Office Park.'

2. Information obtained from Heritage Fields and consistent with sizes used in the traffic study.

Abbreviations: CalEEMod - CALifornia Emissions Estimator MODel GPN - Great Park Neighborhoods sqft - square feet yr - year

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Table 2 **GHG Emissions from Renewable Power Standards Great Park Neighborhoods Heritage Fields** Irvine, California

Renewable Energy Source ¹	Energy Delivered ¹	Percentage of Renewable Energy Delivered
	[million kWh]	[%]
Wind	2,359	21%
Small hydro	449	4%
Biogas	0	0%
Solar	0	6%
Biomass	786	7%
Geothermal	6,965	62%
Total ²	11,234	100%
% of Total Energy From Renewables ¹	13%	
% of Total Energy From Non-Renewables	87%	
Total Energy Delivery ²	83,958,770	MWh
from renewables	11,234,288	MWh
from non-renewables	72,724,482	MWh
CO ₂ Emissions per Total Energy Delivered	631	lbs CO ₂ /MWh delivered
Total CO ₂ Emissions ³	24,026,108	metric tonnes CO ₂
CO ₂ Emissions per	700	the CO (MAA/h delivered
Total Non-Renewable Energy ⁴	728	ibs CO ₂ /Mivin delivered
Estimated Emission Factors for Total Ene	rgy Delivered ⁵	
2010 RPS (20%)	583	lbs CO ₂ /MWh delivered
2020 RPS (33%)	488	lbs CO ₂ /MWh delivered

Notes:

1. The renewable energy portfolio for Southern California Edison, the power utility that is most likely to provide power to the Heritage Fields development. The renewable energy distribution is based on the 2008 data available at

http://www.sce.com/PowerandEnvironment/renewables/

2. Total energy value reported for 2007 by Southern California Edison in california Climate Action Registry. Available at:

http://www.climateregistry.org/CarrotDocs/26/2007/SCEPUP07r3.xls

3. The amount of CO2 emissions is provided in Southern California Edison's Power/Utility Protocol (PUP) report for 2007 available at:

http://www.climateregistry.org/CarrotDocs/26/2007/SCEUPU07r3.xls

4. The emissions metric presented here is calculated based on the total CO_2 emissions divided by the energy delivered from non-renewable sources.

5. The emission factors for total energy delivered are estimated by multiplying the percentage of energy delivered from non-renewable energy by the CO₂ emissions per total non-renewable energy metric calculated above. Two emission factors are presented here for the current 20% RPS goal for 2010 and the presumed 33% RPS for 2020. The estimate provided here and the 2007 PUP report issued by Southern California Edison assume that renewable energy sources do not result in any CO2 emissions. This is not necessarily true for biogas- and biomass-sourced energy but some consider these sources to be "carbon neutral."

<u>Abbreviations:</u> CO_2 = carbon dioxide kWh = kilowatt-hour lbs = pounds MWh = Megawatt-hour PUP = Power/Utility Protocol RPS = Renewables Portfolio Standard SCE = Southern California Edison

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Table 3 GHG Sequestration Associated with Vegetation Great Park Neighborhoods Heritage Fields Irvine, California

	Number of New Trees ¹				CO₂e Sequestered ³ MT			
Type of Land Use Change	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Converision	accumulation ² MT/yr/tree	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Converision	
New Miscellaneous Trees	22,340	40,340	40,340	0.0354	15,817	28,561	28,561	
		15,817	28,561	28,561				

Notes:

1. The number of trees will be of a similar ratio to that of the 2011 Approved Project,. The number of trees for the 2012 Modified Project with Optional Conversion is conservatively assumed to be the same as that in the 2012 Modified Project.

2. CalEEMod default accumulation for miscellaneous tree types.

3. Total CO₂e sequestered over IPCC recommended 20 year active growth period of new trees.

Abbreviations:

 $\overline{CO_2}$ - carbon dioxide

 $CO_2^{-}e$ - carbon dioxide equivalents

GHG - greenhouse gases

GPN - Great Park Neighborhoods

MT - metric tons

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Table 4 GHG Emissions from Area Sources Great Park Neighborhoods Heritage Fields Irvine, California

	CO ₂ e Emissions ²					
Category ¹	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion			
	MT/yr					
Hearth	3,153	6,120	6,894			
Landscaping ³	90	174	196			
Total	3,242	6,294	7,089			

Notes:

1. Categories which CalEEMod classifies as "Area Sources." CalEEMod does not associate any CO₂e emissions with Architectural Coating and Consumer Products.

2. Emissions as estimated by CalEEMod.

3. 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.

Abbreviations:

CalEEMod - CALifornia Emissions Estimator MODelCO2e - carbon dioxide equivalentsGHG - greenhouse gasesGPN - Great Park NeighborhoodsMT - metric tonsyr - year

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Table 5 GHG Emissions Associated with Electricity and Natural Gas Use Great Park Neighborhoods Heritage Fields Irvine, California

	Energy Use ¹			Natural Gas Use ¹			CO _{2e} Emissions from Energy Use ²			
							Total			
Land Use Subtype	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion	
		kWh/yr		kBTU/yr				MT/yr		
Office Park	1,213,610	20,747,900	12,090,800	768,750	13,142,600	7,658,800	312	5,336	3,110	
Research & Development	23,247,900	30,079,200	30,079,200	50,499,800	65,339,000	65,339,000	7,900	10,221	10,221	
Day-Care Center	72,199	72,199	72,199	117,733	117,733	117,733	22	22	22	
K-8 Schools	1,097,460	1,097,460	1,097,460	1,789,610	1,789,610	1,789,610	341	341	341	
High School	-	2,263,870	2,263,870	-	3,691,660	3,691,660	-	703	703	
Place of Worship	223,538	223,538	223,538	485,575	485,575	485,575	76	76	76	
University/College (4Yr)	18,688,200	-	-	20,292,300	-	-	5,260	-	-	
Exposition	6,330,580	-	-	13,751,500	-	-	2,151	-	-	
City Park	0	0	0	0	0	0	-	0	0	
Golf Course	0	-	-	0	-	-	0	-	-	
Apartments Low Rise	1,903,980	3,695,960	4,161,450	8,930,550	17,335,800	19,519,200	904	1,756	1,977	
Condo/Townhouse	6,745,780	21,323,200	24,492,800	35,857,600	113,345,000	130,193,000	3,431	10,844	12,456	
Single Family Housing	17,483,700	21,419,200	23,403,000	100,958,000	123,683,000	135,138,000	9,322	11,421	12,478	
Automobile Care Center	912,033	-	-	1,981,150	-	-	310	-	-	
Strip Mall	4,292,050	2,697,860	2,697,860	665,000	418,000	418,000	994	625	625	
Total	82,211,030	103,620,387	100,582,177	236,097,568	339,347,978	364,350,578	31,023	41,345	42,009	

Notes:

1. Energy usage for each land use is assumed to be consistent with CalEEMod defaults, which is obtained from CEUS or RASS studies on energy use and adjusted to account for 2008 Title 24 building standards. See Appendix A of the CalEEMod user's guide for details.

2. Emissions as estimated by CalEEMod. Emissions from electricity assume a carbon intensity of 488 lb/MWh, which takes into account 33% renewable energy as mandated by California's Renewable Portfolio Standard. Emissions also reflect Heritage Fields' commitment to build houses and non-residential buildings that are 15% more energy efficient than 2008 Title 24 part 6 building code.

Abbreviations:

CalEEMod - CA Lifornia Emissions Estimator MODel CEUS - California Commercial End-Use Survey CO₂e - carbon dioxide equivalents GHG - greenhouse gases GPN - Great Park Neighborhood kBTU - 1,000 British thermal units kWh - kilowatt hours MT - metric tons RASS - California Statewide Residential Appliance Saturation Study SCAQMD - South Coast Air Quality Management District yr - year

Sources:

California Climate Action Registry Reporting Online Tool. Online: https://www.climateregistry.org/CARROT/public/reports.aspx SCAQMD. 2011. CalEEMod User's Guide. Online: http://caleemod.com/. Accessed March 30, 2011.

Table 6GHG Emissions Associated with Water UseGreat Park NeighborhoodsHeritage FieldsIrvine, California

	Units	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion
Indoor Water Use ¹	gallons/yr	379,600,000	642,400,000	642,400,000
Outdoor Water Use ¹	gallons/yr	754,443,000	407,285,000	475,704,000
CO ₂ e Emissions Associated with Water Use ²	MT/yr	3,063	3,027	3,197

Notes:

1. Water use estimates are determined by CalEEMod by applying the project design features like 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) to the total amount quantified in the utilities section of the SSEIR.

2. Emissions as estimated by CalEEMod. Emissions associated with water include emissions that result from the energy used to supply, distribute, and treat water and wastewater. The wastewater treatment plant was assumed to be an aerobic system. Electricity emission factor takes into account 33% renewable energy as mandated by California's Renewable Portfolio Standard.

Abbreviations:

CalEEMod - CALifornia Emissions Estimator MODel CO₂e - carbon dioxide equivalents GHG - greenhouse gases GPN - Great Park Neighborhoods MT - metric tons SCAQMD - South Coast Air Quality Management District SSEIR - Second Supplemental Environmental Impact Report yr - year

Sources:

California Climate Action Registry Reporting Online Tool. Online: https://www.climateregistry.org/CARROT/public/reports.aspx SCAQMD. 2011. CalEEMod User's Guide. Online: http://caleemod.com/. Accessed March 30, 2011.

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Table 7 **GHG Emissions Associated with Waste Great Park Neighborhoods** Heritage Fields Irvine, California

		Waste Disposed ¹		CO ₂ e Emissions Associated with Waste ²			
Land Use Subtype	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion	
	ton	s/yr		МТ	/yr		
Office Park	70	1,192	695	30	505	295	
Research & Development	198	256	256	84	108	108	
Day-Care Center	14	14	14	6	6	6	
K-8 Schools	365	365	365	155	155	155	
High School	-	475	475	-	201	201	
Place of Worship	143	143	143	60	60	60	
University/College (4Yr)	1,413	-	-	599	-	-	
Exposition	32	-	-	14	-	-	
City Park	5	9	9	2	4	4	
Golf Course	140	-	-	59	-	-	
Apartments Low Rise	250	486	547	106	206	232	
Condo/Townhouse	740	2,340	2,687	314	992	1,139	
Single Family Housing	2,998	3,938	4,302	1,271	1,669	1,824	
Automobile Care Center	390	-	-	165	-	-	
Strip Mall	368	231	231	156	98	98	
Total	7,124	9,447	9,723	3,020	4,005	4,122	

Notes:

1. Waste disposed for each land use is assumed to be consistent with CalEEMod defaults which are based on waste disposal surveys by land uses in California conducted by Calrecycle. See Appendix A of the CalEEMod user's guide for more details. This is different than the amount of waste generated that may be paritially diverted from a landfill such as by recycling or composting.

2. Emissions as estimated by CalEEMod. Emissions associated with waste are indirect emissions from waste that is disposed in a landfill. It was assumed that 100% of the waste is sent to landfills with landfill gas capture.

Abbreviations:

CalEEMod - CALifornia Emissions Estimator MODel CO₂e - carbon dioxide equivalents GHG - greenhouse gases GPN - Great Park Neighborhoods MT - metric tons SCAQMD - South Coast Air Quality Management District yr - year

SCAQMD. 2011. CalEEMod User's Guide. Online: http://caleemod.com/. Accessed March 30, 2011.

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Table 8 **GHG Emissions Associated with Traffic Great Park Neighborhoods Heritage Fields** Irvine, California

	Trat	ffic ¹	CO ₂ e Emissions Associated with Traffic ²		
Land Use Subtype	2011 Approved	2012 Modified	2011 Approved	2012 Modified	
	Project (GPN)	Project	Project	Project	
	VM	T/yr	MT/yr		
Office Park	1,998,372	30,087,044	648	9,762	
Research & Development	40,642,448	67,563,299	17,499	29,090	
Day-Care Center	929,079	492,321	294	156	
K-8 Schools	3,540,522	3,403,293	1,106	1,063	
High School	-	5,291,415	-	1,649	
Place of Worship	825,392	735,695	258	230	
University/College (4Yr)	47,281,106	-	14,606	-	
Exposition	55,954,719	-	17,979	-	
City Park	419,168	768,052	136	249	
Golf Course	1,431,816	-	447	-	
Apartments Low Rise	7,712,583	17,949,582	2,392	5,566	
Condo/Townhouse	23,374,349	90,935,715	7,248	28,198	
Single Family Housing	65,240,495	73,409,755	20,230	22,763	
Automobile Care Center	3,387,087	-	1,662	-	
Strip Mall	40,123,298	18,992,974	19,033	9,010	
Total	292,860,435	309,629,145	103,538	107,735	

Notes:

1. Trip rates are based on the Traffic study. All other values (trip length, trip purpose, and trip type) are based on the defaults in CalEEMod which come from ITE, SCAQMD, SANDAG, and SCAG.

2. Emissions estimated using CalEEMod methodologies and emission factors from EMFAC. The fleet mix has been adjusted for each land use consistent with data from ITE and validation of the SCAG traffic model. Emissions associated with transportation include running, idling, and startup emissions.

3. The 2011 Approved and 2012 Modified Project assume a 25% reduction in traffic based on project design features.

4. Based on land use conversion assumptions, the traffic assumptions (i.e. trip generation, trip lengths, and VMT) for the 2012 Modified Project (with and without Optional Conversion) are assumed to be equal.

Abbreviations:

CalEEMod - CALifornia Emissions Estimator MODel CO₂e - carbon dioxide equivalents EMFAC - Vehicular EMission FACtor model GHG - greenhouse gases GPN - Great Park Neighborhoods ITE - Institute of Transportation Engineers MT - metric tons SANDAG - San Diego Association of Governments SCAG - South Coast Association of Governments SCAQMD - South Coast Air Quality Management District VMT - vehicle miles traveled yr - year

SCAQMD. 2011. CalEEMod User's Guide. Online: http://caleemod.com/. Accessed March 30, 2011.

Table 9 Summary of Operational GHG Emissions Great Park Neighborhoods Heritage Fields Irvine, California

		CO ₂ e Emissions ²	
Category ¹	2011 Approved Project (GPN)	2012 Modified Project	2012 Modified Project Optional Conversion
		MT/yr	
Area	3,242	6,294	7,089
Energy Use	31,023	41,345	42,009
Water Use	3,063	3,027	3,197
Waste Disposed	3,020	4,005	4,122
Traffic ³	103,538	107,735	107,735
Total	143,886	162,406	164,152
Service Population ⁴	32,275	36,829	38,176
Emissions per Service Population	4.46	4.41	4.30
Construction Amortized ⁵	3,214	3,214	3,214
Vegetation Amortized ^{5,6}	-527	-952	-952
Emissions per Service Population with Amortized	4.54	4.47	4.36

Notes:

1. All operational categories for which CalEEMod calculates emissions.

2. Emissions as described in previous tables. CO_2e includes CO_2 , CH_4 , and N_2O emissions, weighted by their respective global warming potentials.

3. Based on land use conversion assumptions, the traffic assumptions (i.e. trip generation, trip lengths, and VMT) for the 2012 Modified Project (with and without Optional Conversion) are assumed to be equal.

4. Service population includes residents, workers, and commuting higher education students associated with a project.

5. One-time emissions were amortized over a 30 year period.

6. A net sequestration of carbon results in a decrease (or negative) CO_2e . The number of trees for the 2012 Modified Project with Optional Conversion was conservatively assumed to be the same as that in the 2012 Modified Project.

Abbreviations:

 $\label{eq:calebox} \begin{array}{l} \mbox{CaleEMod} - \mbox{CaleFMod} - \mbox{CA} \mbox{Lifornia Emissions Estimator MODel} \\ \mbox{CH}_4 - methane \\ \mbox{CO}_2 - \mbox{carbon dioxide} \\ \mbox{CO}_2 e - \mbox{carbon dioxide} \\ \mbox{GH} - \mbox{greenhouse gases} \\ \mbox{GPN} - \mbox{Great Park Neighborhoods} \\ \mbox{MT} - \mbox{metric tons} \\ \mbox{N}_2 O - \mbox{nitrogen dioxide} \\ \mbox{yr - year} \end{array}$

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