

Appendix F2
**GREENHOUSE GAS EMISSIONS
TECHNICAL MEMORANDUM**





LSA ASSOCIATES, INC.
20 EXECUTIVE PARK, SUITE 200 949.553.0666 TEL
IRVINE, CALIFORNIA 92614 949.553.8076 FAX

BERKELEY
CARLSBAD
FORT COLLINS
FRESNO
PALM SPRINGS
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MEMORANDUM

DATE: August 20, 2008

TO: Collette L. Morse, RBF Consulting

FROM: Ronald Brugger

SUBJECT: Greenhouse Gas Emissions Related to the Proposed Henry Mayo Newhall Memorial Hospital Master Plan Project

LSA Associates, Inc. (LSA), in response to a request from the City of Santa Clarita (City), California, is providing this memorandum as an addendum to the Air Quality technical report (LSA, June 2008) prepared for the proposed Henry Mayo Newhall Memorial Hospital (HMNMH) Master Plan project. The information in this memorandum supersedes all corresponding global climate change (GCC) information in the Air Quality technical report and updates the analysis provided in the Air Quality technical report.

There are two aspects of the proposed project that will result in the emissions of greenhouse gases (GHGs); construction and operations. During construction the principle source of GHG emissions is the exhaust of heavy-duty equipment and vehicles. During operations there will be many sources of GHG emissions, including the exhaust of project-related vehicles, building HVAC systems, and powerplant emissions from project-related electrical demand. Electrical demand results from many uses, including lighting, HVAC, medical equipment, and water delivery and treatment.

The project sponsors, HMNMH and G&L Realty, propose a Master Plan to guide future development of the inpatient (hospital) and outpatient medical office buildings (MOBs) and administrative medical facilities at the existing HMNMH medical campus. The Master Plan is designed to provide additional enhanced inpatient and outpatient treatment capacity. At build out, the amount of hospital and medical office space on site (not including parking structures) would increase by 327,363 square feet (sf) to 667,434 sf, nearly double that of its current 340,071 sf.

As described in the Air Quality study, demolition and construction would occur during implementation of the Master Plan Buildout Program. It is anticipated that nine new structures will be constructed on the existing 30-acre hospital campus over a 15-year period, as described in the Air Quality report. Phasing is intended to be flexible to respond to hospital and outpatient demands in the future. The California Air Resources Board (ARB) URBEMIS2007 model was used to calculate the peak daily construction emissions, breaking the entire construction process into seven phases, as shown in Table A. These correspond to the same phases shown in the Air Quality study, Table K. The only GHG the URBEMIS2007 model considers is carbon dioxide (CO₂). The exhaust of construction equipment does contain small amounts of other GHGs, such as methane (CH₄) and nitrous oxide (N₂O). A conservative method to estimate these emissions and calculate the carbon dioxide equivalent (CO₂e) is to increase the CO₂ emissions rate by 10 percent. Table K also shows this estimation of CO₂e.

Table A: Construction Emissions (lbs/day)

Construction Phases	CO ₂	CO ₂ e
Demolition	1,100	1,210
Mass Grading	8,700	9,570
Fine Grading	2,400	2,640
Trenching	1,800	1,980
Paving	2,300	2,530
Building	4,900	5,390
Coating	95	105

Source: LSA Associates, Inc., August 2008.

CO₂ = carbon dioxide

CO₂e = carbon dioxide equivalent

Construction of the project would contribute cumulatively to the GHG emissions together with other projects in the City that are under construction. However, the cumulative analysis performed for this project was to analyze the buildout of the City's General Plan rather than listing concurrent projects in the vicinity of this project. Thus, there is insufficient information to attempt to calculate cumulative GHG emissions from combined construction operations.

The Air Quality study calculated project-related emissions of GHGs. The analysis included vehicle exhaust and the direct on-site consumption of electricity and natural gas for heating. Table P from the Air Quality study is included here to show that analysis showed that the proposed land uses generate up to 30,600 tons per year of CO₂e.

Table P: Project Greenhouse Gas Emissions

Emission Source	Emissions (tons per year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Vehicles	25,000	9.7	2.7	26,000
Electricity Production	3,200	0.035	0.019	3,200
Natural Gas Combustion	1400	0.027	0.026	1,400
Total Annual Emissions	29,600	9.8	2.7	30,600

Source: LSA Associates, Inc. April 2008.

CH₄ = methane CO₂ = carbon dioxide

CO₂e = carbon dioxide equivalent N₂O = nitrous oxide

The City requested that LSA add to this analysis the emissions from the electricity used to deliver, treat, and distribute potable water and treat the wastewater. Table B shows the electrical energy needed to accomplish these activities as published in the California Energy Commission *California's Water Energy Relationship* report (December 2005).

Table B: Electrical Energy Required for Water Processing Activities

	kWh/MG	
	Northern California	Southern California
Water Supply and Conveyance	150	8,900
Water Treatment	100	100
Water Distribution	1,200	1,200
Wastewater Treatment	2,500	2,500
Totals	3,950	12,700

Source: California's Water Energy Relationship, CEC 2005
kWh/MG = kilowatt hours per million gallons

As described in the project EIR, the existing water demand for the project site is 125 acre-feet per year (afy). The estimated water demand with build out of the proposed Master Plan is 205 afy. To be conservative, this analysis is based on the proposed project water demand in a dry year, which increases by approximately 10 percent to a total of 226 afy. Table C uses the conservative assumption that all 226 afy go through all four water processing activities shown in Tables B and C and the resulting electricity needed.

Table C: Electrical Energy Required for Water Processing Activities

	Electricity Required
Water Supply and Conveyance	6.56E+05 kWh/year
Water Treatment	7.37E+03 kWh/year
Water Distribution	8.84E+04 kWh/year
Wastewater Treatment	1.84E+05 kWh/year
Total	9.35E+05 kWh/year

Source: LSA Associates, Inc. August 2008.
kWh = kilowatt hours

Adding this additional electricity demand to what was shown in Table P above results in the GHG emissions shown in Table D. This shows that the proposed land uses generate approximately 300 more tons per year of CO₂e.

Table D: Project Greenhouse Gas Emissions

Emission Source	Emissions (tons per year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e
Vehicles	25,000	9.7	2.7	26,000
Electricity Production	3,500	0.038	0.021	3,500
Natural Gas Combustion	1,400	0.027	0.026	1,400
Total Annual Emissions	29,900	9.8	2.7	30,900

Source: LSA Associates, Inc. August 2008.

CH₄ = methane CO₂ = carbon dioxide

CO₂e = carbon dioxide equivalent N₂O = nitrous oxide

Project-related GHG emissions are not confined to a particular air basin but are dispersed worldwide. Consequently, it is speculative to determine how project-related GHG emissions would contribute to global climate change and how global climate change may impact California.