Giroux & Associates
Environmental Consultants

Date: September 23, 2015

To: The Planning Associates
Attn: Hardy Strozier
495 E. Rincon Street, Suite 212
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From: Hans Giroux, Giroux & Associates

Subject: Alberhill Air Quality and GHG Report
Our Reference No. P10-026

As per your request, we have compared the Air Quality and Greenhouse Gas (GHG) impacts from our original 2010 submittal with the updated report prepared in 2012. The 2012 modeling was predicated on changes in land use types and trip generation numbers provided in the updated traffic report. Although criteria pollutants resulting from project construction and operation are substantially lower in the 2012 submittal, they remain, for the most part, significant and unavoidable.

Per direction from the California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD), computer models are used to calculate both construction emissions and operational emissions from a variety of land use projects. The model quantifies both daily maximum and annual average emissions for all criteria pollutants.

At the time of the original submittal in 2010, the California Air Resources Board (CARB) recommended use of the URBEMIS computer program. However, as of 2012, URBEMIS was considered to be outdated and the SCAQMD staff phased in the requirement that all projects be evaluated with the CalEEMod computer model. Therefore, the 2012 update was modeled using the 2012 version; CalEEMod2011.1.1.

The CalEEMod computer model provides the following improvements as compared to URBEMIS:

- CalEEMod calculates greenhouse gas (GHG) emissions (URBEMIS did not).
- CalEEMod calculations are predicated on mobile source emissions based on newer emission factors that incorporate Pavley standards and Low Carbon Fuel standards.
- CalEEMod uses updated emission factors to provide more accurate characteristics (fleet mix, vehicle miles traveled, etc.) of the affected area.
- CalEEMod uses updated CARB construction equipment load factors which demonstrate that for most equipment types, the URBEMIS model resulted in a fairly significant overestimation of emissions.

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In addition to CalEEMod demonstrating lower emissions due to the above modeling improvements, cars and construction equipment are continually becoming progressively cleaner as older engines are being phased out. As the project development timeframe shifts forward, emissions are lower. Therefore, the changes in the 2010 and 2012 modeling versions are substantially different due to the following:

a) changes to trip generation and land uses,

b) modeling differences between the URBEMIS and CalEEMod programs, and

c) cleaner engines and newer equipment/vehicles from shifting the timeline into the future.

Consistent with the above statements, the modeling conducted in the 2012 update demonstrated lower emissions for construction activities, operational emissions and GHG emissions. However, although emissions are significantly lower, they often remained above SCAQMD recommended CEQA thresholds and remain significant and unavoidable.

Construction Emissions

As indicated, CalEEMod was developed by the SCAQMD and provides a model to calculate both construction emissions and operational emissions from both commercial and residential land use components. It calculates both the daily maximum and annual average emissions for criteria pollutants, as well as total or annual greenhouse gas (GHG) emissions.

The Project is comprised of six development phases. Assuming that construction of each phase would require five year duration to complete the 30 year build-out cycle for construction and that phasing is sequential, the following construction time frames were modeled:

- Phase 1 2017 - 2021;
- Phase 2 2022 - 2026;
- Phase 3 2027 - 2031;
- Phase 4 2032 - 2036;
- Phase 5 2037 - 2041; and,
- Phase 6 2042 - 2046.

Utilizing the indicated equipment fleet and construction durations, the construction activity emissions were modeled. Each five-year construction development phase was assumed to consist of site preparation, grading, construction, paving and painting. For simplicity, as seen in the appendix, the first year of construction activity per phase was assumed to consist entirely of site preparation, the next year grading, the next two years construction and painting and paving were both assumed to span the final of the five year phase. The data in the appendix shows the construction emissions detail for each of the possible 30 years of construction, however it is not expected that each activity will necessarily take place in the indicated interval. It is likely that some grading will be occurring while some painting of an already completed phase is occurring. Therefore, the five years of activity were summed and divided by five to obtain an average or typical year of activity, as shown in Table 1. Viewed as a five-year average, no construction emissions will exceed thresholds. However, when painting and coating is condensed into a

shorter time frame (a single calendar year for each phase), ROG emissions could exceed thresholds. A detailed emissions summary showing all 30 years of construction as well as the individual CalEEMod output files is contained in the appendix to this letter.
Therefore, emissions for ROG may exceed the SCAQMD significance thresholds, primarily during painting and coating. If painting and coating for each development phase were spread over a three to five-year period, emissions would be less than significant.

Table 1 – Construction Activity Emissions (pounds/day)

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5
Phase 1 2017 - 2021						
No Mitigation	71.0	66.8	92.5	0.3	26.9	6.0
With Mitigation	71.0	66.8	92.5	0.3	23.6	4.4
Phase 2 2022 - 2026						
No Mitigation	26.0	33.8	49.7	0.2	16.5	4.3
With Mitigation	26.0	33.8	49.7	0.2	12.8	2.7
Phase 3 2027 - 2031						
No Mitigation	4.3	27.4	32.0	0.1	7.0	3.6
With Mitigation	4.3	27.4	32.0	0.1	4.0	2.0
Phase 4 2032 - 2036						
No Mitigation	31.8	24.0	44.5	0.2	17.2	3.7
With Mitigation	31.8	24.0	44.5	0.2	13.3	2.1
Phase 5 2037 -2041						
No Mitigation	12.1	13.7	30.0	0.1	8.6	3.1
With Mitigation	12.1	13.7	30.0	0.1	5.2	1.5
Phase 6 2042 -2046						
No Mitigation	19.7	14.2	31.9	0.1	9.2	3.1
With Mitigation	19.7	14.2	31.9	0.1	6.3	1.5
SCAQMD Threshold	**75**	**100**	**550**	**150**	**150**	**55**

By way of comparison, the 2010 URBEMIS modeling predicted that NOx would be exceeded during grading and construction phases, and that PM-10 and PM2-5 would be exceeded during grading as well as ROG during painting. Therefore, emissions were considerable lower when modeled with the updated computer model.

Operational Impacts (Long-Term)

The greatest project-related air quality concern derives from the new vehicle trips that will be generated by residential and other uses at project completion. At project build-out, proposed residential, commercial, office, recreational and educational uses at the Alberhill Villages development may generate the following daily trips assuming a 36% internal capture rate recommended by the project traffic consultant:

Phase 1	39,989 ADT
Phase 2	12,918 ADT
Phase 3	168 ADT
Phase 4	22,666 ADT
Phase 5	5,561 ADT
Phase 6	20,410 ADT
Total	**101,712 ADT**

Operational emissions for project-related traffic were calculated using the CalEEMod model using the trip generation factors specified by the project traffic consultant for this project. The model was used to calculate area source emissions and the resulting vehicular operational emissions for an assumed project build-out year of 2046. The only mitigation measure modeled was use of gas hearths rather than wood burning fireplaces for residential uses. The results are shown in TABLE 2 at the end of each of six development phases.

Table 2 – Project Related Emissions Burden

	Phase 1 Emissions (lbs/day)						
Year 2021	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**	**CO_2**
Area Sources	130.6	2.5	213.1	0.0	4.20	4.2	49,190.3
Energy	1.8	15.4	8.5	0.1	1.20	1.2	19,451.0
Mobile Sources	127.0	271.7	1,086.1	2.8	315.1	18.1	240,908.2
Total	259.4	289.6	1,307.7	2.9	320.5	23.5	309,549.5
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	No	-

	Phase 2 Emissions (lbs/day)						
Year 2026	77.2	2.2	188.6	0.0	3.8	3.7	43,662.4
Area Sources	1.5	12.8	5.6	0.1	1.0	1.0	16,458.6
Energy	39.4	86.5	332.7	1.1	122.2	6.7	89,875.0
Mobile Sources	118.1	101.5	526.9	1.2	127.0	11.4	149,996.0
Total	**236.2**	**203.0**	**1053.8**	2.4	**254.0**	22.8	299,992.0
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	No	-

	Phase 3 Emissions (lbs/day)						
Year 2031	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**	**CO_2**
Area Sources	2.6	0.0	2.2	0.0	1.1	1.1	16,762.6
Energy	0.0	0.2	0.1	0.0	0.0	0.0	286.5
Mobile Sources	0.5	1.0	3.7	0.0	1.6	0.1	1,156.1
Total	3.1	1.2	6.0	0.0	2.7	1.2	18,205.2
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	No	No	No	No	No	No	-

	Phase 4 Emissions (lbs/day)						
Year 2036	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**	**CO_2**
Area Sources	93.6	2.3	203.6	0.0	4.1	4.1	47,257.4
Energy	1.9	15.8	6.8	0.1	1.3	1.3	20,311.6
Mobile Sources	48.1	122.5	388.3	1.7	183.3	9.9	133,300.5
Total	**143.6**	**140.6**	**598.7**	1.8	**188.7**	15.3	200,869.5
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	No	-

	Phase 5 Emissions (lbs/day)						
Year 2041	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
Area Sources	26.7	0.5	47.4	0.0	0.9	0.9	11,017.1
Energy	0.6	5.0	2.4	0.0	0.4	0.4	6,385.1
Mobile Sources	11.1	31.6	93.5	0.5	48.1	2.6	35,059.2
Total	38.4	37.1	143.3	0.5	49.4	3.9	52,461.4
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	No	No	No	No	No	No	-

	Phase 6 Emissions (lbs/day)						
Year 2046	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**	**CO_2**
Area Sources	15.5	0.2	16.6	0.0	0.3	0.3	3,865.6
Energy	0.2	1.4	0.7	0.0	0.1	0.1	1,747.8
Mobile Sources	17.1	51.4	136.3	0.6	66.2	3.6	48,894.5
Total	32.8	53.0	153.6	0.6	66.6	4.0	54,507.9
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	No	No	No	No	No	No	-

The AVSP will cause the SCAQMD's recommended CEQA threshold levels to be individually exceeded at the completion of Phases 1, 2 and 4. Emissions of CO, ROG, NOx and PM-10 are all forecast within these three maximum intensity phases to exceed their respective SCAQMD significance thresholds by a substantial margin.

The project-related emissions burden will be cumulative as each phase is completed. Although cars and trucks are becoming progressively cleaner, the anticipated rate of AVSP development will exceed the potential for vehicular improvements to off-set the expected growth. Table 3 shows the overall residual air pollution emissions at the conclusion of the 30-year forecast build-out timeframe. Emissions of ROG, NOx, CO, PM-10 and PM-2.5 would exceed the SCAQMD's recommended significance thresholds.

Table 3- Total Project Related Emissions Burden at Build-Out

	Total Emissions (lbs/day)						
Year 2046	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**	**CO_2**
Area Sources*	359.9	7.9	685.8	0.0	13.8	13.7	159,341.4
Energy	7.0	60.1	28.7	0.4	4.8	4.8	76,634.2
Mobile Sources	188.7	548.3	1,551.5	7.3	780.7	42.6	572,079.1
Total	**555.6**	**616.3**	**2,266.0**	7.7	**799.3**	**61.1**	808,054.7
SCAQMD Threshold	55	55	550	150	150	55	-
Exceeds Threshold?	Yes	Yes	Yes	No	Yes	Yes	-

*assumes gas hearths for residential uses

As with the URBEMIS modeling conducted in 2010, CalEEMod demonstrates that operational emissions will be significant and unavoidable. The CalEEMod output files are provided in the appendix.

GHG Emissions

As indicated earlier, the URBEMIS program did not calculate GHG emissions. CalEEMod does calculate indirect criteria pollutant and GHG emissions from processes "downstream" of the project under evaluation such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. While GHG emissions were calculated manually in 2010, the updated analysis was based on CalEEMod.

Construction Activity GHG Emissions

The build-out timetable for this Project will depend upon market conditions. It is anticipated that full build-out may occur over 30 years. For ease of calculations, various construction elements were assigned to discrete years. Whether such activities would occur exactly within assumed years is speculative. For each generic construction activity, the CalEEMod computer model predicts that the following activities will generate the following total CO_2 emissions per phase:

Table 4 – Total CO_2 Emissions Per Phase

Activity	**CO_2 (e) in Metric Tons**
Phase 1 (2021)	14,233.3
Phase 2 (2026)	8,203.6
Phase 3 (2031)	5,309.8
Phase 4 (2036)	8,693.1
Phase 5 (2041)	4,988.5
Phase 6 (2046)	5,780.5
Total	**47,208.5**

SCAQMD GHG emissions policy from construction activities is to amortize emissions over a 30-year lifetime. The amortized level from 47,209 metric tons CO_2(e) is 1,574 metric tons per year.. Additionally construction emissions will cease after the Project is completely built out. Because construction emissions are amortized over 30 years, they are included in the overall operational emissions a shown in Table 5 for purposes of estimating overall GHG emissions.

Operational GHG Emissions

Project-related operational GHG emissions were based upon CalEEMod output. As shown in Table 5, given the size/scope of this planned Project, the annual GHG emissions burden exceeds the threshold screening level of 3,000 MT per year.

Table 5 – Proposed Operational Emissions

Phase 1 Proposed Operational Emissions

Consumption Source	**MT CO_2(e) tons/year**
Area	1,724.7
Energy	14,126.6
Mobile Source	37,911.4
Solid Waste	1,653.8
Water	2,352.7
Annualized Construction	1,573.6
Total	**59,342.80**

Phase 2 Proposed Operational Emissions

Consumption Source	**MT CO_2(e) tons/year**
Area	1,530.9
Energy	6,429.9
Mobile Source	14,147.2
Solid Waste	3,283.9
Water	1,091.4
Annualized Construction	1,573.6
Total	**28,056.9**

Phase 3 Proposed Operational Emissions

Consumption Source	**MT CO_2(e) tons/year**
Area	570.8
Energy	98.8
Mobile Source	182.0
Solid Waste	466.9
Water	446.3
Annualized Construction	1,573.6
Total	**3,338.4**

Phase 4 Proposed Operational Emissions

Consumption Source	**MT CO_2(e) tons/year**
Area	1,656.9
Energy	8,996.9
Mobile Source	21,003.0
Solid Waste	1,058.3
Water	1,535.5
Annualized Construction	1,573.6
Total	**35,824.2**

Phase 5 Proposed Operational Emissions

Consumption Source	MT CO2(e) tons/year
Area	386.3
Energy	2,647.9
Mobile Source	5,011.1
Solid Waste	2,820.6
Water	310.5
Annualized Construction	1,573.6
Total	**12,750.00**

Phase 6 Proposed Operational Emissions

Consumption Source	MT CO_2(e) tons/year
Area	271.1
Energy	4275.7
Mobile Source	15,134.0
Solid Waste	448.0
Water	700.9
Annualized Construction	1,573.6
Total	**22,403.30**

Total Operational Emissions at Project Completion (2046)

Consumption Source	MT CO_2(e) tons/year
Area	5,586.8
Energy	39,713.4
Mobile Source	86,460.2
Solid Waste	10,235.8
Water	6,064.9
Annualized Construction	1,573.6
Total	**149,634.7**

The Project either directly or indirectly will generate greenhouse gas emissions that may have a potentially significant impact on the environment. This conclusion remains the same from the 2010 report which determined that the project would generate 287,856 MT CO_2(e) tons/year. Therefore, although GHG emissions calculated with CalEEMod are substantially reduced they remain higher than the advisory threshold.

Summary

Construction, operational and GHG emissions calculated for the 2012 update generally show substantial improvement over the 2010 study. However, as compared to their respective SCAQMD thresholds no conclusions have changed and impacts remain significant and unavoidable.

Please call me with any questions.

Sincerely,

Hans Giroux
Senior Analyst
Giroux & Associates

Appendix

- All Years Construction Summary
  - CalEEMod2011.1.1 Output

PHASE 1

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2017 Prep							
No Mitigation	8.0	60.4	38.1	0.1	21.0	12.7	8,191.5
With Mitigation	8.0	60.4	38.1	0.1	10.1	6.6	8,191.5
2018 Grade							
No Mitigation	8.9	63.8	45.7	0.1	12.2	6.1	11,067.9
With Mitigation	8.9	63.8	45.7	0.1	6.6	4.1	11,067.9
2019 Construct							
No Mitigation	19.4	96.4	173.4	0.5	46.1	4.8	48,551.9
With Mitigation	19.4	96.4	173.4	0.5	46.1	4.8	48,551.9
2020 Construct							
No Mitigation	18.3	90.0	163.9	0.5	45.8	4.5	48,093.9
With Mitigation	18.3	90.0	163.9	0.5	45.8	4.5	48,093.9
2021 Paint/Pave							
No Mitigation	300.6	23.3	41.6	0.1	9.2	1.9	8,388.6
With Mitigation	300.6	23.3	41.6	0.1	9.2	1.9	8,388.6
SCAQMD Threshold	75	100	550	150	150	55	-

PHASE 2

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2022 Prep							
No Mitigation	6.1	41.6	31.6	0.1	20.0	11.6	8,172.8
With Mitigation	6.1	41.6	31.6	0.1	8.9	5.6	8,172.8
2023 Grade							
No Mitigation	6.7	40.1	41.2	0.1	14.2	4.9	11,048.3
With Mitigation	6.7	40.1	41.2	0.1	6.7	2.9	11,048.3
2024 Construct							
No Mitigation	8.0	35.8	74.5	0.3	21.7	1.9	23,144.7
With Mitigation	8.0	35.8	74.5	0.3	21.7	1.9	23,144.7
2025 Construct							
No Mitigation	7.7	34.0	72.0	0.3	21.6	1.8	22,987.6
With Mitigation	7.7	34.0	72.0	0.3	21.6	1.8	22,987.6
2026 Paint/Pave							
No Mitigation	101.4	17.3	29.3	0.1	4.9	1.2	5,694.7
With Mitigation	101.4	17.3	29.3	0.1	4.9	1.2	5,694.7
SCAQMD Threshold	75	100	550	150	150	55	-

PHASE 3

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2027 Prep							
No Mitigation	5.3	33.3	29.2	0.1	19.6	11.2	8,164.3
With Mitigation	5.3	33.3	29.2	0.1	8.5	5.1	8,164.3
2028 Grade							
No Mitigation	6.1	33.3	40.0	0.1	7.9	4.6	11,042.2
With Mitigation	6.1	33.3	40.0	0.1	4.0	2.6	11,042.2
2029 Construct							
No Mitigation	3.7	31.2	34.0	0.1	3.4	1.0	11,273.8
With Mitigation	3.7	31.2	34.0	0.1	3.4	1.0	11,273.8
2030 Construct							
No Mitigation	3.2	26.5	35.5	0.1	3.1	0.7	11,291.0
With Mitigation	3.2	26.5	35.5	0.1	3.1	0.7	11,291.0
2031 Paint/Pave							
No Mitigation	3.4	12.6	21.4	0.0	0.8	0.6	3,343.4
With Mitigation	3.4	12.6	21.4	0.0	0.8	0.6	3,343.4
SCAQMD Threshold	75	100	550	150	150	55	-

PHASE4

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2032 Prep							
No Mitigation	4.4	23.3	26.8	0.1	19.1	10.7	8155.0
With Mitigation	4.4	23.3	26.8	0.1	8.1	4.7	8155.0
2033 Grade							
No Mitigation	5.1	21.2	38.2	0.1	15.0	4.1	11031.6
With Mitigation	5.1	21.2	38.2	0.1	6.5	2.1	11031.6
2034 Construct							
No Mitigation	7.1	33.5	66.8	0.3	23.8	1.7	25312.9
With Mitigation	7.1	33.5	66.8	0.3	23.8	1.7	25312.9
2035 Construct							
No Mitigation	6.4	31.4	63.5	0.3	23.7	1.6	25165.6
With Mitigation	6.4	31.4	63.5	0.3	23.7	1.6	25165.6
2036 Paint/Pave							
No Mitigation	136.1	10.7	27.1	0.1	4.5	0.5	5737.0
With Mitigation	136.1	10.7	27.1	0.1	4.5	0.5	5737.0
SCAQMD Threshold	75	100	550	150	150	55	-

PHASE 5

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2037 Prep							
No Mitigation	3.9	16.8	25.4	0.1	18.9	10.5	8151.7
With Mitigation	3.9	16.8	25.4	0.1	7.8	4.4	8151.7
2038 Grade							
No Mitigation	4.5	14.5	37.1	0.1	9.9	3.8	11027.9
With Mitigation	4.5	14.5	37.1	0.1	4.4	1.8	11027.9
2039 Construct							
No Mitigation	2.9	14.2	33.0	0.1	6.3	0.5	9843.1
With Mitigation	2.9	14.2	33.0	0.1	6.3	0.5	9843.1
2040 Construct							
No Mitigation	2.7	13.8	32.1	0.1	6.3	0.5	9487.4
With Mitigation	2.7	13.8	32.1	0.1	6.3	0.5	9487.4
2041 Paint/Pave							
No Mitigation	46.6	9.3	22.5	0.0	1.4	0.2	3931.5
With Mitigation	46.6	9.3	22.5	0.0	1.4	0.2	3931.5
SCAQMD Threshold	75	100	550	150	150	55	-

PHASE 6

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
2042Prep							
No Mitigation	3.6	12.8	24.5	0.1	18.7	10.3	8148.6
With Mitigation	3.6	12.8	24.5	0.1	7.7	4.3	8148.6
2043 Grade							
No Mitigation	4.2	10.9	36.5	0.1	7.0	3.7	11024.6
With Mitigation	4.2	10.9	36.5	0.1	3.1	1.7	11024.6
2044 Construct							
No Mitigation	3.4	19.0	37.8	0.1	9.3	0.7	13148.0
With Mitigation	3.4	19.0	37.8	0.1	9.3	0.7	13148.0
2045 Construct							
No Mitigation	3.4	19.0	37.8	0.1	9.3	0.7	13148.0
With Mitigation	3.4	19.0	37.8	0.1	9.3	0.7	13148.0
2046 Paint/Pave							
No Mitigation	83.7	9.3	23.0	0.1	1.9	0.3	4188.2
With Mitigation	83.7	9.3	23.0	0.1	1.9	0.3	4188.2
SCAQMD Threshold	75	100	550	150	150	55	-