Appendix C of the Draft EIR

Air Quality and Greenhouse Gas Modeling Technical Report for the Lime Rock Valley Specific Plan (March 2024)

Air Quality and Greenhouse Gas Modeling Technical Report

for the

Lime Rock Valley Specific Plan

Prepared for:
G3 Enterprises

March 2024

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LIST OF ABBREVIATIONS

CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CO	Carbon Monoxide
CO_2	Carbon Dioxide
EDCAQMD	El Dorado County Air Quality Management District
EIR	Environmental Impact Report
GHG	Greenhouse Gas
kBTU	Thousand British Thermal Units
kWh	Kilowatt Hour
LRVSP	Lime Rock Valley Specific Plan
RCEM	Roadway Construction Emissions Model
RPS	Renewable Portfolio Standards
SMAQMD	Sacramento Metropolitan Air Quality Management District
VMT	Vehicle Miles Traveled
VMVSP	Village of Marble Valley Specific Plan
VOC	Volatile Organic Compounds
WSA	Water Supply Assessment
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

This Air Quality and Greenhouse Gas Technical Report (referred to as Technical Report hereafter) presents an update to the emissions modeling conducted for the Lime Rock Valley Specific Plan (LRVSP) Environmental Impact Report (EIR), using the latest emissions modeling software and accounting for recent legislative requirements that address air pollutant and greenhouse gas (GHG) emissions reductions. These updated emissions estimates shall be the basis for updating significance determinations for impacts AQ-2a and AQ-2d of Section 3.2 "Air Quality" of the LRVSP EIR, and Impacts GHG-1a and GHG-1b of Section 3.6, "Greenhouse Gas Emissions" of the LRVSP EIR, in accordance with El Dorado County Air Quality Management District (EDCAQMD) thresholds (EDCAQMD 2002a).

2 PROJECT DESCRIPTION

The proposed project would be a comprehensive planned residential community totaling approximately 740 acres with a variety of lot sizes and housing types, designed to ensure the preservation of significant historical sites and prominent natural features, including oak woodlands, steep slopes, streams, and wetlands. The proposed project would be a mix of low-density residential and open space uses. Specifically, the project would consist of up to 800 single-family residential units (550 low density and 250 medium density) on 358 acres, an 8-acre neighborhood park with recreational amenities, and approximately 335 acres of public and private open space. The balance of the project area would consist of roads and rights-of-way. Other features of the proposed project would include a network of pedestrian trails and pathways that would connect and enhance existing and proposed trails in the area, including the El Dorado Trail.

The project site is bounded on the north by the existing community of Cameron Estates, on the east by the Sacramento-Placerville Transportation Corridor (SPTC), on the south by Royal Equestrian Estates, and on the west by the proposed Village of Marble Valley Specific Plan (VMVSP) and the existing Deer Creek Wastewater Treatment Plant (WWTP). The LRVSP would rely upon roadway and water infrastructure associated with VMVSP.

El Dorado County's primary objective for the proposed project is to create development patterns that make the most efficient and feasible use of existing infrastructure and public services while promoting a sense of community.

3 AIR QUALITY

This section presents the air quality assessment which includes emissions estimates for short-term (construction) and long-term (operational) increases in criteria air pollutants (i.e., particulate matter) and precursors (i.e., reactive organic gases [ROG] and nitrogen oxides [NO_X]). This assessment includes carbon monoxide (CO) mass emissions modeling but does not include CO dispersion modeling nor analysis of toxic air contaminants and odors. The following sections present the methods of analysis and associated air pollutant emissions that could result from buildout of the LRVSP.

3.1 METHODS

Air pollutant emissions associated with construction and operation of the project were assessed and quantified using standard and accepted software tools, techniques, and emissions factors. The construction and operational emissions modeling and assessment is consistent with the recommendations of EDCAQMD and the California Air Resources Board (CARB). In addition, recent legislative requirements, LRVSP policies, and EIR mitigation measures that would result in emission reductions are included as mitigated project scenarios. A summary of modeling methodology and calculations for construction and operational emissions is provided below.

3.1.1 Construction

Criteria air pollutant and precursor emissions associated with project construction were estimated using the California Emissions Estimator Model (CalEEMod), version 2022.1 which is the latest model tool available at the time of the analysis. Modeling inputs included project-specific land use types and sizes and construction phasing, timing and activities included in Chapter 2, "Project Description," of the EIR, and provided by the project applicant. Model defaults for all other assumptions were used for construction emissions modeling. Buildout of the project was assumed to occur over an extended period beginning in 2027, with full buildout anticipated in 2045. Construction was assumed to progress according to the schedule summarized in Table 3-1. Several offsite improvements are a part of both VMVSP and LRSVP (listed in Table 3-1) and would be required to construction both projects (VMVSP and LRVSP). However, since it is unknown whether VMVSP or LRVSP will be built first, it is assumed that each project would need to account for the emissions associated with those improvements. See Appendix A for model outputs and detailed assumptions.

Table 3-1 Construction Scheduling and Phasing

Land Use	Value	Year															
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
LRL — Residential Low	550 units	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LRM — Residential Medium	250 units	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VP—Village Park	8 acres	X											X				
Roads	39 acres	X						X					X				
Offsite Improvements																	
Lime Rock Valley Road	3,000 feet		X														
Deer Creek Road	2,400 feet		X														
Lime Rock Valley Road	3,600 feet								X								
Phase 2 Loop Road	10,000 feet								X								
Lime Rock Valley Road	5,000 feet													X			
Bass Lake Interchange[a]	20,000 feet	X	X														
Cambridge Interchange[a]	25,000 feet							X	X								
Water Line A	28,700 feet	X	X														
Marble Valley Parkway[a]	7,972 feet									X							

[a] Improvements would only be included as part of the LRVSP project if the VMVSP were not approved or implementation of the VMVSP were delayed beyond the construction schedule for the LRVSP. Since construction of these improvements may be required as part of the LRVSP project, this analysis includes emissions from construction of both the LRVSP and selected VMVSP improvements.

3.1.2 Operation

Operational mobile, area, and energy emissions were also estimated using CalEEMod, version 2022.1 using a combination of project-specific information and model defaults. Modeling inputs included land use types, sizes, and other project details and assumptions included the EIR, including updated inputs from the project applicant. Project-specific trip rates and vehicle miles traveled (VMT) were obtained from the Fehr & Peers Technical Memorandum dated August 31, 2021, which were used to estimate mobile-source emissions. Fully mitigated mobile emissions include the mitigated VMT estimate identified by Fehr & Peers as a result of Mitigation Measure TRA-2, which requires adding 22,000 square feet of commercial retail land use to the LRVSP and implementing a Commute Trip Reduction (CTR) program. Electricity consumption is based on model defaults, while electricity emissions factors were adjusted based on the most recent power label available for Pacific Gas & Electric (PG&E) to account for an increase in carbon-free electricity pursuant to the Renewables Portfolio Standard (RPS) anticipated for operational years including in this analysis. Area-source and waste emissions were modeled using CalEEMod default values. Water and wastewater emissions were modeled using project-specific consumption values specified in the water supply assessment.

Operational modeling was conducted for various years. For purposes of analysis, buildout is assumed to occur in 2045.
Additionally, operational modeling was conducted for operational years that could potentially overlap with construction. As discussed below and as shown in Table 3.1, vertical construction of several residential units would begin in year 1 and operation emissions could begin immediately thereafter in year 2. Accordingly, concurrent construction and operational activities would occur from years 2 through 16, resulting in higher maximum daily emissions than either component when analyzed separately. For purposes of analysis, it was assumed that the first operational year would be 2028 (year 2 of construction).

See Appendix A for model outputs and detailed assumptions.

3.2 RESULTS

3.2.1 Construction Emissions

Construction emissions were modeled for two scenarios: unmitigated and mitigated. The mitigated scenario includes reductions from mitigation measures provided in the EIR. As shown in Table 3-1, several construction activities would likely occur concurrently. To ensure a conservative analysis, maximum daily emissions during these periods of overlap were estimated assuming all equipment would operate at the same time. This approach identifies the maximum daily project-related air quality impact during construction. Estimated unmitigated construction emissions, which do not include emissions reductions from mitigation measures, are summarized in Table 3-2 (which is Table 3.2-6 of the EIR).

Table 3-2 Maximum Daily Unmitigated Construction Emissions (pounds per day)[a] (Table 3.2-4 of the EIR)

Year	ROG	NO_X	CO	PM_{10}			$PM_{2.5}$		
				Dust	Exhaust	Total	Dust	Exhaust	Total
Year 1	**224**	57	63	30	2	33	14	2	16
Year 2	**284**	31	46	21	1	22	10	1	11
Year 3	**284**	26	29	9	1	10	4	1	5
Year 4	**284**	25	29	9	1	10	4	1	5
Year 5	**283**	24	28	20	1	21	10	1	11
Year 6	**283**	22	26	20	1	21	10	1	11
Year 7	**219**	36	56	46	1	47	12	1	13
Year 8	**278**	25	43	31	1	32	11	1	12
Year 9	**278**	24	43	28	1	29	11	1	12
Year 10	**277**	18	25	20	1	21	10	1	11
Year 11	**272**	18	24	20	1	21	10	1	11
Year 12	**214**	17	24	20	1	20	10	1	11
Year 13	**273**	21	41	20	1	21	10	1	11
Year 14	**272**	16	23	20	1	20	10	1	11
Year 15	**272**	15	22	20	1	20	10	<1	11
Year 16	**272**	14	22	20	<1	20	10	<1	11
Threshold	82	82	N/A			BMPs			BMPs

Notes: BMPs = best management practices; CO = carbon monoxide; N/A = not applicable; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; ROG = reactive organic gases.

Bold values indicate exceedance of applicable threshold.

[a] Values may not sum exactly due to rounding.

[b] EDCAQMD CEQA Guidelines consider dust impacts to be less than significant for projects that implement BMPs. EIR Mitigation Measure AQ-2c outlines these BMPs and is required to reduce the impact of construction-related fugitive dust to a less-than-significant level (EDCAQMD 2002b).

Source: CalEEMod 2022.1 (based on modeling conducted by Ascent in 2024).

Table 3-3 below presents the criteria air pollutant and precursor construction-related emissions from buildout of the project with EIR mitigation measures applied. Mitigated construction emissions were quantified using CalEEMod and off-model calculations in Microsoft Excel. See Appendix A for model outputs and detailed assumptions.

- Mitigation Measure AQ-2a. Low-Volatile Organic Compounds (VOC) Coatings During Construction. Mitigated construction modeling assumed the use of low-VOC coatings during construction activity with a VOC content of 10 grams per liter (g/L).
- Mitigation Measure AQ-2b. 10 Percent Reduction in NO_X During Construction Year 1. Mitigated construction modeling assumed a 10 percent reduction in NO_x emissions from off-road equipment during construction year 1.[1]
- Mitigation Measure AQ-2c. Tier 4 Final Construction Equipment Years 2 - 16. Mitigated construction modeling assumed Tier 4 Final off-road equipment would be used during construction between construction years 2 - 16.

[1] Based on the text for Mitigation Measure AQ-2b in the EIR, this NOx requirement will sunset on January 1, 2028 provided that CARB has implemented its In-Use Off-Road. Given that construction is now assumed to start in 2027, this mitigation measure is assumed to apply to the first year of construction only (2027). Starting in year 2 (2028), Mitigation Measure AQ-2d takes over.

- **Mitigation Measure AQ-2d 61 Percent Reduction in Fugitive Dust During Construction**. Mitigated construction modeling applied a 61 percent reduction in PM10 and PM2.5 dust construction emissions. The anticipated reduction in fugitive dust is consistent with EDCAQMD's and South Coast Air Quality Management District's fugitive dust reduction methodology embedded within CalEEMod (EDCAQMD 2002b, SCAQMD 2007).

Table 3-3 Maximum Daily Mitigated Construction Emissions (pounds per day) with Implementation of EIR Mitigation Measures (Table 3.2-5 of the EIR)

Source	ROG[a,b]	NO_X[b,c]	CO[b]	PM_{10}			$PM_{2.5}$		
				Dust[d]	Exhaust[b]	Total[e]	Dust[d]	Exhaust[b]	Total[e]
Year 1	9	9	71	12	<1	13	6	<1	6
Year 2	12	9	56	8	<1	8	4	<1	4
Year 3	12	7	36	4	<1	4	1	<1	2
Year 4	12	7	36	3	<1	3	1	<1	1
Year 5	11	4	36	5	<1	5	3	<1	3
Year 6	11	4	36	5	<1	5	3	<1	3
Year 7	10	22	66	36	1	37	4	1	5
Year 8	12	20	45	28	1	28	4	1	4
Year 9	12	19	45	25	1	25	3	1	4
Year 10	11	4	36	5	<1	5	3	<1	3
Year 11	11	4	36	5	<1	5	3	<1	3
Year 12	9	4	36	5	<1	5	3	<1	3
Year 13	11	9	54	6	<1	6	3	<1	3
Year 14	11	4	36	5	<1	5	3	<1	3
Year 15	11	4	36	5	<1	5	3	<1	3
Year 16	11	4	36	5	<1	5	3	<1	3
Threshold	82	82	N/A	BMPs[f]	-	-	BMPs[f]	-	-

Notes: BMPs = best management practices; CO = carbon monoxide; N/A = not applicable; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; ROG = reactive organic gases

Bold values indicate exceedance of applicable threshold.

[a] Assumes use of low-volatile organic compound (VOC) coatings that have a VOC content of 10 grams per liter per Mitigation Measure AQ-2a.

[b] Assumes use of Tier 4 Final construction equipment used during construction years 2-16 per Mitigation Measure AQ-2c.

[c] Assumes a 10 percent reduction in NO_X during construction year 1 per Mitigation Measure AQ-2b.

[d] Assumes a 61 percent reduction in fugitive dust per Mitigation Measure AQ-2d.

[e] Values may not sum exactly due to rounding.

[f] EDCAQMD CEQA Guidelines consider dust impacts to be less than significant for projects that implement BMPs. EIR Mitigation Measure AQ-2c outlines these BMPs and is required to reduce the impact of construction-related fugitive dust to a less-than-significant level (EDCAQMD 2002b).

Source: CalEEMod 2022.1 (based on modeling conducted by Ascent in 2024).

3.2.2 Operational Emissions

Operational criteria air pollutant and precursor emissions were modeled for two scenarios: an unmitigated scenario and a fully mitigated scenario that accounts for reductions from LRVSP policies as well as proposed EIR mitigation measures. Based on the project construction schedule, it was assumed that the first operational year at full buildout would be 2045. The scenarios are described below. Emissions were quantified using CalEEMod and off-model calculations in Microsoft Excel. See Appendix A for model outputs and detailed assumptions.

The unmitigated scenario presents criteria air pollutant and precursor emissions from project buildout with legislative requirements that are default in CalEEMod at the time of analysis. The unmitigated analysis does not take into account LRVSP policies or EIR mitigation measures.

The mitigated scenario presents criteria air pollutant and precursor emissions from project buildout with legislative requirements and LRVSP policies applied along with EIR mitigation measures. Daily operational emissions were quantified using CalEEMod and off-model calculations in Microsoft Excel. The LRVSP policies applied to this scenario are as follows:

- Policy 7.45. Installation of wood stoves and pellet stoves shall be prohibited. The partially mitigated scenario operational modeling removed all conventional and non-conventional wood-burning fireplaces. Only natural gas-powered fireplaces were assumed for the partially mitigated scenario.
- Policy 7.46. Installation of open-hearth wood-burning fireplaces shall be prohibited. The partially mitigated scenario operational modeling removed all conventional and non-conventional wood-burning fireplaces.

As described in the Draft EIR, Mitigation Measure GHG-2 identifies implementing all-electric buildings as a potential onsite strategy to reduce GHG emissions. When coupled with RPS, all electric buildings that do not consume any natural gas would not generate any emissions. However, the County's authority to require all-electric buildings may be restricted. Thus, emission reductions associated with all-electric design are not provided herein, and for modeling purposes, natural gas consumption is assumed.

Table 3-4 below presents the daily operational criteria air pollutant and precursor emissions taking into account LRVSP policies at full buildout. Moreover, TRA-2 (TDM strategies to reduce residential VMT), would reduce VMT by full buildout as estimated by Fehr & Peers for LRVSP combined with VMVSP project construction. Table 3-5 below presents the daily operational criteria air pollutant and precursor emissions taking into account LRVSP policies and mitigation measure TRA-2 at full buildout. As shown, criteria air pollutant and precursor emissions would be below EDCAQMD thresholds.

Table 3-4 Unmitigated Daily Operational Criteria Air Pollutant and Precursor Emissions at Full Buildout (pounds per day)[a]

Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Area	54	13	53	1	1
Energy	<1	6	3	<1	<1
Mobile	22	12	145	38	11
Total	*77*	*31*	*201*	*38*	*11*
Threshold	82	82	CAAQS[c]	CAAQS[c]	CAAQS[c]
Exceeds threshold?	*No*	*No*	N/A	N/A	N/A

Notes: CAAQS = California Ambient Air Quality Standards; CO = carbon monoxide; N/A = not applicable; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; ROG = reactive organic gases.

[a] Emissions account for reductions achieved by LRVSP policies 7.45 and 7.46.

[b] Values may not add due to rounding.

[c] EDCAQMD considers CO and PM_{10} emissions significant if they would cause or contribute to violations of the CAAQS or NAAQS (EDCAQMD 2002). Use of the PM_{10} standard as a surrogate for the assessment of $PM_{2.5}$ impacts is considered appropriate because $PM_{2.5}$ is a substituent of PM_{10}.

Source: CalEEMod 2022.1 (based on modeling conducted by Ascent in 2024)

Table 3-5 Fully Mitigated Daily Operational Criteria Air Pollutant and Precursor Emissions at Full Buildout (pounds per day)[a]

Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Area	54	13	53	1	1
Energy	<1	6	3	<1	<1
Mobile	21	9	108	24	6
Total	*76*	*29*	*164*	*26*	*8*
Threshold	82	82	CAAQS[c]	CAAQS[c]	CAAQS[c]
Exceeds threshold?	*No*	*No*	N/A	N/A	N/A

Notes: CAAQS = California Ambient Air Quality Standards; CO = carbon monoxide; N/A = not applicable; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; ROG = reactive organic gases.

[a] Emissions account for reductions achieved by LRVSP policies 7.45 and 7.46, along with MM TRA-2.

[b] Values may not add due to rounding.

[c] EDCAQMD considers CO and PM_{10} emissions significant if they would cause or contribute to violations of the CAAQS or NAAQS (EDCAQMD 2002). Use of the PM_{10} standard as a surrogate for the assessment of $PM_{2.5}$ impacts is considered appropriate because $PM_{2.5}$ is a substituent of PM_{10}.

Source: CalEEMod 2022.1 (based on modeling conducted by Ascent in 2024)

Construction of several residential units was assumed start in year 1 and be completed that same year, with operation emissions beginning immediately thereafter in year 2. Accordingly, concurrent construction and operational activities would occur from years 2 through 16, resulting in higher maximum daily emissions than either component when analyzed separately.

Combined construction and operational emissions are presented in Table 3-6 and compared with the EDCAQMD's thresholds. The estimated construction emissions assume implementation of Mitigation Measures AQ-2a through AQ-2e; operational emissions include emissions benefits from applicable and quantifiable LRVSP policies (Policies 7.45, and 7.46), as well as mobile source reductions associated with Mitigation Measure GHG-2 (EV Charging). Mitigation Measures GHG-1 and TRA-2 are not included in the assessment. The analysis also conservatively assumes all structures would be fully occupied immediately following construction.

As shown, combined construction and operational emissions would exceed EDCAQMD's threshold for ROG at Year 16.

Table 3-6 Maximum Daily Mitigated Combined Construction and Operational Emissions (pounds per day) with Implementation of EIR Mitigation Measures [a] (Table 3.2-7 in the EIR)

Year[b]	ROG	NO_X	CO	PM_{10}			$PM_{2.5}$		
				Dust	Exhaust	Total	Dust	Exhaust	Total
Year 2	17	12	73	11	<1	11	5	<1	5
Year 3	23	13	68	8	<1	9	3	<1	3
Year 4	29	16	86	9	<1	10	3	<1	3
Year 5	35	15	113	14	1	15	5	1	5
Year 6	43	20	126	18	1	19	6	1	7
Year 7	45	38	162	51	2	53	8	1	10
Year 8	52	37	153	45	2	46	8	1	9
Year 9	56	38	163	44	2	45	8	2	9
Year 10	60	25	165	27	1	28	8	1	9
Year 11	64	27	176	29	1	30	9	1	10
Year 12	66	28	186	31	1	32	9	1	10
Year 13	72	34	215	33	2	34	10	2	11
Year 14	76	31	207	35	2	36	10	2	12
Year 15	81	33	220	37	2	39	11	2	12
Year 16	77	33	227	39	2	41	11	2	13
Threshold	82	82	CAAQS[c]	BMPs	-	CAAQS[c]	BMPs	-	CAAQS[c]

Notes: CO = carbon monoxide N/A = not applicable; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns; PM_{10} = particulate matter less than or equal to 10 microns; ROG = reactive organic gases.

Bold values indicate exceedance of applicable threshold.

[a] Values may not sum exactly due to rounding.

[b] Buildout of the project is anticipated to occur over an extended period beginning in 2023 and ending in 2037. Emissions were quantified assuming construction would begin in 2023 and the first buildings could become operational in 2027.

[c] EDCAQMD considers CO and PM_{10} emissions significant if they would cause or contribute to violations of the CAAQS or NAAQS (EDCAQMD 2002). Use of the PM_{10} standard as a surrogate for the assessment of $PM_{2.5}$ impacts is considered appropriate because $PM_{2.5}$ is a substituent of PM_{10}.

Source: CalEEMod 2022.1 (based on modeling conducted by Ascent in 2024)

4 GREENHOUSE GASES

This section presents the GHG assessment which includes emissions estimates for short-term (construction) and long-term (operational) increases in GHG emissions. The following sections present the methods of analysis and associated GHG emissions that could result from buildout of the LRVSP.

4.1 METHODS

GHG emissions modeling associated with construction and operation of the project were assessed and quantified using standard and accepted software tools, techniques, and emission factors. The construction and operational emissions modeling and assessment is consistent with the recommendations of EDCAQMD and CARB. In addition, recent legislative requirements, LRVSP policies, and mitigation measures that result in emissions reductions are included as mitigated project scenarios. A summary of modeling methodology and calculations for construction and operational emissions is provided below.

4.1.1 Construction

GHG emissions from construction of the project were estimated using CalEEMod, version 2022.1. Modeling inputs included project-specific land use types and sizes and construction phasing, timing, and activities included in EIR Chapter 2, "Project Description," including updated inputs and project timing from the project applicant. Model defaults for all other assumptions were used for construction emission modeling. Buildout of the project was assumed to occur over a sixteen-year period beginning in 2027. Construction was assumed to progress according to the general schedule summarized in Table 3-1. Some offsite improvements that are a part of VMVSP (listed in Table 3-1) would happen to support both projects (VMVSP and LRVSP). But since it is still unknown which project will be built first, it is assumed that each project would need to account for the emissions associated with those improvements. Hence, emissions from those offsite improvements are accounted in LRVSP project as well. See Appendix A for model outputs and detailed assumptions.

Construction of the project would result in the conversion of oak woodlands, riparian woodlands, grasslands, and wetlands. Removal of this vegetation would result in a one-time change in carbon stock. The resulting carbon dioxide (CO_2) loss was quantified using CalEEMod for the acreages shown in Table 3.3-5 in Section 3.3, "Biological Resources," of the EIR, which accounts for permanent acreage losses of riparian woodlands, forest lands, grasslands, and wetlands. Permanent reductions to grassland, trees, and wetlands were modeled using CalEEMod, version 2022.1. to model carbon storage lost. However, due to the oak tree replanting requirements identified in the in the Oak Resources Technical Report (Appendix F of the EIR), estimated carbon sequestration associated with replanting was also quantified using i-Tree.

4.1.2 Operation

Operational mobile, area, energy, water, solid waste, and wastewater emissions were also estimated using CalEEMod, version 2022.1. Modeling inputs included land use types, sizes, and other project details and assumptions included the EIR, including updated input from the project applicant. Project-specific trip rates and VMT were obtained from Fehr & Peers, which were used to estimate mobile-source emissions. Mitigated mobile emissions include the mitigated VMT estimate identified by Fehr & Peers. Water and wastewater emissions were modeled using project-specific water use factors by land use type in the WSA. Electricity emissions factors were adjusted to account for an increase in carbon-free electricity pursuant to RPS requirements anticipated for future modeled years (2030 and 2045; see discussion below). Model defaults for all other assumptions were used for operation emission modeling. See Appendix A for model outputs and detailed assumptions.

Oak woodlands are protected by policies in the El Dorado County General Plan and County Code of Ordinances which include various replanting requirements if a project results in the permanent removal of oak trees. Under the

Oak Resources Management Plan (ORMP), the project would be required to mitigate all oak woodland impacts at a 1:1 ratio where 50 percent or less of onsite oak woodlands are impacted. Mitigation for removal of individual native oak trees is based on an inch-for-inch replacement standard. Mitigation for Heritage Trees is based on a replacement standard of 3:1 (inches) ratio. If the ORMP is not in effect at the time the development entitlement applications are submitted, the project applicant would comply with Option A of County General Plan Policy 7.4.4.4. Based on the maximum allowable impact of 37 acres (37.6 acres, if the detention basin is constructed) under Option A, an equivalent of 7,400 replacement trees would be planted. Each replacement planting is defined as a 1-gallon oak sapling or three locally collected acorns. The resulting CO_2 sequestered as a result of replanting 7,400 oak trees was quantified using i-Tree (Version 2.6.0) (USDA Forest Service 2024). The project is assumed to sequester CO_2 over a 30-year life period. The total amount of CO_2 sequestered as a result of the tree planting was divided over a 30-year life span and the annual CO_2 emissions sequestered was subtracted from the project's operational annual GHG emissions.

4.2 RESULTS

4.2.1 Construction Emissions

Construction emissions were modeled in CalEEMod. Estimated GHG construction emissions are summarized in Table 4-1.

Table 4-1 Construction-Related Greenhouse Gas Emissions

Construction Year	$MTCO_2e$
Year 1	1,008
Year 2	984
Year 3	350
Year 4	349
Year 5	340
Year 6	339
Year 7	969
Year 8	960
Year 9	953
Year 10	336
Year 11	335
Year 12	332
Year 13	947
Year 14	333
Year 15	333
Year 16	332
Total construction emissions	9,199
One-time sequestration loss	(+) 18,622
Total construction emissions with one-time sequestration loss	27,821

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: CalEEMod version 2022.1, and USDA i-Tree version 2.6.0 (based on modeling conducted by Ascent in 2024).

4.2.2 Operational Emissions

Operational emissions were modeled for three scenarios: an unmitigated scenario, a partially mitigated scenario that accounts for reductions from recent legislative requirements and quantified LRVSP policies, and a mitigated scenario that accounts for reductions from recent legislative requirements, quantified LRVSP policies, and EIR mitigation. GHG emissions were modeled for three analysis years. 2030 and 2045 were modeled to align with CARB milestone years for GHG reduction planning efforts at the state level. 2045 was modeled because that is the assumed the first operational year at full buildout. The scenarios are described below. Emissions were quantified using CalEEMod and off-model calculations in Microsoft Excel. See Appendix A for model outputs and detailed assumptions.

The unmitigated scenario presents GHG emissions estimates from project buildout with legislative requirements that are default in CalEEMod at the time of analysis. The unmitigated analysis does not take into account any LRVSP policies or mitigation measures.

The partially mitigated scenarios presents GHG emissions from project buildout with legislative requirements and LRVSP policies applied. The EIR mitigation measures were not accounted for in this scenario. The legislative adjustments and LRVSP policies applied to this scenario are as follows:

- **RPS.** Mitigated operational modeling adjusted the electric utility provider emissions factors to account for increase in carbon-free electricity pursuant to RPS. For the three modeling years, the electrical grid emission factor was adjusted to assume 60 percent carbon-free in 2030 and 100 percent carbon-free in 2045. See Appendix A for calculations.
- **Policy 7.15. Energy efficient appliances.** The partially mitigated scenario operational modeling assumed energy-efficient appliances (i.e., fans, dishwashers, refrigerators, and washing machines) would be installed in all residential land use types.
- **Policy 7.33. Residential Indoor Water.** Mitigated operational modeling assumed a 20 percent reduction from the 2008 Plumbing Code baseline for residential uses, or achieve the then-current Plumbing Code in effect at the time of construction.
- **Policy 7.37. Recycled water use**. The partially mitigated scenario operational modeling assumed outdoor water consumption in throughout Lime Rock Valley planning area would come from recycled water source. Water consumption estimates were derived from the WSA prepared for LRVSP.
- **Policy 7.38. Irrigation Controllers**. The partially mitigated scenario operational modeling assumed utilization of low-water consumption irrigation systems to reduce outdoor water consumption. Indoor and outdoor water consumption estimates were derived from the WSA prepared for LRVSP.
- **Policy 7.42. Turf Reduction**. The partially mitigated scenario operational modeling assumed all non-public uses within the Lime Rock Planning Area shall limit the use of turf to no more than 25 percent of the total landscaped area. Indoor and outdoor water consumption estimates were derived from the WSA prepared for LRVSP.
- **Policy 7.45. Installation of wood stoves and pellet stoves shall be prohibited.** The partially mitigated scenario operational modeling removed all conventional and non-conventional wood-burning fireplaces. Only natural gas-powered fireplaces were assumed for the partially mitigated scenario.
- **Policy 7.46. Installation of open-hearth wood-burning fireplaces shall be prohibited.** The partially mitigated scenario operational modeling removed all conventional and non-conventional wood-burning fireplaces.

The mitigated scenario presents emissions with legislative requirements, LRVSP policies, and EIR mitigation measures. The legislative adjustments and LRVSP policies applied to this scenario are as follows:

- **RPS** and **VMVSP Policies 7.15**, **7.33**, **7.37**, **7.38**, **7.42**, **7.45,** and **7.46.** The same assumptions described in the scenario above were applied.
- **Mitigation Measure GHG-2.** Revisions to Policy 7.2 and Policy 7.20.

- **Policy 7.4. Level 2 Plug in Electric Vehicle (PEV) Charging Stations.** Mitigated operational modeling assumed amount of Level 2 PEV chargers required for Village Residential Low designations was consistent with guidance in the draft 2022 California Green Building Standards Code (CALGreen) (BSC 2021). GHG emissions reductions associated with installing PEV chargers was calculated using Sacramento Air Quality Management District's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity (GHG Handbook) (SMAQMD 2021). Modeling assumed an increase in electricity emissions as a result of additional energy demand from operating electric vehicle chargers, which was also calculated based on guidance in the GHG Handbook.
- **Policy 7.20. Residential Rooftop Solar.** Mitigated operational modeling assumed all residential units would install 4 kilowatts [kW]) of rooftop solar on each residential unit. Kilowatt-hour (kWh) of generation was estimated based on a 4-kW system in El Dorado County using the National Renewable Energy Laboratory's PVWatts Model.

- **Mitigation Measure TRA-2. TDM strategies to reduce residential VMT.** This measure requires adding 22,000 square feet of commercial retail land use to the LRVSP and implementing a Commute Trip Reduction (CTR) program to reduce VMT. The reduced annual VMT was used to estimate mobile emissions in the mitigated operational modeling.

Table 4-2 below presents the annual GHG emission estimates for each of these three scenarios for 2030 and 2045.

Table 4-2 2030 and 2045 Operational Greenhouse Gas Emissions Associated with Unmitigated and Mitigated With LRVSP Policies and EIR Measures Scenarios (metric tons per year)

Scenario	CO_2	CH_4	N_2O	HFCs[a]	*Sequestration* CO_2[b]	$MTCO_2e$
	2030					
Unmitigated (Table 3.6-5)	1,721	1	0.1	*2*	*-627*	1,148
With LRVSP Policies (Table 3.6-6)	1.611	1	0.1	*2*	*-627*	1,044
Mitigated[a] (Table 3.6-8)	1,134	1	0.1	*1*	*-627*	562
	2045					
Unmitigated (Table 3.6-5)	8,061	6	0.3	*3*	*-627*	7,685
With LRVSP Policies (Table 3.6-6)	7,423	5	0.3	*3*	*-627*	7,009
Mitigated[a] (Table 3.6-8)	5,353	5	0.2	*3*	*-627*	4,923

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent; CO2 = carbon dioxide; CH4 = methane; N2O = nitrous oxide.

[a] HFC amounts account for GWP.

[b] Sequestration accounts for tree planting. Value presented is the annual number, assuming a 30-year project duration.

[c] Emissions reductions account for mandatory quantified LRVSP policies, state regulations, and EIR mitigation measures.

Source: CalEEMod version 2022.1 and USDA i-Tree version 2.6.0 (based on modeling conducted by Ascent in 2024).

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Appendix A

Air Quality and Greenhouse Gas Modeling Results