APPENDIX 28

GLOBAL CLIMATE CHANGE AND CARBON FOOTPRINT ASSESSMENT

Global Climate Change and Carbon Footprint Modified Belleayre Resort Supplemental Draft Environmental Impact Statement

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Table of Contents

List of Tables

List of Abbreviations and Acronyms

BMSC	Belleayre Mountain Ski Center
BTU	British thermal unit
CAA	Clean Air Act
CBECS	Commercial Building Energy Consumption Survey
CEQ	Council on Environmental Quality
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DEIS	draft environmental impact statement
DOE	U.S. Department of Energy
EIA	Energy Information Administration
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gases
GWP	global warming potential
HFC	hydrofluorocarbon
HVAC	heating, ventilation, and air conditioning
LEED	Leadership in Energy and Environmental Design
MSW	municipal solid waste
N_2O	nitrous oxide
NECIA	Northeast Climate Impacts Assessment
NEPA	National Environmental Policy Act
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance
PFC	perfluorocarbon
SDEIS	supplementary draft environmental impact statement
SEQR	State Environmental Quality Review

List of Abbreviations and Acronyms (cont.)

SF_4	sulfur hexafluoride
UMP	Unit Management Plan
VMT	vehicle miles traveled

1 Introduction

The Agreement in Principle and the scope for this Supplemental Draft Environmental Impact Statement (SDEIS) require that the use of energy and the emissions of greenhouse gases be evaluated for this modified project. This evaluation is being undertaken in accordance with the New York State Department of Environmental Conservation's (NYSDEC) *Policy on Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements* (July 15, 2009). The Modified Belleayre Resort at Catskill Park project, proposed by Crossroads Ventures, LLC, consists of the Highmount Spa Resort and the Wildacres Resort. Both of these components of the Belleayre Resort would be constructed near the Belleayre Mountain Ski Center (BMSC); these issues also are being evaluated in connection with the BMSC in the DEIS on the Unit Management Plan (UMP) (see Part A).

The Highmount Spa Resort will consist of the following:

- A 120-unit hotel that includes a 24,000 square foot spa/fitness center
- 120 fractional lodging units (80 located in the hotel/spa and lodge and 40 units as detached duplexes or individual units)
- The Leach Farm Conference/Clubhouse (12,000 square feet).

The Wildacres Resort will consist of the following:

- An 18-hole golf course
- A 250-unit hotel and 42 attached fractional units
- An additional 139 detached fractional units clustered around the hotel (West Village) and in the northeast corner of the site (Front-9 Village) retail shops
- Two restaurants
- A pool and spa
- Tennis courts

- A conference center (500 seats)
- A ballroom (200 seats)
- The Marlowe Mansion Clubhouse
- The Front-9 Village Clubhouse
- The Wilderness Activity Center.

The Wilderness Activity Center is another component of Wildacres and will reuse the existing buildings at the base of Highmount Ski Area. Facilities will include the following:

- The existing main lodge building of Highmount Ski Area, which contains a café with a lounge and library; locker rooms and a weight training room; and a Jacuzzi, sauna, and steam room.
- A 20-feet addition to the existing main lodge that will include an inside rock climbing wall/outdoor rock/ice climbing wall and an enlarged outdoor deck
- The existing ski rental shop, which also sells outdoor products.

Final design drawings have not been prepared for the development of Highmount and Wildacres. The level of information in the drawings and plans that have been produced for permitting and environmental review purposes are as detailed as possible, as noted in NYSDEC's *Policy Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements*. Generic building energy-consumption information was used to approximate greenhouse gases (GHGs) emitted from the Belleayre Resort complex. NYSDEC's GHG policy notes that "the Department recognizes that accurate estimates of energy use and resulting GHG emissions may be complicated by the limitations of energy modeling tools, the variety of project-specific and site-specific characteristics, and the preliminary nature of project design at the point when an EIS is filed. Even within these limitations, an EIS must include consideration of potentially significant environmental impacts. Furthermore, as long as the relative levels of energy use and GHG emissions are compared with respect to project alternatives, and the outcome of the comparison is used in the decision-making process, an important goal will have been achieved even if the quantification of total annual GHG emissions is not precise. By ensuring energy usage and GHG emissions are considered early in project design, the public policy goals of combating climate change and maximizing energy efficiency are best served" (*Policy Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements* p. 5).

As set forth in the Agreement, among the many mitigation measures being incorporated into the resorts, Crossroad Ventures, LLC's goal is to achieve Leadership in Energy and Environmental Design (LEED) Silver status for the resort build-

ings. Other measures that would be implemented in accordance with NYSDEC's energy use and GHG policy are noted in Section 4, Potential Mitigation Measures.

1.1 Climate Change Background Information

Climate change refers to any significant change in measures of climate (temperature, precipitation, or wind) that lasts for an extended period (e.g., decades or longer). Climate change may be affected by a number of factors, including natural cycles (e.g., changes in the sun's intensity or Earth's orbit around the sun); natural processes within the climate system (e.g., changes in ocean circulation); and human activities that change the atmosphere's composition (e.g., burning fossil fuels) or land surface (e.g., deforestation, reforestation, urbanization, and desertification).

Carbon footprint refers to the quantity of GHGs emitted by an organization or activity. GHGs consist primarily of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The presence of these gases in the atmosphere reduces the ability of the atmosphere to allow long-wave radiation (heat) to escape to space. CO_2, CH_4, N_2O, and water vapor are produced by natural processes (e.g., volcanic activity and the decay of vegetable matter) and human activities. The largest manmade sources of GHGs are stationary and mobile sources that burn fossil fuels (National Oceanic and Atmospheric Administration 2009).

In order to assess a carbon footprint, emissions of GHGs are assessed. Each of the GHGs has a different contribution to global climate change. Carbon dioxide equivalency is a quantity that describes, for a given greenhouse gas, the amount of CO_2 that would have the same global warming potential (GWP) when measured over a specified timescale (generally, 100 years). The carbon dioxide equivalency for a gas is obtained by multiplying the mass and the GWP of the gas. For example, the GWP for methane over 100 years is 21. This means that the emission of 1 metric ton of methane is often reported as 21 carbon dioxide equivalent (CO_2e) metric tons of GHG emissions.

GHG emissions are subject to permitting and annual emission reporting requirements by the federal government only for certain source categories and size. These requirements are not applicable to the Belleayre Resort project. Typically the types of activities regulated by the U.S. Environmental Protection Agency (EPA) are large stationary sources constructed to generate electricity or other similar industrial facilities. The proposed Belleayre Resort project is not subject to these federal regulations; as noted above, NYSDEC has issued guidance for assessing GHGs and energy use in a State Environmental Quality Review (SEQR) EIS (*Policy Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements*).

1.2 Global Climate Change

If the Belleayre Resort is built in the next 10 to 20 years, climate change challenges to its construction are expected to be minimal. It is anticipated that the ef-

fects from climate change over the next 10 to 20 years would be small and that local soil and water conditions, which could impact operation of construction equipment, would not change significantly from current conditions. Moreover, depending upon the nature of climate change and its extent, the loss of the benefits provided to the resort by the BMSC (i.e., the synergistic effect of shared BMSC and resort visitors in the winter) could be overcome by a substantially longer season of golf and, potentially, the ability to engage during more months of the year in warmer weather activities.

The Northeast Climate Impacts Assessment's (NECIA) climate projections found that, because of GHG emissions in the recent past, average daily temperatures across the Northeast will rise 2.5°F to 4°F per decade in winter and 1.5°F to 3.5°F per decade in summer over the next several decades, even if actions are taken to reduce emissions. Temperature would increase at a slightly higher rate under the "lower" emission scenario and would increase much more quickly under the "higher" emission scenario, compared with the projected temperature increases of 2.5°F to 4°F in winter and 1.5°F to 3.5°F in summer. The NECIA study suggests that the climate of the project area by mid-century (i.e., in 50 years) could be similar to current conditions in Maryland/Northern Virginia under the lower emission scenario and more similar to Southern Virginia/Northern North Carolina under the higher emission scenario.

Water resources would also be affected by climate change. Rain events during the winter could be more prevalent and of higher intensity, thus increasing runoff and high stream flow conditions. With an earlier end to the snow season, the peak spring runoff could be as much as two weeks earlier than current conditions. During the summer months, there could be extended periods of hot, dry weather, interspersed with periods of strong summer thunderstorms and associated heavy, short-duration rain events (Frumhoff et al. 2007).

2 Carbon Footprint: Assessing GHG Emissions

The Belleayre Resort carbon footprint is the sum of all GHG emissions and is calculated as metric tons per year carbon dioxide equivalent (CO_2e). GHG emissions from the resort primarily would result from fossil fuel combustion during construction and operation of the Belleayre Resort. This section presents quantified impacts from construction and, where feasible, operation of the proposed resort project.

2.1 Construction Activity Emissions

Proposed major construction activities at Belleayre Resort include site preparation, construction of the buildings comprising the Highmount and Wildacres resort areas, and construction of the Wildacres golf course. Emissions from construction are related to equipment use, on-site vehicle use, and off-site vehicle emissions (including delivery trips and construction worker commuting). Construction of the resort areas is projected to occur over a nine-year period, with the major construction effort (hotel construction) occurring during the first two to three years; the additional fractional units (detached multiplex and individual units) would be built over the remaining time period. For purposes of this analysis, it was assumed the golf course would be constructed over a two- year period concurrent with construction of the hotels. Emissions are estimated both for the entire project and for the highest emissions year. The emissions estimates are shown in Table 2-1.

Delivery trips were estimated for the materials and equipment required over the nine-year period. These include trips to deliver concrete, asphalt, gravel, structural steel, lumber, and other building materials. For each material and equipment type, travel distance and number of trips were determined, and appropriate emission factors were applied.

The work force required to build the Belleayre Resort project would be highest during the first few years of the construction period when the hotels and golf course would be built. The number of workers would then decline because a smaller work force would be needed to construct the additional resort housing units.

Table 2-1 Construction GHG Emissions

Source Type	Highest Construction Emissions Year (metric tons)				Total Construction Project (metric tons)			
	CO_2	CH_4	N_2O	CO_2e	CO_2	CH_4	N_2O	CO_2e
Resort Construction Equipment	3,012	1.47	0.10	3,074	10,524	18	1	11,085
Resort Construction Worker Commuting	494	0.03	0.05	511	2,657	0	0	2,751
Resort Construction Deliveries	645	0.02	0.02	651	2,214	0	0	2,234
Golf Course Construction Equipment	2,213	0.11	0.03	2,224	3,024	0	0	3,041
Golf Course Construction Worker Commuting	253	0.01	0.03	262	338	0	0	350
Golf Course Construction Deliveries	87	0.00	0.00	87	116	0	0	117
Total Emissions	**6,705**	**2**	**0.2**	**6,706**	**18,873**	**18**	**1**	**18,893**

Key:
CH_4 = Methane.
CO_2 = Carbon dioxide.
CO_2e = Carbon dioxide equivalent.
N_2O = Nitrous oxide.

2.2 Green Building Design and Materials

In the U.S. buildings have a significant impact on the environment, consuming approximately 39% of the total energy, more than 70% of the electricity, and generating 39% of CO_2 emissions (U.S. Green Building Council 2010). Emissions from the manufacture of building materials and products and the transport of construction and demolition materials result in an even larger GHG footprint.

The Belleayre Resort would adhere to green building principles in constructing its facilities. The nationally accepted benchmark for green building design is certification under the U.S. Green Building Council's LEED rating system. LEED is a green building rating system that assesses the performance of a building in five key areas of human and environmental health:

- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality.

LEED is a performance-oriented system where credits are earned for satisfying criteria designed to address specific environmental impacts inherent in the design, construction, and operation and maintenance (O&M) of the building. Different levels of certification (i.e., Certified, Silver, Gold, and Platinum) are awarded based on the total credits earned. The average LEED-certified building uses 32% less electricity, 36% less total energy, and saves 350 metric tons of CO_2 emissions annually (U.S. Green Building Council 2010).

Crossroads Ventures, LLC has indicated that LEED Silver (the third-highest LEED category) will be the goal for Belleayre Resort. With LEED Silver as a goal, green building strategies and technologies will be required to enhance building energy performance beyond the norm. These strategies and technologies will improve energy efficiency, reduce operational GHG emissions, conserve water and other resources, and minimize waste generation.

The average energy use intensity for a LEED Silver building is 62,000 British thermal units (Btus) per square foot (ft^2). For comparison, the Commercial Building Energy Consumption Survey (CBECS) indicates the average energy use intensity of all buildings included in their survey is about 91,000 Btu/ft^2; the highest LEED category (gold-platinum) has an energy use intensity value of about 51,000 Btu/ ft^2.

Although not fully developed at this stage of design, some of the energy efficiency/environmentally friendly features of buildings at the Belleayre Resort being considered include super-insulated walls and roof, low-E energy-efficient windows, fiber-reinforced cement cladding, standing seam metal roofs, and potential use of landscaped green roofs.

2.3 Potential Project Impacts

GHG emissions are categorized into direct and indirect emission categories. Direct emissions would result from activity of equipment owned or leased by the Belleayre Resort. Indirect emissions are emissions associated with operation of the Belleayre Resort but are not from Belleayre Resort-owned or leased equipment. As noted above, site-specific design specifications such as size of heating units, quantity of resort-owned vehicles, and an equipment inventory for golf course maintenance have not been developed, thus precluding an estimate of site-specific GHG emissions. However, generic lodging energy consumption factors for buildings can be used to estimate energy consumption and associated GHG emissions from building operation.

There are no prescribed thresholds that define significance of GHG emissions. However, in the development of the GHG Mandatory Reporting Rule, the EPA established a minimum GHG emission reporting threshold of 25,000 metric tons per year of CO_2e. (The GHG Mandatory Reporting Rule itself does not require reporting for the development of resorts but does require reporting about specific categories of facilities that emit higher levels of pollutants, such as electricity-generating plants and other similar industrial facilities.) This threshold level of emissions was established based on the anticipated level of GHG emissions that would be expected to occur from sources that are just large enough to be considered significant for other pollutants (carbon monoxide [CO], nitrogen dioxide [NO_2], etc.) regulated under the Clean Air Ac (CAA). In addition, the Council on Environmental Quality (CEQ) has issued guidance for federal National Environmental Policy Act (NEPA) environmental impact statements, suggesting that federal agencies use 25,000 metric tons per year CO_2e value as an indicator value for

agencies' action-specific evaluation of GHG emissions (Council on Environmental Quality February 18, 2010).

2.3.1 Direct GHG Emissions

Sources of direct GHG emissions at the Belleayre Resort include emissions from on-site fossil fuel combustion, primarily in heating systems and kitchen equipment. The primary fuel has not been determined yet, although use of a low-polluting fuel such as propane or natural gas is considered likely. Fugitive emissions of GHGs from heating, ventilation, and air conditioning (HVAC) and kitchen refrigeration systems are relatively small compared with the overall project and were not considered in detail.

Detailed building utility (heating fuel and electrical use) information has not been developed, as, in fact, the NYSDEC Policy has anticipated for a project at this stage, i.e., EIS review. Therefore, building energy use is conservatively estimated using U.S. Department of Energy (DOE) Energy Information Administration (EIA) generic lodging building energy consumption factors. These factors are applied to building square foot estimates to estimate energy use. Crossroads Ventures, LLC estimated the amount of building area to be constructed each year. Table 2-2 shows the building area and energy use estimates.

Table 2-2 Building Area and Energy Use Estimate by Year

Facility	Area Built (ft^2)	Area Operational at End of Period (ft^2)	Electric Use ($kWh \times 10^6$)	Natural Gas Use ($ft^3 \times 10^6$)
Year 1 and 2 - Main Hotels	714,300	714,300	9.6	52
Year 3 - Clubhouse, time shares and fractional units	64,150	778,450	10.5	56.7
Year 4 – Time shares and fractional units at Wildacres and Highmount	83,800	862,250	11.6	62.8
Year 5 - Time shares and fractional units at Wildacres and Highmount	65,600	927,850	12.5	67.5
Year 6 - Time shares and fractional units at Wildacres and Highmount and Marlowe Mansion	77,600	1,005,450	13.6	73.2
Year 7 – Time shares and fractional units at Wildacres	30,000	1,035,450	14	74.5
Year 8 – Unspecified facilities at Highmount	39,000	1,074,450	14.5	78.2
Year 9 – Unspecified facilities at Highmount	41,900	1,116,350	15.1	81.3

Notes:
Electric use estimate based on lodging electricity consumption factor of 13.5 kWh/ ft^2 (Table C14, Commercial Building Energy Consumption Survey 2006).
Natural gas use based on climate zone 2 lodging natural gas consumption factor of 72.8 ft^3/ft^2 (Table C30, Commercial Building Energy Consumption Survey 2006).

Key:
ft^2 = Square feet.
ft^3 Cubic feet.
kWh = Kilowatts per hour.

From these energy estimates, approximate GHG emissions from operations are determined by applying appropriate emission factors. Emission factors for natural gas reflect use of pipeline-quality natural gas; emission factors for indirect GHG emissions due to electricity use are based on DOE eGRID factors for upstate New York. Table 2-3 shows the GHG emission estimate based on the natural gas consumption estimates in Table 2-2.

Table 2-3 Estimate of Greenhouse Gas Emissions from Building Natural Gas Consumption

Year	Emissions (metric tons)			
	CO_2	CH_4	N_2O	CO_2e
2013	2,821	266	5	10,058
2014	3,076	290	6	10,967
2015	3,407	321	6	12,147
2016	3,662	345	7	13,056
2017	3,971	375	7	14,158
2018	4,042	381	8	14,410
2019	4,243	400	8	15,125
2020 and each year after	4,411	416	8	15,725

Notes:
Emissions from natural gas combustion based on The Climate Registry (2008) General Reporting Protocol for pipeline natural gas (Updated January 14, 2011).

Key:
CH_4 = Methane.
CO_2 = Carbon dioxide.
CO_2e = Carbon dioxide equivalent.
N_2O = Nitrous oxide.

2.3.2 Indirect GHG Emissions

Indirect GHG emissions are emissions that are not from Belleayre Resort-owned or leased equipment but that are associated with Belleayre Resort activity. For this analysis, emissions associated with electricity consumption, employee commuting, and GHGs generated from Belleayre Resort municipal solid waste landfilled off-site have been estimated. Other typical indirect emissions such as those associated with visitor travel to and from the Belleayre Resort were not included in the quantitative analysis because of the lack of sufficient input data or reliable methods to estimate this information based on other generic data. Location demographics of Belleayre Resort visitors, visitor stay durations, etc. are not known at this stage in the project planning, so it is not possible to predict visitor travel time to and from the resort.

2.3.2.1 Resort Employee Commuting

Employment estimates for the Belleayre Resort total 541 full-time and 230 part-time employees. A workforce study area was delineated as within an approximately 45-minute drive of the project site. For full-time positions, Crossroads Ventures, LLC estimates that approximately 80% (433) of the 541 full-time positions would be filled by workers commuting from within the workforce study

area, and 20% (108) positions would be filled by workers from outside the workforce study area. Crossroads Ventures, LLC also estimates that 10% of each category of full-time workers would use public transport or carpool (43 workers within the workforce study area, 11 workers outside the study area). For part-time positions, Crossroads Ventures estimates that all workers would originate within the workforce study area. Approximately 10% of the part-time workers (23 workers) would use public transport or carpool. Table 2-4 summarizes the data and estimated annual vehicle miles traveled for employees driving to work at the Belleayre Resort.

Table 2-4 Estimated Distribution of Resort Employee Location and Travel Distance

County Subdivision	Estimated One-Way Travel Time (min)	Estimated Number of Belleayre Resort Workers Who Live in Each Town		Estimated Annual Vehicle Miles Traveled (VMT)
		Full Time	Part Time	
Andes	30	16	9	271,440
Bovina	40	4	2	87,360
Halcott	17	4	2	37,128
Hardenburgh	13	4	2	28,392
Hunter	47	20	11	527,904
Hurley	59	36	19	1,178,112
Lexington	28	8	4	122,304
Middletown	12	106	56	705,744
Olive	40	39	21	870,480
Shandaken	10	110	58	609,960
Woodstock	47	43	23	1,125,462
Outside of county	75	97	0	2,837,250
Total		**487**	**207**	8,401,536

Sources: ESRI Market Profile Reports; Google Maps; AKRF, Inc., Crossroads Ventures, LLC.

Assumptions:

(1) Average commute speed is 45 mph.
(2) Full-time workers work 5 days per week, part-time workers work 3.5 days per week, 52 weeks per year.
(3) 43 full-time and 23 part-time workers residing in the county would take public transport/carpool – no emissions attributed to these worker commutes.
(4) 11 full-time workers residing outside the county would take public transport/carpool – no emissions attributed to these worker commute.

It is assumed that the majority of these workers will work at the main hotels and clubhouse; thus GHG emissions from employee commuting are assumed to begin in 2013 when these main facilities are open. An average travel speed of 45 miles per hour was assumed in computing the total vehicle miles traveled from travel time and the number of employees; part-time employees are assumed to work 3.5 days per week, which results in four round trips per week to work. Emission factors for gasoline-powered automobiles and light duty trucks (SUVs and pick-up trucks) were used. GHG emissions from employee commuting are estimated at 3,713 metric tons per year of CO_2e.

2.3.2.2 Solid Waste Generation

Crossroads Ventures, LLC has estimated that Belleayre Resort's annual solid waste generation will be 1,145 tons per year once full build-out is achieved (after year 2020). During the years prior to full build-out, the quantity of waste generated by operations will ramp up proportional to square feet in operation. The waste generated is assumed to be typical municipal solid waste (MSW); the quantity of waste that will be recycled is not known at this time. Off-site GHG emissions (primarily methane emissions) would occur from the MSW collected at the resort and disposed of in an off-site landfill. The EPA Waste Reduction Model (WARM) Version 11 was used to estimate the life cycle (approximately 30 years) of off-site methane and truck transport GHG emissions associated with the annual waste generation rate. For each year of MSW generation after full build-out, the GHG emissions over an approximately 30-year life cycle period would be 1,322 metric tons of CO_2e, or an average of 44 metric tons of CO_2e per year over 30 years for one year of waste generation.

The major use of electricity at the Belleayre Resort would include building equipment, lighting, and other equipment typically associated with lodgings. Electricity consumption, as noted previously, was approximated using building square footage and generic lodging electricity consumption rates (see Table 2-2). Indirect emissions from electricity consumption were quantified using utility-specific emission factors and following NYSDEC guidance (2009). The indirect GHG emissions associated with estimated electricity consumption is shown in Table 2-5.

Table 2-5 Estimate of Indirect Greenhouse Gas Emissions from Estimated Electricity Use

Year	Emissions (metric tons)			
	CO_2	CH_4	N_2O	CO_2e
2013	3,553	0.10	0.05	3,570
2014	3,886	0.11	0.05	3,905
2015	4,293	0.13	0.06	4,314
2016	4,626	0.14	0.06	4,648
2017	5,033	0.15	0.07	5,057
2018	5,181	0.15	0.07	5,206
2019	5,366	0.16	0.07	5,392
2020 and each year after	5,588	0.16	0.07	5,615

Notes:
Emissions from natural gas combustion based on eGRID emission factors for upstate New York (2004).

Key:
CH_4 = Methane.
CO_2 = Carbon dioxide.
CO_2e = Carbon dioxide equivalent.
N_2O = Nitrous oxide.

Motor vehicle GHG emissions would result from visitors traveling to and from the Belleayre Resort primarily by personal vehicles. While at the resort, visitor vehicles would generally remained parked. Shuttle buses would be used to trans-

port visitors to the Wilderness Activities Center, to BMSC, and to other facilities. The total number of annual visitor trips and an annual vehicle miles traveled estimate for the resort has not been developed. As noted above, at this stage in the project planning it is not possible to predict visitor travel time to and from the resort due to unknown location demographics of resort visitors, visitor stay durations, etc. Therefore, GHG emissions specific to the resort have not been determined. A traffic study conducted to examine impacts at local intersections for microscale air quality impact assessment purposes stated that approximately 60% of the trips generated by the resort during the winter peak travel period would be shared trips between the resort and BMSC. There would be some overlap in visitor vehicle trips to the BMSC and Belleayre Resort during the winter months. Thus, some of the GHG emissions associated with resort visitor travel are captured in the BMSC UMP DEIS.

In 2011 and 2012, construction would take place only at the Belleayre Resort. This would be followed by concurrent construction and operation of facilities in years 2013 to 2021. The potential cumulative effect in this time frame of emissions of GHG is shown in Table 2-6.

Table 2-6 Summary of Belleayre Resort Direct and Indirect GHG Emissions

Year	Emission (metric tons per year)			
	CO_2	CH_4	N_2O	CO_2e
2011 (Construction)	6705	1.6	0.2	6706
2012 (Construction)	3828	3.8	0.2	3832
2013 (Construction and Operation)	11,793	268	5	19,049
2014 (Construction and Operation)	12,058	292	6	1,9970
2015 (Construction and Operation)	12,754	324	7	21,516
2016 (Construction and Operation)	13,303	348	7	22,721
2017 (Construction and Operation)	13,892	377	8	24,105
2018 (Construction and Operation)	13,552	382	8	23,946
2019 (Construction and Operation)	13,822	401	8	24,230
2020 (Construction and Operation)	14,030	417	8	25,372
2021 and beyond (Operation) (see note 1)	13,712	416	8	25,053

Note:
(1) In 2021 and beyond, operation of the fully built resort results in an off-site emission of GHGs from landfilled waste. Prior to this period, a smaller quantity of waste and GHG emissions will be produced as floor space is slowly added over time. Because of the non-linear nature of when these emissions will be emitted, they are not included here.

Key:
CH_4 = Methane.
CO_2 = Carbon dioxide.
CO_2e = Carbon dioxide equivalent.
N_2O = Nitrous oxide.

2.3.3.3 Summary of Potential Emissions

Table 2-6 summarizes potential GHG emissions for the Belleayre Resort. Per NYSDEC's policy on assessing GHG emissions, the table presents total projected GHG emissions as the sum of emissions from direct stationary sources, direct mobile sources, indirect stationary sources, indirect mobile sources, and waste generation. These five source categories represent all significant GHG sources associated with the project.

3 GHG Emissions for Project Alternatives

3.1 Belleayre Modified Resort Alternative

The current conceptual plan for the Modified Resort has been scaled down in size and extent from the initial proposal in 2004.

- The 2004 DEIS project generated 308 vehicle trips during the peak Saturday hour as compared with 168 trips for the current project.
- The size of the project, in terms of its total size as well as the area to be developed, has been reduced by approximately 60%.
- The size of the project, in terms of its number of lodging structures, has been reduced by over 50%.
- The size of the project, in terms of its total number of lodging units, has been reduced by 143 units (19%).
- The size of the project in terms of its single-family home subdivision has been reduced by 100%.
- The length of proposed roads and the total amount of proposed impervious surfaces have both been reduced by approximately 70%.
- Nearly 1, 200 acres of land are now proposed to become New York State Forest Preserve lands.
- 203 acres of land have been placed in a Conservation Easement to the City of New York.
- Two previously proposed private wastewater treatment plants have been eliminated, and treatment is now consolidated at New York City's Department of Environmental Protection Pine Hill treatment plant.
- One golf course has been eliminated and the remaining golf course will be managed in accordance with an Organic Golf Course Management Plan.

- The Wildacres Resort, Highmount Spa Resort, and the detached lodging units will be designed and constructed with green building design elements as set forth by the United States Green Buildings Council. Crossroads Ventures, LLC is committed to obtaining a LEED Silver or higher rating for the Wildacres Hotel, Highmount Hotel, and Highmount Lodge building.

- The design of the storm water facilities at the Wildacres Resort maximizes the use of storm water runoff for irrigation of the golf course.

Project-related direct GHG emissions occur primarily from natural gas combustion in building and facility heating equipment. Compared with the original project design, the modified design reduces the original GHG potential emissions by approximately 50%, based on an overall reduction in the project footprint of about 50%. Based on the assumption that indirect GHG emissions from electric generation are proportional to electricity used by the resort, and with an approximate 50% reduction in building floor area, indirect GHG emissions for the modified project would be approximately 50% of the original project design. Employee commute and solid waste-related GHG potential emissions are also proportional to project size. The smaller facility proposed under the modified project design would require fewer workers and would generate less waste than the original project design, and thus proportionally less potential indirect GHG emissions would be produced.

3.2 Relocation of the Upper Highmount Development Alternative

This alternative shows the Highmount Spa Resort project without the upper 19 detached lodging units or the 5 detached lodging units along the upper access road, and without the access road beyond the hotel and lodge building itself. Under this plan the proposed lift line from the Highmount Spa Hotel would be extended up to the top of the former Highmount Ski Area; a warming hut near the top of the lift also is proposed.

Under this alternative the preference for relocating the 24 detached units removed from the upper part of Highmount would be to add a third floor to the detached lodging unit buildings at Wildacres. The new third-floor units would encompass and be within the footprint of the detached lodging buildings. Parking for all units in the buildings, including these upper floor units, would be provided under the buildings, and elevators would be added to connect the underground parking and the third floor units. The alternative master plan shows how driveways and surface parking for the lower-level detached units have been rearranged to accommodate the underground parking for the third-floor units. The detached units in the Front-9 Village also have been reconfigured slightly, providing a slightly tighter cluster in this area.

Under this alternative the following would occur:

- Elimination of 5,580 feet (1.1 miles) of roadway, the majority of which is located on slopes >20%.
- Reduction of approximately 6 acres of impervious surfaces from roads, buildings and driveways.
- Reduction in the number of detached unit buildings by 24.
- Reduction of approximately 17 acres of site disturbance.

This alternative would not result in a substantial change in potential direct and indirect GHG emissions compared with the modified project design. This alternative changes the type of lodging for some of the floor space to be built and relocates it elsewhere within the resort. This would not significantly change the quantity of GHG emissions produced during operation of the facility from natural gas use, electricity use, employee commuting or solid waste generation. GHG emissions from construction may be reduced slightly due to the reduction in site disturbance (17 acres).

Another alternative to the proposed Belleayre Resort is the No Action alternative. Under the No Action alternative, the GHG emissions shown in Table 2-6 would not occur. Table 3-1 summarizes the effect of the No Action alternative on GHG emissions.

Table 3-1 GHG Emissions for Alternatives Compared with the Preferred Alternative

Alternative	Characteristics of Alternative Affecting GHG Emissions	GHG Emissions Change Compared with Preferred Alternative
No Action	■ Less on-site lodging and fewer amenities ■ No construction activities	■ No additional direct emissions ■ Minor impact on indirect emissions ■ No construction GHG emissions
Relocate the Upper Highmount Development	■ Slight reduction in project footprint ■ Small reduction in on-site roads ■ Small reduction in detached lodging units	■ No significant change in GHG emissions compared with the preferred alternative.

4 Potential Mitigation Measures

Both alternatives would incorporate the following mitigation measures outlined in NYSDEC's *Policy on Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements.*

1. Design an energy-efficient building envelope to reduce heating/cooling requirements
2. Install high-efficiency HVAC systems
3. Construct green roofs
4. Eliminate or reduce use of refrigerants in HVAC systems
5. Use high-albedo roofing materials
6. Maximize interior day lighting
7. Reduce energy demand using peak-shaving or load-shifting strategies
8. Incorporate super insulation to minimize heat loss
9. Incorporate motion sensors and lighting and climate control
10. Use efficient, direct exterior lighting
11. Use water-saving fixtures that exceed building code requirements
12. Re-use grey water and/or collect and re-use rainwater
13. Provide for storage and collection of recyclables in building design
14. Re-use building materials and products
15. Use building materials with recycled content
16. Use building materials that are extracted and/or manufactured within the region

17. Use rapidly renewable building materials

18. Use wood that is locally produced and/or certified in accordance with the Sustainable Forest Initiative or the Forestry Stewardship Council's Principles and Criteria

19. Track energy performance of buildings and develop strategy to maintain efficiency

20. Use energy-efficient boilers, heaters, furnaces, incinerators or generators

21. Minimize energy use through building orientation

22. Provide permanent protection for open space on the project site

23. Conserve and restore natural areas on site

24. Minimize building footprints

25. Design water efficient landscaping

26. Locate new buildings in or near areas designated for transit-oriented development

27. Incorporate transit-oriented development principles in employee and customer activity patterns

28. Purchase alternative fuel and/or fuel-efficient vehicles for fleet

29. Incorporate idling reduction policies

30. Provide new transit service or support extension/expansion of existing transit (buses, trains, shuttles, water transportation)[1]

31. Develop or support multi-use paths to and through site

32. Size parking to meet but not exceed local parking requirements

33. Develop a parking management program

34. Provide on-site amenities such as food service

35. Provide bicycle storage and showers/changing rooms

[1] For on-site transportation mitigation, shuttle buses would be used to reduce trips from the Resort. In winter, shuttle buses would operate between the resort and BMSC to transport skiers between the two facilities. Year-round shuttles would be provided between the Resort areas and the Wilderness Activity Center.

36. Improve roadways to improve traffic flow

37. Use traffic signals and coordination to improve traffic flow and support pedestrian and bicycle safety.

Incorporating these green building principles into the Belleayre Resort construction with the goal of achieving a LEED Silver designation would result in a number of important mitigation measures to lower energy consumption and reduce the GHG emissions estimated in this analysis.

The impact of the proposed project on the ability of the site to sequester carbon would be mitigated, if feasible. Clearing forested areas would be kept to the minimum required for a successful project. In so doing, trees and other woody plants remaining on-site would continue to provide carbon sequestration. In addition, as part of landscaping around the resort areas, replacement trees would be planted wherever feasible.

5 References

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