Part C

Cumulative Impact Analysis

for:

Belleayre Mountain Ski Center UMP-FEIS

and

Modified Belleayre Resort at Catskill Park FEIS

This is a combined action for:

Belleayre Mountain Ski Center
UMP-FEIS
Located in the Town of
Shandaken, Ulster Co., NY

Modified Belleayre Resort at
Catskill Park FEIS
Located in the Towns of
Shandaken and Middletown ,
Ulster and Delaware Co., NY

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<u>Summary of Changes to Part C</u>

1. Added this section to document substantial changes to the "Part C - Cumulative Impact Analysis for: Belleayre Mountain Ski Center UMP-DEIS and Modified Belleayre Resort at Catskill Park Supplemental DEIS" document to form the "Part C Cumulative Impact Analysis for: Belleayre Mountain Ski Center UMP-FEIS and Modified Belleayre Resort at Catskill Park FEIS".

<u>Introduction/Executive Summary</u>

1. Updated what was originally the Introduction section to become the Executive Summary section, incorporating information from the other Part C sections in order to summarize the findings of the Part C document.

<u>Section 1.1</u>

1. Include substantive changes made to section 1.1 Stormwater Management.

<u>Section 1.2</u>

2. Updated 1.2.2.12 regarding 180,000 gallon equalization tank.

<u>Section 1.3</u>

1. Updated Figure 1.3-1 to include streams.

<u>Appendix C – Cumulative Map</u>

1. Inserted new Appendix C - Cumulative Map: Belleayre Mountain Ski Center – Full Build Out Plan and Modified Belleayre Resort at Catskill Park, to show the relationship of the two projects.

<u>Appendix D – Part C Cumulative Response to Public Comment</u>

1. Inserted new Appendix D

1.0 ~~Introduction~~ Executive Summary

This section of the ~~document~~ **FEIS**, "PART C - CUMULATIVE IMPACT ANALYSIS For: BELLEAYRE MOUNTAIN SKI CENTER UMP-~~DEIS~~ **FEIS** and MODIFIED BELLEAYRE RESORT AT CATSKILL PARK ~~SDEIS~~**FEIS**", analyzes the potential combined environmental impacts of these two projects.

As for the Ski Center, the Department of Environmental Conservation (Department), in consultation and with the assistance of the Olympic Regional Development Authority (ORDA) has prepared a ~~Draft~~ **Final** Environmental Impact Statement/Unit Management Plan (UMP-~~DEIS~~**FEIS**) relating to the proposed projects and actions set forth in the draft revision to the UMP which is set forth in Part A of this Document (See footer: "Part A: **Belleayre Mountain** Ski Center UMP-~~DEIS~~**FEIS**").

The Belleayre Resort is as an alternative to the originally proposed project set forth in the Draft Environmental Impact Statement which was accepted as complete in December 2003 (Crossroads' ~~DEIS~~**FEIS**). Crossroads Ventures LLC (Crossroads), the sponsor of the Belleayre Resort proposal, has prepared a ~~Supplemental Draft~~**Final** Environmental Impact Statement (~~Supplemental D~~**F**EIS) relating to ~~the~~ **a modified** Belleayre Resort proposal. The **Modified** Belleayre Resort **at Catskill Park** ~~Supplemental DEIS~~**FEIS** with respect to the **modified** Belleayre Resort proposal is set forth in Part B of this document. (See footer: "Part B: Belleayre Resort at Catskill Park ~~Supplemental DEIS~~**FEIS**").

The two proposed projects include the following components:

•*The modified Belleayre Resort project consists of two resort complexes, both located west of the Ski Center along Ulster County Route 49A and south of NYS Route 28. The first resort, Wildacres, will include a hotel building with 250 units and ancillary hotel uses plus 163 lodging units in multi-unit buildings detached from the hotel and an 18-hole golf course. The second resort, the Highmount Spa, consists of a 120 unit hotel with spa facilities and 53 fractional ownership units; a multi-level lodge building with 27 fractional ownership units and 16 detached lodging units in 8 buildings.*

• *The expansion of the Ski Center is proposed as part of the revision to the Unit Management Plan, as required by The Catskill Park State Land Master Plan. The Department is proposing to expand the Ski Center, consistent with state constitutional limitations on the total miles of ski trail that can be developed at the Ski Center. In the core area, trail, lift and lodge improvements are being proposed. On the west, the Department proposes to acquire portions of the former Highmount Ski Center (90 acres+/-), and upon acquisition, classify this parcel as an addition to the*

Ski Center's Intensive Use Area, and develop new ski lifts and ski trails, with snowmaking capacity on the acquired parcel.

~~Potential cumulative impacts of the have been analyzed in the following areas and more fully discussed in each of the corresponding sections herein:~~

- ~~STORMWATER MANAGEMENT~~
- ~~WATER SUPPLY AND WASTEWATER~~
- ~~SURFACT WATER AND GROUNDWATER RESOURCES~~
- ~~AQUATIC RESOURCES~~
- ~~TERRESTRIAL WILDLIFE~~
- ~~TRANSPORTATION AND TRAFFIC~~
- ~~VISUAL~~
- ~~NOISE~~
- ~~SOCIOECONOMICS~~
- ~~COMMUNITY CHARACTER~~
- ~~AIR QUALITY~~
- ~~CLIMATE CHANGE~~
  ~~CULTURAL RESOURCES~~

Additionally, the ski center expansion reflects the proposed plan for the acquisition of the Highmount parcel from Crossroads. As described in the updated Section 2 "Proposed Land Acquisition & Boundary Adjustments to the Intensive Use Area", DEC proposes to acquire most of the property known as the former Highmount Ski Center (the "Highmount Parcel"). The current property owner, Crossroads, would retain title to a 150 foot wide strip of land running through the parcel, consisting of approximately 5.38 acres in order to construct a ski lift and warming hut (the "Spa Village Property"). Under this proposal, Crossroads would also retain easements across the Highmount Parcel for sewer and utilities and an access road. An updated map of the proposed acquisition has been included in the UMP-FEIS as Appendix A UMP Drawing G3.

If the Highmount Parcel is acquired by DEC, and if the Spa Village ski lift is built by Crossroads, the proposal envisions that ORDA and Crossroads will enter into an operating agreement such that ORDA will maintain and operate the ski lift and ski trails on the adjoining private Spa Village Property for Crossroads, and ORDA would receive compensation for these services. In order to do so, ORDA would need an amendment to their authorizing statute, Public Authorities Law Article 8, Title 28. Ski trails constructed on the Spa Village property by Crossroads would provide a connection between the Highmount parcel and the Spa Village Property. In addition, ski trails on the Highmount parcel would connect to the rest of BMSC. These trail connections would allow for public use of the Spa Village

ski lift and trails leading to the Highmount Spa, as well as ski-in ski-out access to BMSC for Highmount Spa guests. In addition, as part of the Modified Belleayre Resort at Catskill Park, Crossroads proposes to connect the Wildacres resort to the Belleayre West lift by installing a pedestrian crosswalk across County Route 49A. Finally, a new map has been added to PART C – Cumulative Impact Analysis For: Belleayre Mountain Ski Center UMP-FEIS and Modified Belleayre Resort at Catskill Park FEIS as Appendix C depicting these proposed connections between the Ski Center and the Modified Belleayre Resort at Catskill Park.

Cumulative impacts occur when multiple actions affect the same resource(s). These impacts can occur when the incremental or increased impacts of an action, or actions, are added to other past, present and reasonably foreseeable future actions. Cumulative impacts can result from a single action or from a number of individually minor but collectively significant actions taking place over a period of time. In the case at hand, potential cumulative impacts of the two projects that may affect the same resources have been analyzed in the sections of Part C that follow with regard to each of the potentially significant, adverse impacts that were assessed in this analysis:

Stormwater Management -The stormwater management system proposed for the Ski Center uses storage-based attenuation methods such as dry swales, diversion swales, biofilters, dry detention basins, and porous pavement to mitigate the potential impacts that may result from the increases in impervious areas. The majority of the drainage to the East Branch of the Delaware River watershed for the project would consist of the sub-catchments associated with the Modified Belleayre Resort at Catskills Park. The results from the post-construction volume estimates for the Modified Belleayre Resort at Catskill Park that contributes to the East Branch of the Delaware River watershed indicate that peak flow rates are not expected to increase at the majority of the stormwater discharge locations. Additionally, modeling results indicate that no cumulative impacts were observed for stormwater draining to the East Branch to the Delaware River. Part C concludes that the potential adverse impacts on surface water resources that may result from stormwater appear to be minor or short-term. Storm water management systems have been designed to mitigate and minimize any potential long-term impacts of runoff water quality and quantity, including potential thermal impacts.

Water Supply— A water-budget analysis was completed for the Belleayre Mountain Ski Center UMP-FEIS and the Modified Belleayre Resort at Catskill Park FEIS to determine potential quantitative changes in ground and surface water resources that may result from various features of the proposed projects. The potable water supply system for the Ski Center consists of a series of four main groundwater supply wells, and a fifth well

that is dedicated to supplying the Sunset Lodge. The well field will continue to be utilized for the post-development water supply. Although there is an anticipated increase in groundwater withdrawals, the current potable water supply system is capable of delivering the anticipated required demand without requiring additional wells to provide for the increased withdrawals from the aquifer. Surface water from Pine Hill Lake, the Upper Impoundment and Cathedral Glen Impoundment will be used for snowmaking at BMSC. In order to avoid having adverse impacts on stream habitats, withdrawals from the streams contributing to the reservoirs will only be allowed during flows in excess of the minimum stream flow.

For the Modified Belleayre Resort, new wells will be located outside of the Birch Creek drainage system, near the Village of Fleischmanns. Pumping and water quality tests demonstrated that these wells will provide sufficient potable water without adversely affecting the Village of Fleischmanns' water supply. Water that is planned to be used for irrigation at the Belleayre Resort will come from stormwater routed to a lined irrigation pond and water from three wells located on the Wildacres portion of the site. Tests performed on the three wells proposed for irrigation are capable of sustaining typical irrigation season water demands and not adversely affect existing groundwater supplies or surface waters. No surface waters will be impounded in order to provide irrigation water at the Modified Belleayre Resort.

The ongoing operation of the wells supplying the Ski Center as well as the tests conducted on the wells planned to supply the Modified Belleayre Resort development indicate that no cumulative, adverse impact can be expected from the developments to the groundwater resource.

Wastewater —All wastewater from the Ski Center currently is conveyed to, and treated at, the Pine Hill WWTP, except for the Sunset Lodge. The Sunset Lodge is presently served by an on-site septic tank and absorption bed system. However, the Department (now ORDA) proposed that the Sunset Lodge septic tank effluent would be connected to the wastewater collection system in the future and would become influent to the Pine Hill WWTP.

All wastewater generated within the various Modified Belleayre Resort buildings will be collected and transported to the Pine Hill WWTP, via a new connection to the existing Hamlet of Pine Hill sewer system. The Pine Hill WWTP has adequate excess design flow capacity to treat the future wastewater flows from both proposed projects on an average daily flow basis, which is lower that the design flow capacity.

Surface Water and Groundwater Resources — Cumulative Impacts will only be experienced within the East Branch of the Delaware River watershed. The Modified Belleayre Resort project is primarily located in this watershed.

There are five mapped streams and 19 wetlands/wetland segments. Thirteen wetlands are considered jurisdictional, and six did not have any apparent surface water connections to waters of the United States thus were determined not to be jurisdictional. The far northern portion of the Ski Center development is also located within the East Branch of the Delaware River. The Belleayre Mountain Ski Center UMP-FEIS identified six wetland areas and one stream within this area. Four of the wetlands are considered jurisdictional and two were determined to be non-jurisdictional.

After review of existing mapping and reports provided by each project the Department determined that cumulative impacts would occur though they would be temporary and mitigated. There is one intermittent unnamed stream that is a tributary to Emory Brook (Class B(TS)) mapped within both the Ski Center and the Modified Belleayre Resort areas. This stream is indicated as being within the "Highmount Brook Watershed" in the Modified Belleayre Resort at Catskill Park FEIS and indicated as originating in the slopes of the Highmount Ski Area in the Belleayre Mountain Ski Center UMP-FEIS. According to the Belleayre Mountain Ski Center UMP-FEIS this stream occurs within an area where trail clearing and two ski lifts are proposed. Potential impacts to this stream as well as to downstream resources may include siltation, increased turbidity, decreased levels of dissolved oxygen, increased warming, and increased drainage from ski slopes. Construction activities that may have an impact to wetlands and downstream within the East Branch of the Delaware River Watershed include trail clearing/non-mechanized tree and woody vegetation removal, installation of elevated bridges crossings for golf carts, subsurface directional drilling for water and sewer lines, and construction of the Highmount Ski Base.

However, during construction most stream and wetland disturbances would be minor and temporary. Erosion and sediment control measures would be implemented during construction to mitigate potential impacts on surface waters. Measures include detailed phasing and sequencing of construction, perimeter controls, structural controls, temporary and permanent stabilization of channel banks and slopes and installation of sediment basins. In addition, best management practices (BMPs) would be used to control runoff and avoid any potential impacts; and dry season scheduling of the work would help to minimize the potential impacts to these waterbodies.

Aquatic Resources — A total of nine stream crossings are proposed along various intermittent streams located within the combined project. Pedestrian, skier and golf cart passages will be required to span these waterbodies. Very little physical disturbance is proposed within the channel beds and banks of surface waters located on the site; all road crossings and ski trail crossings of streams would utilize elevated bridges, except for one stream crossing at an access road on the Wildacres development that would

require the replacement of an existing culvert with a large bottomless arch culvert. Any impacts that result from stream crossings are considered temporary. Both the Modified Belleayre Resort at Catskill Park FEIS and Belleayre Mountain Ski Center UMP-FEIS present best management practices (BMPs) in Soil and Erosion Control Plans that provide mitigation methods to help reduce the impacts of sedimentation that may otherwise result from construction adjacent to surface waters and habitats. Additionally, any disturbed stream bank, impoundment and wetland areas would be restored and planted with native vegetation.

Regarding wetlands, cumulative impacts resulting from construction of the project were estimated at approximately 2.271 acres for the delineated onsite wetlands, the majority of which are associated with disturbance of forest or vegetation cover caused by construction. However, 2.089 acres of these disturbances include activities such as tree clearing of wetlands for ski trails and golf course play over areas, as well as the minor impacts that would result from the installation of golf cart and pedestrian bridge installation, which would include hand clearing of vegetation. These temporary impacts are not regulated or require permitting as they do not involve dredging or filling in jurisdictional wetlands. The remaining 0.139 acres of regulated impacts would result from the removal and replacement of the ski lift base at the proposed Highmount Ski Area. As part of a mitigation plan, this wetland would be replanted with appropriate vegetation to restore the disturbed area and return it to its ecological function. A conceptual wetland mitigation plan for the Ski center has been outlined in the Belleayre Mountain Ski Center UMP-FEIS, and can be found in Appendix AA, Figure 4.3-2."

An additional long-term impact that may result from the construction and operation of the two projects is the possible increase in temperature of the streams resulting from a reduction in upland forest cover and stream cover in the wetland and stream locations identified as golf course play-over areas. To mitigate potential impacts from thermal loading to the aquatic habitats, any vegetation that is proposed to be disturbed in proximity to the intermittent streams would be replaced with plantings to provide shading of the stream/wetland, while allowing a golf shot to be played over this area. This will be accomplished by placing appropriately sized coir logs along the existing stream banks and planting the coir logs with willow cuttings. Additionally, regular hand cutting maintenance of the vertical growth of the willow sprigs will allow for the development of a more horizontal willow canopy over the stream or wetland. Another mitigation measure for thermal loading is designed into the stormwater management systems for both projects. The proximity of the proposed Ski Center development to trout streams and the potential for thermal impacts on these habitats were considerations in the design of stormwater runoff control.

The Department does not expect that the proposed construction would have any significant impacts on flow, temperature, or macroinvertebrate distribution; however if any impacts are detected during or after construction additional mitigation and restoration will be evaluated.

Terrestrial Wildlife —The cumulative impacts of construction of both projects would result in the clearing of 334.2 acres. This represents 12% of the 2,677.9 acres of the combined projects. Cumulative impacts would result if the magnitude or duration of the combined impacts would result in a significant loss in habitat, forest fragmentation, or disruption of movement patterns of populations of wildlife, including large, mobile wildlife such as bear and deer, less mobile populations such as snakes, breeding bird and bat populations. Each project evaluated the potential for forest fragmentation and concluded that because the project is at the edge of the forest now, it would not add new forest edges, but instead move the edge deeper into the forest. Breeding bird and bat populations are not expected to be affected significantly by construction of the project.

The potential impacts to terrestrial forest ecology during operations were evaluated for both projects. The largest adverse impacts of the projects would occur from the land clearing. Long term impacts to wildlife would be reduced, as local populations would quickly adapt to the new habitat boundaries. Both projects concluded that there would be some adverse impacts from the lost habitats to terrestrial mammals, amphibians, snakes, and birds. These potential adverse impacts would be partially offset by the replacement of the forests with open ski slopes, which provide forage and habitat for birds that prefer the ecological gradient (ecotone) between forests and fields, and the feeding habitat provided by open grasslands for predatory birds. No rare, threatened, or endangered species would be impacted by either project or by the cumulative impacts of both projects

Another type of potential impact resulting from the combined projects would be a significant increase in populations of nuisance or invasive species. However, the Invasive Species Plan for the Modified Belleayre Resort at Catskill Park is intended to assure that the Wildacres Golf Course, and other cleared areas, use best practices to avoid the use of herbicides and prevent the growth of invasive plant species.

Both projects are proposing design elements that avoid and minimize impacts to wildlife. To the extent that is feasible, the proposed new buildings of the Modified Belleayre Resort would be clustered in small areas. Clustering minimizes forest fragmentation and reduces disturbances from roads and utilities. The proposed LEED certification of buildings at both projects would support unobtrusive designs and landscaping only with native vegetation. Maintenance of buffers around streams at the Ski Center, and extensive utilization of BMPs would mitigate impacts to wildlife. As part of

the Belleayre Mountain Ski Center UMP-FEIS, redevelopment of existing trails at Highmount minimizes the impacts to wildlife.

Transportation and Traffic — The Department evaluated cumulative operational impacts on traffic and transportation. The analysis of the cumulative development indicates that the Level of Service (LOS) for traffic entering or crossing NY Route 28 from the intersecting side streets will generally be LOS E or LOS F during the worst-case condition of a peak attendance day at the Ski Center. The LOS F designation is based on the delay experienced per vehicle on the stop-controlled approach. However, some of these intersections still operate with acceptable volume to capacity ratios, indicating that there is reserve capacity (i.e. the hourly volume is less than the hourly service rate). Additionally, these operations reflect the peak season conditions during the peak hour of the day, which is not a reasonable design condition. Delay during offseason and off-peak times of the day would be much less.

Various mitigation measures are proposed, which, among others, includes the construction of a right-turn lane on the northbound CR 49A approach, a left-turn lane on the westbound NY Route 28 approach and the installation of a traffic signal. Other mitigations are assumed in the design of the projects (shuttle service between the resort and the ski area). Other potential mitigation is recommended in the body of this analysis.

Visual —To assess the significance of the cumulative aesthetic impact of the proposed projects, all the research, field studies, maps, figures, and simulations of both visual impact assessments (VIA) and those combined for the cumulative analysis were reviewed. The zone of visibility influence (ZVI) modeling and maps indicate that changes resulting from the expanded Ski Center and new elements of the Modified Belleayre Resort will be blocked from view by topography and vegetation from most locations in the region. As demonstrated in the simulations and line-of-sight profiles, distance, angle, and seasonal changes in vegetation will often prevent the viewers from recognizing built structures from the locations where visibility is possible.

The Modified Belleayre Resort at Catskill Park FEIS VIA determined that the project would not introduce a significant change in the visible landscape, relying on two main factors as follows: the context of the existing views and the mitigation measures integrated into the project design that are intended to reduce the potential for visual impacts. The new ski slopes, like the existing ones, will be highly visible from some locations in the winter months because the white groomed snow provides a high contrast with the forested areas of the mountain. Since the Ski Center currently includes existing ski slopes and the new slopes are of similar length and width, the new expansion is compatible with the existing site. Part C concludes that the combined visual impacts of the two projects will not have a significant effect on the

region's scenic and aesthetic resources, in view of proposed mitigation and project design.

Noise —To evaluate the potential cumulative noise impact resulting from the Belleayre Mountain Ski Center and the Modified Belleayre Resort at Catskill Park, the predicted noise levels, as estimated from modeling conducted for the Belleayre Mountain Ski Center UMP-FEIS and the Modified Belleayre Resort at Catskill Park FEIS, were added. Potential impacts were for the construction and operation of each project at the nearest noise receptor locations. In addition, the combined noise levels were compared with the measured existing noise levels in the area to determine the potential increase in noise above the existing noise level.

Combining the sound levels for the construction of the resort and the ski center projects with mitigation measures employed would result in an increase in the sound level at the receptors ranging from no increase to a 15 decibel increase over the existing sound level. However, mitigation measures planned for these construction projects would reduce the noise levels that may be experienced at the nearest receptors. Part C concludes that the cumulative noise impact of constructing both projects would not be significant.

To assess the potential cumulative noise impact resulting from the operation of the Ski Center and the Modified Belleayre Resort at Catskill Park, the operating noise levels projected by the environmental impact study for each project were combined for the nearest representative receptor locations. Modeling indicates there would be an increase over the ambient noise level at each of the receptor locations as a result of the expanded Ski Center and the Modified Belleayre Resort project operating at the same time. However, by employing mitigation measures such as restricting the snowmaking operations to certain times, and using lower noise HVAC units with shielding, it is expected that the cumulative noise levels due to the operation of both projects would result in a noise increase of less than 5 dBA at all of the receptors with the exception of receptor W-11, the closest receptor on Route 49A to Route 28, which is impacted by the increase in project traffic.

Part C concludes that the worst case cumulative noise resulting from both projects would only include additional traffic noise associated with the resort operation — approaching a 6 dBa increase during daytime in the wintertime.

Socioeconomics — The cumulative socioeconomic impacts of the construction and operation of the expanded Ski Center and the Modified Belleayre Resort would have a positive socioeconomic impact on the local (e.g. the Towns of Middletown, Shandaken, and Olive) and regional economies (e.g. Delaware, Ulster, and Greene Counties).

During construction, the regional output, employee earnings, and total employment would experience substantial increases as a result of construction of these two projects. The increase in construction spending would directly impact the regional and state economy by increasing employment and earnings in the construction industry. Likewise, the operation of the expanded Ski Center and the Modified Belleayre Resort projects would have a long-term positive impact on the local and regional economies. Local employment opportunities, employee earnings, and local expenditures would increase as a result of both projects. Cumulatively, the expansion of the Ski Center and the Modified Belleayre Resort projects are expected to directly inject a total of approximately $29.1 million into the regional economy each year through payroll and wage and salary payments.

The proposed expansion of the Ski Center and the Modified Belleayre Resort projects are not expected to have a significant impact on the population or demographic characteristics of Delaware, Ulster, or Greene counties. The projects are expected to have a positive impact on local sales tax, property tax, and hotel occupancy tax receipts.

The cumulative impacts on socioeconomic conditions of the proposed expansion of the Ski Center and the Modified Belleayre Resort project would be positive (not adversely negative) due to the projected increases in tax revenues, job creation, and economic activity.

Community Character — The community character and land use study area for each project comprises the two project sites and the communities along the Route 28 corridor between Boiceville and Margaretville. While there would be some short-term adverse impacts from construction and operation of the Ski Center and the Modified Belleayre Resort, they are not expected to result in significant adverse cumulative impacts on community character. The Ski Center expands an existing use that dates back to the 1940s, in an area whose economy is centered on tourism and recreation. The same is true for Modified Belleayre Resort, which would create a destination resort in a region that was historically home to such resorts. Part C concludes that the proposed expansion of the Ski Center is consistent with existing on-site uses; and the Modified Belleayre Resort project would re-introduce resort development uses into an area that historically supported this type of development. Nonetheless, it appears consistent with the comprehensive plans and zoning of the two towns that would be home to the resort. This, however, would be a finding that the effected towns will be called upon to make in evaluating the Crossroads project with respect to their zoning requirements and comprehensive plans.

Air Quality — The improvements proposed in the Belleayre Moutain Ski Center UMP-FEIS and the proposed Modified Belleayre Resort at Catskills Park FEIS were evaluated for their potential cumulative impacts on air

quality sources of greenhouse gases (GHG). In addition, a cumulative assessment for construction air pollutant emissions was conducted, based on a worst-case scenario—peak construction year emissions for each project with the assumption they occur during the same year.

Construction emissions would be temporary and emission sources would be distributed throughout the project areas because they are primarily mobile. Construction emissions would cease when construction is completed. The minor cumulative impacts on air quality would cease upon completion of construction. The dispersed nature and short-term impacts would not represent a significant cumulative adverse impact.

Operation of the two facilities is expected to ultimately produce only small cumulative air quality impacts. Several features of both projects are designed to reduce air pollutant emissions, including new snowmaking equipment that uses electric motors to turn fans instead of diesel compressors and pumps; green building design at the Ski Center and Modified Belleayre Resort; minimizing vehicle traffic between the Modified Belleayre Resort and the Ski Center through use of shuttle buses or ski-in/ski-out options.

In conclusion, the potential cumulative impacts on air quality and greenhouse gases are expected to be minor and the projects have incorporated reasonable mitigation measures.

Climate Change- The improvements proposed in the Belleayre Mountain Ski Center UMP-FEIS and the proposed Modified Belleayre Resort were evaluated for their potential cumulative impacts on greenhouse gas (GHG) emissions and climate change (one of the first large scale projects known to have done so in New York). The effect of climate change on the combined projects was also evaluated.

Assuming the projects are built in the next 10 to 20 years, climate change impacts, are expected to be minimal, especially if the Northeast U.S. experiences a slowed warming rate or pause in warming over the next 10 to 30 years as suggested by some researchers. It is anticipated that the effects from climate change over the next 10 years on both projects would be small and that local soil and water conditions, which could impact operation of construction equipment, would not change significantly from current conditions.

The potential for the combined projects to have a contribution toward accelerating global climate change was also considered. The US EPA considers 25,000 tons per year of carbon dioxide equivalent (Co2e), to be a threshold below which project impacts on global climate are *de minimus* and not reportable. This threshold would not be reached except for a few years during the worst case projections of construction and operations at both

project sites overlapping with the extended use of diesel compressors. The proposed mitigation measures would lower emissions below the reportable threshold.

Cultural Resources — Separate cultural resources analyses were conducted for the Belleayre Mountain Ski Center UMP-FEIS and the Modified Belleayre Resort at Catskill Park FEIS. These analyses considered prehistoric archaeological resources, historic archaeological resources, historic structures and changes to the viewshed that could impact the setting of historic resources. Based on information provided in the survey report, the New York State Office of Parks, Recreation and Historic Preservation and NYS DEC has determined that the proposed activity will have no impact on registered or eligible archeological sites or historic structures, consequently construction and operation of the Belleayre Ski Center and the Modified Belleayre Resort are not expected to result in adverse cumulative impacts on cultural resources.

1.1 Stormwater Management

1.1.1 Introduction

Potential impacts that may result from storm water runoff within the Project area were described in Section 4.3 of the Belleayre Mountain Ski Center (BMSC) UMP DEIS [NYSDEC 2011] and Section 3.1 of the Modified Belleayre Resort at Catskills Park SDEIS [LA Group August 2012]. Additionally, individual Stormwater Pollution Prevention Plans (SWPPPs) were prepared to detail the stormwater management designs that have been proposed to mitigate the potential impacts to stormwater quantity and quality that may result from the construction and operation of the Project. Both the Middle Hudson and East Branch of the Delaware River watersheds receive drainage from the Project, with the Modified Belleayre Resort at Catskill Park draining primarily toward the East Branch of the Delaware River and the BMSC drainage split between the Middle Hudson and East Branch Delaware River watersheds (Figure 1-1). Cumulative impacts from stormwater contributing to each of the watersheds are discussed below; cumulative impacts to on-site and off-site surface waters are detailed in Section 1.3, Surface Water Resources.

As described in Section 1, the Modified Belleayre Resort at Catskills Park consists of two development areas: Wildacres Resort (Wildacres) and Highmount Spa Resort (Highmount). Wildacres development includes construction of a 250-unit hotel, detached lodging units, additional parking, installation of a 18-hole golf course and associated clubhouses and maintenance facilities. Highmount development includes a 120-unit hotel and spa, semi-detached lodging units, parking, a Wilderness Activity Center, and new ski lift and trails. A portion of the new ski lifts and trails within the proposed Modified Belleayre Resort at Catskills Park Highmount area connects to the existing and proposed BMSC Highmount trails. In addition to new trails, lifts and terminals at Highmount, the proposed BMSC development includes the construction of three new parking areas, access drives, a new snowmaking pond, new trails and lifts along Belleayre Mountain just east of Highmount trails, a new reception lodge and improvements to the existing Discovery Lodge. The proposed features of the Project are discussed in detail in Section 1.2 of the Modified Belleayre Resort at Catskill Park SDEIS and Section 3 of the BMSC UMP DEIS.

The combined project site is currently mostly undeveloped with land cover consisting of a combination of woodlands, grass covered ski trails, grassed lift areas and minor areas of impervious surfaces. The majority of runoff associated with the Modified Belleayre Resort at Catskill Park, including the Highmount development area south of Route 49A, is collected via three primary intermittent drainage courses located in the planned Wildacres development, all of which drain toward the East Branch of the Delaware River and ultimately the Pepacton Reservoir. Only a small area (approximately 19 acres) of drainage in the Wildacres development, which includes a small portion of the proposed golf course located along the southeastern portion of the Modified Belleayre Resort at Catskills Park, would be directed toward the Middle Hudson River watershed (LA Group August 2012). The BMSC site drains primarily toward the Middle Hudson watershed, with runoff from the proposed Highmount ski area directed to the East Branch of the Delaware River.

1.1.2 Construction

Construction of the Project is ~~expected to~~**could potentially** result in changes to the estimated existing runoff discharge volumes, peak flow rates and sediment loading to receiving waters due to site disturbance and/or land use/cover modifications (i.e., an increase in impervious surfaces such as parking lots, buildings, site clearing, etc. at both project sites) and potential increases in runoff during spring snowmelt due to the additional snowmaking required for the Highmount ski-trail development. Stormwater best management practices (BMP**'s**) and technologies have been proposed for implementation during the construction and operation of the project to mitigate potential impacts that may result from the construction features; **the** BMP**'s are** summarized below and described in detail in the Draft BMSC SWPPP (NYSDEC March 2011) and the Modified Belleayre resort at Catskill Park Stormwater Management Design Report (LA Group March 2012a) and associated Individual SWPPP (LA Group March 2012b).

Construction activities (i.e.buildings, roads, and land grading) for both the BMSC and the Crossroads Resort at Catskill Park projects will involve the disturbance of steep slopes. Since construction activities on steep slopes have the potential for increased erosion, the SWPPPs for both projects were developed to minimize construction related problems. For instance, both SWPPPs include provisions for project phasing, heightened inspections requirements and other measures/BMP**'**s to control erosion. The BMP~~S~~**'s** will be designed in accordance with the NYS Standards and Specifications for Erosion and Sediment Control referenced below (NYS**SSESC**~~SMDM 2010~~**2005**). The DEC will issue individual SPDES permits for the construction because both projects have triggered the steep slope provisions in the SPDES General Permit for Stormwater Discharges from Construction Activity. The individual SPDES permits for both projects will include provisions that require the implementation of the project SWPPP as reviewed and accepted by the Department.

System designs were based on the most current New York State Stormwater Management Design Manual (SMDM) requirements (NYSSMDM 2010) for all storm water management features of the Modified Belleayre Resort at Catskills Park site and for the Discovery Lodge improvements and associated parking area at the BMSC site. Because changes in regulations are expected **over the life of the UMP**, storm water management designs for all other BMSC UMP site features ~~would~~ **will** be updated before construction begins and ~~would~~ **will** be detailed at that time (NYDEC March 2011).

1.1.3 Storm Water Volume

The computer program HydroCAD was used to calculate existing and post-construction estimates of storm water discharges for both project sites, and the design calculations, assumptions, and results of estimated runoff volumes of these analyses were presented the individual SWPPPs prepared for the BMSC and Modified Belleayre Resort at Catskill Park. Hydrologic events evaluated for runoff volume estimates included the 1-year, 10-year, 25-year, and 100-year peak floods; the 1-year flood event was used to design the storm water management features, as required by the NYSSMDM.

Cumulative Impacts on the Middle Hudson River Watershed

Project construction to be conducted in the Middle Hudson River Watershed includes the BMSC proposed parking areas (Upper Discovery Parking, North Parking, East Parking), snowmaking pond area, new Tomahawk Reception Lodge and Skier Bridge Area and improvements to the Discovery Lodge located south of Route 49A. The sub-catchments for each of these construction areas were evaluated individually using HydroCAD modeling software to estimate pre- and post-construction hydrologic conditions. The stormwater runoff resulting from the drainages at the Upper Discovery Parking, North Parking and the Discovery Lodge all discharge to Crystal Spring Brook, while the sub-catchment area associated with the East Parking Lot drains through three culverts under Van Load Road to an adjacent wetland that parallels Route 28 and ultimately discharges to Birch Creek (NYSDEC March 2011; Schumaker April 2011).

Additionally, construction of a small portion of the golf course and detached lodging units proposed for the Modified Belleayre Resort at Catskill~~s~~ Park is also located within the Middle Hudson River; runoff from this 19-acre sub-catchment area is collected in a roadside ditch on the north side of County Rt. 49A and flows through a 24" culvert to eventually discharge to Crystal Spring Brook (LA Group March 2012a). The existing and proposed hydrology estimated from modeling for each of these sub-catchments is provided in Table 1.1-1 and the associated discharge points are shown on Figure 1.1-1. Modeling assumptions and outputs for each sub-catchment area are provided in the respective SWPPPs provided as appendices to Part A and Part B.

Table 1.1-1: Pre- to Post-Construction Hydrology Comparison for Middle Hudson River Watershed (NYSDEC March 2011; LA Group March 2012a; LA Group March 2012b; Schumaker April 2011)

Sub-catchment ID (Discharge Point)	Stormwater Management Design Events								Discharge Point
	1-year		10-year		25-year		100-year		
	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	
BMSC									
Upper Discovery Parking (DP 212)[1]									Crystal Springs Brook
PRE	~~--~~**101.27**	~~--~~**15.82**	301.44	--	345.84	--	479.65	--	
POST	~~--~~**92.0**	~~--~~**12.30**	272.61	--	316.05	--	472.61	--	
North Parking Lot (DP 291)[2]									Crystal Springs Brook
PRE	~~--~~**24.04**	--	71.47	--~~9.04~~	81.92	--	114.26	--	
POST	~~--~~**15.07**	--	30.18	--~~5.36~~	35.38	--	50.92	--	
East Parking Lot (DP 270)									Federal Wetland to Birch Creek
PRE	~~--~~**6.85**	--	19.64	--~~2.05~~	22.43	--	31.02	--	
POST	~~--~~**3.66**	--	11.02	--~~1.05~~	12.46	--	22.15	--	
East Parking Lot (DP 280)									Federal Wetland to Birch Creek
PRE	~~--~~**6.19**	--	16.89	--~~1.76~~	19.21	--	26.33	--	
POST	~~--~~**5.60**	--	16.19	--~~1.33~~	18.75	--	26.36	--	
Discovery Lodge (DP R3)									Crystal Springs Brook
PRE	9.77	0.81	24.28	--	--	--	37.01	--	
POST	4.12	0.39	12.15	--	--	--	21.76	--	
Modified Belleayre Resort at Catskills Park									
19 Acres of Wildacres East (DP 16)									Crystal Springs Brook
PRE	11.97	1.03	60.58	4.57	69.14	5.21	95.48	7.21	
POST	5.55	0.88	31.46	4.09	38.99	4.70	61.92	6.61	

Notes:

[1] Includes drainage associated with new Tomahawk Reception Lodge and Skier Bridge Area

[2] Includes drainage associated with Snowmaking Pond Area

As summarized in **the BMSC section of the** ~~the~~ **above** table~~ above~~, ~~post-construction hydrologic estimates for the Project indicate that the peak flows and runoff volumes for sub-catchment areas with proposed development areas within the watershed are not expected to increase stormwater volumes to the Middle Hudson River when compared with existing conditions~~**a comparison of the results of the pre and post hydrologic analyses indicates a reduction in peak flows for each of the storm events investigated**~~.~~ **(**~~–~~**in addition, the components of the BMSC UMP designed in accordance with the current NYSSMDM also indicate a reduction in the volume of the 1-year 24-hour storm).** Th**e**~~is~~ **hydrologic modeling for the Middle Hudson River Watershed included a comprehensive** ~~analysis includes~~**analysis of the proposed development at the** ~~the drainage area from the portion of the~~ BMSC**,** ~~site that consists of intensive base area development such as new~~**including new** parking lots and~~ proposed~~ building **expansions**~~s~~**, as well as the snowmaking pond and Tomahawk Area Skier Bridge.**~~ which significantly increases the impervious surfaces in these development areas.~~ The stormwater management system proposed for the BMSC uses storage-based attenuation methods **(**~~such as~~ dry swales~~, diversion swales~~, bio~~filters~~**retention**, dry detention basins, ~~green roofs and~~ porous pavement **and sand filters) as well as infiltration,** to meet the volume and peak rate control requirements set by the NYSSMDM~~ to mitigate the potential impacts that may result from the increases in impervious areas~~. A detailed evaluation of the proposed permanent stormwater technologies selected to be applied at each of BMSC development areas, along with design calculations, are provided in the Draft BMSC SWPPP (NYSDEC March 2011). Figures PK1 through PK9 in the BMSC UMP DEIS provide the physical layout of the stormwater management systems proposed for the Project, along with the grading and drainage plans.

The hydrologic analysis of the portion of the Modified Belleayre Resort at Catskill Park contributing to the Middle Hudson River also indicates that runoff volume and peak flow are not expected to increase when compared with existing conditions in this drainage. The portion of the Modified Belleayre Resort at Catskill Park development within this watershed would result in an increase in impervious area from 4.30% to 7.89% (LA Group March 2012a). The stormwater management system proposed for this sub-catchment area includes attenuation techniques such as bioretention ponds, drainage swales and detention basins that mitigate the volume impacts resulting from land cover changes. The Individual SWPPP provided at this time for the Modified Belleayre Resort at Catskill Park was prepared only for Phase 1(A) of the project, which includes construction of the Wildacres hotel, a portion of the Highmount Golf Club and the Highmount Spa Hotel and does not include detail on stormwater management practices for the sub-catchment located in the Middle Hudson River Watershed. However, the

SWPPP has been prepared to set the background and protocol for treatment of stormwater resulting from future Project work (LA Group March 2012b). The runoff collection design, as well as modeling assumptions and outputs, for the proposed stormwater management system for the sub-catchment draining to the Middle Hudson River are described in the Modified Belleayre Resort at Catskill Park Stormwater Management Plan (LA Group March 2012a). Sheets L4.00-4.11 and L5.03-L5.15 in the Modified Belleayre Resort at Catskill Park SDEIS plan set show the proposed sub-catchment mapping and the stormwater management systems proposed for the Project.

Based on hydrologic modeling, cumulative impacts from stormwater runoff are not anticipated to result from the Project for the Middle Hudson River watershed. Stormwater designs for both the BMSC and Modified Belleayre Resort at Catskill Park appear to capture the majority of the drainage that would result from the Project, reducing the peak flows and volumes from the existing conditions using storage based attenuation methods.

Cumulative Impacts on the East Branch of the Delaware River Watershed

The BMSC development proposed within the East Branch of the Delaware River Watershed includes approximately 52 acres of new **and restored** ski trails along the west side of Belleayre Mountain Ski area south of Rt. 49a (Section 4.3 SDEIS). The construction of the ~~Highmount and~~**proposed** Belleayre ski trails and lift corridors ~~would~~ **will** require the clearing of formerly wooded areas, replacing trees with grass and brush cover. ~~M~~**Although m**odifying land cover within th**e**~~i~~s**e** sub-catchment**s** has the potential to change the local hydrology**, any impacts are expected to be minimal as the existing flow patterns will be maintained, with the majority of the runoff consisting of sheet and shallow concentrated flow. In addition, it is believed that the installation of formal stormwater management practices in these areas would result in more land disturbance and significant changes to existing drainage patterns**~~ and may result in small increases in runoff volume and peak flows. ~~**. The redevelopment of the Highmount ski area, will involve the re-establishment of former ski trails, the removal of existing lifts and buildings and the installation of a new lift along an existing corridor.** Drainage from the Highmount ski trails is conveyed north through several culverts that cross under County Route 49A and are directed to intermittent drainages ~~located in the Wildacres development~~ that collect runoff from the Modified Belleayre Resort at Catskill Park site. These drainages are discharged at several locations to culverts that cross under a railroad (LA Group March 2012a).

~~-~~Hydrologic modeling was not prepared by NYSDEC for the Highmount and Belleayre Mountain ski areas; however the Modified Belleayre Resort at Catskill Park did include these sub-catchment areas in an assessment of the Highmount and Wildacres development impacts.~~—~~ The land cover mapping within the proposed Highmount ski area reflects the changes that would result from the necessary trail clearing. **The results of the modeling (Design Point 6 and 6a in Table 1.1-2) indicate that the existing peak flow and volume of stormwater runoff is reduced or maintained for each of the storm events investigated. In addition, in order improve the current drainage patterns along the existing ski trails,**~~To mitigate the potential permanent impacts resulting from the land cover change for the ski trails,~~ water bars or similar stone-lined channels are proposed to divert runoff into adjacent woods at specified intervals to help with erosion control on the slopes (NYSDEC March 2011). ~~Additionally, some of the existing ski trails in the Highmount Ski area are being restored (total of 37 acres) to wooded cover, which would provide additional attenuation of discharge within the sub-catchment (Section 4.3 BMSC UMP DEIS). These mitigation measures would prevent the small permanent increases in drainage volumes and flow rates from becoming significant.~~

The majority of the drainage to the East Branch of the Delaware River watershed for the Project would consist of the sub-catchments associated with the Modified Belleayre Resort at Catskills Park. Construction includes development within the Wildacres West, the remaining portion of Wildacres East and the Highmount Spa Resort. The Highmount drainage consists of approximately 183 acres of wooded and meadow type covers where runoff currently runs overland as sheet flow from the old ski area and is collected along the south side of County Route 49A in drainage swale. This runoff passes underneath County Route 49A through several culverts, including a 52-inch concrete culvert near the base of the Highmount Ski area and is discharged into one of the three main drainage pathways observed onsite located within the Wildacres West development area. Wildacres West stormwater sub-catchment areas include runoff from the eastern portion of the Belleayre Mountain Ski area--the slope just east of Highmount. Stormwater from this southern portion of the sub-catchment is conveyed through culverts under Route 49A and then flows through channelized intermittent drainages through the property until it is collected in an east/west channel along the railroad corridor north of the project site and exists off-site via a number of culverts that pass under the railroad. It consists of approximately 301 acres of primarily wooded cover, meadow areas and wetlands. Wildacres East consists of 90 acres where detached housing and a large portion of the golf course are proposed and associated club/recreation buildings (19 acres of area drains to the Middle Hudson River Watershed). Drainage within this sub-catchment that contributes to the East

Branch of the Delaware River is collected in the railroad corridor and offsite through culverts under the railbed (LA Group March 2012a).

The sub-catchments for each of these construction areas were evaluated individually using HydroCAD modeling software to estimate pre- and post-construction hydrologic conditions. Fourteen stormwater discharge locations were identified within the Project to discharge to the East Branch of the Delaware River watershed and were utilized in the model to evaluate the proposed stormwater management system effectiveness. Table 1.1-2 summarizes the hydrologic modeling results provided in the Modified Belleayre Resort at Catskill Park Stormwater Management Plan (LA Group March 2012a). The associated discharge points are shown on Figure 1.1-1. Modeling assumptions and outputs for each sub-catchment area are provided in the SWPPPs provided as appendices to SDEIS and DEIS for this Project.

Table 1.1-2: Pre- to Post-Construction Hydrology Comparison for the East Branch ~~to~~ of the Delaware River Watershed (LA Group March 2012a; LA Group March 2012b)

Sub-catchment ID (Discharge Point)	Stormwater Management Design Events								Discharge Point
	1-year		10-year		25-year		100-year		
	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	
Highmount (DP 1)									Todd Mountain Brook
PRE	3.77	0.27	18.01	1.15	20.51	1.31	28.20	1.82	
POST	2.37	0.22	17.84	1.13	20.24	1.29	27.31	1.79	
Highmount (DP 2)									Todd Mountain Brook
PRE	20.26	2.11	106.49	9.44	121.88	10.77	169.46	14.92	
POST	11.32	1.73	60.02	7.73	68.69	8.82	95.64	12.21	
Highmount (DP 3)									Todd Mountain Brook
PRE	1.69	0.13	8.12	0.54	9.26	0.62	12.73	0.86	
POST	1.67	0.74	5.19	0.23	5.76	0.26	7.48	0.34	
Highmount (DP 4)									Emory Brook
PRE	6.61	0.54	33.83	2.41	38.66	2.75	53.58	3.81	
POST	5.01	1.679	22.94	6.22	26.47	7.00	37.87	9.47	
Highmount (DP 5)									Emory Brook
PRE	10.49	0.74	55.50	3.42	63.53	3.90	88.34	5.44	
POST	8.83	0.51	42.79	2.27	48.77	2.59	67.16	3.59	

Table 1.1-2: Pre- to Post-Construction Hydrology Comparison for the East Branch ~~to~~ of the Delaware River Watershed (LA Group March 2012a; LA Group March 2012b)

Sub-catchment ID (Discharge Point)	Stormwater Management Design Events								Discharge Point
	1-year		10-year		25-year		100-year		
	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	
Highmount (DP 5a)									Emory Brook
PRE	7.57	0.62	40.90	2.85	46.88	4.53	65.36	4.53	
POST	4.58	0.66	26.09	3.04	29.99	3.49	42.11	4.85	
Highmount (DP 6)[1]									Emory Brook
PRE	32.30	3.17	169.07	14.79	193.45	16.19	268.75	22.42	
POST	20.84	2.95	118.71	13.67	136.44	15.63	191.48	21.75	
Highmount (DP 6a)[2]									Emory Brook
PRE	19.76	2.26	104.54	10.09	119.71	11.51	166.63	15.94	
POST	19.76	2.26	104.54	10.09	119.71	11.51	166.63	15.94	
Wildacres West (DP 7)									Unnamed Tributary to Emory Brook
PRE	57.56	7.58	366.47	34.95	424.74	39.95	607.19	55.58	
POST	50.89	6.80	298.77	30.97	343.50	35.38	483.32	49.14	
Wildacres West (DP 8)									Unnamed Tributary to Emory Brook
PRE	53.51	5.13	238.49	23.05	325.64	26.30	456.92	36.46	
POST	22.63	6.27	188.59	26.99	241.25	30.74	416.82	42.45	
Wildacres West (DP 9)									Emory Brook
PRE	18.01	3.15	131.61	13.83	153.94	15.76	224.36	21.77	
POST	15.26	2.81	116.13	11.67	136.19	13.26	193.69	18.20	
Wildacres East (DP 10)									Unnamed Tributary to Emory Brook
PRE	39.56	11.94	212.16	38.58	245.18	44.05	349.19	61.16	
POST	42.75	8.34	211.67	37.65	243.46	42.98	343.05	59.60	
Wildacres East (DP 11)									Unnamed Tributary to Emory Brook
PRE	24.41	12.40	141.89	15.90	163.12	18.15	228.95	25.16	
POST	16.06	2.31	72.97	19.68	89.12	22.82	146.19	32.57	

Table 1.1-2: Pre- to Post-Construction Hydrology Comparison for the East Branch ~~to~~ of the Delaware River Watershed (LA Group March 2012a; LA Group March 2012b)

Sub-catchment ID (Discharge Point)	Stormwater Management Design Events								Discharge Point
	1-year		10-year		25-year		100-year		
	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	Peak Flow (cfs)	Volume (af)	
West Acres East (DP 12)									Unnamed Tributary to Emory Brook
PRE	6.57	0.48	28.72	1.92	32.54	2.18	44.22	2.98	
POST	7.22	0.41	20.05	1.52	31.56	1.71	42.25	2.30	

Notes:
1. Drainage area includes sub-catchment that contains proposed BMSC Highmount Ski trails
2. Drainage area includes sub-catchment that contains proposed BMSC Belleayre Ski trails
3. Highlighted values indicate increases from pre- to post-development.

The results from the post-construction volume estimates for the Modified Belleayre Resort at Catskill Park that contributes to the East Branch of the Delaware River watershed indicate that peak flow rates are not expected to increase at the majority of the stormwater discharge locations. Flow rates at two discharge points within the Wildacres development show that drainage show minor increases in flow to Unnamed Tributary to Emory Brook during the 1-year peak event. Small increases in runoff volume were observed at a five of the modeled stormwater discharge points, but the minimum runoff reduction volume (RRv) and water quality volume (WQv) requirements of the 2010 NYSSMDM used in the stormwater management system design for Wildacres West and Highmount developments are met in every drainage area evaluated (LA Group MARCH 2012a). In some of the drainage areas 100% of the RRv requirement is met by the proposed storm water treatment management systems.

Treatment systems planned for the Wildacres West development includes directing stormwater through grading to series of roadside swales and catch basins that convey runoff to the existing drainage paths located through the site that either discharge to culverts located along the railroad or to the irrigation pond located just north of Wildacres East. Existing wooded areas within the Wildacres development, including the existing riparian corridor, would be preserved to the extent practicable. Treatment utilizes micropool extended detention ponds, dry swales, and bioretention. The majority of stormwater collected from the Wildacres East development is mostly treated in the irrigation pond after being conveyed through a series of catch basins and bioretnetion areas. The pond is designed with sufficient freeboard to treat the required WQv, and provide the necessary attenuation for the 1, 10, 25 and 100 year storm events (LA Group March 2012a). Overflow from the pond in severe storm events is conveyed to roadside swales where it is discharged to existing drainage channels that run along the railroad bed north of the Project.

The Modified Belleayre Resort at Catskill Park SDEIS provides the proposed physical layout of the stormwater management systems, along with the grading and drainage plans. Within the sub-catchment basins of the Highmount development, stormwater in the vicinity of the proposed hotel and access roads would be primarily collected in catch basins and conveyed through a closed pipe system to detention ponds located north of the proposed hotel. Drainage or overflow from the green roofs proposed as part of the Hotel and Lodge buildings would also be routed to the detention ponds that are a combination of a wet extended detention pond and a micropool extended detention pond to be constructed in series. Runoff would be directed first to the wet extended detention pond, which would function both as an aesthetic pond and treatment and attenuation device. This pond is designed with adequate freeboard to treat the 100 year storm event and would also function as a forebay for the adjacent micropool extended detention pond. Once treated, stormwater would be discharged to the adjacent roadside ditch along Rt 49A. ~~No stormwater treatment is proposed as part of the BMSC development for the new Highmount and Belleayre Ski Center besides the erosion control methods mentioned above; the sub-catchments associated with these Project features would result in minor changes in runoff volume as no impervious surfaces are anticipated to be created (LA Group 2012a).~~ A detailed description and evaluation of the proposed permanent stormwater technologies selected to be applied within the Highmount development, along with design calculations, are provided in the Stormwater Management Design Report (LA Group 2012a) and summarized in Section 2.8.8 of the Modified Belleayre Resort at Catskill Park SDIES.

Modeling results indicate that no cumulative impacts were observed for stormwater draining to the East Branch to the Delaware River. The two sub-catchments (DP 6 and 6a) that are representative of the drainage for the proposed BMSC Highmount Ski trails show no change or decreases in hydrology (peak flow and volume) for the modeling results; development from the Modified Belleayre Resort at Catskills Park within these sub-catchments would be limited to access roads and lift maintenance buildings resulting in very minor increases in impervious areas. The discharge from these sub-catchments would be conveyed through culverts under Rt. 49A to an undeveloped area just west of the Project. Additionally, the sub-catchment representing the proposed BMSC Belleayre

Mountain ski trails and lift corridors east of the Highmount Ski area show no increases in hydrology. This sub-catchment area contributes upland runoff across Rt. 49a to the existing intermittent drainage channels located within the Wildacres West sub-basins, which ultimately discharge at the north boundary of the project across the railroad (DP 7 and 8). Although increases of runoff volume were observed at DP 8, based on the modeling output, it appears that any stormwater impacts anticipated with the East Branch of the Delaware River watershed are likely the result of the development and increases in impervious surfaces associated with Modified Belleayre Resort at Catskills Park and are not cumulative.

Protection from Erosive Flow

An additional impact associated with the proposed project is the potential for erosive flows. Erosive flows can cause degradation to existing drainage channels within the sub-catchments and outfall streams through scour of streambeds. These higher velocity flows also have the potential to cause erosion of Rt 49a at culvert crossings within the project during overflows due to extreme stormwater events that are anticipated during spring snowmelts or summer storms. The stormwater treatment systems for both BMSC and Modified Belleayre Resort at Catskills Park developments were designed so that stream channel protection volume (CPv) requirements were met at all sites by providing at a minimum a 24-hour (12 hour for those discharging to trout streams) extended detention of the 1-year, 24-hour storm event as required by the NYSSMDM (LA Group March 2012a, NYSDEC March 2011). The stormwater treatment systems designed for the Wildacres and Highmount Resort development areas also include attenuation features that are capable of providing storage for the 10-year, 25-year and 100-year storm events to ensure that the post-development peak discharge rate did not exceed the pre-development condition. These storage features should aid in reducing the peak velocities that discharge to culverts that cross Rt. 49a. In addition to using attenuation practices to mitigate stormwater velocities at the runoff discharge locations, conveyance swales are also proposed to be constructed with stabilized surfaces, such as grass, grass with turf reinforcement mat, cobbles or rip rap to protect these stormwater management features from erosion associated with flow velocities during larger storm events (LA Group March 2012a).

As summarized above in Tables 1.1-1 and 1.1-2 the runoff discharge points located at culverts that cross Rt 49a (DP2, DP3, DP4, DP5, DP5a, DP6 and DP 6a on Figure 1.1-1) all show decreases in peak flow rates for all storm events evaluated.

1.1.4 Storm Water Quality

Both the BMSC UMP DEIS and Modified Belleayre Resort at Catskill Park SDEIS and their respective SWPPPs describe potential impacts of runoff on the quality of the receiving waters next to the project sites that result from construction activity and operation of the proposed projects. Short-term impacts such as increased sediment loading from stormwater that may result from construction would be mitigated with best management practices including maintaining buffers around streams and wetlands, providing silt fence and absorption materials during construction, proper sequencing of activities, disturbance limits, temporary sediment basins and planting disturbed areas as soon as practicable. These temporary impacts were not considered to be significant and will not be discussed further in this assessment. Construction phase erosion controls are discussed in detail in the individual SWPPPs for BMSC and Modified Belleayre Resort at Catskill Park along with associated erosion and sediment control figures provided in the DEIS (EC1 through EC12) and the SDEIS (L-3.00 to L-3.27).

Long-term impacts from changes in land cover and land use associated with the proposed features of the project sites include a potential for increase in discharge of nutrients and solids to surface waters, which can cause noxious algae and aquatic weeds to grow, decrease dissolved oxygen and possibly induce changes in water temperature that can influence trout and other temperature-sensitive species. The project is partially located in the New York City Watershed and is subject to phosphorus restrictions as the Middle Hudson River (Ashokan Reservoir) watershed is phosphorus limited. Additionally the Pepacton Reservoir watershed, which is fed by the East Delaware River, is listed under the Clean Water Act (CWA) 303(d) list for a Total maximum Daily Load (TMDL) for phosphorus (LA Group March 2012a).

Both projects have conducted extensive evaluations of selected storm water management technologies capable of treating runoff to meet the water quality objectives and requirements of the NYSSMDM and New York City Department of Environmental Protection (NYCDEP). The evaluations are provided in the individual SWPPPs along with treatment design calculations (LA Group March 2012b; NYSDEC March 2011) It was presumed for both project sites that NYSDEC’s acceptable storm water management practices selected and utilized in the designs capture and treat 80% of total suspended solids (TSS) in the direct calculation and 40% of total phosphorus (TP) as required by NYSSMDM 2010 and NYCDEP 2010 regulations. The results of the stormwater quality discharge assessment are described below.

Cumulative Impacts on the Middle Hudson River Watershed

The changes in land cover that would result from constructing the proposed parking lots and buildings at the BMSC site would produce the majority of potential long-term loading impacts on nearby surface waters draining to the Middle Hudson River watershed. **Although** ~~Th~~**the**~~e~~ BMSC UMP DEIS did not quantify the nutrient loading values for these drainage areas**,** ~~but~~ **it** does list numerous mitigation measures that, using storm water management techniques, would reduce these potential impacts and comply with the NYSSMDM 20120 and NYCDEP 2010 regulations. The treatment systems designed for the BMSC would capture and treat 100% of the stormwater produced by the new development areas and the techniques selected are presumed to provide 80 % removal of TSS and 40% removal of TP. **In addition, in order to provide consistent documentation for the evaluation of potential water quality impacts at the BMSC and the Modified Belleayre Resort at Catskill Park, a pollutant loading analysis has been included in Appendix AI of the BMSC FEIS.**

The drainage from the portion of the Modified Belleayre Resort at Catskill Park (19 acres in the Wildacres development) that contributes to this watershed is small and is not expected to impact the water quality of adjacent surface waters. Section 6.3 of the SWPPP for the Modified Belleayre Resort at Catskill Park discusses stormwater discharge water quality, assumptions, calculations and results in detail. To assess the potential for new loadings of total phosphorus and TSS, calculations based on the Washington Metropolitan Council of Governments (Schueler 1987) and the NYCDEP Guidance for Phosphorus Offset Pilot Programs (1997) were utilized, as agreed upon by NYSDE C and NYSDEP. The total phosphorus and TSS mass loads were calculated for existing and proposed conditions by assuming a loading rate for various cover types within the given sub-catchments (woods, impervious surface, grass, brush, vacant land, etc.). These estimates were then multiplied for the given acreages to estimate a total mass load that was estimated to result from the runoff. After phosphorus and TSS mass loading estimates were calculated for existing and proposed condition, a reduction percentage (80% for TSS and 40% for TP) was assumed for the various post-construction stormwater management practices proposed onsite. These reduction percentages were then applied to the proposed conditions loadings to reflect the final runoff loads that are anticipated to result from the Project. Table 1.1-3 and Table 1.1- 4 summarize the pre- and post-construction TSS and Phosphorus loading, respectively; design points for each sub-catchment are identified on Figure 1.1-1.

Table 1.1-3: Summary of Total Suspended Solids (TSS) Loading for Middle Hudson River Watershed (LA Group March 2012b)			
Sub-catchment ID (Design Point)	Annual Mass Loading (TSS) for Existing Conditions (kg)	Annual Mass Loading (TSS) for Proposed Conditions w/o Treatment (kg)	Annual Mass Loading (TSS) for Treated Stormwater Conditions (kg)
19 Acres of Wildacres East (DP 16)	2,662	3,026	1,7**7**~~2~~2

Table 1.1-4: Summary of Total Phosphorus Loading for Middle Hudson River Watershed (LA Group March 2012b)			
Sub-catchment ID (Design Point)	Annual Mass Loading (TP) for Existing Conditions (kg)	Annual Mass Loading (TP) for Proposed Conditions w/o Treatment (kg)	Annual Mass Loading (TP) for Treated Stormwater Conditions (kg)
19 Acres of Wildacres East (DP 16)	2.3	5.3	3.9

Cumulative Impacts on the East Branch of the Delaware River Watershed

The Modified Belleayre Resort at Catskill Park SDEIS and individual SWPPP provide TSS and total phosphorus loading quantities that would result from the proposed development within the East Branch of the Delaware River watershed **(including the r**~~.~~**e-establishment of trails at the former Highmount ski area).** Storm water drainage in this watershed would primarily discharge to the Pepacton Reservoir, which is regulated through a total maximum daily load (TMDL) permit for total phosphorus in accordance with Section 303(d) of the Clean Water Act. The post-treatment storm water loading ~~contribution~~ **increase** was estimated as ~~55.1~~**57.6** ~~-~~kg/yr (which is approximately 0.~~44~~**17**% of the remaining [unallocated] permissible load of 33,537 kg/yr) that can be added to the Pepacton Reservoir to maintain existing water quality conditions (Section 2.8.8 Modified Belleayre Resort at Catskills Park SDEIS, LA Group March 2012a). A total storm water loading contribution, which includes 97.4 kg/yr of TP from undisturbed areas, is estimated at 14~~8.8~~ **4.9** kg/yr, which is only a 0.4% [DK1]increase in overall phosphorus loading to the reservoir. The TSS loading from the proposed Modified Belleayre Resort at Catskill Park site would decrease from ~~117,145~~**91,976** ~~-~~kg/yr to ~~81,664~~**79,891** kg/yr, ~~compared with~~**from the** existing **to the proposed** condition~~s~~, due to the planned storm water storage attenuation methods. Included in the post-treatment loading is approximately 72,889 kg/yr

TSS discharged from undisturbed or minimally disturbed areas. The reduction in TSS should benefit the water quality of the adjacent surface waters including Emory Brook and the Delaware River and is not subject to any TMDL guidance values (Section 2.8.8 SDEIS Tables 1.1-5 and 1.1-6 summarize the estimated loading at each of the sub-catchments within the Project boundaries.

	Table 1.1-5: Summary of Total Suspended Solids (TSS) Loading for **the East Branch of the Delaware River Watershed (LA Group March 2012a; LA Group March 2012b)**~~Middle Hudson River Watershed (LA Group March 2012b)~~			
Sub-catchment ID (Design Point)	Annual Mass Loading (TSS) for Existing Conditions (kg)	Annual Mass Loading (TSS) for Proposed Conditions w/o Treatment (kg)	Annual Mass Loading (TSS) for Treated Stormwater Conditions (kg)	Net Change of TSS Mass Loading (Proposed – Existing) (kg)
Highmount (DP 1a)	677	903	498	-~~180~~**179**
Highmount (DP 2)	5,029	4,120	4,120	-909
Highmount (DP 3)	310	232	232	~~476~~**-78**
Highmount (DP 4)	1,278	4,457	1,324	~~-609~~**46**
Highmount (DP 5)	1,785	1,176	1,176	~~22~~**-609**
Highmount (DP 5a)	1,503	1,525	1,525	~~-1,264~~**22**
Highmount (DP 6)	8,057	6,793	6,793	**-1,264**~~0~~
Highmount (DP 6a)	5,953	5,~~952~~**953**	5,953	~~-2,892~~**0**
Wildacres West (DP 7)	17,965	16,443	15,073	-2,~~475~~**892**
Wildacres West (DP 8)	12,100	18,431	9,625	-2,~~672~~**475**
Wildacres West (DP 9)	7,581	8,429	4,909	-~~421.5~~**2,672**
Wildacres East (DP 10)	20,145	19,723	19,723	~~-643~~**-422**
Wildacres East (DP 11)	8,184	20,450	7,541	-~~1~~**643**
Wildacres East (DP 12)	1,409	1,399	1,399	~~-889~~**-10**
Total	~~9,4637~~**91,976**	~~113,060~~**110,034**	~~81,664~~**79,891**	**-12,**~~897~~**085**

Table 1.1-6: Summary of Total Phosphorus Loading for **the East Branch of the Delaware River Watershed (LA Group March 2012a; LA Group March 2012b)**~~Middle Hudson River Watershed (LA Group March 2012b)~~

Sub-catchment ID (Design Point)	Annual Mass Loading (TP) for Existing Conditions (kg)	Annual Mass Loading (TP) for Proposed Conditions w/o Treatment (kg)	Annual Mass Loading (TP) for Treated Stormwater Conditions (kg)	Net Change of TP Mass Loading (Proposed – Existing) (kg)
Highmount (DP 1a)	1.0	1.4	1.0	0
Highmount (DP 2)	4.9	7.1	7.1	~~-2.2~~**2.2**
Highmount (DP 3)	0.6	0.5	0.5	-0.1
Highmount (DP 4)	2.2	11.8	7.3	5.1
Highmount (DP 5)	1.3	1.6	1.6	0.3
Highmount (DP 5a)	1.1	2.6~~3~~	2.6	1.5
Highmount (DP 6)	6.6	13.0	13.0	6.4
Highmount (DP 6a)	6.0	6.0	6.0	0
Wildacres West (DP 7)	16.3	21.0	19.4	3.1
Wildacres West (DP 8)	9.9	34.7	25.2	15.3
Wildacres West (DP 9)	10.1	16.8	12.3	2.2
Wildacres East (DP 10)	19.2	19.4	19.4	0.2
Wildacres East (DP 11)	6.0	40.1	26.6	20.6
Wildacres East (DP 12)	2.1	2.9	2.9	0.8
Total	~~**89.4**~~**87.3**	~~**184.3**~~**178.9**	~~**148.8**~~**144.9**	~~**55.1**~~**57.6**

~~The nutrient inputs from the construction of the new Highmount ski trails for the BMSC site in the East Branch of the Delaware River watershed were not quantified because the potential increases that are expected from day uses and ski slope development are small. Clearing the slopes could potentially increase~~

runoff to sensitive headwater streams in the watershed; however, erosion control practices are expected to help minimize these impacts. The portion of the proposed Belleayre Mountain ski trails to be constructed just east of the Highmount Ski area are also anticipated to be minor but would be routed through the stormwater treatment system prior to being discharge at DP 7 and DP 8 as shown in the modeling files of the Modified Belleayre Resort at Catskills Park Stormwater Management Design Report.

The SWPPPs for both the Modified Belleayre Resort at Catskill Park and the BMSC indicate commitment to implementation of BMPs during construction. Because of the potential for long-term impacts from snowmaking activities extending beyond the construction period, the BMSC UMP DEIS (Section 4.3) makes a commitment to long-term monitoring of the water quality of the headwater streams to identify increases in temperature, flow, and nutrients that may result from stormwater flows. This surface water quality monitoring is discussed in section 4.3 of the BMSC UMP DEIS and will be used to evaluate real-time impacts from runoff through the construction and operation of the project. Modifications to the operations or additional mitigation measures would be invoked by NYSDEC to prevent long-term water quality problems.

1.1.5 Thermal Impacts

The Modified Belleayre Resort at Catskill Park storm water management system does not discharge directly to trout streams (LA Group March 2012a); however, the system was designed to consider potential thermal impacts from construction and the potential for land cover changes to impact water temperatures in spring and summer. Using dry drainage swales, micro-pool extended detention ponds, bio-retention, and management methods that promote runoff infiltration were selected to mitigate the potential for storm water thermal loading to receiving surface waters.

The proximity of the BMSC construction to Crystal Brooks Spring, which is the only stream within the Project area considered to be trout water, requires the consideration of handling runoff in respect to thermal impacts. However, it is recognized that some of the non-classified streams could also support populations of trout, at least on a temporary basis. For this reason, the potential impacts of discharge water on temperatures were considered in all the tributary streams.

For drainage swales, dry detention basins and conveyances within the Upper Discovery Parking, North Parking and Discovery Lodge, 12-hour extended detention times were used in the stormwater treatment design calculations as required by the NYSSMDM to help reduce the potential for increases in temperature from stormwater runoff. Stormwater ponds and stormwater wetlands were eliminated during the treatment design evaluation for these areas adjacent to Crystal Brooks Springs as these ~~kind of features~~**treatment practices** are discouraged by guidance (NYSSMDM 2010).

Summary

Potential cumulative impacts from proposed runoff increases in peak flow rates, volume, and nutrient loading to headwater streams and receiving waters were considered in the separate analyses for the proposed BMSC and Modified Belleayre Resort at Catskill Park developments. The potential adverse impacts on surface water resources that may result from stormwater appear to be minor or short-term. Storm water management systems have been designed to mitigate and minimize any potential long-term impacts of runoff water quality and quantity, including potential thermal impacts.

1.2 Water Supply and Wastewater

1.2.1 Water Supply

A water-budget analysis was completed and reported in the BSMC DEIS (Appendices B, C, and D) and the Modified Belleayre Resort at Catskill Park SDEIS) (Appendix 22) to determine potential quantitative changes in ground and surface water resources that may result from various features of the proposed development.

According to the BMSC UMP DEIS (Section 4) there will be an approximate transfer of 52 million gallons of water from the Middle Hudson watershed to the East Branch of the Delaware as a result of snowmaking activities. This would likely cause an increase in runoff during snowmelt events, and potentially a greater increase in percolation, which provides additional water available for groundwater recharge. Surface water from Pine Hill Lake, the Upper Impoundment and Cathedral Glen Impoundment will be used for snowmaking at BMSC. In order to avoid having adverse impacts on stream habitats, withdrawals from the streams contributing to the reservoirs will only be allowed during flows in excess of the minimum stream flow.

The potable water supply system for the Ski Center consists of a series of four main groundwater supply wells, and a fifth well that is dedicated to supplying the Sunset Lodge. The wells have been installed and maintained by the Ski Center. The well field will continue to be utilized for the post-development water supply with modification to the number of wells and distribution from those wells as part of the planned development.

One of the four main wells in the current water supply system is planned to be abandoned due to unresolvable turbidity issues. The fifth well which supplies the Sunset lodge and is not considered a part of the main groundwater supply system is to be abandoned. The Sunset Lodge water supply is planned to be replaced by a 50,000 gallon storage tank that is fed by a booster pump installed in the groundwater supply system.

Existing potable water supply was analyzed using data from the Overlook and Discover meters for the period of December 2007 to April 2008 (BMSC UMP DEIS Appendix C). This analysis shows that peak skier attendance the total metered flow was 36,720 gallons per day (gpd). The calculated groundwater demand for the entire ski facility following development is anticipated to be 60,000 gpd. The existing yields, determined by pump tests, of the three wells that will service the new development is 102 gallons per minute.

Assuming pumping at 67% of well yield capacity, the maximum daily capacity of the existing well sources is 0.67 x (18+60+24) x 1440= 146,880 gpd. Therefore, the available supply remaining after the planned well abandonment far exceeds the anticipated demand. One of the supply wells yields the majority of the water supply capacity; 60 gallons per minute, the remaining wells are capable of providing for the necessary supply should the high yield well be offline. According to the BMSC UMP DEIS there is an anticipated increase in groundwater withdrawals however the current potable water supply system is capable of delivering the anticipated required demand without requiring additional wells to provide for the increased withdrawals from the aquifer.

For the Belleayre Resort, new wells will be located outside of the Birch Creek drainage system and near the Village of Fleischmanns. Pumping and water quality tests demonstrated that these wells will provide sufficient potable water for the Belleayre Resort without the use of the Rosenthal wells and without adversely affecting the Village of Fleischmanns' water supply.

Extensive testing has been completed including long duration pump tests at rates exceeding the necessary production rates for the well fields concurrent with monitoring of surrounding private and water supply wells that may be adversely affected by groundwater extraction for the Belleayre Resorts water supply. Some measurable affects were documented, but no long term adverse impact to aquifer utilization is predicted.

The calculated groundwater demand for the Belleayre Resort following development is anticipated to be 262,000 gallons per day with 100% occupancy. The total anticipated groundwater demand is approximately 111, 000 gallons per day, which represents 70% occupancy. The water supply for the Belleayre Resort is designed to meet the 262,000 gallons per day coming from two well fields labeled K and Q. The two well fields are separated by some distance in order to limit the localized impact to the aquifer that they withdraw from.

The K well field consists of four wells, three wells that will be used for supply purposes, K2, K3, and K4. The K well field is capable of sustaining a long term average pumping rate of 157 gallons per minute, or 226,080 gallons per day. The Q well field consists of one well, Q1 that is capable of sustaining a long term average pumping rate of 45 gallons per minute or 64,800 gallons per day. The combined output of the two well fields is 290,880 gallons per day, which is greater than the maximum predicted demand for the Belleayre Resort.

The well fields must be capable of supplying the Belleayre Resort adequately with the highest production well out of service in order to satisfy the requirements of a water supply system. The K4 well produces a long term average production of 82 gallons per minute. The remaining wells in the supply system are capable of a long term average production of 195 gallons per minute, or 280,800 gallons per day, which is adequate to supply the maximum predicted demand for the Belleayre Resort.

Water that is planned to be used for irrigation at the Belleayre Resort will come from stormwater routed to a lined irrigation pond and water from three wells located on the Wildacres portion of the site. Tests performed on the three wells proposed for irrigation are capable of sustaining an average total pumping rate of approximately 37 gpm for the entirety of the typical irrigation season and not adversely affect existing groundwater supplies or surface waters. No surface waters will be impounded in order to provide irrigation water at Belleayre Resort.

1.2.2 Wastewater

All wastewater from BMSC currently is conveyed to, and treated at, the Pine Hill WWTP, except for the Sunset Lodge. The Sunset Lodge (which is located at the summit of the mountain) is presently served by an on-site septic tank and absorption bed system that is not currently connected to the Pine Hill wastewater collection system. However, it is proposed that the Sunset Lodge septic tank effluent would be connected to the wastewater collection system in the future and would become influent to the Pine Hill WWTP.

All wastewater generated within the various Belleayre Resort buildings will be collected and transported to the Pine Hill WWTP, via a new connection to the existing Hamlet of Pine Hill sewer system. It has been proposed that all of the new sewer pipes and grinder pump stations required to serve the Belleayre Resort will be owned by Crossroads Ventures, with the proposed equalization tank and main pump station being operated and maintained by the New York City Department of Environmental Protection (NYCDEP).

1.2.2.1 Ski Center

The total hydraulic loading / wastewater flow to the Pine Hill WWTP from the proposed ski center expansion was estimated by the NYSDEC and documented in the Engineering Report "Belleayre Mountain Ski Center Wastewater Collection/Treatment Analysis" (dated December 29, 2009). The projected flow was based on the projected peak water use of 57,211 gpd, unmetered maintenance center flow of 150 gpd, sewer infiltration of 1,176 gpd, and information booth flow of 30 gpd for a total flow of 58,567 gpd.

This estimate was the rounded up by the NYSDEC to the projected maximum daily flow of 60,000 gpd for design purposes. Therefore, the projected maximum daily flow from the proposed BMSC expansion is 60,000 gpd, compared to the existing maximum daily flow rate of about 38,000 gpd for the existing ski center, indicates an additional flow of about 22,000 gpd can be expected from the proposed BMSC expansion project.

1.2.2.2 Belleayre Resort

The expected maximum daily sanitary wastewater flows from the Belleayre Resort have been previously estimated for the full build-out condition with 100% occupancy, as documented in the "Wastewater Preliminary Design Report for The Belleayre Resort at Catskill Park including Wildacres Resort & The Highmount Spa Resort" (dated February 2012), as summarized below:

Wildacres hotel, detached lodging, and golf course total:	103,100 gpd
Highmount hotel, detached lodging, and activity center total:	42,100 gpd
Total Maximum Daily Flow:	145,200 gpd

An average day is estimated at when the resort is at 70% capacity, with a flow rate of approximately 101,600 gpd.

In addition, an allowance for groundwater infiltration into the gravity sanitary sewers proposed for the Highmount Spa Resort of 2,400 gpd was included.

According to the preliminary design report, the Belleayre Resort's seasonal and weekday wastewater flow rates were estimated based upon the forecasted hotel occupancy rates in the report mentioned above. Flows approaching the maximum daily flow of 140,000 gpd are anticipated to occur on Friday and Saturday from January through mid-March and during the peak summer season from June through August.

During these peak seasons, the weekday flow is expected to be 15% lower than the weekend flows (at about 116,000 gpd) and Sundays are expected to be the lowest flow days at about 94,000 gpd. During off peak months, the flows are estimated to range from 58,000 gpd during the week to about 87,000 gpd during the weekends when the Belleayre Resort is at full build-out.

1.2.2.3 Residences In Highmount

A total of nineteen (19) residences in the Highmount area are currently served by individual on-site septic systems but have expressed interest in public sewer service. Assuming these are 3 bedroom residential housing units generating a unit flow of 400 gpd each, an additional average daily flow of 7,600 gpd would be discharged into the sanitary sewer system and Pine Hill WWTP. Therefore, the maximum daily flow expected in the future from these three (3) wastewater sources is estimated at 207,600 gpd.

1.2.2.4 Existing Collection Systems

The existing collection system tributary to the Pine Hill WWTP is limited to within the boundaries of the Hamlet of Pine Hill (as shown in Figure 1) and contains a total of 190 manholes. The only large user in the system is the BMSC.

It is recognized that the Hamlet sewer system experiences excessive infiltration/inflow problems. A total of 53 manholes were replaced/rehabilitated in July 2012, while the future plan is to replace/rehabilitate another 70 manholes in the future.

The existing BMSC collection system consists of 11 manholes, 4 septic tanks, 8345 feet of gravity sewer line, and 3015 feet of force mains. The NYSDEC analyzed the conveyance capacity of the critical sewer pipes and pumping station to determine if they have adequate capacity to convey the future projected maximum daily flow of 60,000 gpd.

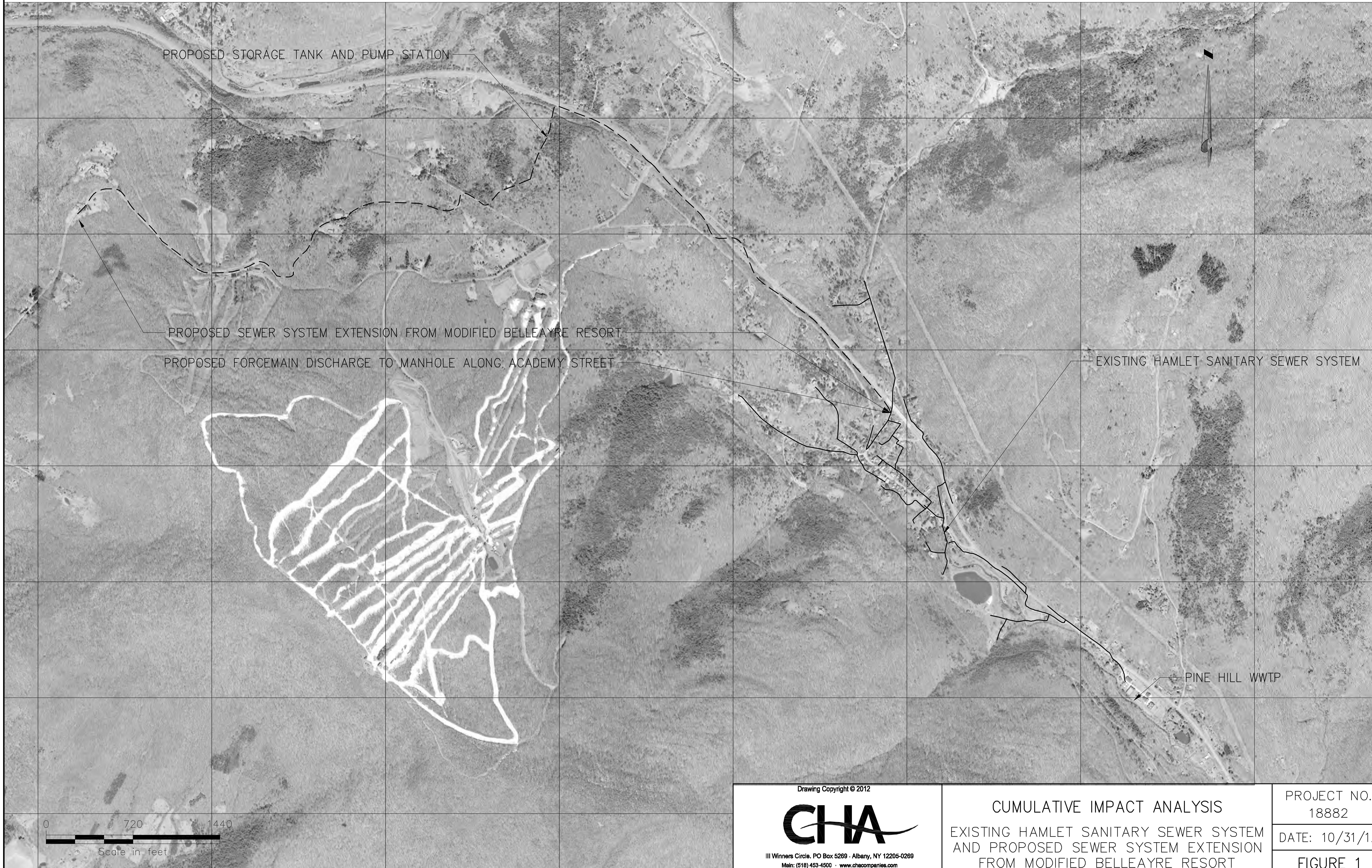
Hydraulic analysis of the 6" HDPE gravity sewer line was performed by the NYSDEC to determine the flow capacity of the collection system. The length of 6" HDPE pipe from manhole #4 to the velocity reduction manhole was used to calculate the system capacity. From the velocity reduction manhole, the 6" HDPE pipe connects to a 20 foot long section of 12" PVC pipe to the sewer flow monitoring station. Finally, flow is conveyed through 8" PVC pipe for approximately 76 feet to the NYCDEP manhole on Bonnieview Road.

The distance from manhole #4 to the velocity reduction manhole is approximately 5,595 feet. The elevation at manhole #4 is 2,460 feet, while elevation at the velocity reduction manhole is 1,630 feet. Using a Manning roughness value of 0.10 for HDPE pipe, the resulting flow capacity was calculated by the NYSDEC to be approximately 1.8 MGD.

The calculated collection system capacity of 1.8 MGD is more than adequate to accommodate the maximum daily flow of 60,000 gpd.

The existing Discovery Lodge pump station is rated at 80 gpm (according to the manufacturers pump specification). The maximum projected flow to the pump station is 37,015 gpd from Discovery Lodge, 150 gpd from the maintenance center, and 30 gpd from the information booth for a total flow of 37,195 gpd.

The existing 80 gpm lift station (38,400 gpd over an 8 hour period, plus 7,500 gallon holding tank, for a total capacity of 45,900 gpd) was determined by the NYSDEC to have adequate capacity to convey the projected peak flow of 37,195 gpd.



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CUMULATIVE IMPACT ANALYSIS

EXISTING HAMLET SANITARY SEWER SYSTEM AND PROPOSED SEWER SYSTEM EXTENSION FROM MODIFIED BELLEAYRE RESORT

PROJECT NO. 18882	
DATE: 10/31/12	
FIGURE 1	

1.2.2.5 Proposed Collection Systems

In general, it has been proposed by Crossroads Ventures, LLC that the wastewater at Highmount will be collected and pumped to Wildacres, where the combined flow will be pumped to the Pine Hill sanitary sewer system. Figure 1 illustrates the proposed routing of the conveyance pipes.

Wastewater from the Highmount Hotel and the detached lodging units will be conveyed to a below-grade pump station. With a maximum daily flow of 42,000 gpd and a peaking factor of 4, the capacity of the pump station will be 120 gpm. The below-grade pump station will have a wet well containing two (2) submersible pumps. Each pump will have a capacity of 120 gpm. The pump station will receive its electrical power from the hotel, which will be backed up with an emergency generator. A 4-inch force main, approximately 4,600 linear feet long, will connect the low pressure sewer system to the Wildacres Resort.

The Wildacres Hotel, clubhouse, and detached lodging units will be served by a low pressure sewer system, with each building being served with duplex grinder pumps. The wastewater flow will be collected in a below-grade pump station wet well, located north of the golf course's hole 4 tee. With a total flow of about 140,000 gpd and a peaking factor of 4, the design pumping rate of the pump station will be 400 gpm. Since full build-out of the project will take a number of years to complete, the pumps will be equipped with Variable Frequency Drives (VFDs) to operate at a lower flow rate initially and adjusted as flow rates increase. The initial pump rate is projected to be 280 gpm.

The below-grade pump station will have a wet well with two (2) submersible pumps. Each pump will have a VFD with a capacity of 400 gpm. The pump station will have its own emergency generator for backup electrical power, since it is not located close to the Wildacres Hotel. A 6-inch force main, approximately 11,000 linear feet long, will discharge to the existing Pine Hill gravity sewer system in a manhole located along Academy Street in the Hamlet of Pine Hill near the Route 28 intersection. The proposed force main will be located within the State Highway Route 28 right-of-way.

The detached lodging units in the Wildacres Front 9 Village area (located in the northeastern portion of the Resort) will be served by grinder pumps and a low pressure sewer system. The combined discharge from the low pressure sewer system will discharge to the pump station at Wildacres.

1.2.2.6 Existing Wastewater Treatment Plant

The existing Pine Hill WWTP was designed to treat 0.50 MGD of domestic sanitary sewage and provides advanced wastewater treatment (including microfiltration) of the final effluent as required by the NYCDEP standards. The treatment facility consists of the following major treatment units:

- Mechanical bar screens
- Parshall flume for flow metering
- Grit chambers
- Grinder pumps
- Rapid mix tanks
- Rotating Biological Contactors (RBCs)
- Secondary clarifiers
- Filter pumps
- Filter cells
- Ultraviolet (UV) disinfection units
- Chlorine contact chamber (not in use)
- Microfiltration (membrane) units
- Post-aeration tank
- Sludge thickener

The facility was designed (according to the design engineer, Malcolm Pirnie) to treat the following influent wastewater flows and loadings:

Peak Hydraulic Flow	1.25 MGD	
BOD – 5 day	120 mg/l	500 lbs/day
TSS	100 mg/l	420 lbs/day
Ammonia Nitrogen	7 mg/l	29 lbs/day
Total Phosphorus	2.5 mg/l	11 lbs/day

In addition, the following septage discharges to the WWTP during the March through November period were anticipated:

Daily flow	5,500 gpd	
BOD – 5 day	7,000 mg/l	321 lbs/day
TSS	15,000 mg/l	688 lbs/day
Ammonia Nitrogen	150 mg/l	7 lbs/day

1.2.2.7 Existing Influent Loadings

Analysis of the latest available WWTP records (provided by the NYCDEP) for the 20 month period from January 2011 through August 2012 indicated the following influent loadings to the Pine Hill WWTP:

<u>Flows:</u>

20 month average daily flow	0.15 MGD
Highest reported monthly average flow	0.4 MGD
Highest reported daily flow	1.3 MGD (September 2011)

<u>BOD – 5 day:</u>

20 month average concentration	52 mg/l
Highest reported monthly average	134 mg/l
Highest reported daily maximum	153 mg/l

<u>TSS</u>	
20 month average concentration	106 mg/l
Highest reported monthly average	412 mg/l
Highest reported daily maximum	800 mg/l

No data on influent concentrations of either ammonia nitrogen or total phosphorus were available for review and comparison to the design criteria for the WWTP, since the SPDES discharge permit does not require monitoring and reporting of influent ammonia or phosphorus concentrations. It should, however, be noted that discussions with the NYCDEP operations staff have indicated that the wastewater conveyed to the Pine Hill WWTP from the BMSC after busy weekends usually contains high ammonia concentrations.

Comparison of the actual flow and influent concentrations of BOD and TSS over the last 20 months to the existing WWTP design criteria indicates that the existing WWTP appears to have adequate excess capacity to treat the proposed future flow of 207,600 gpd from the ski center expansion and the Belleayre Resort projects.

1.2.2.8 Performance of Existing Treatment Facility

Records were obtained from the NYCDEP on performance of the Pine Hill WWTP over the last 20 month period (spanning from January of 2011 through August of 2012) and compared to the State Pollutant Discharge Elimination System (SPDES) discharge permit effluent limits. A summary of this comparison is presented in Table 1 which compares the SPDES discharge permit effluent limits to the actual 20 month average effluent characteristics reported to the NYSDEC and also indicates the worst (in most cases this is the highest) reported value during the 20 month period.

As seen in Table 1, performance of the existing Pine Hill WWTP has generally been very good. The average influent flow is 0.15 MGD compared to the design capacity of 0.5 MGD; however, the highest reported monthly average flow of 0.4 MGD is a concern. Apparently, excessive infiltration/inflow problems exist in the Hamlet collection system which are well documented and efforts are underway to reduce the infiltration/inflow.

During the 20 month period of record, only four (4) SPDES permit violations have occurred. There were two (2) months during which the required minimum 85% removal of BOD was not achieved (> 81% was reported in March of 2011 when the monthly average flow was 0.4 MGD and >84.4% during May of 2011 when the monthly average flow was 0.2 MGD). In addition, there were two (2) months during which the effluent temperature exceeded the required daily maximum 70 degrees F (71.6 degrees F were reported for both the months of July and August of 2012). Therefore, both flow rates and effluent temperature are primary concerns with the existing WWTP.

The apparent concern over the high flow rates experienced at the WWTP during wet-weather conditions were further analyzed to obtain an indication of the severity of the excessive infiltration/inflow problems with the existing Hamlet collection sewer system. Actual circular flow charts of recorded influent flow rates were obtained from the NYCDEP during 10 different wet-weather periods that occurred during the last three (3) year period of 2010, 2011, and 2012. Results of this evaluation are summarized in Table 2, where peak flow rates are compared to baseline (dry weather) flow rates, with the difference being indicated as the infiltration/inflow quantity. The infiltration/inflow quantities were grouped into three (3) categories by amount of total rainfall that occurred during the record period.

As seen in Table 2, an average infiltration/inflow quantity of 270,000 gpd was obtained for rainfall amounts of between 1.16 and 1.8 inches; an average of 680,000 gpd was obtained for rainfall amounts of between 1.95 and 3.4 inches; and an average of 950,000 gpd was obtained for rainfall amounts of between 5.19 and 5.97 inches. A higher than typical flow peaking factor of 6.6 was calculated from the available records (compared to a typical ratio of peak hourly flow to average daily flow of 3.3 from the Ten State Standards), along with an estimate of 85% of the flow conveyed to the Pine Hill WWTP during wet-weather conditions being due to infiltration/inflow. Therefore, these results confirm that the existing Hamlet collection system has serious excessive infiltration/inflow problems.

1.2.2.9 Proposed Flows and Loadings

The proposed future increase in wastewater flow rate at the Pine Hill WWTP is estimated at approximately 169,600 gpd (22,000 gpd from the BMSC expansion and 147,600 gpd from the Belleayre Resort) and is expected to have characteristics of normal sanitary wastewater (according to the Wastewater Preliminary Design Report prepared for Crossroads Ventures, LLC), which are:

BOD	200 mg/l
TSS	200 mg/l
Ammonia	40 mg/l

The flow rates at the BMSC and Resort will vary based on season and occupancy, as described previously in Section 1.2.2 of this report. The wastewater pollutant loadings are expected to vary proportionally with the flow rates, with the maximum additional loadings to the Pine Hill WWTP being as follows:

BOD	283 lbs/day
TSS	283 lbs/day
Ammonia	57 lbs/day

In addition to the sanitary wastewater, the wastewater from the Belleayre Resort will include the backwash from the Resort's water treatment plant (which will be removing arsenic from the groundwater source wells). The levels of arsenic that will need to be removed range from 0.031 mg/l at well K2 to 0.018 mg/l at well K3. The threshold concentration of arsenic that inhibits the activated sludge process is 0.1 mg/l, while the threshold concentration that inhibits the nitrification process is 0.34 mg/l. Due to the low arsenic concentration levels expected, the water treatment plant backwash is not expected to negatively impact the Pine Hill WWTP.

Table 1.2.1
Pine Hill WWTP Performance

Parameter	Type	SPDES Limit	20 Month Average	Worst Reported Value
Flow	Monthly Average	0.5 MGD	0.15 MGD	0.40 MGD
BOD5	Daily Maximum	5 mg/l	< 3.0 mg/l	> 3.0 mg/l
	Daily Maximum	21 lbs./day	<4.8 lbs./day	<12.1 lbs./day
	Minimum % Removal	85%	>92%	>81% *
TSS	Daily Maximum	10 mg/l	<1.0 mg/l	<1.1 mg/l
	Daily Maximum	42 lbs./day	<1.5 lbs./day	<4.0 lbs./day
	Minimum % Removal	85%	>98%	>95%
Settleable Solids	Daily Maximum	0.10 ml/l	<0.1 ml/l	<0.1 ml/l
pH	Minimum Maximum	6.5 8.5	7.3 8.0	6.9 8.2
Ammonia	Monthly Average 6/1 - 10/31 11/1 - 5/31	 1.1 mg/l 2.2 mg/l	 < 0.2 mg/l < 0.4 mg/l	 <0.2 mg/l 2.1 mg/l
Phosphorus	Annual Average	0.20 mg/l	<0.07 mg/l	-
Temperature	Daily Maximum	70^0 F	66.9^0 F	71.6^0 F *
Dissolved Oxygen	Daily Minimum	7.0 mg/l	9.6 mg/l	8.1 mg/l
Fecal Coliform	30 Day Geometric Mean 7 Day Geometric Mean	200/100 ml 400/100 ml	<1.4/100 ml <3.5/ 100 ml	<7/100 ml 45/100 ml
Total Residual Chlorine	Daily Maximum	0.10 mg/l	0 mg/l	0 mg/l

*Note: Two (2) SPDES discharge permit violations occurred in this specific parameter during the 20 month period from January 2011 through August 2012.

Table 1.2.2
Infiltration Inflow/ Quantities

Period	Total Rainfall (inches)	Baseline Flow (gpd)	Peak Flow (gpd)	Difference= I/I (gpd)	Average I/I (gpd)
6/27/11 - 7/4/11	1.16	50,000	390,000	340,000	270,000
4/11/11 - 4/18/11	1.2	100,000	340,000	240,000	
7/5/10 - 7/12/10	1.3	50,000	230,000	180,000	
5/16/11 - 5/23/11	1.4	100,000	440,000	340,000	
4/16/12 - 4/23/12	1.8	50,000	310,000	260,000	
3/22/10 - 3/29/10	1.95	300,000	950,000	650,000	680,000
3/8/10 - 3/15/10	3.4	100,000	800,000	700,000	
9/17/12 - 9/24/12	5.19	20,000	1,050,000	1,030,000	950,00
9/27/10 - 10/4/10	5.8	50,000	1,000,000	950,000	
9/5/11 - 9/12/11	5.97	180,000	1,050,000	870,000	
Average		100,000	656,000	556,000	

Flow Peaking Factor= 656,000 gpd / 100,000 gpd = 6.6

% I/I = 556,000 gpd / 656,000 = 85% during wet-weather conditions.

In summary, the future projected loadings of BOD and TSS to the Pine Hill WWTP are estimated as follows:

	BOD-5 day	TSS
Existing Average Loading Rate	65 lbs/day	133 lbs/day
Highest Monthly Loading Rate	112 lbs/day	687 lbs/day
Proposed Addl. Loadings	283 lbs/day	283 lbs/day
Total Avg. Influent Loadings	348 lbs/day	416 lbs/day
WWTP Design Loading Rate	500 lbs/day	420 lbs/day
Total Max. Influent Loadings	395 lbs/day	970 lbs/day

The wastewater temperature is expected to be similar to typical municipal wastewater (near 10 degrees C during the winter months and near 20 degrees C during the summer months), even with the discharge of the spa tubs at the Resort.

Although the proposed projects will significantly increase the existing daily flow at the Pine Hill WWTP from 150,000 gpd to a proposed future flow of almost 320,000 gpd, this represents only 64% of the design and permitted 500,000 gpd capacity of the Pine Hill WWTP. According to the Wastewater Preliminary Design Report prepared for Crossroads Ventures, LLC in February 2012, since the Pine Hill WWTP has sufficient treatment capacity and the loadings from the proposed projects are similar to conventional residential wastewater, the proposed projects will not adversely affect either the treatment capacity of the WWTP or its ability to meet its SPDES discharge permit.

1.2.2.10 Impact on Chlorine Use

The Pine Hill WWTP presently uses ultraviolet (UV) light disinfection (instead of chlorine) to disinfect the treated wastewater effluent before it is discharged to Birch Creek. The existing UV disinfection system has capacity to treat the wastewater flow from the proposed project in the future. Thus, it should not be necessary for the Pine Hill WWTP to use chlorine in its treatment process. Thus, there should be no impact to aquatic habitats due to the use of chlorine.

1.2.2.11 Potential Impacts On Birch Creek

Since the projected average daily flow to the Pine Hill WWTP in the future (upon implementation of the BMSC expansion and Belleayre Resort projects) of 320,000 gpd is less than the 500,000 gpd rated capacity of the WWTP, the additional flow is not expected to have any adverse impact on Birch Creek during dry weather conditions.

1.2.2.12 Proposed Equalization Tank Construction

It is well documented that the Pine Hill WWTP currently experiences high flows during wet-weather events due to excessive infiltration/inflow problems in the existing Hamlet sanitary sewer system. Even though improvements have been made to reduce the excessive infiltration/inflow flows, the problem persists.

~~The NYSDEC proposed construction of a 180,000 gallon equalization tank (as documented in the NYSDEC December 29, 2009 Engineering Report). Although that report stated that the equalization tank "could potentially be installed at the Pine Hill WWTP to attenuate flow variations coming into the plant", the preference of the NYCDEP is to construct the tank off the WWTP site.~~

~~Construction of the tank off the WWTP site would provide additional operational flexibility for the Pine Hill WWTP by storing in the tank higher strength (particularly TSS and ammonia) wastewater generated at the ski center than the diluted wastewater at the WWTP site (resulting from the excessive infiltration/inflow in the Hamlet sewer system). In addition, it may be difficult to site the proposed storage tank on the WWTP site due to site space constraints.~~

Crossroads Ventures, LLC has proposed construction of a storage tank with 56 foot diameter and 24 foot height that has a capacity of 420,000 gallons (with 12 inches of freeboard) that would be located on the Resort project site, and would be operated by the NYCDEP.

The proposed equalization tank would include a mechanical aerator mixer, odor control equipment, and a duplex submersible pump station. The equalization tank would normally be bypassed, with the pump station pumping all the wastewater generated at the resort to the Pine Hill WWTP. Wastewater would be diverted into the equalization tank during wet-weather periods of high flows.

~~Similar to the BMSC equalization tank, c~~Construction of the tank off the WWTP site would provide additional flexibility for the Pine Hill WWTP by storing higher strength wastewater generated at the resort than the diluted wastewater at the WWTP site (resulting from the excessive infiltration/inflow in the Hamlet sewer system). In addition, the existing WWTP site is space limited and it would be difficult to site the proposed storage tank on the existing WWTP site, according to NYCDEP staff.

1.2.2.13 Conclusions

The following conclusions were reached from performing this assessment:

1. The ongoing operation of the wells supplying the Ski Center as well as the testing conducted on the wells planned to supply the Belleayre Resort development indicate that no adverse impact to the groundwater resource is expected from the development.

2. The Pine Hill WWTP has adequate excess design flow capacity to treat the future wastewater flows from both proposed projects on an average daily flow basis (0.15 MGD existing + 0.17 MGD future = 0.32 MGD total, which is lower that the design flow capacity of 0.50 MGD. However, excessive infiltration/inflow in the Hamlet collection sewer system has resulted in the highest reported monthly average flow of 0.4 MGD at the WWTP.

3. If that situation is repeated in the future, the additional maximum daily flow of 0.17 MGD from the proposed projects would result in flows over the 0.50 MGD design capacity of the Pine Hill WWTP, which would result in a violation of the SPDES discharge permit. Therefore, control of influent flows into the Pine Hill WWTP during wet-weather conditions (via effective use of the proposed equalization tank~~s~~) is essential to preventing violation of the monthly average flow limit of 0.50 MGD in the future.

4. The Pine Hill WWTP design influent BOD loading of 500 lbs/day is higher than the projected future loadings to the WWTP with both proposed projects included on an average monthly basis (65 lbs/day existing + 283 lbs/day future addition from proposed projects = 348 lbs/day total) and highest reported monthly average loading basis (112 lbs/day existing + 283 lbs/day future = 395 lbs/day total). Therefore, the existing WWTP appears to have adequate excess capacity for treatment of the BOD loading proposed in the future with both projects included. However, with increased influent loadings

to the WWTP in the future, higher level of operator attention will be required to ensure violations of the SPDES discharge permit effluent limits do not occur.

5. The Pine Hill WWTP design influent TSS loading of 420 lbs/day is essentially equal to the projected future loading to the WWTP with both proposed projects included on an average monthly basis (133 lbs/day existing + 283 lbs/day future addition from proposed projects = 416 lbs/day total), but is significantly less than the highest projected monthly average loading (687 lbs/day existing + 283 lbs/day future = 970 lbs/day, which would result in a violation of the SPDES discharge permit. Therefore, control of the TSS influent loadings to the Pine Hill WWTP is essential to not violating the daily maximum TSS effluent limit in the future.

6. The maximum effluent WWTP temperature of 70 degrees F allowed by the SPDES discharge permit was violated during 2 months of the 20 month period analyzed, in addition the minimum required 85% BOD removal was not achieved during 2 months of the 20 month period analyzed.

7. Excessive infiltration/inflow in the Hamlet collection sewer system results in a very high wet-weather peaking factor of 6.6 (compared to typical ratio of peak hourly flow to average daily flow of 3.3 from the Ten State Standards), with an estimate of 85% of the flow conveyed to the WWTP being due to infiltration/inflow during wet-weather conditions.

8. With increased influent flows and loadings to the WWTP in the future from the proposed projects, the WWTP operators will be required to devote a higher level of attention to regulating the influent to the WWTP from the equalization tanks, in order to prevent any violations in the SPDES discharge permit requirements from occurring.

9. Sufficient capacity exists at the Pine Hill WWTP to allow the connection of the 19 residences in Highmount, which currently rely on individual on-site septic systems. However, since these residences are outside of the Pine Hill Sewer District, they may not be allowed to connect by the NYCDEP, nor are they are not required to connect to WWTP.

1.2.2.14 Recommendations

Based on this cumulative impact analysis of the BMSC and the Belleayre Resort project, the following recommendations are made:

1. The manhole replacement/rehabilitation program of the Hamlet sewer system started in July 2012 should continue to further reduce the amount of excessive infiltration/inflow conveyed to the Pine Hill WWTP during wet-weather conditions.

2. The following maintenance repairs (suggested by the NYSDEC) of the existing collection system at the ski center should be completed to address infiltration, inflow and flow measurement issues:

    - Replace the sewage flow monitoring device that measures flow from the BMSC to provide more accurate flow estimates and to improve access to the weir for maintenance.

    - Re-grade critical areas of direct surface runoff away from the collection system.

    - Divert stormwater runoff away from the existing wastewater holding tank manhole cover.

    - Repair or replace the asbestos concrete collection lines and block constructed manholes from the Overlook Lodge, adjacent buildings, and the nursery.

3. The existing Memorandum of Understanding (MOU) between the NYSDEC and NYCDEP (dated 3/5/99) which presently requires the BMSC expansion project to be designed and sized to convey a maximum daily flow not to exceed 35,000 gpd must be amended to the projected maximum daily flow of 60,000 gpd.

4. **The NYSDEC original recommendation to construct a 180,000 gallon equalization tank for the BMSC expansion project at either the Pine Hill WWTP site or the BMSC site has been further evaluated and will not be constructed.**

~~4. The NYSDEC proposed construction of a 180,000 gallon equalization tank for the BMSC expansion project on the Pine Hill WWTP site should be relocated to the BMSC site in order to realize the following benefits:~~

~~a. Storage of higher strength wastewater from the BMSC (particularly for TSS and ammonia) than after dilution with the excessive infiltration/inflow in the Hamlet collection sewer system would allow significantly more flexibility for the WWTP operators in regulating influent loadings to the WWTP.~~

~~b. Space at the Pine Hill WWTP is limited for construction of the equalization tank and it would be difficult to locate the tank on-site.~~

~~c. To minimize the increase in wastewater temperature during~~

~~storage in the tank during the summer months, the equalization tank should be constructed buried beneath the ground surface to the extent possible and any exposed surfaces should be painted white to reflect the sunlight.~~

5. An agreement must be executed between the NYCDEP and Crossroads Ventures, LLC for acceptance and treatment of the wastewater generated by the Belleayre Resort project.

6. Crossroads Ventures, LLC should construct the proposed 420,000 gallon equalization tank for the Belleayre Resort project that would be located on the Resort property for operation by the NYCDEP. This equalization tank should also be buried below ground surface to the extent possible and any exposed surfaces should be painted white to minimize wastewater temperature increases during the summer months.

7. The NYCDEP should investigate the high influent TSS concentrations that occur during the summer months, which may be due to first flush effects of the Village sewer system at the commencement of wet-weather events.

8. ~~The 180,000 gallon equalization tank proposed for the BMSC and~~**The** 420,000 gallon equalization tank proposed for the Belleayre Resort will provide **up to** three (3) days of storage at the maximum daily flow rate which will make operations of the WWTP during wet-weather conditions more complex. The available staff level should be evaluated by the NYCDEP to ensure adequate number of staff are available to effectively operate the wet-weather facilities consisting of the equalization tanks and main pump stations. **Under further review it was determined that this recommendation would not be implemented.**

9. The NYCDEP should evaluate the treatment capacity of each of the major unit treatment processes at the Pine Hill WWTP and determine if cost-effective modifications, including construction of a single equalization tank at the Pine Hill WWTP in lieu of individual equalization tanks at BMSC and the Belleayre Resort, or wet-weather operation strategies can be implemented to maximize treatment levels (particularly for TSS and ammonia) in order to prevent any future violations in the SPDES discharge permit from occurring.

10. An evaluation of the Pine Hill WWTP should also be performed to determine if a cost-effective alternative can be implemented to reduce the wastewater temperature increase during the summer months as the wastewater is conveyed through the treatment processes (possibly by decreasing the air temperature within the WWTP building/enclosure) in order to prevent exceedance of the 70 degrees F maximum effluent wastewater temperature limit from occurring in the future.

1.3 Water Resources

1.3.1 Surface Water Resources

This section describes the surface water resources of both the Belleayre Mountain Ski Center Expansion Project (BMSC) and the Modified Belleayre Resort at Catskill Park (BRCP) project and describes the cumulative impacts of the combined project for both on-site and off-site surface water resources.

Surface water resources of these projects are located within the upper headwaters of two watersheds, the Middle Hudson watershed (HUC 02020006) and the East Branch Delaware River watershed (HUC 2040102). The BRCP drains primarily toward the East Branch of the Delaware River and the BMSC drainage is split between the Middle Hudson and East Branch Delaware River watersheds. There are no large surface waterbodies within the project areas; the closest traditional navigable water, East Branch Delaware River, is located approximately 8.0 river miles west of the site. Additional major surface waterbodies that receive drainage from the project sites include the Pepacton Reservoir approximately 14 river miles downstream to the west; Esopus Creek, which is located downstream approximately 17.7 river miles east of the site; and the Hudson River, which is located approximately 30 aerial miles to the east of the project sites.

Surface water resources within the combined project areas include ponds, Pine Hill Lake, perennial and intermittent streams and wetlands. No waters within the immediate vicinity of the Belleayre Mountain Ski Center and the Modified Belleayre Resort at Catskill Park have been identified as Section 303(d) Impaired Waters or as waters not meeting state water quality standards (New York State Department of Environmental Conservation 2008). Potential impacts to surface water resources were described in Section 4.3 of the Belleayre UMP DEIS and Section 3.1 of the Modified Belleayre Resort at Catskill Park SDEIS.

1.3.1.1 Streams

Field surveys were performed to delineate streams and wetlands on both the Modified BRCP and BMSC the development sites. The majority of onsite waterbodies were identified as high-gradient, perennial or intermittent headwater streams of the receiving watersheds; Figure 1.3-1 presents the classified perennial streams and intermittent tributaries that were observed on and around the sites and lists the off-site waterbodies to which they connect. The majority of streams identified within the two project areas are connected to wetlands. Summaries of the characteristics of each individual surface waterbody identified during field surveys are provided in the Appendix AA of the BMSC UMP DEIS, in Section 3.2 of the Belleayre Resort at Catskill Park DEIS, and in Section 3.1 of the Modified Belleayre Resort at Catskill Park SDEIS.

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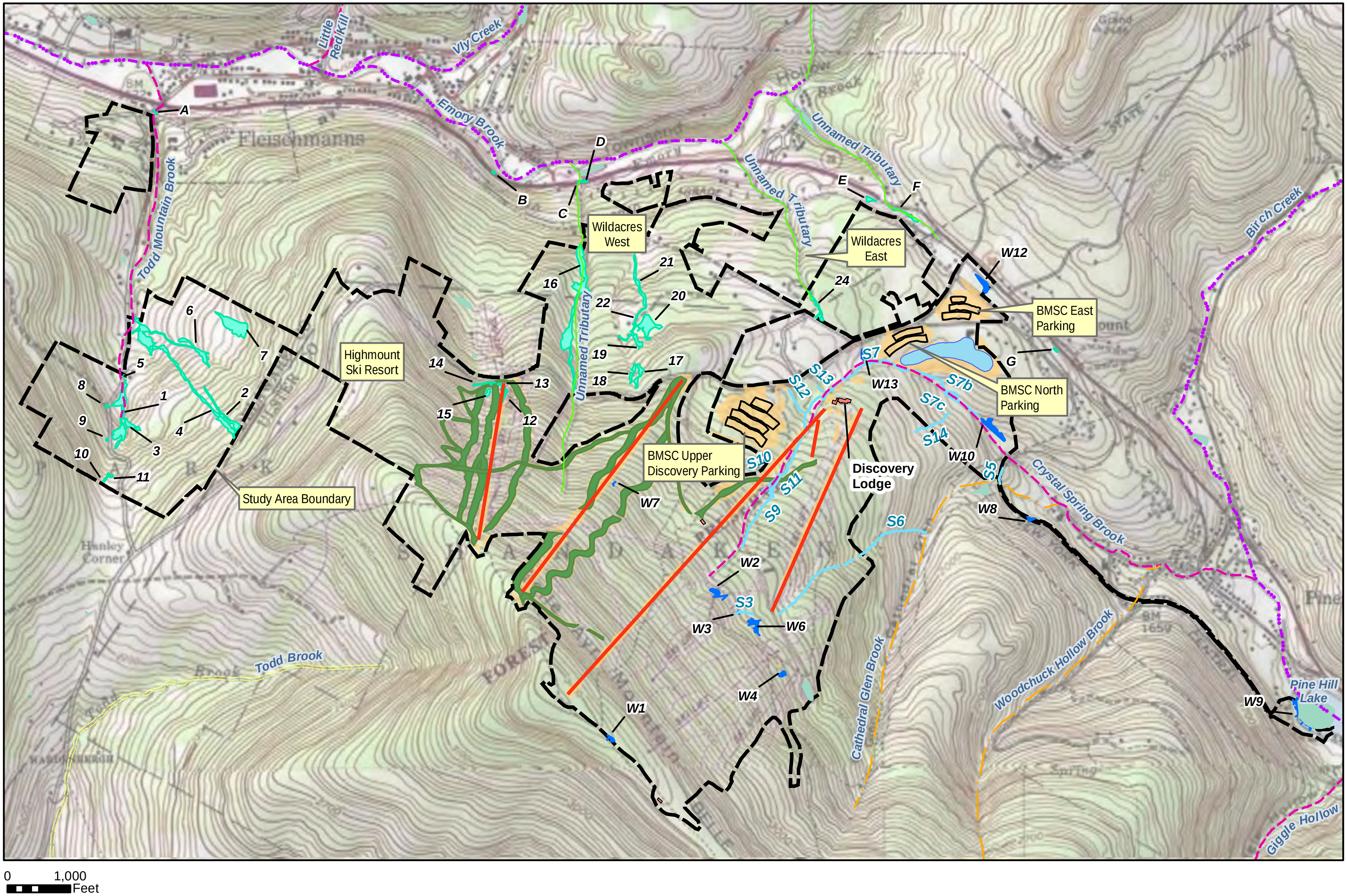


Belleayre Mountain Ski Center
Catskill State Park

Surface Water Resources
Topographic Imagery

Legend	
Proposed Ski Lift (July, 2009)	Proposed Trail Clearing (July, 2009)
Parking Lot	Proposed Tree Cutting Area
Cumulative Study Boundary	Delineated Wetland Polygon
Proposed Snow Making Pond (July 2009)	Modified Belleayre Resort at Catskill Park Delineated Wetland

Unclassified Delineated Stream

NYSDEC Stream Class

- B
- B(T)
- B(TS)
- C
- C(T)

Sheet No. 1

Figure 1.3-1 Surface Water Resources

Date: August 3, 2014

NYSDEC stream classification data were also reviewed to determine whether streams within the project areas are protected by New York State under Article 15 of the Environmental Conservation Law (ECL). NYSDEC uses this stream classification system to identify the value and uses of watercourses within the state. A protected stream is any stream or particular portion of a stream for which any of the following classifications or standards have been adopted by the Department of any of its predecessors: AA, AA(T), A, A(T), B, B(T), or C(T). These categories represent the designated best use of the stream. Class AA and A are potential or actual drinking water sources, Class B indicates a best use for swimming or fishing, and Class C includes waters that can support propagating fish populations. Streams designated with the modifier (T)- trout – also include those more specifically designated as (TS) – trout spawning. For protected streams, disturbance to the bed or banks requires a permit under Article 15 of the ECL. Perennial streams that have not been classified are considered to have the same classification and standards as the downstream reach to which they are directly connected. NYSDEC stream classifications for each on-site waterbody within the Site are also identified in Figure 1.3-1.

Three streams within the Modified BRCP development were identified to be headwaters of the East Branch of the Delaware River watershed. Two of the streams (both Unnamed Tributaries to Emory Brook) are intermittent tributaries of Emory Brook (Class B(TS)), which itself is tributary to the Bush Kill. The two unnamed tributaries that represent the main drainage pathways through the Wildacres development of the BRCP and were identified as Class B streams based on field surveys and stream monitoring data collected within the surface waters. Although these streams are classified as non-trout propagating streams, field evidence indicated that trout may exist in both waterbodies during high water periods and that classification of these tributaries could be upgraded to B(T) (SDEIS 3.1). The third stream, Todd Mountain Brook, is a direct tributary to Bush Kill, a headwater to the East Branch of the Delaware River that eventually empties into the Pepacton Reservoir. Todd Mountain Brook is categorized as an intermittent Class B(T) stream.

Only one stream within the BMSC development drains into the East Branch of the Delaware River watershed (see Figure 1.3-1): the western intermittent Unnamed Tributary to Emory Creek (identified above), which originates in the slopes of the Highmount Ski Area. No perennial streams were observed to drain into the East Branch of the Delaware watershed; however several perennial streams were identified to contribute to the Middle Hudson River watershed. Perennial streams include Crystal Spring Brook, Cathedral Glen Brook, Woodchuck Hollow Brook, and Birch Creek, as well as several unnamed tributaries that are located within the BMSC development.

Crystal Spring Brook is usually a permanent waterbody with hydrology generated by surface runoff and a seasonal high water table (Appendix AA BMSC-UMP DEIS). This waterbody discharges to Birch Creek, a locally important recreational trout fishery (Class B(TS)). Crystal Spring Brook is designated a Class B(T) stream, as supporting trout populations but not spawning; however the current conditions appear to be mostly unsuitable for fish species based on field observations and stream monitoring performed at several locations along the stream (Appendix AA BMSC UMP DEIS). Crystal Spring Brook waterbody has several unnamed tributaries that flow from the slopes of Belleayre Mountain, many of which are intermittent and are only likely to have flow during rainstorms and during the spring snow melt. Although these streams are intermittent during periods of the year, fish may spawn in the spring or fall when water is flowing. Therefore, intermittent streams identified within the BMSC site may potentially provide fish habitat and are considered for the purposes of this impact assessment as candidates for protection of the same level as trout (TS) streams (BMSC UMP DEIS Section 4.3.1). These intermittent unnamed tributaries observed within the BMSC development are located on state land within forest preserve and therefore were not considered during stream classification; however, regulation of these streams would be monitored through conditions presented on a Temporary Revocable Permit (TRP) or in the form of intra-agency memoranda. Construction in the vicinity of these streams would be scheduled during times when trout or trout eggs are not present and under no or low flow conditions.

Perennial tributaries to Crystal Spring Brook, Cathedral Glen Brook and Woodchuck Hollow Brook, are categorized as Class C and are waters supporting fisheries and are suitable for non-contact activities. These two streams contain trout species as indicated through field stream monitoring; however they have not been classified as (T) or (TS). These tributaries are up gradient of the proposed BM SC Project Area and are not anticipated to be disturbed during construction.

Impacts to Streams

Very little physical disturbance is proposed for the surface waters on the project sites. All road crossings and ski trail crossings of stream would be by bridges. Similarly, where golf cart and pedestrian paths cross intermittent streams on the BRCP development, elevated boardwalk crossings would be constructed. No new culverted stream crossings are proposed. To the extent practical, sediment and erosion controls would be implemented during construction to mitigate the potential impacts of construction on surface waters.

The BRCP development would require the replacement of an existing culvert under the driveway to the Marlowe Mansion and existing Wildacres Motel. The new culvert is designed as a steel, bottomless arch culvert that would span the currently culverted crossing that conveys the drainage of the intermittent Unnamed Tributary to Emory Creek through the Wildacres development to discharge south of Route 28 into Emory Creek. This bridge would span 24 feet and impact approximately 0.009 acres of jurisdictional wetlands. Additional work proposed as part of the Modified Belleayre Resort at Catskill Park development includes the construction of six golf cart passages over streams on elevated, boardwalk type crossing structures. Disturbance associated with the construction of these bridges within the wetland and stream corridors totals approximately 172 linear feet and covers an area of 0.04 acres. Helical support posts are proposed to be installed on either side of the stream so that no disturbance to the channel bed or banks would be required.

Additionally, a portion of the Modified BRCP development would require the installation of new water, stormwater and sewer pipes. These pipes cross approximately 263.5 linear feet of stream at multiple locations. To prevent any disturbance or impacts from pipeline stream crossings, directional drilling is proposed. Overall the modifications to the original BRCP SDEIS have reduced the number of stream crossings, including the golf cart and pedestrian passages, within the area of development from 20 to 14 and of the remaining stream crossings, none of which will cause significant long-term impacts to the bed or banks of the waterbody.

The BMSC development includes two proposed stream crossings for skiers along the additional ski trails proposed at Belleayre Mountain. The first stream crossing occurs in the upland area of the most western Unnamed Tributary to Emory Creek (Class B). The second stream crossing occurs where the Discovery Ski Connector Trail crosses Crystal Spring Brook (Class B(T)) near the Belleayre West Lift Base Terminal Area. The proposed crossings would use bridges to completely span the stream bed and channel in order to avoid narrowing the stream bed.

Construction of these crossings will require work in and adjacent to the streambed, creating the potential for temporary releases of sediment into the stream. Potential impacts of construction and operation on waterbodies may include siltation, increased turbidity, decreased levels of dissolved oxygen, increase warming, drainage from ski slopes and pollution from runoff material from roads, parking lots and tree clearing. During the winter months, runoff from roads and parking lots and ski trail maintenance could increase the salinity and alter the pH of the waterbodies within the project site. Best management practices (BMPs) would be used to control runoff and avoid these potential impacts. Additionally, dry season scheduling of the work would help to minimize the potential impacts to these waterbodies.

Erosion and sediment control measures would be implemented during construction to mitigate potential impacts on surface waters. These controls are described in detail in the BMSC SWPPP provided in Appendix E of the UMP DEIS and Appendix 19 of the Modified Belleayre Resort at Catskill park SDEIS. Figure EX 16 of the UMP DEIS shows the locations of the crossings resulting from the new BMSC trail installation and sediment and erosion control plans that would be implemented as shown in Figures EC1 through EC12. Sediment and Erosion Control measures for the Modified Belleayre Resort at Catskill Park are detailed on Figures L3.00 through L3.27. Measures include detailed phasing and sequencing of construction, perimeter controls, structural controls, temporary and permanent stabilization of channel banks and slopes and installation of sediment basins.

1.3.1.2 Wetlands

A total of 34 wetlands were delineated between the two projects totaling 18.64 acres (23 BRCP and 11 BMSC). Wetland delineation reports can be found in Appendix 14 of the Modified Belleayre Resort at Catskill Park SDEIS and in Appendix AA of the Belleayre Mountain Ski Center UMP DEIS. Please note that four wetlands located within the BMSC project area were also identified in the BRCP Wetland Delineation Report. Twenty-seven delineated wetlands were found to meet the criteria for classification as wetlands regulated by the Federal government (i.e. "waters of the United States") under Section 404 of the Clean Water Act. The other seven were found to be isolated and not subject to federal jurisdiction. The Wetland Delineation Reports detail the individual wetlands observed on sites and provide descriptions of types of existing vegetation communities present.

Twenty-three wetlands totaling 15.48 acres of wetlands and streams were delineated for the Modified BRCP. Of these 18 (13.02 acres) are considered jurisdictional. Wetlands within this area are associated with streams or hillside seeps or drainage ways. Many are intermittently flowing rocky stream beds with very little wetland vegetation. In other places the drainage way is at least several yards wide and has a more or less permanent flow of water or constant saturation of the soil near the surface. The majority of these wetlands are shallow emergent marshes associated with intermittent or rocky headwater stream. Forested and scrub-shrub wetlands were also identified.

Eleven wetlands (3.16 acres) were delineated within the BMSC development area. Wetlands are small emergent or forested wetlands, found along streams and at the edges of ski trails and parking lots. Wetlands located in the steep areas are primarily small emergent wetlands that flow downslope into small drainage swales and catch basins. One of the 11 wetlands do not have any hydrological surface connection to any other jurisdictional waters of the United States and are isolated pursuant to Solid Waste Agency of Northern Cook County (SWANCC) *v.* United States Army Corps of Engineers[1].

Of the 18.64 acres of wetlands and streams delineated within the BRCP and BMSC project site boundaries approximately 15.85 acres were found to meet the criteria for classification as wetlands and streams regulated by the Federal government (i.e., "waters of the United States") under Section 404 of the Clean Water Act. Seven wetlands, comprising of a total of 2.79 acres, were found to be isolated and not subject to Federal jurisdiction as they did not appear to have hydrologic surface connections to US waters. No NYSDEC-designated wetlands were observed within the natural resources study area. In addition to onsite

[1] The USACE included in its definition of "waters of the United States" those that "could be used as habitat by birds" and thus "are protected by the Migratory Bird Treaty." This regulation was invalidated by the United Stated Supreme Court in Solid Waste Agency of Northern Cook V. Army Corps of Engineers in January 2001. The Supreme Court ruled that this regulation exceeded the Corp's authority under the Clean Water Act. Today, millions of acres of wetlands in the United States do not fall within the jurisdiction of the Corps due to the outcome of this court case.

wetlands, 0.49 acres of wetlands and streams were delineated along the off-site water and sewer lines proposed as part of the development of the Modified BRCP development.

Impacts to Wetlands

According to the Modified BRCP disturbance to jurisdictional waters includes the hand clearing of 2.08 acres of trees at golf course playovers within the Wildacres development. Clearing of woody vegetation would be accomplished by using chainsaws and other hand-operated power equipment. Heavy machinery, such as bulldozers and backhoes, would not be used to conduct the clearing or to pull stumps; therefore, no disturbance of soil is anticipated for these areas. No wetland filling or excavation is proposed within the development of the Modified Belleayre Resort at Catskill Park.

Onsite wetland disturbances associated with the BMSC development includes the removal and reconstruction of an existing ski lift base at Highmount Ski Area near Route 49A. There are four wetlands in this area- however, only three would be impacted by construction. The new lift base is in the exact location of the previously existing base so permanent impacts are due to installation of the structure are not anticipated;, however grading within the wetland would be required during construction of this feature and may result in temporary impacts. Additionally, some of the ski trails proposed upslope of the Highmount Ski Base also cross delineated wetlands. No soil disturbance is anticipated along the slopes, but hand clearing of vegetation would be required. Table 1.3-1 presents a list of the wetlands that would be impacted by construction of the projects and identifies the type of activities that are proposed for each of the wetlands and the estimate areas of impacts. Reference Figure 1.3-1 for the location of impacted wetlands.

Table 1.3-1: Summary of Impacted Wetlands							
			Type of Wetland Activity and Estimated Impact				
	Isolated Wetland	Delineated Area	Hand Vegetation/ Tree Clearing	Highmount Ski Base	Elevated Bridge Crossing		Subsurface Directional Drill
Onsite Wetlands		Acres	Acres	Acres	Acres	Linear Feet	Linear Feet
1	NO	1.73					
2	NO	0.58					
3	NO	0.3					
4	NO	3.07					
5	NO	0.01					
6	NO	0.64					
7	YES	1.79					
8	NO	0.04					
9	NO	0.02					
10	YES	0.08					
11	YES	0.03					
12	NO	0.10		**0.040**			
13	NO	0.08	**0.005**	**0.075**			
14	NO	0.09	**0.004**	**0.024**			
15	NO	0.14					
16	NO	3.64	**0.80**		**0.025**	**110**	**40**
17	YES	0.37					
18	YES	0.22					
19	NO	0.38	**0.30**				
20	NO	1.26	**0.75**				
21	NO	0.56	**0.13**		**0.015**	**49**	**25**
22	NO	0.06					
24	YES	0.29	**0.10**		**0.003**	**13**	**33**
W1	NO	0.09					
W2	NO	0.03					
W3	NO	0.03					
W4	NO	0.13					
W6	NO	0.35					
W7	YES	0.01					
W8	NO	0.08					
W9	NO	1.00					
W10	NO	0.71					
W12	NO	0.42					
W13	NO	0.31					
Offsite Wetlands							
A	YES	0.03					**16.5**
B	YES	0.02					**16**
C	YES	0.02					**15**
D	YES	0.01					**13**
E	YES	0.15					**72**
Total Impacts			**2.089**	**0.139**	**0.043**	**172**	**230.5**

1.3.1.3 Cumulative Impacts

Cumulative Impacts will only be experienced within the East Branch of the Delaware River watershed (HUC 2040102). All jurisdictional wetlands and streams within this watershed are connected to the East Branch of the Delaware River via Emory Brook, Vly Creek and the Bush Kill.

The Modified BRCP project is primarily located within the East Branch of the Delaware River watershed. As described above there are five mapped streams and 19 wetlands/wetland segments. Thirteen wetlands are considered jurisdictional and six did not have any apparent surface water connections to waters of the United States thus were determined not to be jurisdictional.

The far northern portion of the BMSC development is also located within the East Branch of the Delaware River. Appendix AA of the BMSC UMP DEIS identified six wetland areas and one stream within this area. Four of the wetlands are considered jurisdictional and two were determined to be non-jurisdictional.

After review of existing mapping and reports provided by each project it was determined that cumulative impacts will occur. There is one intermittent unnamed stream that is a tributary to Emory Brook (Class B(TS)) mapped within the both the Ski Center and Resort areas. This stream is indicated as being within the "Highmount Brook Watershed" in the Modified BRCP DEIS and indicated as originating in the slopes of the Highmount Ski Area in the BMSC DEIS. According to the BMSC DEIS this stream occurs within an area where trail clearing and two ski lifts are proposed. Potential impacts to this stream as well as to downstream resources may include siltation, increased turbidity, decreased levels of dissolved oxygen, increased warming, and increased drainage from ski slopes.

Construction activities that may have an impact to wetlands and downstream within the East Branch of the Delaware River Watershed include trail clearing/non-mechanized tree and woody vegetation removal, installation of elevated bridges crossings for golf carts, subsurface directional drilling for water and sewer lines, and construction of the Highmount Ski Base.

In addition to impacts associated with construction within the wetlands, permanent impacts to wetlands could result from the potential increase in contributing surface water due to the additional snowmelt from the proposed ski trails and the runoff resulting from irrigation of the golf course.

Table 1.3.2
Impact Areas within the
East Branch of the Delaware River Watershed

	Impacts		Non-Jurisdictional
	Permanent	Temporary	
Hand Vegetation/Tree Clearing		1.98 ac Wetland	0.10 ac Wetland
Highmount Ski Base	0.139 ac Wetland		
Elevated Bridge Crossing		0.04ac Wetland, 159 lf Stream	0.003 ac Wetland 13 lf Stream
Subsurface Directional Drill		65 lf Stream	33 lf Stream

1.3.1.4 Permit Requirements

Wetlands within the modified BRCP have received a jurisdictional determination by the U.S. Army Corps of Engineers (issued on August 15, 2011 Appendix 14 of the Modified Belleayre Resort at Catskill Park SDEIS). This determination states that work for this portion of the project would not require an individual permit or mitigation plans. Included in this JD are the four wetlands that are included in the BMSC Wetland Waterbodies report (Appendix AA)

Wetlands and streams crossed by the BMSC development are currently under review for jurisdictional determination by the USACE. Based on the estimated total impacted area it is not anticipated that the project will require an individual permit or mitigation plan. This project would fall under the USACE Nationwide Permit 42 that allows for the "discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of recreational facilities." Permit thresholds under this permit are that wetland loss must be less than 0.5 acres and 300 linear feet of stream. A Pre-construction Notification (PCN) must be provided to and approved by the USACE prior to the beginning of the project. Mitigation is required as part of the PCN if impacts to federal wetlands exceed 0.1 acres the project would require an individual permit or mitigation plans.

A concept for the mitigation is shown in Figure 4.3-2 in Appendix AA of the BMSC UMP DEIS. Wetland 14, which is one of the wetlands regulated by the Army Corps of Engineers, is a low-lying drainage swale through an existing flat, grassy area. The drainage continues to an unnamed tributary of Emory Brook. The wetland plant community consists of (*Carex* spp.), flat-top fragrant goldenrod (*Euthamia graminifolia*), giant goldenrod (*Solidago gigantea*), *Agrostis alba*, purple-leaf willow-herb (*Epilobium coloratum*) and wild chervil (*Anthriscus sylvestris*). Grading would impact 0.024 acres of this 0.090-acre wetland.

The proposed mitigation area is a 0.219-acre grassy area north of Wetland 14. This represents a mitigation ratio of 1.6. The mitigation area shares a border with the area. It was selected because it is down-gradient and adjacent to the existing wetland, it is currently mowed lawn with a high likelihood of having deep organic soils, is free of invasive species, and is near the proposed construction area, so access by earthmoving equipment would be uncomplicated.

Successful wetland hydrology would be established by excavating the mitigation area to nine inches below the thalweg (lowest point) of the existing Wetland 14 drainage ditch. This ditch incept slows from the large area of Belleayre Mountain to the south. The proposed excavation would divert and detain the drainage, with the excavated material piled and graded into a berm on the southern margin of the proposed mitigation area. During excavation, the existing organic topsoil would be temporarily stockpiled and spread back onto the mitigation area to a depth of six to nine inches to support the growth of new wetland vegetation.

1.3.2 Ground Water Resources

A water-budget analysis was completed and reported in the BSMC DEIS (Appendices B, C, and D) and the Modified Belleayre Resort at Catskill Park SDEIS) (Appendix 22) to determine potential quantitative changes in ground and surface water resources that may result from various features of the proposed development.

According to the BMSC UMP DEIS (Section 4) there will be an approximate transfer of 52 million gallons of water from the Middle Hudson watershed to the East Branch of the Delaware as a result of snowmaking activities. This would likely cause an increase in runoff during snowmelt events, and potentially a greater increase in percolation, which provides additional water available for groundwater recharge. Surface water from Pine Hill Lake, the Upper Impoundment and Cathedral Glen Impoundment will be used for snowmaking at BMSC. In order to avoid having adverse impacts on stream habitats, withdrawals from the streams contributing to the reservoirs will only be allowed during flows in excess of the minimum stream flow.

The potable water supply system for the Belleayre Mountain Ski Center consists of a series of four main groundwater supply wells, and a fifth well that is dedicated to supplying the Sunset Lodge. The wells have been installed and maintained by the facility. The well field will continue to be utilized for the post-development water supply with modification to the number of wells and distribution from those wells as part of the planned development. One of the four main wells in the current water supply system is planned to be abandoned due to unresolvable turbidity issues. The fifth well which supplies the Sunset lodge and is not considered a part of the main groundwater supply system is to be abandoned. The Sunset lodge water supply is planned to be replaced by a 50,000 gallon storage tank that is fed by a booster pump installed in the groundwater supply system.

Existing potable water supply was analyzed using data from the Overlook and Discover meters for the period of December 2007 to April 2008 (BMSC UMP DEIS Appendix C). This analysis shows that at peak skier attendance the total metered flow was 36,720 gallons per day (gpd). The calculated groundwater demand for the entire ski facility following development is anticipated to be 60,000 gpd. The existing yields, determined by pump tests, of the three wells that will service the new development is 102 gallons per minute. Assuming pumping at 67% of well yield capacity, the maximum daily capacity of the existing well sources is 0.67 x (18+60+24) x 1440= 146,880 gpd. Therefore, the available supply remaining after the planned well abandonment far exceeds the anticipated demand. One of the supply wells yields the majority of the water supply capacity; 60 gallons per minute, the remaining wells are capable of providing for the necessary supply should the high yield well be offline. According to the BMSC UMP DEIS there is an anticipated increase in groundwater withdrawals however the current potable water supply system is capable of delivering the anticipated required demand without requiring additional wells to provide for the increased withdrawals from the aquifer.

For the Resort, new wells will be located outside of the Birch Creek drainage system and near the Village of Fleischmanns. Pumping and water quality tests demonstrated that these wells will provide sufficient potable water for the resort without the use of the Rosenthal wells and without adversely affecting the Village of Fleischmanns' water supply. Extensive testing has been completed including long duration pump tests at rates exceeding the necessary production rates for the well fields concurrent with monitoring of surrounding private and water supply wells that may be adversely affected by groundwater extraction for the resorts water supply. Some measurable affects were documented, but no long term adverse impact to aquifer utilization is predicted.

The calculated groundwater demand for the entire resort following development is anticipated to be 262,000 gallons per day with 100% occupancy. The total anticipated groundwater demand is approximately 111, 000 gallons per day, which represents 70% occupancy. The water supply for the facility is designed to meet the 262,000 gallons per day coming from two well fields labeled K and Q. The two well fields are separated by some distance in order to limit the localized impact to the aquifer that they withdraw from. The K well field consists of four wells, three wells that will be used for supply purposes, K2, K3, and K4. The K well field is capable of sustaining a long term average pumping rate of 157 gallons per minute, or 226,080 gallons per day. The Q well field consists of one well, Q1 that is capable of sustaining a long term average pumping rate of 45 gallons per minute or 64,800 gallons per day. The combined output of the two well fields is 290,880 gallons per day, which is greater than the maximum predicted demand.

The well fields must be capable of supplying the facility adequately with the highest production well out of service in order to satisfy the requirements of a water supply system. The K4 well produces a long term average production of 82 gallons per minute. The remaining wells in the supply system are capable of a long term average production of 195 gallons per minute, or 280,800 gallons per day, which is adequate to supply the maximum predicted demand for the facility.

Water that is planned to be used for irrigation will come from storm water routed to a lined irrigation pond and water from three wells located on the Wildacres portion of the site. Tests performed on the three wells proposed for irrigation are capable of sustaining an average total pumping rate of approximately 37 gpm for the entirety of the typical irrigation season and not adversely affect existing groundwater supplies or surface waters. No surface waters will be impounded in order to provide irrigation water at the Resort.

Blasting is proposed for both projects and both identify that they will conduct either a ‘pre-blast survey’ or a written blasting plan. However, it is recommended that projects coordinate blasting activities to limit and/or reduce any cumulative impacts to homeowner’s wells or groundwater resources. The ongoing operation of the wells supplying the Belleayre Mountain Ski Center as well as the testing conducted on the wells planned to supply the resort development indicate that no adverse impact to the groundwater resource is expected from the development.

1.4 Aquatic Resources

The aquatic resources identified within the BMSC project area and the Modified Belleayre Resort at Catskills Park area include streams, impoundments, and the various types of wetlands and the vegetation associated with wetlands. The surface waters that provide aquatic habitats are described in detail in Section 1.3 of this Cumulative Impact Assessment. Additionally, detailed wetland delineation reports are provided in Appendix 14 of the SDEIS and Appendix AA of the BMSC UMP DEIS. The majority of this section is the summary of Section 3.1 of the Modified Belleayre Resort at Catskills Park SDEIS describes potential impacts to aquatic habitats; Section 3.4 of the SDEIS describes potential impacts to aquatic ecology; the potential impacts from the proposed BMSC UMP actions to surface waters and aquatic habitat is provided in Section 4.3 of the DEIS; and the potential impacts to biota in the waters is described in Section 4.5 of the BMSC UMP DEIS. Wildlife surveys were performed on these sites to identify amphibian, reptile, and fish species that would utilize aquatic habitats within the Project area. This section evaluates the potential cumulative impacts of the project areas on the aquatic habitats and ecology.

Aquatic Habitats and Potential Impacts

All of the streams within the project areas may be used to some extent by wildlife as a source of drinking water. Additionally, watercourses also provide habitat for macroinvertebrates and amphibians, reptiles and fish that may use surface water when streams are flowing. Onsite streams were surveyed for existing hydraulic conditions, aquatic biota, and water quality in order to determine each waterbody’s stream classification using New York State Article 15 of the Environmental Conservation law (ECL). These classifications were used to identify the value and function of area watercourses, particularly to evaluate whether streams promote trout (T) or trout spawning (TS). Streams identified on site, as well as their classification, are described in Section 1.3 of this document. Although the majority of onsite streams were identified as intermittent and flow is anticipated to only be present during periods of continuous or heavy precipitation or snowmelt events, it was assumed that during these precipitation events onsite water bodies may potentially provide fish habitat (Section 4.3.1 of the BMSC UMP DEIS). Waterbody crossing activities within these surface waters, as well adjacent wetlands that are hydrologically connected to these waterbodies, were designed to provide adequate protection of aquatic biota by using thorough evaluation and selection of mitigative measures (see below).

A total of nine stream crossings are proposed along various intermittent streams located on the combined project site (see Section 1.3). Spanning these waterbodies would be required to construct pedestrian, skier and golf cart passages. Very little physical disturbance is proposed within the channel beds and banks of surface waters located on the Project Site; all road crossings and ski trail crossings of streams would utilize elevated bridges, except for one stream crossing at an access road on the Wildacres development that would require the replacement of an existing culvert with a large bottomless arch culvert. Any impacts that result from stream crossings are considered temporary.

In addition to stream surveys, wetland delineations were conducted onsite for both the BMSC development and the Modified Belleayre Resort at Catskills Park development. Wetlands are classified according to vegetative composition and hydrologic activity and are described in detail in Appendix 14 of the Modified Belleayre Resort at Catskills Park SDEIS and Appendix AA of the BMSC UMP DEIS. Activities within wetlands with an apparent hydrologic or functional connection to other waters of the U.S. are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA). A total of approximately 18.6 acres of wetland were identified within the Project boundaries as seen on Figure 1.3-1 of Section 1.3-1 Surface Water Resources - of which 15.8 acres are considered federally regulated (show connection to U.S. waters). No state wetlands were identified under Article 24 of the ECL (wetlands that exceed 12.4 acres in size or have locally significant ecological value). Wetlands were also delineated off-site where streams and wetlands crossed the proposed sewer and water pipelines. There were 5 identified stream/wetland crossings along this off-site route for a total of 1.3 acres.

As summarized in Section 1.3 of this document, cumulative impacts resulting from construction of the project were estimated at approximately 2.271 acres for the delineated onsite wetlands, the majority of which are associated with disturbance of forest or vegetation cover caused by construction. It should be noted, however, 2.089 acres of these disturbances are considered de minimus impacts. De mimimus impacts include activities such as tree clearing of wetlands for ski trails and golf course play over areas, as well as the minor impacts that would result from the installation of golf cart and pedestrian bridge installation, which would include hand clearing of vegetation. These temporary impacts are not regulated or require permitting as they do not involve dredging or filling in jurisdictional wetlands. The remaining 0.139 acres of impacts would result from the removal and replacement of the ski lift base at the proposed Highmount Ski Area as proposed in the BMSC UMP DEIS (Appendix AA of the BMSC UMP DEIS). This activity is covered under Nationwide Permit 42, as regulated by USACE. This permit allows “Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of recreational facilities.” The key provisions of this Permit are that impacts must be less than 0.5 acres and 300 feet of linear impacts. A Pre-construction Notification (PCN) must be provided. Mitigation is required as part of the PCN if impacts to federal wetlands exceed 0.1 acres. No offsite wetland impacts are anticipated as all crossings of wetlands for the water supply and sewer distribution pipelines would be installed via directional drilling.

Mitigation

Construction activities associated with aquatic habitats include the clearing of wetland and stream vegetation at golf course play-overs and ski trails, installation of pedestrian and golf cart bridges, installation of a new reservoir to increase water supply for snowmaking, and grading and building a new ski lift base at the Highmount Ski Area. Both the Modified Belleayre Resort at Catskill Park SDEIS and BMSC UMP DEIS present best management practices (BMPs) in Soil and Erosion Control Plans that provide mitigation methods to help reduce the impacts of sedimentation that may otherwise result from construction adjacent to surface waters and habitats. Additionally, any disturbed stream bank, impoundment and wetland areas would be restored and planted with native vegetation. These plans are provided in Appendix E of the BMSC UMP DEIS and Appendix 19 of the Modified Belleayre Resort at Catskill Park.

During construction most stream and wetland disturbances would be minor and temporary, except for approximately 0.139 acres of wetland that would require significant grading which is required in order to remove and replace an existing structure for the ski lift base at the Highmount Ski Area. This wetland would be replanted with appropriate vegetation to restore the disturbed area and return it to its ecological function. A conceptual mitigation plan that would create 0.219 of wetland to compensate for these impacts is described in Section 1.3 and illustrated on Figure 4.3-2 of Appendix AA in the BMSC DEIS. For any golf holes that cross fringing wetlands associated with the intermittent streams that run through the site, trees would be cut and removed from the wetlands by hand and there would be no removal of herbaceous vegetation within the wetlands and the soils would remain undisturbed (Section 3.4 of the Modified Belleayre Resort at Catskills Park SDEIS). To the extent possible, construction would be sequenced and conducted so that wetland and stream crossings coincide with normally dry periods when there is no flow in streams and when wetlands are at their driest. Stream monitoring for aquatic species is proposed during and after construction at several stream locations within the project area as discussed in Section 1.3 of this document and Section 4.3 of the BMSC UMP DEIS.

Potential impacts to aquatic habitats that may result from the operation of the projects (new ski trails, lodges and resorts, ski lifts, golf course, etc.) include continued maintenance of ski trails (periodic hand clearing of vegetation), potential impacts from use of fertilizer and pesticides on golf course turf, and the possible increase of solar exposure (thermal loading) of intermittent streams and wetlands. Emergent wetlands have been identified on and adjacent to the proposed ski slopes within the Highmount Ski area. These wetlands are typically found in conjunction with side-slope seeps and in topographic depressions that collect and hold water from precipitation and snow melt on the ski slopes and remain emergent because they are mowed and cleared of vegetation during peak recreational months. Maintenance of these ski trails would result in minimal impacts on wetlands during operation of the Project facilities (Section 4.5.3.1 of the BMSC UMP DEIS). The potential adverse impacts from the application of pesticides at the proposed Highmount Golf Course would be mitigated by a commitment to organic practices that avoid applications of toxic substances (Section 3.1.1 of the Modified Belleayre Resort at Catskills Park). If unusual circumstances would dictate the use of chemicals, a special exemption would have to be requested for one-time applications. The Organic Landscape Management Plan is provided in Appendix 15 of the SDEIS.

An additional long-term impact that may result from the construction and operation of the Project is the possible increase in temperature of the streams resulting from a reduction in upland forest cover and stream cover in the wetland and stream locations identified as golf course play-over areas. To mitigate potential impacts from thermal loading to the aquatic habitats, any vegetation that is proposed to be disturbed in proximity to the intermittent streams would be replaced with plantings to provide shading of the stream/wetland, while allowing a golf shot to be played over this area. This will be accomplished by placing appropriately sized coir logs along the existing stream banks and planting the coir logs with willow cuttings. Additionally, regular hand cutting maintenance of the vertical growth of the willow sprigs will allow for the development of a more horizontal willow canopy over the stream/ or wetland (Section 3.1.5 of the Modified Belleayre Resort at Catskills Park SDEIS).

Another mitigation measure for thermal loading is designed into the stormwater management systems for the Project as discussed in Section 4.3 of the BMSC UMP DEIS and Section 3.1.1 of the Modified Belleayre Resort at Catskills Park. The proximity of the proposed BMSC development to trout streams and the potential for thermal impacts on these habitats were considerations in the design of stormwater runoff control. The use of micropool extended detention ponds (not stormwater ponds or wetlands) are proposed to avoid impacts to aquatic biota from temperature stress. Using smaller impoundments such as micropools store runoff from storms for shorter periods than conventional detention ponds, thereby minimizing heating from sunlight. They do not retain water and drain to dry conditions after a storm. Additionally technologies such as porous pavement, dry swales, and surface sand filters are also part of the stormwater treatment design that are used to promote infiltration and subsurface treatment, reducing the potential for increases in temperature of stormwater discharges to wetlands and streams. Stormwater management measures are presented in Appendix 19 of the Modified Belleayre Resort at Catskills Park SDEIS and Appendix E of the BMSC UMP DEIS. Since trout are very sensitive to temperature water quality monitoring, including thermal measurements, is proposed for Crystal Spring Brook and Birch Creek, which have been identified as potential significant trout habitats (Section 4.3.1 of the BMSC UMP DEIS). It is not anticipated that the proposed construction would have any statistically significant impacts on flow, temperature, or macroinvertebrate distribution; however if any impacts are detected during or after construction additional mitigation and restoration will be evaluated.

1.5 Terrestrial Wildlife

1.5.1 Introduction

Separate analyses of potential impacts on terrestrial resources were conducted for the BMSC UMP DEIS (Section 4.5) and the Modified Crossroads Resort at Catskill Park SDEIS (Section 3.4.). Neither of these documents concluded that there is a potential for significant impacts to terrestrial resources from the proposed projects. Additional information about baseline conditions at the Modified Crossroads Resort at Catskill Park is available in Appendix 23, Wildlife Survey Results and Appendix 21, the Invasive Species Control Plan. Cumulative impacts would result if the magnitude or duration of the combined impacts would result in a significant loss in habitat or disruption of movement patterns of populations of wildlife. Another type of impact would result if the combined projects would result in a significant increase in populations of nuisance or invasive species. This section evaluates whether any adverse impacts from both projects could, when considered together, become significant.

1.5.2 Construction Impacts

Section 3.4 of the Modified Crossroads Resort at Catskill Park SDEIS describes potential impacts to 233.4 acres of terrestrial habitats of the 793.3 total acres within the project boundary. Almost all of this (228.1 acres) is the clearing of forests for the resort development. Construction of the Modified Crossroads Resort at Catskill Park would clear 29% of the existing land.

Section 4.5 of the Belleayre Mountain Ski Center UMP describes potential impacts to 100.8 acres (96.1 on the Belleayre property and 4.7 in the Highmount property), most of which is currently successional northern hardwood community. Small sections (< 1 acre) of red maple hardwood swamp and shallow emergent marsh would be cleared to accommodate stream crossings as described in Section 1.3. The tree clearing that would occur during construction for the BMSC UMP would represent 5% of forest of the 1,884.6 total acres of forest at the BMSC.

The cumulative impacts of construction of both projects would result in the clearing of 334.2 acres. This represents 12% of the 2,677.9 acres of the combined projects. The clearing would be conducted to provide new ski trails, utilities, and the buildings and roads associated with new developments.

Large, mobile wildlife such as bear, deer, raccoons, etc. would not face direct mortality during construction because of their natural avoidance of noise from equipment, tree clearing, increased vehicle traffic, infrastructure construction, etc. Indirect mortality due to the permanent loss of habitat could occur, but these species are locally abundant and populations would not be adversely impacted by the proposed construction. Some limited mortality of less mobile species (e.g., rodents, snakes) may occur during the course of construction.

Tree clearing could disrupt wildlife travel corridors for species such as deer and bear. However, the proposed new ski slopes are nearby and parallel to existing trails, so it is unlikely established wildlife corridors occur in these areas.

Another consideration was the cumulative effects of forest fragmentation.. Forest fragmentation occurs when parcels are removed from forest cover, breaking up a large tract into smaller forested areas. There are species of birds and mammals that require large, unbroken areas, and they will not approach the edge of the forest. Fragmentation and the edge effect would increase habitat for wildlife such as deer and raccoons and decrease habitat for forest nesting birds that prefer forest interiors. Each project evaluated the potential for forest fragmentation and concluded that because the project is at the edge of the forest now, it would not add new forest edges, but instead move the edge deeper into the forest. This adverse impact would reduce the total amount of forest, but not add to the length of the edge.

The proposed impacts are consistent with activities such as ground disturbance and recreation that already occur throughout the study area. Ground is disturbed by trail maintenance, mowing, and grooming the slopes. It is anticipated that wildlife in the study area are accustomed to disturbance of this nature and would either relocate to other adjacent suitable habitat or, upon cessation of construction, make use of areas temporarily disturbed as re-vegetation takes place.

Breeding bird and bat populations are not expected to be affected significantly by construction of the project. If construction begins before the breeding season, it is anticipated that breeding birds would likely avoid areas during the active construction phase. If construction begins during breeding season, breeding birds would either be accustomed to disruption of this nature or they would relocate to other adjacent suitable habitat. Indirect impacts on breeding birds would be minimal and involve some habitat alteration in association with the construction of parking lots, and structures. These potential impacts are similar to other disturbances in the area.

1.5.3 Operational Impacts

The potential impacts to terrestrial forest ecology during operations were evaluated for both projects. The largest adverse impacts of the projects would occur from the land clearing operations described above during the construction phases. Long term impacts to wildlife would be reduced, as local populations would quickly adapt to the new habitat boundaries. Both projects concluded that there would be some adverse impacts from the lost habitats to terrestrial mammals, amphibians (frogs, toads, and newts), snakes, and birds. These potential adverse impacts would be partially offset by the replacement of the forests with open ski slopes, which provide forage and habitat for birds that prefer the ecological gradient (ecotone) between forests and fields, and the feeding habitat provided by open grasslands for predatory birds. No rare, threatened, or endangered species would be impacted by either project or by the cumulative impacts of both projects.

Other impacts to wildlife could occur by increased traffic on the roadways. This could result in more road-associated mortality. Although unpleasant, potentially damaging to property, and risky to people, the bulk of the new traffic from the proposed developments would occur during daylight hours when wildlife encounters are infrequent. It is not feasible to predict the frequency of such encounters.

In addition to adverse impacts on wildlife, the potential to increase the presence of invasive species could increase. In particular, the Wildacres Golf Course associated with the Modified Crossroads Resort at Catskill Park could create habitats for invasive plant species. The clearings at the BMSC could have similar problems. A plan to avoid, minimize, and if necessary control weed species is described in Appendix 21 of the Modified Crossroads Resort at Catskill Park SDEIS. Similar management practices would be applied at the BMSC.

There is a potential for significant nuisance wildlife issues to arise. Possible nuisance issues include black bears feeding on garbage and Canada geese occasionally found nesting in shrubbery near buildings or parking lots, demonstrating aggressive behavior toward people while defending their nesting territory. In addition, high geese concentrations around shallow water areas may elevate bacteria levels via fecal coliform. Mice and rats can become associated with food services and buildings. BMPs would be included for managing or avoiding conflicts between humans and wildlife that may arise from increased human/wildlife interaction. For example, mitigation measures such as locking dumpsters will prevent black bears from feeding on garbage, and good hygiene and trapping will be required to control nuisance rodents.

1.5.4 Mitigation

Both projects are proposing design elements that avoid and minimize impacts to wildlife. The Invasive Species Plan (Appendix 21, Modified Crossroads Resort at Catskill Park), is intended to assure that the Wildacres Golf Course and other cleared areas uses best practices to avoid the use of herbicides and prevents the growth of invasive plant species. To the extent that is feasible, the proposed new buildings would be clustered in small areas. Clustering minimizes forest fragmentation and reduces disturbances from roads and utilities. The proposed LEED certification of buildings at both projects would support unobtrusive designs and landscaping only with native vegetation. Maintenance of buffers around streams at the BMSC, and extensive utilization of BMPs would mitigate impacts to wildlife. Latching bear-proof trash bins would reduce nuisance bear encounters, and vegetative buffers around streams and ponds would avoid the creation of habitats for nuisance geese populations.

1.6 Transportation and Traffic

All of the Existing, future No-Build and Build condition evaluations for the study areas for each project are included in the Belleayre Mountain Ski Center (BMSC) UMP DEIS (Section 4.6 and Appendix AD) and the Belleayre Resort at Catskill Park SDEIS (Sections 3.5 and 4.7 and Appendix 11). This evaluation only discusses the cumulative impacts of the two projects.

The estimated time of completion (ETC), or year of opening, of the BMSC UMP and Belleayre Resort for the purposes of this analysis is 2015. The BMSC UMP DEIS discusses that the ETC year of the UMP was revised to 2018 subsequent to the completion of the traffic projections and analysis for the future conditions. However, because the background growth was conservatively estimated and the Route 28 corridor has seen little to no growth in the last ten years, the evaluations of the 2015 (ETC) year and subsequent design horizons (ETC+10 and ETC+20) are still applicable for the revised ETC year of 2018. See Section 3.1 of the BMSC UMP DEIS Appendix AD for a more detailed discussion of the study area volume trends.

The site generated trips for both projects were reviewed:

- BMSC UMP - Trips were estimated based on traffic data collected at the existing site on a peak operating day, and applied to the planned peak attendance level for the UMP (9,000 patrons).

- Belleayre Resort at Catskill Park - Trips were estimated for the project based on the Institute of Transportation Engineers (ITE) *Trip Generation, 8th Edition* data for the component land uses, with applicable adjustments to account for the interaction between the Resort and BMSC that are consistent with ITE recommended practice, including considerations of planned shuttle service and ski-in/ski-out amenities.

It is noted that the conditions analyzed are for a "worst-case" condition that represents the Saturday PM peak hour when patrons are exiting BMSC on the Martin Luther King, Jr. holiday weekend. This is viewed as the peak weekend at the ski center and was analyzed to perform a conservative evaluation of the operations.

The new site generated trips for both sites are summarized in Table 1.6-1

Table 1.6-1 Combined Site Generated Traffic; Saturday Peak Hour

Project	Enter	Exit	Total
BMSC UMP	110	626	736
Belleayre Resort	98	70	168
Total	**208**	**696**	**894**

1.6.1 Potential Impacts

1.6.1.1 Study Area Intersections

The traffic for the combined Build condition (refer to Appendix B of this document for traffic volume figures) was evaluated to determine the traffic impacts related to the BMSC UMP DEIS and Belleayre Resort SDEIS. The combined Build condition was evaluated for the ETC year of 2015. Based on this analysis, a level of service (LOS) was assigned to each intersection and roadway segment for the conditions analyzed using criteria set forth in the Highway Capacity Manual 2000 published by the Transportation Research Board. Descriptions of the LOS criteria can be found in Appendix B of this document. The results of the 2015 No-Build (from the BMSC UMP DEIS Section 4.6) and Combined Build analyses are summarized in Tables 1.6-2 and 1.6-3.

Table 1.6-2 - Level of Service Summary: Intersections

Intersection	2015 No-Build	2015 Combined Build
NY Route 28 & NY Route 212	C	F
NY Route 28 & NY Route 214	C/D	F/F*
NY Route 28 & NY Route 42	C	F
NY Route 28 & CR 47	C/B	F/C
NY Route 28 & Main Street	C	E
NY Route 28 & CR 49A	F/E	F/F
NY Route 28 & CR 38	C	C
CR 49A & Van Loan Road	-	F/F
CR 49A & North Parking	-	F
CR 49A & Gunnison Road / Lower Driveway	D/E	F/F
CR 49A & Discovery Lodge	C	F
CR 49A & Upper Discovery Parking	-	F
CR 49A & Overlook Road	B	F/F

*LOS is provided for both minor street approaches

Table 1.6-3 - Level of Service Summary: Roadway Segments

Segment	2015 No-Build	2015 Combined Build
NY Route 28: NY Route 209 to NY Route 375*	A/B	B/B
NY Route 28: NY Route 375 to NY Route 212	D	E
NY Route 28: NY Route 212 to NY Route 214	C	D
NY Route 28: CR 38 to NY Route 30	C	C
CR 49A: South of Belleayre Access	C	C

* This is a multilane segment, therefore LOS is provided for each direction (EB/WB). All other segments are analyzed as two-lane segments.

The analysis of the cumulative development indicates that the LOS for traffic entering or crossing NY Route 28 from the intersecting side streets will generally be LOS E or LOS F during the worst-case condition of a peak attendance day at the BMSC. The LOS F designation is based on the delay experienced per vehicle on the stop-controlled approach. However, some of these intersections still operate with acceptable volume to capacity ratios, indicating that there is reserve capacity (i.e. the hourly volume is less than the hourly service rate). Refer to Section 2.2 of Appendix B of this document for a detailed discussion on this condition.

Additionally, these operations reflect the peak season conditions during the peak hour of the day, which is not a reasonable design condition. Delay during off-season and off-peak times of the day would be much less. A sensitivity analysis of the site generated traffic at BMSC was completed to test the operations if the ten highest attendance days of the year were disregarded. The mitigation measures are identified in 1.6.2.

1.6.1.2 Growth Inducing Impacts

The construction and operation of the proposed BMSC UMP and Belleayre Resort projects is anticipated to attract local and regional tourists to the area. To support the increase in travelers through the corridor, it can be expected that both projects will induce growth of other supporting uses, such as hotels, restaurants, shops and gas stations, along the NY Route 28 corridor. These developments would be subject to local site plan and zoning approvals, DOT highway access permits, and NYCDEP Watershed Regulations

The potential impact of the growth of development along the corridor would be the increase of access driveways and traffic volume, which have the potential to introduce operational and safety issues. Higher driveway/roadway densities along a corridor can reduce the overall capacity.

Limiting or consolidating access to future development will help maintain the operational capacity of NY Route 28. It would be beneficial for a corridor access management plan to be completed by NYSDOT or other local agency in anticipation of the induced growth developments that can expected in the area. This would help manage the development requests and provide a basis for site access approvals.

1.6.2 Mitigation Measures

1.6.2.1 Study Area Intersections

A sensitivity analysis was conducted for a reduced attendance condition at BMSC that would represent the 11th highest attendance day of the year (i.e. disregarding the top ten highest attendance days). This analysis was utilized and the site generated traffic for the Belleayre Resort at the intersections of NY Route 28 & NY Route 214 and NY Route 28 & CR 49A was also added to determine the combined operations for this condition. Given that only ten ski season days are estimated to experience higher attendance than this condition, it is recommended that the mitigation improvements are considered for this reduced condition rather than the peak attendance day.

For the year of opening (2015), it is recommended that at the intersection of NY Route 28 & CR 49A, a westbound left-turn lane, northbound right-turn lane and a traffic signal are provided. Installing the turn lanes and signalized control at the intersection of NY Route 28 & CR 49A will provide safe and efficient operations for most operating days at BMSC and Belleayre Resort, and will limit delays and improve safety at the intersection on the peak operating days.

Refer to Section 3.0 of Appendix B of this document for a detailed description of mitigation measures.

1.6.2.2 Site Driveways

The documentation for both the BMSC UMP and the Belleayre Resort included a sight distance evaluation along CR 49A and at the proposed driveway intersections. Both identified improvements to be implemented to improve sight distance for drivers along the CR 49A corridor and drivers exiting driveways from both sites. The improvements identified are summarized below:

- Vegetation clearing and/or embankment grading for the intersections with:
    - Wildacres Front 9 Village driveway
    - Lower Discovery Lodge Parking
    - Highmount Spa Resort driveway
    - Wildacres Upper Access driveway

- Intersection Warning Signs:
    - Wildacres Front 9 Village driveway
    - North Parking
    - Upper Discovery Parking
    - Discovery Lodge

- Wildacres Resort Main Access driveway/BMSC Overlook Road: Realignment of CR 49A to improve vertical and horizontal curves to accommodate pedestrian crossing between the Resort and BMSC.

- Wilderness Activity Center driveway: relocate existing driveway 300 feet to south or restrict movements to right-in/right-out.

A comprehensive corridor signing plan should be developed to ensure that the recommended warning signs do not overlap or conflict with each other.

1.6.2.3 Traffic Demand Management

Traffic demand management (TDM) strategies are being incorporated into the project proposals that will reduce the vehicular trips between the two sites as follows:

- Local shuttles: The TIS for the Belleayre Resort discusses the use of a shuttle system to transport skiers between the Resort and BMSC. This assumption was used in the trip generation estimates for the Resort and will greatly reduce the number of vehicular trips made between the two sites.
- Ski-in/Ski-out: The documentation for both projects describe ski-in/ski-out accommodations, which allow Resort users to get right onto a ski lift without driving to BMSC. This also was an assumption used in the Resort trip generation estimates.

Other traffic demand and event management strategies should be implemented to distribute the traffic load on the system.

- Public Transportation: Expand existing Ulster County Area Transit free service to BMSC from Kingston to provide additional capacity on high-attendance ski days and to serve other key local skier origins within the UCAT service area (Poughkeepsie, New Paltz, Newburgh, Wallkill, Saugerties).
- Private Bus Companies: Expand packages available to include other regional skier origins besides NYC and to be available more frequently.
- Operations
  - BMSC: Staggering the closing times of different ski lifts and/or keeping other lodge facilities open longer after the lifts are closed.
  - Belleayre Resort: Offering different check-in/check-out days for the fractional units (spread out over Friday, Saturday and Sunday rather than all on Saturday) and offering a variety of weekend packages for the hotel that would include arrivals and departures on off-peak days (Friday and Monday).
- Driver Information: Providing variable message signs at key locations in the corridor.

1.6.2.4 Aviation

Neither the DEC UMP nor the Belleayre Resort has proposed construction of any airport facilities. Any visitors arriving by airplane would rely on the existing airports in the region including Albany International, Stewart International, Sullivan County Airport and the Kingston–Ulster Airport.

1.7 Visual

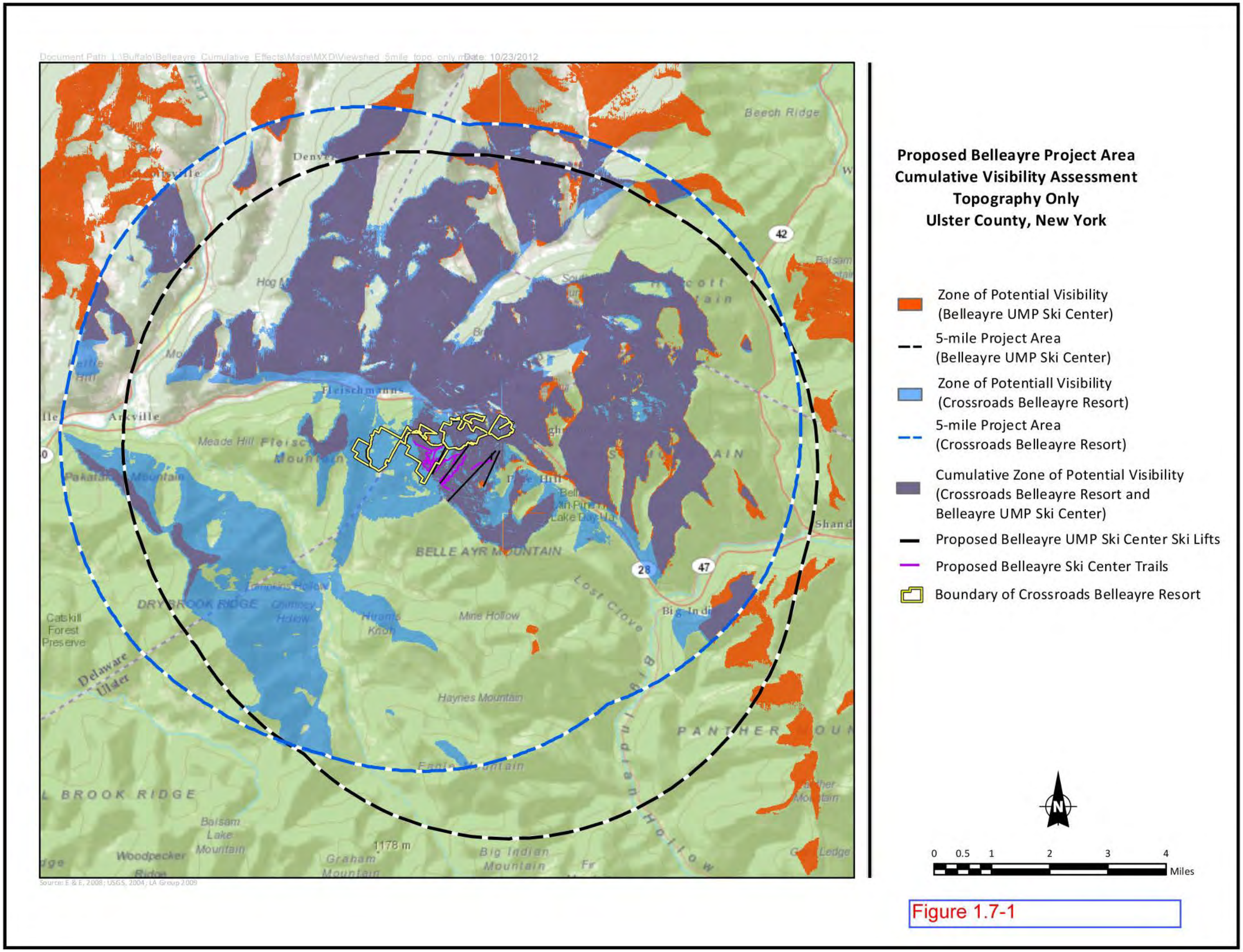
A visual impact assessment (VIA) of the proposed expansion of the Belleayre Mountain Ski Center (BMSC) was prepared for the BMSC UMP DEIS. As part of the Modified Belleayre Resort at Catskill Park SDEIS for the Modified Crossroads Resort at Catskill Park (Resort), a VIA was completed to assess the visual impacts of that project Both VIAs were conducted in accordance with NYSDEC Program Policy "Assessing and Mitigating Visual Impacts" (NYSDEC 2000). An analysis of the combined effects of these two projects has been conducted to assess the cumulative visual impacts of the projects.

Using computer modeling and balloon studies, the project's VIAs provide viewshed mapping and described the results of visibility analysis within a 5-mile radius study area. Prominent viewpoints outside that area from the numerous mountain peaks in the region were also considered. The VIAs also provided an inventory of local and statewide significant aesthetic resources, described the existing visual/aesthetic character of the landscape and characterized viewer groups. Daytime and nighttime simulations of both projects were created to demonstrate the views from the surrounding landscape. This research and the visual tools were used to aid in the determination of significance of the visual and aesthetic impact by evaluating project consistency/contrast with existing landscape components, effect on user groups and mitigation measures as suggested in the DEC's Program Policy.

1.7.1 Zone of Visibility

Assessing the cumulative visibility of the projects involved the evaluation of the VIA Reports of both the BMSC and the Crossroads Resort and determining the combined effects of the projects. The zone of visibility influence (ZVI), or viewshed maps, created for both projects have been analyzed to determine the extent of the area where either project, or both, may be visible within a 5-mile radius. Digital terrain modeling was used for each project to identify the potential viewshed areas, and the combined results of the modeling demonstrate the viewshed of the combined development. Figure 1.7-1 shows the overlapping ZVI of the ski center and the resort based an evaluation of topography only, no vegetation, and represents the most conservative potential for visibility of both or either projects.

As the ZVI map of topography only provides an unrealistically conservative view of the potential for visibility, each of the VIAs also provided a ZVI that considered how views are blocked by vegetation. The Crossroads Resort analysis considered the tree canopy throughout the 5-mile radius, while the BMSC analysis conservatively considered only the tree canopy on BMSC property. Figure 1.7-2 shows the combined ZVIs to indicate where visibility of either or both of the projects is likely.



Proposed Belleayre Project Area - Cumulative Visibility Assessment - Topography Only - Ulster County, New York

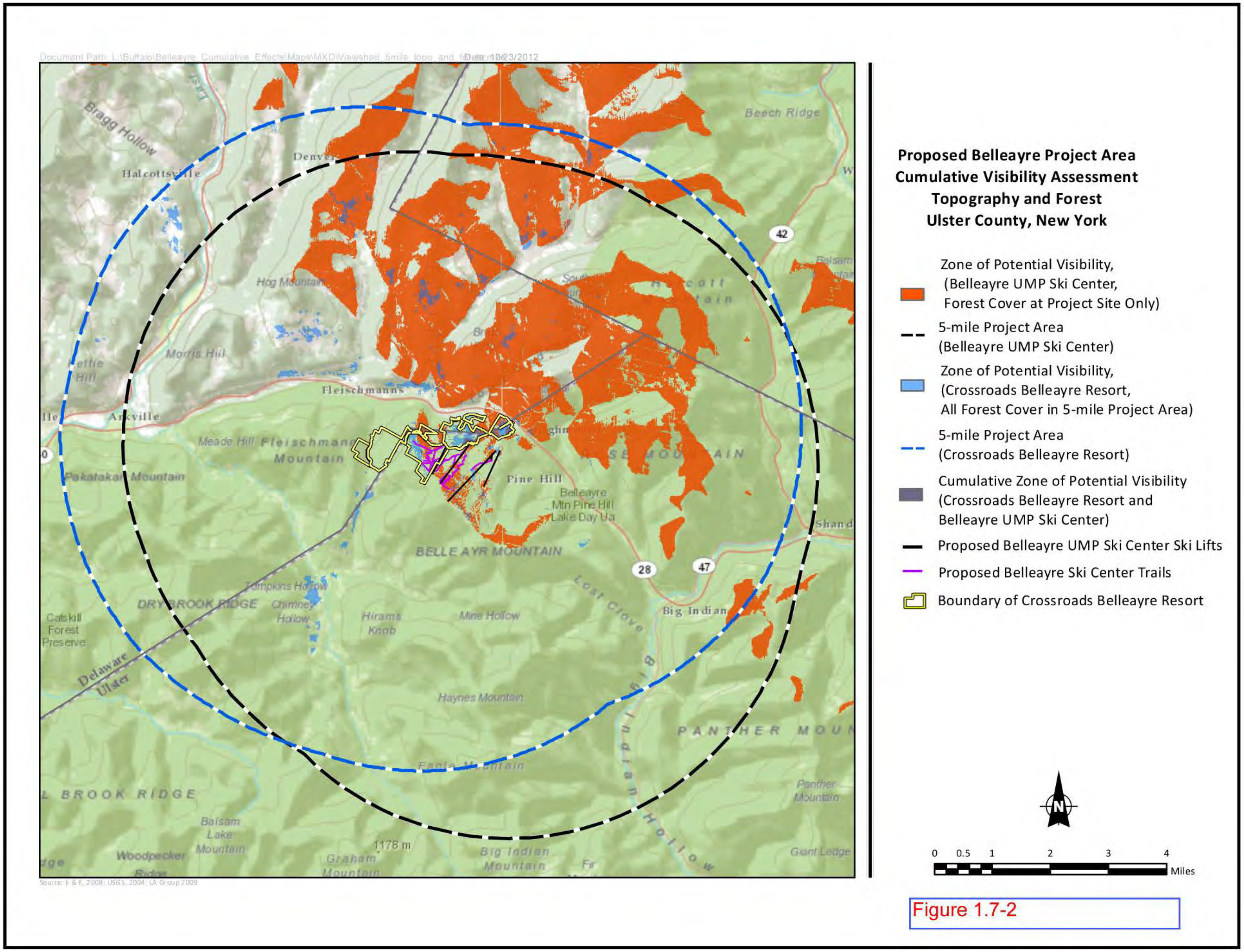


Figure 1.7-2

Proposed Belleayre Project Area - Cumulative Visibility Assessment - Topography and Forest - Ulster County, New York

The 5-mile radius areas surrounding either project are almost the same areas, although the 5-mile radius around the Resort extends farther to the west, while the 5-mile radius surrounding the BMSC is farther to the east. While the potential for visibility of the projects overlap from some locations, from most views, the visibility varies because of the different locations of the two projects. Most of visible facilities of the BMSC are located along the north ridge of Belleayre Mountain, facing northeast. Most of the Resort facilities will be located at a lower elevation on Belleayre Mountain, or in the case of the Highmount area, will be located facing northwest. This lower location and profile means views are usually blocked by vegetation surrounding the project site and between the viewer and the project, as indicated in the viewshed analysis.

In addition to the viewshed analysis of the 5-mile radius from the project, the BMSC VIA analyzed the potential visibility from specific locations as distant as 25 miles away. The Catskill Park has 98 peaks more than 3,000 feet high and spans four counties: Delaware, Greene, Sullivan, and Ulster counties. Views of the combined projects from 18 mountain summits were identified during the scoping process as valuable aesthetic resources that require evaluation in the DEIS, and existing views were evaluated for visibility and quality to assess the potential impact of the project. This evaluation was completed using digital terrain modeling, on-line research, interviews with local guides, and field observations. Beyond 5 miles, only the ski slopes were visible to the naked eye, and from many locations the distance, topography, and angle prevented a clear view of the ski area. A full description of these observations and assessment is provided in the BMSC's VIA, including figures that summarize the evaluations, with viewsheds, line-of-sight profiles, details on each visual resource, and photographs taken from these peaks. Because of the distance and topography, the Crossroads Resort will not be visible from any mountain peaks except Balsam Lake Mountain, where the view is minimal (see Simulation VP-9 of the Crossroads Resort VIA) and there is no view of the BMSC because as determined in the original BMSC visual analysis, all existing and new facilities are blocked by vegetation and topography or not visible due to distance.

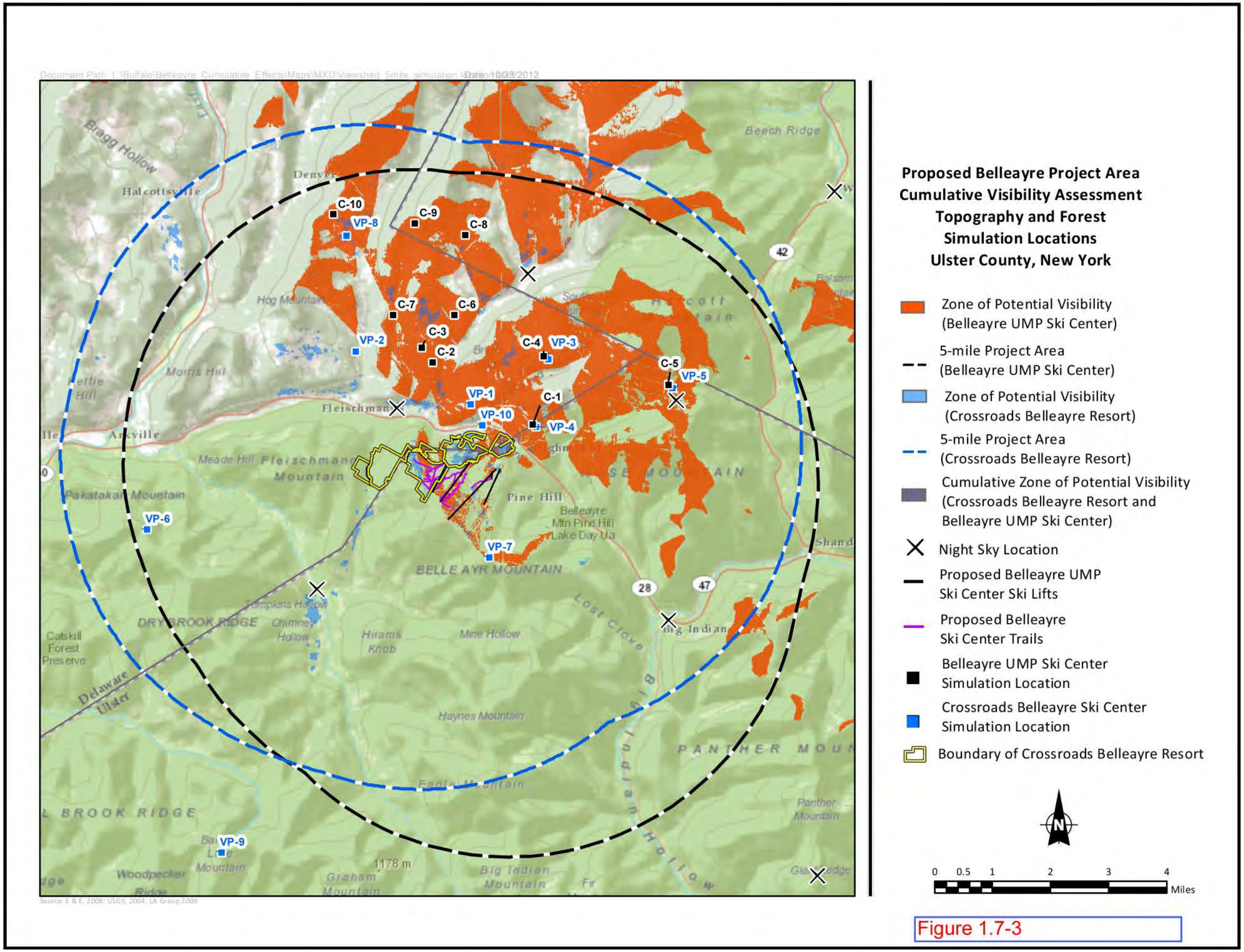
1.7.2 Inventory of Aesthetic Resources

An inventory of aesthetic resources was developed for each of the projects, in accordance with NYSDEC's policy "Assessing and Mitigating Visual Impacts." The locations include all locally significant aesthetic resources that have been officially identified in local or regional land use plans as well as public roads (including but not limited to NYS Route 28), hiking trails, public recreation areas, and areas of historical significance that have potential views into the project development areas. As noted above, significant resources outside the 5-mile radius, such as the nearby Catskill peaks, were also included in the inventory of the projects.

Using a 25-mile radius, more than 170 locations, in addition to the mountain peaks, were noted in the BMSC VIA, and 16 were identified as potentially having views of the project. In the Resort VIA, 40 locations within the 5-mile radius were evaluated, and 29 had the potential for visibility of the project site.

1.7.3 Potential Impacts on Visual Resources: Visual Simulations

Each of the two project's VIAs provided 10 to 11 photo simulations, selected from the many photos taken from receptor locations during field studies of project visibility, to demonstrate how the projects are visible and what they will look like from sensitive, worst-case, and representative locations (see Figure 1.7-3). These locations were chosen for a variety in distance from the projects, representing foreground(0-1/2 mile distance) middle-ground(1/2 mile to 3 miles away) and background (beyond 3 miles distance) visible locations. A review and comparison of these simulations has been completed, evaluating the potential for the visibility of both projects within each view. A summary of that evaluation is provided in Tables 1.7-1 and 1.7-2. Because of line-of-sight issues, there are few locations where both projects are visible. Of the locations chosen for the individual project VIAs, in most cases the other project is not noticeably visible in the view. For example, from the Owl's Nest restaurant, the BMSC is very visible, and the changes to the BMSC will be visible, as shown in the photo simulation(C-1). However, as demonstrated by the Crossroads Resort simulation from the same location (VP-4), it is likely that the Resort facilities will be blocked by the angle of view and vegetation.



Proposed Belleayre Project Area - Cumulative Visibility Assessment - Topography and Forest - Simulation Locations - Ulster County, NY

Table 1.7-1 Summary of Belleayre BMSC VIA Photo-Simulations

Simulation	Location	Distance (Miles)	Similar Resort View	Description of Cumulative Review
C-1	Owl's Nest restaurant	1.8 (Middleground)	VP-4	Resort changes are mostly screened by vegetation
C-2	Breezy Hill Rd.	2.3 (Middleground)	VP-1	See cumulative simulation
C-3	Oak Ridge Rd.	2.6 (Middleground)	N/A	Resort changes are mostly screened by topography and vegetation
C-4	Brush Ridge Rd.	2.6 (Middleground)	VP-3	See cumulative simulation
C-5	Upper Birch Creek Rd.	3 (Middleground)	VP-5	No view of Resort changes
C-6	Top of Bellows Rd.	3.1 (Background)	N/A	Viewpoint is narrow through trees. Resort will be mostly blocked by topography and vegetation.
C-7	Little Red Kill Rd.	3.4 (Background)	VP-8	Resort changes at Highmount will be visible. See cumulative simulation of C-8/VP-8 for similar view.
C-8	Kaftas Rd.	4.4 (Background)	N/A	Resort changes at Highmount will be visible. See cumulative simulation of C-8/VP-8.
C-9	De. Nacola Rd.	4.7 (Background)	VP-8	Resort changes at Highmount will be visible. See cumulative simulation of C-8/VP-8 for similar view.
C-10	Dimmick Mtn Rd.	5.4 (Background)	VP-8	Some visibility of Resort changes at Highmount, but reduced by distance. See cumulative simulation of C-7/VP-8.
C-11	Mt. Temper fire tower	12.6 (Background)	N/A	No view of Resort changes

Table 1.7-2 Summary of Belleayre Resort VIA Photo-Simulations

Simulation	Location	Distance (Miles)	Similar BMSC View	Description of Cumulative Review
VP-1	Wood Road	1/2	C-2	See cumulative simulation
VP-2	Big Red Kill Rd.	2	N/A	No view of BMSC changes
VP-3	Brush Ridge Rd.	2	C-4	See cumulative simulation
VP-4	Owl's Nest Restaurant	1/2	C-1	BMSC changes are visible. Resort changes are screened by vegetation
VP-5	Reisser Farm	2 3/4	C-5	BMSC changes to slopes are visible. Resort changes are screened by vegetation
VP-6	Dry Brook Ridge	4 1/2 (Background)	N/A	No view of BMSC changes, and most Resort changes will be screened by vegetation
VP-7	Cathedral Glen Trail	1 3/4	N/A	View from within BMSC: only parts of projects will be visible; most visibility blocked by vegetation
VP-8	Red Kill Road	3 3/4 (Background)	C-10	See cumulative simulation
VP-9	Balsam Lake Mountain	6 (Background)	N/A	No view of BMSC changes
VP-10	Route 28 East of Fleishmanns		N/A	BMSC and Resort changes to slopes and tree remove will be somewhat visible during leaf-off conditions. All structures will be screened by vegetation

The review of simulations determined that there are three viewpoints from which a cumulative view would be different than the potential view demonstrated in the original simulation, providing a view of both projects and therefore the worst-case scenario of potential cumulative visibility (see Table 1.7-3). New simulations from these viewpoints have been created to document the potential view of the combined projects under "leaf on" and "leaf off" conditions.

Table 1.7-3 Summary of Cumulative Photo-Simulations

Crossroads Resort Simulation	Location	Distance (Miles)	Landscape Position	Similar Belleayre UMP BMSC Simulation
VP-1	Wood Road	1/2	Foreground	C-2
VP-3	Brush Ridge Rd.	2	Middleground	C-4
VP-8	Red Kill Road	3 ¾	Background	C-8

Figure 1.7-3 is a map of the simulation locations from both projects, also indicating the locations of the viewpoints selected for cumulative simulations. Leaf-on and leaf-off conditions were simulated. The simulations are provided in Figures 1.7-4 through 1.7-9.

Figure 1.7-4: VP-1/C-2, Leaf Off

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf Off

Photo Location: Wood Road
Landscape Position: Foreground View to WSW, 1/2 Mile from project site

Figure 1.7-5: VP-1/C-2, Leaf On

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf On

Photo Location: Wood Road
Landscape Position: Foreground View to WSW, 1/2 Mile from project site

Figure 1.7-6: VP-3/C-4, Leaf Off

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf Off

Photo Location: Brush Ridge Road
Landscape Position: Middleground View to SW, 2 Miles from project site

Figure 1.7-7: VP-3/C-4, Leaf On

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf On

Photo Location: Brush Ridge Road
Landscape Position: Middleground View to SW, 2 Miles from project site

Figure 1.7-8: VP-8/C-10, Leaf Off

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf Off

Photo Location: Red Kill Road/Dimmick Mountain Road
Landscape Position: Foreground View to NE, 3 3/4 Miles from project site

02:EN-003237-0001-01TTO\R:\Belleayre\Visual_Assessment\Cumulative Visuals\Figure 1_7-9 VP-8 C-10_LeafOn.indd-01/11/13-GRA

Figure 1.7-9: VP-8/C-10, Leaf On

Cumulative Photo Simulation, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Leaf On

Photo Location: Red Kill Road/Dimmick Mountain Road
Landscape Position: Foreground View to NE, 3 3/4 Miles from project site

1.7.4 Potential Impacts on Visual Resources: Night-time Visibility

During project scoping, it was determined that the visual impact study would include visibility at night and the issues of nighttime "sky glow" and direct glare. The visual impact of night-time lighting on the night sky is a concern in many communities. The Dark Sky Society defines light pollution as "glare, light trespass, and light which is reflected into the night sky, contributing to sky glow, through the use of unshielded, misplaced, excessive, or unnecessary outdoor night lighting"(Dark Sky Society 2009).

Light pollution from ski resorts represents a challenge because the resorts are often located in rural areas, where natural darkness is prevalent but where lighting can also bounce off snow on the slopes or be trapped by low clouds or snowmaking operations. Nighttime skiing requires significant lighting to provide safe conditions for skiers. During snowmaking activities, lighting is necessary for the safety of personnel working with the snowmaking equipment.

Both project VIAs evaluated the impacts of new and existing lighting conditions. For the BMSC, it was noted that there are no plans to provide night-time skiing at Belleayre Mountain, and current lighting is not adequate to allow night skiing. Snowmaking activities will continue to occur during after hours, which will require lighting for the safety of workers. However, with new snowmaking equipment that can be controlled and monitored remotely, the need for lighting on the hill is reduced. In addition, some pole-mounted lights that currently exist will be removed. New exterior lighting on buildings and parking areas will be minimal and designed to minimize stray light. The overall night lighting will therefore be reduced by the proposed action at the BMSC, resulting in a reduced nighttime visual impact.

For the Crossroads Resort VIA, Lighting Research Center (LRC) of Rensselaer Polytechnic Institute analyzed the existing and proposed outdoor lighting at the resort. The outdoor site-lighting performance analysis was completed using computer calculations and modeling and photo renderings. The analysis determined that outdoor lighting at the resort will likely produce more outdoor light, leaving the boundaries of the site during winter conditions. However, outdoor lighting can be designed to reduce light pollution by limiting the amount of light leaving the boundaries to the recommended and required levels.

The VIA of the resort included photographs of the potential worst-case lighting scenarios, showing existing lighting conditions when all lights are on at the BMSC. The analysis completed for the Resort represents a conservative cumulative condition for night time visibility of the combined projects. Figure 1.7-10 provides a simulation of worst-case lighting scenario, viewed from location VP-4/C-1 (Owl's nest).

Because lighting on the slopes is limited to areas needed for worker safety during snowmaking and snowmaking usually occurs when most of the building and parking lot lights are not used, this condition is a very conservative representation of existing conditions. In addition, the changes at the BMSC will reduce existing number of lights and new lighting will be designed to limit light escaping from the property.

Lighting Research Center
21 Union Street
Troy, NY 12180
P. 518-687-7100
F. 518-687-7120

PREPARED FOR:
Crossroads Ventures, L.L.C.
PO Box 267
Mt. Tremper, NY 12457

Outdoor Site Lighting Performance
Belleayre Resort at Catskill Park
Wildacres Resort & The Highmount Spa Resort
Town of Shandaken & Town of Middletown, New York

Title:
Composite Rendering
Nighttime Lighting
Owl's Nest
Site #4
No tennis court lighting

Date:
March 9, 2011

Sheet:
9

Figure 1.7-10, Cumulative Photo Simulation VP-4/C-1, Crossroads Belleayre Resort and Belleayre UMP Ski Center, Night Lighting

1.7.5 Proposed Visual Resources Mitigation Measures

Both projects have been designed so as to avoid or mitigate visual impact and improve the aesthetic quality of the built environment on Belleayre Mountain. The design of the Crossroads Resort has been changed significantly to comply with the Agreement in Principle and address the visual impacts of the project. The modified Crossroads Resort design has eliminated the Big Indian development and includes tight, clustering development and smaller buildings than the original design or the agreed upon conditions of the Agreement in Principle. The new design reduces the amount of cleared area, thereby preserving nearly 70% of the project site in its current condition. The need for surface parking is substantially reduced by placing most parking underground in buildings; all building heights will be maintained within limits set by local land use regulations and exterior finishes will be earth tone colors.

At the BMSC, new ski lifts will be low in profile and will be painted colors that blend into the wooded landscape. Parking lots will be terraced and tree cover will be preserved to block views of the lots. External finishes of the new buildings will also be chosen to blend into the landscape, using earth tone colors and non--reflective glass.

The original plans for the cumulative expansion included 19 units at Highmount. The plans for this part of the project would have required additional roadways and tree removal and be located at a higher and more visible elevation. These plans were cancelled during the revisions of the Crossroads Resort, reducing the cumulative footprint and visibility of the project.

To mitigate light pollution, outdoor lighting will be designed to meet the standards of the International Dark Sky Association. Cut off light fixtures will be used in new applications, and the facility will not be equipped with lighting to allow night skiing. At the Resort, lighting design, screening and operational restrictions, such as the installation of timers on tennis court lighting will minimize light pollution to acceptable levels.

1.7.6 Cumulative Visual Impact Assessment

While cumulative visibility of the BMSC and the Crossroads Resort projects can be estimated and verified, as completed by the separate VIAs and described above, the evaluation of visual impacts at specific locations and the general region is a difficult task. Visual character and aesthetic quality is a subjective evaluation, with each person likely to have a different opinion on what would be considered impact on character and quality. NYSDEC policy states that "aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Significant aesthetic impacts are those that may cause a diminishment of the public enjoyment and appreciation of an inventoried resource" (New York State Department of Environmental Conservation July 31, 2000). The goal of this assessment has been to provide the reader with a clear and scientific understanding of the visibility of the project and to assess visual impact based on the project's compatibility, contrast, and scale as well as any changes in the aesthetic character of the landscape and the impact on users groups.

To assess the significance of the cumulative aesthetic impact of the proposed projects, all the research, field studies, maps, figures, and simulations of both VIAs and those combined for the cumulative analysis were reviewed. The ZVI modeling and maps indicate that changes resulting from the expanded Belleayre BMSC and new elements of the Crossroads Resort will be blocked from view by topography and vegetation from most locations in the region. As demonstrated in the simulations and line-of-sight profiles, distance, angle, and seasonal changes in vegetation will often prevent the viewers from recognizing built structures from the locations where visibility is possible.

The Crossroads Resort VIA determined that the project would not introduce a significant change in the visible landscape, relying on two main factors: the context of the existing views and the mitigation measures integrated into the project design that are intended to reduce the potential for visual impacts. All of the existing views analyzed in the Crossroads Resort VIA have some existing development in them, with some having more than others, and the type varying between viewpoints. Views, for the most part, are from public roads that have existing foreground development between the receptor location and the project site. Mitigation measures associated with the design of the modified project as described above further reduce the visibility of the project.

The new ski slopes, like the existing ones, will be highly visible from some locations in the winter months because the white groomed snow provides a high contrast with the forested areas of the mountain. Since the BMSC currently includes existing ski slopes and the new slopes are of similar length and width, the new expansion is compatible with the existing site. While the new slopes will be a visible feature of the landscape from certain locations, the 47 acres of new slopes represent an increase of only 27% of groomed trails at BMSC. The new lifts and other built structures will not be visible from mountaintop viewpoints because of the distances involved. Based on the similarity of the two projects' contrast and scale to existing visual elements on the landscape, the visual presence of the projects will not have a detrimental effect on the perceived beauty of the surrounding location.

Development is minimal in the region; however, the density, size and type of buildings and facilities are compatible with other property in the region. The visual character of the project will not be different than that of the local roadways with power lines, the Highmount cell tower, and other existing residential structures and ski facilities.

Access to and public enjoyment of surrounding historical, recreational, and commercial land uses will not be negatively impacted by the visual character or visibility of either Project.

Considering the combined visual impacts of the two projects, as well as mitigation described above, the cumulative visual impacts from the BMSC and the Crossroads Resort projects will not have a significant effect on the region's scenic and aesthetic resources.

1.8 Noise

Methodology

To evaluate the potential cumulative noise impact resulting from the Belleayre Mountain Ski Center UMP and the Modified Belleayre Resort at Catskill Park, the predicted noise levels, as estimated from modeling conducted for the BMSC UMP DEIS and the Modified Belleayre Resort at Catskill Park SDEIS, were added. Potential impacts were for the construction and operation of each project at the nearest noise receptor locations. These levels were then compared with the local regulations for compliance with the town code for Shandaken. The Town of Shandaken has limits that apply to the receiving land use in Table 1.8-1, measured at or within the property boundary of the receiving land.

Table 1.8-1 Town of Shandaken Maximum Permissible Continuous Sound Levels at Specified Times

Receiving Property	Time	Sound Level Limits (dBA)
Residential zones (R5, R3, R1.5, HR)	7:00 a.m. to 7:00 p.m.	57
	7:00 p.m. to 7:00 a.m.	53
Commercial zones (HC, HB, and CLI)	7:00 a.m. to 9:00 p.m.	64
	9:00 p.m. to 7:00 a.m.	60

Source: Town of Shandaken 1992

In addition, the combined noise levels were compared with the measured existing noise levels in the area to determine the potential increase in noise above the existing noise level. Under NYSDEC policy, noise level increases of more than 6 dBA over baseline conditions may require a closer analysis of impact potential, depending on existing sound pressure levels and the character of surrounding land use and receptors. In most cases, an increase of 10 dBA would mean that avoidance and mitigation measures should be considered. For operational noise which, unlike noise from temporary construction, has potential for a long-term noise impact, it is appropriate to use the NYSDEC 6 dBA incremental increase guideline as a criterion to identify a significant impact.

1.8.1 Construction Noise

To assess the cumulative effect of construction activities from both projects, the noise levels at the nearest receptors were combined for the construction sites from each project that would occur during the same construction year (up to and including Year 3, when the BMSC is complete). For example, the construction sites for the receptor identified as W-11, which include the north parking lot, the east parking lot, the new reservoir, and the Deer Run Trail for the ski center, were each individually combined with the Highmount golf course construction site projected noise levels.

Table 1.8-2 presents:

1. The construction noise levels estimated for these sites and the combined level,
2. The distance from the construction site to the receptor,
3. The noise level increase over existing levels if both sites would be active at the maximum estimated levels during the same time period, and
4. The increase over existing levels with mitigation measures employed.

These assumptions represent a worst case analysis.

The sound pressure level (SPL) that humans experience typically varies from moment to moment. Therefore, various descriptors are used to evaluate sound levels over time. One descriptor commonly used is the Leq. The Leq is the continuous equivalent sound level. The sound energy from the fluctuating SPLs is averaged over time to create a single number to describe the mean energy, or intensity, level. The Leq has an advantage over other descriptors because Leq values from various sound sources can be combined to determine cumulative sound levels.

Table 1.8-2 Cumulative Construction Noise Levels

Receptor	Const. Years	Project	Construction Activity	Approximate Distance to construction (feet)	Project Sound Level Plus Ambient Leq (dBA)	Daytime Ambient Sound Level Leq (dBA)	Sound Level Change (dBA)	Mititgated Sound Level Change (dBA)
W-1	1 - 2	Resort	Highmount Hotel	620	63	50		
	1 - 2	Resort	Rock Crushing- Highmount Hotel	500	75	50		
	1 - 5	Resort	Highmount Lodge	330	69	50		
	2	Belleayre Ski Center	West Trail Clearing	4500	53	50		
			Combined Sound Level		**76**	50	**26**	**14**
W-2	1	Resort	Conference Clubhouse	600	47	50		
	1	Belleayre Ski Center	Discovery Lodge Expansion	9500	44	50		
			Combined Sound Level		**49**	50	**-1**	**0**
W-3	1	Resort	Wilderness Activities Center	475	48	50		
	1	Belleayre Ski Center	Discovery Lodge Expansion	7500	46	50		
			Combined Sound Level		**50**	50	**0**	**0**
W-4	1	Resort	Wilderness Activities Center	240	54	50		
	1	Belleayre Ski Center	Discovery Lodge Expansion	7000	47	50		
			Combined Sound Level		**55**	50	**5**	**5**
W-5	1	Resort	Wilderness Activities Center	650	45	50		
	1	Belleayre Ski Center	Discovery Lodge Expansion	6680	47	50		
			Combined Sound Level		**49**	50	**-1**	**0**
W-7	1 - 2	Resort	Wildacres Hotel & Facilities	1280	53	50		
	1 - 2	Resort	Rock Crushing- Wildacres/Golf	3500	59	50		
	1 - 2	Resort	Clubhouse	920	53	50		
	2	Belleayre Ski Center	West Trail Clearing	2500	56	50		
	2	Belleayre Ski Center	Upper Parking Lot	2500	58	50		
			Combined Sound Level		**63**	50	**13**	**4**

Receptor	Const. Years	Project	Construction Activity	Approximate Distance to construction (feet)	Project Sound Level Plus Ambient Leq (dBA)	Daytime Ambient Sound Level Leq (dBA)	Sound Level Change (dBA)	Mititgated Sound Level Change (dBA)
W-11	1 - 2	Resort	Highmont Golf Club - nearest hole	200	74	50		
	2	Belleayre Ski Center	North Parking Lot Clearing	335	70	50		
	2	Belleayre Ski Center	East Parking Lot Clearing	3124	69	50		
	2	Belleayre Ski Center	New Reservoir Clearing	977	65	50		
				Combined Sound Level	**77**	50	**27**	**4**
W-11	3	Resort	Front-9 (East) Village - 84 Units	200	76	50		
	3	Belleayre Ski Center	Deer Run Trail	2788	55	50		
				Combined Sound Level	**76**	50	**26**	**15**

Ld = daytime ambient noise level

As indicated in Table 1.8-2, combining the sound levels for the construction of the resort and the BMSC projects with mitigation measures employed, would result in an increase in the sound level at the receptors ranging from no increase to a 15 decibel increase over the existing sound level.

During the construction of the Front-9 Village, mitigation resulting in 5 dBA lower construction sound levels can be accomplished by minimizing on-site equipment. This is predicted to reduce typical construction levels to below significance. Noise during construction of the nearest units, especially those closest to receptor W-11 may result in brief noise impacts typical of residential construction. During such construction at the nearest set of housing units, therefore, temporary barriers or shielding would be used as-needed to further control noise.

A noise increase of up to 14 dBA over the existing background noise level may be experienced by receptor W-1 if the Highmont Hotel construction, rock crushing for the Highmont Hotel, Highmount Lodge construction and clearing for the West Trail are all occurring at the same time. The Highmount Lodge building is scheduled to be constructed in Years 4 and 5 (Phase 3). Though a few lodging units are planned for the first three construction years, most will be constructed as needed over construction Years 4 through 8.

Mitigation measures planned for these construction projects would reduce the noise contribution at the nearest receptors. As stated in the BMSC DEIS and the Modified Belleayre Resort at Catskill Park SDEIS, the following measures would be employed to reduce the noise levels during construction:

- Stationary equipment such as compressors and generators would be located away from noise-sensitive receptors.
- Construction activities would be phased such that not all of the equipment is operating simultaneously.
- Maximum-sized intake and exhaust mufflers will be used on internal combustion engines.
- Idling equipment would be turned off when not in use.
- To the extent possible, construction sites should be laid out in a manner that reduces the need for backing up construction equipment in order to reduce the noise from backup alarms.
- Noise-reduction blankets that would reduce the noise level by 5dB to 10 dB would be installed on perimeter site fencing at some locations, as necessary.
- On-site equipment use would be minimized when within 500 feet of residences in order to reduce the noise of moving equipment on and off-site.

- A sound barrier would be put in place when construction activities would be within 500 feet of a residence.

With the implementation of these measures, the cumulative noise impact of constructing both projects would not be significant.

1.8.2 Facility Operation

To assess the potential cumulative noise impact resulting from the operation of the BMSC and the Modified Belleayre Resort at Catskill Park, the operating noise levels projected by the environmental impact study for each project were combined for the nearest representative receptor locations (See Figure 1.8-1 for receptor locations). Table 1.8-3 presents the representative receptors and the distance from the nearest operating project noise sources.

Table 1.8-3 Approximate Operation to Receptor Distance

Receptor Location	Nearest Ski Center Snowmaking Operation Phase/Distance (Feet)*					Nearest Highmount Snow Gun	Nearest Hotel, Conference Building, or Clubhouse HVAC/Distance
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	(Feet)	(Feet)
W-1	3076	6966	5555	2687	1555	492	Highmount Hotel/328
W-2	4556	8419	6651	3553	2362	1476	Clubhouse/656
W-3	2641	6129	4397	1352	345	984	Wilderness Activities Center/ 951
W-4	2745	5709	4075	1309	423	1476	Wilderness Activities Center/525
W-5	2854	5299	3954	1558	751	1969	Wilderness Activities Center/492

* Distance to nearest operating snowgun

For both studies, the operating noise levels were estimated using CadnaA noise prediction software for stationary noise sources and the Federal Highway Administration Traffic Noise Model (TNM) for traffic. To evaluate the cumulative noise, the operating noise levels illustrated in Figures 4.10-2 through 4.10-6 (E & E 2012) and Table 5-3, Project Operation Noise Assessment and Mitigation – Nighttime, Continuous and Non-continuous Sources (Obrien & Gere 2011), were reviewed and combined. The combined noise sources include; operations for the BMSC (including each of five snowmaking phases), snowmaking on the Highmount ski slopes, the operation of the Wildacres hotels, conference buildings and clubhouses and project traffic noise. Table 1.8-4 presents the operational noise levels, the cumulative sound level, and the predicted increases above the ambient sound level.

Belleayre Mountain Ski Center
Catskill State Park
Project Area, Aerial Photography

Cumulative Operation and Construction Noise Receptor Locations
State Highway
Local Road
Town Boundary

Figure 1.8-1 Belleayre Mountain Ski Center Cumulative Operations and Construction Noise Receptor Locations

Sheet No. 1

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Source: Bing, 2010
Date: February 13, 2013

Table 1.8-4 Cumulative Operating Noise Levels for the BMSC and the Modified Belleayre Resort at Catskill Park

Receptor Location	Noise Level Ski Center[1] Leq (dBA)	Noise Level Wildacres Ski Slopes[2] Leq(dBA)	Hotels Conference Buildings and Clubhouses[3] Leq (dBA)	2015 Build Noise Level Ski Center Traffic[4] Leq (dBA)	2015 Build Noise Level Resort Traffic Leq (dBA)	Daytime Ambient Sound Level Leq (dBA)	Cumulative Sound Level Contribution Projects Plus Ambient Leq (dBA)	Cumulative Increase (dBA)
Phase 1 Ski Center Snowmaking								
W-1	33	41	29	31	37	50	51	1
W-2	26	31	20	31	35	50	50	0
W-3	41	28	24	43	47	50	53	3
W-4	44	33	24	36	44	50	52	2
W-5	46	31	26	32	38	50	52	2
W-7	28	28	21	33	34	50	50	0
W-11	43	20	27	56	54*	54**	60	6
Phase 2 Ski Center Snowmaking								
W-1	28	41	29	31	37	50	51	1
W-2	26	31	20	31	35	50	50	0
W-3	29	28	24	43	47	50	52	2
W-4	30	33	24	36	44	50	51	1
W-5	41	31	26	32	38	50	51	1
W-7	36	28	21	33	30	50	50	0
W-11	49	20	27	56	54*	54**	61	7
Phase 3 Ski Center Snowmaking								
W-1	30	41	29	31	37	50	51	1
W-2	27	31	20	31	35	50	50	0
W-3	30	28	24	43	47	50	52	2
W-4	32	33	24	36	44	50	51	1
W-5	45	31	26	32	38	50	52	2
W-7	42	28	21	33	30	50	51	1
W-11	47	20	27	56	54*	54**	60	6

Phase 4 Ski Center Snowmaking								
W-1	25	41	29	31	37	50	51	1
W-2	24	31	20	31	35	50	50	0
W-3	35	28	24	43	47	50	52	2
W-4	37	33	24	36	44	50	51	1
W-5	41	31	26	32	38	50	51	1
W-7	32	28	21	33	30	50	50	0
W-11	49	20	27	56	54*	54**	60	6
Phase 5 Ski Center Snowmaking								
W-1	21	41	29	31	37	50	51	1
W-2	17	31	20	31	35	50	50	0
W-3	47	28	24	43	47	50	53	3
W-4	47	33	24	36	44	50	53	3
W-5	44	31	26	32	38	50	51	1
W-7	27	28	21	33	30	50	50	0
W-11	38	20	27	56	54*	54**	60	6

[1] Snowmaking Operation 4 pm to 10 pm

[2] With reduced night operations (10:00 p.m. to 7:00 a.m.)

[3] Estimated sound levels assume HVAC with mitigation

[4] Traffic 6 pm to 7 pm when snowmaking phase is fully operational and traffic is 35% of Saturday pm Peak

* Modeled with 35 % of Saturday pm peak hour Resort traffic

** Modeled with 35 % of existing Ski Center Saturday pm peak hour traffic noise level

As the tables disclose, there would be an increase over the ambient noise level at each of the receptor locations as a result of the expanded ski center and the resort project operating at the same time. By employing the mitigation measures: restricting the snowmaking operations for Phases 1through 5 to the hours from 4 p.m. to 10 p.m., restricting the snowmaking operation for the sixth northernmost snowmakers along the west slope (west and northwest of Highmount Lodge to the hours of 7 a.m. to 10 p.m., and using lower noise HVAC units with shielding, it is expected that the cumulative noise levels due to the operation of both projects would result in a noise increase of less than 5 dBA at all of the receptors with the exception of W-11 which is impacted by the increase in project traffic.

With these mitigation measures, it is estimated that the combined operation of both projects would result in a cumulative noise level at receptors W-1 through W-5, and W-7 ranging from 50 to 53 dBA, which falls within the Town of Shandaken noise limit of 53 dBA for a receiving property in a residential zone during the evening and an increase in noise level of less than 4 dBA over the existing noise level, but below the NYSDEC threshold level of 6 dBA. Receptor W-11 exceeds the Shandaken noise limit of 53 dBA under current operations due to traffic noise. Although the NYSDEC guidance suggests that an incremental increase of 6 dBA at the receptor may produce complaints, traffic noise condition would occur during the winter ski season, in the daytime, when residential windows are normally closed, resulting in a 25 to 30 dB noise reduction in the home (New York State Department of Transportation 1998). People are normally engaged in daytime activities that are not as sensitive to noise at this time.

1.8.3 Traffic Noise

To assess the cumulative impact of traffic noise resulting from the operation of the Belleayre Ski Center and the resort projects, the worst-case traffic noise levels (Saturday evening peak hour) projected in the SDEIS for each project were combined. For both studies, the traffic noise levels were generated using the Federal Highway Administration Traffic Noise Model (TNM) noise prediction software. The predicted sound levels for both projects were combined for the winter Saturday PM peak traffic hour (See Table 1.8-5). The initial traffic study for this project used an operational year of 2015, but project delays suggest that 2018 is a more realistic start date. A change in background traffic could impact the noise analysis, but this region is not experiencing significant changes in traffic volumes, so this potential change is not expected to have a detectable change in background noise,

The combined traffic noise increase over the existing noise level would range from 3.9 to 5.7 dBA for receptors 1 through 11 located along Galli Curci Road (see Figure 1.8-2). The operation of both projects would result in an increase in traffic noise of approaching 6 dBA. Although the NYSDEC guidance suggests that an incremental increase of 6 dBA at the receptor may produce complaints, this peak traffic volume would occur during the winter ski season, in the daytime, when residential windows are normally closed, resulting in a 25 to 30 dB noise reduction in the home (New York State Department of Transportation 1998). People are normally engaged in daytime activities that are not as sensitive to noise at this time.

Table 1.8-5 Traffic Noise Levels

Receptor	Existing Noise Level Ski Center Traffic Leq (dBA)	2015 Build Noise Level Ski Center Traffic Leq (dBA)	2015 Build Noise Level Resort Traffic Leq (dBA)	Cumulative Sound Level Leq (dBA)	Cumulative Increase in Sound Level (dBA)
1	35.6	35.9	37.0	39.5	3.9
2	33.4	35.3	35.0	38.2	4.8
3	44.4	47.4	46.5	50.0	5.6
4	40.3	40.2	44.2	45.7	5.3
5	35.0	36.7	37.9	40.4	5.4
6	38.3	41.1	40.3	43.7	5.5
7	54.3	57.9	55.5	59.9	5.5
8	55.6	53.8	60.1	61.0	5.4
9	59.0	60.5	62.7	64.7	5.7
10	60.1	62.8	62.1	65.5	5.4
11	57.8	60.9	58.9	63.0	5.3

A supplemental traffic noise study was conducted to evaluate the summer conditions at the project site (Creighton Manning 2012). Noise measurements were obtained at the three locations that were included in the initial noise impact assessment. The noise measurements obtained at the three locations during August had some results that were consistent with measurements that were taken in November 2007 and some results that reflected higher ambient noise levels due to active environmental conditions (insects, birds) that were absent in the November measurements. The results obtained at each receptor in August were compared to the modeling results presented in the initial noise impact assessment and verified that the results presented in the report show the worst case impacts would occur during the winter.

Traffic levels would be expected to be less during the summer months since the peak operations at the proposed resort would occur during the winter when the Belleayre Ski Center is operational. Since music concerts have been ongoing at the Belleayre Ski Center in the summer, the concert and traffic noise are considered as existing conditions and no additional noise would be expected from the Belleayre Mountain Ski Center UMP operation in the summer. The cumulative noise resulting from both projects would include only additional traffic noise associated with the resort operation, which would be less than the winter traffic noise.

Belleayre Mountain Ski Center
Catskill State Park
Project Area, Aerial Photography

Traffic Noise Receptor Locations
State Highway
Local Road
Town Boundary

Figure 1.8-2 Belleayre Mountain Ski Center
Traffic Noise Receptor Locations

Sheet No. 1

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Source: Bing, 2010
Date: February 13, 2013

References:

Creighton Manning Engineering, LLP. August 2012. *Response to Comments Belleayre Resort at Catskill Park, Towns of Shandaken and Middletown, Ulster and Delaware Counties, NY; CME Project No. 111-164.*

Ecology and Environment, Inc. May 2012. *Belleayre Mountain Ski Center Unit Management Plan & Draft Environmental Impact Statement*. Appendix AG - Noise Technical Report & Data.

O'Brien & Gere. April 2011. *Supplemental Draft Environmental Impact Statement for the Modified Belleayre Resort at Catskill Park*. Appendix 20. Construction and Operations Noise Study.

1.9 Socioeconomics

1.9.1 Economy, Employment, and Income

Construction Impacts

The cumulative socioeconomic impacts of the construction and operation of the expanded BMSC and the Modified Crossroads Resort at Catskill Park development project would have a positive socioeconomic impact on the local (e.g. the Towns of Middletown, Shandaken, and Olive) and regional economy (e.g. Delaware, Ulster, and Greene Counties). In total, the projects are expected to cost approximately $438.9 million. Presumably, a substantial portion of these funds would be used to purchase goods and services from the regional economy. Table 1.9-1 provides a detailed analysis of the construction costs associated with the two projects. As shown on the table, the expansion of the BMSC would cost approximately $74 million to complete while the Modified Crossroads Resort at Catskill Park development project would cost approximately $365 million to complete. The ski center expansion is expected to take approximately five years to construct while construction activities are expected to continue for 10 years at the Crossroads project.

Table 1.9-1: Combined Construction Costs of the Belleayre Mountain Ski Center Expansion Project and the Modified Crossroads Resort at Catskill Park Project

Construction Element	**Total Construction Costs ($million)**
Belleayre Mountain Ski Center Expansion Project	
Trails and Ski Lift Improvements	$21.6
Utility and Parking Improvements	$27.0
Building Improvements	$18.9
Contingency	$6.7
Belleayre Mountain Ski Center Expansion Total	**$74.2**
Crossroads Development Project	
Highmount Spa and Resort	
Residential Construction	$93.5
Non-Residential Building Construction	$56.8
Non-Building and Other Construction (Golf, Parking, etc.)	$31.9
Sub-Total	$182.2
Wildacres Resort	
Residential Construction	$54.7
Non-Residential Building Construction	$68.4
Non-Building and Other Construction (Golf, Parking, etc.)	$59.4
Sub-Total	$182.5
Crossroads Development Project Total	**$364.7**
Total Construction Costs	**$438.9**

Source: Part A - Section 4.11; Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects.

As a result of the proposed construction activities, approximately 230 annual full-time equivalent construction jobs would be created during this phase of the projects. For the sake of the economic analysis, weekly and hourly estimates of the total number of construction workers employed on-site were converted to year-round full-time equivalents (FTE). One full-time equivalent worker is equal to one worker working a total of 2,080 person-hours in a year or several workers working a total of 2,080 person-hours over a shorter duration. These FTE workers are used only to identify and assess the economic impact of this new construction employment. The actual number of workers at the sites would fluctuate depending on the work load. At peak times, the total number of workers on-site could be substantially greater than the average levels indicated on the table.

As shown on Table 1.9-2 the vast majority of the 230 to 234 direct construction jobs would be generated by the Modified Crossroads Resort at Catskill Park, with the expansion of the BMSC accounting for only 12 to 16 FTE construction jobs for the five years duration of construction. In contrast, the Modified Crossroads Resort at Catskill Park project is expected to generate an estimated 218 FTE jobs for the entire 10-year construction period.

Table 1.9-2: Annual Direct Construction Employment Resulting from the Belleayre Mountain Ski Center Expansion Project and the Crossroads Development Project

Construction Element	**Annual Number of Construction Jobs**
Belleayre Mountain Ski Center Expansion Project	12 to 16
Crossroads Development Project	
Highmount Spa and Resort	109
Wildacres Resorts	109
Total Crossroads	218
Total Annual Construction Jobs Generated by Both Projects	**230 to 234**

Source: Part A - Section 4.11; Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects.

In an effort to quantify the direct and indirect economic impacts associated with the proposed construction, an economic model developed by the U.S. Bureau of Economic Analysis, the Regional Input-Output Modeling System (RIMS II) economic model was utilized. Separate modeling efforts were conducted for both the proposed BMSC expansion project and the Modified Crossroads Resort at Catskill Park. Both projects would have a significant indirect impact on the communities located around the proposed construction sites. During the construction phase, the expansion of BMSC would directly and indirectly generate $14.3 million in regional output; increase employee earnings by $4.2

million, and directly and indirectly support 89 jobs each year for the five years that construction is expected to occur (see Table 1.9-3).

Table 1.9-3: Direct and Indirect Impacts Resulting from Construction Expenditures Associated with the Expansion of the Belleayre Mountain Ski Center[1]

Economic Indicator	Expected Annual Change
Annual Change in Regional Output	$14,300,000
Annual Change in Employee Earnings	$4,200,000
Annual Change in Employment (Jobs)	89

[1]Indirect economic impacts resulting from the Belleayre Mountain Ski Center expansion are estimated for Delaware, Greene, and Ulster Counties.

Source: Part A - Section 4.11.

As shown on Table 1.9-4, construction activities at the Modified Crossroads Resort at Catskill Park are anticipated to increase regional output by nearly $80 million a year for the duration of the construction phase. In addition, approximately $21 million in direct and indirect employee earnings and approximately 449 direct and indirect jobs would be generated annually in New York State as a result of the construction phase of the Modified Crossroads Resort at Catskill Park.

Table 1.9-4: Direct and Indirect Impacts Resulting from Construction Expenditures Associated with the Crossroads Development Project[1]

	Expected Annual Change		
Economic Indicator	**Highmount Spa and Resort**	**Wildacres Resorts**	**Total**
Annual Change in Regional Output	$35,120,000	$43,980,000	$79,100,000
Annual Change in Employee Earnings	$9,500,000	$12,040,000	$21,540,000
Annual Change in Employment (Jobs)	199	250	449

[1]Indirect impacts resulting from the Crossroads Development project are estimated for all of New York State.

Source: Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects.

The cumulative economic impacts associated with both the expansion of the Belleayre Mountain Ski Center and the Crossroads Development Project were estimated. Regional output, employee earnings, and total employment would experience substantial increases as a result of construction of these two projects. The increase in construction spending would directly impact the regional and state economy by increasing employment and earnings in the construction industry. As the new construction workers spend a portion of their payroll in the local area and construction companies purchase a portion of the materials from local suppliers, the overall demand for local goods and services would increase. As these local merchants respond to this increase in demand, they may in turn increase employment at their operations and/or purchase more goods and services from their providers. These new workers may then spend a portion of their income in the area, thus "multiplying" the positive economic impacts of the original injection of funds.

However, these impacts result from a one-time injection of funds associated with the construction activities and therefore are short-term. Once the construction is complete and the original funds have left the regional economy through either taxes, savings, or through goods and services purchased from outside the area, these positive economic impacts would cease.

Operational Impacts

Operation of the expanded BMSC and the Modified Crossroads Resort at Catskill Park projects would have a long-term positive impact on the local and regional economies. Local employment opportunities, employee earnings, and local expenditures would increase as a result of both projects. The BMSC expansion project is expected to nearly double the annual attendance at the Belleayre Mountain Ski Center; as a result, total employment at the ski center is expected to increase by approximately 275 additional employees. Likewise, an estimated 541 full-time jobs and 230 part-time/seasonal jobs would be required to operate and maintain the Modified Crossroads Resort at Catskill Park project once it became operational. In total the two projects would create nearly 1,050 new jobs, with approximately 575 of these jobs permanent full-time positions. The remaining 525 jobs would be part-time and/or seasonal in nature (see Table 1.9-5).

Table 1.9-5: Annual Employment at the Belleayre Mountain Ski Center Expansion Project and the Crossroads Development Project during Operation

Type of Job	Belleayre Ski Center Expansion	Crossroads Development Project	Total Employment
Full – Time[1]	32	541	573
Part- Time/Seasonal	200	230	430
Concessionaire	40 to 45	-	40 to 45
Total	272 to 277	771	1,043 to 1,048
[1] Full-time employment includes both salaried and hourly personnel.			

Source: Part A - Section 4.11; Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects.

Approximately 100 of these full-time positions would be salaried and require some managerial or professional expertise. The remaining positions would be paid hourly and would cover a range of more entry-level hospitality, recreation, clerical and building maintenance jobs. Additional full-time positions at the

BMSC are expected to pay between approximately $26,000 and $40,500 (expressed in 2008 dollars) (see Part A- Table 4.11-38). Seasonal part-time workers are expected to earn an average of $7,500 (expressed in 2008 dollars) per year (see Part A-Table 4.11-37). More than 80% of the operational employees at the Crossroads Development project are expected to be hourly. Pay rates for the majority of the hourly employees are expected to range between $12.00 an hour and $30.00 an hour. Salaried managers' remuneration is expected to range between $30,000 and $130,000 depending on the position and level of experience (see Part B- Appendix 3 Table 3.2-18). See Part A - Section 4.11.3.1 and Part B – Appendix 3 Subsection "Employment Expected to be Generated by the Proposed Project" for a more detailed discussion of the types of positions and salaries expected to be generated by the operation of the two projects.

Cumulatively, the expansion of the BMSC and the Modified Crossroads Resort at Catskill Park projects are expected to directly inject a total of approximately $29.1 million into the regional economy each year through payroll and wage and salary payments. Direct employee earnings are expected to increase by approximately $4.2 million at the BMSC as a result of the expansion project and the Modified Crossroads Resort at Catskill Park project is expected to generate an additional $24.9 million employee earnings once its facilities become operational.

Similar to the economic impacts of construction, these additional jobs and employee earnings would further stimulate the local and regional economy and have a positive indirect economic impact on the region. As the new employees from the two projects spend a portion of their payroll in the regional economy, the demand for local goods and services would expand. Revenues at local retail establishments and service providers would increase. As these local merchants respond to this increase in demand, they may in turn increase employment at their operations and/or purchase more goods and services from their providers thus multiplying the original injection of funds.

These secondary or indirect impacts have been calculated for the three-county region for both projects using the RIMS II economic model. As shown on Table 1.9-6, an estimated additional 280 indirect jobs or a total of approximately 1,320 jobs would be created directly and indirectly as a result of these projects. Similarly, the $29.1 million increase in employee earnings would result in an indirect increase of $13.8 million of employee earnings in the region. Therefore, the operation of the BMSC and the Modified Crossroads Resort at Catskill Park project are expected to directly and indirectly increase employee earnings in the three-county area by approximately $42.9 million each year.

Table 1.9-6: Cumulative Annual Direct and Indirect Employment and Employee Earnings Impacts Associated with the Operations of the Belleayre Mountain Ski Center Expansion Project and the Crossroads Development Project

	Belleayre Mountain Ski Center Expansion	Crossroads Resort Project	Total Impacts
Employment Impacts (in jobs)			
Direct Employment Impacts	272 to 277	771	1,043 to 1,048
Indirect Employment Impacts	10 to 20	264	274 to 284
Total Employment Impacts	282 to 297	1,035	1,317 to 1,332
Employee Earnings Impacts (in 2008 $ millions)			
Direct Employee Earnings Impacts	$4.2	$24.9	$29.1
Indirect Employee Earnings Impacts	$0.8	$13.0	$13.8
Total Employee Earnings Impacts	$5.0	$37.9	$42.9

Source: Part A - Section 4.11; Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects.

Unlike the construction impacts described above, the economic impacts associated with the operation of these facilities would be long-term. These positive economic effects on local employment and employee earnings would occur each year that the projects are in operation.

The expansion of the BMSC and the Modified Crossroads Resort at Catskill Park projects may also have an effect on existing ski resorts and other hospitality-related facilities in the area. The Hunter Mountain Ski Center and the Plattekill Mountain Ski Center, which are located approximately 20 miles from Belleayre Mountain Ski Center, and the Windham Mountain Ski Center located approximately 30 miles from the BMSC, are the most likely recreational facilities to be impacted by the proposed expansion and development projects, though other area ski centers could be affected.

The improvements in the facilities at the Belleayre Mountain Ski Center are expected to generate additional demand and increase attendance at the resort (see Part A, Section 4.11.3). While some of this increased attendance may come at the expense of other existing ski centers, much of the additional attendance is anticipated to be new customers who have not previously skied in the Catskill region. Once the new customers come to the Catskill region to ski, it is anticipated that they would also visit other area ski resorts; thereby increasing the demand at these other resorts. The synergy between the Belleayre Mountain Ski

Center and other local ski resorts are anticipated to generate additional demand for all resorts when attendance at one of them increases.

While the overall demand at retail outlets, eating and drinking establishment and lodging facilities and recreational facilities are expected to increase as a result of the combined projects, existing businesses would also experience increased competition from the various components of the Belleayre Mountain Ski Center expansion and the Modified Crossroads Resort at Catskill Park. Part B-Appendix 4 Section 7.3 provides a detailed discussion of the potential positive and negative impacts of the project to commercial development in the region.

Work Force Impacts

As described above, the proposed expansion of the BMSC and the Modified Crossroads Resort at Catskill Park are expected to cumulatively create approximately 230 annual FTE jobs during the construction phase and approximately 573 full-time positions and approximately 475 part-time positions during the operational phase. Based on an analysis of existing commuting patterns; a review of the number of unemployed workers in the local workforce; and an analysis of number of individuals collecting unemployment insurance in the three-county region with relevant work experience in the construction and hospitality industries, it is expected that there would be a sufficient number of unemployed or underemployed workers in the existing labor force in the three-county region to handle this increase in demand for construction workers and part-time operational workers, although some more highly skilled construction positions may need to be filled by individuals who temporarily relocate to the region or by individuals who are willing to commute from areas outside the three-county region. In 2007 there were a total of 6,043 unemployed individuals in the three-county region that were actively looking for employment (see Part A-Table 4.11-18). This figure does not include individuals who have stopped looking for work or who have left the labor force for other reasons. As another measure of the available workforce, a total of 26,116 individuals in the three-county region collected unemployment insurance in 2007. Approximately 20.4% of these recipients had experience in the construction industry while an additional 10.4% of these recipients had experience in the accommodation and food service industry (see Part-B Appendix 3 Table 3.9.2-8). In addition, based on the analysis described above, the majority of the estimated 573 full-time positions that would be created by these two projects would also be filled by existing unemployed or underemployed residents in the three-county region. Approximately 100 of these full-time positions would be salaried and require some managerial or professional expertise. The remaining positions would be paid hourly and would cover a range of more entry-level hospitality, recreation, clerical and building maintenance jobs. See Part A - Section 4.11.3.1 and Part B – Appendix 3: Socioeconomic and Fiscal Conditions and Effects Table 3.9.2-18 for a more detailed discussion of the types of positions expected to be generated by the operation of the two projects.

However, given the relatively small regional labor force, not all of these new positions are expected to be filled by existing residents. When the initial labor force analysis was completed in 2008, it was estimated that up to 250 full-time employees from outside the region would be required to fill these job openings (see Part A-Section 4.11.3 and Part B-Appendix 3 Section 3.9.2). However, unemployment rates in the region have nearly doubled over the past five years and Delaware, Greene, and Ulster counties are currently experiencing some the of the highest unemployment rates in the state. If these employment conditions are still in effect when the proposed projects start operation, more of the newly created full-time positions are expected to be filled by local residents and less in-migration is expected to occur than was originally predicted.

1.9.2 Population and Housing

The proposed expansion of the BMSC and the Modified Crossroads Resort at Catskill Park projects are not expected to have a significant impact on the population or demographic characteristics of Delaware, Ulster, or Greene counties. As described previously the majority of the construction and operation jobs that would be created by these projects are expected to be filled by individuals currently living in the three-county region or by those willing to commute into the region.

Some specialized workers may temporarily relocate to the area during the construction seasons. However, given the transient nature of these jobs it is unlikely that these workers would permanently relocate to the area. Therefore, no significant permanent in-migration into the region is anticipated as a direct result of construction of these projects.

These temporary workers would most likely be housed in existing hotel/motel accommodations, in available rental units or in RV campsites. Currently there are more than 100 hotel/motels, resorts, country inns, and bed and breakfasts in Delaware, Greene, and Ulster counties (Official Tourism Site of New York's Catskills Region 2012). In addition, according to the 2000 census there were more than 2,550 vacant rental properties available in three-county region (see Part A-Section 4.11.1.1 and Part B-Appendix 3 Section 3.9.1 for more details). Given the relatively small number of construction workers expected to relocate and the relatively large number of possible rental units and hotel/motel rooms, temporary housing is not anticipated to be difficult to obtain and the influx of temporary workers are not expected to influence the overall supply of temporary housing during the construction phase.

However, a portion of the full-time operational jobs would likely have to be filled by individuals who currently reside outside of the three-county region. As described above, some of these positions would be filled by current residents or individuals who would be willing to commute; however, up to 250 workers and their households may relocate to the three-county region as a result of their employment at these projects. Assuming an average household size of 2.38 persons, an estimated 595 persons may move into the region as a result of the increased employment opportunities. This figure represents only 0.2% of the region's total population.

Each of these new households would require housing, although all could be housed in the currently vacant units in the three-county region if they so choose. The existing supply of single-family homes for sale and rental units is larger than the estimated number of relocating workers. In 2000 there were a total of 28,137 vacant housing units in the three-county region compared with the expected 250 relocating workers. The existing stock of vacant housing units should be more than sufficient to accommodate any in-migration caused by the projects.

Enough affordable housing is expected to be available in Delaware, Ulster and Greene counties to accommodate the projected influx of 250 families. In 2000, the median gross contract rent in the three counties ranged from $451 in Delaware County to $626 in Ulster County. Gross contract rent is the rent price plus any added utility costs a resident must pay (See Part A- Section 4.11.1.1). In addition, median mortgage and selected monthly owner costs (e.g. utilities and taxes) in 2000 ranged from $825 Delaware County to $1,149 in Ulster County (U.S. Bureau of the Census 2013). Using the U.S. Department of Housing and Urban Development's definition, housing is affordable if mortgage or rental payments and utilities and property taxes do not exceed 30% of total household income. Using this definition, an individual would have to earn $13,530 in Delaware County to afford half of the rental properties in the county and would have to earn $24,750 to afford to purchase half of the owner-occupied housing in the county. Likewise an annual income of $18,780 would be required to afford rental of half of the housing units in Ulster County and an annual income of $34,470 would be required to afford half of the owner-occupied housing units in Ulster County. Given the relatively small number of workers expected to move to the region as a result of these two projects, and the fact that those relocating are likely to be filling the higher paying jobs, housing affordability is not anticipated to be greatly affected.

1.9.3 Taxes and Revenues

The proposed expansion of the BMSC and the proposed Modified Crossroads Resort at Catskill Park projects are expected to have a positive impact on local sales tax, property tax, and hotel occupancy tax receipts. During the construction and operation phases local sales tax receipts would expand as the amount of economic activity in the region expands. As the new workers spend a portion of their income in the local area and as Belleayre and Crossroad suppliers purchase materials in the local area, sales tax receipts in the region would increase. Local sales tax generation would be further enhanced by the increase in attendance at the BMSC as the facility expands and completion of the Modified Crossroads Resort at Catskill Park would further increase tax receipts. Retail activities at the two projects are expected to generate, in total, approximately $2.8 million a year in local sales taxes and an additional $2.8 million in statewide sales taxes. In addition, once operational, the Modified Crossroads Resort at Catskill Park project is anticipated to generate nearly $710,000 in hotel occupancy taxes each year.

Property taxes are also expected to experience a significant increase as a result of the Modified Crossroads Resort at Catskill Park; the expansion of the Belleayre Mountain Ski Center, which is located on state land, is exempted from local property taxes. The first year after the Modified Crossroads Resort at Catskill Park project is completed (Year 11), local property tax receipts from all taxing districts in Ulster County are expected to increase by approximately $3.3 million. In the same year local property tax receipts from all taxing districts in Delaware County are expected to increase by approximately $311,000. See Part B-Appendix 3 Section 3.9.3 for a more detailed discussion of the property tax implications for the Crossroads Development project on a municipal level.

1.9.4 Community Services and Facilities

Development of both projects would result in an increase in visitor expenditures in the area, some new business growth, and generation of minor amounts of new wastewater flows. However, existing businesses would be able to accommodate retail demands, and this business growth is expected to have an insignificant impact on existing land uses or associated public services (potential demand for water and wastewater treatment is reviewed in Sections 1.3 and 1.4).

The BMSC UMP DEIS concludes that a significant population increase is not expected. Because there would be no new in-migration to the study area, existing public services are assumed to be adequate. The Modified Crossroads Resort at Catskill Park SDEIS identifies anticipated service providers for the project. These include emergency services (police, fire, medical, and ambulance), wastewater treatment, schools, waste management, electricity, and telephone providers. All providers indicated the ability and capacity to service the needs of the project. Municipal or outside water supply providers would not be used for either project so no impacts on the water supply are anticipated.

1.9.5 Environmental Justice

According to NYSDEC Commissioner Policy 29, Environmental Justice and Permitting (New York State Department of Environmental Conservation March 2003) a potential environmental justice (EJ) area is defined as a minority or low-income community that bears a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the federal, state, local, and tribal programs and policies (New York State Department of Environmental Conservation 2003). The policy expands upon Executive Order (EO) 12898, issued by President Clinton on February 11, 1994, which requires that impacts on minority or low-income populations be accounted for when preparing environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by federal agencies.

The policy states that a NYSDEC permit applicant must conduct a preliminary screening to identify whether the proposed action is located in a potential EJ area. If the preliminary screening identifies a potential EJ area, the applicant must submit a written public participation plan as part of the complete application for a permit. At a minimum, the plan must demonstrate that the applicant will 1) identify stakeholders in the proposed action; 2) distribute and post written information on the proposed action and permit review process; 3) hold public information meetings to keep the public informed about the proposed action and permit review status; and 4) establish easily accessible document repositories in or near the potential environmental justice area and on the internet to make available pertinent project information.

According to the policy, a minority population is a group of individuals identified or recognized as African-American, Asian American/Islander, American Indian, or Hispanic. Hispanic refers to ethnicity and language, not race. In rural areas, a minority community is defined as having a minority population equal to or greater than 33.8%. A low-income population is defined as a group of individuals having an annual income that is less than the poverty threshold established by the U.S. Census Bureau. This poverty threshold varies based on family size. A low-income community is an area having a low-income population equal to or greater than 23.59% of the total population.

Policy 29 also requires potential adverse environmental impacts within the affected area to be identified. If an area does not meet the NYSDEC thresholds for a potential EJ area, the permit review process may continue independent of the elements of the policy. If an area does meet the NYSDEC thresholds that could indicate it might be an EJ area, the remainder of these policy requirements shall be incorporated into the review process. The proposed socioeconomic study area does not meet EJ thresholds; therefore, no significant EJ issues are expected to occur.

Since the socioeconomic study area identified for these projects do not qualify as an environmental justice community for race, ethnicity, or income reasons, the permit review process may continue independently of the elements of the NYSDEC Commissioner Policy 29, Environmental Justice and Permitting.

1.10 Community Character

The community character and land use study area for each project comprises the two project sites and the communities along the Route 28 corridor between Boiceville and Margaretville.

The power to define the community character is a unique prerogative of municipalities acting in their governmental capacity (*Matter of Vil. Of Chestnut Ridge v. Town of Ramapo*, 45 A.D.3d 74, 94). Community character is defined by municipalities, through their comprehensive plans, which document their existing community character, set out their vision for the future, and configure a road map for achieving that by guiding land use patterns and development. Ideally, comprehensive plan goals are implemented through land use regulations and other municipal actions.

Municipalities commonly define existing character by the synergy of their natural and build environments. The natural environment may include such things as a community's visual and scenic qualities, river corridors, open lands, farmlands, wetlands, woodlands, mountains, critical habitats, air quality, water quality and noise levels.

The build environment may include historic buildings, particular development patterns, and the visual character of the built landscape. Social and cultural environments and the economic environment are also part of the built environment. The social and cultural environment of a community includes such things as the crime rate, property maintenance, school quality, property values, and historic and cultural resources. The economic environment of a community includes types of jobs, their quantity and quality, commuting patterns, and the integrity of a downtown area.

Key characteristics can also include the amount of noise in a community, traffic patterns/volume, and air quality. This section describes the cumulative impacts of the Belleayre and Crossroads projects on the following as they pertain to community character:

- Key elements of community character such as land use, cultural amenities, noise, traffic and air quality;
- Future development in the Catskills;
- The Catskill State Park and Forest Preserve.

1.10.1 Key Elements of Community Character

The general pattern of development within the study area is described in both the BMSC UMP DEIS and the Modified Belleayre Resort at Catskill Park SDEIS as low-density development within a mountainous region. The surrounding lands are primarily undeveloped state-owned lands. Development is concentrated in the valleys and in the hamlets along the Route 28 corridor and is regulated by local zoning and guided by the goals of several local planning documents. A mix of land uses associated with historical uses in the Catskills region— agriculture, forestry, tourist-related uses, including large scale resorts and residential uses—is a central feature of the study area.

Section 3.8 of the Modified Belleayre Resort at Catskill Park SDEIS describes the comprehensive planning efforts in the study area communities. Both projects are described as generally consistent with the applicable local planning and development goals. See section “3.8.2 Land Use, Planning and Zoning, A. Comprehensive Plans and Land Use Plans.” In addition, the proposed project is permissible under the Town of Middletown’s and the Town of Shandaken’s zoning regulations as special permit uses. A special use permit is a use allowed by zoning subject to requirements imposed by zoning to assure that the proposed use is in harmony with zoning and will not adversely affect the neighborhood. Special uses are presumed compatible with the existing land use. The Town of Shandaken has the provision in the Zoning Ordinance which allows resorts, by special permit, in any zone in Shandaken.

The projects integrate with each other (resort and ski area) and are a familiar use in the Catskills, and as stated in Section 3.8, are consistent with the goal of promoting tourism that is embraced by communities in the study area. The projects allow for the conservation of a substantial amount of acreage for public ownership and use, including the acquisition of 1,200 acres known as the “Big Indian” parcel; adaptively reuse and provide for the protection of historic structures; and provide recreational and/or open space within their Project areas.

As indicated in Section 1 of the BMSC UMP DEIS, all of the Project facilities proposed for the Belleayre Mountain Ski Center (BMSC) were carefully planned to support the existing ski center, and there would be no changes in existing land use. The project would not preclude existing or planned uses in the vicinity of the study area. As indicated in the Modified Belleayre Resort at Catskill Park DEIS and SDEIS, permanent land use impacts of the Modified Belleayre Resort at Catskill Park would be restricted to the project site. Approximately 29% of this site would be developed.

As stated in Section 4.7 of the BMSC UMP DEIS, the majority of the proposed new facilities at the BMSC would not be visible from historic/cultural resources. These resources would be screened from ski center facilities either by terrain or by the extensive existing vegetation at the ski center. The proposed new ski slopes could be viewed from some historic structures; however, ski slopes are an existing part of the resort and would not introduce a discordant element into the landscape.

As described in Section 1.8 of the BMCS UMP DEIS, the cumulative impacts of both projects on noise are anticipated to be temporary, and restricted to on-site activities (i.e., during construction). Construction would occur over a period of time and not together all at once, which serves to avoid or reduce construction related noise impacts.

Section 1.11 and Section 1.12 of this cumulative impact assessment describe the potential cumulative impacts of both projects on air quality and Climate Change. Air quality impacts resulting from construction of both projects would be temporary, and sources (i.e., small equipment and trucks) would be distributed throughout the BMSC and the Modified Belleayre Resort at Catskill Park because they are primarily mobile equipment. There would be a short-term cumulative adverse impact on air quality during the mix of construction and operation activities, and the minor cumulative impacts on air quality would cease upon completion of construction.

During operations, minor cumulative impacts are anticipated as a result of traffic-related emissions or pollutants emitted from sources associated with the Belleayre Resort at Catskill Park. For emissions of NOx (a pollutant that factors into regional ozone issues), the reduction at the BMSC from the elimination of existing diesel equipment would likely offset any increase in NOx associated with operation of the Belleayre Resort at Catskill Park. Also, as described in Section 4.8 of the BMSC UMP DEIS and Section 1.11 of this cumulative impact assessment, GHG emissions would exceed the guideline of 25,000 tons per year direct CO_2e during a three-year period associated with construction activities and operation of facilities at the BMSC and the Belleayre Resort at Catskill Park. This short-term cumulative impact would end when construction is completed at the BMSC. In subsequent years, direct cumulative GHG emissions are expected to be less than the guideline of 25,000 tons per year direct CO_2e.

While there would be some short-term adverse impacts from construction on some of the key attributes described above, the cumulative impacts of both projects on these resources would not be expected to alter the community's sense of character.

1.10.2 Future Development

The scope called for a discussion of the impact on future developments in the Catskills in terms of the precedent set by construction of the projects. The projects, however, are so unique that they are unlikely to set any precedent. There is only one publicly owned ski area in the Catskills, However, the other elements regarding future development patterns are set out below.

In the study area communities, commercial and economic activity has been historically focused in the existing hamlets and villages. While limited commercial development exists along Route 28, the concentration of commercial development is limited to the areas immediately adjacent to Boiceville and Margaretville. This pattern of development is likely to continue because of existing local and New York City development patterns, regulations on new development, and existing environmental constraints. As stated in Section 4.1.6.1 of the BMSC UMP DEIS, significant residential, commercial or industrial development is not planned for the area at this time, although the proposed projects would not preclude other development activities. This is also consistent with the comprehensive plans.

The cumulative impacts of the combined projects are not expected to have adverse effects on local water supply. According to the Modified Belleayre Resort at Catskill Park SDEIS, pumping and water quality tests demonstrate that two new wells would provide sufficient potable water for the resort. As stated in Section 3.2 of the Modified Belleayre Resort at Catskill Park SDEIS, no outside service provider, municipal or otherwise, is involved; thus, the Village of Fleischmann's water supply would not be compromised as a result of the project. As described in Appendix B of the BSMC UMP DEIS (Snowmaking Engineer's Report), the expansion project would require a seasonal volume of 203 mg (million gallons) of water for the snowmaking system. The initial opening of the ski area would require 10.5 mg, and a total of 64 mg would be required for the Christmas Holiday Operation. The existing usable storage volume at Pine Hill Lake is 25 mg, and Cathedral Glen is 2 mg. With simple upgrades to the diversion structure weir, the recharge volume over the base conservation flow of 8 cfs is greater than 600 mg, which is more than adequate to supply a typical ski season snowmaking supply.

Wastewater from both projects would be collected and conveyed to the Pine Hill WWTP for treatment. As described in Section 3.1 of the Belleayre Resort at Catskill Park SDEIS, the Pine Hill WWTP has more than sufficient capacity to accept and treat the wastewater generated by the project. The Pine Hill WWTP has a design flow of 500,000 gallons per day (gpd) and it provides advanced wastewater treatment including microfiltration of the final effluent per NYCDEP standards. The average daily flows for the Pine Hill WWTP are reported at 130,000 gpd based on current operational reports. Expected wastewater flows from the project are projected to be 160,000 gpd at full project build out and under a 100% occupancy scenario. Because the loadings from the project are similar to conventional residential
wastewater, the project would neither adversely affect the treatment capacity of the WWTP, nor the ability of the WWTP to meet its SPDES discharge permit limits.

As indicated in Appendix B of the BMSC UMP DEIS, with the appropriate maintenance repairs, the existing BMSC wastewater collection system is adequate to accommodate the proposed expansion. The expansion would result in a maximum daily sewage flow of approximately 60,000 gpd at peak attendance. Thus, the existing Pine Hill WWTP capacity of 500,000 gpd would adequately accommodate the operation of both projects while allowing capacity for future development projects.

As described in Section 3.6 of the Modified Belleayre Resort at Catskill Park SDEIS, none of ten representative locations within a 5-mile viewshed of the project would experience a significant change in visual resources, and the project would not be visible from any Forest Preserve lands classified as Wilderness. While glow from outdoor project lighting is expected, these levels are lower than the recommended limit for most rural locations. Additionally, views were evaluated from 22 locations from mountain peaks, hiking trails and/or overlooks outside of the 5-mile radius. The majority of these did not have views of the project, while 3 of these locations had potential views toward the project. As described in Section 4.7 of the BMSC UMP DEIS, the new ski slopes may be visible from specific visual resources within the study area, but these views are typical of the existing ski area and would not introduce a discordant visual element into the viewshed.

The scope called for an analysis of the visual impact of any proposed development over 2,500 feet. Since the scope was written, the Modified Belleayre Resort at Catskill Park has been changed to eliminate resort development over 2,500 feet in elevation.

1.10.3 Catskill Forest Preserve

As noted in the Section 4.1.6.1 of the BMSC UMP DEIS, the character of the Catskill Forest Preserve is comprised of a rich history, wild and undeveloped surroundings, natural resources, recreational opportunities and regional economic importance. Belleayre Mountain Ski Center is classified in the Catskill Park State Land Master Plan as an intensive use area, which supports development of the area for public recreation. In accordance with the Master Plan, intensive use areas provide facilities designed to accommodate significant numbers of visitors, such as campgrounds, ski centers, and visitor information centers.

The BMSC expansion project is neither designed nor intended to increase access to adjacent forest preserve lands except for any proposed passive recreational uses of portions of the Big Indian lands. Although the project would result in a significant increase in skier attendance at the BMSC and could foster a greater interest in the surrounding area, the project is expected to have negligible impacts on Forest Preserve lands. As described in section 4.13 of the BMSC UMP DEIS, this determination was based on a review of visitor use data from trail registers throughout the Forest Preserve during periods of previous Belleayre Ski Center expansions. The review included registers for the Wilderness Areas adjacent to the Ski Center for a five year period prior to and after the 1999 expansion at

Belleayre. Although the 1999 addition of new trails and lifts resulted in a significant increase in skier attendance, no significant change in use was observed in the surrounding Forest Preserve lands.

As described in Section 3.14 of the Modified Belleayre Resort at Catskill Park SDEIS, the proposed project does not abut any designated Wilderness area or Wild Forest area, nor are there any proposed direct connections between the resort and the Wilderness or Wild Forest areas. Section 3.14 of the Modified Belleayre Resort at Catskill Park SDEIS indicates that State documentation and studies were reviewed to estimate the potential number of additional hikers that would result from project implementation. Although the New York State Comprehensive Outdoor Recreation Plan reports that hiking is predicted to be fairly level between 2005 and 2025, at full build-out (up to 11 years after initiation of construction), approximately 200 additional people per day could be engaged in hiking at local or regional trails including those at the Catskill Forest Preserve However, many of these 200 people may participate in other activities provided by the resort or off-site; thus the SDEIS makes a reasonable estimate that approximately 105 additional people may hike on local and regional trails when the resort would be at average occupancy. Some, but not all of these 105 people would be expected to use Forest Preserve trails in the vicinity of the combined project area.

At average resort occupancy and in the years following BMSC expansion, it is reasonable to expect that the additional number of Forest Preserve visitors would not exceed 105 people per day. While studies have not been conducted to date to determine the park's capacity to accommodate this increase in visitor use, the Modified Belleayre Resort at Catskill Park SDEIS indicates that the project Applicant will assist in data collection efforts that could be used to update future UMPs. The SDEIS indicates that to mitigate adverse impacts that could result from an increase in Forest Preserve use, the applicant would implement a program to educate and guide resort guests in the use of Forest Preserve trails. Trails that may be at risk of overuse would be identified in order to redirect guests to less intensively used trails. Information on guest usage would be submitted to NYSDEC monthly, and a report on trail conditions and guest usage will be submitted to the NYSDEC annually.

1.10.4 Conclusion

The proposed expansion of the Belleayre Mountain Ski Center as set forth in the UMP/DEIS is consistent with existing on-site uses; and the Modified Crossroads project would re-introduce resort development uses into an area that historically supported this type of development. Nonetheless, it is consistent with the comprehensive plans and zoning of the two towns that would be home to the resort. Because the combined projects would not result in a change to the community character of the study area, no significant cumulative impacts on community character are expected.

1.10.5 Mitigation

No mitigation measures for potential impacts to community character are specifically proposed, beyond mitigation for individual resource areas such as impacts on the Catskill Forest Preserve (Crossroads Resort), visual resources (signs and building materials), traffic, and air quality (dust control measures during construction, reduction of air pollutant emissions through the use of green technology, green design, and the use of shuttle buses or ski-in/ski-out options). These mitigation measures are discussed in each resource chapter.

1.11 Air Quality

The improvements proposed in the BMSC UMP DEIS for the BMSC and the proposed Modified Belleayre Resort at Catskills Park were evaluated for their potential cumulative impacts on air quality sources of greenhouse gases (GHG). The potential for impacts from the GHG emissions are further evaluated in Section 1.12.. This evaluation addresses emission of criteria pollutants and greenhouse gases from the construction and operational phases of the projects. Background air quality, as discussed in Section 4.8.1.2 of the BMSC UMP DEIS, is better than the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants although the project location in New York State places it in the Northeast Ozone Transport Region (NOTR). No ambient air quality standards are applicable to greenhouse gases.

Criteria Air Pollutants

Construction

Construction of each project would occur over multiple years. The BMSC expansion would occur over a five-year period; the construction of the Modified Belleayre Resort at Catskills Park would occur in three phases over a period of eleven years. The duration of both projects and the level of activity in each year would vary, depending on a number of factors including but not limited to availability of funding and economic conditions which may affect the pace of development (construction). However, it is possible that construction activities would overlap in one or more years and it is feasible that operation of the expanded Belleayre ski center would overlap with a combination of construction and operational activities at the Crossroads project site. Since it is not feasible to predict which construction activities on each project would occur at a specific time, and the specific activities occurring during the potential overlap period, the cumulative assessment for construction air pollutant emissions is based on a worst-case scenario—peak construction year emissions for each project with the assumption they occur during the same year. Table 1-11.1 summarizes potential construction emissions.

Only construction PM10 emissions associated with material handling were calculated for the original Crossroads Resort project and were disclosed in the 2004 DEIS. These emissions represent a worst-case condition of operation of one portable concrete batch plant and two portable rock crushing plants during 3,800 hours in each of two years. The 2004 Crossroads Resort DEIS stated that the concrete batch plant and rock crushers would be governed by "mobile source" air permits. The Modified Belleayre Resort at Catskills Park SDEIS does not re-evaluate these emission sources or indicate they would not be used, therefore it is assumed the Modified Belleayre Resort at Catskills Park project would still require their use. Typical portable concrete batch plant and rock crushers utilize diesel engines for on-site power. Construction emissions outside of those two years were not determined; they are assumed to be minor, being produced by small equipment and trucks typically used for building construction. A commitment to implement dust control measures as needed was included in the SDEIS. It is reasonable to expect that PM10 emissions for the Modified Belleayre Resort at Catskills Park project would be lower than the original Belleayre Crossroads estimate due to the reduced size and scope of the Modified Belleayre Resort at Catskills Park project. Therefore, the original construction emission estimate is considered conservative for purposes of this cumulative assessment.

Construction emissions for the BMSC would be primarily from mobile sources. These would include bulldozers, excavators, soil compactors, delivery trucks, worker commute vehicles and dump trucks. This equipment would be used during construction of the Discovery Lodge and equipment buildings, clearing new trails and parking areas, and adding snowmaking water storage and adding/replacing ski lifts. Construction would occur during the summer months with year two of the construction period anticipated to be the most active.

Table 1.11-1 Worst-Year Combined Construction Phase Emissions

Source	Emission (tpy)					
	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Belleayre Mountain Ski Center	**8.8**	**27**	**42**	**0.7**	**2.4**	**2.3**
Crossroads Resort	**NA**	**NA**	**NA**	**NA**	**3.3**	**NA**
Total	**8.8**	**27**	**42**	**0.7**	**5.7**	**2.3**

Key:

CO = Carbon monoxide.
NO_x = Nitrogen oxides.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
PM_{10} = Particulate matter less than 10 microns in diameter.
SO_2 = Sulfur dioxide.
tpy = Tons per year.
VOCs = Volatile organic compounds.
NA = No estimate available.

Construction emissions would be temporary and emission sources would be distributed throughout the Belleayre Ski Center and Modified Belleayre Resort at Catskills Park areas because they are primarily mobile. Construction emissions would cease when construction is completed. The minor cumulative impacts on air quality would cease upon completion of construction. The dispersed nature and short-term impacts would not represent a significant cumulative adverse impact.

Operation

Operation of the two facilities is expected to ultimately produce only small cumulative air quality impacts. Several features of both projects are designed to reduce air pollutant emissions:

- New snowmaking equipment that uses electric motors to turn fans instead of diesel compressors and pumps
- Green building design at the BMSC,
- Incorporation of energy saving designs into the Modified Belleayre Resort at Catskills Park project;
- Minimizing vehicle traffic between the Modified Belleayre Resort at Catskills Park project and BMSC through use of shuttle buses or ski-in/ski-out options.

The multi-year construction period for both projects and phased construction/operation of the Modified Belleayre Resort at Catskills Park project would result in a multi-year period of a mix of construction and operation. After completion of construction at the BMSC, the Modified Belleayre Resort at Catskills Park project would continue with a mix of construction and operation as additional Modified Belleayre Resort at Catskills Park facilities are built. Thus, there would be a short-term cumulative effect during the overlapping period of construction and operation activities. The long-term cumulative effect would be operation of the two facilities after completing full build-out of the Modified Belleayre Resort at Catskills Park project.

During operation, the enhancements to the BMSC and the availability of lodging and activities at the Modified Belleayre Resort at Catskills Park resort would increase traffic along roads leading to the site and at the ski center and nearby Crossroads site. Visitor traffic would peak at the ski center and the Crossroads project at different times because the ski center is a day use facility and the Crossroads resort is a longer use facility. The peak traffic hour for the BMSC would be Saturday late-afternoon, shortly after closing, as skiers leave. Traffic to and from the Modified Belleayre Resort at Catskills Park resort would vary depending on arrival and departure times for guests with multiple day stays at the Crossroads. The Modified Belleayre Resort at Catskills Park resort traffic would not have a well-defined "peak hour" at the same time as the BMSC; however the Modified Belleayre Resort at Catskills Park resort traffic study for the 2015 build year shows the resort would add traffic to the Saturday PM peak hour (Crossroad SDEIS Appendix 11). Most visitors at the Modified Belleayre Resort at Catskills Park resort and the BMSC would be expected to use the Crossroads' shuttle service or ski-in/ski-out alternatives rather than individual vehicles, thus providing some degree of mitigation of vehicle trips during the Saturday late afternoon peak travel hour for BMSC. Traffic and associated emissions from the Modified Belleayre Resort at Catskills Park would not be expected to coincide with peak traffic air pollutant emissions associated with the BMSC. Therefore, the potential cumulative impact of traffic-related emissions is expected to be small.

The emission analysis for the BMSC shows that a decrease in on-site NOx emissions is anticipated when full operation would begin after completion of construction (see Table 1.11-2). NOx is singled out here for additional analysis because of its contribution to the production of low-level ozone. The predicted decrease in on-site NOx emissions would be primarily due to the proposed replacement of diesel engine-powered snowmaking equipment with electric motor-driven equipment.

Emission sources at the Modified Belleayre Resort at Catskills Park would consist of propane heating units, eight diesel-fueled emergency generators, cooking stoves and fireplaces, on-site skier/visitor shuttle vehicles, and personal vehicles. The heating units would be small enough to be below the threshold requiring a NYSDEC air permit and would be distributed throughout the Modified Belleayre Resort at Catskills Park. To quality for emergency use status, the diesel engine emergency generators would be limited to less than 500 hours operation per year for each unit; the Modified Belleayre Resort at Catskills Park anticipates an average annual actual operation of about 38 hours per year for each emergency generator.

Table 1.11-2 shows a summary of cumulative emissions. Based on the net change in emissions at BMSC and the potential actual emissions from operation of the Modified Belleayre Resort at Catskills Park, a modest increase in all pollutants would be expected with the largest increases occurring for CO and NOx.

For emissions of NOx (a pollutant that factors into the NOTR regional ozone issue), it is expected that the reduction at the BMSC would offset a portion of the increase in NOx associated with operation of the Modified Belleayre Resort at Catskills Park, cumulatively resulting in an increase of 7 tons per year of NOx (see Table 1.11-2). The cumulative increase in NOx could potentially be as high as 45 tons per year if emergency generator use is based on a full 500 hours per year for each emergency generator. It is unreasonable to expect each generator to operate at its full potential for a year. Therefore, based on expected actual emissions the cumulative increase in NOx emissions of the two projects would not represent a significant adverse cumulative impact.

Table 1.11-2. Potential Cumulative Impacts During Operations, BMSC plus Modified Belleayre Resort at Catskills Park						
	Proposed Emissions (tons per year)					
Emission Source	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Total Existing (Belleayre Mountain Ski Center Equipment and Staff/Visitor Traffic)	7.4	66	41	0.3	1.4	1.3
Total Proposed (Belleayre Mountain Ski Center Equipment and Staff/Visitor Traffic)	7.7	80	12	0.5	0.5	0.3
Net Change at BMSC	+0.3	+14	-29	+0.2	-0.9	-1
Total Proposed Modified Belleayre Resort stationary sources[Note 1]	1.4	5	36	3.7	1.2	1.2
Cumulative Net Change	+1.7	+19	+7	+3.9	+0.3	+0.2
Note 1: Emissions shown include anticipated actual annual emergency generator emissions based on 38 hours per year operation each. Potential annual operation of the generators could be permitted for up to 500 hours per year resulting in higher cumulative emissions.						

1.12 Climate Change

The improvements proposed in the UMP for the BMSC and the proposed Modified Crossroads Resort at Catskill Park were evaluated for their potential cumulative impacts on greenhouse gas (GHG) emissions and climate change. The effect of climate change on the combined projects was also evaluated.

Greenhouse gas annual reporting thresholds (25,000 tons per year) and major source permit greenhouse gas thresholds (100,000 tons per year) have been established by the EPA for stationary emission sources. These thresholds imply levels of significance for stationary sources that require the reporting of emissions and for evaluating mitigation options. There are no specific thresholds established for determining the significance of cumulative greenhouse gas emissions in New York State, but New York has established a protocol for estimating potential emissions.

Federal NEPA GHG guidance suggests 25,000 metric tons per year of carbon dioxide equivalent (CO_2e) as a quantity of direct emissions that may indicate that a GHG assessment would be useful to the public and decision-makers when evaluating a proposed action. New York SEQR and federal NEPA GHG guidance also suggest that mitigation measures should also be discussed when evaluating GHG emissions to provide an indication of intent to reduce GHG emissions, to the extent feasible. For this GHG cumulative assessment, the federal NEPA GHG value of 25,000 tons per year of direct CO_2e is used as a benchmark.

Construction at the BMSC would take place over a five-year period. In each year of construction, direct GHG emissions would be produced from construction equipment exhaust at the rate of approximately 10,000 metric tons of CO_2e per year. Construction at the ski center would also result in the loss of forest when land is cleared for ski lifts and trails. The CO_2e released from the forest and woody material is estimated at 44,000 tons (see Section 4.9.3 in the BMSC UMP DEIS. This release of GHG would likely occur over the period of construction as the woody material decays. It is anticipated the woody material would be chipped and used primarily as ground cover (mulch).

As discussed in Section 4.9.2.3 of the BMSC UMP DEIS and shown in Table 1.12-1, direct GHG emissions during ski center operations would be lower compared with existing direct GHG emissions; conversely, indirect GHG emissions would be higher.. Indirect emissions from the removal of trees for the ski lifts and trails would result in a loss of carbon sequestration estimated at approximately 30 tons of CO_2e per year. Mitigation measures affecting direct emissions of GHGs during operations at the MMSC include the incorporation of green building principles in the new construction at the Discovery Lodge and subsequent reduction of energy consumption and use of electricity-driven snowmaking machines.

Construction at the Modified Crossroads Resort at Catskill Park may initially coincide with construction at the ski center. Since construction at the Crossroads resort would take place over an 11-year period, the overlap of construction GHG emissions at the two sites would potentially cease after a five-year period when construction is completed at the BMSC. In the initial years, the ski center would be emitting GHG from construction and also still using the diesel snowmaking equipment. In this worst-case analysis it is assumed that the replacement of the diesel pumps and compressors would not occur until the end of construction. This is a conservative assumption. Also, the snowmaking would not occur during the same months as the construction, but GHG emissions are assessed on an annual basis so no credit is accepted for the lack of overlap between construction and snowmaking.

Table 1.12-1. Potential for Cumulative Impacts of Greenhouse Gases during Construction and Operations of the BMSC and the Modified Crossroads Resort at Catskill Park (Crossroads)

Year	Cumulative Activity			CO_2e Direct and Indirect Emissions (metric tons per year)			
				Facility		Cumulative	
				Direct	Indirect	Direct	Indirect
Existing				3,651	4,280	3,651	4,280
				0	0		
	Facility	Construction	Operation				
1	Ski Center	✓	✓	13,149	4,280	19,855	4,280
	Crossroads	✓		6,706	0		
2	Ski Center	✓	✓	13,149	4,280	16,981	4,280
	Crossroads	✓		3,832	0		
3	Ski Center	✓	✓	13,149	4,280	28,619	7,850
	Crossroads	✓	✓	15,488	3,570		
4	Ski Center	✓	✓	13,149	4,280	29,214	8,185
	Crossroads	✓	✓	16,065	3,905		
5	Ski Center	✓	✓	13,149	4,280	30,351	8,594
	Crossroads	✓	✓	17,202	4,314		
6	Ski Center		✓	661	7,029	18,734	11,677
	Crossroads	✓	✓	18,073	4,648		
7	Ski Center		✓	661	7,029	19,709	12,086
	Crossroads	✓	✓	19,048	5,057		
8	Ski Center		✓	661	7,029	19,401	12,235
	Crossroads	✓	✓	18,740	5,206		
9	Ski Center		✓	661	7,029	19,499	12,421
	Crossroads	✓	✓	18,838	5,392		
10	Ski Center		✓	661	7,029	20,418	12,644
	Crossroads	✓	✓	19,757	5,615		
11+	Ski Center		✓	661	7,029	20,099	12,644
	Crossroads		✓	19,438	5,615		

Note: In years 3 through 10, Crossroads resort will operate at less than full build out. In year 11 and thereafter, Crossroads Resort operates in full build out mode.

In subsequent years, operation of the BMSC would coincide with operation of completed Modified Crossroads Resort at Catskill Park facilities.. Table 1.12-1 shows a likely time profile of GHG emissions from activities at the Modified Crossroads Resort at Catskill Park during the 11-year period and beyond. Sources of direct GHG emissions at the Modified Crossroads Resort at Catskill Park include emissions from on-site fossil fuel combustion (propane and/or natural gas), primarily in heating systems and kitchen equipment. Off-site direct GHG emissions would be produced by resort staff as they commute to/from work (estimated at approximately 3,700 metric tons per year CO_2e). Fugitive emissions of GHGs from heating, ventilation, and air conditioning (HVAC) and kitchen refrigeration systems are very small compared with the overall project and were not considered significant for the cumulative impact assessment. Indirect GHG emissions would be produced by the Modified Crossroads Resort at Catskill Park‘s use of purchased electricity; the quantity of indirect emissions associated with electricity use would increase as new facilities are opened. When the resort is fully built, approximately 5,600 metric tons per year indirect CO_2e would be associated with electricity use.

Using 25,000 tons per year direct CO_2e as a guideline value, Table 1.12-1 shows a three-year period when cumulative GHG emissions would exceed 25,000 tons per year direct of CO_2e. This period coincides with construction activities and operation of facilities at the two project sites. This short-term effect would end when construction is completed at the ski center. In subsequent years, direct cumulative GHG emissions are expected to be less than 25,000 tons per year direct CO_2e.

Mitigation designed to reduce the direct and indirect emission of GHGs from the BMSC and Modified Crossroads Resort at Catskill Park are focused on efficient use of energy, materials and resources. With these measures implemented, the ski center and Crossroads resort would minimize GHG emissions to the extent practicable.

Mitigation measures that will aide in minimizing emissions of GHGs from the ski center are summarized below:

- Using green building principles in new construction at the Discovery Lodge to lower energy consumption and thus reduce direct and indirect GHG emissions;
- Replace the diesel engine air compressor station with a substantially larger electric air compressor station to mitigate direct GHG emissions associated with snowmaking;
- Testing and repairing leaks in the compressed air system to maintain efficiency;
- Strategic placement of the new water reservoir to take advantage of gravity and use of new higher efficiency pumps;

- Groundwater reclamation to reroute surface water run-off directly to the upper and new reservoirs instead of allowing it to flow to Pine Hill Lake;
- Establish automated procedures and install automated equipment to control energy use; and
- Mitigating a reduced ability to sequester carbon by keeping forest clearing to a minimum, using wood from the cleared areas in on-site building construction if feasible, using the cleared wood as firewood and establishing a forest by planting trees in areas that are currently not forested.

Transportation and other mobile source/equipment GHG emission mitigation measures at the ski center would include:

- Construction emissions mitigation using best management practices aimed to maximize fuel efficiency such as using fuel-efficient vehicles, ensuring that all equipment is properly maintained and minimizing idling of construction vehicles;
- Using existing power sources (e.g., grid electric power) or clean fuel electric generators rather than diesel-powered electric generators;
- Mitigation measures to reduce the impact from staff and visitor traffic such as increasing the number of passengers per vehicle and thereby reduce the number of vehicles travelling to Belleayre Mountain Ski Center. Other key mitigation measures include preferential parking areas for high occupancy vehicles and other incentives for carpooling such as rewards of food, beverages, free/reduced price lift tickets or equipment tuning; and increasing use of mass transit and/or shuttle buses by providing additional parking for buses.

The Modified Crossroads Resort at Catskill Park's design goal is to achieve Leadership in Energy and Environmental Design (LEED) Silver status. The project would also incorporate mitigation measures outlined in NYSDEC's "Policy on Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements." These mitigation measures would result in overall lower energy consumption and associated GHG emissions.

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.

Effects of Climate Change on the Projects

A study of the impacts of climate change on the U.S. Northeast is summarized in the Northeast Climate Impacts Assessment (NEICA) Synthesis Report (Frumhoff et al, 2007, http://www.northeastclimateimpacts.org/). This report states that regional temperature data over the past 30 years (1970 to 2000) show that the average daily temperature in the U.S. Northeast has warmed at a rate of about 0.5 degrees Fahrenheit (°F) per decade. Winter daily average temperatures have warmed at a rate of 1.3°F per decade during this period. The NECIA climate projections found that over the next several decades, due to 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 even if actions are taken to reduce emissions. 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 or more similar to Southern Virginia/Northern North Carolina depending on the amount of warming that ultimately occurs. Some current research suggests that while global warming as a long-term trend will continue, there may be periods of a slowed warming rate or even a pause in the rise of average temperatures over the next 10 to 30 years. The effects of this phenomenon, if realized, could be a delay in the decline in the snow season suggested in the NECIA study.

Another important report is the “ClimAid Report” (Rosenzweig, 2011) that was prepared by a group of scientists for the New York State Energy Research Development Authority. This report extends predictions to 2080 and provides predictions of impacts to specific economic sectors. It states that “…the negative impact on the state’s winter recreation industry will adversely affect the Catskill and Adirondack regions.”

Major winter recreation areas such as the BMSC may face operational challenges during the 21st Century if average global temperatures continue to rise. The primary effect of increasing global temperatures will likely be a shortening of the ski season, reduction in annual snowfall and hours with air temperatures suitable for snowmaking, and a general lessening of the snow quality as more mixed precipitation or rain falls during the winter months. However, the increase in reliance on snowmaking to maintain a reliable snowpack would help to mitigate or adapt to these potential changing conditions, as long as snowmaking capacity is sufficient to take advantage of available snowmaking hours. In addition, the existing layout of the ski center, i.e., the northward facing slopes, will help retain snow during warmer temperatures since sunlight on sunny days will not be as direct as it would be on south facing slopes.

Water resources utilized by the projects 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 2 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. For the BMSC, increased maintenance of land areas may be required to manage runoff to minimize erosion. For the Modified Crossroads Resort at Catskill Park, drought conditions would require an increase in the use of irrigation to maintain landscape appearance and golf course amenities. Water conservation techniques such as using water-saving fixtures that exceed building code requirements, re-use of gray water and/or collecting and re-using rainwater and design water efficient landscaping could be used to mitigate low rainfall periods.

The NECIA Synthesis report also addresses the effect of the lower and higher emission scenarios on plant and animal species. For the lower emission scenario, there could be a 350 mile northward shift in plant species by the end of the century. Many existing hardwood forest and plant species could adapt to these climate conditions and remain viable in the region. Under the higher emission scenario, the NECIA Synthesis report suggests the northward shift could be as much as 500. This degree of climate shift could reduce the productivity of spruce/fir forests through a reduction of habitat capable of supporting these forests. Hemlock forests may also be more susceptible to the northward migration of pests as winter temperatures continue to warm.

Climate change challenges to construction of the projects, if the projects are built in the next 10 to 20 years, are expected to be minimal, especially if the Northeast US experiences a slowed warming rate or pause in warming over the next 10 to 30 years as suggested by some researchers. It is anticipated that the effects from climate change over the next 10 years on both projects would be small and that local soil and water conditions, which could impact operation of construction equipment, would not change significantly from current conditions.

Conversely, the potential for the combined projects to have a contribution toward accelerating global climate change was also considered. The USEPA considers 25,000 tpy of Co_2e, to be a threshold below which project impacts on global climate are *de minimus* and not reportable. This threshold would not be reached except for a few years during the worst case projections of construction and operations at both project sites overlapping with the extended use of diesel compressors. The mitigation efforts described above would lower emissions below the reportable threshold.

1.13 Cultural Resources

Separate cultural resources analyses were conducted for the BMSC UMP DEIS and the Modified Crossroads Resort at Catskill Park SDEIS. These analyses considered prehistoric archaeological resources, historic archaeological resources, historic structures and changes to the viewshed that could impact the setting of historic resources.

1.13.1 Impacts

Prehistoric Archaeological Sites

As indicated in Section 4.12 of the BMSC UMP DEIS, there is no evidence of known prehistoric archaeological resources within a 1-mile radius of the BMSC. As indicated in Section 3.13 of the Modified Crossroads Resort at Catskill Park SDEIS, no prehistoric materials were recovered within the area of potential area of effect (APE) for the Modified Crossroads Resort at Catskill Park. Thus, there is no potential for cumulative impacts on prehistoric archaeological sites resulting from the construction and operation of both projects.

Historic Archaeological Sites

Fourteen historic archaeological sites were identified within a 1-mile radius of the BMSC. The Phase 1 archaeological survey determined that most of the land that would be used for the proposed construction has either sustained a severe prior disturbance or was unsuitable for human habitation because of the extreme slope. With only once exception—the early 20th century Whispell House in Area F—all discovered modern/historical remains are not eligible for State or National Register of Historic Places (S/NRHP) listing or were avoided making further evaluation unnecessary. To avoid potential impacts on the Whispell House property, the parking lot was re-designed following consultation with the NYS Office of Parks Recreation and Historic Preservation (OPRHP). Consequently, the proposed construction activities for the BMSC UMP project will have no effect on historic archaeological sites.

The Phase 1A analysis conducted for the Modified Crossroads Resort at Catskill Park site identified 12 historic archaeological sites within one mile of the Modified Crossroads Resort at Catskill Park project area, many of which are the same sites identified within 1-mile of the BMSC. Five of these sites are listed on the NRHP. A Phase 1B field examination and Supplemental Phase 1B Cultural Resources Report submitted in February, 2010 by Birchwood Archaeological Services for the Modified Crossroads Resort at Catskill Park project did not identify any historic archaeological sites in the additional areas proposed for development. Three historic sites identified in the 2003 Crossroads Development

DEIS will be adaptively reused for the Crossroads resort. To mitigate potential impacts on these structures, the NYS OPRHP will review proposed interior and exterior work. Thus, the proposed construction activities for the Modified Crossroads Resort at Catskill Park project are not expected to have an effect on historic archaeological sites.

Because neither the BMSC UMP project nor the Modified Crossroads Resort at Catskill Park project would have an adverse effect on historic archaeological sites, cumulative impacts on these resources are not anticipated.

Visual Impacts on Historic Resources

As described in Section 4.12.5.3 of the Belleayre UMP SDEIS, 88 historic properties (primarily standing structures) were surveyed and recorded. Of these, three properties were listed on the State or National Register of Historic Places (S/NRHP) and six properties were determined to be eligible, five of them in a response to a survey conducted for the Modified Crossroads Resort at Catskill Park project. Additionally, an historic district in the Village of Fleishmanns is an eligible resource. As indicated in Section 4.12.5.5, of the BMSC UMP DEIS, the majority of the proposed new facilities at the Belleayre Ski Center would not be visible from these historic properties. The resources would be screened from ski center facilities either by terrain or by the extensive existing vegetation at the ski center. Some of the historic structures would be in the visual zone of influence of some of the proposed new ski slopes. However, ski slopes are an existing part of the resort and would not introduce a discordant element into the landscape. Thus, the proposed BMSC expansion is not expected to have adverse visual impacts on historic properties.

While five S/NRHP-listed properties are within a mile of the proposed Modified Crossroads Resort at Catskill Park, all of these structures are located in the Village of Fleishmanns and Pine Hill and are not readily visible from the boundaries of the BMSC or the Modified Crossroads Resort at Catskill Park. The proposed project is visually consistent with previous land uses on the property: the abandoned ski lifts of the former Highmount ski area are still visible in one portion of the APE. Thus, the Modified Crossroads Resort at Catskill Park project is not expected to have adverse visual impacts on historic properties. See Section 1.7 of this cumulative impact analysis for additional information about potential visual impacts from both projects.

Since neither project will have adverse visual impacts on historic properties, cumulative impacts are not expected.

1.13.2 Mitigation

Construction and operation of the BMSC and the Modified Crossroads Resort at Catskill Park are not expected to result in adverse cumulative impacts on cultural resources; thus, no mitigation measures are proposed beyond agency consultation for the adaptive reuse of historic buildings for the Modified Crossroads Resort at Catskill Park and avoidance of the historic Whispell House at BMSC.

Water Budget Analysis

Belleayre Mountain Ski Area
Modified Belleayre Resort at Catskill Park

Highmount, New York

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1.0 INTRODUCTION

This report provides the findings and conclusions of a water budget analysis (Water Budget) that has been completed for the Belleayre Mountain Ski Area (Study Area) and the Belleayre Resort (Wildacres Resort and Highmount Spa Resort). The work has been completed by CHA Consulting, Inc. (CHA) for the New York State Office of General Services (NYSOGS) as a supplement to the Unit Management Plan (UMP) Draft Environmental Impact Statement (DEIS), April 2011. The Budget is an assessment of potential changes in runoff, evapotranspiration and infiltration associated with the construction and development activities planned for Belleayre identified in the UMP. The Water Budget identifies the potential effects to the local watershed due to alterations to the land surface, storm water management structures, irrigation and snow-making capabilities. The Water Budget specifically addresses the conditions and alterations as described in the UMP DEIS and the "Scoping Outline for the Modified Belleayre Resort at Catskill Park Supplemental Draft Environmental Impact Statement" utilizing the information presented to determine the appropriate input parameters to validate existing conditions and predict post-development conditions. The Water Budget was based on the Thornthwaite Model software Version 1.1.0 published by the United States Geological Survey (USGS).

The Study Area encompasses 2480 acres, encompassing the expansion of the ski area and the adjacent resort construction. The study area includes the study areas described in both previous water budget reports for the two separate but adjacent projects, (Alpha Geoscience March 2011, and CHA February 2012). Two outlying parcels of the Belleayre Resort were not included in the study area because development is not occurring on those parcels, the K well field and the abandoned quarry. The two parcels are the location of the primary and back up water supply wells. A planned land acquisition of the former Highmount Ski Area by the NYSDEC was included in the study areas of each report, which totals approximately 100 acres. The combined study area accounts for this overlap by reducing the area study in the Alpha Geoscience report as the area and soil types were included in the previous CHA report.

The planned development will include additional parking, improvements to access roads/walks, clearing of additional trails, construction of a golf course, additions to existing buildings, new conference center/hotel, new multiunit dwellings and additional stormwater management structures and an additional snowmaking reservoir that will be used for expanded snowmaking capabilities. The existing buildings of the former Highmount Ski Area were planned for differing usage as part of each project, but for the purpose of the water balance, the critical factor is that the buildings will remain in their current footprint. The purpose of the Water Budget is to identify the potential changes in runoff and infiltration in the post-development condition, compared to existing condition of the Study Area.

2.0 EXISTING AND POST-DEVELOPMENT CONDITIONS

2.1 EXISTING SITE CONDITIONS

The Belleayre Mountain Ski Area facility currently consists of two lodge buildings, a number of outlying buildings for infrastructure and equipment, parking lots, access roads, cleared trails and lift equipment, stormwater detention ponds and a snowmaking reservoir. The Highmount property is of a similar nature to the Belleayre facility including several small buildings and associated ski- related infrastructure and trail systems. Of note, the Highmount property has not been used since 1994 and the trails have become brush covered due to a lack of clearing and maintenance. The proposed Belleayre Resort is planned to be constructed in an area that is wooded, with some limited areas of non-wooded previously developed property.

The Study Area is located in the vicinity of Shandaken, Ulster County New York, (and extends into Delaware County), which is on the northern slopes of the Catskill Mountains, within the Catskill Forest Preserve. The location of the facility is presented on Figure 1. The Study Area is located within two watersheds as defined by the USGS Hydrologic Unit Codes (HUC); the Middle Hudson Watershed (HUC #02020006), and the East Branch Delaware River Watershed (HUC #2040102).

Four (4) perennial streams that drain into the Middle Hudson Watershed have been identified within the Budget area. The streams are tributaries of the Birch Creek, which eventually discharges into the Middle Hudson Watershed.

No perennial streams that drain into the East Branch Delaware Watershed have been identified in the project area. One (1) ephemeral stream has been mapped along and just beyond the west side of the Water Budget area. The stream has been assigned Class B according to the New York State Department of Environmental Conservation (NYSDEC) indicating that it is appropriate for contact recreation, not for drinking water. The stream drains from the Water Budget area into Emory Brook continuing on to drain into Vly Creek, Bush Kill and eventually into the East Branch of the Delaware River.

Wetlands in the Budget study area cover approximately 3.5 acres. The United States Army Corps of Engineers maintains jurisdiction over 3.375 acres of the total. The wetlands identified within the Study Area are not within any planned disturbance and the mandatory setbacks are honored within the planned development activities.

The majority of the watercourses in the area are designated as protected under the NYSDEC classification system, by either being mapped with a designation of Class C(T), or more valuable, or by having no mapped classification, but having a downstream connection to a watercourse that is protected. Crystal Spring Brook is the only stream within the Budget area classified as B(T) requiring a high level of protection due to its identified support of a Trout population.

The potable water supply system for the Belleayre Ski Area consists of a series of four (4) main groundwater supply wells, and a fifth well that is dedicated to supplying the Sunset Lodge. The wells have been installed and maintained by the facility. The well field will continue to be utilized for the post-development water supply with modification to the number of wells and distribution from those wells as part of the planned development. The UMP/DEIS process required an analysis of the current potable water supply system and the likely changes to the demand that will be a result of the development. The groundwater withdrawal is expected to increase marginally based on the planned increase in visitation.

One of the four main wells in the current water supply system is planned to be abandoned due to unresolvable turbidity issues. The fifth well which supplies the Sunset lodge and is not considered a part of the main groundwater supply system is to be abandoned. The Sunset lodge water supply is planned to be replaced by a 50,000 gallon storage tank that is fed by a booster pump installed in the groundwater supply system.

The calculated groundwater demand for the entire facility following development is anticipated to be 60,000 gallons per day. The total sustainable yield of the three wells that will remain in service is 102 gallons per minute (~147,000 gallons per day). The available supply remaining after the planned well abandonment far exceeds the anticipated demand. One of the supply wells yields the majority of the water supply capacity; 60 gallons per minute, the remaining wells are capable of providing for the necessary supply should the high yield well be offline. The current potable water supply system is capable of delivering the anticipated required demand without requiring additional withdrawals from the aquifer.

Crossroads Ventures LLC. proposes to build a four season use resort/vacation area that is adjacent to the Belleayre Mountain Ski Area on a previously undeveloped parcel of land. The proposed development will offer direct access between the two facilities, and provide a destination with lodging and conference center that is not currently available in the area. The development property is property is roughly 740 acres of wooded area in the lower portion of the valley and extending up the mountain somewhat from New York State Route 28. The resort is proposed to be constructed in two separate parcels, one the Wildacres Resort consisting mainly of a hotel, golf course and practice facility with a clubhouse and the Highmount Spa Resort consisting mainly of a lodge/hotel, and conference center with multi-unit dwellings and ski in ski out access to the Bellayre Mountain Ski Area. The disturbance to construct the proposed facility will be significantly less than the 740 acre property, developing roughly 230 acres. The proposed development has also obtained two small properties that are solely used for water supply well systems, and are not considered part of the study area due to their limited size and small disturbance.

2.2 POST-DEVELOPMENT CONDITIONS

The total area of the Budget study area that is planned to be altered in a manner that potentially affects the water budget is approximately 353 acres out of the total Study Area of 2480 acres. The areas to be developed include: 1) Discovery Lodge improvements, 2) Parking area construction/expansion, 3) Discovery snowmaking reservoir, 4) Ski trails and lift alignments clearing, 5) Golf course development, 6) Irrigation pond construction, 7) Construction of dwellings, 8) Construction of the Highmount Spa, and 9) Construction of the Wildacres Resort.

The major impacts consist mainly of clearing of trees for parking, trails landscaping and construction of buildings. The total disturbance to the Study Area represents roughly 14 percent of the total with the majority of the disturbance to be created on the Belleayre Resort portion of the Study Area. The development-related clearing will occur over non-contiguous portions of the study area which creates a less significant impact than if all of the development was to occur on a contiguous portion of the Budget study area.

Discovery Lodge Improvements

The Discovery Lodge improvements include the addition to the building, construction to the driveway and approach, stormwater infiltration structures, dry swales and stormwater diversion features. The Discovery Lodge improvements will disturb an area of approximately 3.25 acres within an area of 7.5 acres. The disturbance will cause a net change to the Budget that includes creation of additional impervious surface area from the current 0.97 acres to 1.63 acres following the development. The Discovery Lodge area is a small parcel within the study area, the area is discussed as its own parcel because the construction has a separate plan that documents the areas and their development.

The development planned for the Discovery Lodge was designed in a manner that controls stormwater runoff and promotes infiltration of precipitation through features designed to intercept and recover precipitation that falls on the existing and expanded impervious surfaces. The runoff that will be generated by the development is estimated to be less than the current runoff generated by the Discovery Lodge as the storm water is detained in a series of basins and controlled by a diversion structure constructed on the uphill side of the lodge. The diversion structure causes runoff to be directed around the lodge and into a wooded area eliminating a portion of the storm water that would contribute to the runoff downstream of the lodge. The calculations provided in the Discovery Lodge SWPPP indicate that the peak runoff from the development will be reduced by an average of 50%, with the amount of reduction dependent on the significance of the rainfall event. The range of reduction values is between 42% and 59% with the greatest reduction in peak runoff associated with the most significant rainfall events.

Parking Area Expansion

The development planned for the facility is conceived with the expectation that the attendance will increase throughout the year, and will be significantly higher during peak attendance events. Currently the parking available is able to handle the average daily attendance but is significantly lacking during peak attendance events such as holiday weekends. The development of additional parking capacity will provide for more convenient access to the facility, and a safer condition by reducing the number of vehicles parked along shoulders of access roads and public roads surrounding the facility. The disturbance associated with the parking area expansion is 42 acres.

The initial effect of additional parking to the Budget analysis will be an increase in impermeable surface and reduction in vegetated area, creating a situation of runoff without infiltration. The parking areas are designed in a location that has low slopes compared with the majority of the site, reducing the significance of the impact to the surroundings during construction and limiting the significance of the run on by maintaining to the extent possible the current slopes and drainage. The Upper Discovery Parking Lot will be constructed of permeable asphalt allowing storm water to percolate into the soil beneath the parking lot rather than leaving the site as runoff. The permeable asphalt which allows the water to pass through to the underlying soil means that the area will be modeled as the underlying soil for the purpose of the water budget.

The storm water management features associated with the parking lots planned to be developed will be treated as if they do not contribute to infiltration despite the fact that they are unlined. The storm water management features are designed to take the entire volume of runoff generated from the parking lot surface and store it temporarily in a series of detention features that progressively spill over into a centralized detention basin, then on into Crystal Brook. Some amount of infiltration will certainly occur through the unlined channels as runoff is temporarily stored while passing through the system, the infiltration will initially be equivalent to the undisturbed condition, and will progressively become less as the suspended fine particles, (silt and clay) settle from the water and deposit into the bottom of the detention structures, essentially creating a lining. Disregarding the infiltration that will occur as runoff passes through the stormwater management system and will provide a conservative estimate of the infiltration, by treating the entire area developed for stormwater management feature as impervious.

Discovery Snowmaking Reservoir

The addition of the snowmaking reservoir adjacent to the Discovery lodge will provide additional capacity for creating snow and extending the ski season while providing the facility a reduction in energy consumption, and providing some additional infiltration of runoff within the Budget study area. The disturbance associated with the snowmaking reservoir is 25 acres.

Currently the snowmaking reservoir is at a lower elevation and requires pumping over a greater distance and during peak energy usage hours, moving a portion of the storage to a higher elevation allows the water to be nearer where it will be applied and the transfer of the water from the Pine Lake reservoir can be done during off peak hours, reducing the energy cost, and system demand. The effect of additional infiltration from this feature will not be included in the Budget analysis in order to provide a conservative approach. The stored water comes from the Pine Lake reservoir which is a diversion of surface water that is captured from the Birch Creek which is the primary drainage feature exiting the valley. The reservoir is designed to collect runoff from the upland areas to the south and west of the reservoir. The additional runoff that will be captured before leaving the Budget area will allow for a reduced amount of water being utilized from the Pine Hill Lake, and the effect is that diversion at the downstream location will only occur when the flow rate is eight (8) cubic feet per second or higher, rather than the current value of five (5) cubic feet per second.

The snowmaking activities recapture a significant volume of runoff that has left the upland portions of the ski area and flowed along the Crystal Brook Stream to the Pine Hill Lake., and apply it back to the upland portions during the ski season, in order to increase the length of the season. The snowmaking is irrigation, which is the unnatural application of water to the land surface, the effects of irrigation are the same as increasing precipitation, in this case the precipitation is in the winter which delays the release of the liquid phase until the spring melt. The snowmaking water is being withdrawn from diverted runoff from the downstream reaches of the Budget study area and applied back to the upland portions of the Budget study area. This is a return of that runoff back to where it had runoff from, but reapplied at a different season than when it had runoff, allowing it to be stored throughout the winter until it begins to melt and contribute to infiltration and runoff in the spring. The snowmaking process has been occurring at this site for many years and over those years has been expanded to include larger volumes and additional areas. In the current analysis, only the impacts from the planned development and the expansion of the snowmaking capabilities are considered. **Ski Trail and Lift Alignment Clearing**

The clearing of ski trails and lift alignments creates a limited linear disturbance within much larger overall area that remains undisturbed. The majority of the Clearing planned for the former Highmount Ski Area will reestablish trails that had been cleared, but have become overgrown following the closure of the facility. The overall disturbance is 49.75 acres. The soil properties and slopes that make up the study area have very low rates of infiltration and thus very high rates of runoff. The rate of runoff from these areas is not particularly sensitive to alteration of the cover material. The runoff generated from the cleared areas is to be managed through diversion structures that direct the runoff into the large areas that remain tree covered. The maintenance of smooth trails without gullies or channelized flow forming is critical to limiting the maintenance effort required to operate the facility. The flow diversion strategy transports the water from the open sloped areas where it is likely to form channels and gullies to the tree covered areas where the velocity of the flow will be disrupted and damage requiring maintenance is far less likely.

The clearing of ski trails and clearing of areas surrounding parking and improvements does not alter the soil properties, but does cause an alteration to the vegetation and will affect the runoff volume and type.

Golf Course and Irrigation Pond Construction

The construction of an 18 hole championship golf course and driving range practice facility creates the largest disturbance to the study area for a specific purpose. The golf course construction will disturb approximately 44 acres, and will alter the soil type within its footprint. The course will be constructed in two separate areas, both generally north of the Belleayre Ski Area. The construction of the golf course requires the import of soil of the appropriate characteristics to support the specialized vegetation and create the necessary playing surface. The soil that will be used as fill to construct the golf course has characteristics that will provide for less runoff, greater evapotranspiration and greater percolation when compared to the native soil. The area of the golf course that is constructed of imported soil is accounted for as a cut and fill soil type with appropriate hydrologic properties applied for the proposed soil type.

The golf course will also require irrigation to maintain the vegetation during the summer months when evapotranspiration rates are the highest and precipitation is low. The irrigation water will be provided from a 1.2 acre pond that will be constructed to collect and store the necessary water from by diverting runoff from the surrounding upland creating a subcatchment basin. The subcatchment basin including the irrigation pond will become an area of zero runoff as the water from that area will be fully contained within the irrigation pond. The irrigation pond will be constructed with an impervious liner so that there will be no loss of water needed for irrigation to the underlying soils making it an area of zero percolation. The irrigation pond area is accounted for as an impervious surface due to the lined construction with zero percolation and zero runoff from the area.

Additional irrigation water is available from three wells located on the Wildacres portion of the site. The irrigation is planned to come from the water contained within the irrigation pond as described, but in the event that insufficient refill of the pond from stormwater occurs, groundwater will be used to supplement the imbalance. Tests performed on the three wells proposed for irrigation are capable of sustaining an average total pumping rate of approximately 37 gpm for the entirety of the typical irrigation season without adverse effect on existing groundwater supplies or surface water.

Highmount and Wildacres Resort Development

The Highmount Resort development will be constructed in an area to the west of the Former Highmount Ski area. The Wildacres Resort area will be constructed north of the Belleayre Ski Area. Each of the developments include a number of dwellings, a hotel and conference center, the roadways necessary to access the structures, landscaping, and stormwater control structures. The Wildacres Resort will contain a hotel and conference center, a parking garage, 12 octoplex dwellings, and 11 quadplex, dwellings, a clubhouse and golf course maintenance facilities. The Highmount Resort includes a hotel and spa, a lodge building, 8 duplex dwellings and a clubhouse/conference building. The existing Marlowe Mansion will remain undisturbed in the Wildacres Resort area. The Highmount Ski Area does include existing buildings that are planned to be reused as a Wilderness Activity Center as part of the proposed resort development; therefore only the proposed new buildings have been considered in the water budget.
The stormwater features designed to manage runoff from the upland portion of the development will temporarily store runoff before allowing it to pass through to natural drainage features. The water budget analysis assumes that no percolation to groundwater will occur beneath these features, and that all of the water that is collected into these features passes through as runoff. The main disturbance will be to the vegetative cover as the property is developed from wooded to non-wooded. Limited regrading will be conducted to complete building construction and completion of driveways and access roads.

Table 1 below summarizes the total disturbances associated with the post-development condition.

Table 1
Summary of Disturbance Impacts by Development Type

Development Type	Disturbance (ac)	Impact	Net Difference (ac)
Lodge Improvements	3.25	change to impervious surface	0.66
Parking Area Expansion	42	change to impervious surface	21.25
Discovery Snowmaking Reservoir	25	no change	0
Ski Trail and Lift Alignment Clearing	49.75	no change	0
Golf Course Construction	43.25	change to cut and fill soil	43.25
Golf Course Irrigation Pond	1.2	change to impervious surface	1.2
Highmount/Wildacres Resort Development	187.62	change to impervious surface	35.82
Total	**352.07**		**102.18**

3.0 METHODS OF ANALYSIS

A water budget analysis was completed to evaluate the potential changes to surface runoff and infiltration (aquifer recharge) on an annualized basis. The Thornthwaite monthly water balance program, version 1.1.0, published by the USGS, was utilized to perform the Budget computations. The program takes into account seven inputs, Runoff Factor, Direct Runoff Factor, Soil Moisture Storage Capacity, Latitude, Snow Temperature Threshold, Rain Temperature Threshold, and Maximum Snow Melt Rate, to account for the site-specific characteristics. The inputs are carefully chosen and adjusted to best reflect the site characteristics. The data entered into the model is limited to mean monthly temperature and mean monthly precipitation, this data along with the values chosen for the seven inputs allow the model to generate results. The combination of these limited inputs has been developed through empirical validation to provide an accurate estimation of the Budget.

The output from the Water Budget provides a mechanism for estimating percolation into the soil and underlying aquifer, taking into account climatological factors, soil characteristics, site conditions (slope, impervious surfaces, drainage features), and vegetation. The analysis does not predict the available water quantity or water quality. The water budget relies on the assumption commonly used by the USGS that changes in groundwater storage are negligible over an annual basis.

Modifications to the landscape within the project area will have an effect to the Budget with decreased runoff, or increased infiltration considered a positive effect. The environmental impact of proposed site modifications is measured against a baseline determination of existing conditions contrasted with predicted post-development conditions. To run the model, CHA identified two primary site characteristics that will be altered during the course of site development: one is a decrease in the acreage of a specific soil type (with limited infiltration capacity) with a corresponding increase in the acreage of impervious surface; the second is expanded snow-making output. It is important to note that only the final post-development condition was considered for the Belleayre Ski Area despite the fact that the development is anticipated to be constructed in multiple phases. Interim post-development conditions at various stages of construction were not evaluated in the Water Budget.

3.1 MODEL INPUTS AND VARIABLES

As described above, there are a number of inputs and variables to the Thornthwaite Model. This section describes the data used in the model.

Climate Data

Climate data applied to the model has been generated from the available measurements collected by the NYSDEC's Bureau of Air Quality Surveillance at the Belleayre Mt. Air Monitoring Station (Location 5565-03). Alpha Geoscience provided a data set of temperature and precipitation values compiled from the available data collected over the period of 1991-2010 by compiling the daily measurements into monthly averages, then compiling the monthly averages into a single monthly average for the entire period. The data compiled by Alpha is published in the Water Budget Analysis completed for the Modified Belleayre Resort at Catskill Park (Alpha Geoscience, (March 2011) published as an appendix to the Supplemental Draft Environmental Impact Statement (April 2011).

Typically, climate data, specifically precipitation, does not change from the existing condition to the post-development condition. For this project, because the planned development will add enhanced snowmaking in certain areas of the Study Area, the model was also run to evaluate the effect of additional precipitation (in the form of snow). Snowmaking is utilized to extend the ski season and was treated in essence as irrigation being applied to the specific spaces within the Study Area. Similarly the irrigation that is planned for the golf course has been incorporated into the modeling as additional precipitation. The total volume of planned irrigation was divided equally between the months of June, July and August and applied to the area of cut and fill soil representing the golf course, 44.16 acres. The total volume of additional precipitation created from irrigation to the golf course and to the ski slopes is equivalent to approximately 48 million gallons of water. The effect of additional precipitation has been determined by applying the additional volume of precipitation to the affected soil types, and accounting for the changes in percolation and runoff that result.

Soil Types

Various soil types are important in the model because each has different soil moisture storage characteristics and infiltration rates. The Water Budget study area is presented in the UMP DEIS showing areas affected by planned development, and maps identifying soil types include Figure 4.5-1 and Figure 4.5-3. The soils have been mapped using the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil classification guidelines.

The Water Budget study areas consists of approximately 28 different soil types, but most share similar properties, and represent approximately 95% of the Study Area. The model is not sensitive to small variations in soil properties and as a result, infiltration and runoff values are similar for a majority of the Study Area.

For the Water Budget, an analysis was prepared for three different soil types. The planned development will affect approximately fourteen (14) percent of the total study area, and will cause only minor disturbances to many of the soil types that are too small to evaluate. The soil type that will be most affected is the WLB or Wellsboro and Wurtsboro very bouldery soils that are gently sloping. Generally the soil types that are present within the Study area are of Hydrologic Group "C" indicating that the soil has a very slow infiltration rate. The relatively small contribution from the balance of soils with somewhat different properties is overwhelmingly offset by the majority soils rendering the results for the total area to be insensitive to the minority fractions contribution. Table 2 below identifies the net effect of development to each soil type.

Table 2
Summary of Disturbance Impacts by Soil Type

Soil Type	Infiltration Rating	Existing (ac)	Post-Development (ac)	Net Difference (ac)
ARF	Most Limited	882.75	881.5	-1.25
ORD	Most Limited	449.25	432.75	-16.5
LCF	Most Limited	218.25	218.25	0
WLB	Most Limited	156.75	136.25	-20.50
LCD	Most Limited	145.5	143.25	-2.25
ORC	Most Limited	114	97.5	-16.5
CF	Not Rated	46	89.25	43.25
LEE	Most Limited	31	25.5	-5.5
WOB	Most Limited	23	23	0
RXF	Not Rated	15	15	0
VAB	Somewhat Limited	9	9	0
VAD	Most Limited	11.5	11.5	0
MTB	Most Limited	14	13.5	-0.5
HCC	Most Limited	5.5	5.5	0
HCE	Most Limited	33.25	14.5	-18.75
HCF	Most Limited	42.5	42.5	0
LHD	Most Limited	11.25	11.25	0
LHE	Most Limited	4.25	4.25	0
LKE	Most Limited	146	146	0
MNC	Most Limited	14.5	14	-0.5
MND	Most Limited	17.5	16.25	-1.25

Soil Type	Infiltration Rating	Existing (ac)	Post-Development (ac)	Net Difference (ac)
RRE	Most Limited	51.5	33.25	-18.25
RRF	Most Limited	1.25	1.25	0
WMB	Most Limited	2.5	2.5	0
WMC	Most Limited	7	7	0
ARD	Most Limited	0.5	0.5	0
OIC	Most Limited	4	3.5	-0.5
Impervious	Not Rated	22.5	81.5	59
Total		**2480**	**2480**	**0**

Runoff Factors

The selection of runoff factors for each soil type is based on published data from Landphair and Motloch (1985). Values chosen are based on judgment in the application of typical values determined for a small set of generalized soil types. The factors considered in determination of a value to be applied to a specific soil include, vegetative cover, soil composition and slope. The runoff factor is applied evenly to each monthly average precipitation value. The application of the runoff factor determines the amount of precipitation that will be shed from the soil type, and therefore not available for percolation or evapo-transpiration.

The local climate causes seasonal fluctuations in runoff due to the winter precipitation being bound as snow and ice that will remain stored in place until average temperatures exceed the freezing point. The determination of an average annualized runoff value disregards the seasonal variation in runoff due to seasonal climate variation and accounts for the total runoff as if it occurs evenly throughout the year. Moreover, the model does not predict runoff or infiltration at a specific time or condition, but is used a mechanism for measuring the potential overall effect on the conditions caused by the planned development.

Soil Moisture Capacity

Soil moisture capacity was determined from data provided by the USDA NRCS soil survey database for the Budget study area. The USDA NRCS publishes maps identifying the distribution of soil types and the significant characteristics and properties that are associated with the various soil types identified. The soil moisture storage capacity for soils identified in the Budget study area that will be developed ranges from 2.0 to 3.8 inches, with a mean value of 2.7 inches. The soil types present in the Budget study area were verified to be consistent with those presented in the UMP SDEIS, the tables included in the SWPPP were amended to include the additional information required for input into the Thornthwaite Model. The percent rock at the surface which presents a generally impervious surface is potentially significant in two instances; the Lackawanna and Swartswood soils identified as LEE, 9%, and the Oquaga-Arnot soils identified as ORC/ORD, 15%. The impervious surface present within these areas represent a 100% runoff condition. However, the occurrence of the bedrock outcrops is distributed throughout the area. Precipitation that lands on the bedrock outcrops will runoff onto adjacent pervious portions of the soil and the overall effect of the impervious content is therefore considered negligible for the purposes of the model.

Site Clearing and Vegetative Cover

The existing vegetative cover on most of the development area is cleared or non-wooded, but there is a mix of wooded and previously cleared areas that are covered with brush that will be affected by the development. The existing vegetative cover is depicted on Figure 4.5-4. The primary areas to be affected by the development include three parking areas, and a snowmaking reservoir planned to be constructed along Route 49A. The remainder of the significant clearing activities will be completed to expand existing cleared trails, and reestablish cleared trails on the former Highmount Ski Area. The expansion of existing trails is along the margin of existing trails, which is a limited disturbance spread over large areas. The clearing of trails located on the former Highmount Ski Area is a restoration to conditions that were established when the ski area opened originally. The trails began to become overgrown when maintenance ceased in 1994.

The development of the Belleayre Resort will clear an area of previously undisturbed land. The clearing of the land for construction of access roads, parking, building sites, and golf course construction changes both the vegetative cover and the soil types, or infiltration properties of the surface. The creation of additional impervious surfaces for buildings roads and parking is planned in a way that minimizes their impact by directing runoff to designed stormwater control features and allowing a portion of the runoff to make its way onto grassy slopes and infiltrate into the soils. The construction of the golf course will require a change to the underlying soil type and slopes through import of soil with properties that will support the unique vegetation that creates the playing surfaces. The soil that will be imported has significantly greater rates of infiltration and evapotranspiration. The majority of the development area will alter the vegetative cover that is present, but will not have an effect on the soil properties.

The clearing for the post-development condition will be performed in such a way that the overall effect to the Budget study area is relatively insignificant. Small areas are cleared within larger portions of undisturbed areas, and the soil properties remain the same, with only the vegetative cover changing from forested to cleared grassy areas. Because these alterations do not have a significant effect by clearing of large contiguous areas, the values chosen for direct runoff incorporated into the model inputs represent a combined area of grassy slopes and forested slopes. The results calculated by the model are not particularly sensitive to changes in the direct runoff input and as such the differences between the vegetative cover is not significant.

4.0 RESULTS

4.1 EXISTING CONDITIONS

Prior to running the model to consider post-development conditions, the model was run based on existing conditions. Initially, the model was run to predict monthly runoff, evapotranspiration and infiltration amounts based on long term precipitation data for the three main types of soil relative to their infiltration capacities (see Tables A1-A3 in Appendix A).

Additionally, because some snow-making does already occur within specific portions of the Study Area, the model was again run to predict monthly runoff, evapotranspiration and infiltration amounts based on additional precipitation in the form of snow for two soil types (see Tables A4 and A5 in Appendix A).

This analysis was then repeated for the various soil types on an annualized basis. The results for the study area existing conditions are tabulated in Tables A6 and A7.

To validate model results, the total runoff for the Study Area under the last model run was then compared to the stream discharges for the area. The Giggle Brook which drains the Belleayre Mountain is a measuring point maintained by the New York City Department of Environmental Protection, and has very high calculated runoff rate of 20.7 inches annually. Using these calculated runoff rates and the area of the watershed that is captured by the Giggle Brook yields a runoff coefficient of 0.54. The results of the Water Budget analysis performed for this study area are similar to and therefore support the measurements collected at the NYCDEP gauging stations.

The runoff coefficient calculated for the study area, which discharges to the Giggle Brook, is 0.50 under initial conditions. The correlation of these measurements indicates that the high runoff rates are valid, and that because of its topographic relief, Belleayre Mountain produces significant runoff with precipitation from the upland area being removed quickly by surface drainage features and recharge to the aquifer. The similarity of the site specific measurements of stream discharge to the results of the Thornthwaite model lend strong credibility to the parameters chosen for the model input. The small difference between the runoff coefficients may be attributed to two factors, one is the assumption that the discharge measured in the brook is solely attributable to runoff, and two, the study area and the watershed that discharge to the brook are not the same.

The Budget analysis performed using the existing conditions indicate that rate of percolation for the study area is approximately 164 gpm, which is equivalent to 0.07 gpm per acre or approximately 97 million gallons per year for the entire study area of 2480 acres. This rate is based on the natural precipitation that has been recorded at the facilities weather station, this value does not account for the significant amount of precipitation that is generated in the form of snowmaking throughout the ski season. Snowmaking for the purpose of the Budget will be converted to an estimated precipitation equivalent by using the current snowmaking area of 160 acres and the water flow rate of 3600 gpm, together with the estimated duration of snowmaking from the UMP/DEIS. Calculations that include the precipitation in the form of snowmaking activities based on the snowmaking plan included in the UMP/DEIS for the facility generate a significantly different and more accurate estimation of the runoff and percolation for the facility. The Budget analysis performed using the snowmaking precipitation in the current state indicates that the rate of percolation for the study area is approximately 244 gpm, which is equivalent to 0.10 gpm per acre, or 51,712 gallons per year per acre. The addition of a large volume of precipitation in the form of snowmaking generates an increase in the rate of percolation that is 1.49 times the natural precipitation rate of percolation, or an additional 16,593 gallons per year per acre.

The runoff rate for the study area is approximately 2,899 gpm, which is equivalent to 1.17 gpm per acre, or 614,952 gallons per year per acre. Similar to the rate of percolation the addition of precipitation in the form of snowmaking introduces a significant change to the rate of runoff. The Budget analysis performed using the snowmaking precipitation in the current state indicates that the rate of runoff for the study area is approximately 3,159 gpm, which is equivalent to 1.27 gpm per acre, or 667,512 gallons per year per acre. The addition of a large volume of precipitation generates an increased rate of runoff that is 1.09 times the rate of runoff generated by natural precipitation alone, or an additional 52,560 gallons per year.

4.2 POST-DEVELOPMENT CONDITIONS

Following the process described above for the existing conditions on the site, the model was run for the relevant soil types and with expanded snow-making, and irrigation for the post-development condition. The annual percolation and runoff rates for each soil type or group of soil types with similar characteristics were tabulated with the area of each soil group, and converted to an annualized rate in gallons per minute. The annualized percolation to groundwater under post-development conditions by soil group is presented in Tables B1 and B2 in Appendix B. The results for the undeveloped soil groups are as they were under existing conditions, except the areas and model input parameters have been changed to reflect the changes to impervious surfaces associated with the Discovery Lodge expansion, the Parking Lot expansion, and the Snowmaking Reservoir. As discussed above, the clearing for trails does not result in significant changes to the model output because soil type and slopes do not change, and therefore, the amount of runoff is not significantly changed.

The model results for each of three relevant soil groups are included as Tables B3 through B6 in Appendix B. The areas to change in the post-development condition including the Discovery Lodge improvements, the Parking Lot expansion, Golf course, Irrigation pond and the snowmaking reservoir, are tracked separately according to the area of each.

Moreover, snowmaking produces a high moisture content snow that is significantly denser than natural snow. Manmade snow can be controlled to create desirable ski conditions, with the base snow being high water content, and the upper surface of lower water content to create a more powdery surface. Snowmaking for the purpose of the Budget will be converted to an estimated precipitation equivalent by using the expanded area of 203 acres (43 additional acres) and the water flow rate of 5,200 gpm (1,600 gpm additional), together with the estimated duration of snowmaking from the UMP/DEIS. The estimated additional precipitation from snowmaking will be applied to the Highmount area that currently does not receive any manmade snow. A portion of this additional snowmaking may be applied to the areas that currently receive manmade snow, but the expansion of the capabilities will predominantly be used within the Highmount area. The amount of precipitation estimated through the snowmaking season was input into the model as precipitation and is tracked separately from the natural precipitation in the corresponding tables for reference. These values were added to the precipitation data collected at the Belleayre weather station to take into account all precipitation that is applied at the site, both natural and irrigation (snowmaking).

The Budget for the post-development conditions indicates that the annualized percolation rate for the study area will be approximately 210 gpm, which is equivalent to 0.08 gpm per acre, or 42,048 gallons per year per acre. This represents a 34 gpm decrease from the existing conditions aquifer recharge rate of 244 gpm in the Budget study area, or 7,206 gallons per year per acre. This change in percolation rate is small when compared to the seasonal and annual climate fluctuations. Construction of additional impervious surfaces and alteration of the vegetative cover lead to the decrease in percolation. This rate is based on the natural precipitation that has been recorded at the facilities weather station.

When considering snowmaking, calculations that add to the existing precipitation in the form of snowmaking activities based on the snowmaking plan included in the UMP/DEIS for the facility generate a significantly different estimation of the runoff and percolation for the facility. The Budget analysis performed using the snowmaking/irrigation precipitation in the current state indicates that the rate of percolation for the study area is approximately 286 gpm, which is equivalent to 0.12 gpm per acre, or 63,072 gallons per year per acre. The addition of a large volume of precipitation in the form of snowmaking/irrigation generates an increase in the rate of percolation that is 1.5 times the natural precipitation rate of percolation.

The annualized post-development runoff rates estimated for the Budget study area are summarized in Tables B4 and B5 in Appendix B. The Budget analysis for post- development conditions indicates almost no change in the surface water runoff from the study area. The annualized surface water rate of discharge to the natural drainage features is approximately 3,239 gpm, which is equivalent to 1.31 gpm per acre, or 688,536 gallons per year per acre. The post-development rate represents an increase from the existing conditions rate of 2,899 gpm to 3,239 gpm, which is equivalent to an increase of approximately 0.14 gpm per acre, or an additional 73,584 gallons per year per acre.

5.0 DISCUSSION OF RESULTS

A Water Budget analysis completed for the study area accounts for the alteration due to development with regard to alteration in amount or rate of runoff, groundwater withdrawal, and percolation into the soil (groundwater recharge). The analysis attempts to take into account as many of the potential effects of alteration, though some of the potentialities are difficult to quantify, however the analysis even if somewhat limited provides a baseline for recognition of significant issues in the form of drastic alteration of natural conditions.

The development identified in the plan for the expansion of the Belleayre ski facility is mainly in the form of clearing for additional ski trails, expansion of parking lots, expansion of the snowmaking reservoir, and some improvements and expansion to Discovery Lodge. The sum of these disturbances is 120 acres.

A large portion of the disturbance will occur associated with clearing of trails for additional ski area. For these areas, the existing slopes and soil types will not change and therefore runoff predominates both in the existing condition and post-development condition.

The remainder of the development will cause an alteration to the surface creating additional impervious surface. However, the additional impervious surface created during development is approximately 59 acres of the total 2480 acre Study Area, which represents 1.2% of the total area. The creation of impervious surface has the greatest effect on runoff and infiltration presenting nearly 100% runoff and 0 percent for percolation. . The runoff rates from the study area are very high due to the site topography, overall relief, and existing soil type. The combination of mountain slopes and soils that have very low rates of infiltration allows the water to move quickly to the valley floor through established drainage features of streams and brooks.

The development identified in the plan for creation of the Belleayre Resort is mainly in the form of clearing for landscaping, and golf course construction. The alteration of the development area from the existing wooded vegetation to a non-wooded condition does not alter the soil type, and therefore the infiltration rates. The development of the golf course will significantly alter the soil type as well as the vegetative cover; the golf course requires a far more permeable soil that is necessary to support the specialized vegetation that is used to create the golf course playing surface.

The runoff and percolation rate estimates generated through this Budget analysis are annualized averages. The calculated differences between current and developed conditions are general estimates of the potential impact the planned development will have on the site and affected surrounding area. The development as planned appears to present an increase in the rate of runoff, and an increase in the rate of percolation over the Budget study area. The additional application of surface water increases the amount of both percolation and runoff within the study area. Collection of the stormwater to be utilized for golf course irrigation eliminates some of the additional runoff that is created by the planned construction, but is insufficient to fully offset the additional runoff generated. The reapplication of stormwater collected both onsite and from site runoff lower in the valley will significantly increase the percolation, yielding a greater increase in the amount of percolation than runoff.

The increases in both runoff and percolation with a slight decrease in the amount of evapotranspiration are attributed to the increase in the amount of precipitation created by expanded snowmaking and applied irrigation for the golf course. Typically, a comprehensive water balance for any project site should net out between pre- and post-development conditions (for example an increase in post-development run-off will be balanced by a decrease in percolation) and a direct comparison can be made with pre-development conditions because precipitation values almost always remain the same. The fixed volume of water entering the study area in the form of precipitation creates the situation that allows the disturbance to be directly measured in the change in the water balance of the study area. For this project, the post development condition includes a significant increase in precipitation in the form of golf course irrigation and expanded snowmaking and these increase total precipitation values (compared to existing conditions) and significantly impacts water balance.

The additional precipitation applied to the golf course is collected from stormwater that is collected in a lined irrigation pond which reduces runoff from a portion of the site in the post development condition. The water is then reapplied onto an area of the development that has been altered to a more permeable condition allowing for an increase in percolation. The area that is being irrigated is larger than the area that the irrigation water is collected from as a result a portion of that water will runoff from the portion of the area outside the irrigation pond catchment, yielding an increase in runoff.

Snowmaking presents a similar situation, surface water that has left the site as runoff, is reapplied to a portion of the site as precipitation. The portion of the site that receives the additional precipitation as snowmaking is not planned to be altered with regard to soil type. The additional precipitation in this area creates an increase in both percolation and runoff, and a decrease in evapotranspiration as the snowpack will be last longer into the spring and provide a saturated condition into the season where a soil moisture deficit typically leads to losses in the form of evapotranspiration. The creation of additional impervious surfaces in the form of parking, roads and buildings causes an increase in runoff and a decrease in percolation.

The post development condition shows that there is a greater increase in percolation, than runoff, and a slight decrease in evapotranspiration. The water utilized to provide the increase in precipitation that creates this condition comes from runoff that would leave the study area in the natural drainage features. The reapplication of a portion of that water to the study area increases both the percolation and runoff from the study area, indicating that there is no net detraction from runoff after collecting a portion of that water, and a net increase to percolation which will be available to recharge groundwater, these changes are partially at the expense of evapotranspiration due to the study area remaining saturated, or snow-covered for a greater period of the year,

Table 3 below is a summary of the water budget parameters in the pre-development and post development conditions.

Table 3
Summary of Water Budget Parameters in Pre and Post-development Conditions

Development State	Runoff (gpm)	Net Difference	Evapotranspiration (gpm)	Net Difference	Percolation (gpm)	Net Difference
Pre-Development*	2899		2739		244	
Post-Development	3230	+11.75%	2708	-1.2%	286	+17.21%

*****_Natural precipitation plus existing snowmaking_

The calculated differences may be mitigated in ways not easily modeled and include the following:

- Some percolation will occur within the unlined stormwater management features, which will slightly increase the percolation rate, and reduce the rate of runoff.
- Evaporation of storm water in temporary storage features will also occur resulting in a slight decrease in the rate of runoff from those areas.
- A portion of the runoff from buildings and approaches will run onto grassy areas where a portion of it will percolate through the soil.
- The Upper Discovery Parking Lot will be constructed of permeable asphalt allowing some storm water to percolate into the soil beneath the feature rather than leaving the

site as runoff. This lot is being constructed as a demonstration test, and if successful, permeable asphalt may be used in other areas which would expand the benefit.

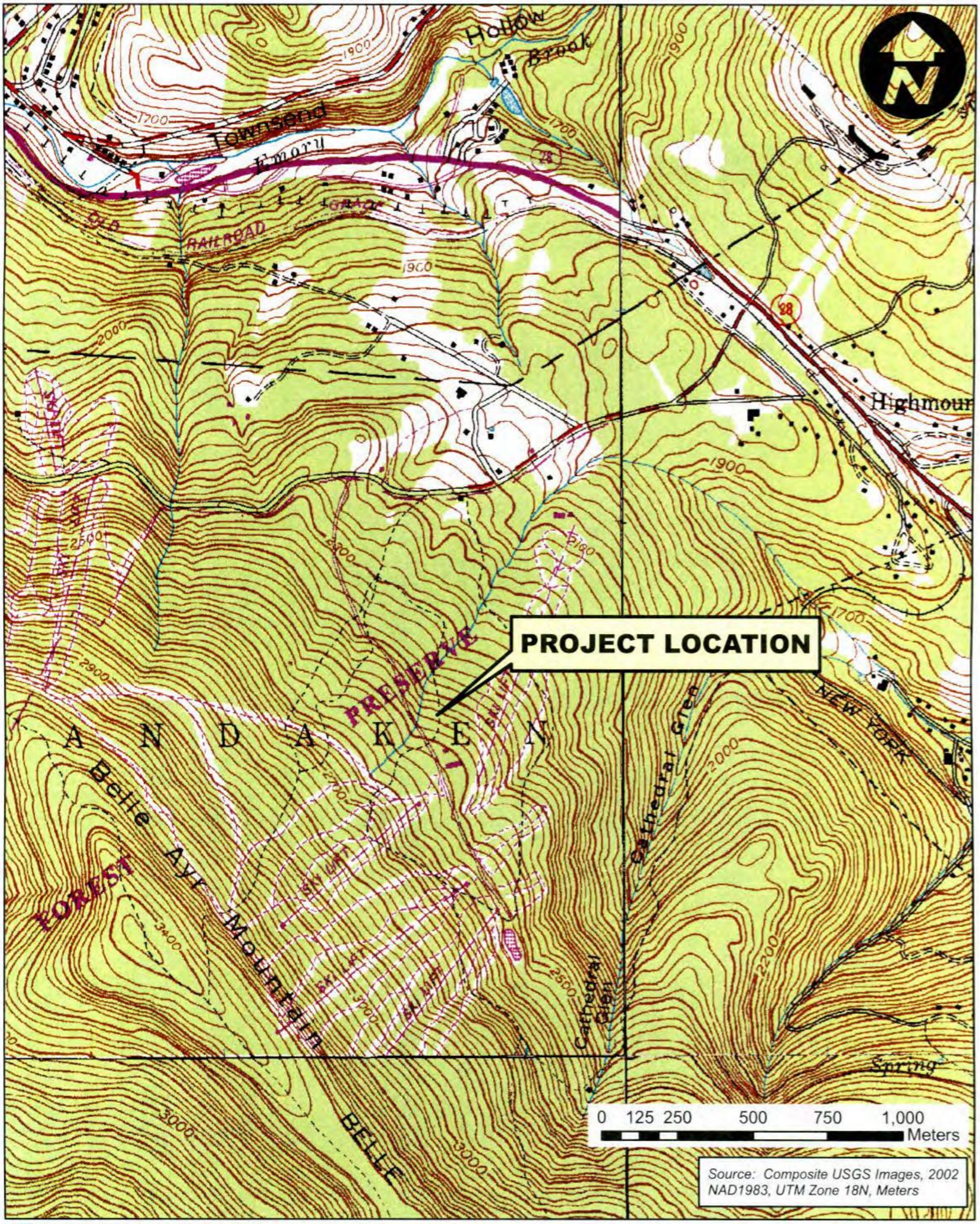
- The Highmount Lodge and the Highmount Spa are planned to be constructed with vegetated roofs which will eliminate a portion of the runoff included in the current calculations by allowing that stormwater to be utilized by the plantings that cover the otherwise impervious surface.

- The Golf Course development includes regrading of the surface contours in order to create the playing surface design. The golf course is being developed along the lower portion of the valley and will receive some run on from the steeper slopes above creating an area that will allow percolation that in this study will be accounted for as runoff.

- There is a slight increase in planned in groundwater withdrawals therefore possibly decreasing the amount of groundwater in storage temporarily.

In summary, the potential changes in the Water Budget for the post-development condition are relatively minor given the small areas of disturbance compared to the overall size of the Study Area. Additionally, some of the measured impacts of additional runoff in the post-development condition may be further mitigated by best management practices for storm water.

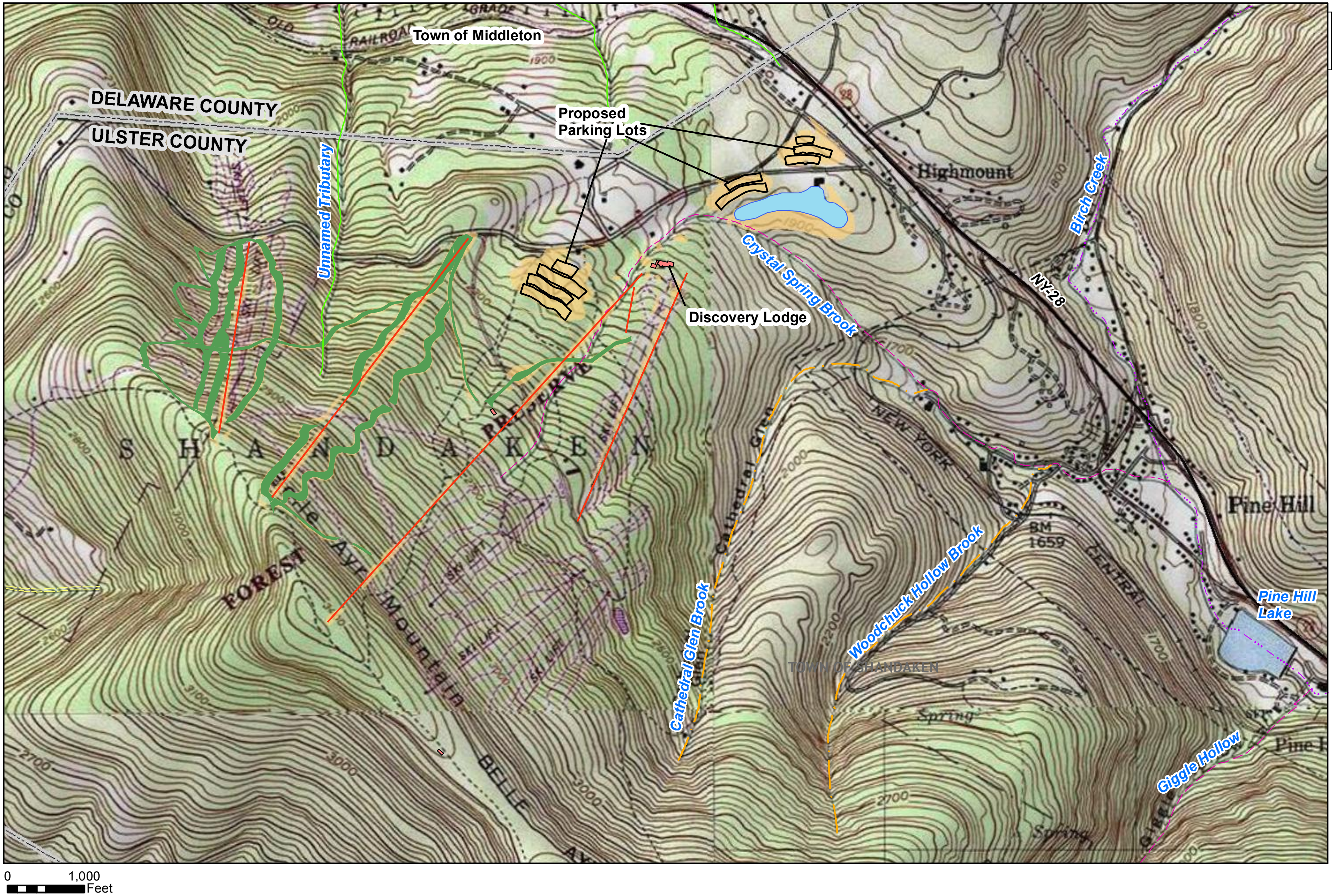
FIGURES



SHUMAKER
Consulting Engineering & Land Surveying, P.C.

Belleayre Ski Lodge Restoration Project
Culvert Installation Location Map

Figure 1 - Site Location



Belleayre Mountain Ski Center
Catskill State Park

Project Area, USGS Topographic Imagery

Proposed Ski Lift Centerline (July, 2009)
Proposed Tree Cutting Area
Proposed Trail Clearing (July, 2009)
Parking Lot
Proposed Snow Making Pond (July 2009)

NYSDEC Stream Class
B
B(T)
B(TS)
C
C(T)

Sheet No. 1

Figure 4.5-1: Ski Center Project Facilities

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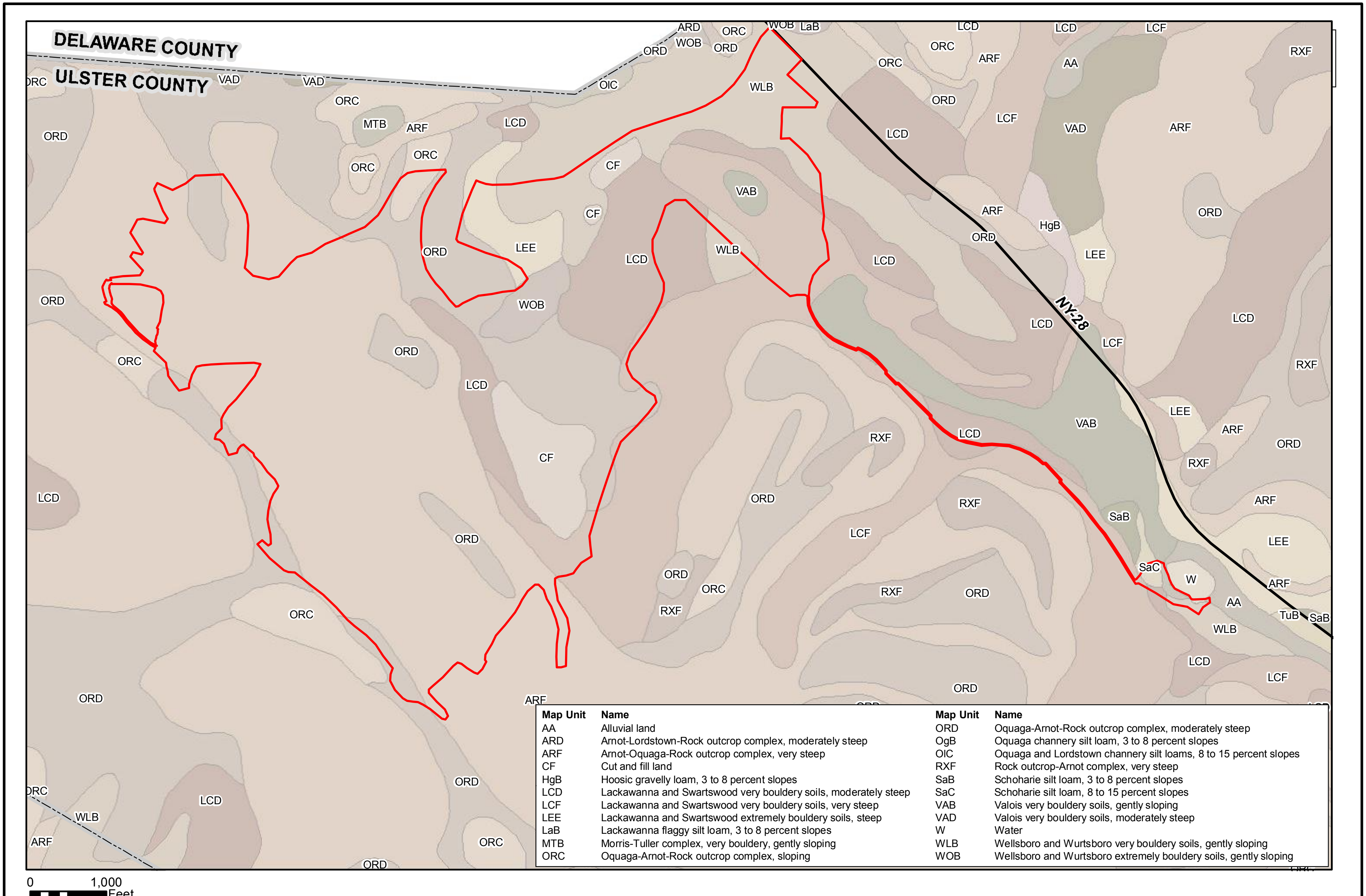
Date: December 16, 2010



Map Unit	Name	Map Unit	Name
AA	Alluvial land	ORD	Oquaga-Arnot-Rock outcrop complex, moderately steep
ARD	Arnot-Lordstown-Rock outcrop complex, moderately steep	OgB	Oquaga channery silt loam, 3 to 8 percent slopes
ARF	Arnot-Oquaga-Rock outcrop complex, very steep	OIC	Oquaga and Lordstown channery silt loams, 8 to 15 percent slopes
CF	Cut and fill land	RXF	Rock outcrop-Arnot complex, very steep
HgB	Hoosic gravelly loam, 3 to 8 percent slopes	SaB	Schoharie silt loam, 3 to 8 percent slopes
LCD	Lackawanna and Swartswood very bouldery soils, moderately steep	SaC	Schoharie silt loam, 8 to 15 percent slopes
LCF	Lackawanna and Swartswood very bouldery soils, very steep	VAB	Valois very bouldery soils, gently sloping
LEE	Lackawanna and Swartswood extremely bouldery soils, steep	VAD	Valois very bouldery soils, moderately steep
LaB	Lackawanna flaggy silt loam, 3 to 8 percent slopes	W	Water
MTB	Morris-Tuller complex, very bouldery, gently sloping	WLB	Wellsboro and Wurtsboro very bouldery soils, gently sloping
ORC	Oquaga-Arnot-Rock outcrop complex, sloping	WOB	Wellsboro and Wurtsboro extremely bouldery soils, gently sloping

Belleayre Mountain Ski Center
Catskill State Park

Project Area, USDA SSURGO Soils

Study Boundary (October, 2009)

Sheet No. 1

Figure 4.5-3: Belleayre Mountain Ski Center Ulster County Soil Map

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Date: December 16, 2010

Belleayre Mountain Ski Center
Catskill State Park

Project Area, NYS Orthoimagery, 2004

Study Boundary (October, 2009)

Ecological Communities

- Brushy Cleared Land
- Developed
- Hemlock - Northern Hardwood Forest
- Maintained Ski Slope and Attendant Features
- Mowed Lawn
- Railroad
- Red Maple - Hardwood Swamp
- Shallow Emergent Marsh
- Successional Northern Hardwoods

Sheet No. 1

Figure 4.5-4: Belleayre Mountain Ski Center Ecological Communities

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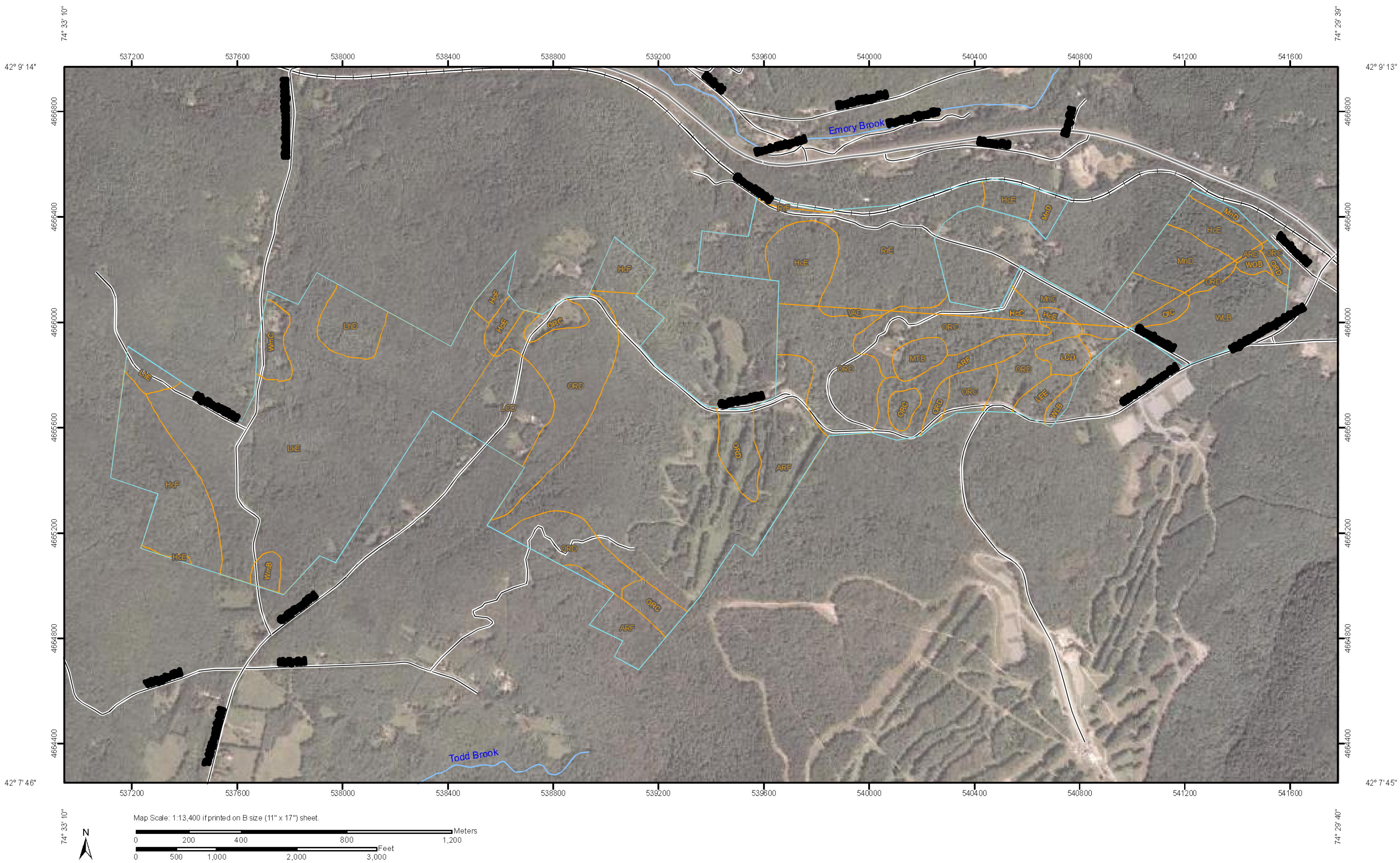
Date: December 16, 2010

Soil Map—Delaware County, New York, and Ulster County, New York



APPENDIX A
Tables – Existing Conditions

New York State Office of General Services
Belleayre Mountain Ski Center

CHA

Natural Precipitation
Most Limited Soils

Month	Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation
January	75.50	6.40	20.10	129.90	49.00
February	52.71	5.90	13.10	125.50	33.71
March	98.55	58.50	20.40	70.00	19.65
April	94.07	72.70	37.40	70.00	-16.03
May	106.51	72.80	64.80	70.00	-31.09
June	113.26	63.20	95.20	70.00	-45.14
July	103.56	52.00	106.60	46.60	-55.04
August	88.75	41.80	81.60	37.10	-34.65
September	114.02	43.40	51.80	70.00	18.82
October	122.48	57.50	29.10	70.00	35.88
November	95.64	58.10	15.70	70.00	21.84
December	89.47	39.50	10.20	70.00	39.77
Total Annualized					
Millimeters	1154.52	571.80	546.00		36.72
Inches	**45.45**	**22.51**	**21.50**		**1.45**

WATER BUDGET ANALYSIS

TABLE A1

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation
Somewhat Limited Soil

Month	Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation
January	75.50	6.4	15.8	134.20	53.30
February	52.71	5.7	12	131.30	35.01
March	98.55	52.3	20.4	89.00	25.85
April	94.07	67.3	37.4	89.00	-10.63
May	106.51	68.3	64.8	89.00	-26.59
June	113.26	59.5	95.2	89.00	-41.44
July	103.56	48.4	105	76.00	-49.84
August	88.75	38.5	79.6	71.40	-29.35
September	114.02	41.7	51.8	89.00	20.52
October	122.48	55.9	29.1	89.00	37.48
November	95.64	57.9	15.7	89.00	22.04
December	89.47	41.7	10.2	89.00	37.57
Total Annualized					
Millimeters	1154.52	543.60	537.00		73.92
Inches	**45.45**	**21.40**	**21.14**		**2.91**

WATER BUDGET ANALYSIS

TABLE A2

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation
Cut and Fill (CF) Soil

Month	**Precipitation**	**Runoff (Total)**	**Actual Evapotranspiration**	**Soil Moisture Storage**	**Percolation**
January	75.50	6.4	15.8	134.20	53.30
February	52.71	5.4	12	131.30	35.31
March	98.55	49.6	20.4	89.00	28.55
April	94.07	64.6	37.4	89.00	-7.93
May	106.51	65.8	64.8	89.00	-24.09
June	113.26	57.4	95.2	89.00	-39.34
July	103.56	45.8	105	76.00	-47.24
August	88.75	36	79.6	71.40	-26.85
September	114.02	41	51.8	89.00	21.22
October	122.48	55.1	29.1	89.00	38.28
November	95.64	58.3	15.7	89.00	21.64
December	89.47	44.4	10.2	89.00	34.87
Total Annualized					
Millimeters	1154.52	529.80	537.00		87.72
Inches	**45.45**	**20.86**	**21.14**		**3.45**

WATER BUDGET ANALYSIS

TABLE A3

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation and Snowmaking
Most Limited Soils

Month	Total Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation	Snowmaking Precipitation	Natural Precipitation
January	449.07	10.20	17.80	132.20	421.07	373.57	75.50
February	312.00	50.00	12.60	79.00	249.40	259.29	52.71
March	156.08	195.20	20.40	79.00	-59.52	57.53	98.55
April	94.07	228.20	37.40	79.00	-171.53		94.07
May	106.51	201.50	64.80	79.00	-159.79		106.51
June	113.26	152.20	95.20	79.00	-134.14		113.26
July	103.56	100.20	106.60	55.60	-103.24		103.56
August	88.75	66.80	82.10	45.60	-60.15		88.75
September	114.02	69.40	51.80	79.00	-7.18		114.02
October	122.48	83.20	29.10	79.00	10.18		122.48
November	139.80	102.10	15.70	79.00	22.00	44.16	95.64
December	399.90	132.20	10.20	79.00	257.50	310.43	89.47
Total Annualized							
Millimeters	2199.50	1391.20	543.70		264.60		
Inches	**86.59**	**54.77**	**21.41**		**10.42**		

WATER BUDGET ANALYSIS

TABLE A4

New York State Office of General Services
Belleayre Mountain Ski Center

CHA

Natural Precipitation and Snowmaking
Cut and Fill (CF) Soil

Month	Total Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation	Snowmaking Precipitation	Natural Precipitation
January	449.07	6.4	16.7	132.20	425.97	373.57	75.50
February	312.00	31.7	11	79.00	269.30	259.29	52.71
March	156.08	128.8	20.4	79.00	6.88	57.53	98.55
April	94.07	165.6	37.4	79.00	-108.93		94.07
May	106.51	164.8	64.8	79.00	-123.09		106.51
June	113.26	143.3	95.2	79.00	-125.24		113.26
July	103.56	112.8	106.6	55.60	-115.84		103.56
August	88.75	87.1	86.3	45.60	-84.65		88.75
September	114.02	85.6	51.8	79.00	-23.38		114.02
October	122.48	90.3	29.1	79.00	3.08		122.48
November	139.80	100.7	15.7	79.00	23.40	44.16	95.64
December	399.90	119.8	10.2	79.00	269.90	310.43	89.47
Total Annualized							
Millimeters	2199.50	1236.90	545.20		417.40		
Inches	**86.59**	**48.70**	**21.46**		**16.43**		

WATER BUDGET ANALYSIS

TABLE A5

New York State Office of General Services
Belleayre Mountain Ski Center

CHA

Existing Conditions
Natural Precipitation

Soil Type	Infiltration Rating	Budget Acres	Runoff	Runoff Gpm	Percolation	Percolation Gpm
ARF	Most Limited	882.75	22.51	1026.59	1.45	66.13
ORD	Most Limited	449.25	22.51	522.45	1.45	33.65
LCF	Most Limited	218.25	22.51	253.81	1.45	16.35
WLB	Most Limited	156.75	22.51	182.29	1.45	11.74
LCD	Most Limited	145.5	22.51	169.21	1.45	10.90
ORC	Most Limited	114	22.51	132.58	1.45	8.54
CF	Not Rated	46	20.86	49.57	3.45	8.20
LEE	Most Limited	31	22.51	36.05	1.45	2.32
WOB	Most Limited	23	22.51	26.75	1.45	1.72
RXF	Not Rated	15	22.51	17.44	1.45	1.12
VAB	Somewhat Limited	9	21.40	9.95	2.91	1.35
VAD	Most Limited	11.5	22.51	13.37	1.45	0.86
MTB	Most Limited	14	22.51	16.28	1.45	1.05
HCC	Most Limited	5.5	22.51	6.40	1.45	0.41
HCE	Most Limited	33.25	22.51	38.67	1.45	2.49
HCF	Most Limited	42.5	22.51	49.43	1.45	3.18
LHD	Most Limited	11.25	22.51	13.08	1.45	0.84
LHE	Most Limited	4.25	22.51	4.94	1.45	0.32
LKE	Most Limited	146	22.51	169.79	1.45	10.94
MNC	Most Limited	14.5	22.51	16.86	1.45	1.09
MND	Most Limited	17.5	22.51	20.35	1.45	1.31
RRE	Most Limited	51.5	22.51	59.89	1.45	3.86
RRF	Most Limited	1.25	22.51	1.45	1.45	0.09
WMB	Most Limited	2.5	22.51	2.91	1.45	0.19
WMC	Most Limited	7	22.51	8.14	1.45	0.52
ARD	Most Limited	0.5	22.51	0.58	1.45	0.04
OIC	Most Limited	4	22.51	4.65	1.45	0.30
Impervious	Not Rated	22.5	38.95	45.28	0.00	0.00
Total		**2480**		**2898.77**		**163.95**

WATER BUDGET ANALYSIS

TABLE A6

New York State Office of General Services

Belleayre Mountain Ski Center

CHA

Existing Conditions

Natural Precipitation and Snowmaking

Soil Type	Infiltration Rating	Budget Acres	Runoff	Runoff Gpm	Percolation	Percolation Gpm
ARF	Most Limited	782.75	22.51	910.29	1.45	58.64
ARF*	Most Limited	100	54.77	282.96	10.42	53.83
ORD	Most Limited	429.25	22.51	499.19	1.45	32.16
ORD*	Most Limited	20	54.77	56.59	10.42	10.77
LCF	Most Limited	218.25	22.51	253.81	1.45	16.35
WLB	Most Limited	156.75	22.51	182.29	1.45	11.74
LCD	Most Limited	135.5	22.51	157.58	1.45	10.15
LCD*	Most Limited	10	54.77	28.30	10.42	5.38
ORC	Most Limited	114	22.51	132.58	1.45	8.54
CF	Not Rated	16	20.86	17.24	3.45	2.85
CF*	Not Rated	30	48.70	75.48	16.43	25.46
LEE	Most Limited	31	22.51	36.05	1.45	2.32
WOB	Most Limited	23	22.51	26.75	1.45	1.72
RXF	Not Rated	15	22.51	17.44	1.45	1.12
VAB	Somewhat Limited	9	21.40	9.95	2.91	1.35
VAD	Most Limited	11.5	22.51	13.37	1.45	0.86
MTB	Most Limited	14	22.51	16.28	1.45	1.05
HCC	Most Limited	5.5	22.51	6.40	1.45	0.41
HCE	Most Limited	33.25	22.51	38.67	1.45	2.49
HCF	Most Limited	42.5	22.51	49.43	1.45	3.18
LHD	Most Limited	11.25	22.51	13.08	1.45	0.84
LHE	Most Limited	4.25	22.51	4.94	1.45	0.32
LKE	Most Limited	146	22.51	169.79	1.45	10.94
MNC	Most Limited	14.5	22.51	16.86	1.45	1.09
MND	Most Limited	17.5	22.51	20.35	1.45	1.31
RRE	Most Limited	51.5	22.51	59.89	1.45	3.86
RRF	Most Limited	1.25	22.51	1.45	1.45	0.09
WMB	Most Limited	2.5	22.51	2.91	1.45	0.19
WMC	Most Limited	7	22.51	8.14	1.45	0.52
ARD	Most Limited	0.5	22.51	0.58	1.45	0.04
OIC	Most Limited	4	22.51	4.65	1.45	0.30
Impervious	Not Rated	22.5	38.95	45.28	0.00	0.00
Total		**2480**		**3158.59**		**244.31**

* Indicates area where snowmaking occurs

WATER BUDGET ANALYSIS

TABLE A7

APPENDIX B
Tables – Post Development Conditions

New York State Office of General Services

Belleayre Mountain Ski Center

Developed Conditions
Natural Precipitation

Soil Type	Infiltration Rating	Budget Acres	Runoff	Runoff Gpm	Percolation	Percolation Gpm
ARF	Most Limited	881.5	22.51	1025.13	1.45	66.03
ORD	Most Limited	432.75	22.51	503.26	1.45	32.42
LCF	Most Limited	218.25	22.51	253.81	1.45	16.35
WLB	Most Limited	9.6	0	0.00	1.45	0.72
WLB	Most Limited	126.65	22.51	147.29	1.45	9.49
LCD	Most Limited	3.1	0	0.00	1.45	0.23
LCD	Most Limited	140.15	22.51	162.99	1.45	10.50
ORC	Most Limited	2.1	0	0.00	1.45	0.16
ORC	Most Limited	95.4	22.51	110.94	1.45	7.15
CF	Not Rated	38	16	31.41	13.74	26.97
CF	Not Rated	5.25	0	0.00	13.74	3.73
CF	Not Rated	30	48.7	75.48	16.43	25.46
CF	Not Rated	16	20.86	17.24	3.45	2.85
LEE	Most Limited	1	0	0.00	1.45	0.07
LEE	Most Limited	24.5	22.51	28.49	1.45	1.84
WOB	Most Limited	1	0	0.00	1.45	0.07
WOB	Most Limited	22	22.51	25.58	1.45	1.65
RXF	Not Rated	15	22.51	17.44	1.45	1.12
VAB	Somewhat Limited	9	21.40	9.95	2.91	1.35
VAD	Most Limited	11.5	22.51	13.37	1.45	0.86
MTB	Most Limited	13.5	22.51	15.70	1.45	1.01
HCC	Most Limited	5.5	22.51	6.40	1.45	0.41
HCE	Most Limited	2.5	22.51	0.00	1.45	0.19
HCE	Most Limited	12	22.51	13.96	1.45	0.90
HCF	Most Limited	42.5	22.51	49.43	1.45	3.18
LHD	Most Limited	11.25	22.51	13.08	1.45	0.84
LHE	Most Limited	4.25	22.51	4.94	1.45	0.32
LKE	Most Limited	146	22.51	169.79	1.45	10.94
MNC	Most Limited	14	22.51	16.28	1.45	1.05
MND	Most Limited	4	0	0.00	1.45	0.30
MND	Most Limited	12.25	22.51	14.25	1.45	0.92
RRE	Most Limited	33.25	22.51	38.67	1.45	2.49
RRF	Most Limited	1.25	22.51	1.45	1.45	0.09
WMB	Most Limited	2.5	22.51	2.91	1.45	0.19
WMC	Most Limited	7	22.51	8.14	1.45	0.52
ARD	Most Limited	0.5	0	0.00	1.45	0.04
OIC	Most Limited	3.5	0	0.00	1.45	0.26
Impervious	Not Rated	10.6	0	0.00	0	0.00
Impervious	Not Rated	70.9	38.95	142.67	0.00	0.00
Total		**2480**		**2920.07**		**210.05**

WATER BUDGET ANALYSIS

TABLE B1

New York State Office of General Services

Belleayre Mountain Ski Center

CHA

Developed Conditions

Natural Precipitation and Snowmaking

Soil Type	Infiltration Rating	Budget Acres	Runoff	Runoff Gpm	Percolation	Percolation Gpm
ARF	Most Limited	781.5	22.51	908.84	1.45	58.54
ARF*	Most Limited	100	66.04	341.19	12.2	63.03
ORD	Most Limited	412.75	22.51	480.00	1.45	30.92
ORD*	Most Limited	20	66.04	68.24	12.2	12.61
LCF	Most Limited	218.25	22.51	253.81	1.45	16.35
WLB	Most Limited	9.6	0	0.00	1.45	0.72
WLB	Most Limited	126.65	22.51	147.29	1.45	9.49
LCD	Most Limited	3.1	0	0.00	1.45	0.23
LCD	Most Limited	130.15	22.51	151.36	1.45	9.75
LCD*	Most Limited	10	66.04	34.12	12.2	6.30
ORC	Most Limited	2.1	0	0.00	1.45	0.16
ORC	Most Limited	95.4	22.51	110.94	1.45	7.15
CF	Not Rated	38	16	31.41	13.74	26.97
CF	Not Rated	5.25	0	0.00	13.75	3.73
CF	Not Rated	16	20.86	17.24	3.45	2.85
CF*	Not Rated	30	58.91	91.30	19.27	29.87
LEE	Most Limited	1	0	0.00	1.45	0.07
LEE	Most Limited	24.5	22.51	28.49	1.45	1.84
WOB	Most Limited	1	0	0.00	1.45	0.07
WOB	Most Limited	22	22.51	25.58	1.45	1.65
RXF	Not Rated	15	22.51	17.44	1.45	1.12
VAB	Somewhat Limited	9	21.40	9.95	1.45	0.67
VAD	Most Limited	6.5	22.51	7.56	1.45	0.49
VAD*	Most Limited	5	66.04	17.06	1.45	0.37
MTB	Most Limited	13.5	22.51	15.70	1.45	1.01
HCC	Most Limited	5.5	22.51	6.40	1.45	0.41
HCE	Most Limited	2.5	22.51	0.00	1.45	0.19
HCE	Most Limited	12	22.51	13.96	1.45	0.90
HCF	Most Limited	42.5	22.51	49.43	1.45	3.18
LHD	Most Limited	11.25	22.51	13.08	1.45	0.84
LHE	Most Limited	4.25	22.51	4.94	1.45	0.32
LKE	Most Limited	146	22.51	169.79	1.45	10.94
MNC	Most Limited	14	22.51	16.28	1.45	1.05
MND	Most Limited	4	0	0.00	1.45	0.30
MND	Most Limited	12.25	22.51	14.25	1.45	0.92
RRE	Most Limited	33.25	22.51	38.67	1.45	2.49
RRF	Most Limited	1.25	22.51	1.45	1.45	0.09
WMB	Most Limited	2.5	22.51	2.91	1.45	0.19
WMC	Most Limited	7	22.51	8.14	1.45	0.52
ARD	Most Limited	0.5	0	0.00	1.45	0.04
OIC	Most Limited	3.5	0	0.00	1.45	0.26
Impervious	Not Rated	10.6	0	0.00	0	0.00
Impervious	Not Rated	70.9	38.95	142.67	1.45	5.31
Total		**2480**		**3239.50**		**285.97**

WATER BUDGET ANALYSIS

TABLE B2

* Indicates area where snowmaking occurs

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation and Expanded Snowmaking
Most Limited Soils

Month	Total Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation	Snowmaking Precipitation	Natural Precipitation
January	502.24	10.20	17.80	132.20	474.24	426.74	75.50
February	480.12	61.40	12.60	79.00	406.12	427.41	52.71
March	193.37	246.80	20.40	79.00	-73.83	94.82	98.55
April	94.10	280.70	37.40	79.00	-224.00		94.07
May	106.51	245.90	64.80	79.00	-204.19		106.51
June	113.26	185.30	95.20	79.00	-167.24		113.26
July	103.56	123.20	106.60	79.00	-126.24		103.56
August	88.75	80.60	82.10	77.70	-73.95		88.75
September	114.02	80.20	51.80	79.00	-17.98		114.02
October	122.48	90.40	29.10	79.00	2.98		122.48
November	168.43	122.20	15.70	79.00	30.53	72.79	95.64
December	444.12	150.50	10.20	79.00	283.42	354.65	89.47
Total Annualized							
Millimeters	2530.96	1677.40	543.70		309.86		
Inches	**99.64**	**66.04**	**21.41**		**12.20**		

WATER BUDGET ANALYSIS

TABLE B3

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation and Expanded Snowmaking
Somewhat limited Soils

Month	Total Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation	Snowmaking Precipitation	Natural Precipitation
January	502.24	6.4	16.7	133.30	479.14	426.74	75.50
February	480.12	39.1	11	84.00	430.02	427.41	52.71
March	193.37	162.5	20.4	84.00	10.47	94.82	98.55
April	94.10	203.8	37.4	84.00	-147.10		94.07
May	106.51	201.5	64.8	84.00	-159.79		106.51
June	113.26	174.8	95.2	84.00	-156.74		113.26
July	103.56	138.5	106.6	84.00	-141.54		103.56
August	88.75	107.4	86.3	84.00	-104.95		88.75
September	114.02	101.3	51.8	84.00	-39.08		114.02
October	122.48	102.5	29.1	84.00	-9.12		122.48
November	168.43	120.3	15.7	84.00	32.43	72.79	95.64
December	444.12	138.2	10.2	84.00	295.72	354.65	89.47
Total Annualized							
Millimeters	2530.96	1496.30	545.20		489.46		
Inches	**99.64**	**58.91**	**21.46**		**19.27**		

WATER BUDGET ANALYSIS

TABLE B4

New York State Office of General Services
Belleayre Mountain Ski Center

CHA

Natural Precipitation
Impervious Surfaces

Month	Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation
January	75.50	1.00	50.20	75.50	24.30
February	52.71	5.40	25.70	118.50	21.61
March	98.55	79.00	20.40	88.40	-0.85
April	94.07	98.50	37.40	44.20	-41.83
May	106.51	110.80	50.10	22.10	-54.39
June	113.26	117.30	11.10	11.10	-15.14
July	103.56	107.50	5.50	5.50	-9.44
August	88.75	92.50	5.50	0.00	-9.25
September	114.02	117.60	0.00	0.00	-3.58
October	122.48	125.90	0.00	0.00	-3.42
November	95.64	99.00	0.00	0.00	-3.36
December	89.47	34.80	10.20	47.70	44.47
Total Annualized					
Millimeters	1154.52	989.30	216.10		0.00
Inches	**45.45**	**38.95**	**8.51**		**0.00**

WATER BUDGET ANALYSIS

TABLE B5

New York State Office of General Services
Belleayre Mountain Ski Center

Natural Precipitation and Irrigation
Cut and Fill Soil

Month	Total Precipitation	Runoff (Total)	Actual Evapotranspiration	Soil Moisture Storage	Percolation	Irrigation Precipitation	Natural Precipitation
January	75.50	2.50	23.10	126.90	49.9		75.50
February	52.71	2.30	22.90	104.00	27.51		52.71
March	98.55	18.60	20.40	61.00	59.55		98.55
April	94.07	28.60	37.40	61.00	28.07		94.07
May	106.51	33.70	64.80	61.00	8.01		106.51
June	168.10	42.00	95.20	61.00	30.9	54.84	113.26
July	158.40	43.30	106.60	61.00	8.5	54.84	103.56
August	143.60	44.90	86.3	61.00	12.4	54.84	88.75
September	114.02	45.30	51.80	61.00	16.92		114.02
October	122.48	50.50	29.10	61.00	42.88		122.48
November	95.64	52.20	15.70	61.00	27.74		95.64
December	89.47	42.70	10.20	50.80	36.57		89.47
Total Annualized							
Millimeters	1319.10	406.60	563.50		348.95		
Inches	**51.93**	**16.00**	**22.17**		**13.74**		

WATER BUDGET ANALYSIS

TABLE B6

CUMULATIVE IMPACT ANALYSIS FOR:

BELLEAYRE MOUNTAIN SKI CENTER UMP DEIS
AND
BELLEAYRE RESORT AT CATSKILL PARK
SUPPLEMENTAL DEIS

APPENDIX B:
TRANSPORTATION IMPACT STUDY

Prepared for:

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December 2012

CHA Project No. 18882

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1.0 INTRODUCTION

1.1 Background

The New York State Department of Environmental Conservation (NYSDEC) prepared a Draft Environmental Impact Statement (DEIS) in May 2012 for the proposed Unit Management Plan (UMP) for the Belleayre Mountain Ski Center (BMSC) in Highmount, New York. The UMP includes trail and ski lift expansions, equipment improvements, and lodge expansions. The Belleayre Resort at Catskill Park is a separate development project proposed by Crossroads Ventures, LLC to be located on property adjacent to the Ski Center. The resort project is proposed to include two hotels, fractional ownership units (a.k.a. timeshares) and an 18-hole golf course. A Supplemental DEIS (SDEIS) was prepared in August 2012 for the Belleayre Resort project to identify the project-specific impacts of that development, including its impacts on the transportation system.

1.2 Project Description

The purpose of this study is to evaluate the cumulative transportation impacts of the combined traffic volumes of the BMSC UMP and the Belleayre Resort. All of the Existing, future No-Build and Build condition evaluations for the study areas for each project are included in the BMSC UMP DEIS (Section 4.6 and Appendix AD) and the Belleayre Resort at Catskill Park SDEIS (Sections 3.5 and 4.7 and Appendix 11).. This study will only discuss the cumulative impacts of the two projects.

2.0 CUMULATIVE TRAFFIC CONDITION

2.1 Cumulative Traffic Volumes

The estimated time of completion (ETC), or year of opening, evaluated for the BMSC UMP and Belleayre Resort is 2015. The BMSC UMP DEIS discusses that the ETC year of the UMP was revised to 2018 subsequent to the completion of the traffic projections and analysis for the future conditions. However, because the background growth was conservatively estimated and the Route 28 corridor has seen little to no growth in the last ten years, the evaluations of the 2015 (ETC) year and subsequent design horizons (ETC+10 and ETC+20) are still applicable for the revised ETC year of 2018. See Section 3.1 of the BMSC UMP DEIS Appendix AD for a more detailed discussion of the study area volume trends.

The site generated trips for both projects were estimated and presented in their respective traffic impact studies. In summary:

- BMSC UMP - Trips were estimated based on traffic data collected at the existing site on a peak operating day, and applied to the planned peak attendance level for the UMP (9,000 patrons).
- Belleayre Resort at Catskill Park - Trips were estimated for the project based on the Institute of Transportation Engineers (ITE) *Trip Generation*, *8th Edition* data for the component land uses, with applicable adjustments to account for the interaction between the Resort and BMSC that are consistent with ITE recommended practice, including considerations of planned shuttle service and ski-in/ski-out amenities.

As identified in the BMSC UMP traffic study, the peak day of activity at the ski center is Saturday during the winter season; traffic data was collected on the Martin Luther King Jr. Birthday holiday weekend to provide a conservative "worst-case" at the study area intersections. The peak hour coincides with patrons leaving at the end of the day, approximately 4-5pm.

The Resort is not expected to have a peak hour during the same timeframe. However, since the ITE trip generation data only provides one peak hour trip rate for Saturday conditions, their peak hour of generator is being used. This is a conservative approach since its peak trip generation would not likely coincide with the peak hour of adjacent street traffic and the ski center.

The new site generated trips for both sites are summarized in Table 1.

Table 1
Combined Site Generated Traffic
Saturday Peak Hour

Project	Vehicle Trips		
	Enter	Exit	Total
BMSC UMP	110	626	736
Belleayre Resort	98	70	168
Total	**208**	**696**	**894**

While the BMSC planned peak attendance day is 9,000 patrons, it is not anticipated to be a regular occurring level of attendance. The TIS for the BMSC UMP cites that historical attendance data available from BMSC shows that the average Saturday attendance is approximately 57 percent lower than the peak attendance day. This would indicate that the average Saturday attendance with the UMP could be expected to be approximately 3,900 patrons.

The site generated trips summarized in Table 1 were added to the 2015 No-Build background volumes from the BMSC UMP traffic study to develop the 2015 Combined Build traffic volumes, as shown on Figures 1 and 2 in Appendix A.

2.2 Capacity Analyses

The operating conditions of transportation facilities are evaluated based on the relationship of existing or projected traffic volumes to the theoretical capacity of the highway facility. Various factors affect capacity including traffic volume, travel speed, roadway geometry, grade, number and width of travel lanes and intersection control. The operating conditions were evaluated using Highway Capacity Software (HCS+), which uses the methodology in the 2000 *Highway Capacity Manual* (HCM), published by the Transportation Research Board (TRB). The procedures describe operating conditions in terms of Level of Service (LOS). In general, "A" represents the best operating condition and "F" represents the worst. Descriptions of LOS and the associated performance measures set forth in the HCM 2000 are provided in Appendix B.

To determine the cumulative impact of the BMSC UMP and Belleayre Resort on the operations of the adjacent transportation system, traffic operations of the study intersections and roadway segments were analyzed for the Saturday peak hour for the 2015 (ETC) Combined Build Condition.

It is important to note that the conditions analyzed are a "worst-case" peak condition at BMSC since the trip generation was based on the highest attendance (9,000) patrons anticipated. As stated previously, the normal recurring attendance is likely to be much lower. Additionally, the estimated site generated trips for the Belleayre Resort are based on the peak hour of the hotel and fractional units. The peak hours of these uses are not likely to overlap with the peak exiting traffic of the BMSC. Peak entering and exiting traffic at the Resort is more likely to occur earlier in the day, as visitors are checking in and out, rather than during the PM peak hour when ski lifts close and BMSC patrons leave.

The LOS summary of the 2015 No-Build (from the BMSC UMP DEIS Appendix AD) and 2015 Combined Build conditions are provided in Table 2 for the study intersections and Table 3 for the roadway segments. The computation worksheet summaries are provided in Appendix C.

Table 2
Intersection Level of Service Summary
2015 (ETC) Saturday Peak Hour

Intersection & Approach		2015 No-Build Condition		2015 Combined Build Condition	
		LOS	Delay	LOS	Delay
NY Route 28 & NY Route 212					
NY Route 28 (Left)	EB	A	8.5	A	9.0
NY Route 212	SB	C	20.7	F	73.4
NY Route 28 & NY Route 214					
NY Route 28 (Left)	EB	A	8.2	A	8.8
NY Route 28 (Left)	WB	A	8.8	B	10.8
South Street	NB	C	23.2	F	83.2
NY Route 214	SB	D	26.0	F	365.7
NY Route 28 & NY Route 42					
NY Route 28 (Left)	EB	A	7.6	A	8.1
NY Route 42	SB	C	20.1	F	79.7
NY Route 28 & CR 47					
NY Route 28 (Left)	EB	A	7.7	A	8.0
NY Route 28 (Left)	WB	A	9.0	B	11.8
CR 47	NB	C	18.6	F	104.9
CR 47	SB	B	12.1	C	19.0
NY Route 28 & Main Street					
NY Route 28 (Left)	WB	A	9.2	B	12.1
Main Street	NB	C	16.7	E	40.5
NY Route 28 & CR 49A					
NY Route 28 (Left)	EB	A	7.6	A	7.6
NY Route 28 (Left)	WB	A	7.7	A	8.2
CR 49A	NB	F	169.1	F	952.3
Owl Nest Road	SB	E	42.9	F	**
NY Route 28 & CR 38					
NY Route 28 (Left)	EB	A	8.4	A	8.7
CR 38	SB	C	15.2	C	18.0
CR 49A & Van Loan Road					
CR 49A (Left)	EB			A	8.0
CR 49A (Left)	WB	**N/A**		C	15.1
Van Loan	NB			F	368.2
Van Loan	SB			F	**
CR 49A & North Parking					
CR 49A (Left)	WB	**N/A**		B	14.1
North Lot Driveway	NB			F	273.0
CR 49A & Gunnison Road/Lower Driveway					
CR 49A (Left)	EB	A	7.5	A	7.9
CR 49A (Left)	WB	A	9.6	B	12.5
Belleayre Lower Driveway	NB	D	34.2	F	333.2
Gunnison Road	SB	E	39.6	F	**
CR 49A & Discovery Lodge					
CR 49A (Left)	WB	A	8.8	B	11.1
Discovery Lodge Driveway	NB	C	21.6	F	71.8
CR 49A & Upper Discovery Parking					
CR 49A (Left)	WB	**N/A**		B	10.3
Upper Discovery Parking	NB			F	134.8
CR 49A & Overlook Road					
CR 49A (Left)	EB			A	7.5
CR 49A (Left)	WB	A	7.5	A	7.8
Overlook Road	NB	B	13.2	F	53.7
Wildacres Resort	SB			F	588.4

* Delay given in seconds per vehicle.
** Delay value exceeds limits of analysis.

Table 3
Segment Level of Service Summary
2015 (ETC) Saturday Peak Hour

Segment		2015 No-Build Condition	2015 Combined Build Condition
NY Route 28: NY Route 209 to NY Route 375*	EB	A	B
	WB	B	B
NY Route 28: NY Route 375 to NY Route 212		D	E
NY Route 28: NY Route 212 to NY Route 214		C	D
NY Route 28: CR 38 to NY Route 30		C	C
CR 49A: South of Belleayre Access		C	C

* This is a multilane segment, therefore LOS is provided for each direction. All other segments are analyzed as two-lane segments.

The analysis of the cumulative development indicates that the LOS for traffic entering or crossing Route 28 from the intersecting side streets will generally be LOS E or LOS F during the worst case condition of a peak attendance day at the BMSC. While the site generated trips related to the BMSC UMP and the Belleayre Resort increase delay at these study area intersections, many of the unsignalized approaches still operate with an acceptable volume to capacity (v/c), indicating that there is reserve capacity. Particularly, NY Route 212 (v/c = 0.73), NY Route 42 (v/c = 0.70), CR 47 (v/c = 0.75) and Main Street (v/c = 0.18), though they operate at LOS E or F still have reserve capacity based on their v/c ratios. Additionally, the 95th percentile queue lengths are at approximately four vehicles or less. Based on these analyses, no improvements are recommended at these locations for the year of opening.

The intersections of NY Route 28 & NY Route 214 and NY Route 28 & CR 49A are estimated to operate with higher levels of delay and v/c ratios that exceed capacity (greater than 1.0). These intersections, as well as the intersections along CR 49A, are addressed under mitigation improvements.

The segment of NY Route 28 from NY Route 375 to NY Route 212 is estimated to operate at LOS E for the Combined Build condition. However, it still is estimated to operate with reserve capacity with a v/c ratio of 0.74 and no improvements are recommended for this roadway segment.

3.0 MITIGATION IMPROVEMENTS

3.1 NY Route 28 & NY Route 214

At the intersection of NY Route 28 and NY Route 214, the increase in delay on the NY Route 214 approach is related to the additional site trips eastbound on NY Route 28 during the peak hour.

Traffic signal warrant criteria were reviewed and the intersection does meet the peak hour warrant criteria for the Saturday peak hour evaluated. However, since this is just one hour of a peak operating day, and weekdays and the off-peak seasons will not experience the same levels of delay, the installation of a traffic signal is not recommended. This recommendation is also based on a sensitivity analysis that is presented later in Section 3.4. To alleviate the delay for right-turn vehicles from NY Route 214, a right-turn lane could be provided on the approach. This would reduce the overall approach delay to 164 seconds per vehicle, though the left-turn movement would still operate with a v/c ratio of 1.38. The intersection operations with the addition of a southbound right-turn lane are shown in Table 4.

3.2 NY Route 28 & CR 49A

The intersection of NY Route 28 & CR 49A is estimated to operate with high levels of delay during the Saturday peak hour with the added site traffic related to BMSC UMP and the Belleayre Resort. While it is not anticipated that this delay will be experienced on weekdays or during off-peak times and seasons, to provide the safe and efficient movement of traffic in the area, a greater level of traffic control may be needed. Traffic signal warrant criteria were reviewed and the intersection does meet the peak hour warrant criteria for the Saturday peak hour evaluated.

The addition of a northbound right-turn lane on CR 49A, a westbound left-turn lane on NY Route 28 and the installation of a traffic signal would provide LOS D operations at the intersection. The right-turn movement from CR 49A may still experience excessive delay during the peak hour of exiting traffic, as most traffic exiting both sites are estimated to turn right onto NY Route 28 from CR 49A. The intersection operations with the addition of a northbound right-turn lane, westbound left-turn lane and traffic signal control are shown in Table 4.

To better accommodate traffic during weekdays and/or the off-season, the signal could be set to rest in green on NY Route 28 or switched to flashing operations.

Table 4
Level of Service Summary
With Mitigation Improvements: Peak Event
Saturday Peak Hour

Intersection & Approach		2015 Combined Build Condition	
		LOS	Delay
NY Route 28 & NY Route 214			
NY Route 28 (Left)	EB	A	* 8.8
NY Route 28 (Left)	WB	B	10.8
South Street	NB	F	83.2
NY Route 214	SB	F	164.0
NY Route 28 & CR 49A (signalized)			
NY Route 28	EB	D	46.9
NY Route 28	WB	B	15.5
CR 49A	NB	E	59.8
Owl Nest Road	SB	B	16.0
Overall		*D*	*50.5*

* Delay given in seconds per vehicle.

3.3 CR 49A Intersections

The delay experienced at the roadway and driveway intersections along CR 49A is related to exiting traffic leaving the BMSC and Belleayre Resort parking areas. Since these delays are short-duration and event related, it is not recommended that additional turn lanes or traffic signal control are installed. Additionally, the vehicles experiencing the delay are contained within the sites. Event management traffic control strategies could be implemented to help control and direct traffic during the peak hour. Staffing the driveways on peak attendance days at the BMSC would allow them to stop CR 49A eastbound traffic to allow movements from the parking areas.

3.4 Sensitivity Analysis

Since these analyses are representative of a worst-case condition, with the BMSC UMP operating on a peak day, a sensitivity analysis of the site generated traffic was completed to determine what the operations would be at the NY Route 28 & NY Route 214 and NY Route 28 & CR 49A intersections for a reduced condition.

The TIS for the BMSC UMP included a sensitivity analysis for a reduced attendance of 6,078 patrons. This attendance level was equated to be approximately 32% lower than the peak attendance day, or the same as removing the top-ten highest attendance days. This analysis was utilized and the site generated traffic for the Belleayre Resort at the intersections of NY Route 28 & NY Route 214 and NY Route 28 & CR 49A was also added to determine the combined operations for this condition.

The LOS summary is provided in Table 5. For this condition, the NY Route 214 approach to NY Route 28 operates with a v/c ratio of 0.68 and geometric improvements at the intersection would not be necessary.

At the intersection of NY Route 28 & CR 49A, unsignalized and signalized controls were tested. With the additional geometry recommended in Section 3.2 (westbound left-turn lane and northbound right-turn lane), the unsignalized intersection is still estimated to operate at LOS F on the CR 49A and Owl Nest Road approaches, with the CR 49A northbound right still operating over capacity (v/c = 1.03). However, with the signalized control, the intersection is estimated to operate at overall LOS B, with all approaches operating at LOS C or better.

Table 5
Level of Service Summary
With Mitigation Improvements – 6,078 patrons at BMSC
Saturday Peak Hour

Intersection & Approach		2015 Build Condition	
		LOS	Delay
NY Route 28 & NY Route 214*			
NY Route 28 (Left)	EB	A	** 8.5
NY Route 28 (Left)	WB	A	9.3
South Street	NB	D	34.5
NY Route 214	SB	F	52.5
NY Route 28 & CR 49A (unsignalized)			
NY Route 28 (Left)	EB	A	7.6
NY Route 28 (Left)	WB	A	7.9
CR 49A	NB	F	58.7
Owl Nest Road	SB	F	***
NY Route 28 & CR 49A (signalized)			
NY Route 28	EB	C	28.7
NY Route 28	WB	B	11.3
CR 49A	NB	B	18.4
Owl Nest Road	SB	B	15.7
Overall		*B*	*18.0*

* The analysis of this intersection represents existing geometric conditions with no improvements.
** Delay given in seconds per vehicle.
*** Delay value exceeds limits of analysis.

Given that only ten ski season days are estimated to experience higher attendance than this condition, it is recommended that the mitigation improvements are considered for this reduced condition rather than the peak attendance day. Installing the turn lanes and signalized control at the intersection of NY Route 28 & CR 49A will provide safe and efficient operations for most operating days at BMSC and Belleayre Resort, and will limit delays and improve safety at the intersection on the peak operating days.

3.5 Traffic Demand Management Strategies

There are some traffic demand management (TDM) strategies are being incorporated into the project proposals that will reduce the vehicular trips between the two sites:

- Local shuttles: The TIS for the Belleayre Resort discusses the use of a shuttle system to transport skiers between the Resort and BMSC. This assumption was used in the trip generation estimates for the Resort and will greatly reduce the number of vehicular trips made between the two sites.

- Ski-in/Ski-out: The documentation for both projects describe ski-in/ski-out accommodations, which allow Resort users to get right onto a ski lift without driving to BMSC. This also was an assumption used in the Resort trip generation estimates.

Overall, the interaction between the two sites is estimated to result in a 51% reduction in trips (175 total trips) to and from the Resort. Additionally, the Resort itself can act like a form of TDM. Currently, most of the patronage at BMSC consists of day trips, resulting in peak surge of exiting traffic. The cumulative effect of these projects is that it provides an opportunity for shared-use trips to the area that can reduce the concentration of peak hour traffic.

Other traffic demand and event management strategies should be implemented to distribute the traffic load on the system.

- Public Transportation: BMSC and Ulster County Area Transit (UCAT) are currently teamed up to provide free round-trip bus service to BMSC from Kingston (and other stops along NY Route 28 between Kingston and BMSC). Expanding this service to provide additional capacity on high-attendance ski days and to serve other key local skier origins within the UCAT service area (Poughkeepsie, New Paltz, Newburgh, Wallkill, Saugerties) can result in greater reductions in vehicular trips to BMSC. Providing bus service to Poughkeepsie would also open the opportunity to provide a connection for Metro-North rail riders.

- Private Bus Companies: Adirondack Trailways currently offers ski packages that include round-trip transportation from New York City and a lift ticket. Multiple day packages with overnight accommodations are also available, with shuttle service to and from the lodging locations. This service could also be expanded to include other regional skier origins besides NYC and to be available more frequently to reduce the number of vehicular trips to BMSC and Belleayre Resort.

- Operations
  - BMSC: Staggering the closing times of different ski lifts rather than closing them all at the same time would spread the departures over a longer period of time. Similarly, keeping other facilities open in the Discovery and Overlook Lodges so that patrons are encouraged to stay at the facility longer after the lifts are closed would also spread the load of departures to other times of the day.
  - Belleayre Resort: The Resort could also help stagger the loading of the transportation by offering different check-in/check-out days for the fractional units (spread out over Friday, Saturday and Sunday rather than all on Saturday) and by offering a variety of weekend packages for the hotel that would include arrivals and departures on off-peak days (Friday and Monday). These strategies would help spread the entering and exiting trips of the Resort so that they do not coincide with the peak exiting traffic of the ski center.

- Driver Information: Providing variable message signs at key locations in the corridor could also communicate to drivers on heavy ski days that traffic delays may be experienced.

3.6 Sight Distance Improvements

The documentation for both the BMSC UMP and the Belleayre Resort included a sight distance evaluation along CR 49A and at the proposed driveway intersections. Both identified improvements to be implemented to improve sight distance for drivers along the CR 49A corridor and drivers exiting driveways from both sites. The improvements identified are summarized below:

- Vegetation clearing and/or embankment grading for the intersections with:
  - Wildacres Front 9 Village driveway
  - Lower Discovery Lodge Parking
  - Highmount Spa Resort driveway
  - Wildacres Upper Access driveway

- Intersection Warning Signs:
    - Wildacres Front 9 Village driveway
    - North Parking
    - Upper Discovery Parking
    - Discovery Lodge

- Wildacres Resort Main Access driveway/BMSC Overlook Road: Realignment of CR 49A to improve vertical and horizontal curves to accommodate pedestrian crossing between the Resort and BMSC.

- Wilderness Activity Center driveway: relocate existing driveway 300 feet to south or restrict movements to right-in/right-out.

A comprehensive corridor signing plan should be developed to ensure that the recommended warning signs do not overlap or conflict with each other.

4.0 GROWTH INDUCING IMPACTS

The construction and operation of the proposed BMSC UMP and Belleayre Resort projects is anticipated to attract local and regional tourists to the area. To support the increase in travelers through the corridor, it can be expected that both projects will induce growth of other supporting uses, such as hotels, restaurants, shops and gas stations, along the NY Route 28 corridor. These developments would be subject to local site plan and zoning approvals, as well as DOT highway access permits.

The impact of the growth of development along the corridor would be the increase of access driveways and traffic volume, which have the potential to introduce operational and safety issues. Higher driveway/roadway densities along a corridor can reduce the overall capacity.

Limiting or consolidating access to future development will help maintain the operational capacity of NY Route 28. It would be beneficial for a corridor access management plan to be completed by NYSDOT or other local agency in anticipation of the induced growth developments that can expected in the area. This would help manage the development requests and provide a basis for site access approvals.

5.0 CONSTRUCTION TRAFFIC

The construction traffic for each project was estimated in their respective studies and is summarized in Table 6. The method of measurement for the construction truck traffic was different for each, with the estimate for BMSC UMP in total number of trucks in use for construction operations and the estimate for Belleayre Resort in number of truck trips per day in and out of the site.

Table 6
Construction Traffic

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
BMSC UMP: **# Trucks in Use**	7	12	9	9	8	-	-	-	-
Belleayre Resort: **# Truck Trips per Day**	53	53	10	10	10	10	10	7	7

As shown, years 1 and 2 will have the highest level of construction related truck activity. In year 2, if it is conservatively assumed that each of the twelve trucks used at BMSC UMP were to make 4 trips per day, it would equal 48 trips per day. Combined with the truck trips for Belleayre Resort and spread over a ten-hour workday, it equates to approximately 10 trips per hour. These trips would be directionally split between entering and exiting the site. The current average daily traffic on NY Route 28 is approximately 3,000 vehicles per day so the construction truck traffic is estimated to increase the daily traffic volumes by approximately three percent. It is not anticipated that construction traffic will affect traffic operations on NY Route 28 or its intersections with local roads.

6.0 CONCLUSION & RECOMMENDATIONS

A DEIS has been completed for the proposed UMP for the BMSC. The UMP is proposed to add trails and lifts, improve equipment and expand their lodges. With these facility improvements, it is anticipated that the peak attendance level would be a maximum of 9,000 patrons a day. A SDEIS has been prepared for the Belleayre Resort at Catskill Park, which includes hotels, fractional units and a golf course.

The purpose of this cumulative transportation impact analysis is to evaluate the effects of the combined traffic of both projects.

The traffic evaluations were conducted for the combined condition, which includes the BMSC maximum peak attendance day and therefore represent a conservative "worst-case" representation of traffic volumes in the area. Trips for the Belleayre Resort were estimated based on the land uses included on-site, and applying credits related to the interaction between the Resort and BMSC (such as shuttle use between the sites and ski-in/ski-out accommodations).

The combined site trips estimated for the BMSC UMP and Belleayre Resort equate to 894 new trips during the peak seasonal condition during the Saturday PM peak hour (208 entering and 696 exiting).

The study area intersections were analyzed for the combined Build conditions to identify the future operating conditions with the ski center expansion and the Resort. The analyses show that many stop-controlled approaches within the study area are estimated to operate at LOS E or F with the combined traffic estimated from both projects. But while traffic crossing or entering NY Route 28 may experience long delays during the peak hour of exiting traffic, the NY Route 28 corridor has sufficient capacity and will operate satisfactorily for through traffic.

For some of the intersections that are estimated to operate at LOS E or F, the v/c ratio and queue lengths indicate that there is still reserve capacity at the intersection and mitigation is not warranted. Additionally, many of the intersections listed that experience LOS E or F are driveways from BMSC or the Resort and the vehicles experiencing the delay are contained within the sites.

The traffic operations on a peak operating day at BMSC is event-like in nature in that it is not a regular occurring condition, and therefore should not be used as a basis for design of transportation facilities. A sensitivity analysis was conducted to test the operations at the intersections of NY Route 28 & NY Route 214 and NY Route 28 & CR 49A during a reduced attendance day at BMSC.

Based on the evaluations and looking at what improvements are necessary for a reduced attendance condition that will serve most of the operating days at the BMSC, physical mitigation improvements are only recommended at the intersection with NY Route 28 & CR 49A. The installation of a northbound right-turn lane, a westbound left-turn lane and a traffic signal will provide safe and efficient operations at the intersection for most operating days at BMSC and will reduce delays and improve safety on the peak operating days.

There are some TDM strategies are being incorporated into the project proposals that will reduce the vehicular trips between the two sites:

- A shuttle system to transport skiers between the Resort and BMSC.
- Ski-in/Ski-out accommodations, which allow Resort users to get right onto a ski lift without driving to BMSC.

Additionally, the Resort itself can act like a form of TDM in that BMSC currently consists of primarily day-trips, but the Resort provides an opportunity for shared-use trips to the area that can reduce the concentration of peak hour traffic.

Other traffic demand and event management strategies should be implemented to distribute the traffic load on the system. These can include:

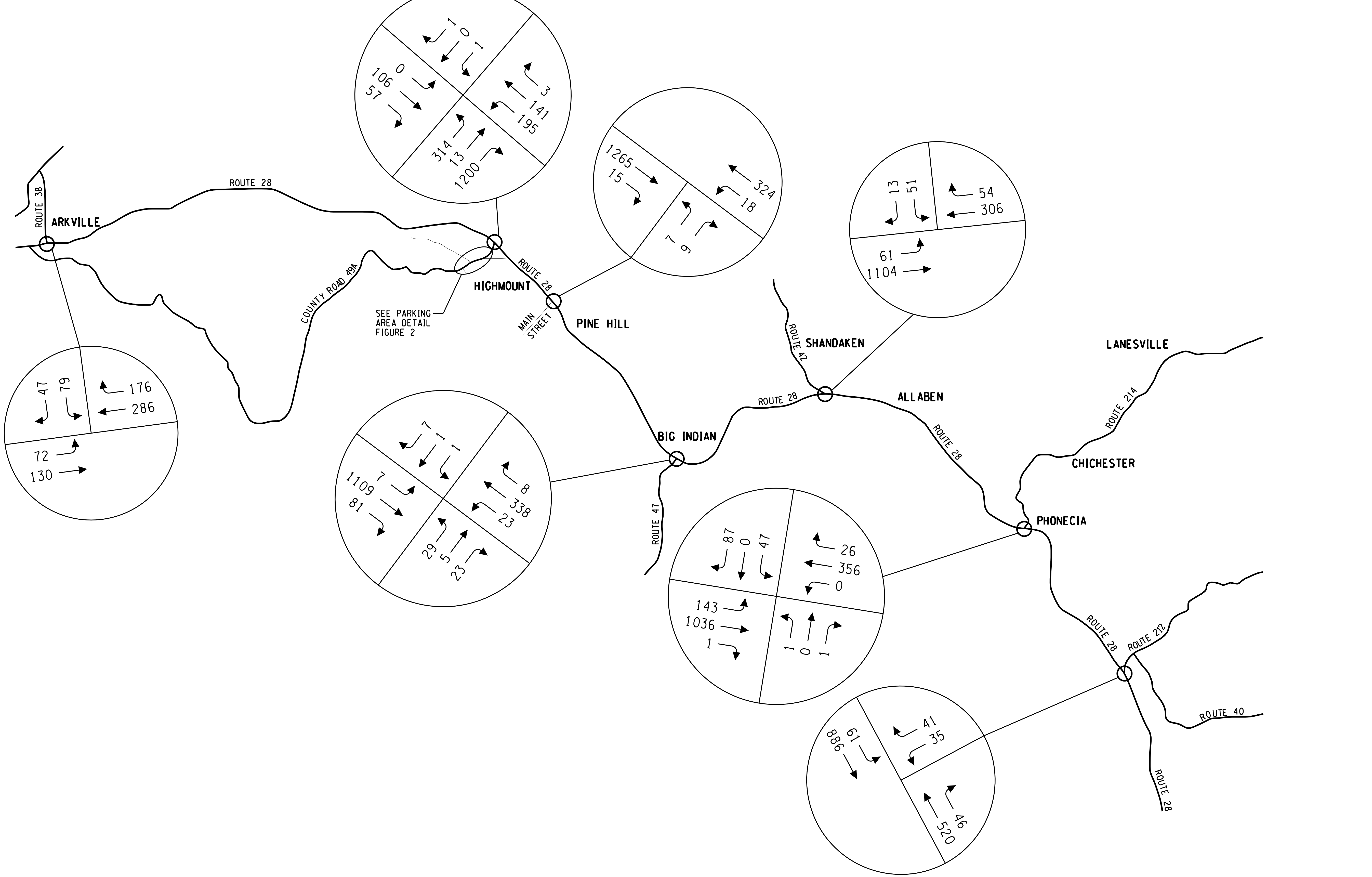
- Expanding the existing free bus service from Kingston to BMSC to provide additional capacity on peak days and to serve other key local skier origins.
- Expanding packages available from private bus companies to include other regional skier origins besides NYC and to be available more frequently.
- Staggering the closing times of different ski lifts at BMSC rather than closing them all at the same time. Similarly, keeping other facilities open in the Discovery and Overlook Lodges so that patrons are encouraged to stay at the facility longer after the lifts are closed.
- The Resort could offer different check-in/check-out days for the fractional units and offer a variety of weekend packages for the hotel that would include arrivals and departures on off-peak days.
- Providing variable message signs to communicate to drivers on heavy ski days that traffic delays may be experienced.

Sight distance evaluations were also conducted for both projects, and resulted in a number of recommendations along CR 49A and at the driveway intersections. Vegetation clearing, embankment grading and/or intersection warning signs are recommended for most of the driveways. At the intersection of CR 49A & Wildacres Main Access driveway/Overlook Road, a realignment of CR 49A is recommended due to the sight distance limitations and the need to install a pedestrian crossing to accommodate the ski-in/ski-out operations.

The potential for induced growth along the NY Route 28 corridor to support the increased number of travelers and tourists to the area could cause operational and safety issues in the future. A corridor access management plan should be developed by NYSDOT or other local agency to manage access for new development applications so that is does not reduce the capacity of the corridor.

In summary, with the recommendations aforementioned, the cumulative operations of the BMSC UMP and Belleayre Resort at Catskill Park will not have an adverse effect on the operations of the area transportation system.

APPENDIX A
FIGURES



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2015 (ETC) COMBINED BUILD VOLUMES
STUDY AREA INTERSECTIONS
SATURDAY PEAK HOUR

CUMULATIVE IMPACT ANALYSIS
BMSC UMP & BELLEAYRE RESORT

FIGURE
1

DATE: 10/12

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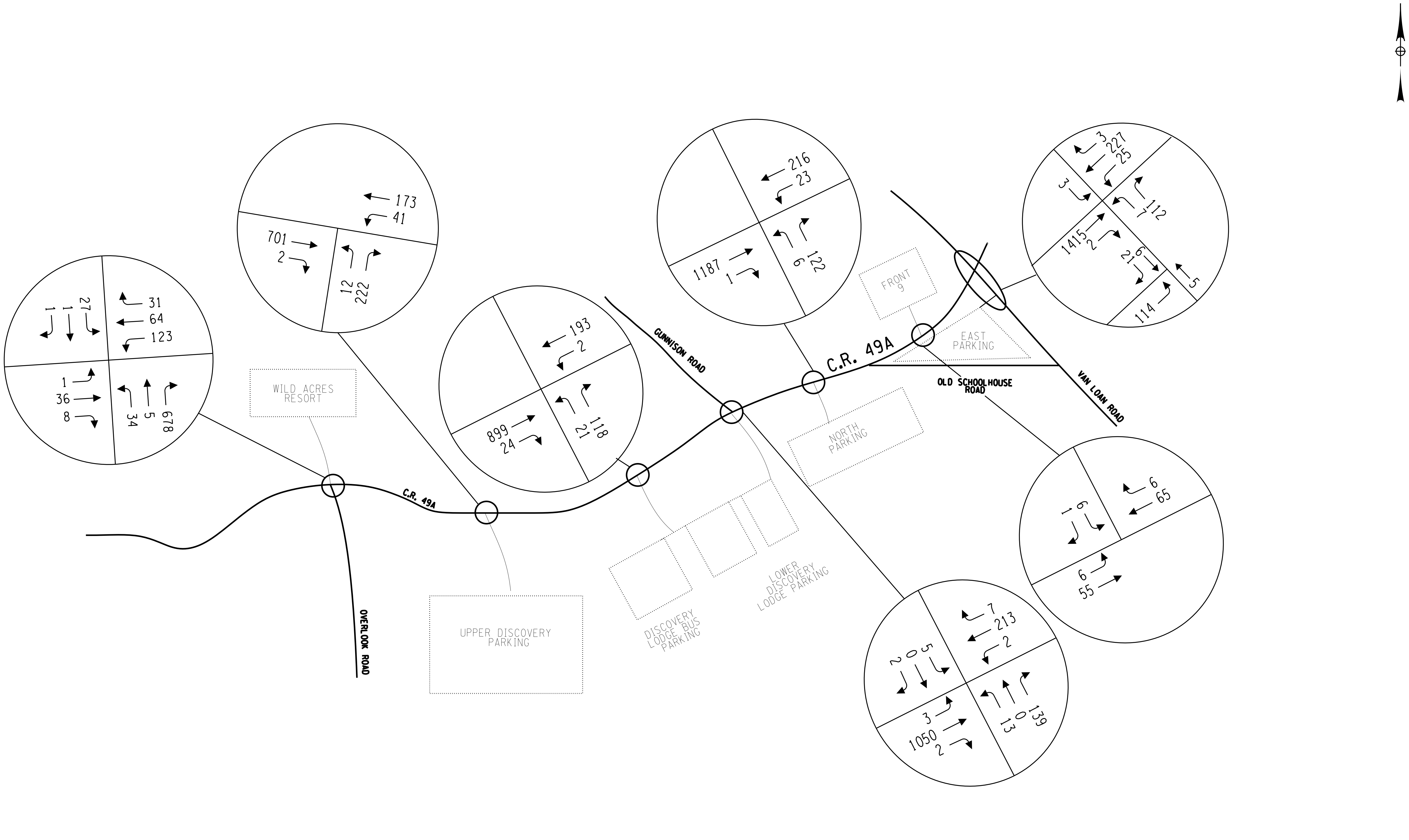

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2015 (ETC) COMBINED BUILD VOLUMES
STUDY AREA INTERSECTIONS
SATURDAY PEAK HOUR

CUMULATIVE IMPACT ANALYSIS
BMSC UMP & BELLEAYRE RESORT

FIGURE
2

DATE: 10/12

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APPENDIX B
LEVEL OF SERVICE CRITERIA

From the *Highway Capacity Manual 2000* published by the Transportation Research Board:

Signalized Intersections

LOS CRITERIA FOR SIGNALIZED INTERSECTIONS

LOS	Control Delay per Vehicle (s/veh)*
A	≤ 10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

Highway Capacity Manual 2000
** s/veh = seconds per vehicle*

LOS A describes operations with low control delay, up to 10 s/veh. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.

LOS B describes operations with control delay greater than 10 and up to 20 s/veh. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.

LOS C describes operations with control delay greater than 20 and up to 35 s/veh. These higher delays may result from only fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

LOS D describes operations with control delay greater than 35 and up to 55 s/veh. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (v/c) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

LOS E describes operations with control delay greater than 55 and up to 80 s/veh. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.

LOS F describes operations with delay in excess of 80.0 s/veh. This level, considered unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also be contribute significantly to high delay levels. Often, vehicles do not pass through the intersection in one signal cycle.

Unsignalized Intersections

The level of service criteria for an unsignalized intersection differs from that of a signalized intersection because of the expectation that signalized intersections encounter more traffic and therefore greater delays. The thresholds for the levels of service of unsignalized intersections are as follows:

LOS CRITERIA FOR UNSIGNALIZED INTERSECTIONS

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10-15
C	> 15-25
D	> 25-35
E	> 35-50
F	> 50

Highway Capacity Manual 2000
** s/veh = seconds per vehicle*

APPENDIX C
CAPACITY ANALYSIS WORKSHEETS

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & Rte 214*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* — North/South Street: *Rte 214*

Intersection Orientation: *East-West* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*143*	*1036*	*1*	*0*	*356*	*26*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.82*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*155*	*1126*	*1*	*0*	*434*	*31*
Percent Heavy Vehicles	*2*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LTR*			*LT*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*1*	*0*	*1*	*47*	*0*	*87*
Peak-Hour Factor, PHF	*0.50*	*0.50*	*0.50*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*2*	*51*	*0*	*95*
Percent Heavy Vehicles	*0*	*0*	*0*	*3*	*3*	*3*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LT*		*LTR*			*LTR*	
v (veh/h)	*155*	*0*		*4*			*146*	
C (m) (veh/h)	*1096*	*624*		*50*			*95*	
v/c	*0.14*	*0.00*		*0.08*			*1.54*	
95% queue length	*0.49*	*0.00*		*0.25*			*11.24*	
Control Delay (s/veh)	*8.8*	*10.8*		*83.2*			*365.7*	
LOS	*A*	*B*		*F*			*F*	
Approach Delay (s/veh)	--	--	*83.2*			*365.7*		
Approach LOS	--	--	*F*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & Rte 212*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* | North/South Street: *Rte 212*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*61*	*886*			*520*	*46*
Peak-Hour Factor, PHF	*0.88*	*0.88*	*0.25*	*1.00*	*0.89*	*0.89*
Hourly Flow Rate, HFR (veh/h)	*69*	*1006*	*0*	*0*	*584*	*51*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*35*		*41*
Peak-Hour Factor, PHF	*0.25*	*1.00*	*0.25*	*0.65*	*1.00*	*0.65*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*53*	*0*	*63*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*69*						*116*	
C (m) (veh/h)	*958*						*158*	
v/c	*0.07*						*0.73*	
95% queue length	*0.23*						*4.47*	
Control Delay (s/veh)	*9.0*						*73.4*	
LOS	*A*						*F*	
Approach Delay (s/veh)	--	--				*73.4*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & Rte 42*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* North/South Street: *Rte 42*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*61*	*1104*			*306*	*54*
Peak-Hour Factor, PHF	*0.94*	*0.94*	*0.25*	*1.00*	*0.94*	*0.94*
Hourly Flow Rate, HFR (veh/h)	*64*	*1174*	*0*	*0*	*325*	*57*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*51*		*13*
Peak-Hour Factor, PHF	*0.25*	*1.00*	*0.25*	*0.71*	*1.00*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*71*	*0*	*18*
Percent Heavy Vehicles	*0*	*0*	*0*	*2*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*					*L*		*R*
v (veh/h)	*64*					*71*		*18*
C (m) (veh/h)	*1240*					*102*		*694*
v/c	*0.05*					*0.70*		*0.03*
95% queue length	*0.16*					*3.57*		*0.08*
Control Delay (s/veh)	*8.1*					*97.3*		*10.3*
LOS	*A*					*F*		*B*
Approach Delay (s/veh)	--	--				*79.7*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	JMK
Agency/Co.	CHA
Date Performed	10/25/2012
Analysis Time Period	Saturday Peak

Site Information

Intersection	Rte 28 & CR 47
Jurisdiction	Highmount, NY
Analysis Year	2015 Combined Build

Project Description 18882 - Belleayre Mtn Ski Center

East/West Street: Rte 28 | North/South Street: CR 47

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	7	1109	81	23	338	8
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94
Hourly Flow Rate, HFR (veh/h)	7	1167	85	24	359	8
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	29	5	23	1	1	7
Peak-Hour Factor, PHF	0.71	0.71	0.71	0.75	0.75	0.75
Hourly Flow Rate, HFR (veh/h)	40	7	32	1	1	9
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	7	24		79			11	
C (m) (veh/h)	1192	556		105			268	
v/c	0.01	0.04		0.75			0.04	
95% queue length	0.02	0.14		4.06			0.13	
Control Delay (s/veh)	8.0	11.8		104.9			19.0	
LOS	A	B		F			C	
Approach Delay (s/veh)	--	--		104.9			19.0	
Approach LOS	--	--		F			C	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & Main St.*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882*

East/West Street: *Rte 28* | North/South Street: *Main St.*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*1265*	*15*	*18*	*324*	
Peak-Hour Factor, PHF	*0.50*	*0.97*	*0.97*	*0.84*	*0.84*	*0.42*
Hourly Flow Rate, HFR (veh/h)	*0*	*1304*	*15*	*21*	*385*	*0*
Percent Heavy Vehicles	*2*	*--*	*--*	*0*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*7*		*9*			
Peak-Hour Factor, PHF	*0.70*	*1.00*	*0.70*	*0.25*	*0.25*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*10*	*0*	*12*	*0*	*0*	*0*
Percent Heavy Vehicles	*14*	*0*	*0*	*2*	*0*	*3*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*21*		*22*				
C (m) (veh/h)		*531*		*123*				
v/c		*0.04*		*0.18*				
95% queue length		*0.12*		*0.62*				
Control Delay (s/veh)		*12.1*		*40.5*				
LOS		*B*		*E*				
Approach Delay (s/veh)	--	--	*40.5*					
Approach LOS	--	--	*E*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	JMK
Agency/Co.	CHA
Date Performed	10/25/2012
Analysis Time Period	Saturday Peak

Site Information

Intersection	Rte 28 & CR 49A
Jurisdiction	Highmount, NY
Analysis Year	2015 Combined Build

Project Description 18882 - Belleayre Mtn Ski Center

East/West Street: Rte 28 | North/South Street: CR 49A

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	106	57	195	141	3
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.76	0.76	0.76
Hourly Flow Rate, HFR (veh/h)	0	129	69	256	185	3
Percent Heavy Vehicles	4	--	--	1	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	1	0	1	0
Configuration	LT		R	LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	314	13	1200	1	0	1
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	365	15	1395	4	0	4
Percent Heavy Vehicles	1	1	1	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LTR		LTR			LTR	
v (veh/h)	0	256		1775			8	
C (m) (veh/h)	1374	1381		578			0	
v/c	0.00	0.19		3.07				
95% queue length	0.00	0.68		153.95				
Control Delay (s/veh)	7.6	8.2		952.3				
LOS	A	A		F			F	
Approach Delay (s/veh)	--	--	952.3					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JMK	Intersection	Rte 28 & Rte 38
Agency/Co.	CHA	Jurisdiction	Highmount, NY
Date Performed	10/25/2012	Analysis Year	2015 Combined Build
Analysis Time Period	Saturday Peak		

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* | North/South Street: *Rte 38*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	72	130			286	176
Peak-Hour Factor, PHF	0.92	0.92	0.25	1.00	0.89	0.89
Hourly Flow Rate, HFR (veh/h)	78	141	0	0	321	197
Percent Heavy Vehicles	4	--	--	1	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				79		47
Peak-Hour Factor, PHF	0.25	1.00	0.25	0.78	1.00	0.78
Hourly Flow Rate, HFR (veh/h)	0	0	0	101	0	60
Percent Heavy Vehicles	0	0	0	1	0	1
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	78						161	
C (m) (veh/h)	1038						436	
v/c	0.08						0.37	
95% queue length	0.24						1.67	
Control Delay (s/veh)	8.7						18.0	
LOS	A						C	
Approach Delay (s/veh)	--	--				18.0		
Approach LOS	--	--				C		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*JMK*	Intersection	*CR 49A & Van Loan*
Agency/Co.	*CHA*	Jurisdiction	*Highmount, NY*
Date Performed	*10/29/2012*	Analysis Year	*2015 Combined Build*
Analysis Time Period	*Saturday Peak*		

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A* North/South Street: *Van Loan*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	1415	2	25	227	3
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.66	0.66	0.66
Hourly Flow Rate, HFR (veh/h)	0	1645	2	37	343	4
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7	0	112	3	0	0
Peak-Hour Factor, PHF	0.70	0.70	0.70	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	10	0	160	12	0	0
Percent Heavy Vehicles	2	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	0	37		170			12	
C (m) (veh/h)	1212	392		108			0	
v/c	0.00	0.09		1.57				
95% queue length	0.00	0.31		12.75				
Control Delay (s/veh)	8.0	15.1		368.2				
LOS	A	C		F			F	
Approach Delay (s/veh)	--	--	368.2					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/29/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*CR 49A & North Parking*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A* | North/South Street: *North Parking*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		1187	1	23	216	
Peak-Hour Factor, PHF	0.77	0.77	0.77	0.66	0.66	0.66
Hourly Flow Rate, HFR (veh/h)	0	1541	1	34	327	0
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6		122			
Peak-Hour Factor, PHF	0.70	0.60	0.70	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	8	0	174	0	0	0
Percent Heavy Vehicles	5	0	5	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		34		182				
C (m) (veh/h)		431		132				
v/c		0.08		1.38				
95% queue length		0.26		11.96				
Control Delay (s/veh)		14.1		273.0				
LOS		B		F				
Approach Delay (s/veh)	--	--	273.0					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*CR 49A & Gunnison Rd*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A*

North/South Street: *Gunnison Rd/Belleayre Lower*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*3*	*1050*	*2*	*2*	*213*	*7*
Peak-Hour Factor, PHF	*0.77*	*0.77*	*0.77*	*0.66*	*0.66*	*0.66*
Hourly Flow Rate, HFR (veh/h)	*3*	*1363*	*2*	*3*	*322*	*10*
Percent Heavy Vehicles	*2*	--	--	*8*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*13*	*0*	*139*	*5*	*0*	*2*
Peak-Hour Factor, PHF	*0.60*	*0.60*	*0.60*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*21*	*0*	*231*	*20*	*0*	*8*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*3*	*3*		*252*			*28*	
C (m) (veh/h)	*1227*	*484*		*161*			*0*	
v/c	*0.00*	*0.01*		*1.57*				
95% queue length	*0.01*	*0.02*		*16.95*				
Control Delay (s/veh)	*7.9*	*12.5*		*333.2*				
LOS	*A*	*B*		*F*			*F*	
Approach Delay (s/veh)	--	--	*333.2*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/29/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*CR 49A & Discovery Lodge*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A* — North/South Street: *Discovery Lodge*

Intersection Orientation: *East-West* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		899	24	2	193	
Peak-Hour Factor, PHF	0.77	0.81	0.81	0.74	0.74	0.66
Hourly Flow Rate, HFR (veh/h)	0	1109	29	2	260	0
Percent Heavy Vehicles	2	--	--	7	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	21		118			
Peak-Hour Factor, PHF	0.74	0.60	0.74	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	28	0	159	0	0	0
Percent Heavy Vehicles	9	0	9	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		2		187				
C (m) (veh/h)		596		222				
v/c		0.00		0.84				
95% queue length		0.01		6.47				
Control Delay (s/veh)		11.1		71.8				
LOS		B		F				
Approach Delay (s/veh)	--	--	71.8					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/29/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*CR 49A & Upper Discovery Park*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A* | North/South Street: *Upper Discovery Parking*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		701	2	41	173	
Peak-Hour Factor, PHF	0.77	0.77	0.77	0.66	0.66	0.66
Hourly Flow Rate, HFR (veh/h)	0	910	2	62	262	0
Percent Heavy Vehicles	2	--	--	3	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	12		222			
Peak-Hour Factor, PHF	0.65	0.60	0.65	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	18	0	341	0	0	0
Percent Heavy Vehicles	5	0	5	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		62		359				
C (m) (veh/h)		743		312				
v/c		0.08		1.15				
95% queue length		0.27		14.91				
Control Delay (s/veh)		10.3		134.8				
LOS		B		F				
Approach Delay (s/veh)	--	--	134.8					
Approach LOS	--	--	F					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*JMK*
Agency/Co.	*CHA*
Date Performed	*10/25/2012*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*CR 49A & Upper Driveway*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Combined Build*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *CR 49A* | North/South Street: *Upper Driveway*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	36	8	123	64	31
Peak-Hour Factor, PHF	0.43	0.43	0.43	0.71	0.71	0.71
Hourly Flow Rate, HFR (veh/h)	2	83	18	173	90	43
Percent Heavy Vehicles	2	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	34	5	678	27	1	1
Peak-Hour Factor, PHF	0.79	0.79	0.79	0.80	0.80	0.80
Hourly Flow Rate, HFR (veh/h)	43	6	858	33	1	1
Percent Heavy Vehicles	1	0	1	2	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	2	173		907			35	
C (m) (veh/h)	1452	1479		899			24	
v/c	0.00	0.12		1.01			1.46	
95% queue length	0.00	0.40		18.95			4.38	
Control Delay (s/veh)	7.5	7.8		53.7			588.4	
LOS	A	A		F			F	
Approach Delay (s/veh)	--	--	53.7			588.4		
Approach LOS	--	--	F			F		

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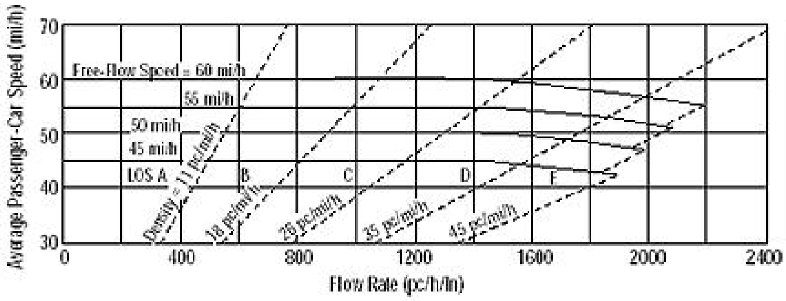
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	JMK
Agency or Company	CHA
Date Performed	10/29/2012
Analysis Time Period	SATURDAY PEAK

Site Information

Highway/Direction to Travel	Rte 28
From/To	Rte 209 / Rte 375
Jurisdiction	
Analysis Year	2015 Combined Build

Project Description Belleayre Ski resort expansion

☑ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1353	Peak-Hour Factor, PHF	0.91
AADT(veh/h)		%Trucks and Buses, P_T	2
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.971

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Undivided
FFS (measured)	
Base Free-Flow Speed, BFFS	60.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	1.6
FFS (mi/h)	58.4

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	765
Speed, S (mi/h)	58.4
D (pc/mi/ln)	13.1
LOS	B

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

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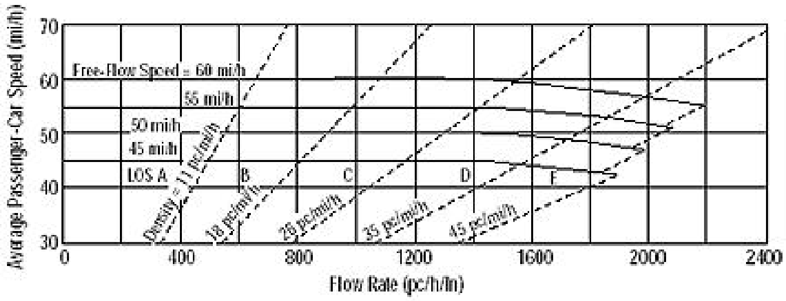
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	JMK
Agency or Company	CHA
Date Performed	10/29/2012
Analysis Time Period	SATURDAY PEAK

Site Information

Highway/Direction to Travel	Rte 28
From/To	Rte 209 / Rte 375
Jurisdiction	
Analysis Year	2015 Combined Build

Project Description Belleayre Ski resort expansion

☑ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1419	Peak-Hour Factor, PHF	0.93
AADT(veh/h)		%Trucks and Buses, P_T	2
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.971

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Undivided
FFS (measured)	
Base Free-Flow Speed, BFFS	60.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	1.6
FFS (mi/h)	58.4

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	785
Speed, S (mi/h)	58.4
D (pc/mi/ln)	13.4
LOS	B

Design

Design (N)

Required Number of Lanes, N

Flow Rate, v_p (pc/h)

Max Service Flow Rate (pc/h/ln)

Design LOS

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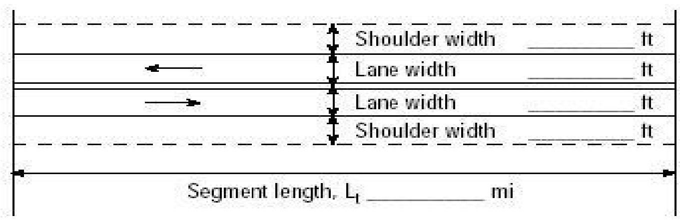
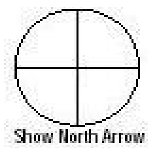
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	JMK	Highway	Rte 28
Agency or Company	CHA	From/To	Rte 375 / Rte 212
Date Performed	10/29/2012	Jurisdiction	
Analysis Time Period	SATURDAY PEAK	Analysis Year	2015 Combined BUILD

Project Description: *Belleayre Ski resort expansion*

Input Data





☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	2012 veh/h
Directional split	52 / 48
Peak-hour factor, PHF	0.87
No-passing zone	56
% Trucks and Buses , P_T	2 %
% Recreational vehicles, P_R	0%
Access points/ *mi*	3

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	0.99
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.1
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	0.990
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2359
v_p * highest directional split proportion[2] (pc/h)	1227

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	60.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	0.0 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	0.8 mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	mi/h	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	59.3 mi/h

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	0.8
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	40.2

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	1.000
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	2313
v_p * highest directional split proportion[2] (pc/h)	1203
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	86.9
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	2.7
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	89.6

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio, v/c=V_p/ 3,200	0.74
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	7400

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*25754*
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	*184.2*

Notes

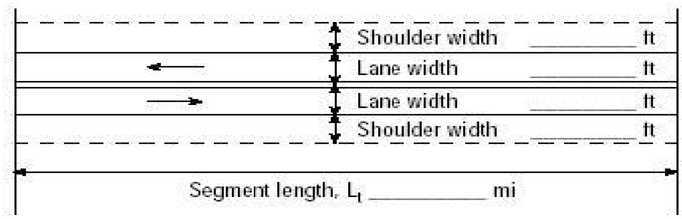
1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

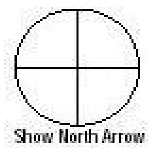
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*JMK*	Highway	*Rte 28*
Agency or Company	*CHA*	From/To	*Rte 212 / Rte 214*
Date Performed	*10/29/2012*	Jurisdiction	
Analysis Time Period	*SATURDAY PEAK*	Analysis Year	*2015 Combined BUILD*

Project Description: *Belleayre Ski resort expansion*

Input Data





☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	*1324* veh/h
Directional split	*65 / 35*
Peak-hour factor, PHF	*0.87*
No-passing zone	*56*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points/ *mi*	*3*

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	*0.99*
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	*1.1*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.990*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*1553*
v_p * highest directional split proportion[2] (pc/h)	*1009*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	*60.0 mi/h*
Field Measured speed, S_{FM}	*mi/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	*0.0 mi/h*
Observed volume, V_f	*veh/h*	Adj. for access points, f_A (Exhibit 20-6)	*0.8 mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*59.3 mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	*1.1*
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	*46.1*

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	*1.00*
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*1522*
v_p * highest directional split proportion[2] (pc/h)	*989*
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	*73.8*
Adj. for directional distribution and no-passing zone, $f_{d/np}$(%)(Exh. 20-12)	*6.2*
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	*80.0*

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	*D*
Volume to capacity ratio, v/c=V_p/ 3,200	*0.49*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	*1484*

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*5164*
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	*32.2*

Notes

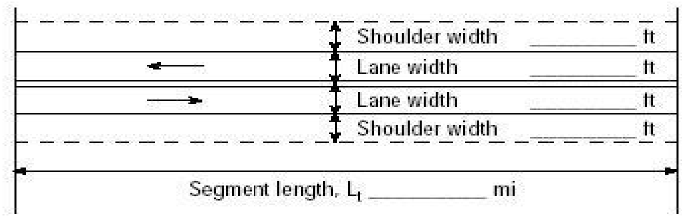
1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*JMK*	Highway	*Rte 28*
Agency or Company	*CHA*	From/To	*CR 38 / Rte 30*
Date Performed	*10/29/2012*	Jurisdiction	
Analysis Time Period	*SATURDAY PEAK*	Analysis Year	*2015 Combined Build*

Project Description: *Belleayre Ski resort expansion*

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	*580* veh/h
Directional split	*52 / 48*
Peak-hour factor, PHF	*0.81*
No-passing zone	*45*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points/ *mi*	*3*

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	*0.93*
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	*1.1*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.982*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*784*
v_p * highest directional split proportion[2] (pc/h)	*408*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	*60.0* mi/h
Field Measured speed, S_{FM}	*mi/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	*0.0* mi/h
Observed volume, V_f	*veh/h*	Adj. for access points, f_A (Exhibit 20-6)	*0.8* mi/h
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*59.3* mi/h

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	*2.1*
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	*51.1*

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	*0.94*
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.990*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*769*
v_p * highest directional split proportion[2] (pc/h)	*400*
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	*49.1*
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	*13.0*
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	*62.2*

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	*C*
Volume to capacity ratio, v/c=V_p/ 3,200	*0.25*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	*251*

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*812*
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	*4.9*
Notes	
1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.	

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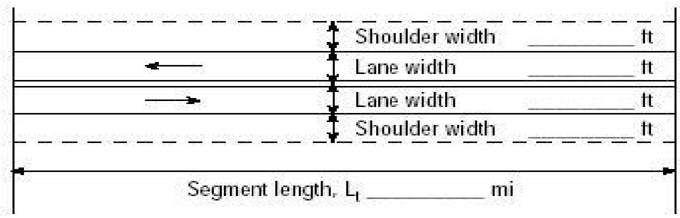
TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*JMK*	Highway	*Rte 28*
Agency or Company	*CHA*	From/To	*CR 49A S. of Ski Center*
Date Performed	*10/29/2012*	Jurisdiction	
Analysis Time Period	*SATURDAY PEAK*	Analysis Year	*2015 Combined Build*

Project Description: *Belleayre Ski resort expansion*

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☐ Level ☑ Rolling

Two-way hourly volume	*497* veh/h
Directional split	*75 / 25*
Peak-hour factor, PHF	*0.89*
No-passing zone	*100*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points/ *mi*	*3*

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	*0.93*
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	*1.1*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	*0.982*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*611*
v_p * highest directional split proportion[2] (pc/h)	*458*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	*45.0 mi/h*
Field Measured speed, S_{FM}	*mi/h*	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	*3.7 mi/h*
Observed volume, V_f	*veh/h*	Adj. for access points, f_A (Exhibit 20-6)	*0.8 mi/h*
Free-flow speed, FFS FFS=S_{FM}+0.00776(V_f/ f_{HV})	*mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*40.5 mi/h*

Adj. for no-passing zones, f_{np} (*mi/h*) (Exhibit 20-11)	*3.9*
Average travel speed, ATS (*mi/h*) ATS=FFS-0.00776v_p-f_{np}	*32.0*

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	*0.94*
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ $P_T(E_T$-1)+$P_R(E_R$-1))	*0.990*
Two-way flow rate[1], v_p (pc/h)=V/ (PHF * f_G * f_{HV})	*600*
v_p * highest directional split proportion[2] (pc/h)	*450*
Base percent time-spent-following, BPTSF(%)=100(1-$e^{-0.000879v_p}$)	*41.0*
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	*22.7*
Percent time-spent-following, PTSF(%)=BPTSF+$f_{d/np}$	*63.7*

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	*C*
Volume to capacity ratio, v/c=V_p/ 3,200	*0.19*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)= 0.25L_t(V/PHF)	*195*

Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=V*L_t	*696*
Peak 15-min total travel time, TT_{15}(veh-h)= VMT_{15}/ATS	*6.1*

Notes

1. If Vp >= 3,200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split Vp>= 1,700 pc/h, terminated anlysis-the LOS is F.

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*CLD*	Intersection	*Rte 28 & Rte 214*
Agency/Co.	*CHA*	Jurisdiction	*Highmount, NY*
Date Performed	*10/29/12*	Analysis Year	*2015 Combine Build Mitigation*
Analysis Time Period	*Saturday Peak*		

Project Description *18882 - Belleayre Mtn Ski Center*	
East/West Street: *Rte 28*	North/South Street: *Rte 214*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*143*	*1036*	*1*	*0*	*356*	*26*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.82*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*155*	*1126*	*1*	*0*	*434*	*31*
Percent Heavy Vehicles	*2*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LTR*			*LT*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*1*	*0*	*1*	*47*	*0*	*87*
Peak-Hour Factor, PHF	*0.50*	*0.50*	*0.50*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*2*	*51*	*0*	*95*
Percent Heavy Vehicles	*0*	*0*	*0*	*3*	*3*	*3*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LT*		*LTR*		*LT*		*R*
v (veh/h)	*155*	*0*		*4*		*51*		*95*
C (m) (veh/h)	*1096*	*624*		*50*		*37*		*618*
v/c	*0.14*	*0.00*		*0.08*		*1.38*		*0.15*
95% queue length	*0.49*	*0.00*		*0.25*		*5.33*		*0.54*
Control Delay (s/veh)	*8.8*	*10.8*		*83.2*		*447.4*		*11.9*
LOS	*A*	*B*		*F*		*F*		*B*
Approach Delay (s/veh)	--	--	*83.2*			*164.0*		
Approach LOS	--	--	*F*			*F*		

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SHORT REPORT

General Information		Site Information	
Analyst	*CLD*	Intersection	*RTE 28 & CR 49A*
Agency or Co.	*CHA*	Area Type	*All other areas*
Date Performed	*10/29/2012*	Jurisdiction	*HIGHMOUNT, NY*
Time Period	*SATURDAY PEAK*	Analysis Year	*2015 COMBINED BUILD MITIGATION*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*0*	*1*	*1*	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*0*
Lane Group		*LT*	*R*	*L*	*TR*			*LT*	*R*		*LTR*	
Volume (vph)	*0*	*106*	*57*	*195*	*141*	*3*	*314*	*13*	*1200*	*1*	*0*	*1*
% Heavy Vehicles	*4*	*4*	*4*	*1*	*1*	*1*	*1*	*1*	*1*	*0*	*0*	*0*
PHF	*0.82*	*0.82*	*0.82*	*0.76*	*0.76*	*0.76*	*0.86*	*0.86*	*0.86*	*0.25*	*0.25*	*0.25*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Startup Lost Time		*2.0*	*2.0*	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	
Extension of Effective Green		*2.0*	*2.0*	*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	
Arrival Type		*3*	*3*	*3*	*3*			*3*	*3*		*3*	
Unit Extension		*3.0*	*3.0*	*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width		*12.0*	*12.0*	*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour		*0*	*0*	*0*	*0*			*0*	*0*		*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = *30.0*	G = *10.0*	G = *0.0*	G = *0.0*	G = *40.0*	G = *0.0*	G = *0.0*	G =
	Y = *5*	Y = *5*	Y = *0*	Y = *0*	Y = *5*	Y = *0*	Y = *0*	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *95.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*129*	*70*	*257*	*190*			*380*	*1395*		*8*	
Lane Group Capacity		*192*	*163*	*677*	*888*			*577*	*1262*		*673*	
v/c Ratio		*0.67*	*0.43*	*0.38*	*0.21*			*0.66*	*1.11*		*0.01*	
Green Ratio		*0.11*	*0.11*	*0.47*	*0.47*			*0.42*	*0.79*		*0.42*	
Uniform Delay d_1		*40.9*	*39.8*	*15.7*	*14.6*			*22.0*	*10.0*		*16.0*	
Delay Factor k		*0.24*	*0.11*	*0.11*	*0.11*			*0.23*	*0.50*		*0.11*	
Incremental Delay d_2		*8.8*	*1.8*	*0.4*	*0.1*			*2.8*	*59.4*		*0.0*	
PF Factor		*1.000*	*1.000*	*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	
Control Delay		*49.8*	*41.6*	*16.0*	*14.8*			*24.8*	*69.4*		*16.0*	
Lane Group LOS		*D*	*D*	*B*	*B*			*C*	*E*		*B*	
Approach Delay	*46.9*			*15.5*			*59.8*			*16.0*		
Approach LOS	*D*			*B*			*E*			*B*		
Intersection Delay	*50.5*			Intersection LOS						*D*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*CLD*
Agency/Co.	*CHA*
Date Performed	*10/30/12*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & Rte 214*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Comb Build - 6078 attend*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* | North/South Street: *Rte 214*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*120*	*729*	*1*	*0*	*302*	*26*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.82*	*0.82*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*130*	*792*	*1*	*0*	*368*	*31*
Percent Heavy Vehicles	*2*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration	*LTR*			*LT*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*1*	*0*	*1*	*47*	*0*	*82*
Peak-Hour Factor, PHF	*0.50*	*0.50*	*0.50*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*2*	*51*	*0*	*90*
Percent Heavy Vehicles	*0*	*0*	*0*	*3*	*3*	*3*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LT*		*LTR*			*LTR*	
v (veh/h)	*130*	*0*		*4*			*141*	
C (m) (veh/h)	*1160*	*832*		*126*			*208*	
v/c	*0.11*	*0.00*		*0.03*			*0.68*	
95% queue length	*0.38*	*0.00*		*0.10*			*4.20*	
Control Delay (s/veh)	*8.5*	*9.3*		*34.5*			*52.5*	
LOS	*A*	*A*		*D*			*F*	
Approach Delay (s/veh)	--	--	*34.5*			*52.5*		
Approach LOS	--	--	*D*			*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*CLD*
Agency/Co.	*CHA*
Date Performed	*10/30/12*
Analysis Time Period	*Saturday Peak*

Site Information

Intersection	*Rte 28 & CR 49A*
Jurisdiction	*Highmount, NY*
Analysis Year	*2015 Comb Build - 6078 attend*

Project Description *18882 - Belleayre Mtn Ski Center*

East/West Street: *Rte 28* | North/South Street: *CR 49A*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*106*	*44*	*128*	*141*	*3*
Peak-Hour Factor, PHF	*0.82*	*0.82*	*0.82*	*0.76*	*0.76*	*0.76*
Hourly Flow Rate, HFR (veh/h)	*0*	*129*	*53*	*168*	*185*	*3*
Percent Heavy Vehicles	*4*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration	*LT*		*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*244*	*13*	*822*	*1*	*0*	*1*
Peak-Hour Factor, PHF	*0.86*	*0.86*	*0.86*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*283*	*15*	*955*	*4*	*0*	*4*
Percent Heavy Vehicles	*1*	*1*	*1*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*		*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*L*	*LT*		*R*		*LTR*	
v (veh/h)	*0*	*168*	*298*		*955*		*8*	
C (m) (veh/h)	*1374*	*1399*	*345*		*924*		*0*	
v/c	*0.00*	*0.12*	*0.86*		*1.03*			
95% queue length	*0.00*	*0.41*	*8.03*		*20.96*			
Control Delay (s/veh)	*7.6*	*7.9*	*55.5*		*59.7*			
LOS	*A*	*A*	*F*		*F*		*F*	
Approach Delay (s/veh)	--	--	*58.7*					
Approach LOS	--	--	*F*					

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SHORT REPORT

General Information		Site Information	
Analyst	*CLD*	Intersection	*RTE 28 & CR 49A*
Agency or Co.	*CHA*	Area Type	*All other areas*
Date Performed	*10/29/2012*	Jurisdiction	*HIGHMOUNT, NY*
Time Period	*SATURDAY PEAK*	Analysis Year	*2015 COMB BUILD MIT reduced*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	0	1	1	1	1	0	0	1	1	0	1	0
Lane Group		LT	R	L	TR			LT	R		LTR	
Volume (vph)	0	106	44	128	141	3	244	13	822	1	0	1
% Heavy Vehicles	4	4	4	1	1	1	1	1	1	0	0	0
PHF	0.82	0.82	0.82	0.76	0.76	0.76	0.86	0.86	0.86	0.25	0.25	0.25
Pretimed/Actuated (P/A)	A	A	A	A	A	A	A	A	A	A	A	A
Startup Lost Time		2.0	2.0	2.0	2.0			2.0	2.0		2.0	
Extension of Effective Green		2.0	2.0	2.0	2.0			2.0	2.0		2.0	
Arrival Type		3	3	3	3			3	3		3	
Unit Extension		3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width		12.0	12.0	12.0	12.0			12.0	12.0		12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0	0	0	0			0	0		0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 20.0	G = 15.0	G = 0.0	G = 0.0	G = 30.0	G = 0.0	G = 0.0	G =
	Y = 5	Y = 5	Y = 0	Y = 0	Y = 5	Y = 0	Y = 0	Y =
Duration of Analysis (hrs) = 0.25					Cycle Length C = 80.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		129	54	168	190			299	956		8	
Lane Group Capacity		343	291	685	938			516	1099		602	
v/c Ratio		0.38	0.19	0.25	0.20			0.58	0.87		0.01	
Green Ratio		0.19	0.19	0.50	0.50			0.38	0.69		0.38	
Uniform Delay d_1		28.4	27.4	11.2	11.1			20.0	9.7		15.7	
Delay Factor k		0.11	0.11	0.11	0.11			0.17	0.40		0.11	
Incremental Delay d_2		0.7	0.3	0.2	0.1			1.6	7.7		0.0	
PF Factor		1.000	1.000	1.000	1.000			1.000	1.000		1.000	
Control Delay		29.1	27.7	11.4	11.2			21.6	17.4		15.7	
Lane Group LOS		C	C	B	B			C	B		B	
Approach Delay	28.7			11.3			18.4			15.7		
Approach LOS	C			B			B			B		
Intersection Delay	18.0			Intersection LOS						B		

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