

CAIRNGORM SKI AREA FEASIBILITY ASSESSMENT & STRATEGIC PLAN



November 2018

Prepared by:

SE GROUP

EXECUTIVE SUMMARY

In January 2018 SE Group, in association with Fourth Street, was retained by the Highlands and Islands Enterprise (HIE) to conduct a comprehensive, independent review of the uplift facilities at Cairngorm Mountain ski resort (Cairngorm) to determine the best way forward for potential reinvestment.

This robust analysis delved into all aspects of ski area operations, the winter and summer marketplace, the site and existing infrastructure, potential revenues and costs, and stakeholder perspectives.

The findings and recommendations of this project present a five- to ten-year vision for Cairngorm, which in turn will build upon the Glenmore and Cairngorm Strategy.

KEY POINTS

Overview

- There is immense unlocked potential at Cairngorm that can be unleashed with targeted, strategic investments
- Cairngorm's potential carrying capacity is 2,700 but actual capacity is only 1,600
- The funicular is unique to Cairngorm and should continue to be enhanced, and restricting its use to e.g. ski school and non-skiers should be explored once new uplift is in place
- Snow fencing is crucial to operations at Cairngorm and the system should be used and upgraded as necessary to consistently provide snow on the slopes and reduce snow drifting
- Cairngorm doesn't have a high enough skier capacity to justify the expense of reopening and running Coire na Ciste, nor would it effectively resolve the overcrowding and long queues
- Cairngorm and the wider community should work together to present a unique experience and seamless message about the destination
- There is an opportunity to provide transport links connecting Cairngorm with the greater Aviemore tourist destination

New infrastructure

- New infrastructure and technology should be put in place to mitigate against closures of the access road, funicular, lifts, and terrain due to weather events
- A mountain coaster and zip line tour would provide outdoor recreation experiences to a wide range of tourists and interests, while generating revenues
- Snowmaking would enable Cairngorm to ensure snow coverage for the entire ski season
- A 3,200 people per hour (pph) aerial chairlift in Coire Cas would improve operational efficiency and make the resort attractive to destination skiers
- An additional 3,000 pph aerial chairlift would link areas of the mountain via a high-speed lift and access race terrain to facilitate races and training
- Improvements such as a base area carpet conveyer lift would provide a 'best-in-class' beginner experience, regardless of weather, to attract and maintain the family market
- Expanding and remodelling the Ptarmigan, reopening the Sheiling, and improving the base facilities would improve operations, capacity, experience, and revenues across the resort
- A lift-served mountain biking system is consistent with the 'outdoor adventure' orientation of the area and would be accessible to many

Investment

- The total estimated capital costs of upgrading facilities is approximately £27m over five to ten years
- The proposed improvements are intended to increase winter visits to 150,000 consistently, higher during peak years

ANALYSIS. THE COMPLEXITY OF THE EXISTING CONDITION

The terms of engagement for this review exercise are twofold: 1) undertake a comprehensive review of the facilities at Cairngorm, and 2) opine on opportunities for future reinvestment. The phrasing of the first task is telling, and the use of descriptor ‘comprehensive’ intentional—to fully understand the current state of the Cairngorm facilities and operations requires a much deeper dive into the complexity of the larger context in which Cairngorm exists.

The Marketplace

A market assessment was undertaken to define industry trends, regional and local market demographic profiles and identify the existing regional amenities and attractions in the area surrounding Cairngorm.

The assessment looks at Cairngorm’s ability to achieve previous visit levels and the necessary steps to do so, providing a framework for proposed upgrades to the resort. Overall, the ski resort industry is highly competitive, and resorts must set themselves apart through a unique brand and efficient operations to succeed.

Scottish ski resorts, Cairngorm included, have struggled with that competition and seen a declining number of visitors in the past twenty years. Cairngorm’s visitor numbers have been very variable in that period, ranging from ±20,000 to ±140,000 skier visits in good snow years.

However, the British population still participates in skiing at a very high rate (10%, compared to 3% in the U.S.) and the popularity of indoor, artificial slopes in Glasgow and other urban areas demonstrates a strong level of interest in the sport. British skiers have also expressed a desire to ski in Scotland again, particularly to teach their children to ski in Scotland.

To bring these skiers to Cairngorm, the resort will need to provide the modern infrastructure destination skiers have come to expect, reliable snowpack, in combination with Cairngorm’s unique, rugged experience.

Other important factors for the ski area’s success include appealing to millennials through affordability and short lift queues, providing an excellent beginner experience, and capitalising on the strong tourism to Aviemore and Cairngorms National Park in the winter and the summer.

The existing visitors to the area in the summer present many opportunities for Cairngorm to increase summer visits and revenues. Cairngorms National Park and the region are a major summer destination for tourists interested in natural beauty and adventure. Cairngorm can have a broad summer appeal with activities for all types of visitors that generate revenue.

The Natural Environment

Cairngorm is at the heart of the UK's biggest national park, and the Cairngorm Mountains National Scenic Area. It is also recognised internationally for its wildlife habitats and wild birds. These aspects are beneficial in attracting people to the resort, and must also be taken safeguarded in the context of commercial activity and development.

Cairngorm is also the sixth highest mountain in the UK and subject to frequent adverse weather events that can lead to closures of the access road, funicular, lifts, and terrain. These impede the resort's operational efficiency and detract from the visitor experience. New infrastructure and technology should be put in place to mitigate against the impacts of these weather events.

Climate change is expected to impact the weather conditions at Cairngorm, although not to the extent that other Scottish ski areas may experience. The potential impacts and the uncertainty around them should be considered going forward.

Existing Operations

The existing mountain infrastructure at Cairngorm does not provide a skiing experience that can compete in today's marketplace, reflected in the downward trend of annual ski visits. The lift system is slow, uncomfortable riding, and requires significant labour to operate, leading to long queues and lift closures in the base area.

The ski area lacks a snowmaking system and, therefore, cannot provide the reliable snow cover necessary to operate its lifts, open its terrain, and encourage visitors to plan trips to Cairngorm. Analysis of climatic conditions shows snowmaking operations would be feasible.

The guest services facilities do not match the resort's overall capacity and the facilities can be very crowded, also detracting from the visitor experience. With the funicular, the resort has many non-skier visits and needs to accommodate them as well. On crowded days, the parking area at Coire Cas fills up and some visitors must park in the Coire na Ciste car park. There is an opportunity to provide a public transport link to Aviemore, connecting Cairngorm physically and conceptually to the greater Aviemore tourist destination.

Coire na Ciste

This assessment was specifically tasked with investigating the possibility of re-establishing the second base area at Coire na Ciste. The two main reasons cited for this are 1) to enable ski access when the Coire Cas road is closed, and 2) to alleviate crowding and queues at Coire Cas.

To open the ski area during a road closure, the Coire na Ciste base area would require a duplicate of nearly everything found at Coire Cas - ticketing, rentals, snowsports school, food, administration, medical services, at least one snowcat/pisting machine and maintenance facility.

Two possibilities for the reopening the Ciste were identified and analysed; one involving a surface lift system and a second using a chairlift.

A surface lift would cost around £600k and require snow to operate. Relying on natural snowfall or traditionally produced man-made snow (i.e., utilising snow cannons) is inadvisable below 620 metres. The Ciste sits at 540 metres. A SnowFactory machine could work at lower levels, and would typically cost

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around 400k euros to buy and £35k a year to run. This option has very high capital and operating costs without fully improving the guest experience.

An aerial chairlift would not require a skiable track back to the Ciste base. A new installation would cost between £2.5m, for a fixed-grip, and £5m for a detachable/gondola system (none of the past lift infrastructure could be utilised in a new system).

With 8,000 visits a day as the standard guideline in mountain planning to justify a second base area, it was concluded that the mountain simply doesn't have a high enough skier capacity to merit reopening Coire na Ciste. Cairngorm should instead maximise the operational efficiency by upgrading facilities at Coire Cas.

Carrying Capacity

At present, Cairngorm's potential carrying capacity is 2,700. However, the peak number of visitors on a single day and frequent lift closures indicate an actual carrying capacity of around 1,600. The proposed infrastructure improvements are designed to increase this to nearer the 2,700 figure.

Many existing operations issues result in greater expense, lower visits, and a negative visitor experience.

- The road to the resort may close during weather events or the work required to keep it open affects the efficiency of the operation, the guest experience, and ultimately visits and revenue. There are possible solutions to be investigated.
- The funicular is a major asset for the resort but the over-reliance on it is problematic given its limited capacity and non-skier use. Its susceptibility to closure also hampers the experience for both skiing and non-skiing visitors, and solutions are needed. With improved uplift in place, Cairngorm should explore restricting the funicular to a few types of visitors (i.e., ski school, non-skiers).
- Existing surface lift tracks are problematic. They are difficult to ride and maintain and they rely on proper snow coverage. They also take up space that could be used for skiing.
- Snow fencing is crucial to operations at Cairngorm and the system should be used and upgraded as necessary to consistently provide snow on the slopes and reduce snow drifting.
- The lower mountain, the terrain above and surrounding the base area, often struggles with reliable snow cover, creating operational challenges—improving the reliability of snow conditions on the lower mountain terrain is necessary.

Addressing these issues is integral to the continued viability of the operation and must be a focus of any future upgrading or expansion at Cairngorm.

Planning and Regulation

As Cairngorm management moves forward it will need to collaborate with the regulatory bodies. In addition, a Visitor Management Plan (VMP) governs operations to ensure that visitors have no adverse impacts on the environment and activities should be planned within the constraints of the VMP, as changes are unlikely.

The Highland Council acts as the first line of review in any planning application. The Cairngorms National Park Authority grants and enforces planning permissions in the National Park. Scottish Natural Heritage manages Natura sites and monitors other resort planning. The Scottish Environment Protection Agency ensures the protection of water and other important natural resources.

THE PLAN. OPPORTUNITIES FOR THE FUTURE

Considering the complexity of the current condition, this review explores opportunities for Cairngorm's future. A similar puzzle of interconnected pieces must be considered as part of this exploration, including lift infrastructure, terrain and snowmaking, guest services, and multi-season activities.

When thinking about the future of Cairngorm one must consider this: when visitors are coming to Cairngorm it is within the context of the broader destination. They blur the lines between the town of Aviemore, Glenmore and the ski area. Cairngorm and the larger community should respond in kind, and continually work together to present a unique experience and seamless message about the destination.

The Opportunity – Winter

The proposed winter improvements are designed to enhance the guest experience in a way that is competitive in the marketplace, maximises revenue generation, and is founded in operational efficiency.

Lift Infrastructure

The upgrade concept for lifts would significantly reduce the total number of lifts and add new ones to create a more efficient system with a better guest experience. The new chairlifts should be constructed in a phased approach to allow for evaluation during the process.

The Phase One lift improvements would resolve the out-of-base capacity issue with a 3,200 people per hour (pph) aerial chairlift out of the Coire Cas base area, improving the operational efficiency of three surface lifts, and making the resort attractive to destination skiers.

The Phase Two lift improvement, an additional aerial chairlift of up to 3,000 pph capacity, would link areas of the mountain via a high-speed lift and access race terrain to facilitate races and training.

The Beginner Experience

Infrastructure improvements such as a base area carpet conveyer lift would provide a 'best-in-class' beginner experience, regardless of weather, to attract and maintain the family market.

Snowmaking

A snowmaking system would enable Cairngorm to ensure snow coverage on a significant portion of the runs, up to 30 hectares of terrain, making Cairngorm a more enticing to destination skiers.

Guest Services

Expanding and remodelling the Ptarmigan, reopening the Sheiling, and improving the base area facilities would improve operations, capacity, experience, and revenues across the resort.

The Opportunity – Summer

The current summer opportunities are limited. Many visitors seek experiences beyond the funicular, and the base area environment does not encourage guests to explore. The upgrade concept expands on the current offering and is focused on broadening the resort's summertime appeal.

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A mountain coaster and zip line tour are planned for Phase One to provide outdoor recreation experiences to a wide range of tourists and interests, while generating revenues. The funicular is unique to Cairngorm and the experience should continue to be enhanced to increase visitors and revenues.

Mountain biking, in Phase Two, is consistent with the 'outdoor adventure' orientation of the Aviemore area visitors/residents and a lift-served system would be accessible to many visitors.

The base area is currently not attractive and needs enhancements which would in turn increase the length of stay, the opportunity for additional food & beverage (F&B) revenue and participation in the other activities.

THE FINANCIALS

The total estimated capital costs of upgrading summer and winter facilities as described above is around £27m. It is suggested this investment is made in a phased approach over the five to ten-year period.

Skier Visits

The proposed improvements to the lift infrastructure and addition of a snowmaking system are intended to increase winter visits to 150,000 consistently, with higher numbers during a peak year. It is assumed that the increase in visits after the initial improvements will, over time, increase Cairngorm's market share.

Phased Investment

It is recommended that investment in the resort is phased. Total capital cost for Phase One would be around £16.5m, for a chairlift, mountain coaster, zipline tour, snowmaking and environmental works. Phase Two would be a further £10.5m, including an additional chairlift, snowmaking and mountain biking.

A STRATEGY FOR THE FUTURE

As one of the largest and most challenging ski areas in Scotland—which sits in the centre of one of the busiest National Parks and adventure tourism destinations in the UK—Cairngorm Mountain has the potential to be a highly successful ski area. However, numerous operational and financial challenges have been experienced in recent years.

The existing mountain infrastructure at Cairngorm offers a skiing experience that is not competitive in today's marketplace: the lifts are slow and uncomfortable to ride, with a low out-of-base capacity that often results in long queues; the terrain, like other ski resorts, is good but has unreliable snow cover, and the guest services are often over-crowded; beginners and families are not adequately catered for and ski area offerings don't align with the market and guest expectations.

Winter operations are also inefficient and require more staff time and financial resources to operate than they should. The lift network is particularly inefficient and there are significant issues with the ski area's out-of-base capacity, especially when considering the non-skier demand on the funicular.

In addition, Cairngorm routinely experiences wind and adverse weather events that force the closure of the access road, funicular, lifts, and terrain, further taxing operational demands and diminishing the guest experience.

The success of winter sports at Cairngorm is on the resort being sustainable all year round. Summer offerings are however quite limited. While the funicular ride and views from the Ptarmigan are spectacular, many visitors to Cairngorm are seeking more. This is compounded by the base area environment, which does not encourage guests to linger or explore.

All the above factors have resulted in the need for this study. A complete and comprehensive analysis of all facilities and operations at Cairngorm Mountain has demonstrated the immense value this critical community asset represents. It has also uncovered significant opportunities for improvement and enhancement that respond to current challenges, build upon the strengths of the mountain, differentiate it from other resorts, and capitalise upon opportunities within Cairngorm's rapidly-changing market. Careful consideration of each potential enhancement has vetted the feasibility of each enhancement and identified the strategic investments with the greatest potential for positive community impact. Over time, these enhancements will work together to ensure a long-term sustainable future for the ski area.

The upgrade concept for Cairngorm addresses all aspects of the current condition, focusing on the investments with the greatest potential impact and creating a more desirable—and competitive—experience for visitors. This will facilitate increased revenues, through the increase in visits and the ability to increase revenue per visit. Enhancements are also focused on creating a more efficient, and thus economically viable operation. This is primarily accomplished through the upgrading of the lift infrastructure from surface to aerial lift technology and the installation of a snowmaking system.

Collectively these upgrades reduce operational expenditures while also significantly improving the on-mountain experience. Summer enhancements are intended to appeal to a broader audience by providing 'something for everyone' as well as complementing the existing recreational offering of the wider Aviemore/Glenmore area. As with the winter concept, these upgrades significantly improve the Cairngorm summer experience as well as the revenue-generating opportunities of the summer business.

All the proposed upgrades at Cairngorm are designed to work together as part of a new and sustainable business model for the ski area with a focus on measured, responsible investments that will lead to balanced growth in the operation. Infrastructure improvements are expected to drive additional skier visits. The installation of a snowmaking system will create a more consistent snowpack and improve the quality of the skiing and riding surfaces. Reliable snow conditions, along with a modern aerial lift system to service the ski terrain will encourage skiers to plan trips to Cairngorm and visit more frequently throughout the season. Our projections estimate the upgrades will increase annual winter visits to 150,000 consistently, with higher numbers during a peak year. Similarly, summer upgrades are expected to drive additional visits to Cairngorm on the order of another 150,000+ visits. This increase in visits, as well as an anticipated increase in average visitor spending, is expected to increase overall revenues. At the same time, labour and other operating expenses are expected to decrease as a result of the new lift scheme and other improvements.

While current conditions at Cairngorm are challenging, there is immense unlocked potential in the mountain which can be unleashed with targeted, strategic investments. With this review in hand, and subject to the availability of funding, Cairngorm is poised to capitalise on this potential to propel it into the next stage of life at the ski area.

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INTRODUCTION

Highlands and Islands Enterprise (HIE) is the Scottish Government's economic and community development agency for the Highlands and Islands of Scotland. HIE works with private businesses and public and voluntary sector organisations to build sustainable economic growth across a diverse and beautiful region, from Shetland to Argyll and from the Outer Hebrides to Moray. HIE is committed to developing the Highlands and Islands as a competitive region which is home to strong communities, successful, high growth businesses and excellent quality of life.

Since the early 1960s the village of Aviemore, sitting on the main A9 arterial highway and Inverness to Edinburgh/Glasgow railway, has grown as a tourism destination. This is largely a result of the development of Cairngorm Mountain (Cairngorm) as a winter ski resort. The perceived 'mountain lifestyle' has attracted people to the area which is also home to a disproportionate number of Olympic athletes in relation to the area's population.

HIE owns Cairngorm Estate, located about 15 km south-east of Aviemore, in the Scottish Highlands. This extends to some 1,418 hectares/3,500 acres. Some 598 hectare/1,477 acres of the estate is leased by HIE to Cairngorm Mountain Ltd (CML) as a year-round visitor attraction.

HIE has contracted with SE Group to undertake a **comprehensive, independent review** of the uplift facilities at Cairngorm Mountain ski resort to determine the best way forward for potential reinvestment. The Cairngorm Ski Area Feasibility Assessment & Strategic Plan (Strategic Plan) will significantly contribute to the preparation of a five- to ten-year long-term strategy for the ski area (is not part of this review) and will build on the Glenmore and Cairngorm Strategy.

The Process

The Cairngorm Strategic Plan was initiated in January 2018 and will be completed by September 2018. A robust, multi-faceted analysis looked at all aspects of the current and historical Cairngorm operations in order to make informed recommendations for the future. The strategic planning process included:

- Review of background material on the history of the operation, past studies, operational strategy, stakeholder issues and ideas, regulatory context
- Review of the winter marketplace to understand the depth and opportunity for increased skier visits
- Review of the summer marketplace to understand the existing complexity and how Cairngorm may increase visits/length of visit/visitor spend at the area, and how it may complement and increase the attractiveness and thus drive more visits to the broader destination of Aviemore/Glenmore/Cairngorms National Park
- Review of the current site, infrastructure and operation to evaluate current conditions and operational sustainability, and determine opportunities for increased efficiencies and revenue generation
- A week on site during the winter season to see all aspects of the operation, and to interview all statutory consultees and stakeholder groups to fully understand the multiple perspectives on the existing operation and future opportunities at Cairngorm

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- Incorporation of the findings of this in-depth analysis into concepts for winter and summer upgrading of the facility
- Development of a financial model to determine a phased approach to concept implementation that yields the greatest opportunity for 1) improving the visitor experience, 2) increasing efficiency of operations, 3) increasing winter and summer visits, 4) driving revenue generation, and 5) achieving a maximum return on investment.

The findings and recommendations of this Strategic Plan will inform the preparation of a five- to ten-year long-term strategy for Cairngorm, which in turn will build upon the Glenmore and Cairngorm Strategy.

Community Participation

An important part of the process is consultation with all of Cairngorm's stakeholders—ownership and operations, steering committee, local interest groups and statutory consultees—regarding Cairngorm's long-term recreation and infrastructure plans. This included:

Steering Committee

- HIE – Highlands & Islands Enterprise. (Client and owner)
- CML – Cairngorm Mountain Ltd. (Ski area operator)
- CMT – Cairngorm Mountain Trust (Charitable organisation – past operator)

Statutory Consultees

- CNPA – Cairngorms National Park Authority
- THC – The Highlands Council
- SNH – Scottish Natural Heritage
- SEPA – Scottish Environment Protection Agency

Stakeholders

- CBP – Cairngorm Business Partnership
- ABA – Aviemore Business Association
- AGCT – Aviemore and Glenmore Community Trust
- VS – VisitScotland
- SSC – Scottish Ski Club
- CSC – Cairngorm Ski Club
- BASI – British Association of Snowsport Instructors
- GL – Glenmore Lodge (declined to participate)
- SS – SnowsportScotland
- NEMT – North-East Mountain Trust (declined to participate)
- MS – Mountaineering Scotland (declined to participate)

This consultation involved initial interviews with interested parties during the February 2018 site visit, and subsequent review of initial findings with Statutory Consultees during the second visit in July 2018. In addition, several community members shared their thoughts with the consulting team via email.

About Our Consultant Team

SE Group has assembled a team for the Cairngorm project that provides the diverse expertise needed to address all components of the project, including market research (lead by Fourth Street), master planning, mountain planning, multi-season recreation planning, business and operations strategy.

SE Group – With over 60 years of experience working with ski areas and mountain resorts, SE Group brings broad experience in helping ski areas realise opportunities for sustainable multi-season operations, while maintaining the qualities and character of the area that are important to the community.

Resort planning and design is the cornerstone of SE Group. This unique legacy dates back to 1958 when the sport and lifestyle of alpine skiing emerged as a growing business opportunity. As the first consulting firm to focus on the planning, design and operation of ski areas, the company evolved into an internationally recognised innovator and leader in the mountain resort industry. SE Group also has extensive experience in planning, design and implementation of community and outdoor recreation projects for municipal, county, regional and non-profit clients, focusing on locations that are influenced by a strong natural resource base, visitors and tourism, and seek to promote access to the outdoors.

SE Group’s specialists have worked on thousands of projects throughout North America, South America, Europe, and Asia. These projects have provided a worldly perspective on what it takes to create enjoyable, successful, and sustainable four-season mountain resorts and communities in a multitude of physical, environmental, cultural, and market settings. As trusted advisors to clients, the SE Group team utilises its expertise to develop business strategies and create contemporary, innovative and lasting designs.

Appendix 1 provides additional information on SE Group.

Fourth Street – A management consultancy practice specialising in business planning across the leisure, tourism and cultural sectors, at the core of Fourth Street’s service is a keen understanding of the market, the drivers of a competent business model, and the key ingredients that allow organisations and places to thrive.

Fourth Street works with owners, operators, developers, funders and stakeholders across all stages of a project, from the creation of new concepts and visions, through options appraisal, feasibility assessment, strategy development and delivery to operations. They have a breadth and depth of experience that few can match, covering a range of sectors including Tourism, Resorts, Sport and Leisure.

From this broad experience, they have developed a clear understanding of why some places become great destinations and others don’t. They take pride in helping clients to realise their vision for new projects and have a track record that demonstrates an ability to translate vision and strategy into clear and deliverable recommendations. Their advice is always clear, candid and informed by robust analysis and rigorous business planning.

Fourth Street’s portfolio of experience covers a broad and diverse range of projects. For all projects there are several consistent features including the need to demonstrate and evidence market need; forming part of an overarching strategy and business case; research which draws on the latest insight,

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trends and best practice; and visitor footfall and/or participation levels being one of the key drivers and determinants of the success of the organisation and destination. This diversity of experience enables Fourth Street to talk with authority on almost all issues that are likely to emerge in supporting the Cairngorm uplift review and to quote, from personal experience, examples to illustrate what works and, critically, what does not.

Acknowledgements

The Cairngorm Review is the result of a collaboration between our planning group (SE Group, Fourth Street), the HIE and CML management teams, and the broader Cairngorm community. SE Group would like to thank all team members for their contributions and collaborative spirit throughout the planning process.

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PART ONE: ANALYSIS. *THE COMPLEXITY OF THE EXISTING CONDITION*

The terms of engagement for this review exercise are twofold: 1) undertake a comprehensive review of the facilities at Cairngorm, and 2) opine on opportunities for future reinvestment. The phrasing of the first task is telling, and the use of descriptor ‘comprehensive’ intentional; to fully understand the current state of the Cairngorm facilities and operations requires a much deeper dive into the complexity of the larger context in which Cairngorm exists.

Part One of this review delves into the complexity of this existing condition, exploring:

- The competitive marketplace
- Industry trends
- Ownership and management
- The natural environment
- Facilities and operations
- Planning and regulation

Key takeaways from this analysis are highlighted in bold italics, calling attention to the pieces of this interconnected puzzle that provide clarity and insight to the current situation, and inspiration for future opportunities related to the future direction of Cairngorm.

I. THE MARKETPLACE

As a component of the Cairngorm review, a market assessment was undertaken to define industry trends, regional and local market demographic profiles, and to identify the existing regional amenities and attractions in the area surrounding Cairngorm. The assessment provides a framework for assessing the potential opportunities and assisting in the strategic decision making regarding the future of Cairngorm as a four-season recreation area. The complete Cairngorm Mountain Uplift Review: Market Analysis (April 2018, Fourth Street) document may be found in Appendix 2 of this document. Below is a summary of the relevant assessment findings.

A. The Winter Marketplace

Cairngorm’s update and expansion of its infrastructure and facilities must be informed by the winter marketplace it operates within. The market indicates what is realistic in terms of the annual visits Cairngorm may achieve, who those potential visitors are, and what Cairngorm must do to attract them. With the market in mind, Cairngorm’s improvements will be designed with the appropriate capacity and facilities given its number and type of visitors, along with a unique experience to differentiate it in the competitive market.

1. Ski Industry Trends

As Cairngorm, and the broader Aviemore/Glenmore area consider future opportunities, it is worth planning in the context of resort trends and other existing resort destinations, in terms of what needs to be delivered and what it means to be a resort destination.

Consumers across all sectors are increasingly seeking ‘experiences’ with associated higher expectations of the broader overall offer. The implications for ski resorts being that in addition to a good snowsports experience other factors are becoming increasingly important. This is driving up expectations of the overall experience in several areas, and many resorts actively responding and adjusting their offer to meet consumers growing needs and expectations.

Skier Visits

Given the competitiveness of the marketplace, Cairngorm must craft a unique market position that builds upon the strengths of the mountain, differentiates it from other resorts, and responds to the opportunities within the market. It must also expand its offering to appeal to a broader audience, which can ultimately expand its revenue stream.

As reported by the 2018 International Report on Snow & Mountain Tourism, skier visits worldwide have been stable at approximately 400 million for several years. Over this period mature markets such as the Alps and the U.S. have experienced reduced growth, while other markets such as China are emerging. In the absence of market growth, visits at individual destinations is maintained or grown by increasing the percentage of market share. In this highly competitive market product differentiation and unique experiences are key to market capture.

According to the Ski Club of Great Britain 2017 Consumer Research Report, the most important factors—the big five—in British ski destination choices are: 1) guaranteed snow; 2) size of ski area; 3) how busy the slopes are; 4) price; and 5) quality of accommodation. Cairngorm is competitive on these factors within Scotland, but given the increased accessibility to resorts in Europe, Cairngorm operates in a highly competitive marketplace.

Beginner Conversion

There are two important opportunities at Cairngorm around beginners. First, attracting more local, day use beginners from the immediate area. Cairngorm should conduct increased, intentional community outreach to bring school kids to the mountain and redouble efforts to streamline and improve school programs and partnerships. Second, attracting more destination beginners by catering to second generation British skiers and marketing the resort as a destination for British families to learn to ski. In both cases, the mountain must deliver a high-quality beginner experience that reflects industry best practices.

Given the implication on future potential and growth, retaining beginners and converting them into long-term participants is a front-burner topic in the ski industry. Ski areas have been running school children and teens through learn to snowsports programs for decades, and recent beginner conversion studies have shown that kids who have been introduced to snowsports are more likely to continue if there are more programs for them, or if their parents and family ski or ride too.

First-time and beginner downhill snowsports participants are frequently day visitors, as they are unlikely to invest a considerable amount of time and money in a destination visit for a sport that they do not yet feel competent in. The exception to this is destination groups/families where there are beginners accompanying more advanced skiers. In both cases, catering to first time and beginner participants is critical to the survival of the sport.

The 2017 Ski Club of Britain consumer research identified a high proportion of British skiers who ski as a family as well as with other families. Skiing as a social experience and whole family activity are key factors. The same report also identified that 48% seek flexibility in terms of length of stay and travel dates and this may be an area where skiing in Scotland, rather than abroad, may have its advantages for growing the domestic market.¹ There is also an anecdotal sense that while many Scottish skiers have shifted their trips abroad, there is a desire to teach their children to ski in Scotland.

Millennials

Understanding and attracting Millennials is essential but a demanding task for ski areas.

The National Ski Areas Association (NSAA) in the United States has recently undertaken a study of the Millennial generation (young adults aged 18 to 34 years old) to understand their downhill snowsports participation patterns, as Millennials will be the future of skiing and snowboarding.² When compared to all other age cohorts, the Millennial generation accounts for the largest number of snowsports participants. However, Millennial skiers and snowboarders on average ski less days per season than other age cohorts, with an average of only 4.9 days on the mountain in the 2014/15 season.

When asked to describe what they like most about downhill snowsports, the words most frequently mentioned by respondents include 'fun,' 'freedom,' 'friends,' and 'outside.' One aspect that sets Millennials apart from their older counterparts is their social inclinations, which was noted throughout the qualitative interviews. Many Millennial skiers and riders indicated that skiing is, to them, a social activity—they prefer to spend both day visits and overnight destination trips with friends and family. When asked what they dislike about skiing and snowboarding, Millennial snowsports participants were most likely to respond with words like 'cold,' 'cost,' and 'lift queues.' The cost of the sport is clearly a barrier for some Millennials. In fact, respondents were asked to talk about the reasons their friends cite for not skiing or snowboarding, and many mentioned 'money,' 'cost,' or the 'expensive' nature of the sport.

Resorts must take into consideration the relatively lower income of some Millennials and their financial limitations to boost participation from this age cohort. By contrast, more affluent Millennials are spending money on luxurious experiences that they feel are worth the time and investment. As they are less likely to have families and own homes, they typically have a considerable amount of dispensable income to put into experiences and products. Distinctive ski areas have an opportunity to bring in high income Millennial skiers and snowboarders who are seeking a unique experience.

¹ Ski Club of Great Britain, Consumer Research Report 2017 – Unique Analysis of the Snowsports Market

² NSAA Millennial Study, 2014/15

[Part One: Analysis. The Complexity of the Existing Condition]

Despite the identified limitations, 55% of Millennial skiers and snowboarders strongly agreed with the statement, 'I'm committed to skiing/snowboarding for life.' Interestingly, the percentage strongly agreeing with this statement declined somewhat with age (from younger Millennials to older Millennials) as well as with the presence of children. However, this paints a positive picture overall of Millennial participation in the downhill snowsports market.

Emphasis on Summer Activities

Cairngorm currently experiences similar visitor numbers in the summer and the winter, due to the significant summer business created by the funicular. The broader destination of Aviemore/Glenmore has much higher visits in the summer than winter. There is an opportunity for Cairngorm to expand its summer offering to capture more of this already existing audience, as well as increase the attraction of the area as a summer destination.

To generate year-round income and boost visits in all seasons, many ski resorts have recently been working hard on improving their summer offerings. Travel and accommodations are often more affordable for summer visitors than they are for winter visitors, and multi-season recreation offerings at resorts may be oriented to encompass a wider visitor market. Most resorts in the summer marketplace also offer special events that relate to recreation, food and beverage, health and wellness, music, arts and culture, and many other themes. As many resorts continue to expand and improve their summer offerings, it will likely be more difficult for resorts without multi-season opportunities to maintain sustainable operations and remain relevant in the resort marketplace.

Pass Partnerships

Cairngorm is a good candidate for a pass partnership, as the partnership would not only generate international awareness about Cairngorm but would also encourage potential destination visitors to experience the area. Pass partnerships also offer added appeal by associating a single resort with a variety of other ski areas, thus providing a marketing advantage by expanding the captive audience for the resort. The relative 'ruggedness and remoteness' of Cairngorm may be a positive asset if it were to be included on a pass partnership and marketed towards hardcore destination skiers seeking an authentic and new experience.

In recent years, reciprocal ski passes created by resort partners have become a popular option for downhill snowsports participants. These pass partnerships allow skiers and snowboarders to visit a variety of resorts nationally and internationally under one comprehensive pass with a one-time purchase.

Pass partnerships provide a unique opportunity for resorts to attract new skiers and snowboarders from various locations and expand their customer base. They encourage snowsports participants to visit off-the-beaten path destinations and appeal to skiers and snowboarders looking to cross destination ski areas off their bucket list.

Terrain Diversity

To provide the highest quality guest experience, Cairngorm should offer groomed runs of all ability levels, some level of each of the undeveloped terrain types, and terrain parks to accommodate these new and emerging trends within the ski industry. This would build upon Cairngorm's current market position among the Scottish ski areas and further differentiate the experience at Cairngorm from that at the indoor and artificial slopes.

Terrain variety is an increasingly important factor in evaluating the quality of the actual skiing and riding guest experience at a resort. Internationally, terrain variety is consistently ranked as one of the most important criteria in skiers' choice of a ski destination, typically behind only snow quality, and ahead of other considerations such as lifts, value, accessibility, and resort service, for example. This is a relatively recent industry trend, representing an evolution in guest tastes and expectations.

A primary goal of trail system design is to provide a wide variety of ski terrain. In terms of a resort's ability to retain guests at that resort, both for longer durations of visits and for repeat business, one of the more important factors has proven to be variation in terrain. This means having developed runs of all ability levels, some groomed on a regular basis and some not, mogul runs, bowl skiing, tree skiing, back country style skiing, and terrain parks and pipes.

A current trend in trail design is to increase the width of the developed trails. With wider runs, the terrain density decreases, and the market preference is increasingly for lower densities. With the advent of snowboards, shaped skis, and telemark skis, skiers and boarders take wider, carved turns. These wider turns take up more space than a traditional slalom-style parallel turn, which increases the required space per skier. Further, these advancements in ski technology have enhanced overall skiing ability, which means increased demand for intermediate and advanced terrain. The resulting need for expanded terrain is compounded by the lower acceptable densities of the higher-level terrain.

Terrain parks have become a vital part of most mountain resorts' operations and are now considered an essential mountain amenity. The presence of terrain parks at mountain resorts has changed various operational and design elements. The demand for grooming can increase, as terrain parks often require specialised or dedicated operators, grooming machines, and equipment (such as half-pipe cutting tools). Terrain parks typically require significant quantities of snow, either natural or man-made, often increasing snowmaking demand. Terrain parks can affect circulation on the mountain, as the parks are often popular destinations.

Current trends in park design are focused on quality and creating progression, so that less experienced riders have the means and ability to learn how to use the more difficult features. Beginner parks are typically located on wide trails and have features that are lower in height, softer, and rounder. The next step usually has small tabletops and more difficult rails. From there, parks progress up to offering huge jumps and technical rails.

Comprehensive Destination Amenities

A unique brand identity and experience is critical for Cairngorm to be relevant in the marketplace. Capitalising on the area's unique assets and expanding amenities would help to position Cairngorm strongly amongst the competition. Many visitors to Cairngorm are likely to be destination visitors, which means that the surrounding community of Aviemore/Glenmore would also need to contribute to this unique, branded experience. Lodging, dining, and non-skiing activity options need to adequately accommodate the needs of destination visitors.

Overnight visitors, instead of focusing solely on the skiing or boarding experience, are starting to look for a more comprehensive visit. They expect not only a good snowsports experience, but also high-quality lodging, food, and entertainment experiences.

Visitors are also looking for a more holistic and authentic mountain experience. Internationally there are hundreds of ski resorts for visitors to choose from—resorts must be creative to stand out in the competitive marketplace. Today, many ski resorts have developed their own unique brand, something that keeps them distinctive and allows visitors to differentiate them from other mountains.

Successful Year-Round Mountain Recreation Areas

The following factors are the primary components of successful ski areas and mountain resorts.

Mountain destinations can be successful on a variety of levels, and there is no single recipe for success. Not all successful ski areas are necessarily large destinations; small day areas can also be quite financially accomplished in different ways from the larger, more well-known resorts.

The following list briefly presents some of the most crucial factors that generally make a mountain resort a successful business enterprise.

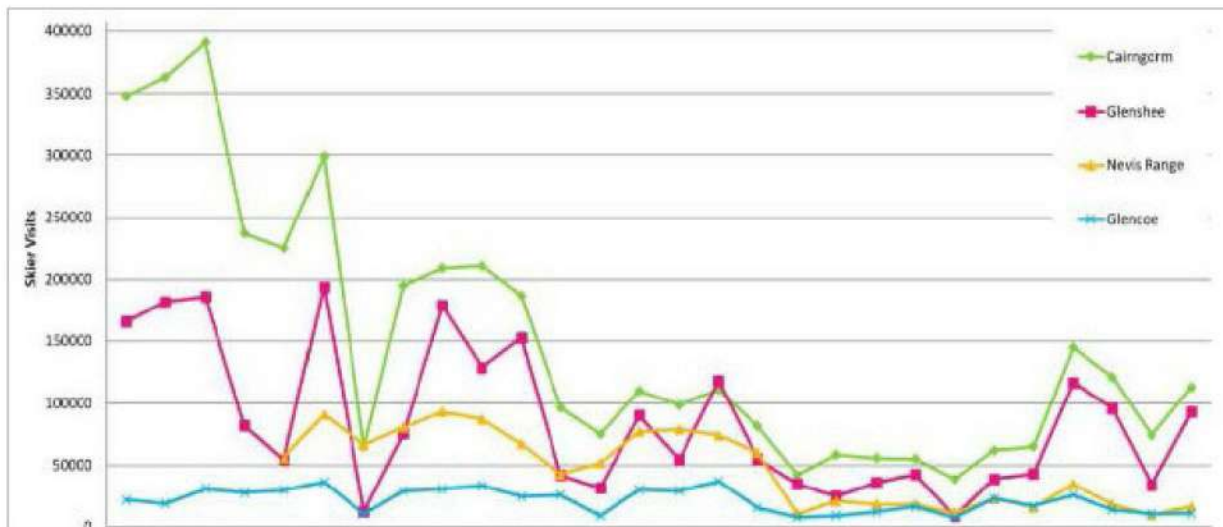
- ***Access to Customers***, either through proximity to a local population or an air transportation system to fly destination visitors to the area.
- ***Adequate Size and Complexion***, to keep customers engaged, either over the season (for a day area) or over a multi-day stay (for a destination area), with a variety of options and to keep them coming back and to create a 'critical mass' of activity and animation.
- ***Diversity of Bed Base***, to provide places for destination visitors to sleep (and to potentially diversify ski area revenues if the company owns a lodge or two).
- ***Diversity of Revenue Streams***, both within a given season and across seasons. A diversity of multi-season activities, programs and events is critical to be attractive and competitive in the marketplace.
- ***Access to Capital***, to fund continual ski area improvements.
- ***Marketing Budget and Strategy***, to ensure new customers visit and existing customers return.
- ***Customer Service***, providing a high-level of service is critical to delivering a great experience for guests.
- ***Efficient Management***, which drives departmental revenues while monitoring costs, thus delivering high margins.

2. Scottish Skier Visits

With declining skier visits across Scottish ski resorts, Cairngorm must provide a high-quality guest experience and create a unique identity based on its location and current trends in skiing. Cairngorm should pursue opportunities to attract ‘niche’ destination skiers from outside the country to help bolster visits. Building upon Cairngorm’s reputation for harsh, rugged alpine conditions, the resort may capture international skiers who are ‘collecting’ unique skier experiences. These offerings may also align with accommodating emerging trends in the industry for which the border region is already known, such as ski-touring and mountaineering. This approach would build off the oft shared sentiment ‘If you can ski in Scotland, you can ski anywhere!’ and the more advanced skier offering would complement improvements to the whole family experience, offering something for everyone.

Scotland’s five ski resorts have shared similar mixed fortunes with overall skier visits, having declined significantly over the last twenty years from a peak in the 1980s (c. 600,000 total visits).

Figure 1. Scottish Snow Sports Market – Skier Visits Volume



Source: HIE Historical Information

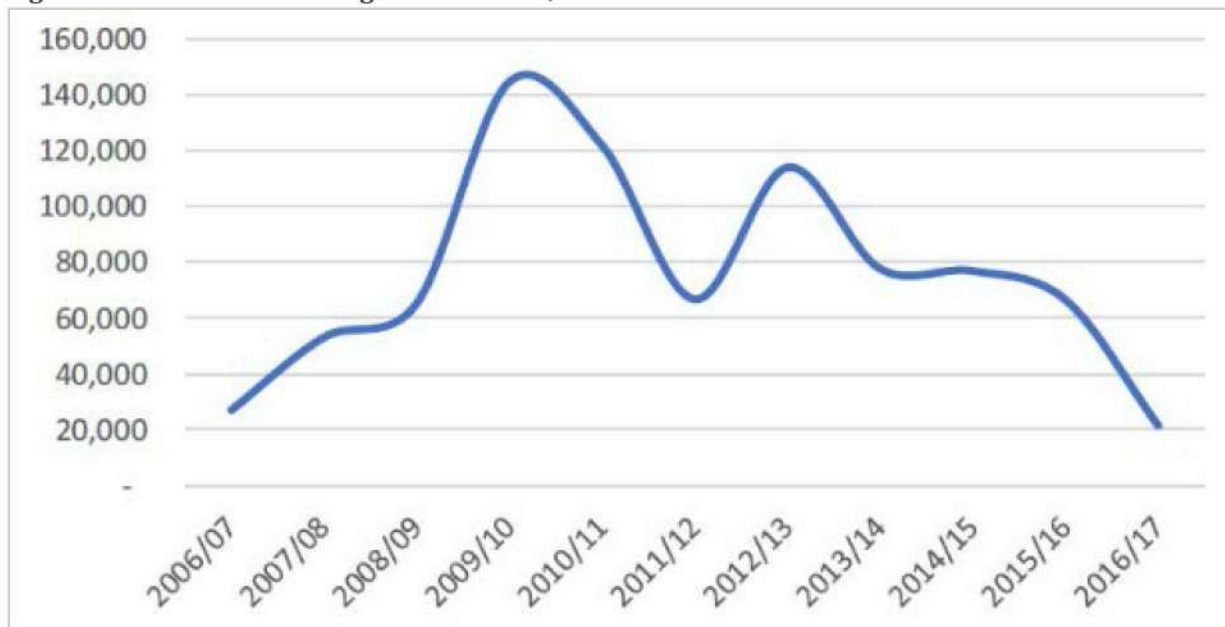
Scotland, however, is not alone in experiencing declining numbers of ski visits. While the 2018 report indicates a slight increase, the 2017 International Report on Snow & Mountain Tourism cites a ‘flattening market’ in regard to the Western ski market more broadly and considers that while populations have increased, skier visits have not. It suggests that ‘besides long-term weather and snow conditions, there are a number of other factors. The evolution of western demographics is a major issue, as well as increased worldwide competition in holiday and leisure activities, the improvement of retention rates and updated ski learning solutions.’ The report identifies a clear need for action suggesting that the ski industry needs to do more to improve the customer experience.

3. Cairngorm Skier and Winter Visits

Annual skier visits have been highly variable at Cairngorm in recent years. Without snowmaking, Cairngorm cannot provide a consistent, reliable snowpack (snow lie)—low snow years correspond to very low skier visits. As a result, and understandably, destination visitors are hesitant to plan trips to Cairngorm. However, peak skier visits, nearly 150,000 in 2009/10, are achieved when the snow is good, and represent a realistic goal for Cairngorm to seek as the norm rather than the exception.

Annual skier visits at Cairngorm Mountain have varied significantly over the last ten years, rising from 23,000 in 2006/07 to a peak of 144,000 in 2009/10 and falling back to 21,000 in 2016/17. Performance is extremely weather dependent illustrated by the low ski numbers last season which was a poor season in terms of snowfall.

Figure 2. Skier Visits to Cairngorm Mountain, 2006 to 2017



Source: Historic Cairngorm Mountain data

Skier numbers over the last couple of seasons demonstrate the current instability of the operation and weather dependence of operating the ski resort at Cairngorm. Even when fully operational, the weather can change quickly and the wind is often strong. These are challenging conditions both for those operating the mountain and those skiing.

Meanwhile the funicular appears to attract more consistent visitor numbers and to be performing as an alternative when there is no opportunity to ski. Observations and anecdotal feedback identified difficulties with catering to these two very differing consumer groups over the winter season; skiers and non-skiers. Skiers just want to 'get up the mountain and ski,' while non-skiers seek a more relaxed, slower paced, leisure experience—the current experience for the non-skier at peak times is uncomfortable.

4. Ski Clubs

Ski club members that call Cairngorm home are a growing group of valuable 'loyalists' and advocates. They are passionate about the sport and their home mountain Cairngorm!

There are around 37 active Ski Clubs in Scotland with a collective membership of approximately 5,000. Two clubs have a presence at Cairngorm. Cairngorm Ski Club is a local club focusing on actively growing its membership. With around 200 members, they are targeting a tentative 10% annual growth. Of the 200 members, around 120 to 130 are children and they are actively building relationships with local schools. The Scottish Ski Club, which also has a hut on Cairngorm Mountain, has around 1,200 members from all over Scotland, with around 200 to 300 (licenced) racers, the balance being recreational skiers.

5. The Competition

Scottish Ski Resorts

As one of the largest ski areas in the country and located in a region that is rich in adventure sport offerings, Cairngorm, as part of the larger destination of Aviemore/Glenmore, is well positioned to be a market leader in Scottish mountain recreation.

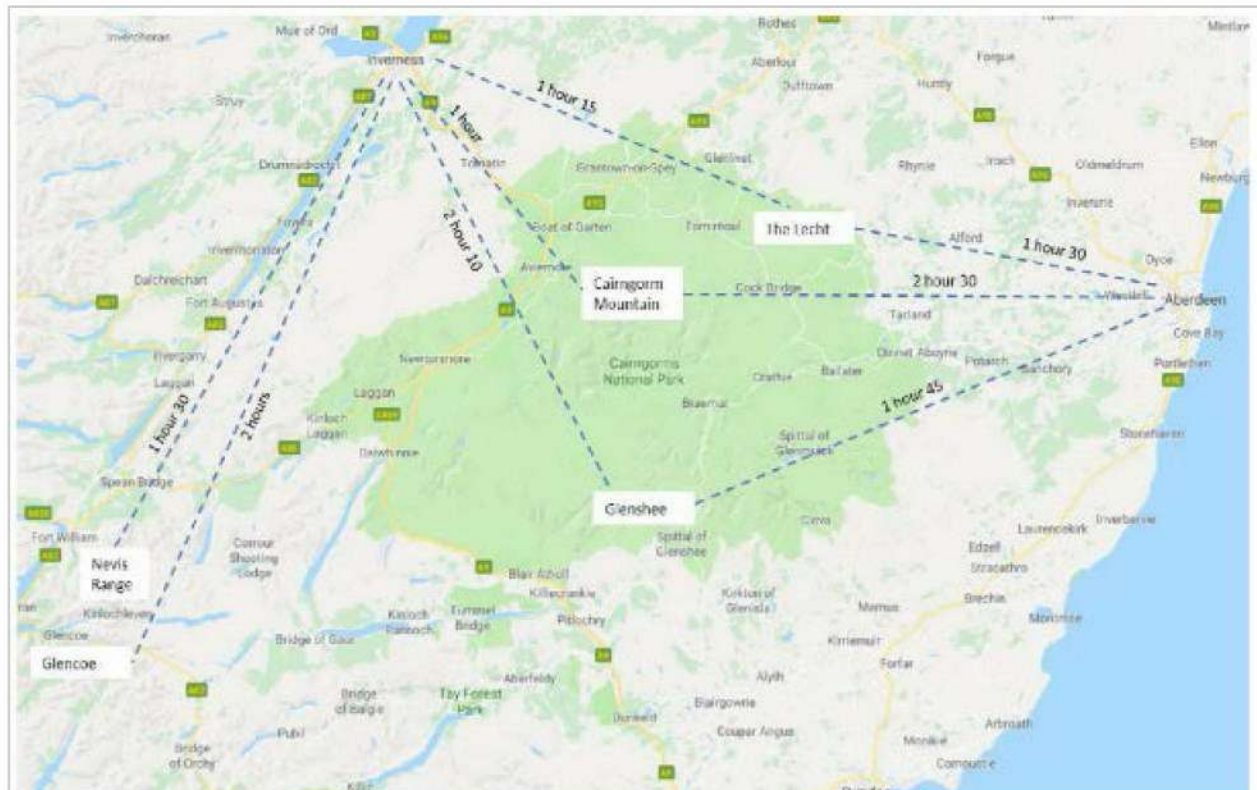
Cairngorm Mountain is one of five Scottish ski areas. Cairngorm achieves the highest number of visits of the five resorts with an even split of snow sports to non-snow sports visits. Of the five ski resorts Cairngorm is one of the largest with 32 runs and 11 lifts and a vertical drop of over 1,800 feet. Cairngorm is also considered to be one of the best known of the Scottish resorts. The funicular railway is a unique feature and drives the non-snow sports visits. Other than this the resort has not diversified into other activities.

The other four resorts include:

1. ***Glenshee*** is the largest of the Scottish ski resorts and offers extensive skiing over four mountains. The offer is focused on winter snowsports, it is also located in the Cairngorms National Park area, towards the south close to Dundee and Perth. Like Cairngorm it has not diversified into other activities, and non-snowsports visits are low.
2. ***The Lecht*** is also located within the Cairngorms National Park area and the smallest of the five—it promotes itself as a 'fun' ski area. It is considered an especially good resort for beginners and intermediates and offers a range of outdoor activities both summer and winter. The Lecht has recently hosted a popular Winter Games event and appears to be successfully targeting a family audience. The Lecht is also cited as having easier access from the car park and an overall easier experience; however, there can be access issues with the A939, described as 'infamous' for becoming blocked in winter.
3. ***Nevis Range*** is located close to Glencoe and only a couple of hours from Glasgow. It has 'Britain's only mountain gondola' taking visitors from the base station to the bottom of the slopes, it is considered a visitor attraction. Nevis Range offers a range of skiing from beginner slopes to advanced off-piste. It has also diversified its summer offer significantly with downhill mountain biking, tree adventure aerial obstacle course, Zoom Trax tubing slide, which is free to use and located outside the gondola top station. It is an internationally acclaimed venue for mountain biking hosting the UCI Mountain Bike World Cup.

4. **Glencoe** is the oldest Scottish ski centre and the most southern. It offers skiing for beginners as well as experts with the longest and steepest runs in Scotland. The resort offers free sledding on a 75-metre slope close to the café. Summer activities include mountain biking and tubing. Glencoe also offers on-site accommodation with micro lodges and camping.

Figure 3. Scotland's Ski Resorts and Drivetimes



Source: Drivetimes from the AA Route Planner

Across the five resorts there are variations in offer, pricing and facilities with the average cost of a day pass around £30. Cairngorm Mountain day pass is the highest at £36.

Three of the ski resorts are within the Cairngorms National Park. Despite the slightly differing locations of the resorts all are a 2- to 3-hour drive from the major cities (and populations) of Glasgow and Edinburgh.

Glencoe the most southern of the five is still approximately a 2-hour drive from Glasgow. Cairngorm Mountain is the closest to Inverness Airport, with low cost flights from London Gatwick and a flight time of under two hours it is potentially easily accessible from London and the south east, it is also easily accessible by train via the station at Aviemore.

Indoor and Artificial Slopes

Indoor and artificial slopes are very popular in urban areas in the UK. Although an artificial slope has been suggested for Cairngorm, the resort should set itself apart with its natural setting and terrain.

In addition to the ski resorts, Snow Factor in Braehead (Glasgow) houses Scotland's only real indoor snow slope. Facilities include a teaching/instruction slope, a main slope (200m long), four ski lifts, an ice climbing wall, sledging, Bavarian-themed restaurant and ice bar. Snow Factor boasts that 500,000 people having learned to ski there. It is located a short drive from Glasgow City Centre. There are three other indoor real snow slopes across the UK: the Chill Factor in Manchester, the Snow Centre in Hemel Hempstead and the original Snowdome at Tamworth.

These facilities, being located nearer to higher density urban populations, provide a more 'accessible' skiing experience than the mountain destinations and are also available year-round. The indoor facilities have the significant benefit of being able to deliver a consistent real snow experience, whatever the weather, in direct contrast to the challenges faced at the Scottish resorts. However, the size and capacity of the slopes is a limiting factor for those of an intermediate or advanced ability.

There is also a wide range of dry slope facilities across Scotland and the UK of varying sizes. The 2017 International Report on Snow and Mountain Tourism puts the current number at around 70, having fallen markedly from around 200 in the 1980s, citing reasons for the reduction including the growth of larger regional dry slopes and introduction of real snow indoor slopes along with cuts to public funding. However, this decline in numbers from the 1980s also mirrors the decline in skier visits within the UK and indicates a preference for real snow experiences. There are ten artificial ski slopes in Scotland and several other smaller private slopes typically linked to larger education, training or hospitality offers.

In the immediate Aviemore area there are small dry slope facilities at Glenmore Lodge and dry slopes available at both Outdoor Discovery centres at the Hilton Coylumbridge and MacDonald Aviemore Centre. At Glenmore Lodge and Outdoor Discovery, the dry slope is just one of a wide range of indoor and outdoor activities on offer with ski lessons and equipment hire available alongside the dry slope offer. The Hilton Coylumbridge promotes itself as the 'closest hotel to the Cairngorm slopes' and as a place for 'family skiing.'

Overall available dry slope facilities in Scotland vary from smaller 60m slopes to 120m, with larger centres offering a variety of facilities from standard lessons to children's parties and snow tubing. Most facilities are located close to population centres and are a significant distance from Cairngorm. The two nearest (in addition to Glenmore Lodge and Hilton discussed above) are small slopes teaching skiing alongside a broader outdoor offer (Loch Insh Outdoor Centre and Lagganlia Centre for Outdoor Learning).

There is currently a proposal for developing a dry slope at Cairngorm. There are several considerations that suggest this may not be the best fit:

- A dry slope may diminish the very qualities that bring visitors up to the ski area, in both the summer and winter. People come to Cairngorm Mountain to take in the incredible views and to experience a real alpine environment. The alpine experience at the ski area is unique even within the Aviemore area, which is why many regional visitors take the trip up the access road to simply park in the base area and experience the scenic beauty of their surroundings. Developing

dry slopes may diminish the natural beauty of the area and does not take advantage of what makes Cairngorm's location unique.

- Dry slopes can and have been developed all over Scotland and can be enjoyed much closer to home with virtually the same experience that may be offered at Cairngorm. Destination skiers come to Cairngorm to ski on a real snow surface, not an artificial surface. The development of new activities should focus on improvements you wouldn't or couldn't do in other areas.
- While dry slopes could be utilised in the summer, there is a question as to the demand for this experience at Cairngorm relative to other offerings. This offering, even as a beginner dry slope, may limit the summer audience more than some other, more broadly accessible activities. Additionally, summer visitors are very different than winter visitors—they are better conceptualised as National Park Visitors and adventure tourists rather than skiers (see *The Summer Marketplace* discussion). They are looking for summer mountain activities, not winter activities.
- A primary driver for an artificial slope proposal at Cairngorm is the unreliability of the beginner experience in the lower mountain/base area in the winter. This can likely be better addressed with strategic snowmaking improvements, which will allow Cairngorm to capitalise on really sets it apart—real skiing on a real surface in a real alpine environment in Scotland!

6. Athlete Development

As one of the largest and most challenging ski areas in Scotland, Cairngorm could be a regular 'on-snow' training venue for snowsports athletes. Connectivity between an indoor training facility and Cairngorm through programs and partnerships would be necessary to providing the full spectrum of training venues for developing snowsports athletes. However, it may not be practical business-wise to place such a facility close to Cairngorm.

Snowsports Scotland's professional athlete development program is now structured around 40% off-snow and 60% on-snow activities (of which 50% of the on-snow activities are reduced risk). Increasingly, indoor facilities for acrobatics, gymnastics, etc. are playing a vital role in the athlete pathway, with opportunities being pursued to develop a national centre of excellence for snowsports with references to Woodward in the U.S. and links with Glenmore Lodge being explored.

Glenmore Lodge is a Sports Scotland National Training Centre with links to the Aviemore Community sports hub, which works alongside local partners to increase participation in sport generally. The aim of the community sport hub project is 'to bring together all the key partners involved in sport to create a joint approach to its development which will lead to an increase in participation levels locally. The project has a particular focus on supporting Community Sport Clubs to deliver quality sports and physical activity opportunities to the whole community.'

Woodward and other similar facilities aim to encourage participation in sports in general, not just the development of professional athletes and so helping to also deliver the wider associated health benefits of encouraging people to be more active. Woodward offer progression-based facilities for all levels with the emphasis on fun and participation from professional athletes to those with no experience. Facilities offered include a range from trampolines and gymnasiums to pump tracks and skate parks.

There are evident aspirations for development of enhanced sports training facilities in Scotland, and these would have benefits in terms of encouraging take up and participation in sports generally.

These modern facilities, with an emphasis on reduced risk and the availability of a wide variety of different activities, may be used by athletes from a variety of different disciplines. Such facilities also have a broad appeal and are, therefore, more likely to be used by a wider 'public' audience, helping to generate important revenue on which many of these facilities rely. Understanding the depth of this opportunity, both from a training and recreational perspective, will be key to developing a business plan and determining the best location for such a facility in Scotland.

B. The Summer Marketplace

1. The Highlands and Cairngorms National Park Visits

Cairngorms National Park brings a huge number of potential resort visitors to the area. While many National Park visitors do make it up to Cairngorm, visitor data indicates that many more could make the resort part of their trip. Some summer National Park visitors who make the trek up the access road never make it any further than the base area—they don't ride the funicular or engage in activities, but they want to be in this place. There is an opportunity for Cairngorm to expand its summer offering to appeal to a broader range of visitors who are seeking an alpine experience and activities in the National Park. Become a 'must do' venue in the region!

The Highlands of Scotland and the Cairngorms National Park are established visitor destinations. The Highlands was the third most visited area after Edinburgh and Glasgow, visited by 23% in the recent Scotland Visitor Survey.³

Visitors to the Highland Council area were in excess of 6 million in 2016, +5% on the previous year, of which just under 4 million were staying visitors and 2 million were day visitors.⁴ While this covers a broad geographic area the number of visitors demonstrates the extent of the appeal of this part of Scotland despite its very northern location. The area includes Aviemore but only part of the Cairngorms National Park.

These visitor numbers broken down by month indicate that while people visit all year round, visits during the spring and summer months are the highest, in particular July to September at around 2.7 million visitors and April to June at 1.9 million. The first quarter of the year (Jan-Mar) is the quietest with around 635,000 visitors, followed by the last quarter (Oct-Dec) with just under 950,000 visitors.⁵

Visits to the Cairngorms National Park area are also increasing with 1.8 million visitors in 2016. Total visitor numbers increased by 13% between 2009 and 2016.⁶ It is interesting to note that this rise in visits to the national park has been seen since the decline in skier visits to Scotland indicating that though they may not be skiing, an increasing number of people are visiting the national park area.

³ Scotland Visitor Survey 2015/16, VisitScotland, survey carried out May to September

⁴ STEAM Final Trend Report 2009–2016, Highland Council, Global Tourism Solutions (UK) Ltd Survey

⁵ Ibid.

⁶ Adventure Tourism in Scotland, Research Report August 2015 (HIE)

The Cairngorms National Park Tourism Action Plan notes that approximately three quarters of visitors to the national park coming from the UK and cites domestic markets as the priority for growth. Visits to the park area are predominantly domestic trips with 54% from Scotland, 25% elsewhere in the UK and 21% from overseas. Most visitors are in family groups of all ages. In comparison to Scotland overall, Cairngorms National Park attracts a higher proportion of visitors from Scotland and a lower proportion from the rest of the UK (although not confirmed, it has been suggested that this might be down to a higher proportion of 'rest of the UK' visitors concentrating their visits on Scotland's larger cities).⁷

2. Aviemore/Glenmore in Summer

Over the past few decades, Aviemore/Glenmore has evolved into a premiere family adventure destination within Scotland. It is a recognised hub for outdoor activities and pursuits built around the natural landscape. It has a long history and heritage. There is a strong local passion from those who have grown up, lived or worked in the area, often founded on a connection with Cairngorm Mountain itself—where many have learnt to ski.

Natural Landscape and Scenic Beauty

In the United Kingdom, natural beauty is one of the primary motivators for where to take a holiday. This preference presents a major opportunity for growth for Cairngorm Mountain, with its location in the Scottish Highlands, one of the most popular UK destinations. To capitalise on the relatively high proportion of visitors coming to the Cairngorms National Park for general sightseeing and enjoyment of the natural landscape, Cairngorm Mountain should provide a range of activities for visitors to engage with the incredible natural surroundings. Amenities must not only connect visitors with the natural world, but the design of such facilities must complement, and not detract from, the experience of the natural landscape. Capitalise on what makes Cairngorm unique—the mountain environment itself!

The stunning natural environment of the Cairngorms is the primary draw for the ski area, Aviemore/Glenmore, and the region. Beautiful scenery/countryside is cited as the primary reason for visiting the Cairngorms area by 35% in line with visits to Scotland as a whole (50%).⁸ Top activities undertaken while in the Cairngorms National Park area focus on sightseeing (56%) and low-level walking (44%). More active pursuits including skiing/winter sports were mentioned (13–14%), but even these are dependent upon the natural environment. When analysed by season, activities undertaken in winter see skiing/winter sports top at 66%, while general sightseeing / relaxing are top during the other seasons at 58%–64%.⁹

⁷ Cairngorm Visitor Survey 2014/15

⁸ Scotland Visitor Survey 2015/16, VisitScotland; Cairngorm Visitor Survey 2014/15

⁹ Cairngorm Visitor Survey 2014/15

Adventure Tourism

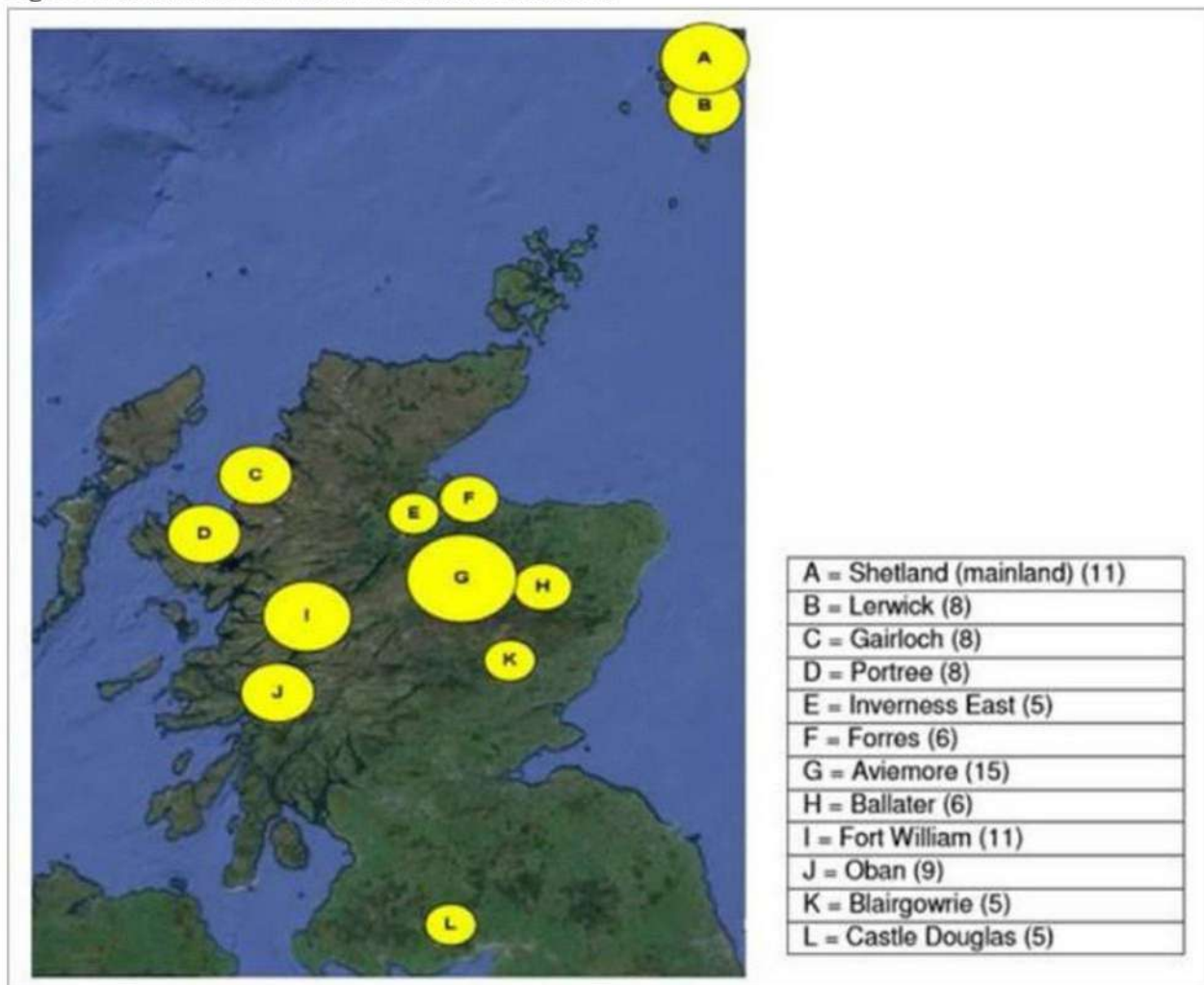
Cairngorm is located in Scotland's adventure tourism hotbed. With many people visiting the area to partake in these activities, Cairngorm should provide new recreation offerings at the mountain that complement, rather than compete, with current local offerings. Furthermore, Cairngorm can appeal to National Park visitors looking for outdoor recreation in controlled setting. With its existing infrastructure and amenities, Cairngorm is a perfect gateway to expose the National Park's 1.8 million visitors to the natural world and provide cutting edge forms of accessible outdoor recreation in a managed and safe environment. As opposed to recreating on your own elsewhere in the park, the gateway approach to activities at Cairngorm should provide a sense of adventure while eliminating the 'anxiety' that can frequently accompany the need for experience, gear and skill to enjoy recreation in the alpine environment.

The 2015 HIE Adventure Tourism in Scotland Report identifies that the highest concentrations of Adventure Tourism businesses in Scotland are in the Highlands and Islands region. Of the 350 adventure tourism businesses identified in Scotland more than a third are located in the Highland Council area— 115 businesses representing 35%.¹⁰ The future outlook is also positive with over two thirds of businesses surveyed (68%) looking to expand their turnover in the future. The report also identifies growth areas including 'soft adventure' with tour operators identifying future demand for activities such as walking, self-guided walks, one-week tours, road cycling / mountain biking, skills courses and packages.

The wider Aviemore/Glenmore area boasts a broad range of activities and attractions for families and the outdoor adventure market, from zip wires and quad bikes to water sports and adventure parks. Much of this activity takes place within the Glenmore corridor between Aviemore and Cairngorm. Glenmore Lodge offers a wide range of outdoor activities and has its own dry slope, the Watersports Centre at Loch Morlich offers a range of watersports activities and mountain biking along with the Reindeer Centre, Glenmore Visitor Centre, Glenmore Forest Park itself, TreeZone and Rothiemurchus Estate, and the Hilton Coylumbridge Resort. There is a wide range of activities and attractions available within the immediate area, just 10 to 15 minutes from the mountain! The 2015 Adventure Tourism Research Report maps clusters adventure tourism businesses in Scotland. As shown in the following figure, the largest cluster is in Aviemore.

¹⁰ 18 2015 HIE Adventure Tourism in Scotland Research Report

Figure 4. Clusters of Adventure Tourism Businesses



Source: Adventure Tourism in Scotland, Research Report August 2015 (HIE)

Retail businesses in the town include several ‘outdoor’ specialists as well as a wide range of food and beverage operators, reflecting Aviemore’s role as an outdoor activity destination in both summer and winter. Located within the Cairngorms National Park, Aviemore is one of the principal ‘gateways’ to the national park and potentially has a larger role to play as an orientation point and hub of activity.

A Resort Community

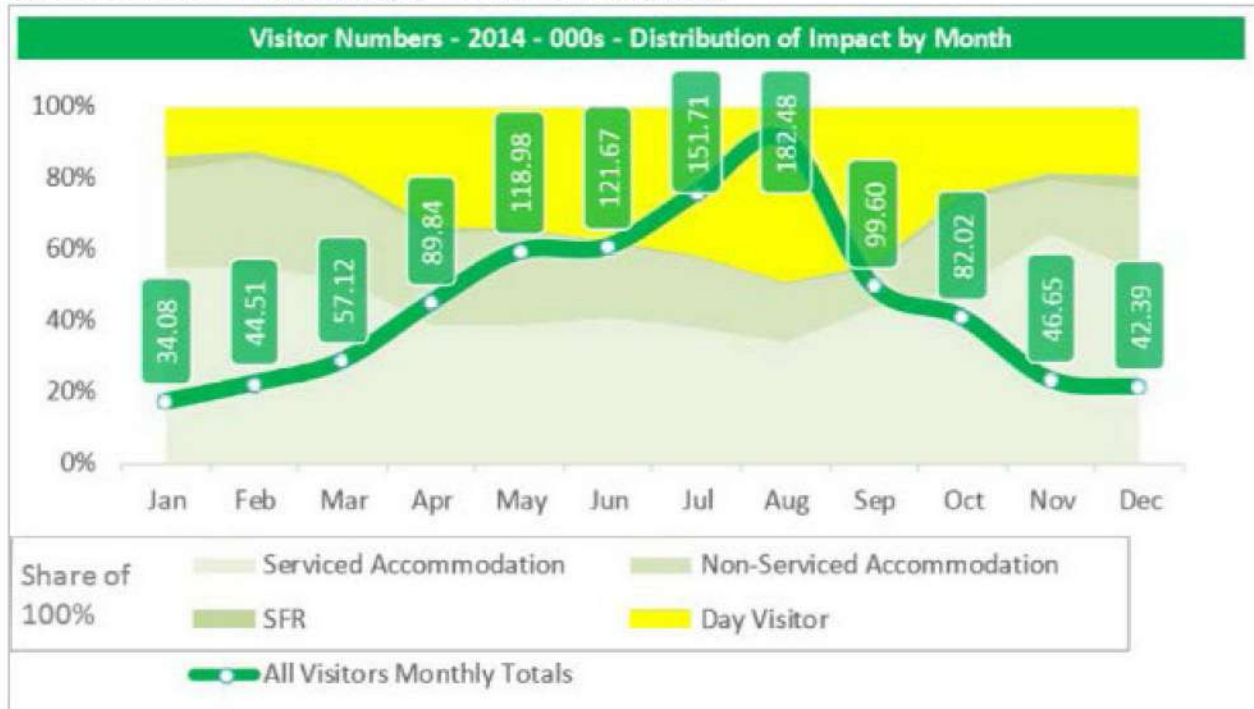
Cairngorm is located up the road from Aviemore/Glenmore, an established visitor destination with a long history. The destination was originally synonymous with skiing and winter sports—with a reputation for being rather rugged—but over time Aviemore has evolved to into a more family-oriented summer destination with a wide range of attractions and activities to offer. This has been further enhanced by its location within Cairngorms National Park, which has become an increasingly popular place to visit. Cairngorm has an opportunity to both support and draw from the success of Aviemore as a summer destination, as well as smooth out the seasonality and become a year-round family adventure destination.

Recent assessments of tourism in Aviemore describe a successful, popular tourist destination. The Cairngorms Business Partnership ‘Business Barometer’ monitors performance across businesses within the Cairngorms National Park and identifies strong performance from the Badenoch and Strathspey area of the park, which includes Aviemore. The 2016/17 report identifies higher increases in visitor numbers and revenue in Aviemore, compared to other areas, with accommodation providers in this area also reported to have higher occupancy than those elsewhere. Aviemore is also reported to have a higher than average second home market, though this is also considered to have contributed to a lack of affordable homes in the area and in turn has an impact on staffing and staff accommodation.

Visitor numbers to the Badenoch and Strathspey area total over 1 million per annum with a reported 2.8 million visitor days. The breakdown of visitors is biased towards staying visitors at around 700,000 and day visits at 370,000. Since 2009, the number of day visitors has declined, while the number of staying visitors has increased—up almost 23% from 570,000. Staying visitors account for around 2.4 million-day visits, this equates to an average stay of 3.5 days. Visitor numbers peak significantly during the summer months more than tripling, from 45,000 in February (2014) to 152,000 in July and 183,000 in August.¹¹

¹¹ STEAM Final Trend Report 2009–2014 – Badenoch and Strathspey (GTS [UK] Ltd). Note: Badenoch and Strathspey area includes Aviemore and extends to include Kingussie and Grantown-on-Spey.

Figure 5. Badenoch and Strathspey Visitor Numbers (2014)



Source: Steam Final Trend Report 2009–2014 – Badenoch and Strathspey (GTS [UK] Ltd)

Albeit at lower levels, there are still over 30,000 to 40,000 visitors per month to the area over the winter. In terms of the number of visitor days spent in the area, summer peaks in August are almost 450,000 (2014), while winter months average 100,000+, November is the lowest at 107,000 (2014) and February highest at just under 150,000. The pattern of visitor numbers and visitor days spent in the area across the year demonstrate the dominance of the summer offering and the area’s short-break appeal, while the additional winter offer is likely to be important in helping to create year-round appeal.

3. Tourism Visit Potential – Market Indicators

The market assessment identified several positive indicators for growth in tourism-related, winter and summer visits. These numbers are important when considering the depth of the marketplace and associated visit potential for future winter and summer activities at Cairngorm.

The UK has a robust skier population and continues to grow skiers through use of indoor or dry slope facilities close to urban centres. Membership within the ski clubs in Scotland is also significant, and those that call Cairngorm home are passionate about the area. Access to the Cairngorm area continues to improve, and overall visits to Cairngorms National Park is on the rise throughout the year. Visitors are nature enthusiasts, and many are seeking adventure experiences. The local population surrounding Cairngorm is growing. Local Cairngorm skiers are loyal advocates of the area, and many local businesses are focused on providing outdoor adventure recreational activities.

Skiing

Skiers in the UK. ± 6.3 million (around 10% of the national population; note that the U.S. skier population is 3% of its national population)

Skiers in Scotland. ± 120,000 recreational skiers

Scottish Ski Club. ± 1,200 members

Snow Factor in Braehead (Glasgow). ±500,000 people having chosen to learn to ski there

Scottish ski resorts. Of the five Scottish ski resorts Cairngorm has the largest number of visits and is also considered to be one of the best known of the Scottish resorts.

Figure 6. Scottish Skier Visits

	Snowsports	Non-Snowsports	Total
Cairngorm	101,330	103,100	204,430
Nevis Range	23,942	135,472	159,413
Glencoe	29,740	34,667	64,406
Glenshee	78,567	911	79,478
Lecht	30,872	1,167	32,038
Total	264,450	275,315	539,766

Source: The Five Snowsports Centres

Cairngorm skier visits. Skier visits over the last ten years have varied significantly from year to year rising from 23,000 in 2006/07 to a peak of 144,000 in 2009/10 and falling back to 21,000 in 2016/17. Performance has been extremely weather dependent illustrated by the low ski numbers last season which was a poor season in terms of natural snowfall.

Access to skiing in Scotland. Three of the ski resorts are within the Cairngorms National Park. All five areas are a two- to three-hour drive from the major cities (and populations) of Glasgow and Edinburgh. Cairngorm Mountain is the closest to Inverness Airport, with low cost flights from London Gatwick and a flight time of under two hours it is potentially easily accessible from London and the south east, it is also easily accessible by train via the station at Aviemore.

Population

The local resident market is growing. The Inner Moray Firth area which includes Inverness and surrounding area, has a total population of around 153,293 (2011) and this is increasing.

Day visit market capture. From a small local population of just over 5,000 in the immediate area, there is a significant increase in population once over an hour, an incremental increase in population of circa 174,000 between the 60- and 90-minute drivetimes. This 90-minute drivetime population is representative of the broader day visit market. The population is projected to increase across all three areas.

Figure 7. Population and Households

	0–30 minutes	0–60 minutes	0–90 minutes
Population	5,404	25,773	199,930
Households	2,416	11,034	87,355

Source: Experian Current year estimates (mid-year 2016)

Short-break destination market capture. Cairngorm Mountain is over a two-hour drive from these cities in most instances and this will reduce its appeal as a day visit destination. There is, however, the potential opportunity to improve appeal as a short-break destination. It is worth noting that the planned improvements to the A9 are expected to reduce journey times between Perth and Inverness and between Inverness and the Central Belt (Glasgow and Edinburgh) by around 18 to 20 minutes, as well as improving the overall journey experience. For those living in Perth this is likely to make a day visit more appealing with a travel time closer to 90 minutes.

Visits

Highlands Visits

Visitors to the Highland Council area. ± 6 million in 2016 (just under 4 million staying visitors and 2 million-day visitors). While this covers a broad geographic area the number of visitors demonstrates the extent of the appeal of this part of Scotland despite its very northern location. The area includes Aviemore but only part of the Cairngorms National Park.

Cairngorms National Park Visits

Visits to the Cairngorms National Park area. 1.8 million visitors in 2016. Total visitor numbers increased by 13% between 2009 and 2016.

Ride the funicular! Cairngorm Mountain funicular railway is the second most mentioned attraction, visited by 21% (Cairngorms National Park visitors who visited an attraction). Users of the funicular over the summer months are around 90,000 to 100,000 with peak months in July and August.

Badenoch + Strathspey Area Visits

Visitors to the Badenoch and Strathspey area. +1 million (2.8 million visitor days). Overnight visitors at around 700,000 and day visits at 370,000. Since 2009, the number of day visitors has declined, while the number of staying visitors has increased—up almost 23% from 570,000.

Summer peaks. Visitor numbers peak significantly during the summer months more than tripling, from 45,000 in February (2014) to 152,000 in July and 183,000 in August.

Visitor days. Summer peaks in August are almost 450,000 (2014), while winter months average 100,000+, November is the lowest at 107,000 (2014) and February highest at just under 150,000. The pattern of visitor numbers and visitor days spent in the area across the year demonstrate the dominance of the summer offering and the area's short-break appeal, while the additional winter offer is likely to be important in helping to create year-round appeal.

Badenoch + Strathspey Area Bed Base

Hotels, guest houses and B&Bs. ±250 establishments, ±5,000 bed spaces. Accommodation in Aviemore itself is dominated by two large resort hotels; MacDonald resort and Hilton Coylumbridge (collectively ±600 beds)

Non-serviced accommodation (self-catering, touring and camping). ±400 establishments, ±9,000 bed spaces.

Visitor Demographics

Adventure and Nature. Cairngorms National Park's tourism action plan cites the growth markets as being 'Adventure Seekers' and 'Natural Advocates.' Typically Adventure Seekers are affluent with a younger profile than other segments (an estimated 55% under 35). Natural Advocates are described as slightly less affluent ('mid affluence') and older (46% in the 35 to 54 age bracket and 36% over 55). These two groups while they have differing requirements are both important target markets, encompassing both those who want to participate in active pursuits and those who are looking for a more passive experience. As a premiere family adventure destination within Scotland, the offerings of Aviemore/Glenmore reflect these growth markets.

Short breaks at home. Holiday Trends 2016 (an annual report on the intentions, motivations and attitudes of the British holiday-maker [BDRC Continental]) cites that for the second year running the proportion of Britons taking a short break at home has increased, with 73% intending to take one that year.

Natural beauty. With natural beauty being one of the primary motivations for taking a UK holiday and the Scottish Highlands among the four most popular UK destinations, Cairngorms National Park (and Cairngorm Mountain) is well positioned to continue to grow its domestic visitor market.

Millennials in the marketplace. Millennials are widely considered to be an important market for the travel and tourism industry. Millennial Traveler (January 2017) urges caution in terms of viewing Millennials as a collective group, citing that, 'within the generation itself lies an enormous range in their life stage, career and disposable income and, therefore, there might be a difference in how younger (16 to 24) and older (25 to 36) cohorts of this generation behave,' there is commonality in terms of their desire to enrich their lives through travel with technology playing an important role. In 2015, the Millennial market generated 3.8 million trips, 18 million nights and £1.269bn of expenditure in Scotland.

II. OWNERSHIP AND MANAGEMENT

A. Land Ownership

The Highlands and Islands Enterprise (HIE) is the landowner of Cairngorm. Beyond its interest in Cairngorm being a sustainable operation, HIE, as the economic and community development agency, is vested in assisting the larger Aviemore/Glenmore area become a better place to live, work, and play.

Cairngorm Mountain is part of the Cairngorm estate. The estate is owned by Highlands and Islands Enterprise (HIE), the Scottish Government's economic and community development agency for a diverse region which covers more than half of Scotland and is home to around 450,000 people. HIE's role is to develop sustainable economic growth across the region. To achieve this, it creates infrastructure for future investment, assists large and small businesses with growth aspirations and has a unique role strengthening communities, particularly in fragile areas. As part of this HIE supports communities to acquire and develop land and other assets. HIE supports the growth ambitions of business and social enterprise clients working through an account management model in order to accelerate growth in turnover, profitability, wage levels, exports and, therefore, gross value added (GVA) in the HIE area. HIE also invests in transformational projects across the region aiming to make the Highlands and Islands a more competitive and attractive place to live, work, study and grow.¹²

B. Operations Management

The strategy for Cairngorm aims to improve the experience to increase year-round visits thereby improving the financial performance and establishing and maintaining a sustainable operation. As part of a savvy and experienced business entity, Cairngorm Mountain Limited's disciplined pursuit of this strategy will continue within clearly defined financial parameters and operational requirements.

From its inception in the 1960s until 2008 the ski area was operated by a private entity called Cairngorm Mountain Limited (CML). When the operating group experienced financial difficulties in 2008, HIE assumed ownership of CML and the operations responsibilities of the ski area.

In June 2014, following a public tender process to find a new operator for Cairngorm Mountain, HIE sold its shares in the operating company, CML, to Natural Assets Investments Ltd. CML is now operated by a Natural Assets subsidiary, UK Great Travel Company Ltd. CML was granted a 25-year lease (running to 2039) and entered into an operating agreement with HIE. The assets leased from HIE comprise the funicular railway and other ski-tow infrastructure, all buildings, car parks and service infrastructure. CML, as Tenant, is responsible for maintenance of all the facilities.

CML has a clearly defined strategy for Cairngorm:

- Create a year-round mountain destination and focal point in the heart of the Cairngorms
- Provide the best visitor experience in the National Park
- Create new activities in summer that attract extra ticket spending
- Increase dwell time within the buildings to increase F&B and retail spending

¹² HIE. 2018. 'About Us' <http://www.hie.co.uk/about-hie/default.html>

C. Stakeholders

Interviewing stakeholders was invaluable to understanding the history, context, and opportunities at the ski area. It was also critical in identifying all the topics that need to be addressed to complete a comprehensive analysis so Cairngorm—and the community more broadly—can move forward with confidence that they are making informed decisions.

This review inspires to leverage the power behind the passion, ideas and enthusiasm of the community stakeholders surrounding the resort. Public participation in planning efforts such as this review contribute to better decisions because planners have more complete information—in the form of additional facts, values, and perspectives obtained through public input—to bring to bear on the planning process. In addition, final decisions are more implementable and sustainable because of consideration of the needs and interests of all stakeholders, and stakeholders better understand and are more invested in the outcomes.

Cairngorm is very much a part of the community fabric in the region and local stakeholders hold a strong ‘emotional ownership’ over the ski area. Cairngorm Mountain serves as a recreation venue, a place of employment, a tourism destination, and an economic driver. The mountain also holds a special place in the hearts and minds of locals that transcends all these functions. Cairngorm is a big part of the identity of the region, and a big reason why many have chosen to live or move here. It is a uniting element within community, and one of which many locals feel a sense of ownership.

The local community is also very passionate about the future of Cairngorm. To ensure active community engagement, stakeholder interviews were conducted, and open comments were received from many passionate users. The issues and ideas raised by these stakeholders have been taken to heart and considered throughout this analysis and the development of the opportunities for the future.

To facilitate the integration of community input into the review process, the issues, ideas and opportunities shared by stakeholders were catalogued and categorised under the following themes:

Marketplace

- Visit Patterns and Use
- National Park & Regional Trends
- Skier Market
- National Snow sports Trends
- Competitive Edge and Differentiators

Economic Development

- Regional Economic Development
- Regional Cooperation
- Ownership and Management Arrangement
- Economic and Long-Term Viability

Transportation

- Parking and Arrival
- Mountain Road
- A9 and Road Network
- Transit

Environmental

- Environmental Considerations and Permitting
- Climate Change & Weather
- Hydro Potential

Other

- Current/on-going Projects
- PR and Marketing

Winter Operations

- Ski Experience
- Athlete Development
- Ski School & Instruction
- Terrain Parks
- Ski Capacity
- Beginners and Families
- Mountain Infrastructure
- Mountain Operations
- Snowmaking
- White Lady
- Lift System
- Funicular
- Coire Na Ciste
- Base Lodge, Guest Services, and F&B

Multi-Season & Non-Ski Operations

- Dry/Indoor Slopes
- Alpine Coaster
- Guided Walks
- Non-Skiing Access to the Mountain
- Walking Paths and Trails
- Mountain Biking
- Other Multi-Season Activities

Once categorised, individual comments around each theme were integrated into the analysis of that element of the plan. It is important to note that feedback was received from a range of stakeholders holding an array of views and concerns on any given issue. While stakeholder opinions were not always aligned, there was a very clear and shared passion for Cairngorm Mountain and finding the best way for the resort to move forward on these issues.

III. NATURAL ENVIRONMENT

A. Topography

The following topographical elements describe the resort:

- Cairngorm is characterised by mostly north-facing slopes off the summit of Cairngorm Mountain
- There is a significant ridge that separates the two sides of Cairngorm—The Coire Cas side and the Coire na Ciste side
- The highest point is Cairngorm summit, at 1,240 meters
- The highest point in the ski area (the top of Ptarmigan T-Bar) is at 1,146 meters
- The base area is 620 meters, for a lift-served skiable vertical drop of 526 meters
- The Coire na Ciste carpark is at 540 meters

B. Natura Sites

HIE owns Cairngorm Estate, which extends to 1,418 hectares. Of this, 598 hectares are leased until 2039 to CML and operated as a tourist attraction. The remaining 820 hectares is managed as open hill, of which 727 hectares, known as the Natura sites, has protected status under the EU Habitats and Wild Birds Directives. These place a legal obligation on HIE to ‘maintain the land in favourable conservation status.’ They are also contained within the Northern Corries and Cairngorms Sites of Special Scientific Interest (SSSI).¹³

C. Drainages

Each of the water courses at the ski area are designated by the Scottish Environmental Protection Agency as they flow into Loch Morlich and ultimately the River Spey, both of which are also designated. Loch Morlich is a shallow, freshwater loch surrounded by Glenmore forest. The designated bathing water is a 500-meter-long stretch on the eastern side of the loch. It was designated as a bathing water in 2008 and is one of only three inland bathing waters in Scotland.

The River Spey is designated as a Special Area of Conservation (SAC) for Atlantic salmon, freshwater pearl mussel, lamprey and otter, and the lower Spey is a Special Area of Conservation for coastal shingle and floodplain woodland features. Over 60% of the catchment falls within the Cairngorms National Park.

The primary water courses on the mountain include:

- Allt na Ciste
- Allt Coire Cas
- Marquis Well
- Allt Coire an Sneachda
- Allt Creag an Leth-choin

¹³ HIE. Working with the Environment at Cairngorm.

D. Views

The views from Cairngorm are spectacular on clear days. As the sixth highest mountain in the U.K., it offers long views of the Highlands.

- The best views are from the summit of Cairngorm, which are available on guided walks from Ptarmigan.
- The views from Ptarmigan are excellent (looking to the north are almost as good as those from the summit) and are easily seen from the viewing platform at the facility.
- The views from the funicular are excellent as well, as it rides up the Coire Cas valley, then turns and climbs to the Ptarmigan station.

E. The Weather

1. Adverse Weather at Cairngorm

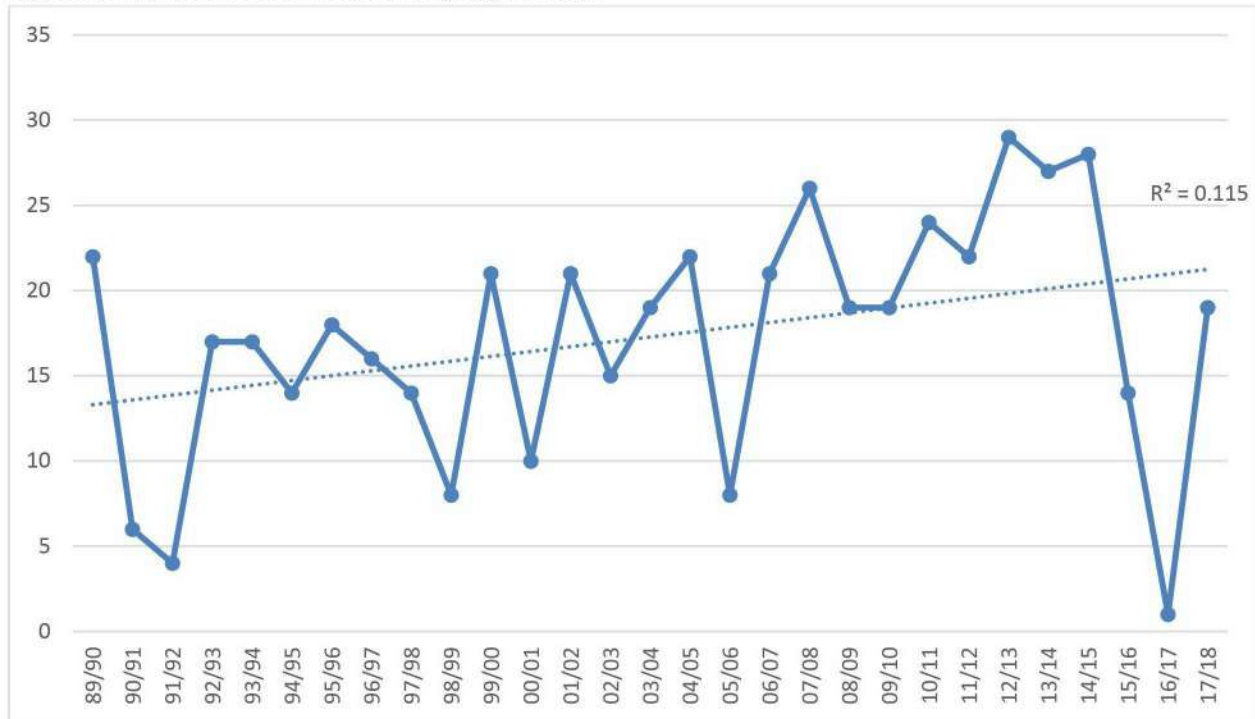
Extreme weather is both a challenge and an opportunity at Cairngorm. Heavy snowfalls, wind, blowing snow, and fluctuating temperatures all present a challenge at the ski area, requiring extensive snow fencing and snow management. These conditions can at times prevent the opening and consistent operation of the access road, the surface lifts, the terrain, and the funicular. Adverse weather can also impact the potential for summer activities at the resort. Extreme weather, however, also presents an opportunity in the brand identity of Cairngorm, as the mountain and the region are already a well-known destination for more extreme hill walking, climbing, mountaineering, and ski-touring.

Ski Area Closures

Cairngorm routinely experiences wind and adverse weather events that force the closure of the access road, funicular, lifts, and terrain. Closures during such events create major operational difficulties for the ski area, quickly diminish the guest experience, and decrease the overall reliability of the ski area operations from a guest standpoint. Thus, there is a need to develop a strategy for minimising the effects of adverse weather on operations, by improving the reliability of uplift and terrain offerings, and the snow management on the access road.

The most important metric to track relative to adverse weather at Cairngorm is ski area closures and 'stormed off days.' While the number of stormed off days has been variable over the past 30 years, there has been a slightly upward trend in the number of stormed off days each season over this period. The average number of stormed off days a season averaged approximately 14 days in the early 1990s compared to an average of approximately 20 days in the past few seasons.

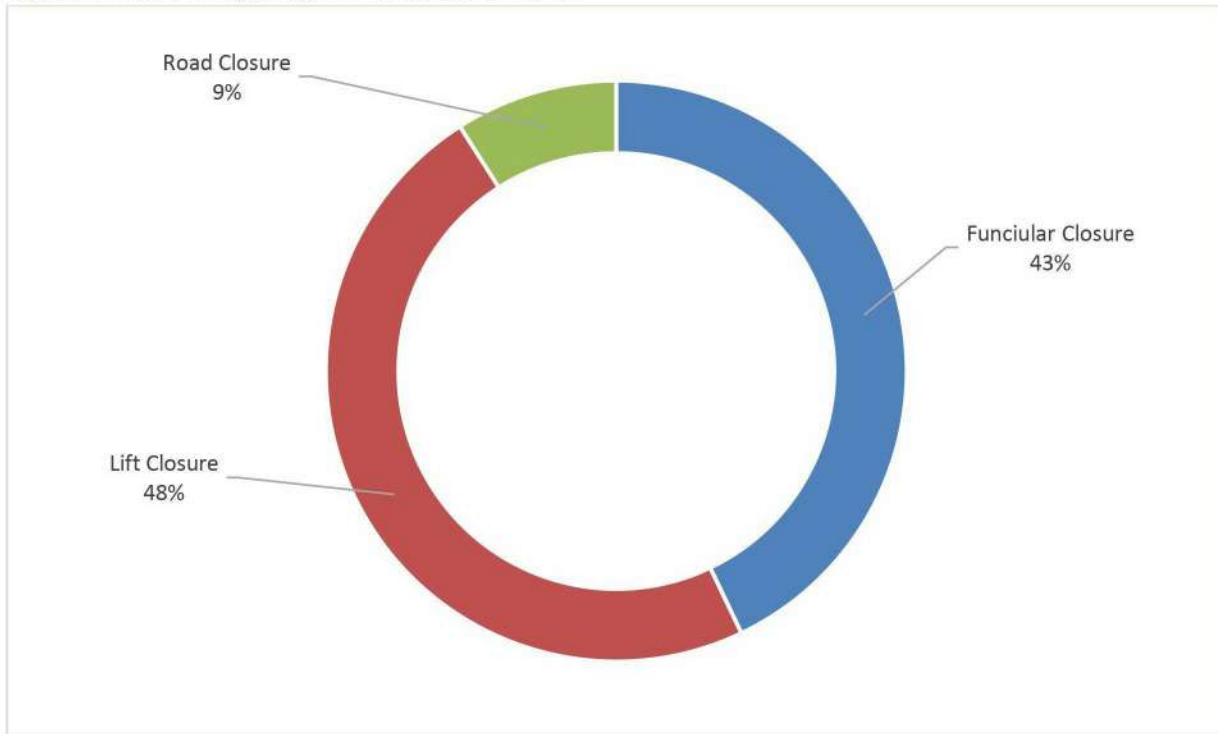
Figure 8. Number of Stormed Off Days by Season



Available stormed off and ski area closure data is somewhat inconsistent over the past thirty years, but there is detailed data on the reason for closures for the 2001/02 season through 2009/10 season, which when combined with anecdotal information about mountain operations can help characterise the overall impact of adverse weather at Cairngorm. Detailed closure data is available for some seasons before 2001/02, but the lift regime and mountain operations were very different from the current arrangement making this data less useful for this analysis.

Despite the relatively high profile of access road closures in the media and with stakeholders, uplift/funicular closures accounted for more than 90% of full ski area closures between 2001 and 2010. Lift closures were slightly more problematic than funicular closures, but adverse weather presented operational challenges for both.

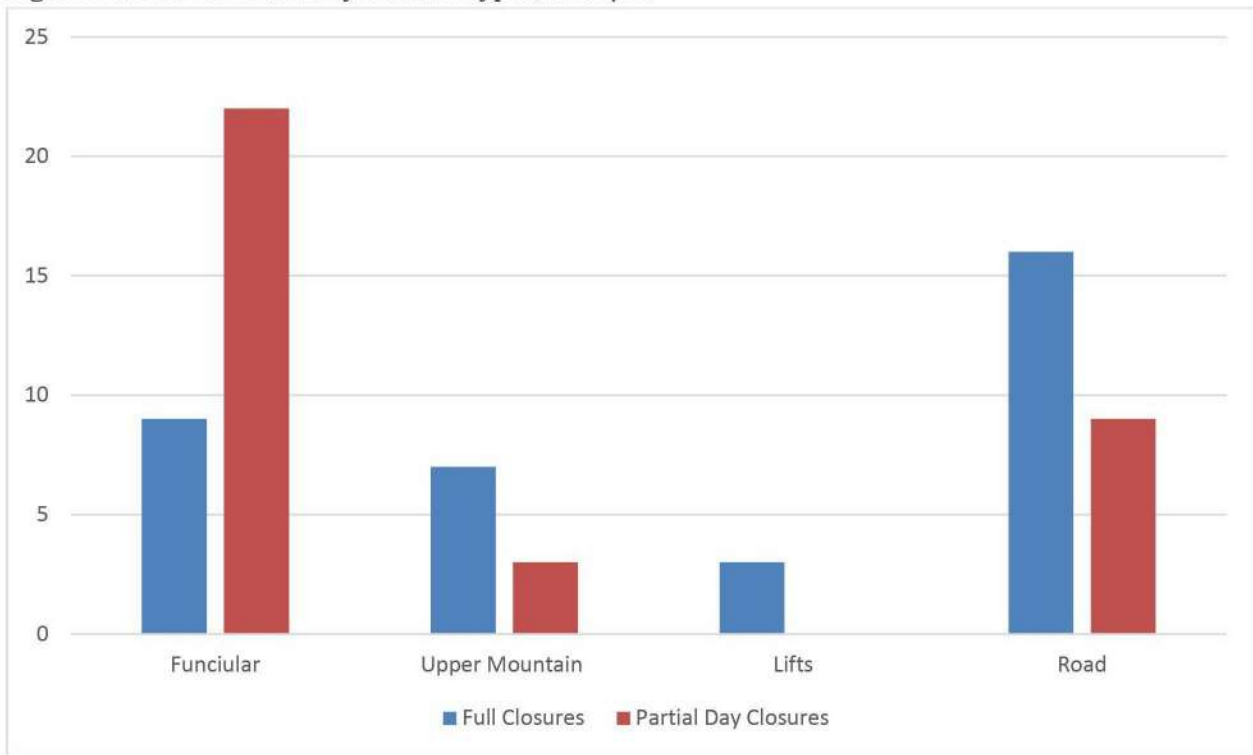
Figure 9. Closure Type by Per Cent, 2001–2010



The most detailed data/closure notes for Cairngorm is from the 2009/10 season, which provides an understanding of the partial closures that may be experienced at the ski area in a given year. This data suggests there are slightly more operational challenges with the funicular than with the surface lifts, and if the road is closed, it is more likely to be closed all day than for just part of the day.

In total, there were 35 full-day closures and 34 partial-day closures in the 2009/10 season. With 184 total possible skiable days (days with snow), the ski area experienced either a full or partial closure on about 1/3 of their potential operating days. In many cases the ski area is closed because the mountain is struggling to deal with the effects of a heavy snowfall or blowing snow, not necessary because the adverse weather is being experienced at that specific time. Thus, if the capacity of Cairngorm to deal with snow management was increased—or the need to manage snowfall and adverse weather was decreased with more advanced infrastructure—many fewer closures could be experienced. This suggests there is a strong need to improve operational efficiency and snow management across the ski area.

Figure 10. Full vs Partial Day Closure Types, 2009/10



2. Climate Change and Scotland

Despite favourability relative to other Scottish ski areas, Cairngorm must consider the likely impacts of climate change and ensure it is utilising adaptation strategies to confront warmer weather, such as advanced snowmaking capabilities and a diversification of recreational opportunities. It must also consider the timeline of investment and its realisation of a return on that investment—planning a return on investment in the next ±30 years (the average lifespan of a ski lift) is plausible, but planning further into the future, at achieving a return on investment over 50 or more years is difficult given the large potential impacts of climate change. Investments made today will have a very different outlook than investments made in the future; moving forward the potential effects of climate change should be periodically reassessed.

Mountain resort tourism is often identified as being particularly vulnerable to the impacts of climate change. While many resorts are implementing adaptation strategies for dealing with the impacts of climate change, such as expanded snowmaking capacity and offering multi-season recreation opportunities, it is important for mountain resorts to understand the magnitude of climate change they can expect to effectively plan for the future. This analysis presents an analytic snapshot of the range of climate change that may be expected at Cairngorm, recognising the high level of uncertainty and the politically-charged nature of climate change forecasting.

Three of the most important considerations for mountain resorts with respect to climate change are long-term changes in Winter Mean Temperatures, Winter Mean Precipitation, and Weather Variability. This discussion considers the expected impacts on these data points for the area surrounding Cairngorm, Scotland using the UK Climate Projections (UKCP09). According to the UKCP09 website, it 'is the leading source of climate information for the UK and its regions [and] it is designed to help users with the process of adapting to a changing climate.'¹⁴

As explained by UKCP09:

'It is impossible to predict exactly how much greenhouse gas emissions will be released in the future. In light of this climate projections are given for a number of different plausible scenarios for greenhouse gas emissions. These scenarios are based on a set of assumptions about factors such as socio-economic development and technological change. The emissions scenarios used in UKCP09 were developed by the Intergovernmental Panel on Climate Change (IPCC).

Three emissions scenarios are used in UKCP09:

- 1. Low emissions (also known as B1);*
- 2. Medium emissions (also known as A1B); and*
- 3. High emissions (also known as A1FI).*

*UKCP09 treats these scenarios as equally plausible. When presenting UKCP09 projections you may want to present findings for a range of scenarios to show the range of possible outcomes.'*¹⁵

¹⁴ UK Climate Projections. 2018. <http://ukclimateprojections.metoffice.gov.uk/>

¹⁵ Ibid.

In response to this guidance, this analysis presents the range of possible outcomes for Winter Mean Temperatures and Winter Mean Precipitation in the region surrounding Cairngorm for each of the three emissions scenarios considered by UKCP09.

Winter Mean Temperature

As with most other regions in Scotland, the UK, and the globe, Cairngorm is expected to experience warmer weather throughout the year. Historically, Cairngorm has had average temperatures at or below freezing (0°C) from November to April. Since 1985, the Cairngorms have experienced mean daily temperatures of approximately 0°C in November, -1.6°C in December, -2.2°C in January and February, -1.6°C in March and 0°C in April.¹⁶ According to UKCP09, in the short-term (2020s), the central estimate of increase in winter mean temperature for the region surrounding Cairngorm ranges between 1°C under low emissions and 1.1°C under high emissions. In the mid-term (2050s), the central estimate of increase in winter mean temperature for the region surrounding Cairngorm ranges between 1.6°C under low emissions and 1.8°C under high emissions. In the long-term (2080s), the central estimate of increase in winter mean temperature for the region surrounding Cairngorm ranges between 2°C under low emissions and 2.5°C under high emissions. The following table demonstrates expected changes in mean winter temperatures for the Scotland North Region by time period, emissions scenario and probability level.

Figure 11. Change in mean winter temperature (°C)

Region	Probability level			
	10%	50%	90%	Wider range*
2020s Low emissions scenario				
Scotland North	0.2	1.0	1.9	0.1 – 2.0
2050s Low emissions scenario				
Scotland North	0.6	1.6	2.6	0.6 – 3.0
2080s Low emissions scenario				
Scotland North	1.0	2.0	3.2	0.9 – 4.1
2020s Medium emissions scenario				
Scotland North	0.2	1.1	2.0	0.1 – 2.0
2050s Medium emissions scenario				
Scotland North	0.6	1.6	2.8	0.6 – 3.0
2080s Medium emissions scenario				
Scotland North	0.9	2.2	3.6	0.9 – 4.1
2020s High emissions scenario				
Scotland North	0.1	1.0	2.0	0.1 – 2.0
2050s High emissions scenario				
Scotland North	0.7	1.8	3.0	0.6 – 3.0
2080s High emissions scenario				
Scotland North	1.2	2.5	4.1	0.9 – 4.1

*The wider range is defined as the range from the lowest to highest value of change for all Emissions scenario and all three (10, 50, and 90%) Probability level for each 30-year time period.

¹⁶ Meteo Blue. Global NEMS weather model. https://www.meteoblue.com/en/weather/forecast/week/the-cairngorms_united-kingdom_2654064; further supported by review of Techno Alpin and Scottish Ski Club data.

Winter Mean Precipitation

The region surrounding Cairngorm is projected to experience steadily increasing precipitation throughout the winter months (and throughout the entire year). The projected change in mean winter precipitation for the area surrounding Cairngorm is shown in the following table.

Figure 12. Change in mean winter precipitation (%)

Region	Probability level				
	10%	50%	90%	Wider range	
2020s Low emissions scenario					
Scotland North	-3	+5	+13	-5	+14
2050s Low emissions scenario					
Scotland North	-1	+8	+20	-1	+26
2080s Low emissions scenario					
Scotland North	+4	+16	+31	+4	+45
2020s Medium emissions scenario					
Scotland North	-2	+6	+14	-5	+14
2050s Medium emissions scenario					
Scotland North	+3	+13	+24	-1	+26
2080s Medium emissions scenario					
Scotland North	+4	+17	+35	+4	+45
2020s High emissions scenario					
Scotland North	-5	+4	+14	-5	+14
2050s High emissions scenario					
Scotland North	+3	+13	+26	-1	+26
2080s High emissions scenario					
Scotland North	+9	+24	+45	+4	+45

*The wider range is defined as the range from the lowest to highest value of change for all Emissions scenario and all three (10, 50, and 90%) Probability level for each 30-year time period.

Variability

Based on operating conditions at Cairngorm’s and our experiences with hundreds of other mountain resorts around the world, we know that mean temperature and precipitation (i.e., snowfall) does not paint the full picture of climate impacts on ski operations—weather variability is also a huge factor. An average temperature of below freezing is all well and good, but not if it is arrived at with a large spread of exceedingly warmer and cooler days. Thus, we also provide a discussion of variability on ski operations and consideration of maximum daily temperatures.

Climate models for the region surrounding Cairngorm indicate that average monthly temperatures will likely be below freezing—and generally cold enough for natural and man-made snow—throughout the core winter period (December through March) through the 2050s. However, the climate models also indicate the consistency of natural snowfall and temperatures below freezing will be more variable than they have been in the past. While wetter winters will likely mean snowier winters for Cairngorm in the future, the models indicate that mid-winter rains will also become more likely, impacting natural snow quality. Warmer thaw periods interspersed throughout the winter are also expected to become more likely, making all-natural snow surfaces even more challenging.

Snow Sports Climate Change Outlook

Overall, the outlook for snow sports is relatively favourable, in that snow sports are expected to remain viable for most of the winter in the Cairngorm area at least through the 2050s. Snow sports viability in November and April will likely continue to be significantly reduced, even in the short term.

Findings from this analysis are generally in alignment with the 2001 Climate Change and Changing Patterns of Snowfall in Scotland report, which found, ‘At the highest ski lift/tow on Cairngorm, Ptarmigan (1,060–1,150 meters) the greatest reduction [in the average number of days on which snowpack and a raising of snow-lines during the winter months] would be less than 20% as a result of greater winter precipitation with air temperatures, despite warming, still being below 0°C for lengthy periods.’¹⁷

Given Cairngorm’s relatively high elevation, this favourable outlook may provide a comparative advantage relative to resorts elsewhere in Scotland that may have less favourable snow sports conditions in the future, as alluded to in the 2001 Climate Change and Changing Patterns of Snowfall in Scotland report.

¹⁷ The Scottish Executive Central Research Unit. 2001. Climate Change and Changing Patterns of Snowfall in Scotland.

IV. EXISTING OPERATIONS

The existing mountain infrastructure at Cairngorm offers a substandard skiing experience that cannot be competitive in today's marketplace—the lifts are slow and uncomfortable to ride, with a low out-of-base capacity that often results in long queues; the terrain is good but has unreliable snow cover, and the guest services are often over-crowded. Declining annual skier visits reflect this condition. In addition, and as a direct result of the existing mountain infrastructure, winter operations are inefficient. In concert, this results in an unsustainable business model.

A. Financial Balance

Benchmarking is often used in the analysis to determine relevant operating revenues and expense levels for similar ski areas. A benchmarking evaluation entails the use of industry data to compare a resort's operational and financial characteristics with similar sized and located ski areas. This comparison with peer ski areas provides an operational performance 'report card' from which we can ask questions about the existing operations and offer recommendations for improvement or understand the financial implications of potential operations of new facilities.

In the United States there is a long standing annual economic survey, the NSAA (National Ski Areas Association) Economic Analysis, that resorts submit operational data to and utilise its information to benchmark performance. This analysis is performed through an annual survey of member resorts' physical characteristics (e.g., size and capacities), and financial performance by operating department. In 2016/17, 112 resorts throughout the country participated in the survey. Unfortunately, there is not a similar survey for European resorts; therefore, the NSAA Economic Survey may be the best source for operational comparisons and insight for Cairngorm.

NSAA organises the survey results by region and size and provides a rich source of information that allows for analytical analysis (benchmarking) by these categories. This is the best industry information available to compare resorts by region and size and glean valuable insights regarding a resort's operating results and present possible opportunities for improvement. A typical benchmark analysis compares key resort financial data with survey information by resort size within a region as detailed in the following tables. The following tables are summaries of resorts across the U.S. grouped by size with Vertical Transport Feet per Hour (VTFH) of 0 to 7.5MM VTFH or 0 to 2.3MM Vertical Transport Meters per Hour (VTMH).¹⁸ Cairngorm falls within this range with a VTFH of 4,573 (or VTMH of 1,882).

¹⁸ Vertical Transport Feet per Hour (VTFH) is the product of the vertical rise of a lift and the lift manufacturer's rated skiers-per-hour capacity. VTFH is the size classification used to segment ski areas in the annual NSAA Economic Analysis report. VTFH is considered the most consistent basis for year-to-year classification.

The following table summarises the average per cent of total revenue generated by the main revenue-generating departments.

Figure 13. NSAA Economic Analysis – Per Cent of Total Revenue by Department (Ski Areas-less than 7,500,000VTFH)

Gross Revenue	2016/17	2015/16
Tickets	35.4%	36.2%
Snowplay & other winter ops	3.8%	3.7%
Lessons	8.3%	8.3%
Food and beverage	18.5%	18.4%
Retail stores	5.1%	5.3%
Rental shops	7.5%	7.3%
Accommodations/lodging	7.8%	7.9%
Miscellaneous	0.4%	0.6%
Other	11.9%	10.7%
Property operation	1.3%	1.6%
Total	100.0%	100.0%
Number of areas	44	45

The following table provides a summary of major expenses breakdowns as a per cent of total revenue.

Figure 14. NSAA Economic Analysis – Expenses as a Per Cent of Total Revenue (Ski Areas – less than 7,500,000VTFH)

Expenses	2016/17	2015/16
Cost of goods	9.4%	9.1%
Direct Labor	28.5%	28.4%
Maintenance & repair	5.3%	3.9%
Other direct	9.8%	11.0%
Payroll taxes/workers comp	4.9%	5.1%
Electric power/fuel	4.7%	4.8%
General and administration	13.2%	15.9%
Marketing/advertising	3.5%	4.1%
Insurance	1.7%	1.9%
Land use fees	1.4%	1.0%
Property/other taxes	1.8%	1.7%
Miscellaneous	-2.3%	0.6%
Depreciation	8.6%	10.2%
Amortization	0.0%	0.1%
Operating Leases	0.5%	0.8%
Interest	2.4%	1.0%
Profit before taxes	6.6%	0.4%
Total	100.0%	100.0%
Number of areas	44	45

[Part One: Analysis. The Complexity of the Existing Condition]

Another source of information is the income statement providing per cent breakdown of revenue categories and expenses as a per cent of total revenue, summarised by operating and common expenses that provides the operating margin, operating profit and profit before taxes.

Figure 15. NSAA Economic Analysis – Average Ski Area Financial Data – Income Statement (by size) (Ski Areas – less than 7,500,000VTFH)

Revenue	2016/17	2015/16
Tickets	35.4%	36.2%
Snowplay & other winter ops	3.8%	3.7%
Lessons	8.3%	8.3%
Food and beverage	18.5%	18.4%
Retail stores	5.1%	5.3%
Rental shops	7.5%	7.3%
Accommodations/lodging	7.8%	7.9%
Miscellaneous	0.4%	0.6%
Other	11.9%	10.7%
Property operation	1.3%	1.6%
Total Revenue	100.0%	100.0%

Figure 15. NSAA Economic Analysis – Average Ski Area Financial Data – Income Statement (by size)
(Ski Areas – less than 7,500,000VTFH) (CONT.)

Revenue	2016/17	2015/16
Expenses		
Tickets	15.4%	16.6%
Snowplay & other winter ops	0.8%	0.7%
Lessons	3.3%	3.3%
Food and beverage	13.5%	13.1%
Retail stores	3.7%	3.6%
Rental shops	1.6%	1.7%
Accommodations/lodging	4.7%	4.8%
Miscellaneous	1.1%	0.2%
Other (operating depts.)	8.7%	7.7%
Payroll taxes	4.9%	5.1%
Property operation	4.8%	5.6%
Subtotal, Expenses & Allocations	62.5%	62.4%
Operations Margin	37.5%	37.6%
Common Expenses		
General and administration	13.2%	15.9%
Marketing/advertising	3.5%	4.1%
Insurance	1.7%	1.9%
Land use fees (public)	0.4%	0.5%
Land use fees (private)	1.1%	0.5%
Property taxes	1.6%	1.6%
Other taxes (except income)	0.1%	0.0%
Miscellaneous	-2.3%	0.7%
Subtotal, Common Expenses	19.3%	25.2%
Operating Profit	18.2%	12.4%
Depreciation	8.6%	10.1%
Amortization	0.0%	0.1%
Operating Leases	0.5%	0.8%
Interest	2.5%	1.0%
Profit Before Tax	6.6%	0.4%
Number of areas	44	45

B. Existing Mountain Infrastructure: Lifts, Terrain, Guest Services

The following section summarises the existing condition of the infrastructure that supports Cairngorm’s mountain operations: the lifts, terrain and guest services facilities.

1. Design Criteria and Mountain Operations

A variety of design criteria, each of which helps to create a quality ski experience, influence the upgrading and expansion of ski areas.

At mountain resorts, guests have a variety of expectations—to participate in recreation associated with mountains, to enjoy dining and shopping opportunities, and to enjoy a mix of other vacation experiences in a mountain setting. Thus, a destination resort must offer a multitude of services, amenities, and experiences that are designed to allow a guest to ‘re-create’ their spirit. Design parameters that guide the development of everything from the pedestrian-oriented, social environment, to the alpine experience, all contribute to the success of a destination resort.

Following the principal base lands and mountain design criteria leads to the development of a successful resort:

- Base Area Design
- Slope Gradients and Terrain Breakdown
- Trail Density
- Trail System
- Terrain Parks
- Lift Design
- On-Mountain Guest Services
- Capacity
- Balance of Facilities
- Multi-Season Recreation Activities

Additional information regarding these design criteria may be found in Appendix 3.

2. Efficiency and Mountain Operations

In order to be a sustainable business enterprise, future upgrading of Cairngorm must be focused on the goal of achieving maximum operation efficiency.

A significant focus of current mountain resort operations is operation efficiency, and achieving balance between lift capacity, terrain capacity, and all other aspects of the operation. This is particularly relevant to economic sustainability as operating financial margins in the ski industry are so tight that high operational costs will likely preclude financial viability.

3. Lift Infrastructure

The following table lists the specifications of all the ski lifts at Cairngorm.

Figure 16. Lift Specifications – Existing Conditions

Lift Name, Lift Type	Top Elevation	Bottom Elevation	Vertical Rise	Slope Length	Average Grade	Actual Capacity	Rope Speed	Carrier Spacing	VTMH	Lift Maker/ Year Installed
	(m.)	(m.)	(m.)	(m.)	(%)	(pph)	(m./sec.)	(m.)		
Funicular Railway	1,087	639	447	1,940	24%	1,200	10.0	3,600	536,744	Doppelmayr 2000
Car Park T-Bar	776	628	148	914	16%	600	2.5	30	88,544	Muller 1965
Fiacaill Ridge Poma	853	627	226	1,044	23%	865	4.0	17	195,490	Poma 1981
Sheiling Platter	755	703	52	280	19%	720	2.0	10	37,722	SunKid 2016
Coire Cas T-Bar	1,009	770	239	1,062	23%	624	2.5	29	149,399	Muller 1963
M1 Poma	1,090	788	303	992	32%	900	4.0	16	272,508	Poma 1980
Coire Na Ciste T-Bar	1,102	973	130	805	16%	782	2.5	23	101,526	Muller 1963
Polar Express Poma	1,099	1,087	12	61	20%	348	1.5	16	4,082	Poma 1987
Ptarmigan T-Bar	1,146	1,064	82	535	16%	709	2.5	25	58,425	Muller 1970
West Wall Poma	1,083	714	369	1,617	24%	800	4.0	18	295,045	Poma 1986/2016
Day Lodge Poma	800	641	159	784	21%	900	4.0	16	142,833	Poma 1988

In addition to the existing lifts, there were previously two fixed-grip chairlifts at Cairngorm, located in Coire na Ciste. In concert these lifts provided a second access point onto the mountain from the Coire na Ciste parking area. These lifts stopped operating in 2004 after a series of poor snow winters and the infrastructure has since been removed.¹⁹

Lift Network Efficiency

A more efficient lift network at Cairngorm would have a smaller number of higher capacity aerial lifts, which would serve the same number of skiers but provide a much higher-quality skier experience with lower lift operation/maintenance costs.

The lift network at Cairngorm is the greatest operational inefficiency at the resort. The funicular is an excellent lift with numerous benefits, but its low hourly capacity and susceptibility to closures from snow drifts restricts its functionality and reliability as a repeat-ski lift. The remaining lifts are all old surface lifts (with the exception of the SunKid conveyor). These lifts are all at least thirty years old, with three lifts over fifty years old. The lifts have been very well maintained, with replacements of key components at regular intervals.

- The surface lifts are difficult to ride and can be tiring and/or uncomfortable. The surface lifts are the largest contributing factor to the low utilisation rates of the resort (see the *Utilisation* discussion)—many skiers simply don’t want to ride surface lifts.

¹⁹ The tower foundations/pylons were determined to be structurally unsound prior to the removal of the Coire na Ciste lift infrastructure.

- An additional significant challenge of the surface lifts is the impact it has on delaying or preventing the resort from opening, due to:²⁰
 - Lack of snow on the uptrack
 - The time and effort required to clear out and groom the uptracks in the morning
 - Closures during the day due to a need to groom and maintain the uptracks
- In short, the surface lift user experience is substandard and operation inefficiency is high

Another inefficiency of the lift network is the total number of lifts. With 11 total lifts to operate and maintain, Cairngorm’s lift operations are out of scale for the number skiers the mountain can support.

Summer Operations

The funicular ride at Cairngorm is a unique and popular summer mountain experience. Given its popularity, Cairngorm should enhance that visitor experience to attract additional visitors to Cairngorm.

In addition to serving the skiing operation, the funicular is also a year-round tourism attraction. The funicular, in combination with the Ptarmigan on-mountain restaurant, provides an opportunity for visitors to experience the high alpine mountain environment of Cairngorm. However, the existing outdoor viewing platform at Ptarmigan is small and does not offer a very appealing outdoor experience for these tourist-oriented users of the funicular.

It is important to note that Cairngorm adjoins land which is designated under the EU Habitats and Wild Birds directives because of its nature conservation interest. As such, a formal agreement (s.49/50 agreement) between HIE and SNH was created to ensure that non-skier use of the funicular be managed in such a way that it will not adversely affect the integrity of these EU sites. This agreement, and the resulting Visitor Management Plan includes a ‘closed system’ which prevents visitors using the funicular from leaving the Ptarmigan facility unless under guided supervision. These guests may use the outdoor viewing platform that is part of Ptarmigan, but they cannot leave the building without a guide.

4. Terrain Distribution

Cairngorm is an efficient operation in terms of the ski terrain. Its terrain distribution matches industry guidelines, suiting all levels of skiers. It also has the proper amount of terrain—too little terrain would result in over-crowding on the ski runs; too much ski terrain would mean that while skier densities would be very low, the cost of maintaining a surplus of terrain would not be sustainable.

The ski terrain at Cairngorm is excellent. There is a wide variety of ski terrain types, and the ski runs are interesting and fun to ski.

The terrain distribution by ability level at Cairngorm is very close to the standard skier market distribution, with most of the terrain being intermediate level, but with a balanced amount of beginner, novice, advanced, and expert terrain as well.

There is also a good balance between the amount of ski terrain and uphill lift capacity.

²⁰ None of these factors affect aerial lifts, as they do not require the lift line to be a smooth, skiable, snow covered surface.

5. Snowmaking

There is currently very limited snowmaking infrastructure at Cairngorm, but a general acknowledgment that the ability to make man-made snow, especially on the lower mountain terrain, would significantly improve the ski experience. Analysis of weather conditions determined that snowmaking would be feasible at Cairngorm. In most years, the early winter temperatures would enable the resort to make snow for 180 hours mid-mountain by Christmas and 170 hours at lower elevations. Given this capability, Cairngorm is exploring the potential water supply.

Before proceeding with systems design and engineering, it must first be determined if winter temperatures would support a snowmaking operation at Cairngorm. As such, as part of this review a historical temperature analysis for snowmaking feasibility was completed by Sno.matic Controls & Engineering, a renowned snowmaking system engineering firm. The analysis is based on data from two sources: 1) Techno Alpin (TA) weather data collected from November 2014 to present and 2) Scottish Ski Club (SSC) records collected from 2007 through 2014. The summary memo of this analysis is provided in Appendix 4.

The following conclusions are drawn from this analysis:

- It is feasible to make snow at the mid-mountain site, as reflected by temperature measurements from Techno-Alpin system and projections based on the Scottish Ski Club max/min temperature data.
- An average of approximately 180 hours of snowmaking is available at the mid-mountain prior to Christmas, and an additional 140 hours by the middle of January.
- Snowmaking conditions continue until at least mid-February, with an average of over 200 hours available below 28°F WB.
- There are years, as evidenced by the 2016 TA data, where very few snowmaking hours will be experienced during December. During these years, very little (if any) snow can be made prior to Christmas. The SSC data suggests that these years are rare.
- Most of the snowmaking hours fall in the -2 to -3°C temperature range; there are relatively few hours available below this temperature range.
- A typical fan gun will deliver in the range of 30 USgpm at -2°C WB. Based on this flow assumption, each gun would have the capability to cover approximately 1 acre of terrain before Christmas in an average year. This assumes that adequate water is available at all times to operate the gun. That assumption is highly dependent on the amount of water recharge and the storage volume at the resort.
- While temperatures for this analysis reflect conditions at the mid-mountain elevation, the values for <26°F/-3°C can be used to estimate potential snowmaking hours at the lower elevations for a first approximation. An average of approximately 170 hours of snowmaking would likely be available in the lower-mountain prior to Christmas, with an additional 128 hours by the middle of January.
- Snowmaking operations may be curtailed due to high winds, especially in the upper mountain area. However, the TA data suggests that there are relatively few periods where winds exceed 30 km/hr (18 mph).

- According to the Scottish Environment Protection Agency, Cairngorm Mountain has an abstraction licence for snowmaking for a specific location and amount of withdrawal. Available capacity needs to be assessed and a further abstraction licence may from SEPA may be required.

In addition to needing suitable temperatures, a snowmaking system also requires a reliable source of water. The Cairngorm management team, in collaboration with SEPA representatives has initiated an analysis of winter withdrawal capacity from the drainages within the ski area boundary which may be conducted during the 2018/19 season.

6. Guest Services

Providing a high-level of guest service is critical to the visitor experience. Cairngorm's guest services are undersized and over-crowded on busy days. Addressing guest service deficiencies should be a priority for Cairngorm.

As these facilities are expensive to build and expensive to provide, efficiency is imperative. Efficient operations demand a careful balance between the type, amount, and location of guest services and the overall resort capacity. Cairngorm's guest services are efficient but do not match the needs and number of skiers.

Guest services at Cairngorm are provided in the Day Lodge, adjacent Funicular Building, and on-mountain at the Ptarmigan lodge. Previous operations included the mid-mountain Sheiling lodge which is currently closed.

- The current layout of guest service space is efficient. With the two adjacent base area buildings and one on-mountain restaurant, there is little to no redundancy in guest use space.
- The guest services at Cairngorm are not in balance with the resort capacity, with notable deficiencies in restaurant seating, kitchen/serverly/back-of-house, and ski rental (hire) space.
- Many guest services buildings lack welcoming and wayfinding signage. With many destination visitors at Cairngorm for the first time, signage is necessary to provide an enjoyable guest experience.

It should also be noted that there are spaces within the guest service buildings that don't provide key services to skiers, such as the exhibition hall and cat storage shed in Ptarmigan, and the large ticket/queueing space in the base station building. These spaces, while serving a function for the larger resort operation, do not contribute to the core guest services needs of the skiing population.

7. Parking

On occasion, demand exceeds capacity at the Coire Cas car park. The Coire na Ciste car park provides additional spaces when necessary. Looking forward, public transit options from Aviemore/Glenmore would reduce parking demand and link the places as one resort destination.

There are two parking lots at the main Coire Cas base area, with a combined capacity of approximately 950 cars. From a ski operation perspective, this capacity is enough for all but the busiest days. Utilising an assumed industry standard average vehicle occupancy (AVO) of 2.5, this equates to 2,375 skiers which is just below the CCC of 2,700. There are, however, several factors that affect this capacity for the ski area operation:

- Winter non-skiing funicular users
- People who are walking (or uphill skiing) to the top also use Cairngorm’s parking lots. These guests are not buying lifts tickets, but are still using parking spaces
- The lower of the two parking lots is often used by buses, with up to 16 buses arriving at the area on a busy day. Buses are a more efficient way to get skiers to the hill, as they have a higher capacity relative to the required space for parking (i.e., more buses would raise the parking capacity)
- Employees also parking in the Coire Cas lots

Because of these factors, there is a need for additional capacity beyond the Coire Cas parking lots. On peak days, the car park at Coire na Ciste is used, with shuttle buses transporting skiers to the main base area. This car park has space for about 610 cars/1,525 skiers.

Opportunities should be pursued to increase the frequency and amount of public transportation between Cairngorm and the Aviemore/Glenmore area, which would offer a direct ‘door-to-door’ connection for overnight guests. As a collective ‘resort destination’ this connectivity between the overnight accommodations and related amenities of Aviemore/Glenmore with Cairngorm is a critical part of the resort experience.

8. Coire na Ciste

This assessment was specifically tasked with investigating the possibility of re-establishing the second base area at Coire na Ciste. Analysis has determined that reopening this base area would cause significant operational redundancies and adversely affect the financial viability of the operation—the mountain simply doesn’t have a high enough skier capacity to justify the expense of a second base area. Cairngorm should maximise the operational efficiency by upgrading facilities at the Coire Cas base area, rather than replicate the existing facilities with upgrades at Coire na Ciste.

A standard guideline in mountain planning is that a secondary base area is needed when the capacity of the resort exceeds 8,000 people per day. If visits are less than 8,000 per day, there typically would not be enough revenue generated to support the capital and operational cost of a second base area (costs including construction and operation of a second base lodge, staffing, ticket sales infrastructure, ski hire staff and equipment, restaurants, snowmaking and piste grooming equipment, lift construction and operation).

Beyond this 8,000-visitor guideline, issues with snow-cover, terrain, and operational requirements reinforce that re-establishing a second base area at Coire na Ciste is inefficient and inadvisable. The analysis below expands on this assessment by exploring the requirements, related expense, and potential benefits, of reopening Coire na Ciste.

Lift Access

Based on the car park capacity (500 spaces), a lift at Coira na Ciste would require an uphill capacity of 1,500 pph. Two possible lift configurations were explored.

Option 1

A surface lift would run from the Coire na Ciste car park to the bottom terminal of the West Wall Poma. This lift would be approximately 950 meters in length and require snow covered terrain along the lift

alignment. However, the elevation of the Coire na Ciste car park is 520 meters, well below the Coire Cas base area, and the slopes immediately above Coire na Ciste rarely receive snow. Weather data, resort information, and snowmaking analysis suggest that relying on natural snowfall or traditionally produced man-made snow (i.e., utilising snow cannons) is inadvisable below 620 meters at Cairngorm. At the lower elevations leading to the Coire na Ciste car park, a SnowFactory machine would be an option but tests at Coire Cas showed that would be problematic as well. In addition, SnowFactory machines are significantly more expensive than typical snowmaking machines to purchase and operate. Furthermore, there is roughly 100 meters of completely flat, very difficult to ski terrain down to the car park.

The associated capital costs for this Option include approximately £600,000 for the surface lift and £400,000 euros for the SnowFactory.²¹ Operating costs related to snowmaking on the uptrack and ski run would be approximately £35,000 per year, assuming approximately 1.5 hectares of snowmaking and about 2.5 million gallons of water. In short, this option has very high capital and operating costs without fully improving the guest experience.

Option 2

The second option is an aerial lift from the base area to the bottom of the Coire na Ciste T-bar. This lift would be 1,800 meters in length, and would have both uphill and downhill capacity, eliminating the need for snowmaking around the car park.

An aerial lift would either cost around £2.5 million for a fixed-grip lift or £5 million for a detachable (or gondola). It is important to note that a new installation would not be able to utilise any of the past lift infrastructure; the tower foundations (pylons) were deemed structurally unsound in past analyses.

Though this option has very high capital costs, it is the better alternative of the two options, as it would not require creating a skiable track back to the Coire na Ciste base area.

Winter Operations

Neither of these alternatives provide the most efficient strategy for resolving the two main operational issues that have been cited in support of the case for reopening the Coire na Ciste base area.

- The first argument is that when the road up to Coire Cas is closed by snow, an operating base area at Coire na Ciste would allow the ski area to open. In this situation, a small, scaled-down base area facility would not allow the ski area to open when the road is closed; to open the ski area during a road closure, the Coire na Ciste base area would require a duplicate of nearly everything found at Coire Cas. Adequate customer service for all guests would have to be provided so as not to discriminate between users (ticketing, rentals, snowsports school and some level of food service). Administration would need to be nearby to oversee the operation, and medical services provided. At least one snowcat/pisting machine and some level of maintenance facility would also need to be present, to allow the operations team to access the mountain in the morning to prepare the pistes and lifts for operation. Given the extent and redundancy of guest service and operations facilities required, reopening the Coire na Ciste base area to prevent resort closure when the road is closed would be a very expensive undertaking from both a capital and operational cost perspective. Installing snow fencing or snowsheds (see

²¹ Costs listed in this section were received in euros. Euros were converted to pounds using the Royal Bank of Scotland's currency converter at rates of 0.8170 for Euros as of August 15, 2018.

Part One, Section IV.D.1 The Road) would be a more cost-effective way of limiting road closures and enabling the resort to open.

- The second argument is that a second base area (Coire na Ciste) would alleviate the crowding and lines at Coire Cas in the morning. This issue should be resolved through necessary improvements to the lift infrastructure in the Coire Cas base area, as outlined in this plan. Improving the out-of-base staging capacity at the main Coire Cas base area (see *Part Two, Section II.A Lift Infrastructure*) would be much more cost efficient (both capital and operational costs) than reopening the Coire na Ciste base area which would require additional lift infrastructure, snowmaking, and redundant guest services and operations facilities.

Reopening Coire na Ciste would be an expensive replication of the existing base area that is unwarranted by skier visits and would not markedly improve resort operations or contribute to the financial viability of the resort. The out-of-base capacity is not required, and the additional CCC is not necessary to accommodate visit number goals. As stated later in this document (see *Part Two, Section II.A Lift Infrastructure*), the goal of the upgrading concept for the mountain is not to increase the daily capacity of Cairngorm, but rather to improve the experience which in turn will increase overall utilisation and visits. Given the depth and complexion of the marketplace and identified potential for skier visits, it cannot be assumed that additional lift infrastructure at Coire na Ciste would drive additional resort visitors beyond the assumptions made in this feasibility study.

If the Coire na Ciste base area was built, it would only be 'needed' on days when the car park at Coire Cas exceeds capacity. Given the existing and expected visit numbers to the resort, that is expected to occur only a few days each season. Therefore, the facilities and lift infrastructure at Coire na Ciste would rarely be fully utilised. In that situation, the resort would likely choose not to open the lift and staff the facilities on the vast majority of days.

From a financial standpoint, reopening the Coire na Ciste base area would be a major expense that would be under-utilised and reduce the operational efficiency, possibly threatening the economic viability of the resort.

Summer Operations

Similar logic may be applied to considering the reopening of Coire na Ciste base area for summer operations: the additional capacity is not required, and the potential for additional revenue generation simply would not begin to cover the costs of establishing and operating a second base area.

The current summer operations revolve around the funicular, which operates out of the Coire Cas base area. Concepts for additional summer activities are focused on the Coire Cas base area (see *Part Two, Section III. The Opportunity – Summer*), taking advantage of the funicular operation, existing guest service facilities (both in the base and at Ptarmigan), and the Coire Cas terrain. Creating a central 'critical mass' of summer activities not only allows for an efficient operation from a guest services perspective, but also maximises the 'cross-selling' ability of the activities; guests see all the resort has to offer from one central location, making them more likely to participate in more than one activity (the 'let's go and do THAT next!!' phenomena).

9. Capacity

Cairngorm Mountain's CCC is approximately 2,700, but deficiencies in the existing operation (out-of-base capacity, lift capacities, restaurant seats), and the lack of consistent lower mountain snow cover are keeping the functional capacity of Cairngorm at 1,600 which is MUCH lower than the CCC (see also Out-of-base Capacity and Resort Balance discussions). Currently 2,700 people at Cairngorm is more reflective of an overcrowded, hectic peak day than an average day. Future upgrading concepts should address these deficiencies to all Cairngorm facilities to realise its CCC, which will in turn improve the guest experience and result in a more balanced operation.

In ski area planning, a 'Comfortable Carrying Capacity' (CCC) is established, which represents an at-one-time guest population to which all ski resort functions are balanced. The design capacity is a planning parameter that is used to establish the acceptable size of the primary facilities of a ski resort (ski lifts, ski terrain, guest services, restaurant seats, building space, utilities, parking, etc.).

Accordingly, the design capacity does not normally indicate a maximum level of skier visits or a 'cap' on visits, but rather the number of visitors that can be 'comfortably' accommodated on a daily basis. Design capacity is typically equated to a resort's fifth or tenth busiest day, and peak-day skier visits at most resorts is at least 10% higher than the design capacity.

Comfortable Carry Capacity (CCC) defines a skier visit level where all the infrastructure is being used at its capacity (e.g., there are queues at all lifts, all parking spaces are full, etc.), but that there isn't over crowding (e.g., wait times for ski hire aren't very long, lift queues are manageable, everyone can find a seat at the restaurant, etc.).

The accurate estimation of the CCC of a mountain is a complex issue and is the single-most important planning criterion for a ski area. Related skier service facilities, including base lodge seating, mountain restaurant requirements, toilets, parking, and other guest services are planned around the proper identification of the mountain's true capacity.

Resort CCC is calculated by summing the individual CCC calculation for each individual lift. The calculation is based on a comparison of the uphill capacity (supply) with the downhill capacity (demand) for each lift.

The CCC of Cairngorm has been calculated at approximately 2,700 people as shown in the following table. Skier visit patterns from the *highest skier visit years* of the past fifteen seasons substantiate this CCC—10th busiest days have averaged around 2,600 and peak days have averaged around 3,400.

However, during years with a regular level of visits, the 10th busiest day is around 1,600 skier visits. Given the operational inefficiencies of Cairngorm (i.e., lift closures and delayed openings, slow funicular loading), the *actual/functional* CCC is 1,600 as well. The CCC is a determining factor in skier visit numbers. With the aforementioned inefficiencies detracting from the resort's comfortable capacity and visitor experience, the resort rarely attracts more than 1,600 visitors per day. These lower skier visit numbers correspond to lower revenues, despite operating expenses that remain in line with the higher (2,700) capacity number.

Figure 17. Comfortable Carrying Capacity – Existing Conditions

Lift Name, Lift Type	Slope Length	Vertical Rise	Actual Capacity	Adjusted Hourly Capacity	VTM/Day	Vertical Demand	CCC
	(m.)	(m.)	(pph)	(pph)	(000)	(m/day)	(guests)
Funicular Railway	1,940	447	1,200	540	1,691	4,428	380
Car Park T-Bar	914	148	600	420	434	1,299	330
Fiacaill Ridge Poma	1,044	226	865	433	684	4,189	160
Sheiling Platter	280	52	720	648	238	1,369	170
Coire Cas T-Bar	1,062	239	624	562	941	2,678	350
M1 Poma	992	303	900	630	1,335	5,848	230
Coire Na Ciste T-Bar	805	130	782	704	640	1,712	370
Polar Express Poma	61	12	348	313	26	615	40
Ptarmigan T-Bar	535	82	709	638	368	1,589	230
West Wall Poma	1,617	369	800	720	1,859	5,423	340
Day Lodge Poma	784	159	900	360	400	3,539	110
Total	10,035		8,448	5,967	8,616		2,710

10. Out-of-base Capacity

The primary problem in Cairngorm operations is its out-of-base capacity. The base area has many surface lifts and the funicular, but often some lifts have a delayed opening and the open lifts' capacity cannot match the number of skiers in the base area. A single, high-capacity lift out of the base would alleviate this issue, transporting all skiers up on the mountain quickly and easily.

Out-of-base capacity (or staging capacity) is a critical factor in mountain resort planning; a ski area must have enough hourly capacity in the out-of-base lifts to move all the arriving skiers onto the hill within an hour and a half.

On days when all the out-of-base lifts are operating, the funicular is operating at full capacity, the Day Lodge and Ridge Poma lifts and Car Park T-Bar are running, there is sufficient capacity to meet this criterion. However, it is often the case that all out-of-base lifts are not operating during that critical hour and a half staging period at the beginning of the day:

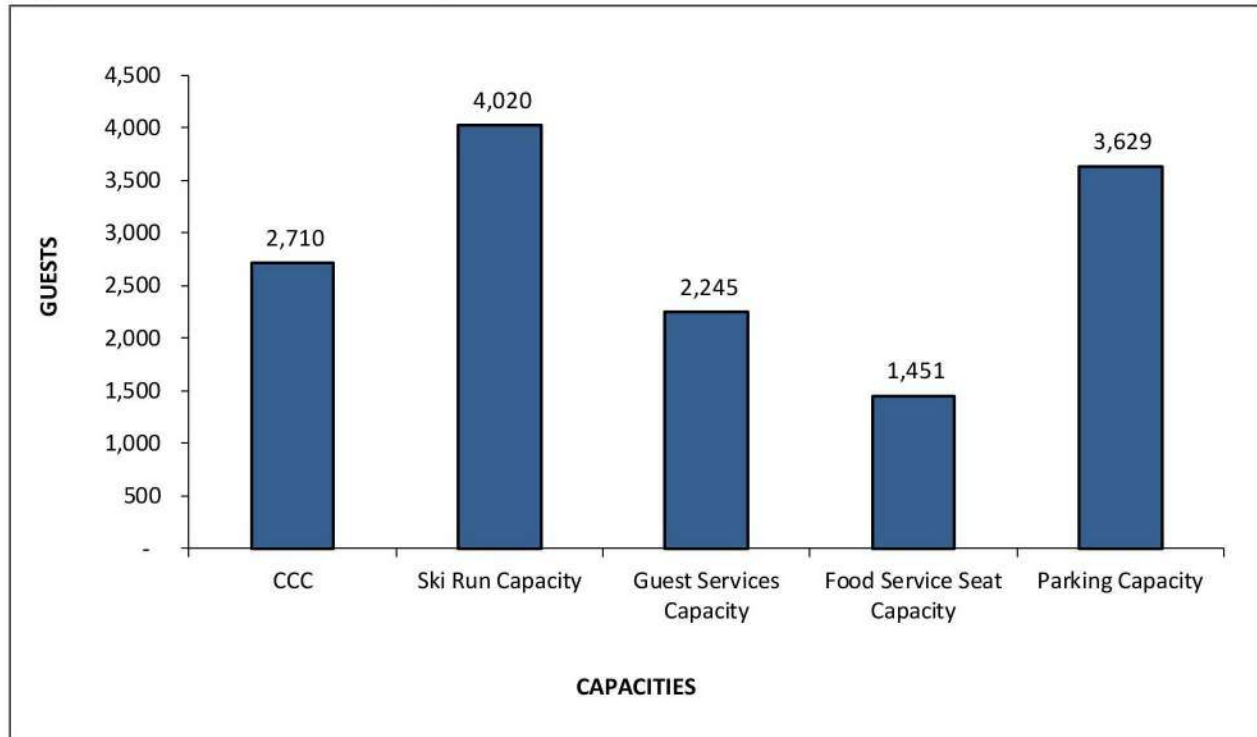
- The funicular occasionally has delayed openings, due to the wind drifting issue. This puts pressure on the surface lifts.
- On days when there is not enough snow at the base area to ride the out-of-base surface lifts, all skiers must ride the funicular.

In either of these situations, there is high demand on the remaining lifts, and lift queues can get very long—there have been situations where there have been hour long queues at the out-of-base lifts. These situations create frustration and a negative experience for skiers. These initial experiences set the tone for the entire visit. A smooth beginning typically leads to a positive visitor experience that leaves the skier eager to return, while a rough start will do just the opposite.

11. Resort Balance

The overall balance of the existing resort is evaluated by calculating the capacities of the resort's various facilities and comparing those facilities to the resort's CCC. The guest services capacity and food service seat capacity are well below the resort's carrying capacity. The importance of those aspects to visitor experience means that the lowest component capacity acts as a limiting factor for the number of visitors.

Figure 18. Resort Balance – Existing Conditions



As the chart above shows, the CCC, ski terrain, and parking capacities are balanced. However, guest services and food service seating capacities are notably lower.

Options should be explored to increase the capacities of these lower capacity components (guest services, food service seating), as they negatively impact the overall resort experience. This in turn adversely affects visits; there is typically a correlation between visits and lowest component capacity. This proves true at Cairngorm as the average 10th busiest day over the past fifteen seasons is about 1,600 people, which is very close to the existing restaurant seating capacity.

12. Utilisation

Utilisation, the extent of the potential visits that the ski area achieves, is a ski area planning metric employed to analyse the success of a resort. The target utilisation rate varies, dependent on day vs. destination resort. Cairngorm, without overnight lodging but close to Glenmore and Aviemore, is a day/destination resort, but has seen utilisation rates drop below the acceptable range for both destination and day resorts.

The utilisation rate of a resort is the percentage of total potential visits that is achieved through actual visits, as measured against its daily capacity (CCC) and length of season. A resort's winter utilisation rate is calculated as: skier visits/(CCC x annual operating days). A high utilisation rate is desirable, as it reflects a more consistent use of the facility throughout the winter season.

Utilisation rates typically range from 25% to 55%. Destination resorts (those with lodging where skiers will go for a week ski vacation) tend to have higher utilisation rates (averaging $\pm 45\%$), while day-use ski areas (those with no lodging and all skiers just come for the day), tend to have lower utilisation rates (averaging $\pm 35\%$). Improving the utilisation rate by increasing annual visitors is an overall goal for most mountain resorts.

Over the past fifteen seasons, Cairngorm has been open an average of 123 days. Considering the variable visitor numbers and a consistent CCC of 2,700, Cairngorm's annual utilisation rates have fluctuated between 15% and 45%, with an average of 25%. Low utilisation rates are very problematic for resorts. The resort is paying to operate the lifts, groom the trails, and staff its facilities without receiving the necessary skier visit levels and revenues to cover those expenses.

There is no overnight lodging at Cairngorm Mountain, but its proximity to Glenmore and Aviemore means the resort functions as both a day and destination area. As such, its average utilisation rate should fall within the 35% to 45% range.

C. Visitor Management Plan

The Visitor Management Plan (VMP) governs operations to ensure that visitors have no adverse impacts on the environment. Activities should be planned within the constraints of the VMP. While changes to the VMP may be possible, it is unlikely Cairngorm Mountain would be successful in arguing for significant relaxation of the closed system and the protections in place given current political and economic realities of doing so.

The planning approval for the funicular resulted in an agreement that required there be a plan for managing non-skiing visitors—The Visitor Management Plan (VMP). The final version of the VMP, agreed in 2000, includes a 'closed system' which operates outside of the ski season and reflects SNH's concerns over their responsibility as agent for the Scottish Government in ensuring the integrity of the adjoining European sites. The 'closed system' agreement includes a range of management provisions to ensure the funicular development has no adverse impacts on the integrity of adjacent EU sites. These include:

- Summer funicular visitors are not allowed out of the Ptarmigan station unless on an approved guided activity within the Ski Area.
- Snowsport customers and ski spectators cannot leave the Ski Area under the terms and conditions of ticket sale.

[Part One: Analysis. The Complexity of the Existing Condition]

- Visitors seeking a short walk are encouraged onto robust trails within the Ski Area.
- Hill walkers/mountaineers are pointed towards robust, well-managed paths leading to the key destinations.
- The Detailed Monitoring Scheme (DMS) is implemented annually to provide evidence to ensure the visitor management arrangements are successful at avoiding damage to the Natura sites or give early warning if they are not.

Access for those who wish to walk in the high hills is retained through the existing footpath network from Coire Cas car park; however, the easy access to the plateau and EU sites previously provided by the chairlift system is not possible under this plan. A comprehensive footpath network extends from the Coire Cas car park. Visitors can access several footpaths, some of which remain within the operational Ski Area boundary and others lead into adjacent areas.

According to the VMP, Cairngorm will offer guided walking/biking experiences from the Ptarmigan within the Ski Area to cater for demand from people who wish to exit the building in a way that avoids damage to the European sites.

The VMP was updated in 2017 to reflect current conditions and monitoring results, but the implications of the plan remain very similar to the original intent. The revised 2017 VMP builds on the first edition (adopted in 2000) and incorporates 'lessons learned' from the experience of managing visitors during operation. It incorporates the findings from the Detailed Monitoring Scheme (DMS), which has indicated improvement in habitats, with no negative impacts to EU sites attributable to the railway operation. This has in turn led to reductions in monitoring, although elements could be reinstated if circumstances change in future. No further reserved management powers have been needed. Monitoring has been carried out on approved changes to the VMP during the first decade of operation and has allowed SNH to have confidence that the changes do not have any damaging impacts on the notified interests of the EU sites.

The 2017 VMP reflects external changes since the opening of the funicular railway, with the most notable being the designation of the Cairngorms National Park, and the Land Reform (Scotland) Act 2003, which provides for a right of responsible access to most land and water in Scotland. The Cairngorms National Park Authority is now the key advisor in the role of access authority and planning authority.

According to the 2017 VMP and the most recent DMS, the operation of the funicular has not been shown to have any significant impact on the overall numbers of long walkers and climbers visiting Cairngorm. Previously, a small proportion of these mountain users took advantage of the access provided by the chairlift. These people now use the Coire an t-Sneachda, the Fiacail a'Choire Chais and the Northern Corries paths.

Cairngorm can request a review of the VMP at any time, in which case SNH/THC must carry out the review, but the costs of review are borne by Cairngorm. Such a review could be triggered by a desire to put in place a 'better' visitor experience than the current system allows whilst ensuring the EU sites remain adequately protected. Information to trigger such a review is unlikely to come directly from the monitoring though monitoring data might help reach conclusions about the consequences of certain changes.

Any significant relaxation of the VMP would require a detailed business case which would have to satisfy SNH. This would be likely to require significant investment in studies to demonstrate to SNH's satisfaction that the proposed changes would not prejudice the EU sites. These costs and associated legal costs in renegotiating the agreement would have to be met by Cairngorm. Proposals would have to make economic sense in terms of any additional site management or other costs which the operator would be expected to cover (e.g., ranger-guided walks, additional paths. etc.).

D. Operational Maintenance Issues

Several operational maintenance issues have been identified at Cairngorm, which in concert contribute to the unsustainability of the existing operation.

1. The Road

The road is a critical link for the ski area. The challenges related to keeping it open during weather events are causing significant delays and closures, which affect the efficiency of the operation, the guest experience, and ultimately number of visitors and revenue; solutions should be explored.

There are a few sections of the access road that are susceptible to blowing and drifting snow, resulting in road closures. This issue was a common theme mentioned during several stakeholder interviews.

The most significant section is the length of road from the Ciste car park up to the beginning of the one-way downhill section. While the new snowblower plow is very effective at helping to clear out these sections, this is still a significant issue and causes opening delays and closures.

Two solutions should be investigated: a short-term and a long-term plan.

- In the short-term, wind fencing should be installed on the uphill side of the road, in accordance with well-established road maintenance techniques. This will cause the snow to drift above the road, helping keep the road clear of snowdrifts.
- If this technique does not prove to be effective a more permanent solution of snowsheds should be investigated. Used extensively in the Alps, snowsheds provide shelter for roads that are prone to drifting snow and avalanches. Snowsheds are very expensive; the more cost-effective snow fencing technique should be fully explored before considering this alternative.

2. The Funicular Line

The funicular line occasionally closes due to snow drifts, hampering the visitor experience for skiing and non-skiing visitors. Techniques should be studied to help alleviate this situation, including snow fencing and/or wind breaks in select locations.

Snow drifting along the line closes the funicular—resulting in long lines at other lifts, a shut-down of the Ptarmigan facility, and a less desirable experience for all guests. There are two specific areas that are problems:

- Snow drifts at the entrance to the tunnel
- Snowdrifts in sections along the line

The snowdrifts occasionally can get deep enough that they cover the tracks and require removal of the snow prior to operation of the funicular.

3. The Surface Lift Tracks

The surface lifts have many downsides that adversely affect the skiing experience at Cairngorm.

The nature of surface lifts has several downsides:

- ***Ride experience.*** It is physically challenging, tiring, and often uncomfortable to ride a surface lift. The Poma lifts take a fairly high degree of skill to ride, particularly the initial take-off.
- ***Snow coverage.*** The lift uptracks that the skiers ride up on must be covered with snow and a groomed surface to be functional. These tracks require snow coverage, which demands a large amount of the snow fencing. Much of the existing snow-fence on the mountain is solely dedicated to the goal of covering the lift uptracks. In addition, snow is farmed and moved from other locations to aid in this uptrack coverage. This is snow, and grooming (piste machine) time, that could be used to maintain the ski runs instead.
- ***Maintenance.*** During windy, snowy, or stormy times, a large amount time and expense is needed to prepare the lift uptracks with the groomers (piste machines). It was reported by mountain operations staff that it often takes two hours just to simply groom out the lift uptracks on mornings after storms. With aerial lifts, that effort could be spent on the ski runs. On days when it is snowing and/or particularly windy, the lifts are occasionally stopped to allow the uptracks to be groomed out again.
- ***Space requirements.*** A lift uptracks takes up terrain that can only be used for that purpose — terrain that could otherwise be used for ski runs. There could literally be another ski run in the place of each of the uptracks. The current lifts were placed in the locations that have the best natural snow cover, to ensure coverage and thus regular operation. However, this means that locations on the mountain that have the best snow for skiing are currently being utilised by the lift uptracks.

4. The Funicular

The funicular is a major asset for the resort but the over-reliance on it is problematic given its limited capacity and non-skier use, and susceptibility to closures. Cairngorm should explore restricting the funicular to a few types of visitors (i.e., ski school, non-skiers).

The funicular is a remarkable machine—providing a fast, comfortable, easy ride from the base of the mountain to Ptarmigan. It can be used during all seasons, day and night, and in virtually all weather. It can be ridden by both skiers (and, notably, snowboarders) and pedestrians. It provides covered and comfortable indoor loading and unloading. In short, it is a huge asset to the resort.

However, there are a few shortcomings with the funicular:

- ***High demand.*** The funicular is a very popular lift, as it is the only non-surface lift at the resort, and as such is the only lift that many skiers prefer to ride. This results in lines can often be very long.
- ***Limited hourly capacity.*** While the funicular has a nominal hourly capacity of 1,200 people per hour, that is only achievable under the most ideal circumstances. This would require that the funicular make the trip in four minutes (only possible at full speed without stops or slow-downs), and then a turn-around time in the terminals of two minutes. This also requires loading 120 people in the funicular every trip, which isn't practical with people carrying skis and

snowboards. In a practical sense, turn-around is closer to six minutes and only 100 people are loaded each trip. This correlates to an hour capacity of closer to 600 people per hour. This is very low capacity for a ski lift as most modern ski lifts can transport 2,000 to 3,000 people per hour.

- **Non-skier use.** On peak ski visit days each winter, there often are 400 to 500 additional non-skiers who ride the funicular. While non-skier use should be encouraged as it brings more visitors to Cairngorm and creates an additional revenue stream, given the current hourly capacity issues this puts an even higher demand on the funicular and exacerbates the negative experience of extended lines.
- **Closures.** As discussed, the funicular is susceptible to snow drifts at various places along the track, particularly at the entrance to the tunnel. Ideally this issue can be addressed to some degree using snow fencing and/or wind-blocks.

The overall winter experience for both skiers and non-skiers alike would be much better served if the primary function of the funicular was to transport ski school groups to the top of mountain learning terrain (and take them back down if necessary) and provide non-skier access to Ptarmigan.

5. Snow Fencing

Snow fencing is crucial to operations at Cairngorm and the system should be used and upgraded as necessary to consistently provide snow on the slopes and reduce snow drifting.

Snow fencing is used extensively and effectively as a 'snow farming' technique at Cairngorm. Without snow fencing, there would often not be any skiable runs at the resort, as evidenced by the bare slopes that often exist adjacent to the ski runs with snow fencing.

- Most of the named, maintained runs at Cairngorm have snow fencing
- Some of the snow fencing is an older, less effective type of fencing that has vertical (rather than horizontal) slats
- The recently installed snow fencing conforms with the latest thinking in snow-fence design (horizontal slats), which has been shown to be effective in installations all around the world
- The older style of fencing should eventually be replaced with the more modern horizontal slat fencing

As previously discussed, it is worth testing the possibility that snow fencing could also be used effectively to reduce the frequency and extent of snow drifting on the access road and the entrance to the tunnel of the funicular.

6. Lower Mountain Terrain

The lower mountain, the terrain above and surrounding the base area, often struggles with reliable snow cover, creating operational challenges. Improving the reliability of snow conditions on the lower mountain terrain would alleviate many of these issues.

Due to warmer temperatures, typically experienced during early season and periodically throughout the season, the lower portion of the mountain (the base area/day lodge up the mid-station on the funicular) occasionally does not have enough natural snow coverage for skiing.

During these periods, the only way to ski the mountain is to ride the funicular from the base up to the upper portions of the mountain, where snow coverage is more reliable. During these times, the funicular stops at the mid-station to allow skiers to repeat-ski the upper portion of the mountain. This further reduces the hourly capacity of the funicular.

7. Snow Safety

Explosives are used effectively around the world by snow safety crews to control avalanches. Without the use of explosives, there is no way to assure that steeper slopes will not slide. The mountain/ski patrol at Cairngorm does not use explosives to control snow slope stability but should be provided the means to do so.

Explosives are used effectively around the world by snow safety crews to control avalanches. Without the use of explosives, there is no way to assure that steeper slopes will not slide.

The mountain/ski patrol does not use explosives to control snow slope stability. As a result, a significant amount of upper mountain terrain is closed on days following significant snow storms. These are the times that it is most important to open the whole mountain when snow conditions are optimal, and demand is high, especially for upper ability level terrain found in the upper mountain areas.

The ski patrol should be given the budget, equipment, and training necessary to effectively use explosives to control avalanches and be able to open the whole mountain on days with fresh snow. The importance of this from a marketing/word-of-mouth standpoint cannot be over-estimated—skiers will stay away if the mountain has a reputation of not having good terrain open on powder days.

V. PLANNING AND REGULATION

While the planning and regulatory process surrounding Cairngorm involves several phases, the individual steps in the process and how to navigate them is clearly defined. There is also considerable support available in each part of the process. As Cairngorm management moves forward it will need to continue its collaboration with the regulatory bodies, work through the process and allocate time and resources to do so.

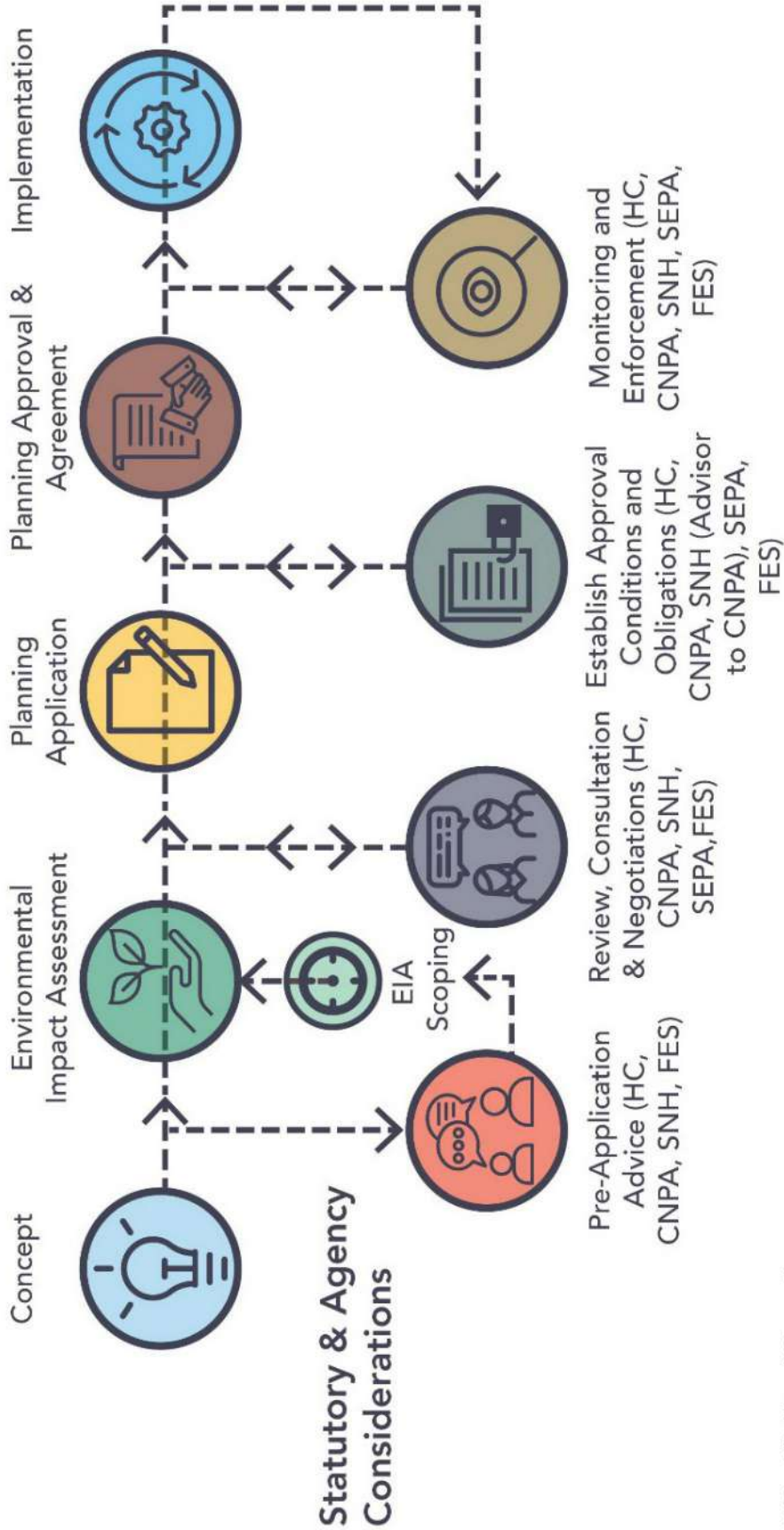
There are layers of planning authority and environmental regulation in place at Cairngorm. All planning applications for Cairngorm Mountain must be made to the planning department of the Highland Council, the local authority whose jurisdiction the ski area is within. The Highland Council checks that the application includes all the information needed to determine it and registers receipt of the application. Once the application is registered, the Highland Council will also notify Cairngorms National Park Authority (CNPA) of the application, as they do with all planning applications made in the National Park. The Highlands Council provides application forms and 'pre-application advice' on how to make a planning application and whether the application is likely to be approved or refused. A planning application may also be submitted online through the Scottish Government ePlanning portal.

The CNPA has 21 days to decide whether to 'call in' and determine a planning application. If an application is called in, the CNPA notifies the Highland Council, the applicant and any consultees that it has called in the application.

All planning applications in the National Park are assessed against the Cairngorms National Park Local Development Plan 2015 (LDP) whether it is the CNPA or the local authority that makes the decision. The CNPA prepares the LDP and other planning guidance for the National Park and all five local authorities as well as the CNPA use them to decide planning applications in the National Park.

If an application is called in by the CNPA, then a planning officer will process the application and make a recommendation to the CNPA Planning Committee. It is the CNPA Planning Committee who make the final decision. If an application is not called in, then it will likely be decided by the Highland Council Planning Committee.

Project Development Process



- HC = Highland Council
- CNPA = Cairngorm National Park Authority
- SNH = Scottish Natural Heritage
- SEPA = Scottish Environmental Protection Agency
- FES = Forest Enterprise Scotland

A. The Highland Council

In terms of Cairngorm regulations and planning, the Highland Council acts as the first line of review in any planning application. The Highland Council is also Cairngorm's best avenue for pre-application advice and feedback on proposals, plans, and applications.

Scotland is divided into 32 areas designated as 'council areas' or 'local authorities.' Cairngorm Mountain falls within the Highland Council area, serving 232,000 people across 26,484 km². The Highland Council has 74 elected members, serving on 11 four-member wards and 10 three-member wards.

Important strategic, regulatory and local committees governing Cairngorm Mountain include:

- Environment, Development and Infrastructure Committee
- South Planning Applications Committee
- Planning Review Body
- Highland Licensing Committee
- Highland Licensing Board
- Badenoch and Strathspey Area Committee

B. Cairngorms National Park Authority

In terms of Cairngorm regulations and planning, the Cairngorms National Park Authority (CNPA) produces and manages the Cairngorms National Park Local Development Plan, Supplementary Guidance, and the Cairngorms Planning Advice notes that explain parts of the planning process. The CNPA also monitors the planning permissions they grant and has powers to enforce planning conditions if development does not comply with them.

The purpose of the CNPA is to ensure that the National Park's aims, as set out in the National Parks (Scotland) Act 2000, are collectively achieved in a coordinated way. The four aims set out in the National Parks (Scotland) Act 2000 are:

1. To conserve and enhance the natural and cultural heritage of the area
2. To promote sustainable use of the natural resources of the area
3. To promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public
4. To promote sustainable economic and social development of the area's communities

In addition to working alongside the Park's five local authorities to review all planning applications, the CNPA provides several services to support businesses, land owners and local communities within and around the National Park to deliver three strategic outcomes: 1) Conservation, 2) Visitor Experience, and 3) Rural Development.

C. Scottish Natural Heritage

In terms of Cairngorm regulations and planning, Scottish Natural Heritage (SNH) consults on planning application evaluations and has been involved in agreements and monitoring for planning approvals. Environmental Impact Assessments, also part of the planning application process, are in their domain. And once the application is submitted, SNH serves as the primary advisor to the Planning Authority. SNH may have a role in monitoring the development of the new facilities at Cairngorm depending on the conditions attached to the planning permission. In addition, SNH is charged with managing the Natura sites upland from Cairngorm Mountain, which have protected status under the EU Habitats and Wild Birds Directives.²² To protect these important sites, SNH ensures Cairngorm’s operations ‘maintain the land in favourable conservation status’ through monitoring and evaluation. To comply with the Habitats Regulations, SNH must evaluate and provide consent for any proposed improvements that could have a likely significant effect on the EU sites.²³ This provision applies to improvements within and outside the site boundaries.

SNH is the lead public body responsible for advising Scottish Ministers on all matters relating to the natural heritage.

SNH’s purpose is to:

- secure the conservation and enhancement of nature and landscapes;
- foster understanding and facilitate enjoyment of nature and landscapes;
- advise on the sustainable use and management of nature and landscapes;
- further the conservation, control and sustainable management of deer in Scotland; and
- SNH also advises local authorities, and works with the Scottish Parliament and public, private and voluntary organisations towards shared aims.

D. Scottish Environment Protection Agency

In terms of Cairngorm regulations and planning, the Scottish Environment Protection Agency (SEPA) is primarily involved with ensuring the protection of water and other important natural resources. Water courses on Cairngorm Mountain lead into Loch Morlick (a designated public beach), which has a currently high-water quality standard (‘great’ or ‘excellent’) that must be maintained. Sewage treatment at the mountain, earthwork and surface runoff, and potential impacts from snowmaking are all important considerations.

SEPA is Scotland’s principal environmental regulator, regulating activities that could lead to pollution or environmental damage.

SEPA protects and improves Scotland’s environment in several ways. These include helping regulated operators and individuals to understand and comply with environmental regulations and to realise the many economic and social benefits of good environmental practice.

²² Directives 92/43/EEC and 79/409/EEC, respectively.

²³ The Conservation (Natural Habitats, &c.) Regulations 1994, as amended

Responsibilities include regulating:

- activities that may pollute water
- activities that may pollute air
- waste storage, transport, treatment and disposal
- the keeping and disposal of radioactive materials
- activities that may contaminate land

E. Forestry Enterprise Scotland

In terms of Cairngorm regulations and planning, the Forest Enterprise Scotland manages the forest north of the ski resort; the northern edge of the ski resort (along the road) borders the forest. The road up to the ski resort passes through this forest and FES manages this road. The road is susceptible to closures with weather events. FES also manages outdoor recreation opportunities and the visitors centre at nearby Glenmore Park.

FES is the agency of the Forestry Commission responsible for managing the National Forest Estate. The National Forest Estate makes up 9% of the country's total land area and more than 32% of its woodlands. FES's work includes:

- timber management
- Renewable energy
- Conservation and the environment
- Tourism and recreation
- Local communities
- Health, safety, and wellbeing of forest users

FES is divided into twelve districts where each district manages the forests within its district. FES prepares forest management plans, district strategic plans, and specific resource plans. Each district will manage timber, carry out forest conservation projects, and construct and maintain trails and other recreation facilities.

PART TWO: THE PLAN. *OPPORTUNITIES FOR THE FUTURE*

Considering the complexity of the current condition, Part Two of this review explores opportunities for Cairngorm’s future. A similar puzzle of interconnected pieces must be considered as part of this exploration, including:

- Lift infrastructure and implementation phasing
- Terrain and snowmaking
- Guest services – Ptarmigan, Sheiling, Base Area
- Multi-season activities

Key benefits of each proposed concept are highlighted in bold italics, calling attention to the possible improvements to the guest experience, operational efficiency, and/or revenue generating potential that each solution may provide in the future.

I. DEFINING THE DESTINATION

Cairngorms National Park. Aviemore. Glenmore. Cairngorm Mountain. A united destination. A diverse experience. Greater power of attraction.

When visitors are coming to Cairngorm it is within the context of the broader destination; they blur the lines between the town of Aviemore, Glenmore and the ski area. Cairngorm and the larger community should respond in kind, and continually work together to present a unique experience and seamless message about the destination.

II. THE OPPORTUNITY – WINTER

The current winter guest experience is sub-standard and fails to meet market demand. Assuming the mountain is open (which as noted throughout the analysis of existing conditions is not a foregone conclusion), beginning of day lines are prevalent, forcing many guests to queue for tickets, ski hire, a cup of coffee, and to get up onto the mountain. Once on the mountain the snow surface is unreliable, and many lifts are often closed. At lunch the queuing continues, and the chances of getting a seat on a busy day are slim. In the current competitive marketplace skiers will not tolerate such conditions, and once experienced are unlikely to return.

The upgrade concept for Cairngorm addresses all negative aspects of the current condition, creating a more desirable—and competitive—experience for visitors. This in turn facilitates increased revenues, through the increase in skier visits and the ability to increase revenue per visit. The concept is also focused on creating a more efficient, and thus economically viable operation. This is primarily accomplished through the upgrading of the lift infrastructure from surface to aerial lift technology and the installation of a snowmaking system. Collectively these upgrades reduce operational expenditures while also significantly improving the on-mountain experience.

A. Lift Infrastructure

The upgrade concept significantly reduces the total number of lifts, providing a greatly improved, and more competitive guest experience and a more efficient operation. The proposed improvements are not intended to increase the CCC, but rather allow the resort to well-meet its existing CCC.

This concept replaces most of the surface lifts with three, strategically-placed aerial chairlifts. The aerial lifts will free up the surface for the creation of more ski runs and eliminate that operational task of continually grooming/maintaining the surface lift uptracks.

The three chairlifts are proposed to be high-speed six-passenger detachable chairlifts. The two reasons for proposing this technology are:

- **Higher hourly capacities.** This allows for fewer lifts and will result in shorter lift queues.
- **Heavier chairs.** High winds are frequently experienced at Cairngorm. Six-passenger chairlifts can be run in windspeeds up to 100km/hour.

The concept also includes the addition of a base area carpet conveyer lift to provide a ‘best-in-class’ beginner experience, regardless of weather.

The specifications of the proposed upgraded lift network are included in the following table. The impact of the high-capacity lifts can be seen in the VTMH column. Both Phase One and two lifts have more than twice the VTMH of any of the existing lifts.

Figure 19. Lift Specifications – Upgrade Plan

Lift Name, Lift Type	Top Elevation	Bottom Elevation	Vertical Rise	Slope Length	Average Grade	Actual Capacity	Rope Speed	Carrier Spacing	VTMH	Lift Maker/ Year Installed
	(m.)	(m.)	(m.)	(m.)	(%)	(pph)	(m./sec.)	(m.)		
Funicular Railway	1,087	639	447	1,940	24%	1,200	10.0	3600	536,744	Doppelmayr 2000
Sheiling Platter	755	703	52	280	19%	720	2.0	10	37,722	SunKid 2016
Polar Express Carpet	1,099	1,087	3	32	10%	600	0.6	4	1,800	Proposed
West Wall Poma	1,003	714	289	772	24%	800	4.0	18	231,163	Poma 1986/2016
Day Lodge Poma	800	641	159	784	21%	900	4.0	16	142,833	Poma 1988
Lift A	1,018	630	388	1,982	20%	3,200	5.0	34	1,240,778	Proposed
Lift B	1,180	747	433	1,526	30%	3,000	5.0	36	1,298,970	Proposed
Lift C	1,164	956	208	1,242	17%	2,400	5.0	45	498,641	Proposed
Base Area Carpet	1,023	1,020	3	31	10%	600	1	3.6	1,800	Proposed

The lift improvements proposed in this concept maintain the CCC of the resort, and accomplish two important goals:

- 1) Increase operational efficiencies. Increased efficiency of the lift network leads to reduced operational costs. The savings associated with the upgrade plan are quantified in *Part Three: The Financials*.
- 2) Improve the quality of experience. Addressing the significant out-of-base lift capacity deficiency and replacing surface lifts with aerial chairlifts results in a better experience. The aerial chairlift is faster, reliable, and has a higher capacity than the existing lifts, reducing queues in the base area. On the lift, the high-speed detachable technology results in the shorter ride times and more comfortable ride that skiers have come to expect. And while riding the six-person lifts, whole families and groups of friends can sit together, better enjoying each other's company and their day at Cairngorm. This will result in Cairngorm becoming more competitive in the marketplace, enabling Cairngorm to increase its utilisation so that it may once again achieve 150,000 skier visits a year.

1. Lift Infrastructure Phasing Strategy

The chairlifts would be constructed in a phased approach. This phased approach would allow the management team 'pause' between projects, to fully understand the financial benefits of achieving the two primary goals of each lift installation (increasing efficiency and improving the experience) and make calculated decisions regarding moving to the next phase.

Phase One

The Phase One lift improvements would resolve the out-of-base capacity issue with a 3,200 pph aerial chairlift out of the Coire Cas base area.

Removal of the Car Park T-Bar, the Fiaciall Ridge Poma, and the Coire Cas T-Bar. Replace the function of these surface lifts with a single six-passenger chairlift operating at 3,200 pph.

The out-of-base capacity issue, and the overloading of the Funicular, would be resolved with this lift. At 3,200 pph it has the capacity to move the entire capacity of Cairngorm (i.e., 2,700 people) up the mountain in less than the morning access period (one hour and a half) while also accommodating round-trip skiers. This would vastly improve the visitor experience, reducing queue times and ride times. The high-speed lift and associated experience would be in line with what British destination skiers travel for and have come to and expect. With this lift, Cairngorm could once again be a destination resort for British skiers. While revenues would increase with this lift and the additional skiers, operational expenses would decline as the lift would make resort operations more efficient. The resort would no longer need to groom three lift lines or provide snow cover on the tracks (see *Part Three: The Financials* for the quantified cost benefits).

The addition of a base area carpet conveyer lift would greatly improve the experience for beginner skiers by providing an effective and efficient beginner area at the base, even in inclement weather.

Phase Two

The Phase Two lift improvement, an up to 3,000 pph aerial chairlift, would link areas of the mountain via a high-speed lift and access race terrain to facilitate races and training.

Removal of the M1 Poma. Replace the function of this surface lift with another high-speed six-passenger lift. This lift could be installed at a lower hourly capacity as it would not have the same out-of-base demand as the Phase One lift.

This lift would provide the necessary connectivity from Coire Cas to Coire na Ciste, as well as providing access to excellent repeat-skiing opportunities on M1, White Lady, Coronation Wall, etc.

Having a high-speed, high-capacity lift to use for race training would be a vast improvement to the race venue. This lift would resolve the issue of providing top-to-bottom access to the race training arena on White Lady. The bottom terminal of this lift would be located at the bottom of the White Lady run, in the vicinity of the old White Lady tow bottom terminal. This configuration would create a very positive race training experience, increasing the utilisation of the facilities.

In addition to providing access to the race training terrain, the lift would provide access and connections across the ski resort. The bottom terminal is easily accessed from the Scottish Ski Club building. From the top terminal (located at the top of the mountain), skiers could ski the western terrain, or head back down towards the Day Lodge.

Phase Three

The Phase Three lift would provide an improved experience for the lower ability level skiers on the upper mountain, as well as increase the lift capacity, lowering lift queue wait times across the mountain.

Removal of the Ptarmigan and Coire na Ciste T-Bars. Lowering the top terminal of the West Wall T-Bar. Replacement of the function of these surface lifts with a third high-speed six-passenger lift. This lift could be installed at an even lower hourly capacity than the Phase Two lift.

This is the lowest priority project, but one that would complete the process of modernising the uplift infrastructure at Cairngorm.

B. Terrain Improvements

In total, approximately 18 hectares of ski runs are envisioned to be added to the lift-served terrain network. Additional terrain makes Cairngorm more enticing to destination skiers looking to ski multiple days.

As discussed, the terrain at Cairngorm is excellent and doesn't need much improvements. That said, the removal of several surface lifts and the terminal locations of the proposed aerial lifts present opportunities to create additional ski routes that would complement the existing terrain and the proposed lift alignments. Furthermore, additional terrain would make visiting Cairngorm more enticing to destination skiers. Destination skiers typically choose to take ski trips to resorts with lots of varied terrain. Therefore, with more terrain, Cairngorm would be more attractive.

1. The Beginner Experience

Providing a 'best-in-class' beginner experience is critical to attracting and maintaining the family market, as well as ensuring the future sustainability of the sport. Additional conveyer lifts for beginner skiers would enable Cairngorm to offer a great beginner experience regardless of weather.

The beginner ski experience at Cairngorm would be improved by the addition of two conveyer lifts:

- ***Replacing the Polar Express Poma with a new conveyer.*** This would continue to serve the ski school programming that occurs up at Ptarmigan on nice days.
- ***Base area conveyer.*** Located at the base of the resort to complement the terrain at the top of the mountain and serve the ski school programming during inclement weather.

The Sheiling Platter would stay in place.

Appealing to British families looking to teach their kids to ski is crucial to the continued success of the resort. Surveys have shown that many British families have a strong desire or preference that their children learn to ski in Britain. This represents a large potential market for Cairngorm. Family visitors are great sources of revenue for the resort and area, spending money on tickets, ski hire, lessons, and lodging for multiple days. And providing a great visitor experience would encourage these families to return to Cairngorm year after year.

2. Snowmaking

The addition of a robust snowmaking system would enable Cairngorm to ensure snow coverage on a significant portion of the runs for the entirety of the ski season, including the lower mountain and critical base area environment.

The snowmaking system, providing coverage to key locations on the mountain (approximately 30 hectares of coverage) including the critical lower mountain terrain, would include fully-automated fan guns located strategically to be able to make snow in various wind situations.

The snowmaking coverage is envisioned to include most of the Coire Cas terrain in Phase 1 (except for Fiaciall Ridge), and the M1, White Lady, and M2 runs in Phase 2. These runs are thought to give the most improvement to the ski experience and the best return on investment. Additionally, this plan maximises snowmaking coverage in less wind-prone areas. If snowmaking is found to be effective, additional funding is available, and accompanying water sources are found, then expanded coverage could be considered in the future.

The following table details, on a conceptual level, the coverage area by phase, length of pipe and power lines, the number of guns, and the water and power requirements. These numbers are based solely on general industry specifications and averages—no level of engineering has been done.

Figure 20. Snowmaking Coverage Area

	Phase 1	Phase 2	Total
Coverage area (hectares)	16	14	30
Length of snowmaking pipe and power lines (km)	6.5	5.4	11.9
Number of hydrants	130	108	238
Volume of snow required (cubic meters)	180,000	150,000	330,000
Snow density	55%	55%	
Volume of water required (cubic meters)	99,000	82,500	181,500
Number of fan guns	13	10	23
Power requirements (kW) per fan gun	20	20	
Power requirements (kW) Total	260	200	460
Water requirements (Liter/Minute) (at -2 c) per fan gun	160	160	
Water requirements (Liter/Minute) (at -2 c) total	2,080	1,600	3,680

Note that the amount of water required to make snow at any location can vary significantly due to temperature and humidity. The above analysis makes some assumptions based on the high temperatures and humidity found in Cairngorm and assumes a similar water use per hectare at ski resorts found in similar climates worldwide.

Despite the frequent high winds at Cairngorm, analysis of available weather data, and the results of on-site snow gun testing over the past few years show that there are sufficient periods of conducive weather (temperature, humidity, and wind and direction) to enable the resort to effectively use snowmaking equipment. This is particularly true in the lower, more protected, parts of the resort in Coire Cas - which is where most of the proposed snowmaking coverage is located.

A detailed Snowmaking System Master Plan will be required to determine the extent of the system. Analysis of water withdrawal capacity is required prior to any further system design and engineering.

3. Technology

Many of the operational challenges that Cairngorm Mountain faces are not entirely new within the ski industry, and in many cases modern technologies have been developed to address them. Capitalising on best practices and ski industry technology will be critical to the continued success of Cairngorm.

Several new technologies are available that would likely add functionality and improve the ski experience at Cairngorm.

- Weather and snow condition monitoring equipment. Given the speed with which weather changes at Cairngorm, having more monitoring equipment installed at key locations around the mountain could help the operations team anticipate and quickly respond to changes in conditions.
- Lift data. Modern ski lifts have numerous monitoring systems built into them, including weather monitoring, operations, even lift queue wait times. These are all available remotely.
- Snow depth gauges. Modern snowcats (such as the PB 600s in use) may be outfitted with technology that shows the depth of snow at any given location of the cat. This allows for better snow depth management, and extended ski seasons, as excess snow may be moved to locations where the cover is thin.

4. Ptarmigan Expansion

The already proposed expansion and remodel of the Ptarmigan would improve the operations, capacity, and visits across the resort.

The expansion and remodel would significantly increase the seating and guest service space capacity of this facility. In turn, this would address the seating deficit and imbalance of guest service space relative to resort capacities. In addition, the expanded viewing area would significantly improve the on-mountain experience for the non-skier.

Combined with the Funicular, the expanded Ptarmigan facility creates a unique experience that could attract destination visits year-round. For skiers, the expanded facilities would reduce crowding at lunch time, improving both the lunchtime and overall experience. Reduced crowding would facilitate more people to purchase their lunch at the resort, increasing the resort's food and beverage revenue. Coupled with riding the funicular, eating lunch with such dramatic views at the Ptarmigan facility is a unique Cairngorm experience that could attract destination skiers and other visitors year-round.

5. Sheiling Restaurant

In concert with the Ptarmigan expansion, reopening Sheiling would provide much needed seating capacity, and bring the resort capacities into better balance.

In addition to Ptarmigan, it is recommended that the Sheiling facility be brought back into operation as a lunch restaurant. Adjacent to the bottom terminal of the proposed Phase Two lift, this facility would be conveniently located and in high demand. By providing an additional restaurant facility, the existing lunchtime crowding would be dispersed across the resort, creating a more pleasant experience at each facility. Without the threat of crowds and long lines, more visitors would choose to purchase lunch at resort restaurants, increasing the resort's food and beverage revenue.

6. Base Area Facilities

Improving the base area guest services will address deficiencies and improve the Cairngorm experience in both winter and summer and benefit both skiing and non-skiing guests.

Analysis of the existing operation identified a significant deficit in food service space (seating and kitchen/servery/back-of-house) and a shortage of ski hire space. The Ptarmigan expansion and re-opening of Sheiling would largely address the former, though there would still be a slight shortage of seating.

As such, at some point in the future Cairngorm should consider expanding the amount of guest services space in the base area. This could be achieved by enclosing the space between the Day Lodge and the Base station buildings, creating a 'one-stop-shop' efficient service centre, with all guest services under the same roof.

III. THE OPPORTUNITY – SUMMER

The current summer guest experience is limited. While the funicular ride and views from Ptarmigan are spectacular, it is not what many visitors to Cairngorm are seeking as evidenced by the number of arriving visitors that fail to even get out of their cars. This is compounded by the inhospitable base area environment which does not encourage guests to linger or explore.

The upgrade concept for Cairngorm expands on the current offering and is focused on broadening the experience to a broader audience by providing activities that offer ‘something for everyone’ and complement the existing recreational complexion of the larger Aviemore/Glenmore area. As with the winter concept, these upgrades significantly improve the Cairngorm summer experience as well as the revenue-generating opportunities of the summer business.

A. Positioning

Cairngorm sits within a region that experiences significant summer visits and provides visitors with a wide variety of outdoor adventure-related activities. When thinking about opportunities for summer operations at the mountain, this larger context must be considered. What can Cairngorm offer that highlights the unique mountain environment and complements the broader experience of the National Park-Aviemore-Glenmore?

The recreational offerings of the region provide a myriad of opportunities to experience the scenic beauty and natural attributes of the area. The existing summer operations at Cairngorm contribute to this offering by providing access to the mountain environment and the stunning views that the mountain affords. Moving forward, the mountain should continue providing unique opportunities to experience the mountain environment, in ways that broaden the appeal to a larger portion of the already-captive audience that visits the region every summer.

B. Building on the Existing: Funicular, Ptarmigan, and the On-mountain Experience

The proposed improvements to the on-mountain experience at Cairngorm will enhance the unique attraction of the funicular as it continues to be an effective driver of summer visits to the mountain.

The funicular is a great summer asset, providing a unique mountain experience that drives visitors to Cairngorm. Building upon the current extent of the funicular experience would allow this attraction to be a better ‘magnet,’ and increase year-round visits to the mountain.

The proposed expansion of Ptarmigan will greatly enhance both its utility as a food service venue and the visitor experience at the top of the mountain. The expanded and improved viewing platforms will create a more desirable ‘outdoor’ experience of the mountain top, and the increased seating capacity improves the attractiveness of the venue for banquets and special events.

While access beyond the building is not allowable without a guide, a more accessible (with gentle gradient) walking path loop, coupled with frequent scheduling, would facilitate a guided experience that may be attractive to more mountain top visitors.



C. Mountain Coaster

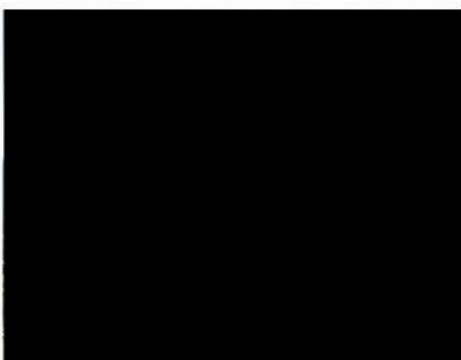
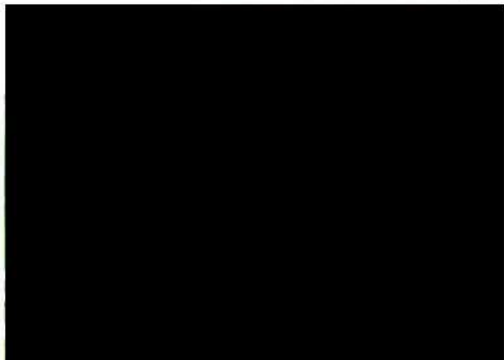
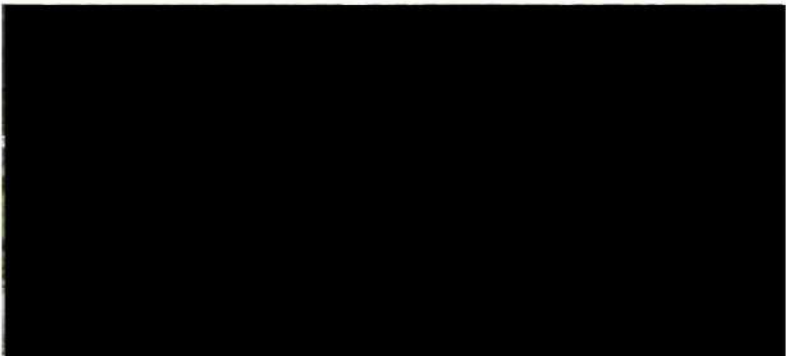
A mountain coaster ride is a unique way to experience the mountain environment and would be a beneficial addition to the base area experience at Cairngorm.

The mountain coaster is an evolution of the alpine slide. Riding an alpine coaster involves traveling in a self-braking, two-person sled which travels on two tubular rails. This allows for a closed loop system, so that participants begin and end their ride in the same location. The ride is exciting and varied, and may include curves, corkscrews and downhill stretches. Centrifugal brakes control maximum speeds, and riders may control their speed at all times allowing for a unique hands-on experience for all ages.

It requires no specific skill or training of the participant and does not require a considerable time commitment (assuming no time is spent queuing, a ride experience may be accomplished in less than ½ hour). Typically pricing for this activity is low (£10). It is a fun activity for the whole family, and a perfect alternative to visitors to Cairngorm who may want to experience the mountain and enjoy the view, but do not have the time and/or money to take a funicular ride.

The mountain coaster may operate year-round. The track's supporting structure sits directly on the ground (from 3 to 20 feet off the ground), with limited foundations (depending on the design of the track). Track placement is uncomplicated, allowing a high degree of flexibility of installation. Streams, ravines, uneven/steep sections, even ski trails may be easily crossed as needed.

The mountain coaster alignment and location shown in the Summer Concept is a preliminary Alpine Coaster concept developed by Wiegand, the world's market leader in the Mountain Coaster industry. The staging area for the coaster concept is on the east side of the funicular building, so that it may be visible and easily accessed by visitors arriving at the base area.



D. Zip Line Tour

Similar to a mountain coaster, a zip line tour is also a unique way to experience the mountain environment. A zip line tour system is designed as a multi-stage zip line tour that allows the customers to explore the terrain of a mountain resort via multiple zip line spans and short walks in between the spans. Customers can 'fly' over the steep bowls and off-piste resort terrain previously only accessible to skiers. It is a mountain experience unlike anything else. Parallel zip lines and the ability to control the speed of descent enhances the zip line ride experience.

While requiring no specific skill, some physical fitness is required and there is some training required to familiarise participants with the harness and braking system. In contrast to the coaster, a zip line tour is typically between two and three hours in duration (including the initial training and orientation) and has a higher price point (£100). The tour would appeal to the more adventurous at heart who have come to the area for an outdoor-adventure oriented experience.

The zip line tour system shown in the Summer Concept is a ZipTour® preliminary concept developed by Zip Rider that features three long zip lines. The tour begins with a ride up the funicular and a short walk to the beginning of the first zip line and ends in the Coire Cas base area just below the day lodge.

A ZipTour® differs from other zip line tours because of the use of patented trolley technology, a dynamically controllable device that allows the customer to control their speed of descent and ride experience. Zip Rider is the only zip line company in the world that offers this technology, which allows the implementation of long zip line spans that can descend from the mountain summit to the base area in just 2 to 4 spans. As participants approach the landing platform of each span they begin to slow their trolleys down and come to a stop over the deck. The guides lower them to the platform and place their trolleys into their backpack to prepare them for the walk to the next span.

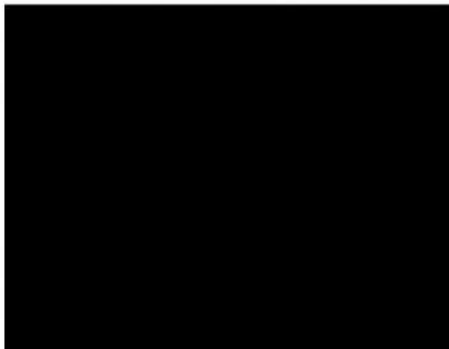


E. Mountain Biking

Downhill mountain biking has long been recognised as a ‘complementary’ summer athletic pursuit to winter skiing/riding. While the activity does require a certain level of physical fitness, the advent of ‘flow’ style downhill riding, and the creation of trail systems that accommodate a broader ability level range of riders has increased the appeal and accessibility to the marketplace. Additionally, as an activity, mountain biking is consistent with the ‘outdoor adventure’ orientation of the Aviemore area visitors/residents.

In 2015 the current operating group at Cairngorm engaged industry experts Gravity Logic to undertake an Initial Consultation and Operational Assessment for downhill mountain biking at Cairngorm. The inquiry into mountain biking is consistent with a global trend in the mountain resort industry. With the recent advent of Mountain Bike Parks, a combination of trail networks (downhill/flow, cross-country, casual off-road riding) and bike skill development areas, mountain biking has become a popular summer-time activity at many ski areas. Development of these parks has allowed bike operations at ski areas and mountain resorts to evolve beyond technical single-track trail systems into areas that bring people of different skills and fitness into the sport, expanding the market appeal and financial viability of the operation. As part of mountain biking operations, ski areas typically rent activity-appropriate bikes and associated gear, as well as offer lessons and group tours, increasing the accessibility of the sport and revenue generating opportunities.

While cross country mountain biking is offered throughout the region, including the Glenmore Lodge, the only other lift-served downhill biking in Scotland occurs at Nevis Range. Given the growing popularity of the sport, there is room in the marketplace for more downhill venues.



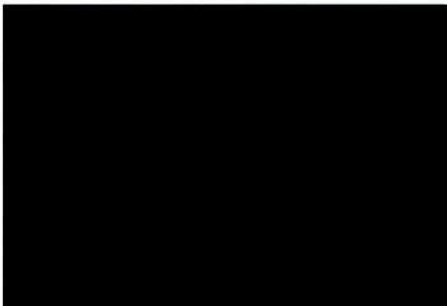
The Gravity Logic study confirms the feasibility for downhill mountain biking at Cairngorm. The initial Gravity Logic concept features popular ‘flow’ trails of all ability levels, accessible from the funicular. The trail plan is certainly very preliminary in nature and given the fragile nature of Cairngorm’s mountain environment would require significant additional planning and design prior to implementation. Further refinement should also focus on the addition of more lower ability level terrain, as current trends in trail design show this to be the most flexible alternative for attracting a broader audience.

Initial conversations with regulatory agencies identified concerns around a mountain biking operation, specifically around potential erosion issues created from the construction and on-going maintenance and operation of the trail network, and the ability to contain riders within the Cairngorm operating area and preventing them from venturing into adjacent protected habitat areas within Glenmore Forest Park. Pursuit of establishing mountain biking at Cairngorm will require continued agency coordination and regulatory compliance.

F. Base Area Experience

Despite the viewing opportunities, the base area in the summer is not attractive. Little attention has been paid to creating a welcoming environment that encourages arriving visitors to get out of their car. Creating a more inviting outdoor seating area, additional viewing locations, and accessible (without a lot of gradient change!) walking paths that connect the various activities and areas of interest, would greatly improve the base area experience at Cairngorm. This in turn would increase the length of stay, as well as increase the opportunity for additional food & beverage revenue and participation in the other activities offered at the resort.

Studies have shown that there is significant existing summer traffic coming up to the Cairngorm base area, and associated evidence indicates that many of these visits end at this point without taking the funicular to the top of the mountain. This is understandable since even from the base area the views are spectacular, and for the many repeat visitors the limited offering of the Ptarmigan experience may not warrant another trip up the mountain.



PART THREE: THE FINANCIALS

The third and final part of this review is a financial assessment of the opportunities discussed in Part Two. An important aspect of understanding the future opportunities for multi-season operations at Cairngorm is understanding the capital costs and possible economic performance of the potential facilities and/or activities.

The following improvements and activities are planned:

- Three 6-person detachable lifts (capacity of 3,200 pph, 3,000 pph, and 2,400 pph)
- Automated snowmaking system (30 hectares)
- Terrain improvements (13+ hectares)
- Base area surface lift – carpet
- Base area landscape and outside food and beverage
- Mountain Coaster
- Zip line tour
- Lift served mountain biking

The information provided as part of this initial assessment will be utilised in the subsequent preparation of a 5- to 10-year long-term strategy for the ski area (not part of this review) which will build on the Glenmore and Cairngorm strategy.

I. CAPITAL COSTS VS. REVENUE OPPORTUNITIES

A. Typical Financial Data – Activities

The following tables summarise the ranges of typical capital costs, potential visits, price points and revenue associated with the proposed activities and support activities discussed in this analysis. Estimated visits, ticket/ride price and operating margin is based on data obtained at other existing summer operations. For this initial financial analysis, a conservative approach is used for financial estimates, generally using the higher end of a range of potential capital costs and the lower end of a range of potential activity use levels and pricing. This strategy was utilised to prevent overly optimistic forecasts that might prove too challenging to achieve.

- **Capital Costs.**²⁴ The costs presented represent the estimated costs to acquire and install the activity, and do not include on-going operational expenses. It is important to note that these estimates are based on very preliminary planning, and that future planning and design will be required to establish a more comprehensive understanding of capital costs.
- **Visits.** Visits is the estimated amount of annual participation per occurrence (i.e., if one person took four rides on the mountain coaster it would count as four visits).

²⁴ Capital costs were received in pounds, euros, and dollars depending upon the estimate's source. Euros and dollars were converted to pounds using the Royal Bank of Scotland's currency converter at rates of 0.8079 for Euros and 0.6867 for dollars as of June 14, 2018.

- **Ticket/Ride Price.** This is a range of the average amount charged to participate in an activity based on existing summer operations. Averages account for the estimated price for a single ticket, as well as daily or seasons pass price allocations.
- **Potential Revenue.** Revenue is the result of the estimated visits times the estimated ticket/ride price.

It is important to note that these ranges represent data from typical operations of the activities listed, and are based on similar circumstances, operations and experiences observed at other multi-season areas. Additional planning and design will be required to establish a more comprehensive understanding of the capital costs and possible financial performance of proposed activities.

Figure 21. Typical Financial Data – Activities

Activity	Capital Cost		Visits		Ticket/Ride Price		Potential Revenue	
	Low	High	Low	High	Low	High	Low	High
Mountain Coaster	£2,747,000	£2,885,000	65,000	110,000	£5.00	£14.00	£325,000	£1,540,000
Zip Line Tour	£1,888,000	£2,403,000	12,000	20,000	£52.00	£86.00	£624,000	£1,720,000
Lift Served Mountain Biking	£1,545,000	£2,000,000	6,000	25,000	£17.00	£27.00	£102,000	£675,000

Notes:

1. Ranges are based on preliminary vendor estimates. Actual figures will vary depending on further design and analysis of the site, regulatory and operation-specific circumstances.

Mountain Coaster: Quoted from Wiegand (May 2018, included in Appendix 5) €1,310,719.51. Quote also recommends 45% additional for earthworks, mounting, buildings, customs etc., and 10–12% for installation costs. For this analysis an additional 75%–100% of baseline costs have been assumed to cover these additional costs.

Zip Line Tour: Initial estimated range provided by Eric Cylvick via email 5/29/18 – \$2.75M–\$3.5M

Mountain Biking: Trail costs are assumed to be £90,000/km for a total cost of £1,545,300, with annual maintenance of £172K, as quoted in the ‘IN CONFIDENCE’ memo of CML response (August 2016) made by HIE on CML’s Gravity Logic report.

B. Capital Costs – Lifts and Snowmaking

The following table summarises an estimated range of capital costs for the proposed upgrading and expansion of the lift infrastructure and establishment of a snowmaking system at Cairngorm. Again, these estimates are based on very preliminary planning; further master planning and design will be required to establish a more comprehensive understanding of the capital costs.

Figure 22. Capital Costs – Lifts and Snowmaking

Activity	Type	Capacity	Capital Cost	
			Low	High
Lift #1	six-passenger detachable	3,200 pph	£6,059,000	£7,513,000
Lift #2	six-passenger detachable	3,000 pph	£5,655,000	£7,029,000
Lift #3	six-passenger detachable	2,400 pph	£5,049,000	£6,302,000
Surface Lift	Surface	900 pph	£263,000	£331,000
Snowmaking		30 hectares	£3,090,000	£4,120,000

Notes:

Ranges are based on preliminary vendor estimates. Actual figures will vary depending on further design and analysis of the site, regulatory and operation-specific circumstances.

Lifts: Quoted from Doppelmayr (May 7, 2018; included in Appendix 6).

Snowmaking: Assumption based on industry average pricing per hectare of proposed coverage.

II. FINANCIAL ANALYSIS

The goal of this financial analysis is to validate the financial viability of the proposed concepts, through the comparison of the cost to acquire, construct and operate proposed activities (winter and summer), providing for an increased number of visitors and resulting revenues.

The following analysis uses estimates of visits, capital costs, revenue per visit, operating costs to estimate additional contribution of the proposed facility improvements and activities to the resort’s operating margin. The following improvements are included in the upgrade plan:

- Lift #1, 6-passenger detachable lift – 3,200 pph
- Lift #2, 6-passenger detachable lift – 3,000 pph
- Lift #3, 6-passenger detachable lift – 2,400 pph
- Base area beginner carpet conveyor
- Automated snowmaking system – 30 hectares
- Terrain improvements – 13 hectares
- Mountain Coaster
- Zip Line Tour
- Lift served mountain biking
- Base area landscape improvements and outside food and beverage (F&B)

These recommended improvements are organised into three phases. These phases were developed based on the potential financial impact or contribution from each component and are expanded upon in the following discussion.

Figure 23. Cairngorm Proposed Facilities and Activities

	Facility Improvements	Activities
Phase One	6-passenger detachable lift – 3,200 pph Automated snowmaking system – 20 hectares Terrain improvements – 9 hectares Base area carpet conveyor Base area landscape & outside F&B	Mountain Coaster Zip Line Tour
Phase Two	6-passenger detachable lift – 3,000 pph Automated snowmaking system – 10 hectares Terrain improvements – 4 hectares	Lift served mountain biking
Phase Three	6-passenger detachable lift – 2,400 pph	

The following financial analysis is based on the findings of the preliminary concepts, and is likewise very preliminary in nature. More exact financial analysis should be completed as future master planning and design development.

A. Skier Visits

Skier visits, both existing and expected, are essential to estimating the potential revenues and determining the necessary facilities and infrastructure. The proposed improvements to the lift infrastructure and addition of a snowmaking system are intended to increase winter visits to a consistent average of 150,000, with higher numbers during a peak year.

This increase will be achieved through increased utilisation of the ski area throughout the season, rather than expanding capacity (CCC to remain around 2,700). The installation of Lift #1 (Phase One detachable lift) and associated terrain/snowmaking is expected to attract and increase skier visits. The installation of detachable lifts in Phase Two and Three is not expected to significantly increase the number of visitors, but it will enhance the overall experience and provide opportunities for racing and other activities.

1. Existing Skier Visits

In recent years, skier visits have been highly variable around snowfall and weather conditions. Total visits have range from a high of 144,347 for the 2009/10 season to a low of 21,267 during the 2016/17 season. Average visits since the 2006/07 season is approximately 76,000 but during the past five seasons (2013/14–2017/18) that average has fallen to 60,087.

Figure 24. Past Skier Visit Data

Season	Skier Visits
2006/07	26,832
2007/08	52,856
2008/09	65,100
2009/10	144,347
2010/11	121,420
2011/12	66,463
2012/13	113,582
2013/14	77,351
2014/15	76,588
2015/16	66,226
2016/17	21,267
2017/18	59,003

During this period:

- Three of the twelve years reported visits greater than 100,000
- The peak number of annual visits was approximately 144,000
- Seven of the twelve years reported visits between 50,000 and 80,000
- Two of the twelve years reported visits less than 30,000

2. Future Skier Visits

Infrastructure improvements are expected to drive additional skier visits. The installation of a snowmaking system will create a more consistent snowpack year and improve the quality of the skiing and riding surfaces. Reliable snow conditions, along with a modern aerial lift to service the ski terrain will encourage skiers to plan trips to Cairngorm and visit more frequently throughout the season. Ski visits should begin to climb towards peak levels of ±140,000 visits. However, we do assume that the increase in visits will not be instantaneous and Cairngorm will slowly increase its market share over a number of years.

For purposes of the financial analysis, we assume 60,000 for base year visits, (the average for the last five seasons) and that visits will increase significantly in the year after the installation of Phase One improvements, followed by incremental increases in visits over the next few years until the second lift upgrade is installed.

Figure 25. Estimated Skier Visits

Season	Skier Visits	
	New	Total
Base Year		60,000
Phase One		
Year 1	50,000	110,000
Year 2	10,000	120,000
Year 3	10,000	130,000
Phase Two	20,000	150,000

B. Coire Cas Parking

In 2018 CML began applying compulsory charges for parking at the Coire Cas parking lot at Cairngorm. The parking fees payable at this car park are as follows:

- Cars – £2.00
- Minibuses/Vans – £8.00 (if staying overnight, £2 if visiting during the day)
- Annual Passes – £25.00

These fees are also displayed on the welcome sign at the entrance to the car park. There are a few exemptions, including Blue Badge and Seasons Pass holders and emergency or contractor vehicles.

The income from these fees will provide additional revenue to the operation. This revenue has not been included as part of this analysis.

C. Phase One

The total capital costs for Phase One are £16,444,000 (£10,906,000 for winter facilities and £5,538,000 for summer facilities and activities). In concert, in addition to enhancing the overall appeal of the resort, these activities and facilities have the potential to contribute approximately £2,696,100 (£1,964,100 in winter and £732,000 in summer) to the resort's operating margin annually.

Below is a summary of the estimated capital costs, visits, revenues, expenses and contribution to operations from the implementation of the Phase One facility improvements and activities.

Figure 26. Phase One Summary Costs and Revenue

Expense Item	Capital Cost	Visits	Revenue per Visit	Revenue	Operating Expenses	Expense Savings	Potential Average Annual Contribution
Facility Improvements							
Snowmaking	£2,747,000				£140,000		-£140,000
Terrain Improvements	£315,000				£33,000		-£33,000
Lift #1 (year one)	£7,513,000	50,000	£30.00	£1,500,000	£128,000	-£40,000	£1,412,000
Lift #1 (year two)		10,000					
Lift #1 (year three)		10,000					
Existing Visits		60,000	£3.56	£213,600			£213,600
Base Are Carpet Conveyor	£331,000				£18,500		-£18,500
Base Area Landscape & Outside F&B	£250,000	20,000	£6.00	£120,000	£105,000		£15,000
Total Facility Improvements	£11,156,000			£1,833,600	£424,500	-£40,000	£1,449,100
Additional Winter Revenues (% of new revenues)							
Equipment Hires				£287,000	£69,000		£218,000
Catering				£725,000	£609,000		£116,000
Retail				£231,000	£192,000		£39,000
Snow School				£211,000	£186,000		£25,000
Total Additional Winter				£1,454,000	£1,056,000		£398,000
Activity							
Mountain Coaster							
Mtn Coaster – Summer	£2,885,000	76,000	£6.00	£456,000	£84,000		£372,000
Mtn Coaster – Winter		24,000	£6.00	£144,000	£27,000		£117,000
Zip Line Tour	£2,403,000	12,000	£40.00	£480,000	£120,000		£360,000
Total Activities	£5,288,000			£1,080,000	£231,000	£0	£849,000
Phase One Grand Total	£16,444,000			£4,367,600	£1,711,500	-£40,000	£2,696,100

Further supporting details of this analysis are provided in the following discussion.

1. Phase One: Winter Improvements

During Phase One, a snowmaking system, 6-passenger detachable lift, a carpet conveyor lift and terrain improvements are planned to vastly improve operational efficiency and the skier experience and raise annual skier visits to past peak levels on a consistent basis. As described earlier in this report (Part Two, Section II.B.2) an automated snowmaking system will ensure the ski area can open on time each season and carry ski operations through low snow periods during the year. The lift upgrade to a 6-passenger detachable lift will provide the efficient uphill conveyance that the modern skier expects. In addition, the lift provides other operational efficiencies such as the removal of three surface lifts, reducing staffing, operational, and maintenance demand in preparing the lifts after storms.

The assumptions and process behind the financial analysis are explained in the following discussion.

Snowmaking

Capital costs for 30 hectares of snowmaking were estimated at £4,120,000. The 20 hectares of snowmaking that are part of the Phase One improvements have an estimated capital cost of £2,747,000 and annual operational costs of approximately £140,000. This total is based on the industry assumptions for operating costs including power, labor and Snomax, at approximately £3,510 per hectare.²⁵ With 20 hectares of snowmaking coverage at Cairngorm, it would cost approximately £70,000 to provide the initial snow cover to open, with another £70,000 estimated to account for additional snowmaking that may be required after warming periods during the season.

Terrain Improvements

Phase One also includes opening nine hectares of terrain to ski off the new aerial chairlift and improve the skiing experience for visitors. The cost to open new ski runs averages £35,000 per hectare, resulting in £315,000 in estimated capital costs for the nine hectares. The operational cost to groom the additional nine hectares for a ski season is estimated at £33,000. A grooming machine can groom 20 hectares per 8-hour shift at an estimated cost of £69.00 per hour of operation. Four hours to groom the additional nine hectares would result in an estimated cost of £276 per night. That, when multiplied by 120 operating days for the season (given snowmaking), results in an operational cost of approximately £33,000.

Lift #1

The cost of the Phase One detachable lift was estimated at £7,513,000. The estimated revenues consider the expected extended length of the season (120 days), increase in visits (50,000 additional visits over the 60,000 average base visits to total 110,000 visits in year one), and increase in ski spend (£30.00; see *Average Spend* discussion). Following those assumptions, ticket revenue increases by £1,500,000 from the 50,000 additional annual visitors and £213,600 from the average spend and length of season increase of the 60,000 base visitors.

Operating costs for the new lift assume two operators for nine hours/day (half hour to setup, 8 hours of operations, and a half hour to shut down), for 120 days or 1,080 hours (25% is added to account for

²⁵ Snomax is a brand name for an additive of particulates added to the water to provide a particulate matter that facilitates the formation of a snow crystal. The Snomax additive enhances the amount of snow crystals generated when making snow, making the process to make snow more efficient and creates a greater amount of snow. This is a similar process as when seeding clouds to create rain.

labor burden; i.e., taxes and benefits). That results in a total labor cost of £27,000. Additionally, 3% of revenues, or £51,408, is estimated for ongoing general maintenance, and a maintenance contingency of £50,000 is carried to account for additional unexpected repairs, for total operating expenses of £128,408.

Base Area Carpet Conveyor Lift

Similarly, the new carpet conveyor lift requires one operator for nine hours/day (half hour to setup, 8 hours of operations, and a half hour to shut down) for 120 days or 1,080 hours (25% added to account for labor burden; i.e., taxes and benefits). This results in a labor with burden cost of £13,500. Other operational expenses are estimated at £5,000, bringing the total operating costs for this lift to £18,500.

Average Spend

The analysis above assumes an increase in the average ski spend of £3.56. The increase in average ski spend from the 2016/17 to 2017/18 winter season was £2.76, going from £23.86 to £26.44. The increase of £3.56 average ski spend in this analysis assumes a modest ticket price increase. A price increase is logical given the investment in snowmaking and installation of the new high capacity lift, which will significantly enhance the overall ski experience.

Expenses Adjustment

With the installation of Lift #1 (the 6-passenger detachable lift), three existing surface lifts should be removed. An aerial lift does not require the same extent of ‘digging out’ during and after a storm or daily surface preparation to operate the lift, compared to the surface lifts. The labor savings from reducing surface lift maintenance and operating one lift instead of three is significant and estimated at approximately £40,000.

The following table summarises the impact on operating expenses by removing three surfaces lifts, based on past operations data.²⁶

Figure 27. Estimated Ski Season Opening Time Operating Costs Savings

	# of Lifts (pre-Phase One)	# of Lifts (with Phase One)	Cost Reduction	Operating Days	Estimated Cost Reduction
Surface Lifts	10	7			
Normal Operating Day	£1,218.85 ^a	£936.42	£282.44	86	£24,289.41
Day after Storm Off	£2,011.54 ^b	£1,932.00	£79.54	17	£1,352.21
Storm Off Day	£3,606.06 ^c	£3,393.95	£212.11	17 ^d	£3,605.90
Total				120	£29,247.52

Notes:

^a On a normal operating day, opening costs are estimated at £121.89 per lift.

^b On a day after a storm off day, opening costs are estimated at £201.15 per lift.

^c On a storm off day, opening costs are estimated at £360.16 per lift.

^d Seventeen storm off days were estimated per season. Between the 1989/90 season and 2017/18 season, on average, the resort was stormed off 17.3 days. In recent years, between the 2007/08 and 2017/18 season, the resort was stormed off an average of 20.7 days. However, 17 was used as a conservative value for this analysis. With 17 stormed off days, 17 day after storm after days, in a 120-day season, there would be 86 normal operating days.

²⁶ For this analysis CML provided the opening time costs in detail of hours, rates and personnel required to prepare ten surface lifts for operating under normal operating day conditions, the day after a Storm Off day and a Storm off day.

Figure 28. Operating Costs Differential on Surface Lifts vs. Aerial Lifts

	Lifts	Operators	Hours	Hourly Rate	Operating Days	Cost
Surface Lift	3	3	9.00	£10.00	120	£32,400.00
Aerial Lift	1	2	9.00	£10.00	120	£21,600.00
Operating cost savings operating one aerial lift verses three surface lifts						£10,800.00

Figure 29. Annual Operating Cost Reduction

Reduction	Savings
Opening time operating cost reduction	£29,247.52
Operating one aerial lift verses three surface lifts	£10,800.00
Annual Savings	£40,047.52

By only needing to open seven surface lifts, compared to ten, the annual cost saving is estimated at £29,247.52. There is a savings in labor, as operating one aerial lift versus three surface lifts brings a savings of about £10,800 per season, resulting in a total cost savings of approximately £40,000.

There will be no additional job creation from the addition of snowmaking or terrain improvements; these activities will be taken on by existing staff.

Additional Winter Revenue

The increase in annual visitors from 60,000 to 110,000 will affect the revenue from equipment hires, catering, retail, and snow school. Using operating margins and revenue breakdowns from the 2017/18 season, these additional visitors will bring in an additional £1,454,567 in revenue in these areas, along with operating expenses of £1,055,817.

Figure 30. Additional Winter Revenues (as % of new revenues)

	Winter 17/18 % of Trading Income	Winter 17/18 Margin %	Expected Phase One Revenues	Phase One Operating Expenses	Phase One Operating Margin	Phase One Margin %
Equipment Hires	7.2%	76.0%	£286,928	£68,863	£218,065	76%
Catering	18.2%	16.0%	£725,291	£609,244	£116,047	16%
Retail	5.8%	17.0%	£231,137	£191,844	£39,293	17%
Snow School	5.3%	12.0%	£211,211	£185,866	£25,345	12%
TOTAL			£1,454,567	£1,055,817	£398,750	27.4%

Ski visitors purchasing tickets and passes account for a significant portion of revenue. During the 2017/18 season, ticket and pass purchases accounted for 43% of total revenue. Assuming an additional 50,000 visitors with the implementation of Phase One improvements, there would be an increase of £1,713,600 in ticket revenue. If that continues to be 43% of total revenue, the increase in total revenue after the Phase One improvements would be £3,985,116. That would bring total annual revenue above £7 million.

Figure 31. Additional Winter Revenue Resulting from Phase One

Revenue Source	Nov 2017 to May 2018 Revenue	% of Trading Income	Margin %	Ticket Revenue	% of Trading Income	Impact from additional 50,000 visits
Tickets						
Funicular	£615,307	19.9%				
Walks w/ funicular element	£4,392	0.1%				
Bikes	-					
Ski Tickets	£1,056,915	34.2%		£1,056,915		
Ski Ticket for Snow School	£80,868	2.6%		£80,868		
Season Tickets	£198,454	6.4%		£198,454		
Pass Cards	£38	0.0%				
Total for Tickets	£1,955,975	63.3%		£1,336,238	43%	£1,713,600
Catering						
Catering	£561,900	18.2%				
Catering Events	£4,000	0.1%				
Catering Total	£565,900	18.3%	16.0%			
Retail						
Retail	£180,141	5.8%	17.0%			
Hires						
Equipment Hire	£165,978	5.4%				
Hire re Snow School	£56,510	1.8%				
Total for Hire	£222,488	7.2%	76.0%			
Snow School						
Snow School	£165,324	5.4%	12.0%			
Other						
Trading Income	£3,089,830	100.0%			100%	£3,985,116
Other Income	£15,810					
Total Income	£3,105,641					

Mountain Coaster – Winter Operations

The mountain coaster will operate during the winter, providing an additional source of revenue. Most resorts choose to operate on a reduced schedule in the winter (focused on weekend afternoons and holiday periods) and are typically profitable in doing so.

Based on similar operations, an estimated 24,000 coaster rides would occur each winter. At £6.00 per ride, the coaster would generate £144,000 in revenue.²⁷ The coaster requires four people to operate. Assuming 480 hours of operation per winter season, at an estimated hourly rate of £10.00 with 25% added for taxes and benefits, total labor costs would be £22,500. Ongoing maintenance expenses are estimated at 3% of revenues or £4,320 for winter operations. In sum, total operating costs for the winter season are approximately £27,000. Therefore, winter coaster operations are estimated to contribute approximately £117,000 to the resort. (See additional discussion regarding coaster operations and costs in *Phase One: Summer Improvements*.)

²⁷ Coaster manufacturers are reporting that coasters in the UK and Europe are attracting a greater number of riders, but at a lower revenue per visit.

2. Phase One: Summer Improvements

The Phase One summer improvements are intended to generate additional revenue, both by attracting more visitors to the resort and creating paying activities for the existing and new visitors. In combination, the activities to be added in Phase One (a mountain coaster and zip line tour) appeal to nearly the whole spectrum of potential resort visitors. The mountain coaster is a short duration activity that is accessible for all levels of physical capabilities. Coaster rides tend to be more affordable as well. The zip line tour is a more challenging activity that would be appealing to the many outdoor enthusiasts visiting the area. In addition, base area upgrades would enhance the guest experience for all visitors and encourage sightseers driving through to get out of their cars and enjoy a cup of tea and a snack while taking in the view.

These activities and enhanced facilities have the potential to contribute over one million pounds to the resort's operating margin each year, and are described in the following discussions.

This analysis is based on a 100-day summer operating season. Through late May and early June, the resort would operate only on weekend afternoons. From the middle of June through August, operations would be daily, before winding down to weekend afternoons in September through mid-October. This equates to 758 operational hours across the season.

Mountain Coaster – Summer Operations

The capital cost for the designed mountain coaster is estimated at £2,885,000. Coaster manufacturer Wiegand reports that UK and European coasters typically experience ridership of more than 100,000 for the summer with many operations reaching 150,000 visits. This analysis assumed 76,000 riders annually. The ticket price per ride used in this analysis, £6.00, matches similar European coasters.

Estimating 76,000 rides at £6.00 per ride, total summer coaster revenue would be £456,000. Staffing for the summer is 4 operators with patrol support in case of medical emergencies and potentially additional staff for ticketing. Using 4.75 staff for 758 hours at £10.00/hour, plus 25% to account for taxes and labor benefits, results in a total labor cost of £45,005. As to additional operating expenses, 3% of revenues, or £13,700, is estimated for ongoing maintenance of the coaster. An additional £25,000 should be carried as a contingency for unexpected maintenance. This brings the total operating cost for the mountain coaster in the summer to approximately £84,000, leaving £372,000 as the contribution to the operating margin.

Zip Line Tour

The zip line tour concept proposes three zip lines in succession from the top of the mountain down into the base area. Capital costs for the zip line tour are estimated at £2,403,000. Visits are estimated at 12,000 at a cost of £40.00, based on similar operations and generating £480,000 in revenue over the summer. Labor, along with the taxes and benefits burden, would cost £80,500 for eight personnel (two employees per span, two in the base area to prepare guests, provide training and collect harnesses when finished). Other operating costs include £25,000 for other operating expenses, £14,400 for ongoing maintenance based on 3% of revenue, leading to an annual operating cost of approximately £120,000. The contribution to the operating margin from the zip line tour is estimated at approximately £360,000.

Base Area Improvements

Capital costs for base area improvements, including a small outdoor-oriented F&B venue (i.e., a food truck) for summer operations, are estimated at £250,000. It is estimated that such a venue would have approximately 20,000 customers over the course of the summer. These guests would spend an average of £6.00, generating £120,000 in revenue. The cost of the food products is estimated at £48,000 or 40% of revenue. Labor costs of four personnel (at £10.00/hour for 758 hours) plus estimated payroll taxes and benefits is approximately £37,900. Other operating costs are estimated at £15,000, and 3% of revenue for ongoing maintenance, or £3,600. Therefore, total operating expenses to approximately £104,500. The estimated contribution from the summer food-truck venue is approximately £15,500.

D. Phase Two

The total capital costs for Phase Two are £10,542,500 (£8,542,500 for winter facilities and £2,000,000 for summer activities). In concert, in addition to enhancing the overall appeal of the resort, these activities and facilities have the potential to contribute approximately £736,000 (£678,000 in winter and £58,000 in summer) to the resorts operating margin annually.

Estimated capital cost, visits, revenue per visit, revenues, operating expenses, savings, and contribution to operating margin for the Phase Two improvements are summarised in the following table.

Figure 32. Phase Two Summary Costs and Revenues

Phase Two	Capital Cost	Visits	Revenue per Visit	Revenue	Operating Expenses	Expense Savings	Potential Average Annual Contribution
Facility Improvements							
Snowmaking	£1,373,500				£70,000		−£70,000
Terrain Improvements	£140,000				£16,000		−£16,000
Lift #2	£7,029,000	20,000	£35.00	£700,000	£98,000		£602,000
Total Facility Improvements	£8,542,500	20,000		£700,000	£184,000	£0	£516,000
Additional Winter Revenues (% of new revenues)							
Equipment Hires				£117,000	£28,000		£89,000
Catering				£296,000	£249,000		£47,000
Retail				£94,000	£78,000		£16,000
Snow School				£86,000	£76,000		£10,000
Total Additional Winter				£593,000	£431,000		£162,000
Activity							
Lift-Served Mountain Biking	£2,000,000	13,000	£25.00	£325,000	£267,000		£58,000
Phase Two Grand Total	£10,542,500	33,000		£1,618,000	£882,000	£0	£736,000

1. Phase Two: Winter Improvements

Phase Two expands facilities and infrastructure to improve visitor experience during the winter. Phase Two adds a six-person detachable lift with 3,000 pph capacity, four hectares of terrain improvements, and 10 hectares of snowmaking coverage.

Snowmaking

In Phase Two, 10 hectares of snowmaking coverage are added and the estimated capital cost for this additional coverage is £1,373,500. For operational costs, power, labor and Snomax are estimated at approximately £3,510 per hectare to create an ample snow base. The cost for the initial snow cover of the 10 hectares as part of opening the resort is approximately £35,000. That figure should be doubled, for a total operational cost of £70,000, to include additional snowmaking (e.g., after warming periods) that may be required during the winter season.

Terrain Improvements

An additional four hectares of terrain improvements are included in Phase Two to create a better skiing experience for the guest. The capital cost of ski run terrain improvements averages £35,000 per hectare, leading to £140,000 estimated capital costs. The operational cost to groom an additional four hectares of terrain for the winter is estimated at approximately £16,000. A grooming machine can groom an estimated 20 hectares per 8-hour shift at £69.00 per hour of operation. Estimating two hours to groom the additional four hectares for an estimated cost of £138 per night. Multiplied by the 120-day operating season, the operational costs come out to approximately £16,000.

Lift #2

The capital cost of this six-person detachable lift was estimated at £7,029,000. Combined with the further expansion of the snowmaking system, a second aerial ski lift is expected to generate 20,000 new visitors annually, bringing total winter visits to 150,000. The average ski spend is estimated at £35.00, up £5.00 from Phase One. Therefore, 20,000 new visits will increase ticket revenue by £700,000.

Operating costs for the new lift include labor, ongoing maintenance, and other operating expenses. Labor-wise, operating the new lift requires two operators for nine hours/day, (half hour to setup, eight hours of operations, and a half hour to shut down,) for 120 days or 1,080 hours across the season, with an additional 25% to account for labor burden (taxes and benefits), for a total labor cost of £27,000. Other operating costs are estimated at £50,000 and ongoing maintenance, at 3% of revenues would be approximately £21,000. In summary, total expenses for the lift would be approximately £98,000.

Also, in Phase Two one surface lift is removed. Cost savings were not estimated with the lift's removal since a surface lift is operated has one operator and the new detachable lift requires two operators. Any cost savings from removing the surface lift would not be significant in relation to the operation of the new lift.

The winter facility improvements included in Phase Two are estimated to contribute approximately £516,000 to the operating margin of the resort.

Additional Winter Revenue

The increase in annual visitors from 130,000 to 150,000 will affect the revenue from equipment hires, catering, retail, and snow school. Using operating margins and revenue breakdowns from the 2017/18 season, these additional visitors will bring in an additional £594,186 in revenue in these areas, along with operating expenses of £431,298. The estimated operating margin contribution from additional winter revenues is £162,888.

Figure 33. Additional Winter Revenues (as % of new revenues)

	Winter 17/18 % of Trading Income	Winter 17/18 Margin %	Expected Phase Two Revenues	Phase Two Operating Expenses	Phase Two Operating Margin	Phase Two Margin %
Equipment Hires	7.2%	76.0%	£117,209	£28,130	89,079	76%
Catering	18.2%	16.0%	£296,279	£248,874	£47,405	16%
Retail	5.8%	17.0%	£94,419	£78,367	£16,051	17%
Snow School	5.3%	12.0%	£86,279	£75,926	£10,353	12%
TOTAL			£594,186	£431,298	£162,888	27.4%

Ski visitors purchasing tickets and passes account for a significant portion of revenue. The same assumptions utilized in Phase One are used to estimate additional winter revenues and operating expenses for Phase Two. During the 2017/18 season, ticket and pass purchases accounted for 43% of total revenue. Assuming an additional 20,000 visitors with the implementation of Phase Two improvements, there would be an increase of £700,000 in ticket revenue. If that continues to be 43% of total revenue, the increase in total revenue after the Phase Two improvements would be £1,627,907.

2. Phase Two: Summer Activities

Lift Served Mountain Biking

Phase Two adds lift served mountain biking to the resort. Trail construction costs are estimated at £100,000 per kilometer for modern trails with appropriate clearances and features. The capital cost for 20 kilometers of trail is estimated at £2,000,000. Estimated revenue is based on 13,000 visits at £25.00, generating £325,000 in revenue.

Staffing requirements for the operation include four lift operators, three safety patrol, one person for bike rentals, and two instructors, for a total of 10 employees. Labor is estimated at approximately £75,800 (10 employees at £10.00/hour for 758 hours including an additional 25% of labor for related taxes and benefits). Operating costs to maintain the trails are estimated at £172,000 annually (per Gravity Logic August 2016 report to HIE). Total operating and ongoing maintenance costs are estimated at approximately £267,000. Lift served mountain biking is forecasted to contribute approximately £58,000 to the operating margin of the resort.

E. Phase Three

Phase Three is the potential addition of a third lift and related terrain improvements. The addition of the third lift is assumed to be in the distant future and would be added to retain the existing number of visits. At this time, an increase in visits and/or revenue is not projected.

PART FOUR: A STRATEGY FOR THE FUTURE

As one of the largest and most challenging ski areas in Scotland—which sits in the center of one of the busiest National Parks and adventure tourism destinations in the UK—Cairngorm has the potential to be a highly successful ski area. However, numerous operational and financial challenges have been experienced in recent years. The existing mountain infrastructure at Cairngorm offers a substandard skiing experience that is not competitive in today’s marketplace: the lifts are slow and uncomfortable to ride, with a low out-of-base capacity that often results in long queues; the terrain is good but has unreliable snow cover, and the guest services are often over-crowded; beginners and families are not adequately catered to and ski area offerings don’t align with the market and guest expectations.

Winter operations are also inefficient and require more staff time and financial resources to operate than they should. The lift network is particularly inefficient and there are significant issues with the ski area’s out-of-base capacity, especially when considering the non-skier demand on the funicular. In addition, Cairngorm routinely experiences wind and adverse weather events that force the closure of the access road, funicular, lifts, and terrain, further taxing operational demands and diminishing the guest experience. Summer offerings are also quite limited. While the funicular ride and views from Ptarmigan are spectacular, it is not what many visitors to Cairngorm are seeking. This is compounded by the inhospitable base area environment which does not encourage guests to linger or explore.

In concert, all the above factors have resulted in an unsustainable business model and sparked the need for the current study. A complete, independent and comprehensive analysis of all facilities and operations at Cairngorm has demonstrated the immense value this critical community asset represents. It has also uncovered significant opportunities for improvement and enhancement that respond to current challenges, build upon the strengths of the mountain, differentiate it from other resorts, and capitalise upon opportunities within Cairngorm’s rapidly-changing market. Careful consideration of each potential enhancement—coupled with an in-depth financial analysis—has vetted the feasibility of each enhancement and identified the strategic investments with the greatest potential for positive community impact. Over time, these enhancements will work together to ensure a long-term sustainable future for the ski area.

The upgrade concept for Cairngorm addresses all aspects of the current condition, focusing on the investments with the greatest potential impact and creating a more desirable—and competitive—experience for visitors. This will facilitate increased revenues, through the increase in visits and the ability to increase revenue per visit. Enhancements are also focused on creating a more efficient, and thus economically viable operation. This is primarily accomplished through the upgrading of the lift infrastructure from surface to aerial lift technology and the installation of a snowmaking system. Collectively these upgrades reduce operational expenditures while also significantly improving the on-mountain experience. Summer enhancements are focused on expanding the offerings to a broader audience by providing activities that offer ‘something for everyone’ and complement the existing recreational complexion of the larger Aviemore/Glenmore area. As with the winter concept, these upgrades significantly improve the Cairngorm summer experience as well as the revenue-generating opportunities of the summer business.

All the proposed upgrades at Cairngorm are designed to work together as part of a new and sustainable business model for the ski area with a focus on measured, responsible investments that will lead to balanced growth in the operation. Infrastructure improvements are expected to drive additional skier visits. The installation of a snowmaking system will create a more consistent snowpack and improve the quality of the skiing and riding surfaces. Reliable snow conditions, along with a modern aerial lift system to service the ski terrain will encourage skiers to plan trips to Cairngorm and visit more frequently throughout the season. Our projections estimate the upgrades will increase annual winter visits to 150,000 consistently, with higher numbers during a peak year. Similarly, summer upgrades are expected to drive additional visits to Cairngorm on the order of another 150,000+ visits. This increase in visits, as well as an anticipated increase in average visitor spending, is expected to increase overall revenues. At the same time, labor and other operating expenses are expected to decrease as a result of the new lift scheme and other improvements.

The vast majority of the anticipated revenue and expense gains would be realised after implementation of Phase 1, which will require a capital investment of approximately £16.5 million (£11 million for winter facilities and £5.5 million for summer facilities and activities) and will contribute approximately £2.7 million (£1.97 million in winter and £732,000 in summer) to the resort's operating margin annually, creating a sustainable operation that will continue to provide recreation, economic and other community benefits to the region long into the future.

While current conditions at Cairngorm seem dire, there is immense unlocked potential in the mountain which can be unleashed with targeted, strategic investments. With this review in hand, Cairngorm is poised to capitalise on this potential to propel it into the next stage of life at the ski area. We are excited to watch the evolution.